

ICAC

Avoiding Air Permitting Pitfalls

ICAC Series on Data Centers
and Emissions Control

Considerations for Developers
and Equipment Suppliers



Who is ICAC?

**Our members are
clean technology
innovators and
provide clean air
solutions**

For over 60 years, our members have been providing air quality monitoring and control technologies to every industry:

- ✓ Industrial Heat
- ✓ Power Generation
- ✓ Oil and Gas
- ✓ Maritime and Port
- ✓ Cement
- ✓ Ceramics and Glass
- ✓ Metal
- ✓ Manufacturing
- ✓ Data Centers





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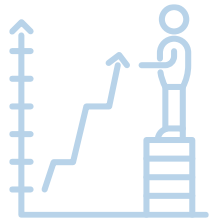
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U.S. Growth in Data Center Development



Unprecedented demand

Cloud computing and AI workloads are fueling a historic data center construction boom across the U.S.



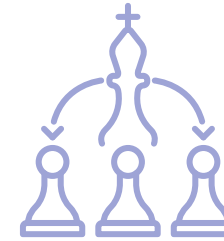
Massive investment ahead

Global data center capital expenditures could surpass **\$1.7 trillion by 2030**, with over **40% in the United States** (McKinsey).



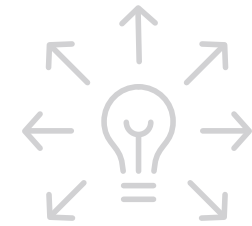
Soaring energy demand

The DOE projects U.S. data centers could consume **7–12% of national electricity by 2030**, up from just 4.4% in 2023.



Strategic implications

Data centers are becoming **critical energy infrastructure**, influencing grid planning, emissions policy, and local permitting nationwide.

