Town Council Meeting
January 2026 Work Session No. 2
January 29, 2026 | 3:30 PM
Apex Town Hall | 73 Hunter Street, Apex, NC
3rd Floor Training Rooms A and B

AGENDA

1. **Call to Order | Pledge of Allegiance**
   Mayor, Jacques K. Gilbert

2. **Apex Fire Department Updates**
   Chief Tim Herman, Apex Fire Department
   a) **Center for Public Safety Excellence Accreditation**
   b) **2026 Fire Academy**
   c) **Wake County EMS Updates**
   d) **Capital Improvement Plan Updates**
      - **Station No. 1**
      - **Station No. 2**
      - **Station No. 4**
      - **Station No. 7**
      - **Hunter Street Public Safety Campus**

3. **Apex Police Department Updates**
   Chief Ryan Johansen, Apex Police Department
   a) **High-Level Update**

Continued to next page

English	Spanish	Chinese (Simplified)
ANNOUCEMENTS Members of the public can access and view the meeting on the Town's YouTube Channel https://www.youtube.com/c/TownofApexGov or attend in-person. The meeting date, start time, and location details are included at the top of this agenda document.	**ANUNCIOS** Las personas interesadas pueden acceder y ver la reunión a través del canal de YouTube de la Ciudad en https://www.youtube.com/c/TownofApexGov o asistir en persona. En la parte superior de este documento de agenda se indican la fecha, la hora de inicio y la ubicación de la reunión.	**公告** 公众可通过镇政府的YouTube频道 https://www.youtube.com/c/TownofApexGov 在线旁听会议，或选择现场参与。会议日期、开始时间及地点详情见本议程文件顶部。
Accommodation Statement: Anyone needing special accommodations to attend this meeting and/or if this information is needed in an alternative format, please contact the Town Clerk's Office. The Town Clerk is located at 73 Hunter Street in Apex Town Hall on the 2nd Floor, (email) allen.coleman@apexnc.org or (phone) 919-249-1260.	**Aviso sobre adaptaciones:** Si necesita adaptaciones especiales para asistir a esta reunión o requiere esta información en un formato alternativo, comuníquese con la Oficina del Secretario Municipal, ubicada en el segundo piso del Ayuntamiento de Apex, en 73 Hunter Street, por correo electrónico a través de allen.coleman@apexnc.org o llamando al 919-249-1260.	**便利服务声明：** 如需特殊便利服务以参加本次会议，或需要将本信息提供为其他格式，请联系镇书记官办公室。 办公地址：Apex镇政务厅二楼（Hunter街73号） 邮箱：allen.coleman@apexnc.org 电话：919-249-1260

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AGENDA - CONTINUED

b) Top Challenges
- **Staffing**
- **Vehicles**
- **Space**

c) Automated License Plate Reader (ALPR) Program Review and Update

4. Data Center Research – *Continued from January 22, 2026*
Bruce Venable, Planner III, Planning Department
Other Town staff as applicable
a) Public Health and Safety
b) Comparative Benchmarking w-other Municipalities
c) Update on requested follow-ups and additional updates

5. 2025 Municipal Election Budget Discussion
Allen Coleman, Town Clerk

6. Adjournment

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APEX
NORTH CAROLINA

Apex Fire Department

January 2026 Updates

Agenda

- Center for Public Safety Excellence Accreditation
- Current Fire Academy
- Wake County EMS Update
- Capital Improvement Plan updates
  - Station 1
  - Station 2
  - Station 4
  - Station 7
  - Hunter Street Public Safety Campus

International Fire Service Accreditation Model

- Provides greater community alignment.
- Encourages quality improvement.
- Facilitates input from and builds positive relationships with staff.
- Identifies areas of strengths and weaknesses.
- Allows for the establishment of a plan for improvement.
- Provides for greater data-driven decision-making.
- Communicates management and leadership philosophies.
- Ensures our agency has a defined mission and related objectives.
- Encourages the development of organizational procedural documents.

Accreditation Timeline

- Strategic Plan published 2/26!
- Finalizing Community Risk Assessment
- Created a Standard of Coverage
- Completed the Self-Assessment manual.
- On-site peer review visit in the spring of 2026
- Commission hearing August 2026!

2026 Fire Academy

- Partnership with Wake County (17th Academy), started January 12, 2026
- Apex has 9 Cadets in this academy!
- Academy takes place at the Wake County Fire Training Center in New Hill.

Wake County EMS Updates

- Revamping the response protocols county-wide in an effort to improve service from Wake County EMS.
- All Fire Departments in Wake County are aware and have agreed to the plan.
- Multiple metrics have been determined to ensure the new plan is working as desired, to include not increasing on-scene times for fire departments.
- Phased approached with rolling out the new plan.

Capital Improvement Plans

Apex Station 1

- Economic Development sent out a feasibility RFQ in July 2025, but did not receive favorable applications.
- The RFQ was revised and re-advertised in Jan. 2026 for 60 days.
- Study is desired to provide the best use of the property and provide guidance towards the goal of a public private partnership.

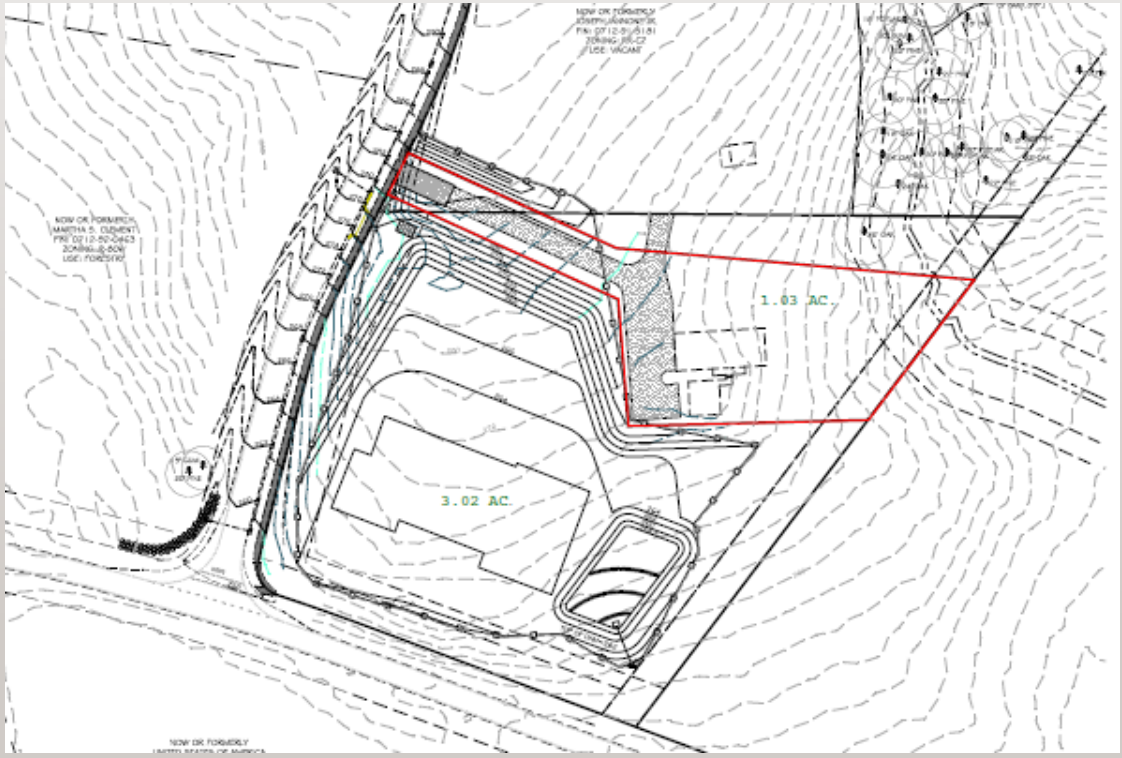
Apex Station 2

- Presented a plan to co-locate in a new station with Wake County EMS on the current site.
- EMS was proposing this to occur 2028-2030 timeframe.
- EMS, under the direction of a new Director, is changing the deployment model for ambulances and has put this project on hold.
- Apex has pushed this project out on our CIP to 2032.

Apex Station 4

“New” Olive Chapel Rd. Fire Station

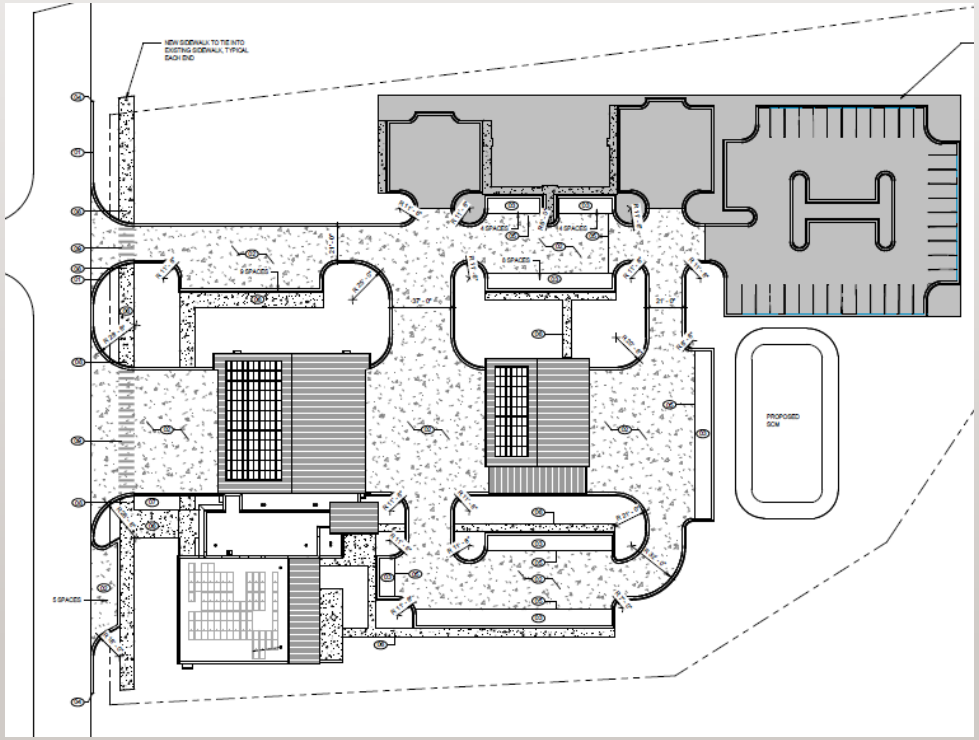
- Finalizing the details on desired property before purchasing.
- Construction on CIP for FY30.



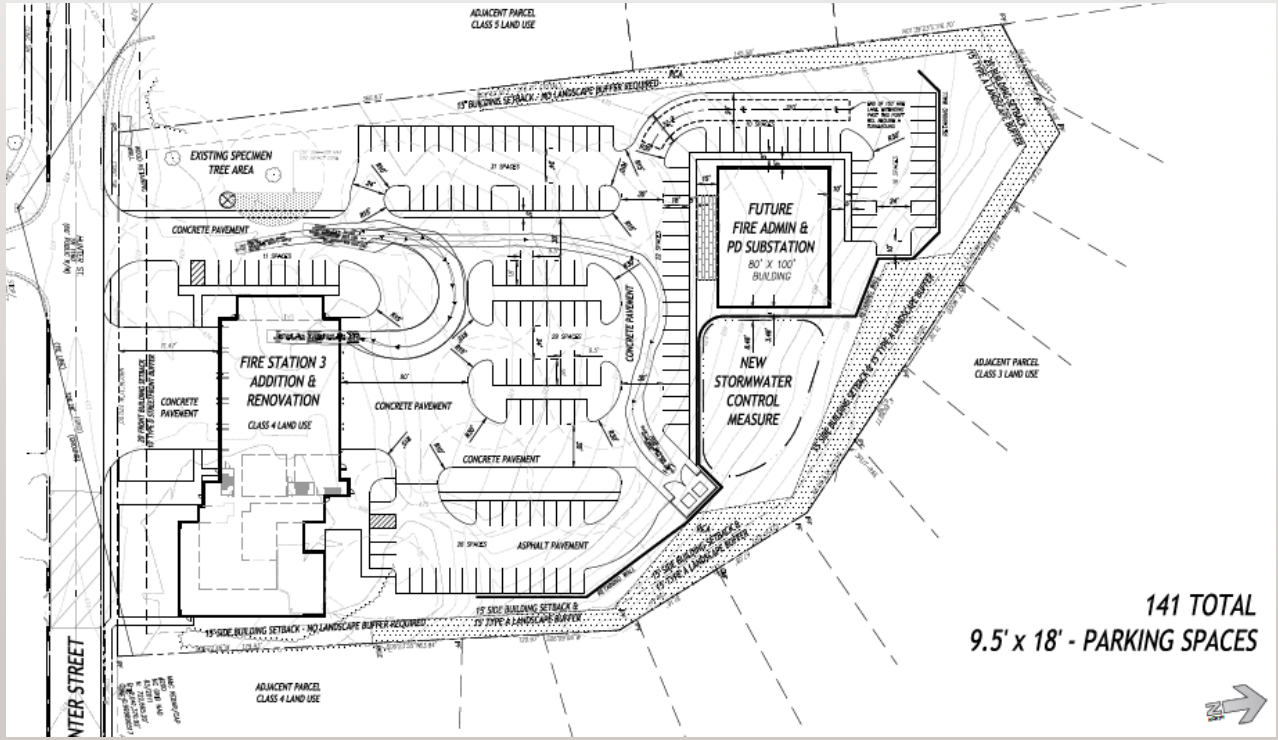
Hunter Street Public Safety Campus

Update #1 (overall site)

Before



After



Update #2 (Timeline)

- Phase 1 (Fire Station and Sitework)
  - Advanced planning completed – Jul. 25
  - In design phase now – Oct. 25 – Oct. 26
  - Ready to bid in Oct. 2026
  - Projected Completion – Aug. 2028

- Phase 2 (Office Building)
  - Advanced planning started Oct. 25 – Apr. 26
  - Design phase scheduled Jun. 26 - May 27
  - Ready to bid in Jun. 2027
  - Projected Completion – Mar. 29

*Fire Admin has to be out of current building by July 2030.

Update #2 (Timeline)

- After collaboration with the architect, town staff, and the fire department, it is recommended to construct the whole project at one time and not two phases.
- This option saves money and improves project coordination.
- This option would take the project to bid June 2027.
- Project completion in March 2029.

Update # 3 (Funding)

- Phase 1 (Fire Station & Sitework)
  - Current budget - $5,752,102
  - Need additional funds FY27 - $8,000,000
    - Increase includes sitework for the whole project.
    - Cost per sq. ft. provided after advance planning phase increased.
    - Additional needs discovered during advanced planning for existing structure.
  - Additional funds for phase 1 are worked in the current financial model.

Update # 3 (Funding)

- Phase 2 (Office Building, 24,000 sq. ft.)
  - Fire Administration Offices
  - Police
  - IT
  - Additional office space for other needs

  - Current budget - $1,637,000 (design)
  - Need additional funds FY28 - $14,363,000
    ** Not currently in the financial model*

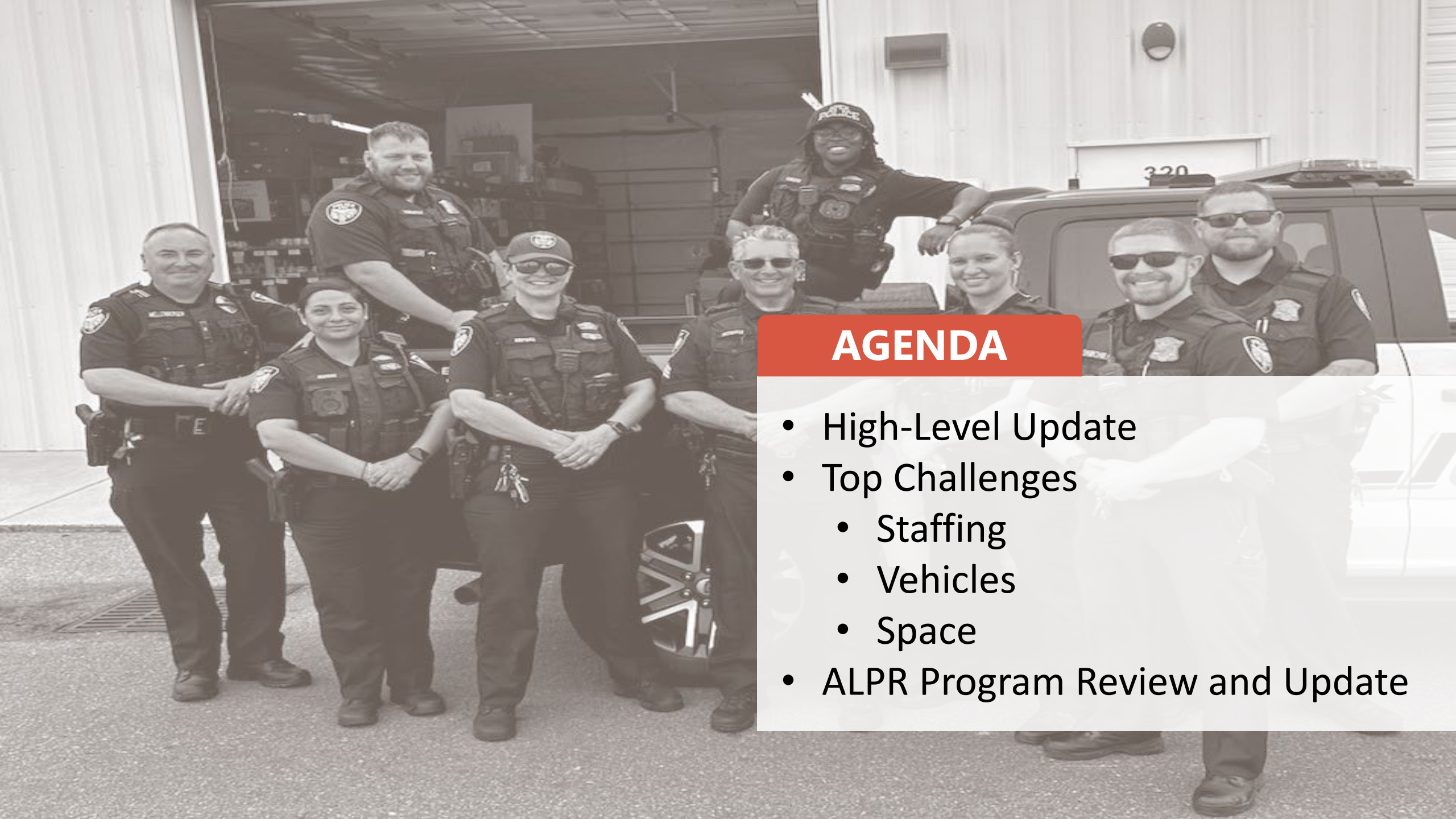
Questions

Council Work Session – January 29, 2026

Apex Police Department Update

Police Chief Ryan Johansen

APEX
NORTH CAROLINA



AGENDA

- High-Level Update
- Top Challenges
  - Staffing
  - Vehicles
  - Space
- ALPR Program Review and Update

High-Level Update – Culture…Culture…Culture

- Broken people = broken culture
- Culture vs. Command Conundrum
  - Not unique to Apex
- Cops aren't breaking policing…policing is breaking cops
- Policing is incredibly complex and difficult
- We need cops to be at their best…**all the time**

Better policing requires the deployment of happy, healthy, well-adjusted **HUMAN BEINGS** into the community, as **PART OF THE COMMUNITY**

…This is not as easy as it sounds

High-Level Update – A Culture of Excellence

Start With Why

- Individually – Why do you do this work? Why did you start? Why do you continue?
- Collectively – Why do we exist? What do we believe? What makes us different?
- Organizationally – What must you believe to be a part of this team?

Establish How

- What are the values we hold sacred in pursuit of our Why? What are the guiderails?

Only now can we truly evaluate What

- What we do, the actual work, must constantly be assessed for alignment with our Why and our How.