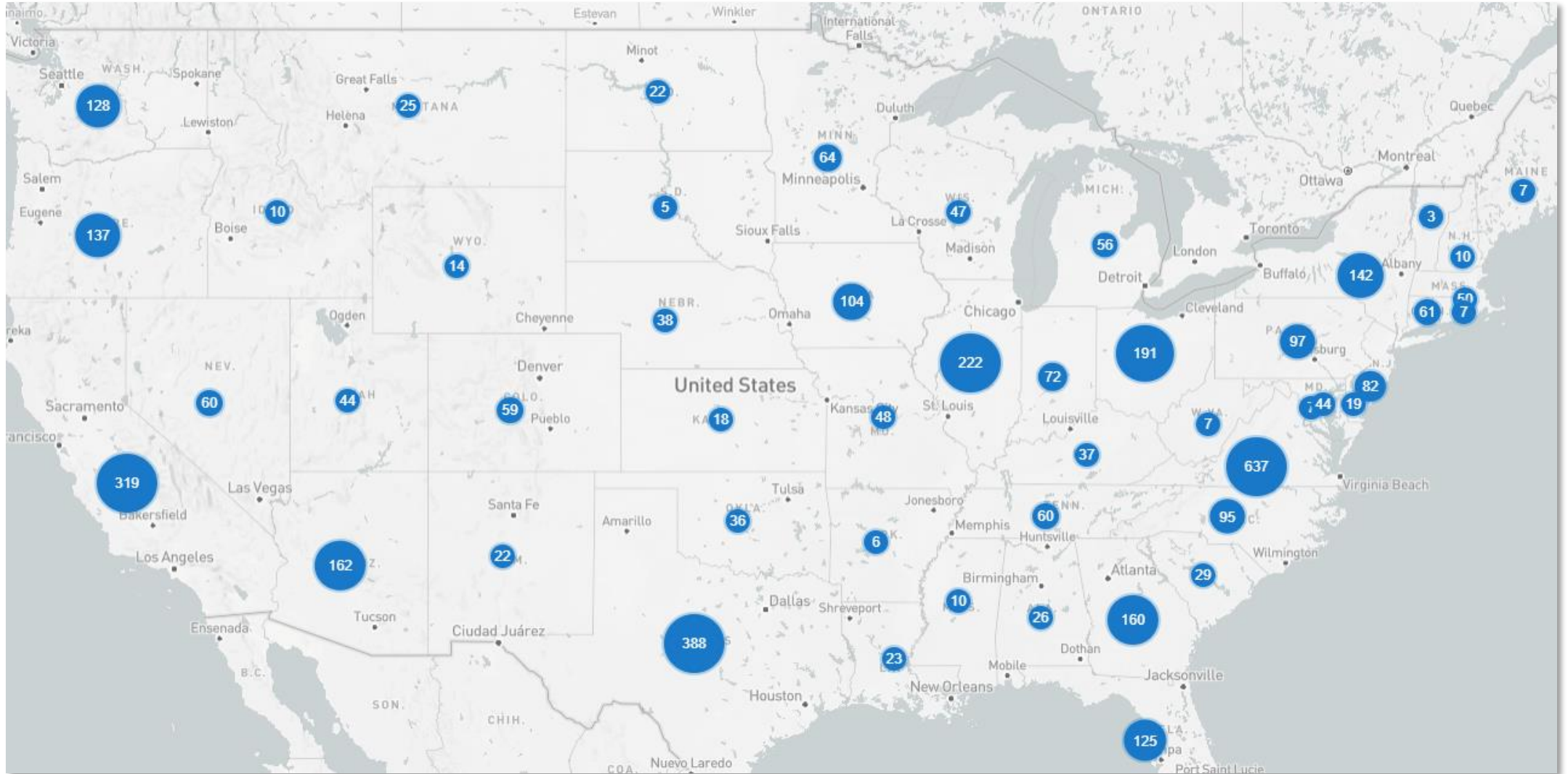


Opportunity and challenge

The same digital expansion driving innovation also raises urgent questions about sustainability and energy resilience.



U.S. Growth in Data Center Development



Source: [Datacenters.com](https://www.datacenters.com)




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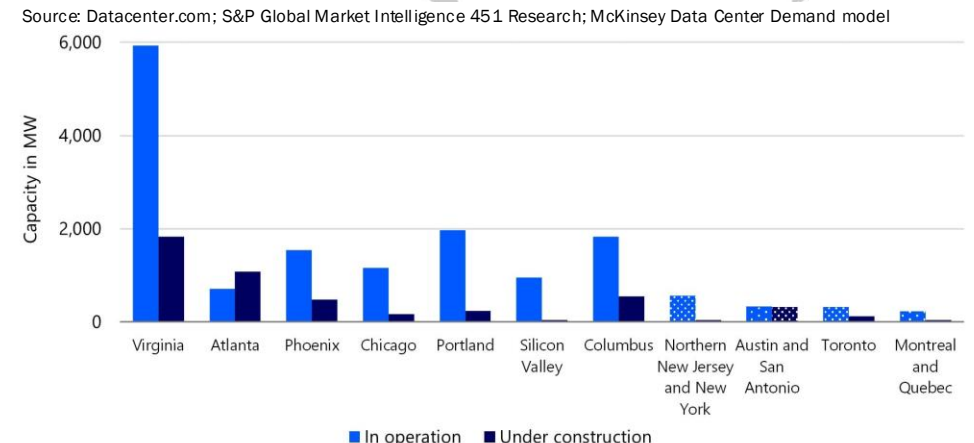
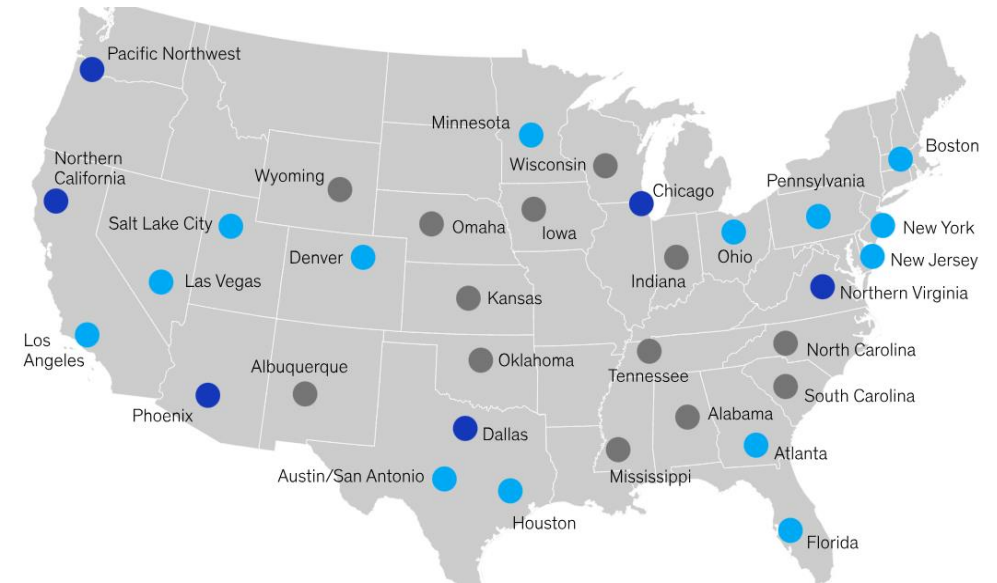


U.S. Growth in Data Center Development

- Increasing demand is pushing siting beyond traditional hubs (Virginia, Silicon Valley, NJ) to secondary/emerging markets.

Recent reports suggest:

-  Primary markets: Saturated but still growing (Virginia, Silicon Valley, Northern NJ)
-  Secondary markets: High activity, cost advantages, emerging hyperscale hubs (Phoenix, Atlanta, Chicago)
-  Emerging markets: Abundant power and land availability, poised for rapid scale-up (Columbus, Portland, Salt Lake City, Dallas, Denver)



Source: Cushman & Wakefield 2025; Rabobank



Environmental Considerations for Data Centers



Rising regulatory complexity

Developers face an expanding web of federal, state, and local requirements governing emissions, air quality, water use, and energy systems.



Integrated compliance challenge

Successful projects must align air, water, and energy strategies early in design to avoid permitting conflicts and costly redesigns.



Emissions control under pressure

Stricter emission limits demand advanced technologies, clean fuels, and operational constraints that affect cost and reliability.



Uncertain regulatory landscape

Ongoing rule changes and evolving GHG policies create planning and investment risk for new and expanding facilities.



Design-stage decision impact

Site layout, equipment selection, and power strategy all determine long-term environmental footprint and permit viability.



Sustainability as a differentiator

Projects that optimize energy efficiency and minimize emissions can gain community support, regulatory goodwill, and brand advantage.



Rapidly Changing Dynamics

New and existing State and Federal policy changes may significantly impact the ways in which data centers are permitted, constructed, and operated.



Federal Permitting Reform Legislation

- Could streamline environmental reviews
- May establish firm deadlines for agency decisions
- Would aim to improve interagency coordination—especially for large, energy-intensive projects.



Texas Expedited Permitting Program

- Applicants may request accelerated review of air-permit applications by submitting a special “Expedited Request” form and paying a surcharge.