High-Level Update – A Culture of Wellness

- 1-on-1's, all hands meetings, a true open door policy
- Physical fitness
  - 10x increase in staff actively engaged in regular fitness programming
  - Team fitness activities
  - Recovery solutions
  - Diet/nutrition awaiting funding
- Mental Health
  - BetterHelp portal
  - Critical Incident Stress Debriefings
  - Re-establishment of Peer Support
- Financial Health
  - Smartdollar
- Organizational Health
  - Support and development vs. "the bag of hammers"

High-Level Update – Some indicators we're on the right track

- The Survey
- 75% reduction in vacancies
- 3x increase in proactive police contacts
- 20% reduction in roadway injuries
- 35% reduction in motor vehicle B&Es
- 25% reduction in retail larceny cases
- 5x increase in felony drug possession arrests
- 3x increase in illegal firearms possession arrests
- Interception of more than $2 million in fraud money returned to victims
- Single seizure of over 1,500 pounds of marijuana being distributed in Apex
- Multiple arrests of suspects trafficking cocaine in Apex
- 26 applicants for Sergeant promotional process
- Anecdotally…dramatic shift in energy and enthusiasm at APD

Top Challenges - STAFFING

- Last staffing study was in 2004
  - Population was about 26,000 at that point
  - Identified 5 as the absolute minimum for patrol 24/7
  - We are still using this number today
  - This isn't even enough for 1 officer/zone

Top Challenges - STAFFING

According to the FBI, the national average ratio of officers to population in municipal cities/towns…

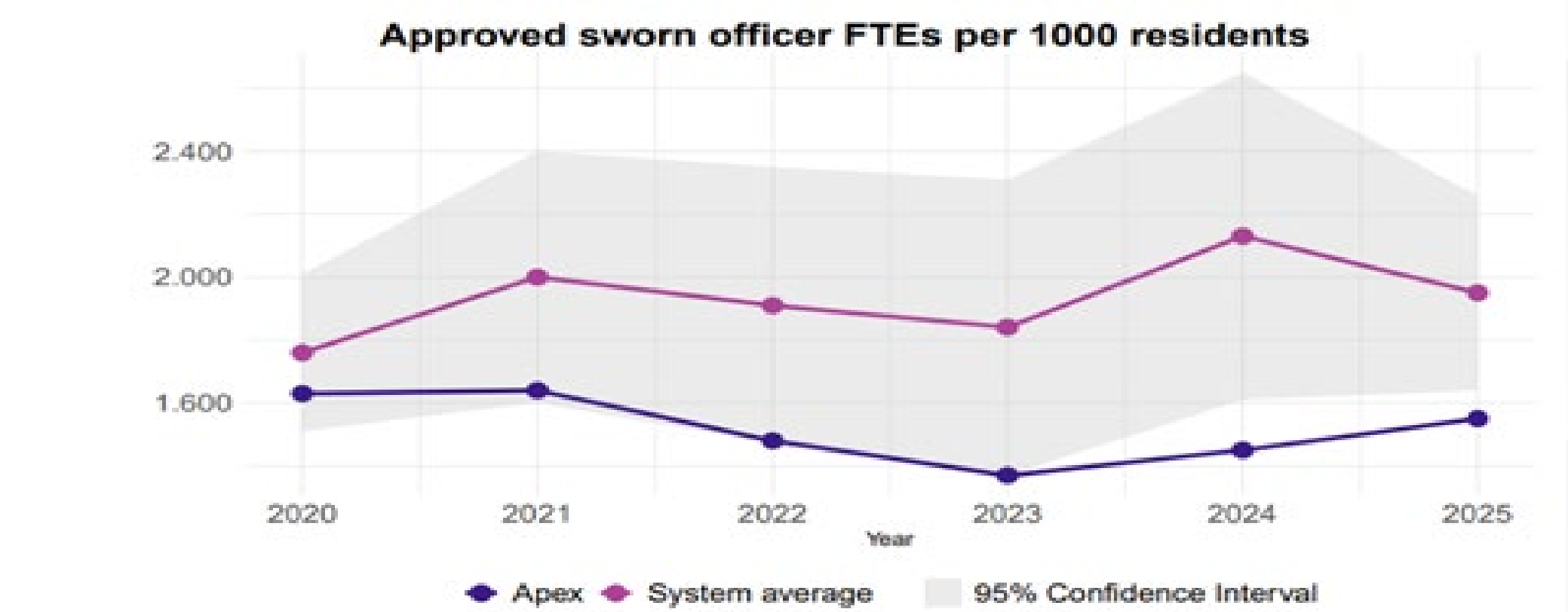
2.4 per 1,000

If Apex met this national average we would have about…

190 Sworn Police Officers

Almost 2x our actual number

Top Challenges - STAFFING



Base Municipality: Apex
Service: Police Service

Comparison Municipalities:

Asheville, Chapel Hill, Gastonia, Rocky Mount, Wake Forest

Generated at: 2026-01-08 17:27:00.981638
Data updated on: November 11, 2025

Top Challenges - STAFFING

- Why is staffing at this minimum such a problem?
  - Not just for the low frequency/high impact event
  - Simple, everyday patrol resource dilemma

7 Officers on duty

2 respond to a retail theft

3 respond to a domestic

1 at jail with earlier arrest

1 Officer now protecting 25+ square miles and 80,000+ people

Top Challenges - STAFFING

- In the current fiscal year all sworn officer additions were cut from the budget…except two SROs
  - We are contractually obligated to provide the SROs
  - SROs are partially reimbursed by the County
- Staffing needs in FY 26-27 are significant

Review of Top Challenges from May - STAFFING

- 5 traditional methods of assessing staff needs for police
  - Crime rates/trends
  - Per-capita
  - Minimum viable staffing
  - Authorized/budgeted levels
  - Workload/Relief Factor based

Apex has been a hybrid of these two

Modern policing calls for a more integral approach that considers multiple factors, such as:

- ***Population***
- ***Crime Rates/Trends***
- ***Area size and type***
- ***Workloads***
- ***Service expectations***

Top Challenges - STAFFING

FIRST CONSIDERATION: ABSOLUTE MINIMUM STAFFING

- Patrol must cover **6 zones**, 24/7/365
- Each squad must at minimum have **1 SGT / 6 OFCs** to do this
- **6 Squads = 36 OFC minimum**
- According to **IACP Study**: Must staff patrol at least **130%** of minimum number to account for leave, training and administrative time

Would require **12 more officers, 2 per squad** just to make **absolute minimum**

Top Challenges - STAFFING

SECOND CONSIDERATION: WORKLOAD RELIEF FACTOR ANALYSIS

= How much time per officer is actually available for patrol duties

WORKLOAD RELIEF FACTOR ANALYSIS				
	Days/Year	Shift Hours	Hours/Yea	Availablity
BASE (# of days needing coverage)	365	10	3650	100%
SCHEDULED DAYS OFF PER YEAR	157	10	1570	57%
VACATION ACCRUED	12	10	120	54%
SICK LEAVE ACCRUED	8.25	10	82.5	51%
COMPASSION LEAVE TAKEN	9	10	90	49%
HOLIDAY LEAVE ACCRUED	7	10	70	47%
DISCIPLINE (average across the agency)	10	10	100	47%
TRAINING (average across the agency)	12	10	120	44%
FMLA (average USED across the agency)	9.3	10	69.6	43%
MILITARY (average USED across agency)	0	10	41.5	41%
OTHER	0	0	0	43%
Total Remaining Hours:		1484	2166	59.33%
1 Manpower Unit (MPU) (Hrs: per officer)		3690		
Relief Factor (RF) (MPU/Available Hrs.):		2.46		

59%
ANNUAL TIME AWAY FROM PATROL

Key Result: Only **41%** of an officer's annual hours are available for **patrol duties**

⚠ **RF = 2.46:** Not enough officers for true **"call relief"**

- Necessary staffing levels for workload are higher than bare **minimum**

+ 24 OFCs

Top Challenges - STAFFING

RESPONDING TO CALLS EXCEEDS IACP THRESHOLD

Our officers currently spend over **60%** of work time responding to calls for service — more than double the IACP recommendation.

- This exceeds the **30% maximum** IACP suggests for responding to calls.

⚠ Research has proven **proactive** policing substantially reduce crime and increase traffic safety.

RESPONDING TO CALLS: >60%

IACP RECOMMENDATION: ≤30%

Top Challenges - STAFFING

- Thorough assessment of workloads and staff allocations ongoing
- A reorganization of the department to optimize efficiency and effectiveness due in March
  - 2 Divisions (Field Services and Support Services)
  - Prioritizing patrol
    - Two Detectives, K9 unit moved into patrol
    - Consolidation of Directed Patrol Unit (DPU) and Drugs/Vice
    - New Patrol Schedule
      4x10 with built in training
      6 squads (2x dayshift, 2x swing shift, 2x midnights)
      SGT/CPL replacing 2 SGT structure
  - Expansion of the Training/Recruiting Unit
  - Creation of a Fleet/Equipment Unit
  - Creation of a Special Events Unit

Top Challenges - SPACE

- Beautiful downtown police station
- Outgrew it the day we moved in
- Command has maximized use of space
  - Lieutenant office in a utility closet
  - Multiple staff in single person offices
- Lack of space for new programs
  - Real-Time-Crime-Center
  - Wellness equipment
  - CNT/SRT
- Use of public safety stations has been critical, but has issues
  - Siloes, social disconnection, subcultures, etc.

Top Challenges - SPACE

- Space Needs Study
  - Immediate need – 34,209 sq. ft.
  - Estimated 20 year need – 40,268 sq. ft.
  - Current space – 19,785 sq. ft.
- We have less than 58% of the space we need now
- We have less than 50% of the space we need in future
- Current plan is to spend over $30 million to provide less than 70% of needed space
- Would like to begin assessing an entirely new Police Headquarters location/building

Top Challenges from - Vehicles

- Police response model is different
  - We respond from the field individually, not from a station in teams
  - Vehicles are offices, stations, detention facilities, equipment storage, and only means of responding to calls
- Every cop must have a functioning vehicle
  - No vehicle = no police response
- FY 24-25
  - 20+ vehicles due for replacement
  - Less than half provided in budget
- FY 25-26
  - 30+ vehicles due for replacement
  - Again less than half provided in budget
  - 2 SROs added, without budget for vehicles

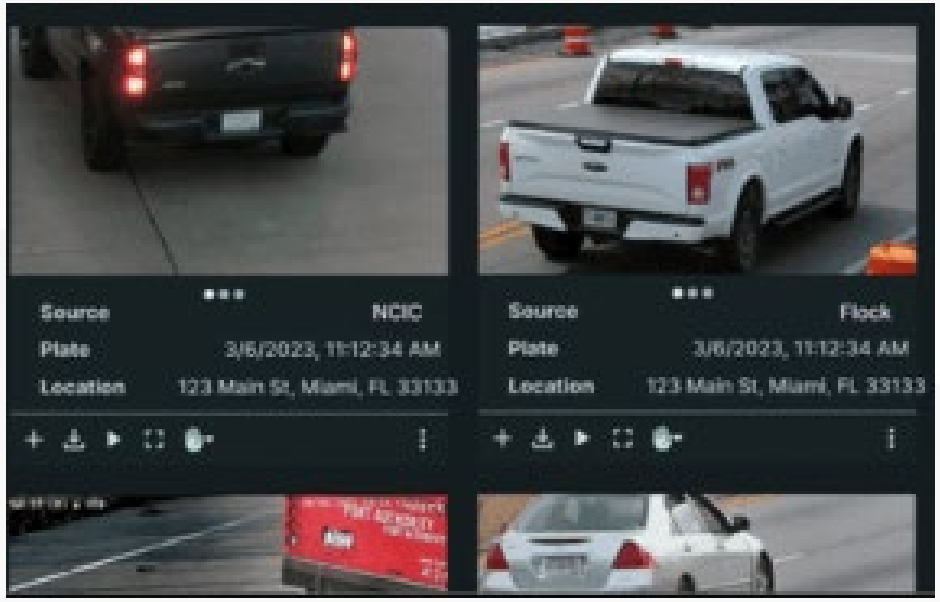
Top Challenges - Vehicles

- Delaying purchases is having a compounding effect
- Vehicle and equipment prices increase every year
  - Putting off purchases is costing us money
  - Since 2020 cumulative price increases are over 25%
    - This means for every 4 cars we could have gotten then, we now get 3
- We need to get back to zero so we can manage annual vehicle needs


ALPR Program Review and Update

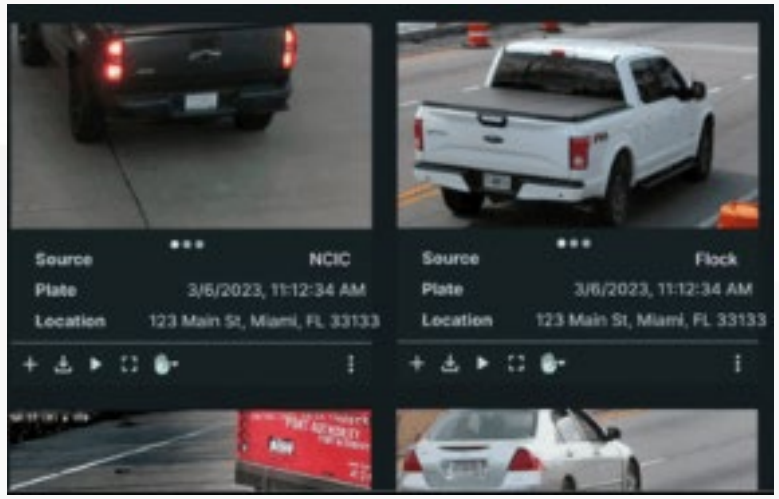
What is the Flock/ALPR Program and how does it work?

- Network of stationary Automated License Plate Reader cameras
  - Strategically positioned throughout the Town
    - Common ingress/egress of perpetrators of crime
    - Crime mapping
    - Town Gate concept
  - Captures an image of rear of vehicles (not drivers/passengers)
    - In plain view, on public right of way

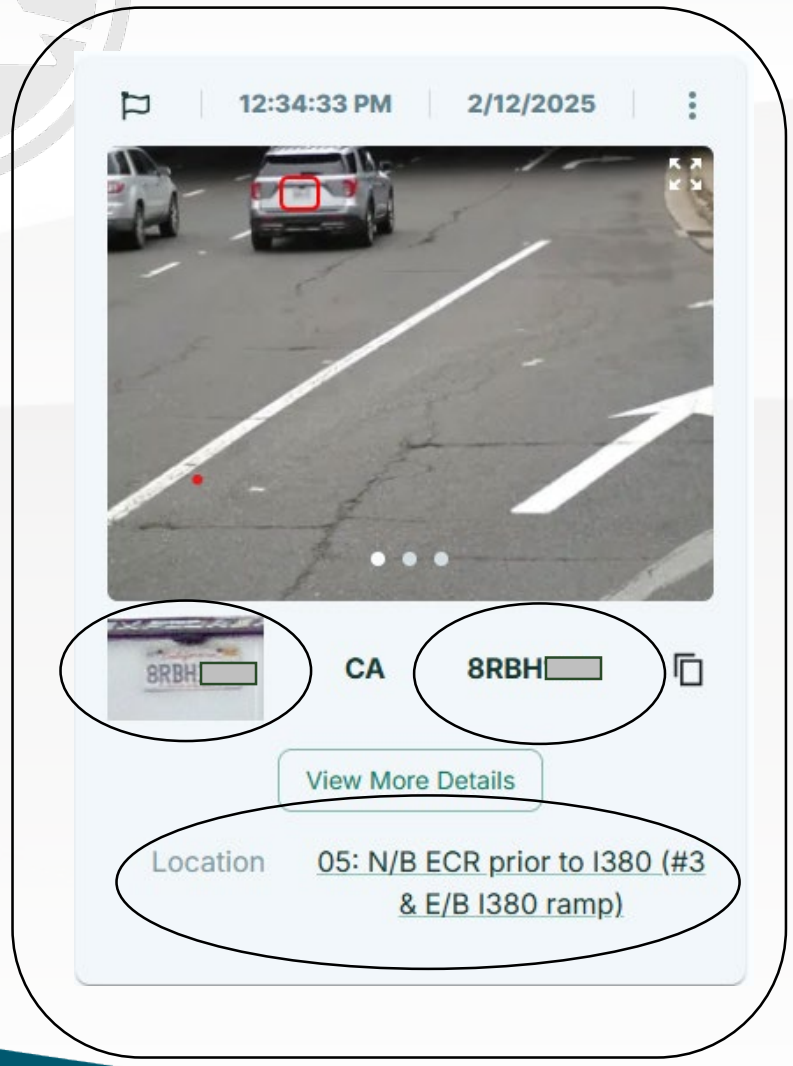


What is the Flock/ALPR Program and how does it work?

- What does the system do with these images
  - Reads/determines license plate numbers
  - Automatically searches for number matches in state database
    - Stolen vehicles
    - Crime vehicles with stop orders
    - Missing persons, AMBER/SILVER alerts, etc.
  - Notifies APD officers/dispatch of matches in real time
  - Analyzes vehicle components to discern make/model/color
    - Critical for vehicles with no plates or obstructed plates
  - Stores images for specified period
    - Creates a searchable database for police investigators
    - More to come on this



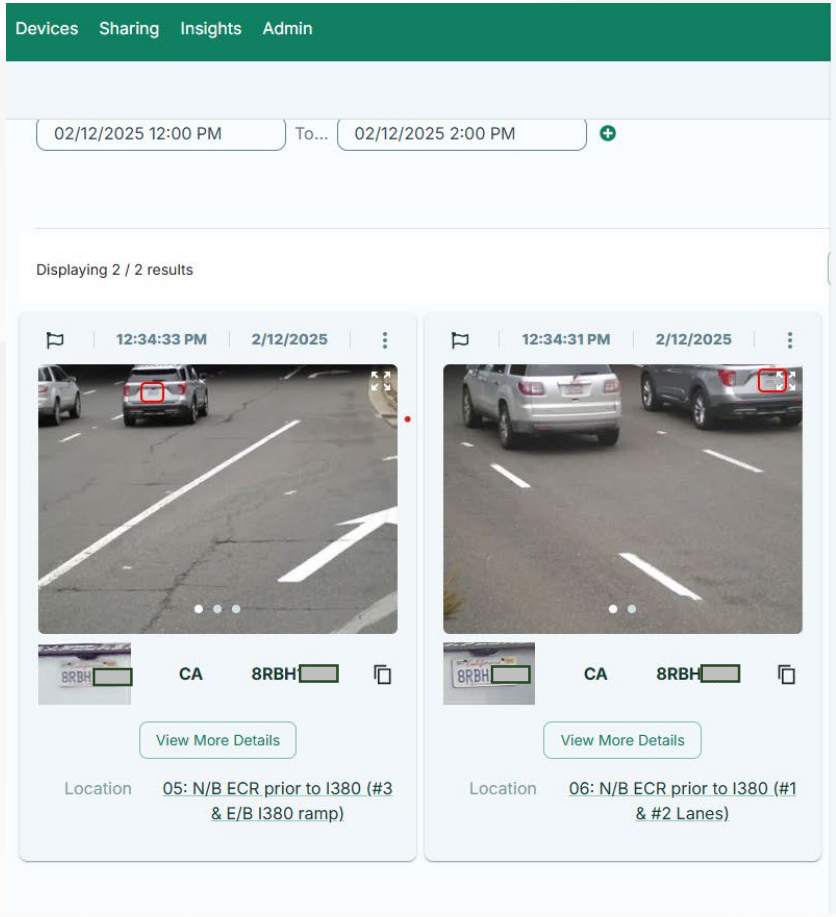
What is the Flock/ALPR Program and how does it work?

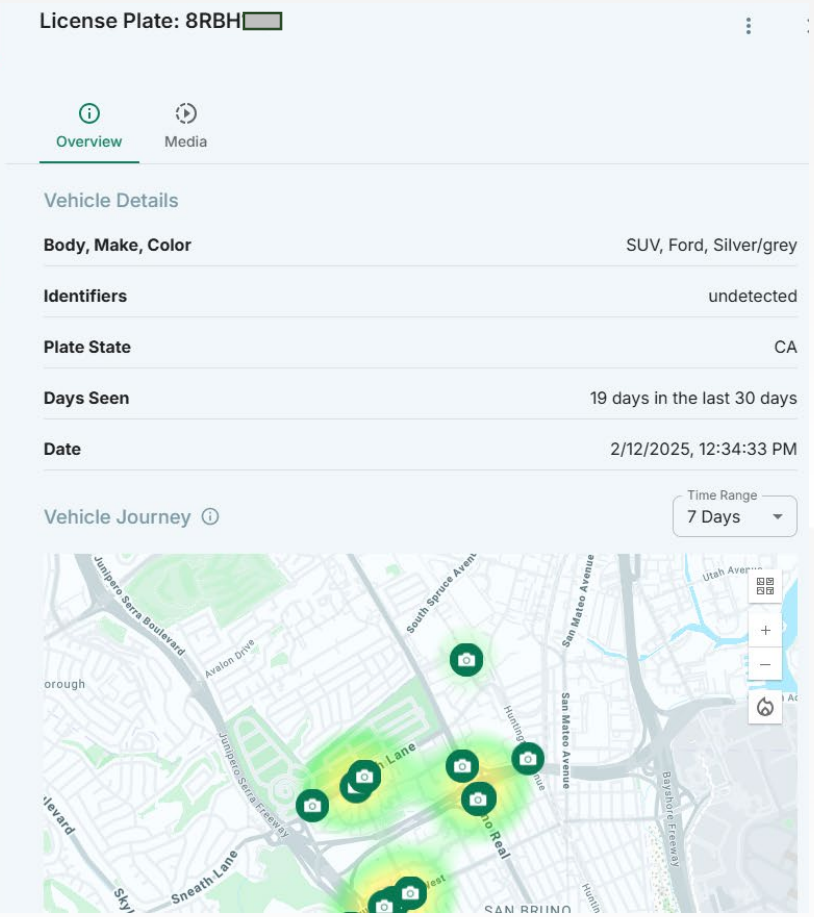


- What do officers/dispatch see?
  - Receive “hit” notification with image and location of read
  - Includes close up of plate alongside actual plate of the “hit”
  - Dispatch/Officer must confirm match before taking any action

What is the Flock/ALPR Program and how does it work?