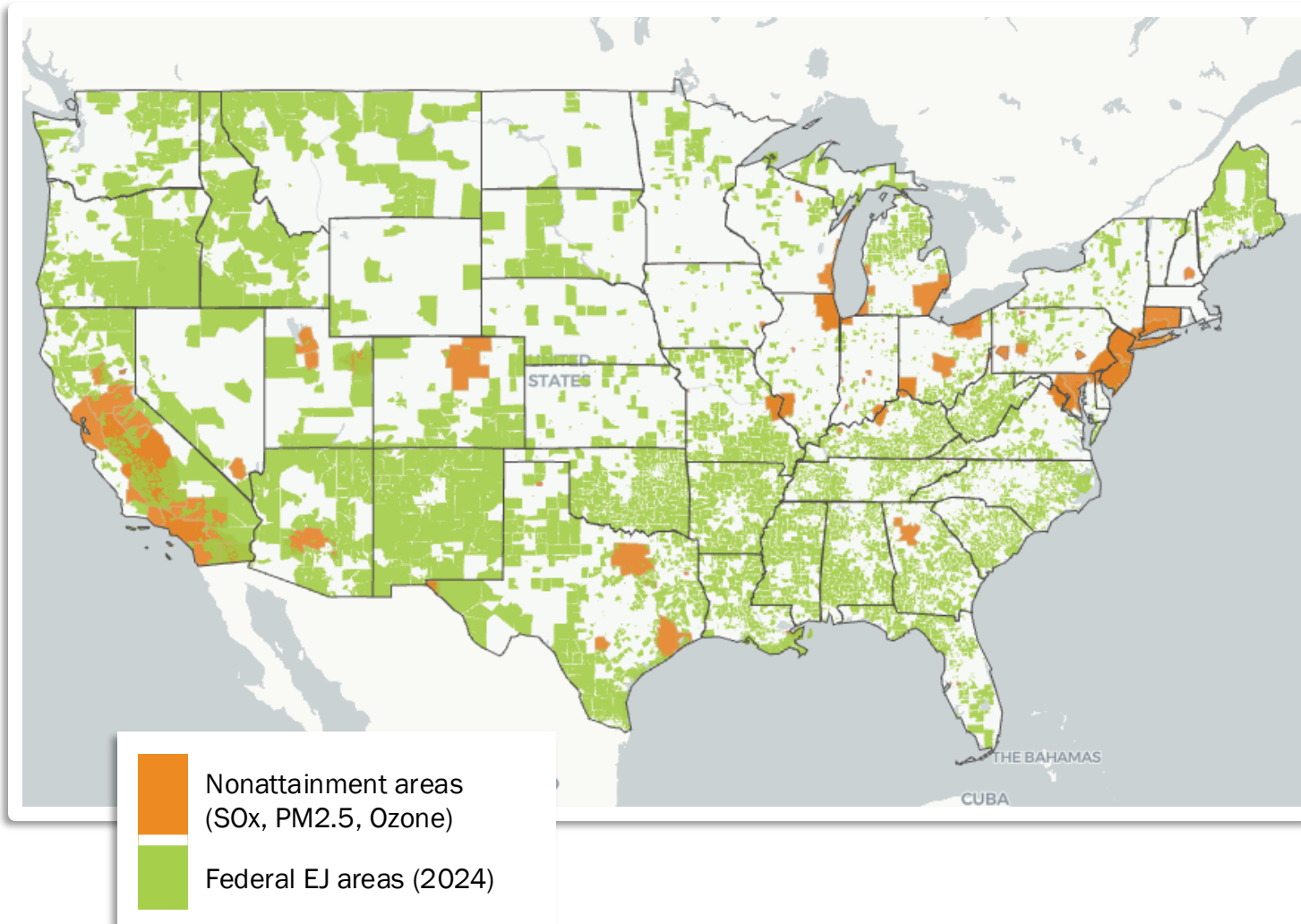


California CEQA Ballot Measure

- Establishes firm deadlines and streamlining provisions for “essential infrastructure” projects, potentially reducing CEQA review time and litigation risk.

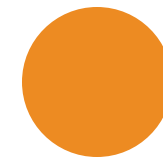


Varying Regulatory Requirements

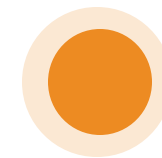


Regulatory requirements may vary significantly based on location, due to local conditions, government preferences, etc.

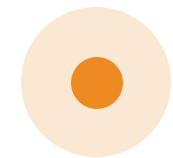
- Permitting processes will likely be required at



Federal
Level



State
Level



Local
Level

- Each level of government has its **own priorities** that need to be considered and addressed.



Typical Data Center Equipment and Emissions Potential

	NO _x	SO ₂	PM	CO	CO ₂	VOC	PFAS
IT Halls (servers, PDUs, etc.)	-	-	-	-	-	-	-
On-site power generation (primary)	✓	✓	✓	✓	✓	✓	-
On-site backup power generation (e.g., diesel/natural gas generators)	✓	✓	✓	✓	✓	✓	-
Uninterruptible Power Supply (UPS) and Battery Energy Storage Systems	-	-	-	-	-	-	-
Cooling systems (e.g., chillers, towers, CRAH/CRAC)	-	-	✓	-	-	✓	✓

*Water and chemical treatment systems also have the potential to release biocides, corrosion inhibitors, heavy metals, and high dissolved solids

Major air programs & regulations



**State/Local Authority
Air Quality Permit To
Construct and/or
Operate -
Minor Sources**



**Title V Operating
Permit Program –
Sources over 100
tons/year potential
to emit.**



**PSD/NSR Permitting
for Major Sources
Over 250 (unlisted)/100
(listed) tons per
year potential to emit**



**NNSR Permitting in
non-attainment areas
Depends on area
severity**



**New Source
Performance
Standards (NSPS) for
new or modified
sources of 40
CFR Part 60**



**National Emissions
Standards for
Hazardous Air
Pollutants (NESHAPS)
of 40 CFR Part 61-63**



**Title IV Acid
Rain Program of 40
CFR Part 72-78**



State/Local Authority Air Quality Permit To Construct and/or Operate



Know your regulating authority; each one has different rules:

- Local authorities in many urban jurisdictions
- State authorities
- EPA may have authority over tribal or other lands.
- Communicate with them early and often!

Factors that impact air permitting

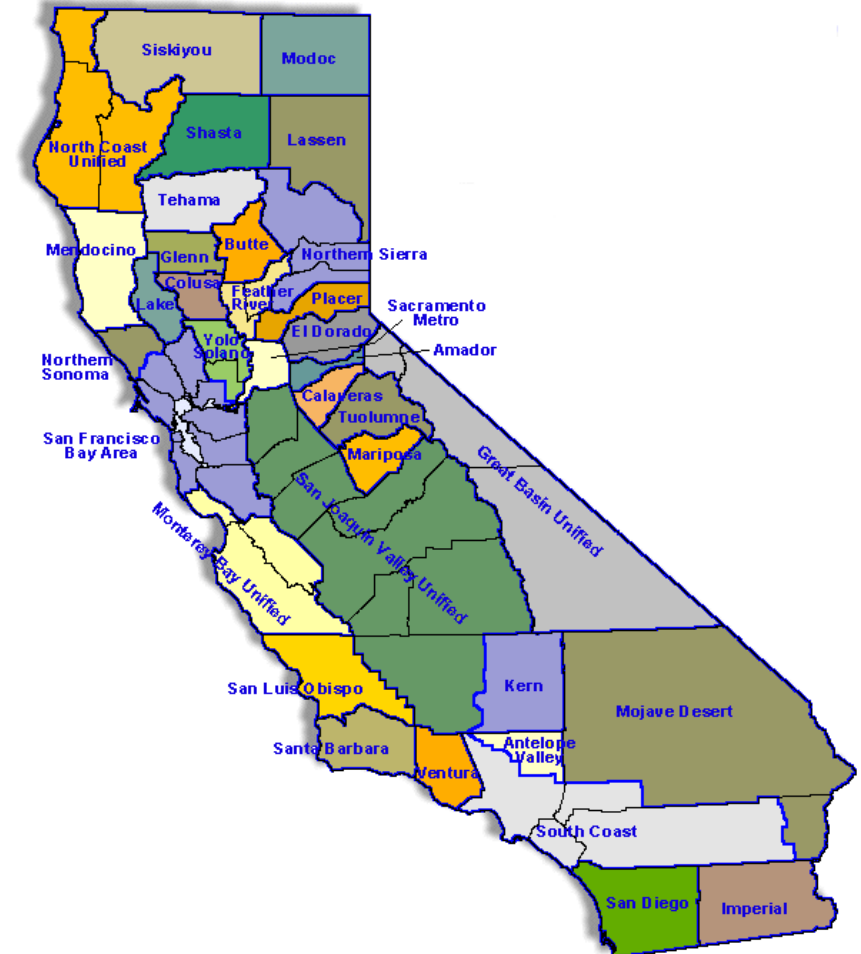
- Fuel for generation unit
- Type and size of generation unit
- Emissions Controls, which could include Best Available Control Technology (BACT)
- Emergency vs base-load
- Operating schedule – limited operations vs baseload (24/7/365)
- Location of source:
 - Non-attainment vs Attainment Areas
- Treatment of "temporary" emissions sources

Operation Permitting Limits and Requirements

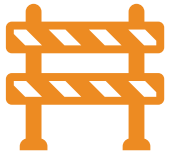
Title V Thresholds

- 100 tpy for all projects
- Additional reporting/testing
- Semi-annual compliance statements and certifications

California Air Districts



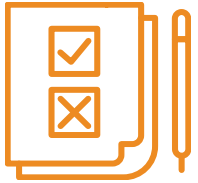
NSR/PSD Major Source Permits



Construction Permitting Limits and Requirements

- **PSD Thresholds**
 - 250 tpy for reciprocating and simple-cycle turbines
 - 100 tpy for boilers and combined-cycle turbines
- **Will require BACT (attainment)/LAER (non-attainment) determinations**
 - Ex. SCR and Oxidation Catalysts for turbines must be reviewed for these analyses
 - Ex. Particulate filters for engines
- State and local governments may have their own limits and requirements
 - Speak to an air permitting professional familiar with the specific state or local agency
- **Will require substantial air dispersion modeling:**
 - NAAQS and PSD Class II and Class I Increments
 - NO_x 1-hour and PM_{2.5} typically cause issues
 - Annual PM_{2.5} NAAQS lowered recently
 - Causing issues with backgrounds and non-attainment statuses
 - Class I Visibility
 - Preliminary screening of Q/D to determine if deposition modeling is required (utilizes CALPUFF)
 - $Q = \text{NO}_x + \text{PM} + \text{H}_2\text{SO}_4 + \text{SO}_2$
 - Required to consult and work with Federal Land Managers
 - Try to site facilities farther than 300 km from Class I areas
 - Preconstruction ambient air monitoring possible





New Source Performance Standards

- **Subparts D, Da, Db, Dc for Boilers**
 - Subpart Da is specific to fossil fuel fired electric utility steam generators
 - PM, CO, NO_x and SO₂ emission limits
- **Subpart KKKK – NO_x requirements for NG Turbines**
 - >850 MMBtu/hr limit is 15 ppm
 - >50 MMBtu/hr and ≤ 850 MMBtu/hr limit is 25 ppm
 - New rule proposed in late 2024 – no movement on rule- would require SCR on all units over 20% capacity factor
- **Subpart JJJJ or IIII – NO_x, CO, VOC requirements for Diesel and Spark Ignition Engines**
 - Oxidation Catalyst and SCR can be used to meet requirements
- **Subparts TTTT and TTTTa – Green House Gas (CO₂) from turbines and steam-generating units. (See GHG considerations slide)**





National Emissions Standards for Hazardous Air Pollutants

- **Subpart YYYY—Turbines**
 - Had been stayed, Stay removed in 2022
 - Major HAP Sources need to meet 91 ppb formaldehyde at 15% O₂
- **Subpart ZZZZ—Engines**
 - Oxidation Catalyst and additional parametric monitoring required for major sources of HAPs

In addition, some states have their own Toxics Analyses that are required.