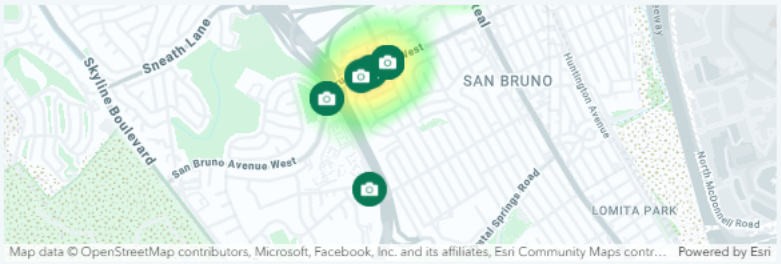
- Creates a temporary, searchable database for investigations
- Can look for a plate, a make/model/color, or reads on a specific camera during a specific timeframe
- Cannot search for a person, name, address, or other personal identifying information





What is the Flock/ALPR Program and how does it work?

- Temporary, searchable database for investigations
  - We specify retention period
  - We own/control data
  - Data sharing at our discretion
    - Policing agencies only
    - For legitimate law enforcement purposes only
    - Each request approved/denied by APD
    - Flock data sharing MOU required
    - Additional data sharing agreement specific to APD required



Device Information

Device Owner	San Bruno CA PD
Device Name	05: N/B ECR prior to I380 (#3 & E/B I380 ramp)
Device Type	Falcon
Device Location	37.63228925468925,-122.41851079616997
Nearest Address	992 CA-82, San Bruno, CA 94066, USA
Device Network	San Bruno CA PD
Source	Flock Safety

Confidence

Confidence Levels

Body	[0.99] High Confidence
Make	[0.99] High Confidence
Color	[0.96] High Confidence

Plate confidence is 0.86. This image was sent to the Hot List Tool for processing. Users with Hot List Tool access and the appropriate application settings will receive Alert(s) if this license plate is on an active hot list(s).

Plate state confidence is 1.00. This image would have passed state filters for California AND any custom hot list entries that do not have a state filter

What the Flock/ALPR Program is NOT

- It is NOT facial recognition
- It is NOT widespread person surveillance
- It is NOT tied to Personal Identifying Information (PII)
- It is NOT used for traffic enforcement
- It is NOT used for non law enforcement purposes

Why is this important for public safety IN APEX?

- Crime prevention
  - Notable increase in property crime
    - Can feed increase in violent crime
  - Current response is mostly reactive (post report)
  - Proactive efforts can feed perceptions of bias
  - Flock as "Early Warning System"
    - Notice of the presence of criminal(s), before victimization
    - Stolen vehicles (used in vast majority of our crime sprees)
    - Vehicles recently used in criminal acts
    - Known safety concerns (school and other threats cases)
  - Deterrence
    - Robust criminal communications
      (San Mateo County example)

Why is this important for public safety IN APEX?

"The certainty of apprehension, not the severity of the ensuing consequences, is the more effective deterrent of crime." - Daniel S. Nagin (leading expert on criminal justice)

- Investigations
  - Nationally, >70% of crimes involve the use of a motor vehicle
  - In Apex, this number is closer to 80%
  - Vehicle identification is critical evidence in solving crimes
    - Imagine having a license plate and/or vehicle description for 80% of our crimes
  - Vehicle ID, direction of travel, immediate tracking
  - Especially valuable for crime during light traffic (majority in Apex)
  - We have the resources to be thorough, we lack the evidence
- Just a few examples
  - San Mateo homicide; San Bruno catalytic converter shooting; San Bruno fatal hit and runs; Westminster serial sex assault case; YouTube shooter threat
  - Already in Apex – Jackpotting case; residential burglars in stolen vehicle; motor vehicle break in series

Why is this important for public safety IN APEX?

- Bias mitigation
  - Any endeavor involving humans will include bias
  - If bias is implicit, it cannot be eliminated
  - Criminal profiling drives most stops aimed at prevention
  - Ultimately, stops are almost always based on discretionary choice
    - This introduces bias
  - Mitigating the negative impacts of bias is critical
  - Stops based on facts versus observations help mitigate bias
- Technology and systems built by humans can still reflect bias
  - Flock contains multiple layers to minimize this effect

Key Policy/Procedure Components

- Balancing privacy concerns and community safety needs
  - Suggestion that system can track all “comings and goings”
    - Data retention period of 30 days mitigates this
      1/3 of state requirement of 90 days
    - Shorter terms eliminate many investigative benefits, longer create privacy concerns
    - Longer retention only with search warrant and/or preservation request
  - Data sharing and potential misuse of data
    - No automatic sharing, must apply directly to APD Admin
    - Restricted to policing agencies for official law enforcement purposes only
    - Must sign Flock MOU and APD data sharing agreement (prevents resharing)
    - Will not share with entities engaged in immigration enforcement

Key Policy/Procedure Components

- Misuse by end users
  - Each search requires right to know/need to know documentation
  - System tracks all access and searches (completely auditable)
  - Regular supervisory review of system use for compliance
- Confirmations required prior to action
  - Visual confirmation of accurate plate read
  - System “hit” alone not sufficient to justify stop
    - Must confirm active want on vehicle in state systems
- Supervisor approval for “hot list” entry
  - Submission/approval of form required to input a vehicle
- Civilian Intel Analyst as ALPR Coordinator
- Annual Reporting
  - Trend/patterns; program effectiveness; need for policy changes; training needs

Summary/Closing

- Flock/ALPR program will reduce crime, increase apprehensions/prosecutions, deter criminal actors and make our community safer and more secure
- Embracing tools like Flock is critical in bias mitigation
- The value to community safety/security far exceeds minimal privacy intrusion of capturing a license plate that is already in public view

Questions?

APEX
NORTH CAROLINA

Joint Planning Board-Town Council Work Session on Data Centers

January 22, 2026

Data Center Presentation

- Data Centers
- Energy Consumption
- Water Consumption
- Environmental Impact
- Noise
- Land Use
- Economic Impact
- Traffic Generation
- Public Health & Safety
- Regulation Comparison

APEX NORTH CAROLINA

Data Centers

What is a data center?

A data center is a facility that provides computational services such as cloud computing, data storage, artificial intelligence (AI), cryptocurrency mining, and high-performance computing. These facilities support critical services, including email, streaming, online banking, social media, and medical records.

Types of Data Centers

Enterprise and Internal:

Are typically owned, operated, and located on-site by a single company. They may be as small as a server closet, or as large as a server room/building that provides services to internal users.

Example of this would be the internal server room located within Apex Town Hall that allows staff to host and share internal information throughout the organization to better serve the Town's departments and daily operations.

Types of Data Centers

Colocation (small, medium, large scale):

Colocation data centers operate much like a multi-tenant shopping center, where businesses lease space from a data center owner in the form of individual server racks or, in some cases, entire dedicated server rooms.

In some cases, companies leasing space from the data center operator may need to have physical access to their servers to maintain specific equipment or operations. Due to this, companies prefer to utilize and partner with colocation facilities within roughly 30–60 miles of their offices.

Types of Data Centers

Hyperscale:

Hyperscale Data Centers are large-scale facilities that provide behind-the-scenes digital services supporting much of the modern internet. Unlike other types of data centers, hyperscale facilities are typically built for and fully occupied by a single company that owns and operates the site to support its own large-scale cloud, or AI (Artificial Intelligence) services.

Common characteristics of hyperscale data centers include:

- Energy demand: ~100 MW or more
- Water demand: ~1 Million Gallons Per Daily (MGD) or more
- Number of servers: ~5,000 or more
- Redundancy Tiers: III or IV

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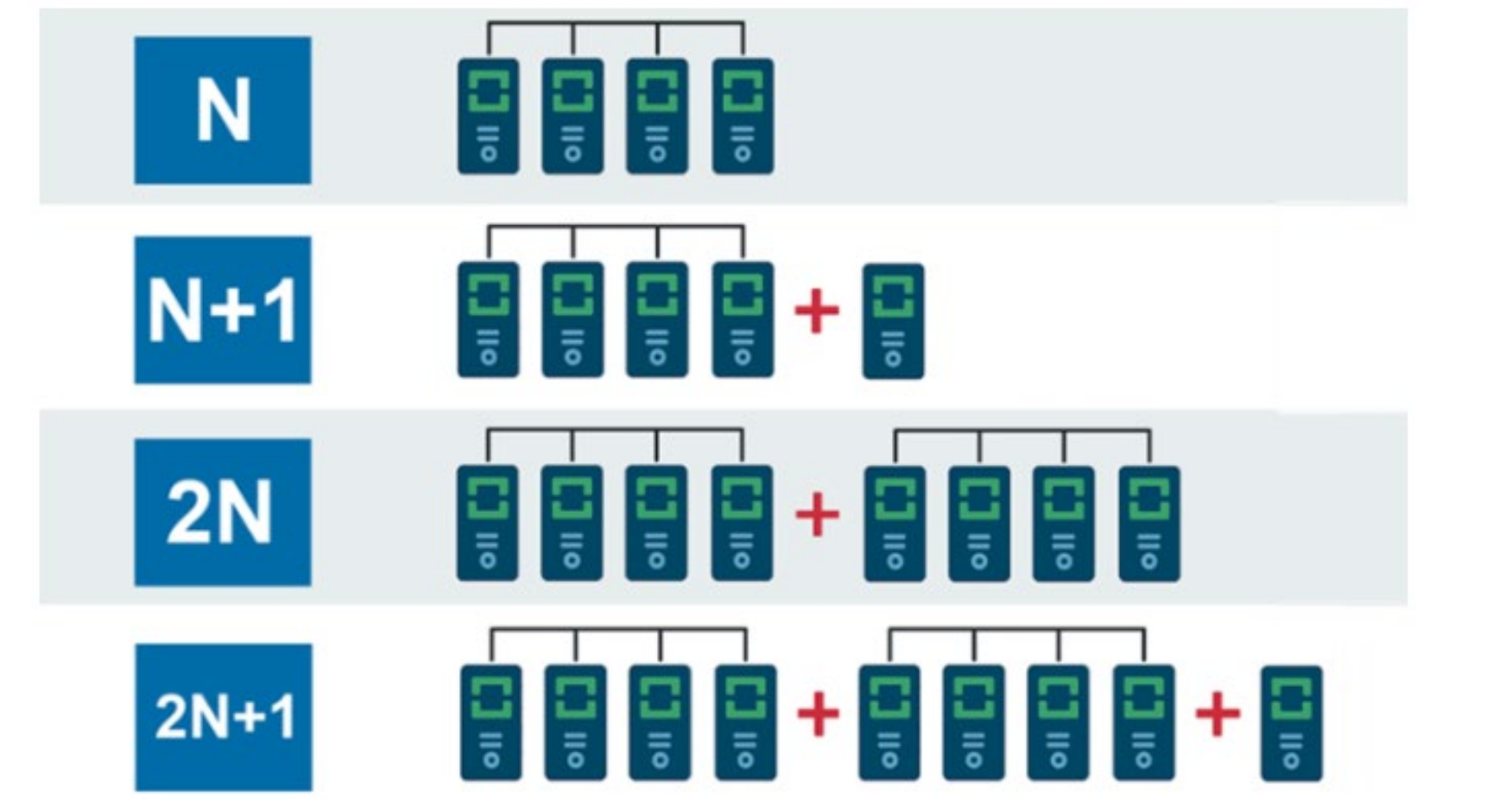
Data Centers

What are data center redundancies?

Level	Tier I	Tier II	Tier III	Tier IV
Redundancy	No	Partial; redundant components	N+1	2N or 2N+1
Redundant Distribution Paths (Energy, Cooling)	No	No	Yes, but only one path active at a time	Yes, all paths active simultaneously
Uptime Guarantee	99.671%	99.741%	99.982%	99.995%
Downtime per Year	28.8 hours	22 hours	1.6 hours	0.4 hours
Concurrently Maintainable	No; maintenance requires downtime	No; maintenance requires downtime	Yes, without taking data center offline	Yes, without taking data center offline
Cost	Moderate	High	Very High	Extremely High

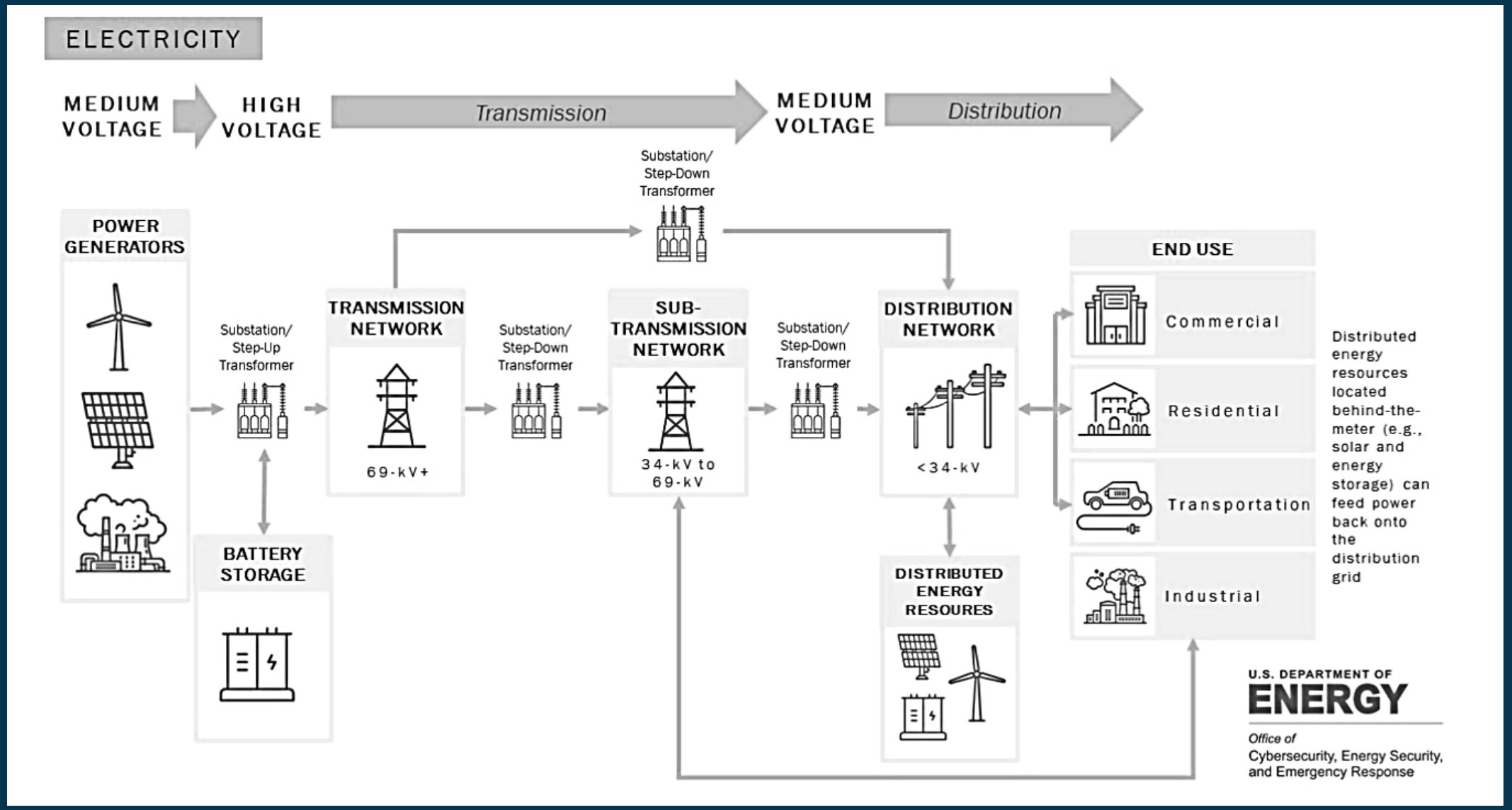
Data Centers

Visual example of redundancy tiers I-IV

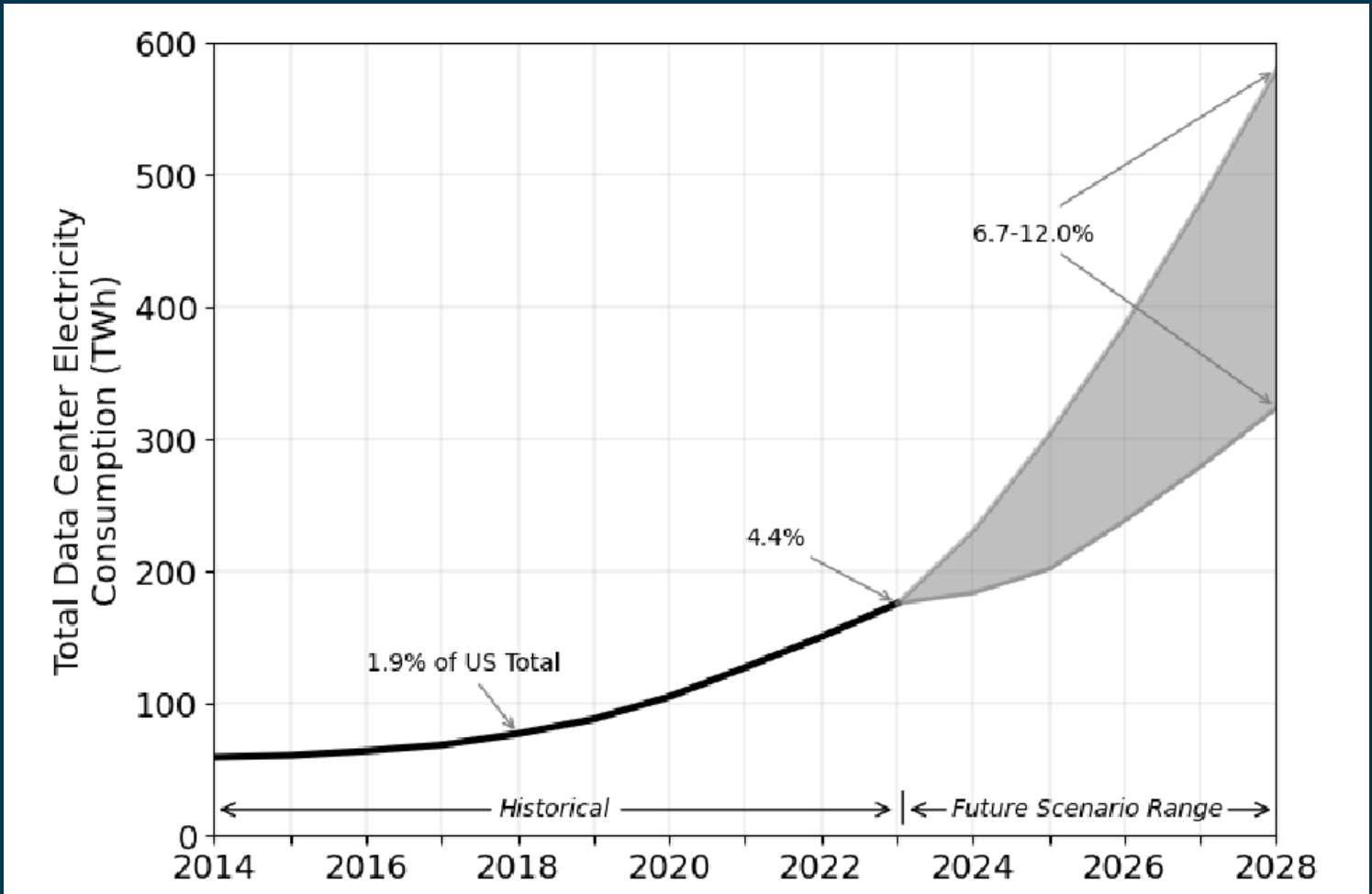


Source: https://phoenixnap.com/

Understanding the Grid



Energy Consumption
Total Data Center Electricity Consumption (TWh)