- May be emission limits or health risk assessment requirements
 - Typically the same air dispersion model can be utilized for Criteria and HAPs/Air Toxics
 - Some states have screening models and methodologies
 - If facility exceeds health risks, work closely with state, may require additional requirements or controls (*requirements vary*)



Title IV Acid Rain Program

All fossil-fuel fired units serving an electrical generator over 25 Megawatts (per unit) and selling electricity are subject

(with a few minor exceptions)

The Title IV Acid Rain Program Adds:

- Substantial monitoring, stack testing and reporting requirements – which needs more staff and/or consultants
- More rigorous Continuous Emissions Monitoring (CEMS)
- Cap and trade program for SO₂ and NO_x emissions, with annual emissions credits purchase requirements.



Considerations for Greenhouse Gases

New Source Performance Standards (NSPS)

- **NSPS TTTT**
 - Applies to Steam Generating Unit or Combustion Turbine built between 2014 – 2023.
 - Has a base load rating greater than 250 MMBtu/hr of fossil fuel (either alone or in combination with any other fuel); and
 - Serves a generator or generators capable of selling greater than 25 MW of electricity to a utility power distribution system
- **NSPS TTTTa**
 - Finalized in 2024, applies to:
 - stationary combustion turbines that commence construction or reconstruction after May 23, 2023.
 - Has a base load rating greater than 250 MMBtu/hr of fossil fuel (either alone or in combination with any other fuel); and
 - Serves a generator or generators capable of selling greater than 25 MW of electricity to a utility power distribution system

Currently, units must comply with NSPS TTTT or NSPS TTTTa

- EPA has proposed the remand of TTTTa, but we don't know what that will look like or what will happen
- EPA sought comments on TTTT

Some states have rigorous GHG emissions reduction goals.

How do state GHG requirements (including reporting) change your plans?



Case Study #1



Hypothetical Project Facts:

- GW scale data center designed for AI and high-performance computing
- CHP plant located onsite (e.g. natural gas engines)
- Battery energy storage systems located onsite
- Emergency generator located onsite

Local considerations:

- Located in NAAQS attainment area
- Located in state/county with air requirements that are not more stringent than Federal requirements

Hypothetical Project Considerations

- This would likely be a PSD – Major source with associated permitting – long lead times for permit application preparation and review by authority. Engage the authority early.
- Ambient Air Pre-monitoring may be required.
- NO_x and CO emissions will need maximum control to pass air dispersion modeling for NAAQS and increment consumption.
- Oxidation catalyst may be required for BACT
- Location with stringent Toxics program will be problematic for health risk assessment.

Case Study #2

Hypothetical Project Facts:

- GW scale data center designed for AI and high-performance computing
- Natural gas turbines located onsite to supplement grid-supplied electricity
- Backup diesel generators located onsite

Local considerations:

- Located in NAAQS ozone non-attainment area
- Located in state/county with state or local air requirements that are more stringent than Federal requirements
- Located in an environmental justice area

Hypothetical Project Considerations

- **This would likely be a NNSR and PSD** – Major source with associated permitting – long lead times for permit application preparation and review by authority. Engage the authority early.
- Ambient Air Pre-monitoring may be required.
- Non-attainment status of location will require **lowest achievable mission rates** (LAER), and likely NOx and VOC offsets.
- **Passing dispersion modeling may be very difficult.** Will need innovative modeling strategies and perhaps limitations on operations (i.e. not full throttle 24/7/365).
- Location with stringent Toxics program will be problematic for health risk assessment.
- Environmental Justice requirements will vary greatly by locality, but expect some concessions requirements, possibly wholly unrelated to the project. The EJ requirements may be suspended by current administration.
- Very substantial work with authority over details, very long process anticipated.

Case Study #3



Hypothetical Project Facts:

- A data center company purchases a small, distressed coal-fired generating station for re-activation/repurposing.
- The plant purchase price is low.
- The company proposes to build the new data center on the same property as the coal-fired power facility.

Hypothetical Project Considerations

- Existing permits need updating. Wait time for permit revision was unexpected. State authority is very leery of plant emissions performance.
- Plant was built from well-used equipment and is unreliable, much downtime.
- Existing emissions controls are not well engineered, history of emissions violations.
- Additional mercury controls under NESHAPS Subpart UUUUU (now proposed for appeal) and more CEMS were required.
- GHG reductions will be prohibitively costly if they are enforced

Takeaway:

A new installation of natural gas fired turbines or reciprocating engines may have been a smarter, more cost effective and reliable in the long run.

Other Environmental/Siting Issues to Consider

Air Quality Permitting



Siting is getting more difficult and impacted by local regulations:

Water Quality Considerations

Noise Pollution Issues

Visual Impacts of Cooling Systems

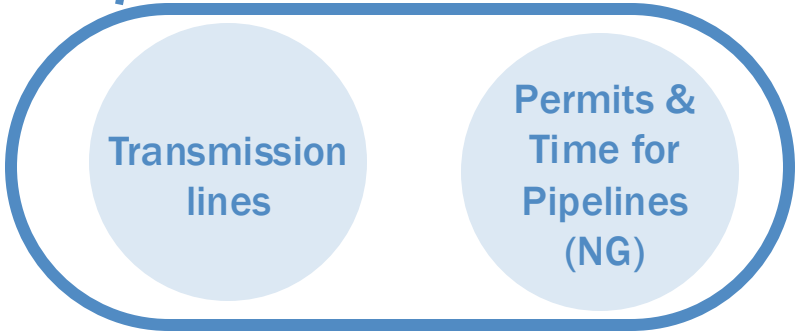
Considerations for Connections:

Additional cost and time/permitting consideration

Fuel Storage

Hazardous Waste Management

Timelines for Permits, etc.



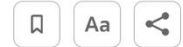
Community Considerations Making the News

Power Grab
Tech giants fight plan to make them pay more for electric grid upgrades

Big Tech's data center boom poses new risk to US grid operators

By Tim McLaughlin

March 19, 2025 7:52 PM MDT · Updated March 19, 2025



Prince William residents complain of "catastrophic noise" from data centers

North Virginia residents' groups say they have had enough



[1/5] A car drives past a building of the Digital Reality Data Center in Ashburn, Virginia, U.S., March 17, 2025.

LOCAL // TRENDING

College Station City Council rejects plan to build 600-megawatt data center amid community backlash

By Michael Garcia, Staff Writer
Updated Sep 12, 2025 4:31 p.m.

Does the AI boom threaten local air quality? A north Denver neighborhood is about to find out

By Sam Brasch · Oct. 14, 2025, 4:00 am

NAACP launches lawsuit over pollution from Musk's xAI

Memphis is already ranked as an asthma capital of the nation.



An aerial view of the xAI data center. | Steve Jones/Flight by Southwings for SELC

By AVRIL SILVA
06/17/2025 04:23 PM EDT



Data center emissions probably 662% higher than big tech claims. Can it keep up the ruse?

Emissions from in-house data centers of Google, Microsoft, Meta and Apple may be 7.62 times higher than official tally

Home / Financial / AI-Induced Power Inflation: U.S. Electricity Prices Near Data Centers Soar 267% in Five Years
AI-Induced Power Inflation: U.S. Electricity Prices Near Data Centers Soar 267% In Five Years

By Siobhán Delaney

Input Oct 23, 2025 09:45 Modified Oct 23, 2025 09:47



Schedule Considerations

Total Time

**12-36
Months**

- Cannot start construction until permit issued (assuming PSD)
- New EPA guidance regarding "Begin Actual Construction" - Sept. 2, 2025

Prepare application (including modeling)

3-6 months (depends on Class I modeling)

Agency review time and issue draft permit

6-24 months

Public notice

30 days (state agency) | 45 days (EPA)

Respond to comments and issue permit

1-6 months



Emerging Policy Watch



- Evolving GHG and NSR regulations
- Federal efforts to accelerate permits
- New non-attainment areas
- State criteria pollutant regulation
- State-level carbon programs expanding



Key Takeaways for Success with Air Permitting

1. There are no shortcuts around air quality rules and permitting – *plan ahead*.
2. **Engage knowledgeable help** – air regulations can be complex.
3. Understand ramifications of proposed location: regulatory authority, rules and standards, attainment status, public perception.
4. Identify combustion sources **early**, these are the main sources that need permitting.
5. Calculate PTE (potential to emit) conservatively, **24/7/365 operations**.
6. Engage your regulating authority. Have a pre-application meeting with agency.
7. Design modern, low-emission systems to future-proof the project.
8. Be thoughtful of future administration changes around GHG and air emissions standards.
9. Engage community early and often.



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Q & A

Please submit
questions via the
'Q&A' feature on Zoom

The Institute of Clean Air Companies



Market Insight



Engagement
with Decision-
Makers



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Thank you



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Next up will be Sessions 2 and 3 (coming 2026) focusing on Control Technologies and Measurement & Monitoring technologies for data center emissions.