Source: Shehabi et al., 2024 United States Data Center Energy Usage Report, LBNL 2001637

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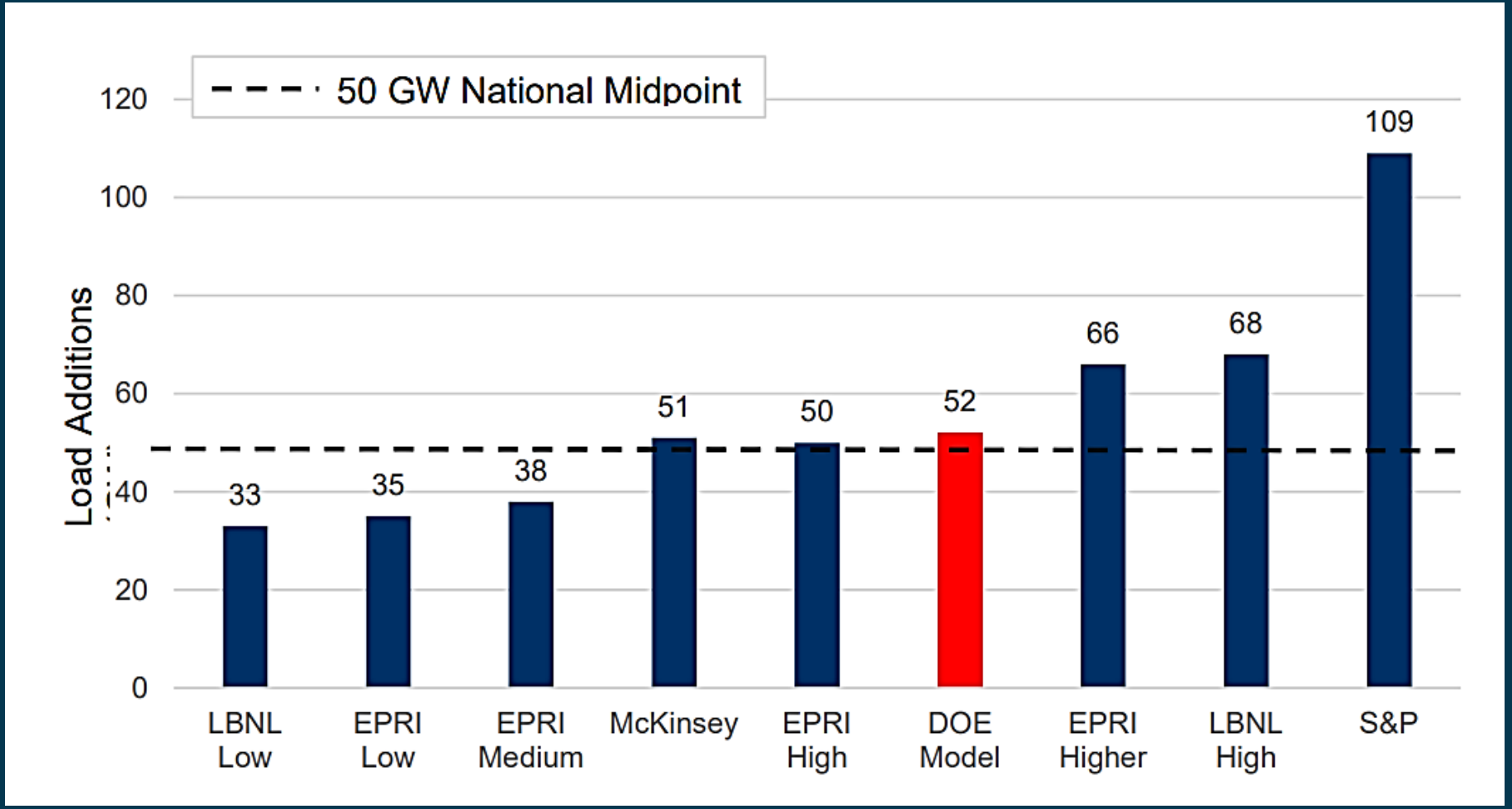
Energy Consumption
Additional Load Demand



Source: U.S. Department of Energy, Resource Adequacy Report – Evaluating the Reliability and Security of the U.S. Electric Grid, July 2025

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Energy Consumption

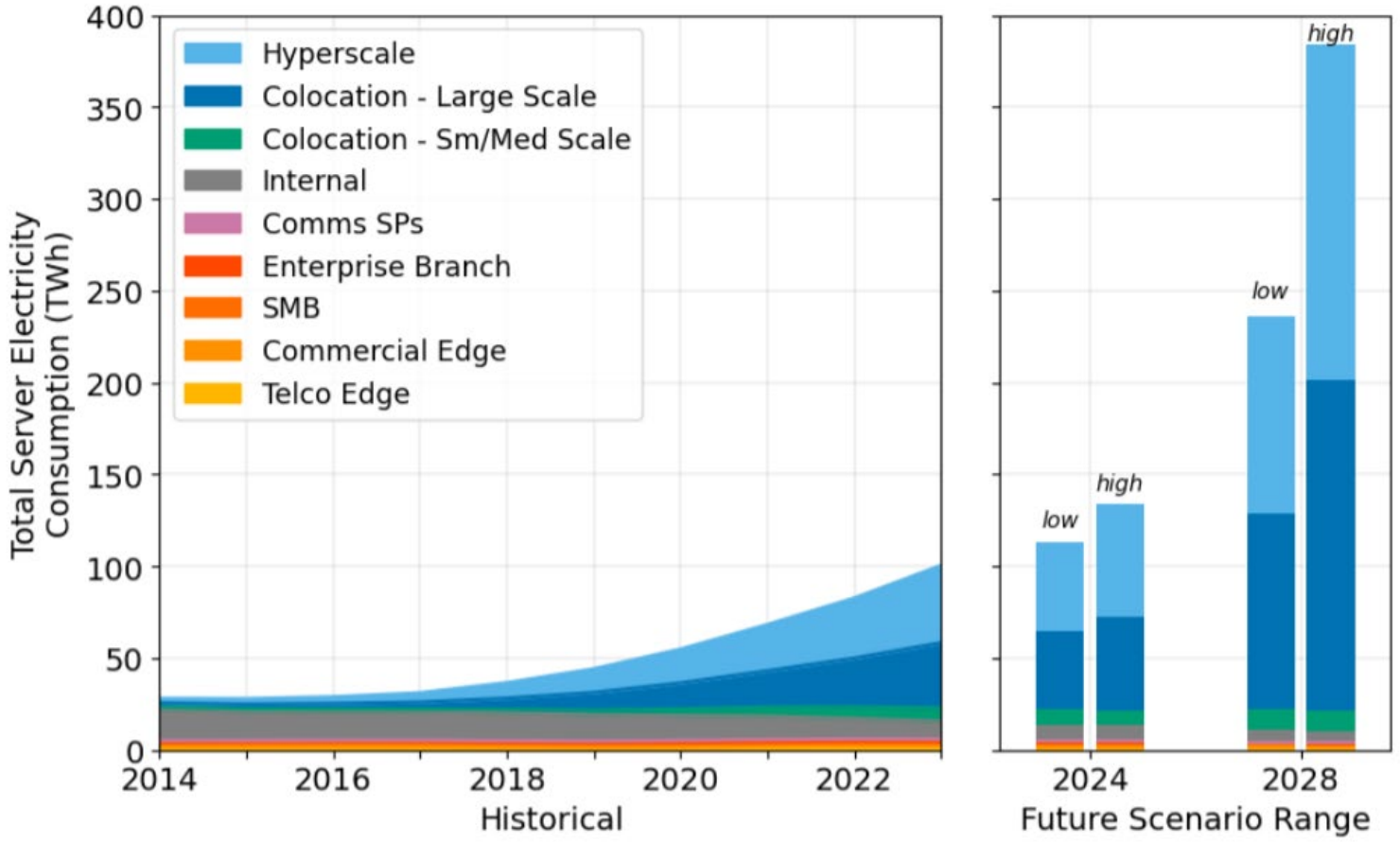

Figure 5.2. Server annual electricity use by space type.

Source: Shehabi, A. et al. (2024). United States Data Center Energy Usage Report. LBNL-2001637, Lawrence Berkeley National Laboratory.

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Energy Consumption
Anticipated mean peak load 2030

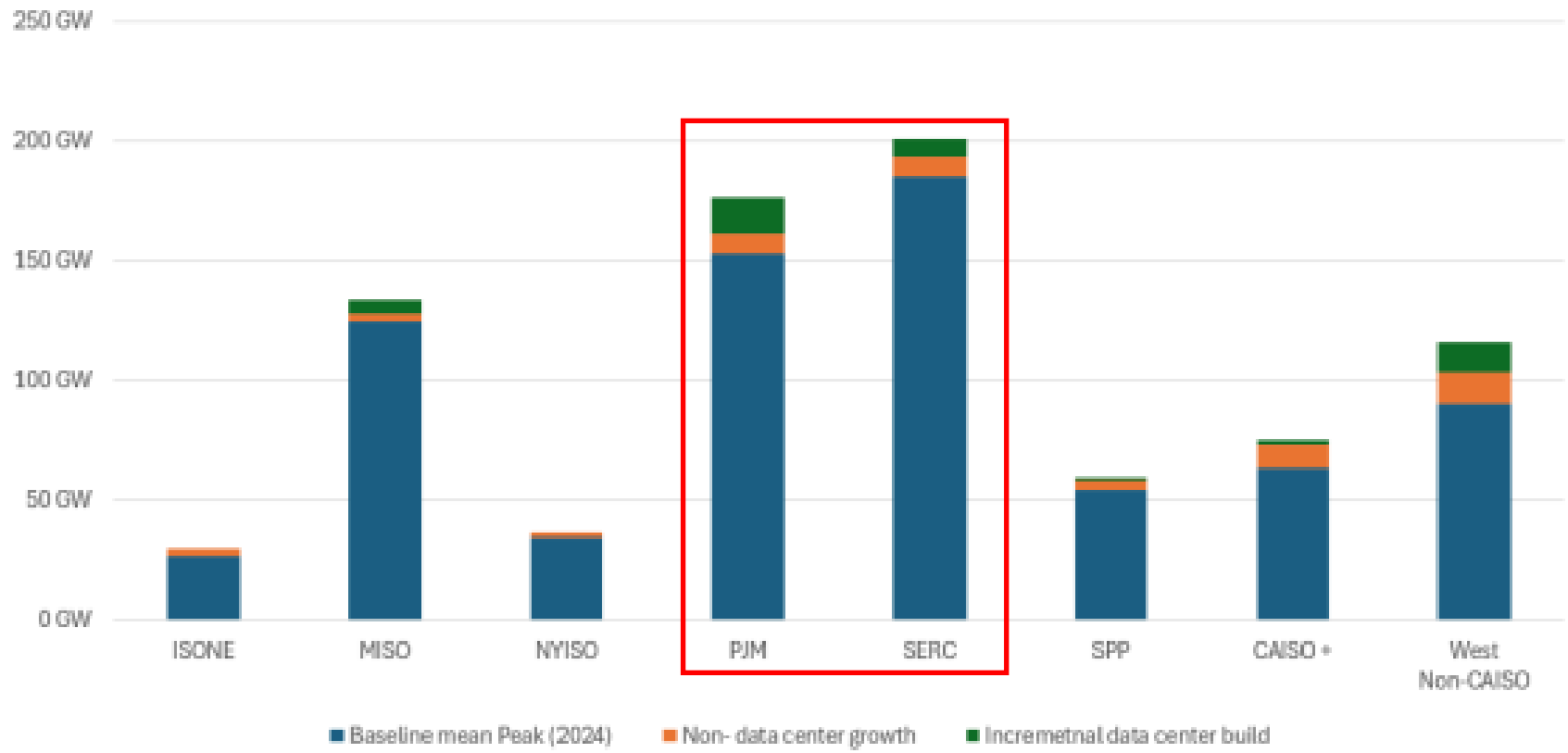

Figure 9. Mean Peak Load by RTO (Current Case vs 2030 Case)

Source: U.S. Department of Energy, Resource Adequacy Report – Evaluating the Reliability and Security of the U.S. Electric Grid, July 2025

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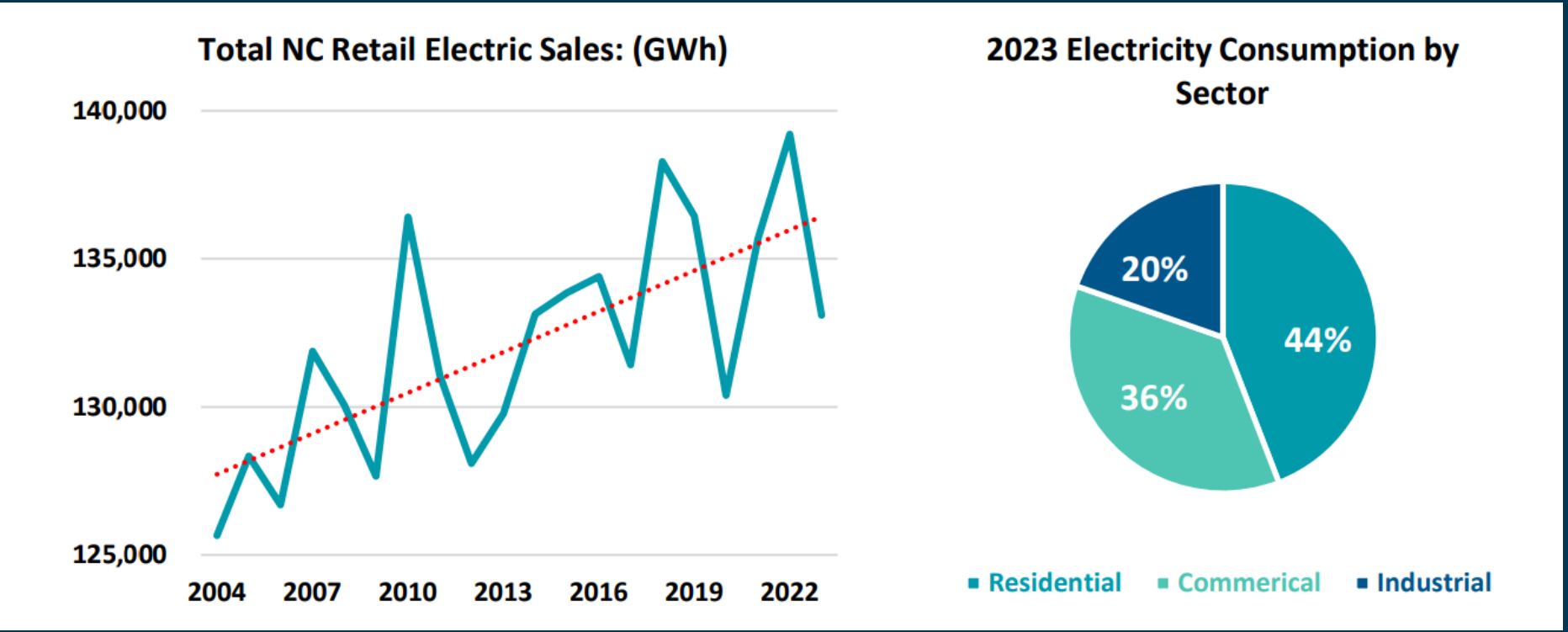
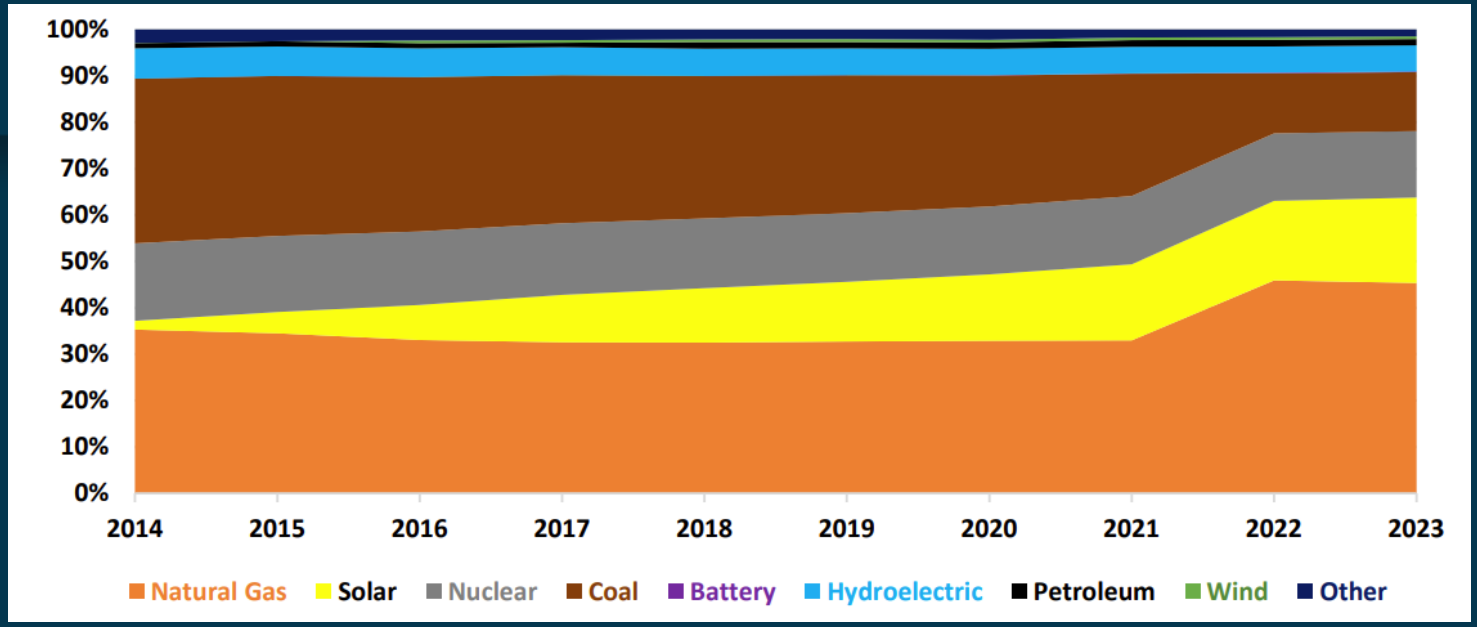
Energy Consumption

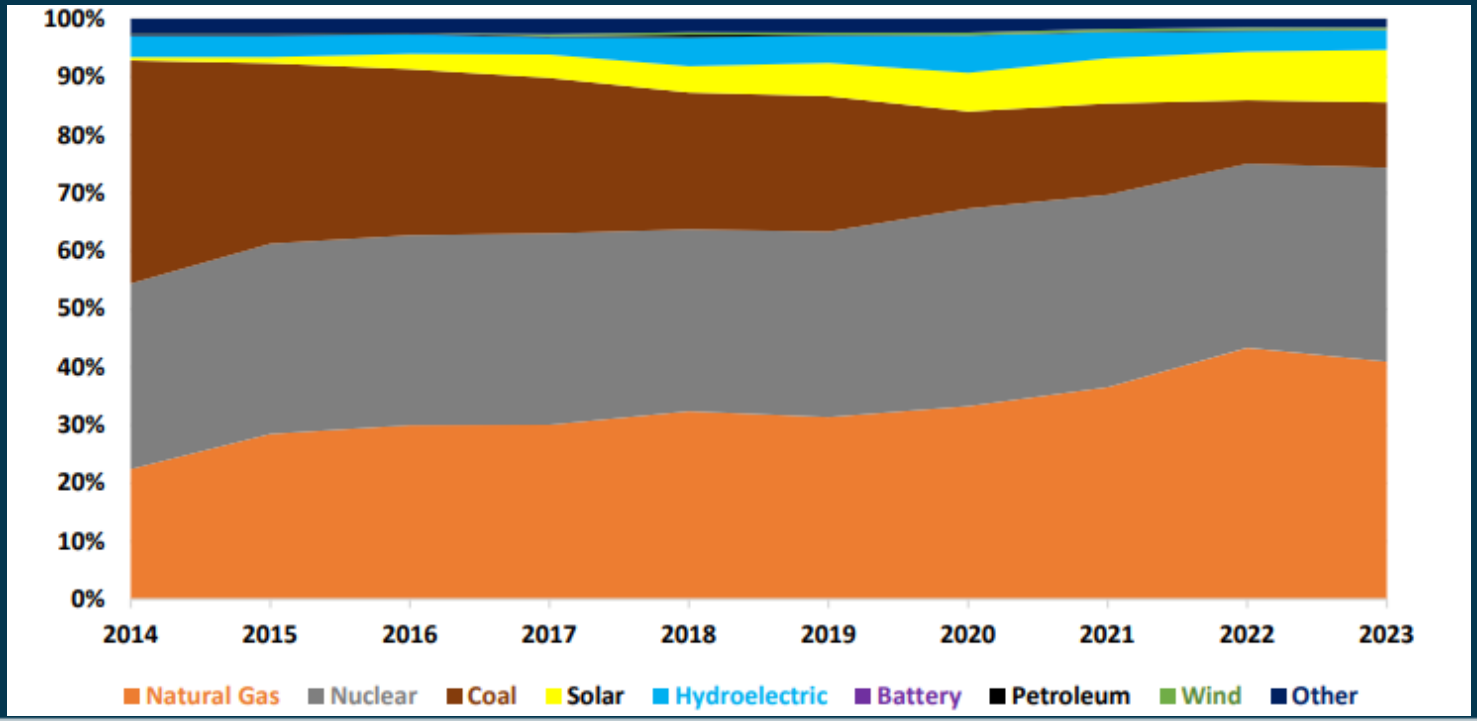


Source: NCDEQ. (2025). North Carolina Energy Security Plan: Final Report. State Energy Office.