Featuring presentations from ICAC members including:





Additional Information



Today's Presenters



Tess Fuller

Senior Air & Noise Permitting Specialist

Working from more than 75 offices around the world, **Burns & McDonnell** designs and builds critical infrastructure. Their family of companies — driven by engineers, construction professionals, architects, planners, technologists and scientists — delivers projects grounded in safety and a desire to make a difference as they make their clients successful. Founded in 1898, Burns & McDonnell is 100% employee-owned. [Burns & McDonnell website](#)



Kellen Sullivan

Consulting Director



Chris Hiltunen, P.E.

Ambient Monitoring Director

Bison Engineering is an employee-owned company that has served as trusted environmental air quality advisors for clients throughout the country and across many industries for over 45 years. Their expertise in the environmental regulatory landscape can be used to maximize efficiency and push projects forward. They offer innovative air quality permitting, monitoring, data collection, gas flow monitoring, and source testing and work directly with federal, state, and local air quality regulators to simplify the process and keep clients in compliance. [Bison Engineering website](#)



Today's Presenters



Clare Schulzki
Executive Director

Since before the Clean Air Act was enacted, **ICAC, the Institute of Clean Air Companies**, member companies have represented providers of a diverse array of air pollution control technologies, measuring and monitoring systems, and equipment and services in the U.S. and abroad. ICAC provides a needed voice for the technologies that achieve practical and measurable emissions reductions for stationary sources. [ICAC website](#)



Ted Michaels
Partner

For over 20 years, innovative start-ups, Fortune 500 enterprises, and environmental stakeholders have maximized their business goals by leveraging **AJW's** unique coast-to-coast, international, and bipartisan expertise in how markets and governments work. **AJW** works closely with clients to develop sophisticated business strategies and advocate for policies and regulations that support innovators in both domestic and international markets. [AJW website](#)



Additional Resources

Industry & Market Forecasts

- **McKinsey & Company — “The Cost of Compute: A \$7 Trillion Race to Scale Data Centers” (2024)**
Global investment forecasts through 2030, including U.S. share (~40%).
<https://www.mckinsey.com/.../the-cost-of-compute-a-7-trillion-dollar-race-to-scale-data-centers>
- **JLL — “2025 Global Data Center Outlook”**
Trends in site selection, energy demand, regional growth patterns, and sustainability pressures.
<https://www.jll.com/en-us/insights/market-outlook/data-center-outlook>
- **Boston Consulting Group (BCG) — “Breaking Barriers to Data Center Growth” (2025)**
Analysis of how data center loads are driving U.S. power-sector expansion and infrastructure bottlenecks. <https://www.bcg.com/publications/2025/breaking-barriers-data-center-growth>



Additional Resources

Government & Research Data

- **Lawrence Berkeley National Laboratory (LBNL) – “2024 U.S. Data Center Energy Usage Report”**
Benchmark reference on current and projected energy use, including AI-related trends.
<https://eta-publications.lbl.gov/.../lbnl-2024-united-states-data-center-energy-usage-report.pdf>
- **U.S. Department of Energy (DOE) – Data Center Energy Research Program**
Tools, datasets, and policy assessments of efficiency measures and electricity demand.
<https://www.energy.gov/energyefficiency/data-centers>
- **U.S. Energy Information Administration (EIA) – Electricity Demand and End Use Data**
National datasets tracking load growth from data centers and computing sectors.
<https://www.eia.gov/energyexplained/electricity/use-of-electricity.php>



Additional Resources

Environmental & Permitting Resources

- **U.S. EPA - Title V Operating Permit Policy and Guidance Document Index**
Over 230 policy and guidance documents that help to interpret the Part 70 and 71 permit requirements.
<https://www.epa.gov/title-v-operating-permits/title-v-operating-permit-policy-and-guidance-document-index>
- **U.S. EPA - New Source Review Policy and Guidance Document Index**
Over 600 EPA-issued policy and guidance documents related to NSR preconstruction permit program
<https://www.epa.gov/nsr/new-source-review-policy-and-guidance-document-index>
- **Texas Commission on Environmental Quality (TCEQ) – Air Permitting Portal (Expedited Permits)**
Details on expedited air permitting pathways for industrial and data center projects.
<https://www.tceq.texas.gov/permitting/air>
- **California Energy Commission (CEC) – Energy Demand Forecasts and Environmental Studies**
Includes grid integration, water use, and siting impacts for large data centers.
<https://www.energy.ca.gov/>
- **Virginia Department of Environmental Quality – Data Center Permitting Information Hub**
Provides guidance on air and environmental permits specific to Northern Virginia’s data center corridor.
<https://www.deq.virginia.gov/permits/air/issued-air-permits-for-data-centers>