Installed Capacity by Fuel Type



Generation by Fuel Type



Source: NCDEQ. (2025). North Carolina Energy Security Plan: Final Report. State Energy Office.

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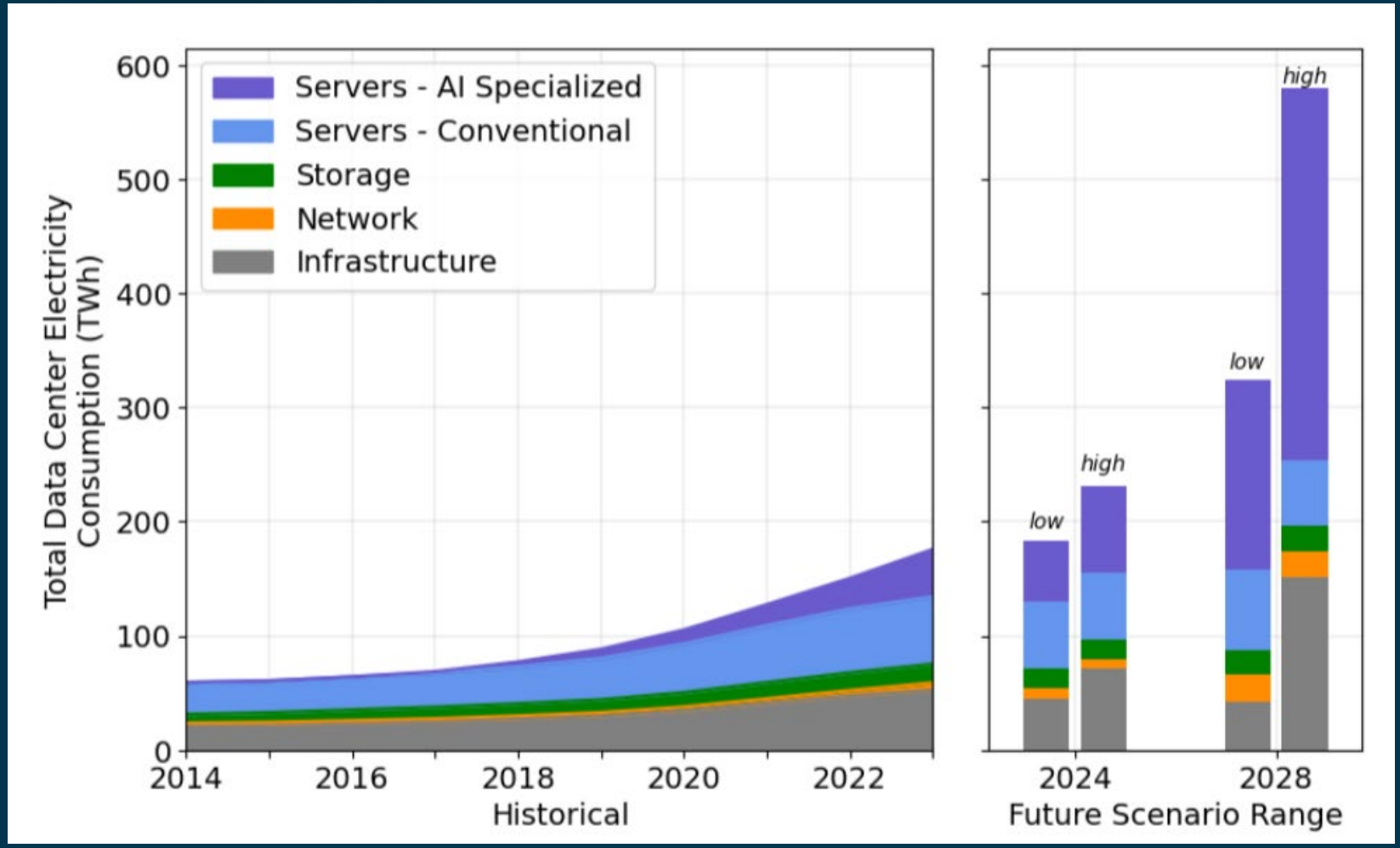
Impact of Artificial Intelligence



Source: Shehabi, A. et al. (2024). United States Data Center Energy Usage Report. LBNL-2001637, Lawrence Berkeley National Laboratory.

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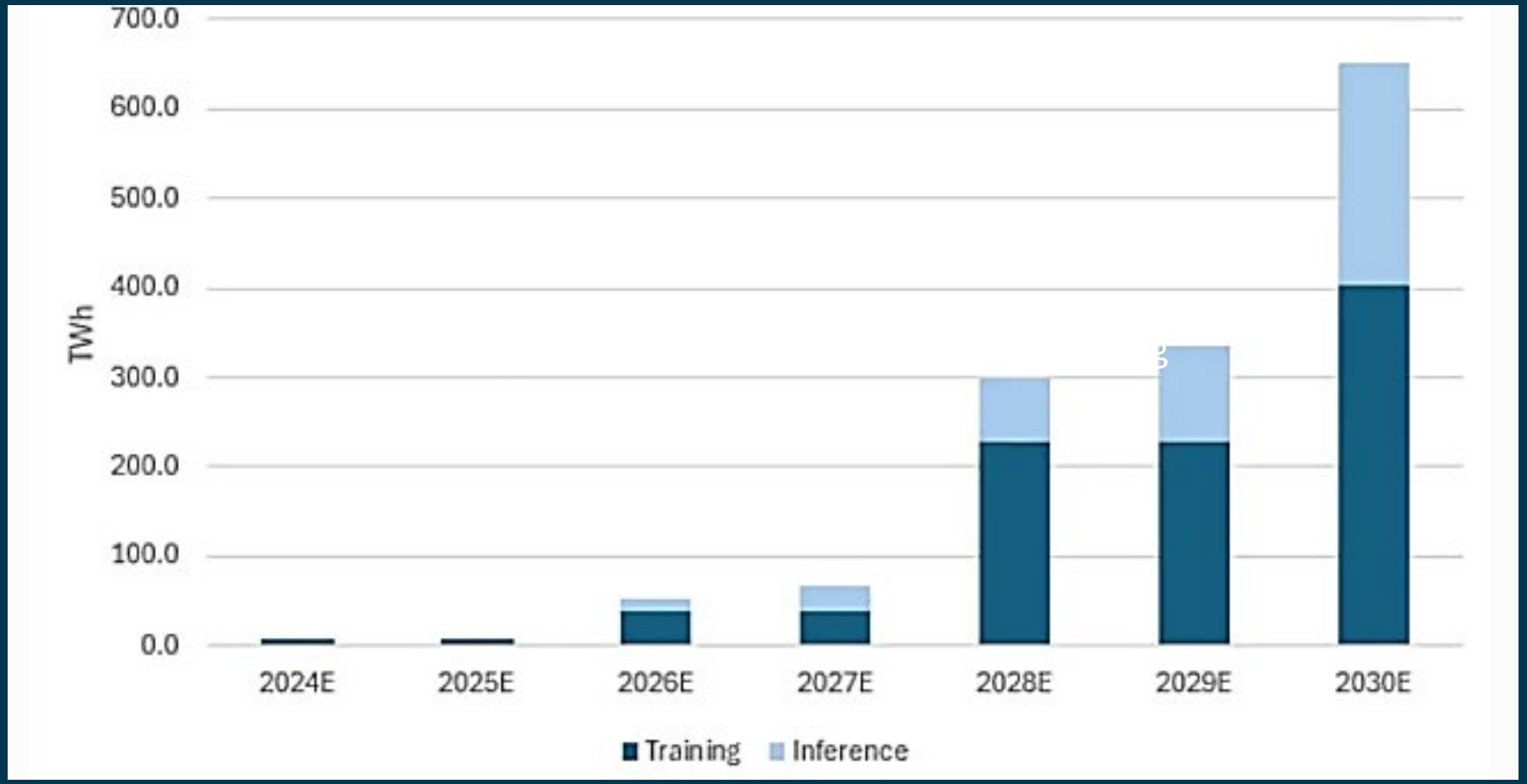
Impact of Artificial Intelligence



Source: Beth Kindig, "AI Power Consumption: Rapidly Becoming Mission-Critical," *I/O Fund*, June 24, 2024

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Energy Consumption

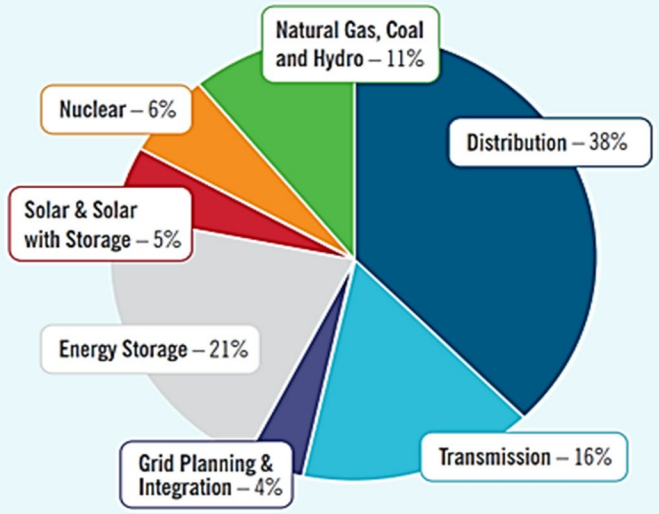
Future Generation (Near Apex)

- 356 MW of standalone Battery Energy Storage Systems (BESS) in New Hill
- 100 MW of Solar in Longleaf
- 900 MW of Nuclear at Shearon Harris

APEX NORTH CAROLINA

2027-2028 Multiyear Rate Plan Investments

*As part of this rate request, Duke Energy has proposed $8.3 billion in new investments represented in the chart below.**



Distribution – $3.2 billion across 436 projects
Transmission – $1.3 billion across 603 projects
Grid Planning & Integration – $302 million across 96 projects
Energy Storage – $1.7 billion across 13 projects
Solar & Solar with Storage – $391 million across 5 projects
Nuclear – $502 million across 48 projects
Natural Gas, Coal and Hydro – $934 million across 198 projects

**Represents North Carolina retail portion of system investments.*

Source: Duke Energy, *2025 NC Rate Case Fact Sheet*.

Proposed Rate Change by Customer Class

Customer Class DEC	% Increase Jan. 1, 2027	% increase Jan. 1, 2028	Customer class DEP	% increase Jan 1, 2027	% increase Jan. 1, 2028
Overall	10.9%	4.1%	Overall	10.9%	4.1%
Residential	13.5%	4.5%	Residential	13.9%	4.3%
General service	7.3%	4.0%	SGS	9.8%	4.8%
Industrial	9.0%	3.7%	MGS	6.4%	4.3%
OPT (Business TOU)	8.3%	3.6%	LGS	5.4%	3.6%

APEX NORTH CAROLINA

Energy Consumption

Large Load Users

Duke Energy is exploring ways to work with large electricity users, such as data centers, manufacturing facilities, and any other use exceeding 50 MW of power.

In SC, Duke reached a settlement with the Sierra Club and other interested parties to petition the state's utility commission to require additional items as part of their review and approval of new energy request.

This may include:

1. Minimum contract period and contract demand for billing purposes;
2. Collateral requirements;
3. Exit policies and restrictions on customer capacity reduction;
4. Treatment of generation, transmission, and administrative costs;
5. Interconnection costs, including opportunities to support grid-enhancing technologies to manage interconnection costs;
6. Optional tariff provisions for flexible interconnections; and
7. Optional tariff provisions for management of clean behind-the-meter resources and optional clean transition tariffs to enable direct selection of new clean energy resources.

Energy Consumption

Policy Considerations & Potential Mitigation Measures

- Evaluating if an Electrical Load Study detailing the project's anticipated diversified load and peak demand for both summer and winter seasons would help the Town understand any potential impact to the local grid.
- Encouraging data centers to set a Power Usage Effectiveness (PUE) ratio goal to maximize efficiency (perhaps a goal of 1.25 or lower) and to provide the Town with annual report on the data center's PUE.
- Evaluating alternative on-site generation or energy storage.

Water Consumption

The primary water use for a data center comes from cooling computing equipment. The amount of water necessary will be dependent on factors such as:

- Size of the system (number of units, racks, etc.)
- Cooling method - liquid (evaporative) vs air cooling (less water)

A hyperscale data center may require ~1–5+ MGD (365 million gallons – 1.83 billion gallons annually).

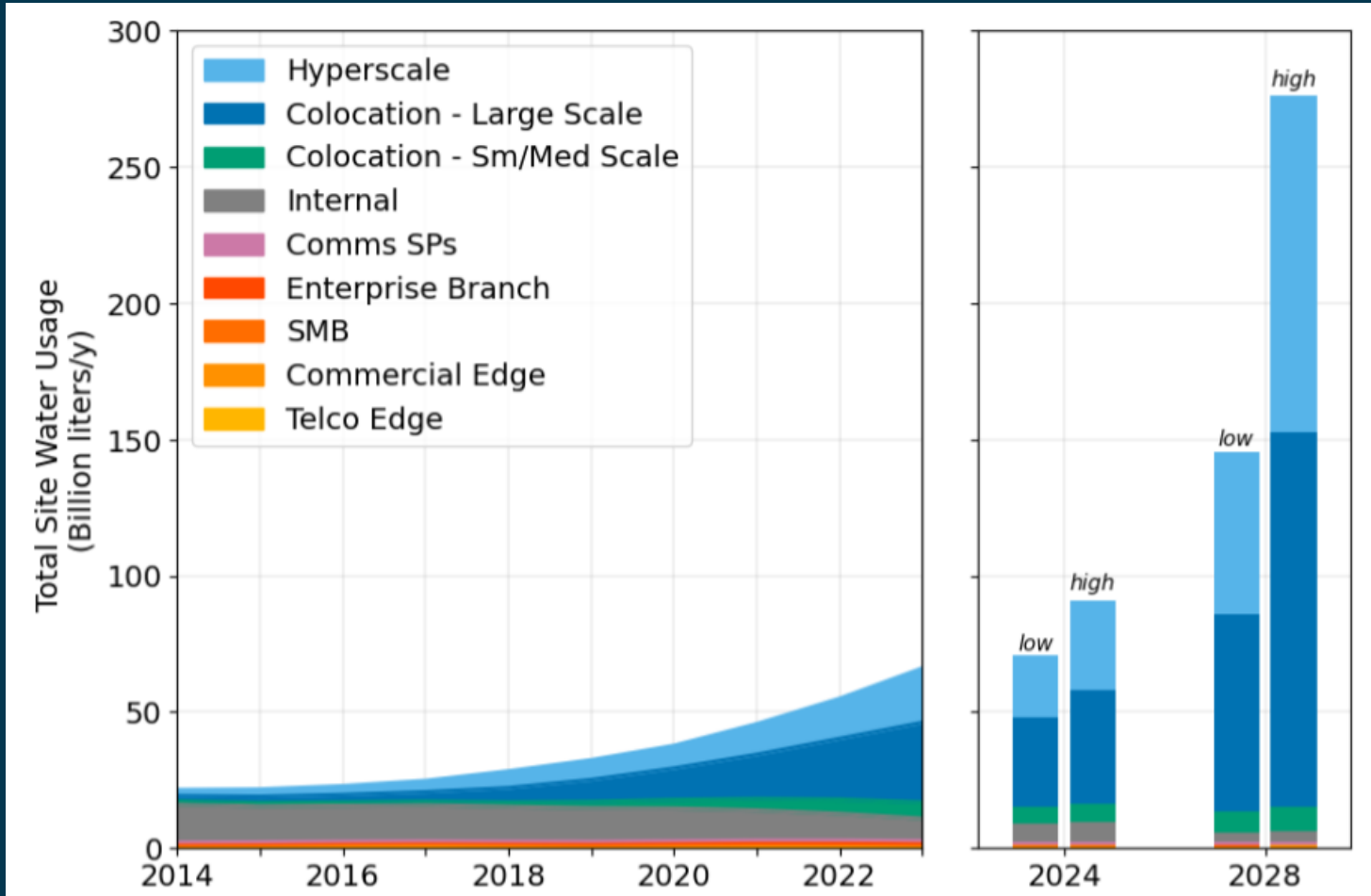


Figure 5.9. Direct water consumption by data center type.

Shehabi, A. et al. (2024). United States Data Center Energy Usage Report. LBNL-2001637, Lawrence Berkeley National Laboratory.

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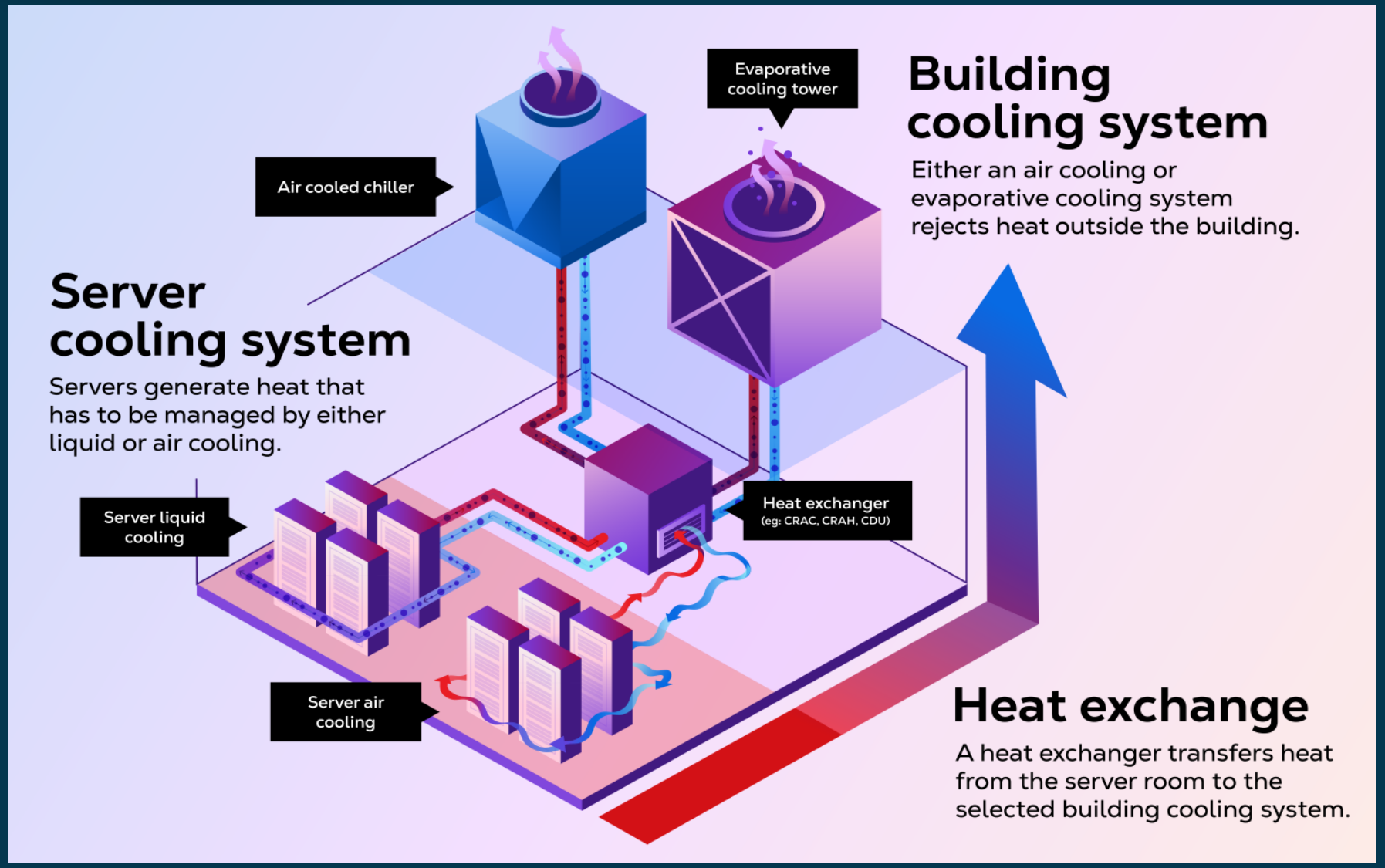
Cooling Systems



Source: equinix.com

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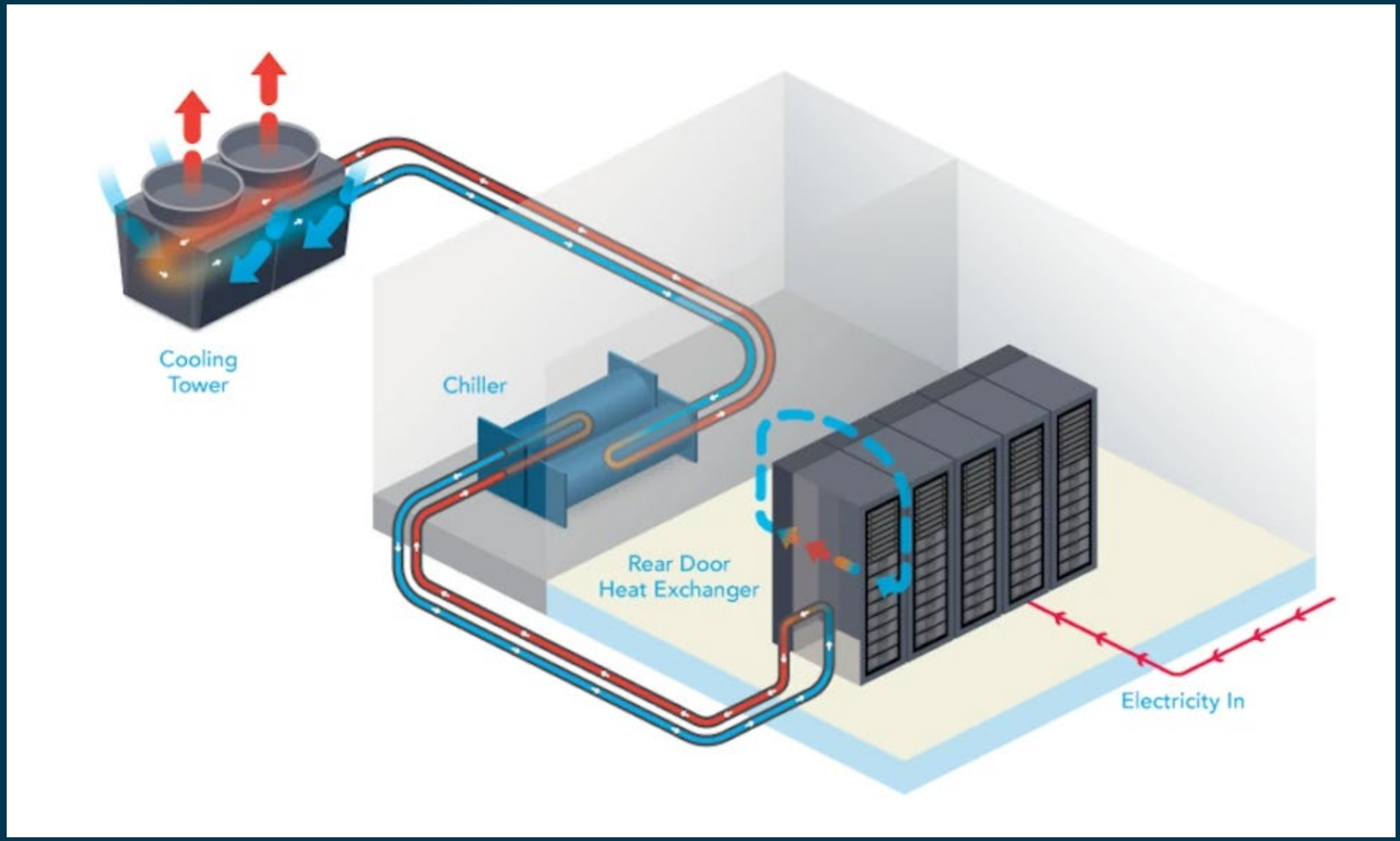
Closed-Loop
Liquid to air cooling



Source: Upsite.com

APEX
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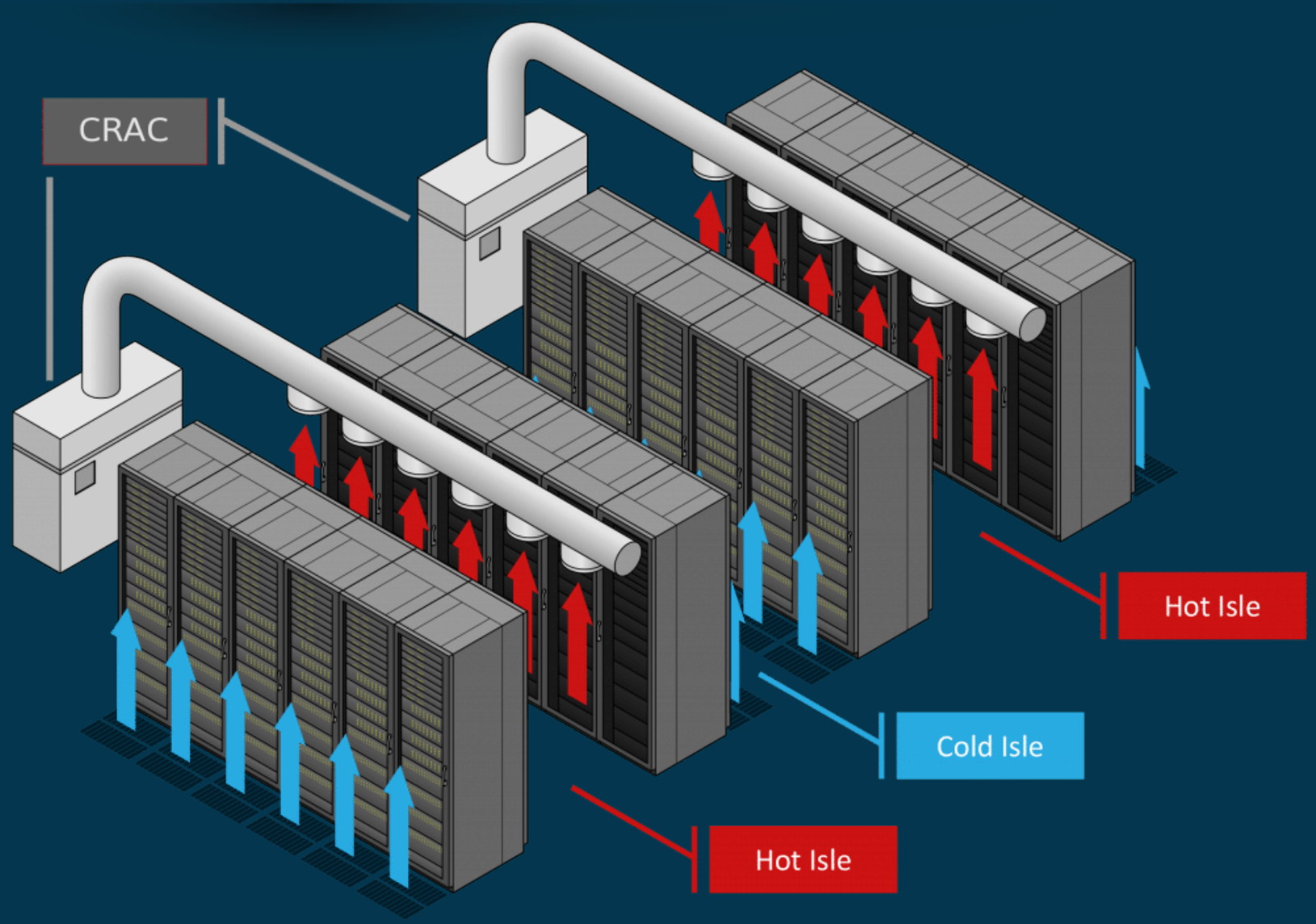
Air Cooling



Source: nlyte.com

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Comparing Water Use by Use Type

1,500,000 Gallons of water per day applied to each of the following uses.

Use	Design Flow Rate	Equivalency	Notes/Context
Multi-Family Residential/Apartments	250 GPD/unit	~6,000 units	Comparable to several large apartment complexes
Single-family residential	300 GPD/unit	~5,000 homes	Roughly a small town's worth of housing
Hospital	300 gal/bed	~5,000 beds	Equivalent to multiple large regional hospitals
Grace Christian School	~18,000 GPD	~83 comparable schools	Local reference point
Felton Grove High School	~35,250 GPD	~43 comparable schools	Local reference point
Light Industrial: Apex Light Industrial Phase 2	~69,130 GPD	~22 comparable buildings	Local reference point
Auto Manufacturing	~39,000 gallons per unit*	~38 vehicles per day	A single plant may create up to 100,000 to 400,000 vehicles per year
Bioscience Facility	~67, 000 GPD	~22 comparable facilities	Median of regional reference points

APEX NORTH CAROLINA

Water Consumption

Policy Considerations & Potential Mitigation Measures

- Encouraging or requiring the use of reclaimed water for equipment cooling applications.
- Limiting potable water use for non-cooling site needs, emergencies, or reclaimed water system maintenance periods.
- Encouraging or requiring the use of geothermal closed loop for cooling.
- Discouraging or prohibiting the use of groundwater for cooling.
- Considering adoption of a potable water surcharge to discourage domestic water use, support water conservation and infrastructure costs. Encouraging onsite storage of reclaimed water to serve the use for a 24-hour period minimum.

Water Consumption

Policy Considerations & Potential Mitigation Measures cont.

- Requiring a water and sewer study detailing anticipated demand, necessary infrastructure and plant updates, and long-term operating impacts to the utility system.
- Encouraging data centers to set a Water Usage Effectiveness (WUE) ratio goal to maximize efficiency (perhaps a goal of 0.5 or lower) and to provide the Town with annual report on the data center's WUE.
- Applying monitoring and reporting requirements that follow the Towns Sewer Use Ordinance and pretreat wastewater if needed to meet local limits.
- Allowing a combination of air and liquid cooling methods to optimize efficiency and reduce waste.

Environmental Impacts

Data centers may impact the environment from daily operation (lighting, greenhouse gases, etc.) or from potential equipment failure that leads to leaks of hazardous material onsite, or fires and explosions.

Known Points of Concern:

- Light Pollution
- Air Quality & Greenhouse Gases
- Water Quality and Supply
- Ground and Air Contamination

Environmental Impacts: Light Pollution

Data centers may store highly sensitive information regarding financial, medical, or in some instances national security-related information. As a result, data centers take security very seriously and tend to provide enough lighting to adequately monitor and ensure safety on the site.

Any lighting concerns not fully mitigated by the UDO's exterior lighting standards will need to be addressed through suggested zoning conditions at the time of rezoning to mitigate potential impacts on neighboring property owners and local wildlife. Such conditions may include additional standards for fixture height, additional shielding, and greater setbacks from the property lines.

Environmental Impacts: Air Quality

Direct Impact: Emissions from onsite generators can release greenhouse gases and other air pollutants, that contribute to climate change and can degrade local air quality. Additional mitigation measures may be necessary to reduce or control the emissions from onsite power generation.

Indirect Impact: Some fossil fuel power plants may have their life spans extended beyond their original retirement date to help meet the demand for electricity until newer plants are brought into service. When this occurs, it creates the potential for an increase in greenhouse gases and other air pollutants that may have negative impacts on communities near these power plants and thus results in indirect environmental impact from excess energy demand.

Diesel Emissions

The Environmental Protection Agency (EPA) states that exposure to diesel exhaust like that from diesel backup generators has been linked to serious health effects, including asthma and other respiratory illnesses, and can aggravate existing heart and lung conditions, particularly among children and older adults. These impacts can lead to higher rates of emergency room visits, hospitalizations, missed work and school days, and premature death.

Environmental Impact: Water Quality and Quantity

Direct Impact: Data centers that withdraw large volumes of potable water from shared reservoirs may create direct impacts, such as stress on wildlife, degradation of habitat, and reduced water availability for surrounding communities.

Indirect Impact: Power generation facilities require large amounts of water to cool, and as demand for energy grows, the need for more energy to meet that demand will indirectly require an increase in water use.

Jordan Lake Water Supply Allocations

Allocation-holder	Allocation (% of Water Supply Pool)*
Cary/Morrisville & Apex	46.2
Chatham County –North District	13
Durham	16.5
Hillsborough	1
Holly Springs	2
Orange County	1.5
OWASA	5
Pittsboro	6
Total distributed allocation:	**91.2 (out of 100)**
Remaining allocation:	**8.8**

*Every 1% equals 1 million gallons of water per day (MGD). 100% = 100 million gallons of water per day (MGD).

Source: NC Department of Environmental Quality – Jordan Lake Water Supply Allocation, Current Allocations

APEX NORTH CAROLINA

Environmental Impact: Ground Contamination

- Data centers that store coolants, diesel, battery backups, or biocides for cooling tower treatment must comply with state and federal requirements for safe storage and use of potentially hazardous materials.
- Equipment failure could result in leaks or spills of potentially hazardous materials, posing a risk to the local environment.

Environmental Impact: Air Contamination

A hyperscale data center typically requires multiple cooling towers to dissipate heat generated by large-scale computing operations. Depending on facility size, redundancy requirements, and cooling design, a hyperscale data center may utilize anywhere from fewer than ten to several dozen cooling towers at full build-out.

Improper maintenance of building water systems may contribute to the growth and spread of potentially harmful bacteria such as Legionella. The most common illnesses associated with Legionella exposure are Legionellosis and Legionnaires' disease.

In rare cases, research has shown that due to the aerosolization associated with cooling towers, the spread of Legionella may occur outside of the immediate area of the site, and under certain conditions, aerosolized mist may up to travel several miles from the source.

To prevent the growth and spread of Legionella, the CDC has developed an assessment and operational toolkit; adherence to these resources may help minimize the risk of releasing potentially harmful bacteria into the environment.

Environmental Impact

Policy Considerations & Potential Mitigation Measures

- Applying existing UDO Section 8.6 *Exterior Lighting* and considering additional zoning conditions to address lighting concerns such as color temperature, brightness, fixture height, and light trespass.

- Considering the use of Tier IV or Tier IV equivalent backup generators to reduce the adverse impact on air quality.

- Considering the use of natural gas generators for emergency backup.

- Considering the use of spill containment berms, walls, and impermeable barriers to prevent off-site and ground contamination.

Environmental Impact

Policy Considerations & Potential Mitigation Measures cont.

- Considering closed-loop cooling alternatives, such as geothermal systems (e.g., Pit Thermal Energy Storage) or reclaimed water, to reduce impacts on local aquifers and shared reservoirs.

- Considering the use a closed-loop cooling system that does not create a mist that carry the legionella bacteria into the environment, and that can demonstrate compliance with CDC and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Guideline 12 2023 *Managing the Risk of Legionellosis Associated with Building Water Systems* standards.

Note: Additional environmental considerations regarding environmental assessments, testing, and monitoring were shared by residents on 1/14/2026; staff will need additional time to conduct research prior to presenting on these items.

APEX NORTH CAROLINA

Noise

Data centers use large backup generators and have HVAC systems that often include cooling chillers, which are louder than standard HVAC units. Together, this equipment can produce continuous high- and low-frequency noise that may impact nearby properties.

The most common way that sound is measure by **Decibels (dB),** which measures sound intensity on a logarithmic scale, where every 10 dB increase represents sound that is perceived as roughly twice as loud.

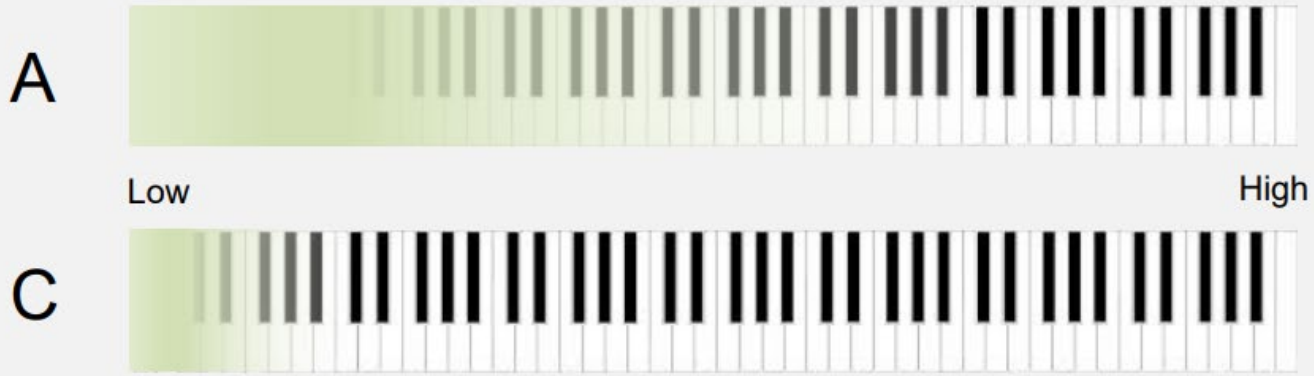
Decibels are measured by comparing a sound's pressure level to a standard reference level, with A-weighting (dBA) reflecting human hearing sensitivity and C-weighting (dBC) capturing lower-frequency sounds.

Other analysis such as Octave-band measure decibel levels across additional frequencies (Hz) beyond the A or C weighted scales.

Noise

Measurement Levels – Being updated

Distinction between A/C Weighted Scale



Octave-band sound levels, continuous

APEX NORTH CAROLINA

Noise Source	Approx. Decibel Level (dB)	Potential Effect / Perception
Jet take-off (80ft)	150	Risk of severe physical injury; possible eardrum rupture at close range
Aircraft carrier deck	140	Extremely painful; immediate risk of hearing damage
Military jet take-off with afterburner (50 ft)	130	Painful; immediate hearing damage likely
Thunderclap; chain saw; oxygen torch	120	Threshold of pain for many individuals; hearing damage possible with short exposure
Jet flyover (1,000 ft); live rock music; horn noise – train (100 ft)	110	Very loud; hearing damage likely with short exposure
Gas lawn mower (3ft)	100	Hearing damage possible in as little as 15 minutes; ~8× perceived loudness of 70 dB
Diesel Truck (50ft) General Freight Train (100ft) Lawn mower (100ft)	90	Hearing damage possible with prolonged (8-hour) exposure; ~4× as loud as 70 dB
Garbage disposal (3ft); dishwasher; factory noise;	80	Hearing damage possible with long-term exposure; ~2× as loud as 70 dB
Passenger car at 65 mph; freeway traffic; vacuum cleaner (10ft); radio or TV	70	Upper range may be annoying to some individuals
Conversation in restaurant or office; background music; AC unit (100 ft); heavy traffic (300ft)	60	Generally comfortable; normal conversation level
Quiet suburb; conversation at home	50	Quiet; minimal disturbance
Library; bird calls; urban ambient sound floor	40	Very quiet
Quiet rural area	30	Extremely quiet
Whisper; rustling leaves	20	Barely audible
Breathing	10	Near the threshold of hearing

Noise

AIR-COOLED CHILLERS

Data centers commonly rely on air-cooled chillers that are installed either at ground level or on the roof. Air-cooled chillers are a notable source of exterior noise due to the operation of large fans and compressors used to expel heat from the facility. These components can add significant noise to the site.

Source: Aircomfort.com

APEX NORTH CAROLINA

Noise

COOLING TOWERS

Cooling towers function by receiving heated water from the facility's liquid chillers and dispersing heat into the atmosphere. The cooled water is then recirculated back into the system. This process involves multiple mechanical components operating simultaneously, which can generate noise. Data centers typically employ one to several dozen cooling towers, often located on rooftops.

Source: bextel.com

Source: bextel.com

APEX NORTH CAROLINA

Noise

BACKUP GENERATORS

Data centers are designed to operate continuously, with minimal tolerance for service interruptions. To maintain operations during power outages, facilities are equipped with diesel-powered backup generators. Although generator use is typically infrequent and limited to emergency events or testing conditions, their operation can result in substantial short-term noise impacts on adjacent properties.

Source: storagereview.com

Source: kaloengineering.com

APEX NORTH CAROLINA

Noise

AIR HANDLING UNITS

Air handling units serve two primary functions within a data center: (1) providing adequate ventilation to remove heat and airborne contaminants, and (2) maintaining acceptable operating temperatures within server halls. These units are typically located on the rooftop. The quantity of air handling units may be significantly higher than that of typical office and industrial uses. When operating simultaneously, air handling units can generate combined noise levels above the typically accepted decibel level near residential uses.

Source: technical.ly

APEX NORTH CAROLINA

Example of site layout and location of generators and cooling equipment.

Source: Nathan Howard/Bloomberg via Getty Images

APEX NORTH CAROLINA

Example of site layout and location of generators and cooling equipment.

Source: Piedmont Environmental Council, Hugh Kenny

APEX NORTH CAROLINA

Example of site layout, including the location of generators and cooling equipment and their proximity to residential uses.

Source: Piedmont Environmental Council, Hugh Kenny

APEX NORTH CAROLINA

Example of site layout, including the location of generators and cooling equipment and their proximity to residential uses.

Source: Piedmont Environmental Council, Hugh Kenny

Noise

Policy Considerations & Potential Mitigation Measures

- Providing measurable and enforceable use standards and/or zoning conditions that address both high-frequency and low-frequency noise.
- Prioritizing the utilization of pre-construction and post-construction noise studies prepared by a qualified, third-party acoustical professional to evaluate compliance with adopted standards.
- Prioritizing maximum allowable noise levels at property lines (for example, 55 dBA and 50 dBC, or limits established as defined number of decibels above existing ambient conditions) with additional mitigation evaluated if standards cannot be maintained.

Noise

Policy Considerations & Potential Mitigation Measures cont.

- Exploring best practices for when the use of backup generators is appropriate (e.g., emergency operation and maintenance activities).
- Encouraging generator testing and maintenance to defined daytime hours (e.g., 10:00 a.m. to 4:00 p.m.) to minimize community impacts.
- Encouraging minimum separation distances between sound-generating equipment and property lines and encouraging placement of such equipment behind principal structures to provide additional shielding.
- Encouraging the use of parapet walls to screen all rooftop equipment. UDO Sec. 5.2.4.B.2 allows parapet walls to extend no more than 5 feet above the allowable height of the building, so the actual building height may need to be reduced in order to accommodate the needed parapet wall height.

Land Use (Zoning, Site Design, Aesthetic Standards)

Data center zoning varies by jurisdiction: some require overlay districts with specific performance standards, others limit data centers to industrial zones, while some allow them in both commercial and industrial districts.

In recent years concerns related to noise, architectural designs, and specific use standards have resulted in other municipalities amending their zoning ordinance standards to attempt to mitigate these impacts via:

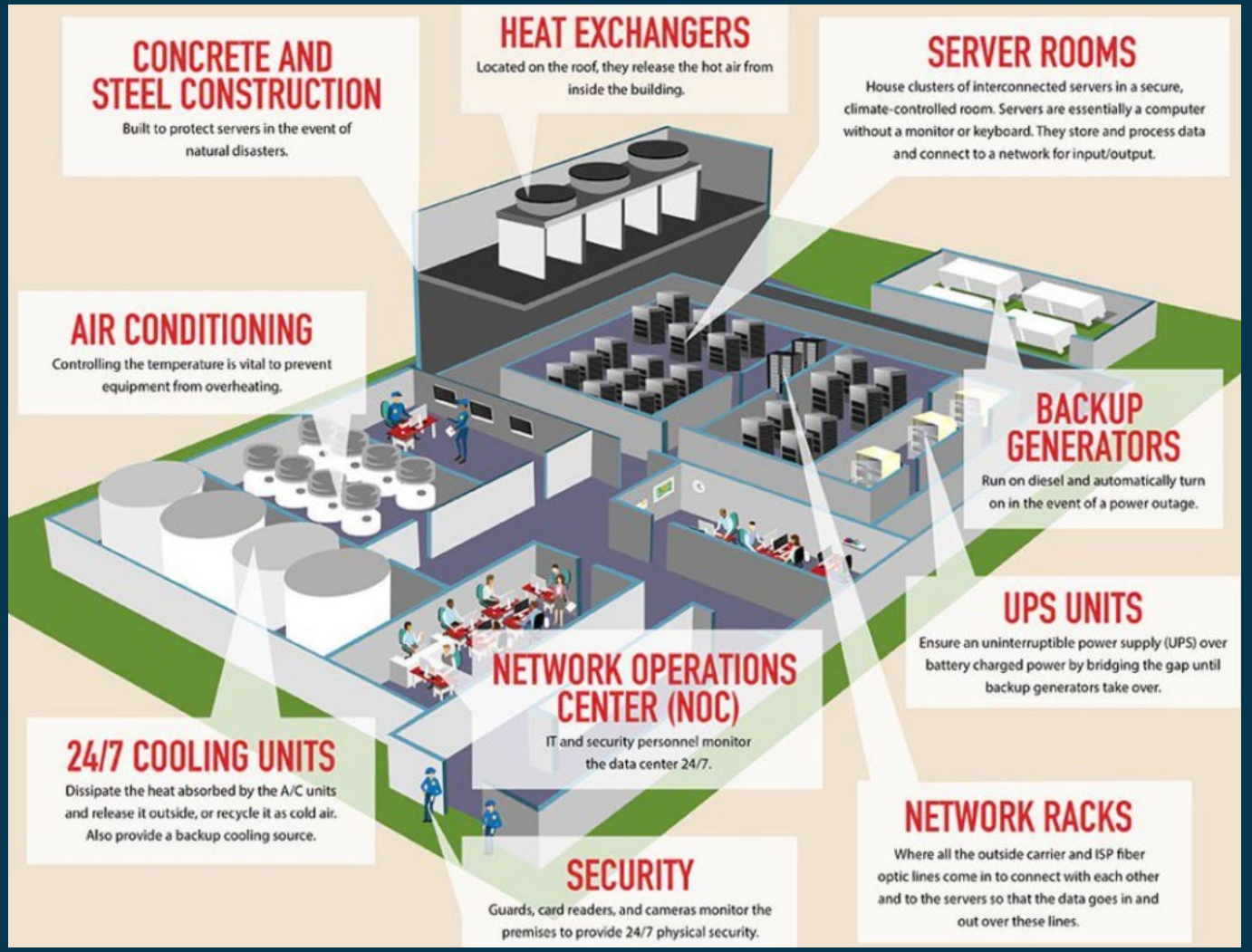
- Larger setbacks (100’ - 1,000’)
- Wider buffers (50’ - 200’)
- Additional screening for electrical and mechanical equipment.
- Increased separation requirements for noise producing equipment from property lines.

Additionally, large colocation and hyperscale data centers may require on-site electric substations to meet power demands.

- Substation placement and visibility can impact surrounding communities due to safety concerns, noise, and visual effects.

Land Use

Example of site layout and design of a data center.



Source: greenarchworld.com

APEX NORTH CAROLINA

Land Use

Example of site layout and design of a data center.

APEX NORTH CAROLINA

Land Use

Example of the importance of site distance from residential uses.

Source: Gerville/Istock. Loudoun Meadows, Aldie, VA.

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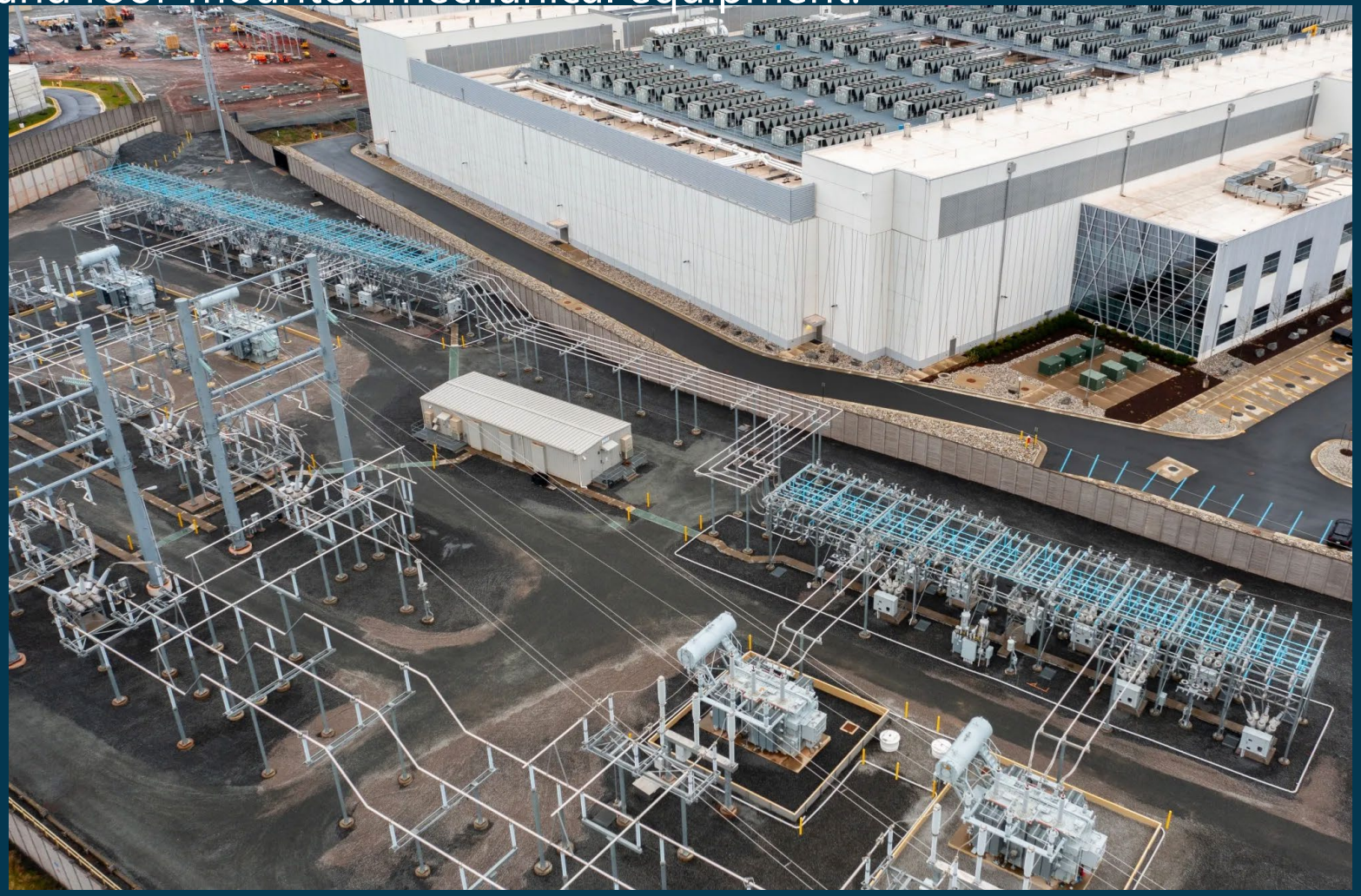
Land Use

Example of electric substation constructed to support data centers.

Source: pecva.org

Land Use

Example of electric substation constructed to support data centers and roof-mounted mechanical equipment.



Source: energynow.com; Nathan Howard/Bloomberg

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Design Standards

Data center designs can vary widely, and without strong architectural standards, developments may result in 60'-100' tall plain warehouse structures that can quickly age, diminish local character, and become visual eyesores.

Source: DPR.COM Meta's Henrico County Data Center

Design Standards

Example building designs of a data center.

Source: dgtlinfra.com *Amazon (AWS) Data Center Location in Northern Virginia*

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Decommissioning & Reuse of Hyperscale Data Center Sites

- **Future reuse depends on decommissioning:** Retaining high-hazard infrastructure (fuel systems, batteries, substations) can limit redevelopment options, increase permitting complexity, and trigger higher building and fire code requirements.
- **Full removal increases flexibility:** Complete decommissioning supports adaptive reuse and aligns with a broader range of employment, commercial, or industrial land uses.
- **Change of occupancy matters:** Under the NC Building Code, new uses require evaluation of remaining infrastructure; retained hazardous systems may force higher-hazard occupancy classifications.

Decommissioning & Reuse of Hyperscale Data Center Sites cont.

- **Code implications:** Higher-hazard classifications can require enhanced fire protection, separation, egress, and life-safety systems under the NC Building and Fire Codes.
- **Hazardous materials process:** Reuse requires inventory, reporting, closure planning, removal, inspection, and approval by fire and environmental authorities.
- **Utility infrastructure considerations:** Private substations may be removed or retained; continued use requires full compliance with NC codes and updated electrical documentation.
- **Best practice:** Require a **decommissioning and reuse plan** at the time of approval to ensure long-term site adaptability and community protection.

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Land Use

Policy Considerations & Potential Mitigation Measures cont.

- Following best practices for data center application review, including conditional zoning and developer agreements.
- Finalizing amendments to the Unified Development Ordinance (UDO) to create the data center use, definition, and related supplemental standards.
- Applying existing UDO Article 9 *Design Standards* and considering additional zoning conditions to address architectural concerns such as building massing, fenestration, facade articulation, and materials.
- Encouraging maximum height standards or minimum setback distances for data center structures to limit visual impact.

Land Use

Policy Considerations & Potential Mitigation Measures cont.

- Limiting hyperscale data center development to zoning districts intended for industrial use.
- Evaluating minimum site area thresholds (e.g., 100 acres or more) to ensure adequate separation from surrounding land uses and infrastructure.
- Prioritizing enhanced setbacks and wide buffers (e.g., 200’ – 1,000’) that prioritize the preservation of existing mature vegetation and the use of berms where little or no vegetation exists.
- Encouraging the applicant to provide a decommissioning and reuse plan to address long-term site viability and potential future redevelopment.

Land Use

Policy Considerations & Potential Mitigation Measures cont.

- Encouraging internal placement of equipment and screening of rooftop or ground-mounted equipment when internal placement is not practicable.
- Prioritizing minimum separation distances between potential hazard areas (such as fuel storage tanks and battery energy storage systems) and sensitive land uses, including schools, daycare facilities, hospitals, and similar uses.
- Encouraging early installation of perimeter buffers and screening in initial phase to mitigate visual impacts during construction and operation

Capacity and Regulatory Requirements

Water Treatment: Cary/Apex Water Treatment Facility

- Total Facility Capacity: 56 MGD
- Apex Capacity: 12.88 MGD (23% Ownership)
- Apex Avg. Daily Flow (2025): 5.05 MGD (39%)
- Apex Max Day Demand (2025): 6.9 MGD

Raw Water Intake: Jordan Lake

- Apex Capacity: 10.6 MGD (23% Allocation)
- Apex Avg. Raw Demand (2025): 5.83 MGD

Capacity and Regulatory Requirements (cont.)

Water Storage: Elevated Storage

- Hunter Street Tank: 0.5 MG
- Mason Street Tank: 1.0 MG
- Tingen Road Tank: 1.5 MG
- Available Storage: 3.0 MG
- Pleasant Park Tank: 1.5 MG (Under Construction)
- Planned Storage (2026): 4.5 MG

Capacity and Regulatory Requirements (cont.)

Water Storage: Regulatory Requirements

- **MINIMUM**: ½ Average Daily Flow
- 2025 Avg. Daily Flow: 5.05 MGD
- Required Elevated Storage: 2.52 MGD
- Current Available Storage: 3 MGD
- Planned Available Storage (2026): 4.5 MGD

Water Storage: Purpose

- Water Pressure
- Emergency Supply (water main break, pump failure, etc.)
- Fire Flow/Demand
- Peak Flow Demands

*Apex also holds 23% of clear-well storage at CAWTP excluded from above

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Capacity and Regulatory Requirements (cont.)

Wastewater Treatment: Apex Water Reclamation Facility

- Total Facility Capacity: 3.6 MGD
  - Functional Capacity: 2.8 MGD
- Apex Avg. Daily Flow (2025): 1.1 MGD (39.3% Functional)

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Capacity and Regulatory Requirements (cont.)

Western Wake Regional Water Reclamation Facility (WWRWRF)

- Total Facility Capacity: 18 MGD
- Apex Capacity: 6.12 MGD (34% Ownership)
- Apex Avg. Daily Flow (2025): 5.05 MGD (82.5%)

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Capacity and Regulatory Requirements (cont.)

Wastewater Treatment: Pretreatment Requirements

- Apex Sewer Use Ordinance (Div. 4.5, Sec. 19-92) sets parameters on characteristics of wastewater prior to entering the public system.
  - Cary Sewer Use Ordinance applies additionally on projects flowing to Western Wake Regional Water Reclamation Facility
- Industrial Use Permit (IUP) required for projects with discharge characteristics not meeting the required ordinance
  - IUP are site specific and designed based on the materials found in discharge
  - Required pre-treatment onsite, at the cost of the discharger
  - Sampling Requirements to verify pretreatment requirements are met

Capacity and Regulatory Requirements (cont.)

Constituent	Collection & Treatment Concern	Effect
TDS (salt)	• Water quality (pass-through) • Interference	• Effluent toxicity • Elevated effluent TSS
Biocides & fungicides (QAC and organics)	• Interference	• Elevated effluent NH_3-N • Effluent toxicity
Corrosion inhibitors – Metals, orthophosphate, organics	• Interference • Water quality • Biosolids	• Elevated effluent NH_3-N • Land application restrictions • Effluent toxicity
Metals – Mo, Cr, Al, Cu, Zn	• Biosolids • Nitrification inhibition • Water quality	• Land application restrictions • Effluent toxicity
Antiscalants	• None	• None

Source: Cheslek, H. Black and Veatch

Water System Impacts

- Instantaneous, inconsistent peak water demand
- Infrastructure needs for peak demand
  - Initial Capital Costs (Developer/Owner)
    - Distribution Improvements and Expansion (Pipe)
    - Treatment Capacity and Expansion
    - Elevated Storage Needs
  - Long-Term Operation and Maintenance (Town)
    - Water Quality and Age Impacts during off-peak (flushing, water loss)
- On-Site Storage
  - Provide on-site stability during peak demand
  - Reduced conveyance costs for the Town
  - Reduced treatment costs due to offset demand

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Reclaimed Water

- Treated wastewater being used for purposes other than drinking; not discharged to a body of water
- Operated like a domestic water system, commonly distributed through purple pipes
- Currently no reclaimed distribution network at either Apex WRF or Western Wake Regional WRF.
- Water Source Capacity Protection (Jordan Lake)
- Increased treatment capacity due to offset
- Reduces available water supply to downstream partners

Economic Impact – Employment Generation

- Few workers typically employed for day-to-day operations, with research showing floor area–to–employee ratios as high as 5,000 square feet per employee.
- A 250,000-square-foot data center may require only about 50 full-time employees to operate once constructed.
- Significant temporary construction employment is associated with data center development, particularly during site preparation, building construction, and infrastructure installation.
- Permanent jobs, while limited in number, are generally well-paying, with technology professionals averaging $108,100 annually, network support technicians $76,060, and data center roles ranging from $42,000–$149,000.
- These wages exceed U.S. median household incomes (which in 2024 were $44,870 for female nonfamily households and $58,000 for male nonfamily households) highlighting the high-wage nature of data center employment.

Economic Impact – Tax Revenue
Real and Personal Property

- Data centers are subject to ad valorem property taxes for real and personal property
  - Real (buildings and land)
  - Business property (equipment)

- Assessments are conducted by County tax office
  - Real property per schedule
  - Business property annually during listing cycles

- Data provided by Wake County –
  - Real property values per square foot stable 2016-2024
  - Business property values per square foot volatile 2016-2024

Economic Impact – Tax Revenue
Illustrative Example (Wake County Data)

- Using 2024 Assessed Values:
  - Average Data Center has $38,000,000 of real value
  - Average Data Center has $115,000,000 of business personal property (subject to depreciation)

Type	Per $100	Apex Property Tax (Estimate)
Real Value	$380,000	$135,280
Business Personal Property	$1,150,000	$409,400
	Total	$544,680

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Economic Impact – Tax Revenue Depreciation

- Data center depreciation is more volatile than traditional real property due to the high concentration of equipment
- Equipment depreciates at a significantly faster rate than real estate assets
- While rebuilds and upgrades may restore value, there is limited historical data to reliably project or guarantee long-term outcomes

- An example from Wake County Tax Administration shows data processing equipment depreciated by approximately **95% within five years**

Business Personal Property (BPP) of $115,000,000			
Year	Depreciation	BPP Per $100	Property Tax Estimate
Installed	-	$1,150,000	$409,400
1	20%	$920,000	$327,520
2	39%	$701,500	$249,734
3	59%	$471,500	$167,854
4	80%	$230,000	$81,880
5	95%	$115,000	$20,470

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Economic Impact – Tax Revenue
Sales and Use Taxes

- Qualifying data centers are exempt from sales tax on electricity and certain support equipment (7% and 7.25%, respectively).
- Other tax exemption/incentives for eligible data centers exist under North Carolina law, but are not available in Wake County.
- Apex receives 3.29% of Wake County sales tax collections.

Traffic Generation

Policy Considerations & Potential Mitigation Measures

- Requiring coordination between Town staff, NCDOT (if involving NCDOT maintained roadways), the applicant, and the applicant's traffic engineer to determine the scope of any trip generation letter or full TIA.
- Considering mitigation measures identified in a TIA or traffic letter, such as turn lanes, signal modifications, or other operational improvements, to maintain roadway safety and capacity.
- Encouraging coordination between Town staff, the applicant, and the applicant's traffic engineer to determine the scope of any trip generation letter or full TIA.
- Considering mitigation measures identified in a TIA or traffic letter, such as turn lanes, signal modifications, or other operational improvements, to maintain roadway safety and capacity.

Traffic Generation

Policy Considerations & Potential Mitigation Measures cont.

- Evaluating traffic impacts using Land Use Code (LUC 160) in the ITE Trip Generation Manual (11th Edition), which defines a data center as a free-standing warehouse-type facility primarily used for off-site storage of computer systems, applications, and secure data. Some facilities may include maintenance areas and small office spaces and may be occupied by single or multiple tenants.

- Recognizing that LUC 160 reports an average daily trip generation rate of 0.99 trips per 1,000 square feet, while acknowledging that sample sizes are small and additional data may be needed to refine anticipated trip generation.

- Coordinating with NCDOT's Congestion Management group, as recommended, to evaluate trip generation methodology on a case-by-case basis.

Hazards

Hazards associated with Data Centers may include:

- Chemical Hazards
  - Data centers may have large volumes of coolants, refrigerants, and biocides (for water treatment).
- Fire & Explosion Hazards
  - Data centers may have large volumes of stored fuel onsite to power backup generators.
  - Volume of stored fuel will depend redundancy requirements, energy demand, and number of generators.

Scenario:

A hyperscale data center with 96 diesel generators may have ~500,000 gals or more of diesel fuel onsite (each generator may carry ~6,000 gals each 6,000 x 96 =576,000 gals).

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Hazards

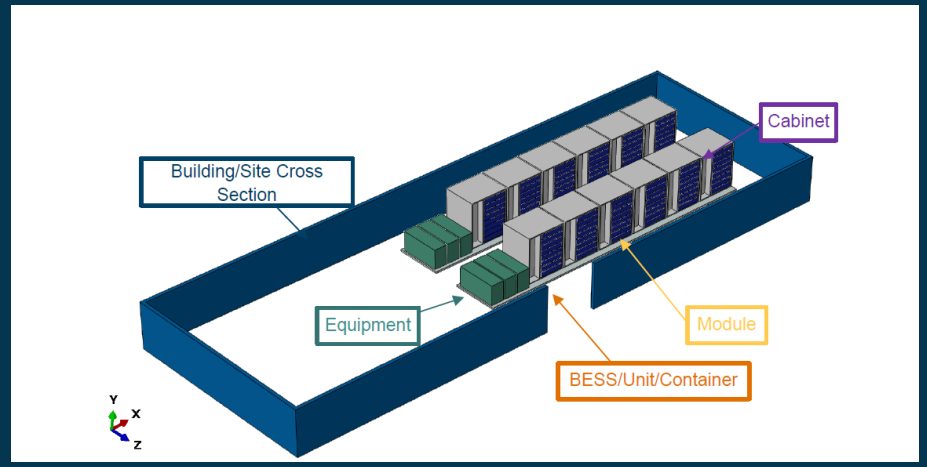
Fire & Explosion Hazards cont.

Battery Energy Storage Systems (BESS)

What is a BESS?

- Stores excess energy on-site from renewable sources or grid various battery chemistries: lithium-ion, lead-acid, sodium-ion, solid-state, etc.
- Discharges energy during peak demand, service interruptions, or sells back to the grid.
- Typically consists of modular container units housing 200–1,000+ batteries per container.
- Can include multiple containers for larger capacity needs.
- Supports various battery chemistries: lithium-ion, lead-acid, sodium-ion, solid-state, etc.

Source: Americas.rwe.com



Source: Landscape of Battery Energy Storage System Hazards & Mitigation Strategies (NFPA FPRF, 2023).

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Key Hazards of BESS

Thermal Runaway

- Overheating of battery cells can trigger self-sustaining chemical reactions.
- Risk of fire or explosion increases rapidly.

Toxic and Flammable Gas Emissions

- Fires may release hydrogen, carbon monoxide, CO_2, methane, hydrogen fluoride, VOCs.
- Health hazards and emergency response complications.

Stranded Energy

- Residual electrical energy can persist after damage or discharge.
- Risk of shock, arc flash, arc blast, or delayed re-ignition.

Particulate & Environmental Hazards

- Combustion produces soot, fine particulates, and potentially toxic byproducts.
- Can contaminate air, soil, and nearby environment.

Planning & Safety Implications

- Hazards affect fire suppression, emergency response, and post-incident remediation.
- Requires: proper system design, operational controls, site location consideration, and coordination with fire/emergency services.

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Fire Response Capabilities

- Town of Apex Fire Department (current and future)
- Cary, Apex, Morrisville (CAM) partnership
- Mutual-aid Agreements
- Hazmat response contract

Data Centers – Related to Fire Protection

- Research was conducted related to fires and other emergencies at data centers.
- Data centers are typically in fire resistive buildings with automatic fire detection and suppression systems.
- The majority of the internal components are computers/servers. They also have battery back-up power systems, which can created challenges if a fire occurs.
- There are an estimated 12,000 data centers in the world, 5,500 in the US. Between 2014-2023, 22 fires were reports world-wide, less than 1% of them having a fire.

FIRE: Policy Considerations & Mitigation Measures

- Early & Frequent Engagement
- Independent Fire Protection Review
- Water Supply & Runoff Containment
- Department Training & Guidance

Police: Emergency Access and Operational Independence

Given the sensitive or restricted nature of many data centers, the police department must ensure that officers can access the facility in emergencies without unnecessary delays or dependence on on-site staff.

This includes:

- Pre-establishing secure access procedures for both emergency and after-hours responses.
- Ensuring APD has direct access to relevant areas of the property during time-sensitive events such as alarms, medical emergencies, or security breaches.
- Clarifying expectations with the facility operator regarding gate access, credentialing, and key control.
- Any delays in gaining entry hinder the Department's ability to protect life and property.

Police: Community Concerns and Increased Calls for Service

Even when operations run smoothly, data centers can generate community complaints related to:

- Noise (HVAC systems, backup generators)
- Light pollution
- Traffic
- Contractor activity
- Environmental concerns
- Perceived public safety risks

The majority of these complaints—regardless of whether they are police matters—are typically routed to APD as the initial point of contact. This will likely increase call volume and necessitate ongoing coordination with other Town departments for appropriate follow-up and resolution.

Police: Traffic and Construction Impacts

The construction phase of a data center can significantly impact local roadways due to heavy equipment, frequent deliveries, and a large contractor workforce. Post-construction, traffic patterns may remain elevated depending on staffing levels and ongoing maintenance activity.

Impacts may include:

- Increased collisions or near-miss incidents due to large vehicle movements.
- Road obstruction complaints.
- The need for periodic traffic control or special patrol assignments.
- Longer-term roadway wear or congestion.
- APD may also need to coordinate with NCDOT, Town Engineering, and facility leadership to mitigate traffic impacts and ensure safe ingress and egress.

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Police: Specialized Response Considerations

Data centers often house large quantities of electrical equipment, lithium-ion batteries, cooling systems, and backup generation infrastructure. In emergency situations—particularly fire, hazardous material releases, or electrical failures—response may require specialized equipment or training.

Public safety considerations include:

- The need for detailed pre-incident planning with APD and Fire.
- Potential need for additional PPE or tools for safe ingress.
- Coordination with the Fire Department on rescue procedures, evacuation routes, suppression methods, and incident command.
- Understanding of any high-voltage, chemical, or battery-related hazards that may affect law enforcement operations.

Police: Alarm Response and False Alarms

Data centers typically utilize extensive alarm and monitoring systems. Historically, facilities of this nature can generate high volumes of alarms—security breaches, access control notifications, and sensor alerts—some of which default to police response.

Key considerations:

- Increased demand on APD for alarm verification response.
- Possible need for specialized training on interpreting alarm categories.
- Developing clear expectations with facility management to reduce unnecessary dispatches.

Police: After-hours Activity and Contractor Presence

These sites frequently operate 24/7 and may involve after-hours vendor access for maintenance, upgrades, or emergency repairs.

APD often becomes the first responder for:

- Suspicious persons calls.
- Verification of contractor authorization.
- Securing the premises during system outages.
- This adds to routine patrol workload.

Police: Conclusion

While these challenges are manageable with proper planning and resource support, they represent meaningful impacts to police operations that should be considered when evaluating any data center project.

Regulation Comparison

Planning Staff reviewed the development standards from several communities that permit data centers.

- Charlotte, NC
- Maiden, NC
- Loudon County, VA (updates to standards are underway)
- Fairfax County, VA
- Frederick County, VA
- Prince William County, VA
- Edgecombe County, NC (standards adopted November 2025)

Regulation Comparison

In general, the use is permitted in Industrial zoning districts, with some communities allowing the use in other zoning district types subject to certain conditions being met.

Most communities have requirements related to the following:

- Additional setbacks from roads and/or residential uses
- Additional buffers from roads and/or residential uses
- Standards for the location and/or screening of ground- and roof-mounted mechanical equipment
- Building design standards
- Time limits on generator testing
- Location and screening of onsite electric substations, storage tanks, etc.
- Requirements for noise studies (pre- and post-construction)

UDO Amendment Process Summary

- UDO Sec. 2.3.2 states that "an amendment to the text of this Ordinance may be proposed by the Town Council, the Planning Board, the Board of Adjustment, the Planning Director, or pursuant to Sec. 2.2.1 *Authority to File Applications*". Sec. 2.2.1 states applications may be submitted "by the landowner, lessee or person holding an option or contract to purchase or lease land, or an authorized agent of the landowner".
- UDO Amendment applications are accepted on the 1st business day of the month.
- Staff provides comments to the applicant on the proposed revisions, and the applicant resubmits revisions for staff review. This continues until the application is ready to be scheduled for public hearing.
- The Planning Board hears the proposed amendment as a New Business item and makes a recommendation to the Town Council.
- The Town Council holds a public hearing and makes the final decision to approve or deny the proposed amendments.

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TOWN OF APEX DATA CENTER RESEARCH STAFF REPORT

JOINT PLANNING BOARD & TOWN COUNCIL WORK SESSION
JANUARY 22, 2026

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1. INTRODUCTION

This report provides the Town of Apex Planning Board and Town Council with information about hyperscale data centers and their potential impacts. It examines how hyperscale data centers within the Town's jurisdiction or future jurisdiction may affect the community in terms of energy use, water use, environmental impacts, noise, land use (including zoning, buffers, and design), economic impact, traffic, and public safety considerations.

This report will also provide a brief overview of how other jurisdictions regulate data centers and implement standards to mitigate potential impacts caused by the use. Preparation of this report included coordination and input from staff across several Town departments to support a thorough and informed analysis.

1.1 DATA CENTERS

1.1.1 OVERVIEW OF DATA CENTERS

A data center is a facility that provides computational services such as cloud computing, data storage, artificial intelligence (AI), cryptocurrency mining, and high-performance computing. These facilities support critical services, including email, streaming, online banking, social media, and medical records. There are approximately ~4,200 – 5,000 active data centers of varying sizes in the United States, a number that is expected to increase substantially in the coming years to meet the growing demand for online services. The American Edge Project and Technology Councils of North America's report, *America's AI Surge: Powering Investment, Jobs and Growth in Every State*, estimates that across all states an estimated 2,800 data centers are approved or under construction.[1]

1.1.2 TYPES OF DATA CENTERS & REDUNDANCY TIERS

Data centers can be developed in a variety of configurations, sizes, and mission parameters to meet the market and technological demands of their customers. For the purposes of this report, the most common types of data centers are enterprise and internal data centers, colocation data centers of various sizes, and hyperscale data centers. In addition to having different types in terms of size, configuration, and services, data centers may also be classified by a tier system that outlines the amount of redundancy that is required to maintain uninterrupted operation and service.

ENTERPRISE AND INTERNAL

Enterprise and internal data centers are owned, operated, and located on-site by a single company. They may be as small as a server closet, or as large as server room/building that provides services to internal users. An example of this would be the internal server room located within Apex Town Hall that

[1] American Edge Project and Technology Councils of North America, *America's AI Surge: Powering Investment, Jobs and Growth in Every State* (Washington, DC: American Edge Project, December 2025), https://americanedgeproject.org/wp-content/uploads/2025/12/Americas-AI-Surge-Powering-Growth-in-Every-State.pdf

allows staff to host and share internal information throughout the organization to better serve the Town's departments and daily operations.

COLOCATION (SMALL, MEDIUM, LARGE SCALE)

Colocation data centers operate much like a multi-tenant shopping center, where businesses lease space from a data center owner in the form of individual server racks or, in some cases, entire dedicated server rooms. This allows companies to meet their IT and server needs without having to purchase land or go through the lengthy site, building, and zoning approval processes required to develop a data center themselves. Instead, the data center owner has already secured the necessary approvals. Day-to-day facility operations and maintenance are handled by full-time, on-site professionals. In some cases, companies leasing space from the data center operator may need to have physical access to their servers to maintain specific equipment or operations. Due to this, companies prefer to utilize and partner with colocation facilities within roughly 30–60 miles of their offices.

HYPERSCALE

While there is no single, universally accepted definition of a hyperscale data center, the term is generally understood based on a combination of characteristics rather than a fixed threshold. Discussions of hyperscale facilities typically consider factors such as overall energy demand (approximately 50–1,000 megawatts (MW)), water and wastewater usage (roughly 1–5 million gallons per day), land area requirements, the scale of server deployment (often 5,000 or more servers), and the level of redundancy designed into the facility (commonly described using Tier I–IV classifications).[2]

Hyperscale data centers are large-scale facilities that provide behind-the-scenes digital services supporting much of the modern internet. Unlike other types of data centers, hyperscale facilities are typically built for and fully occupied by a single company that owns and operates the site to support its own large-scale cloud services. These facilities may provide computing power and data storage, enable developers to build and deploy applications, deliver software through web-based platforms, improve website performance through globally distributed servers, and support advanced data analytics.

Historically, hyperscale data centers primarily supported distributed cloud computing, in which workloads are shared across large networks of servers to process substantial volumes of data. More recently, hyperscale facilities have become critical infrastructure for artificial intelligence (AI) computing, which requires significantly higher power density and specialized equipment. As a result, newer data centers may be designed as hybrid facilities capable of supporting both traditional cloud services and AI-driven workloads.

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[2] Phill Powell and Ian Smalley, *What Is a Hyperscale Data Center?*, IBM Think (2025), https://www.ibm.com/think/topics/hyperscale-data-center

Due to the necessity for continual operation, hyperscale data centers will seek to minimize downtime and provide a Tier III - IV level of redundancy to ensure service reliability that meets all service level - agreement (SLA) requirements for their customers.[3]

REDUNDANCY CONSIDERATIONS

One defining characteristic often associated with data centers and how to classify them is by the level of redundancy that is incorporated into the planning and operation of the data center. Redundancy in this situation speaks to how the operator of the data center will maintain reliability and minimize downtime of their system by using additional backup systems onsite to provide all necessary resources (power, cooling, and components) for continual operation. These redundancies are broken down into four tiers based on the level of redundancy built into the system (see figure 1).

TIER I

A Tier I data center operates from a basic capacity framework (N) meaning there are no redundancies for power and cooling and will not have backup components in place to negate potential system failures. Failures almost always require some downtime to repair. Tier I facilities will operate with a guaranteed uptime of ~ 99.671% and downtime of ~ 28.8 hours annually.[4]

TIER II

A Tier II data center operates with partial redundancies (N+1), typically in the form of backup components in place to address interruption or failures to the system. This may include forms of Uninterrupted Power Supplies (UPS) and generators. Tier II data centers, like Tier I, will still rely on a single power and cooling distribution system and may experience downtime if those systems experience failure. Tier II facilities will operate with a guaranteed uptime of ~ 99.741% and downtime of ~ 22 hours annually.[5]

TIER III

A Tier III data center is concurrently maintainable with redundant components and redundant distribution paths to serve the critical environment of the data center (N+1). Unlike Tier I and Tier II, these facilities require no shutdowns when equipment needs maintenance or replacement. The components of Tier III are added to Tier II components so that any part can be shut down without impacting IT operation. Tier III facilities will operate with a guaranteed uptime of ~ 99.982% and downtime of ~ 1.6 hours annually.[6]

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[3] Goodwin, Michael. *"What Is an SLA (Service Level Agreement)?"* IBM Think. Accessed January 2, 2026. https://www.ibm.com/think/topics/service-level-agreement.

[4] Kaplarevic, Vladimir. *"Data Center Redundancy: A Guide to Redundancy Levels."* PhoenixNAP, October 21, 2025. https://phoenixnap.com/blog/data-center-redundancy.

[5] Socomec US. *"Data Center Redundancy Definition & Reliability Best Practices."* https://www.socomec.us/en-us/solutions/business/data-centers/data-center-redundancy-definition-reliability-best-practices

[6] Kaplarevic, *Data Center Redundancy: A Guide to Redundancy Level*

TIER IV

A Tier IV data center represents the highest level of redundancy, generally employing a 2N or 2N+1 configuration for all critical systems. These facilities are designed with two independent and physically isolated power and cooling distribution paths. This configuration is intended to reduce the likelihood that a single equipment failure, maintenance activity, or distribution path interruption would affect IT operations, while also supporting continuous cooling and overall system stability. Tier IV facilities will operate with a guaranteed uptime of ~ 99.995% and downtime of ~ 0.4 hours annually.[7] [8]

Level	Tier I	Tier II	Tier III	Tier IV
Redundancy	No	Partial; redundant components	N+1	2N or 2N+1
Redundant Distribution Paths (Energy, Cooling)	No	No	Yes, but only one path active at a time	Yes, all paths active simultaneously
Uptime Guarantee	99.671%	99.741%	99.982%	99.995%
Downtime per Year	28.8 hours	22 hours	1.6 hours	0.4 hours
Concurrently Maintainable	No; maintenance requires downtime	No; maintenance requires downtime	Yes, without taking data center offline	Yes, without taking data center offline
Cost	Moderate	High	Very High	Extremely High

Figure 1 Comparison of Redundancy Tier Classifications[9]

2. CONSIDERATIONS TO DATA CENTER IMPACTS & POTENTIAL MITIGATION MEASURES

2.1 ENERGY CONSUMPTION

Data centers require large amounts of energy in order to power and operate the vast amount of computing and cooling equipment required to maintain optimal performance during operation.

[7] Uptime Institute. *"Tier Classification System."* Accessed January 2, 2026. https://uptimeinstitute.com/tiers

[8] Kaplarevic, *Data Center Redundancy: A Guide to Redundancy Level*

[9] Socomec US. *"Data Center Redundancy Definition & Reliability Best Practices."* https://www.socomec.us/en-us/solutions/business/data-centers/data-center-redundancy-definition-reliability-best-practices;

Kaplarevic, Vladimir. *"Data Center Redundancy: A Guide to Redundancy Levels."* PhoenixNAP, October 21, 2025. https://phoenixnap.com/blog/data-center-redundancy.

2.1.1 ENERGY DEMAND

The energy demand from data centers may have direct and indirect impact on the Town of Apex. It is important to be aware of the current state of the electrical grid at a national and local level so that factors such as infrastructure needs, power generation, and the cost of improvements are well communicated and understood by elected officials, developers, and community stakeholders.

In 2023, data centers of all types and sizes consumed approximately 4% (176 Terawatt hours) of the total available electricity in the United States. This demand is projected to increase from 4% to somewhere between 6 to 12% (325 to 580 Terawatt hours) of total available electricity in the United States by 2028 (figure 2).[10]

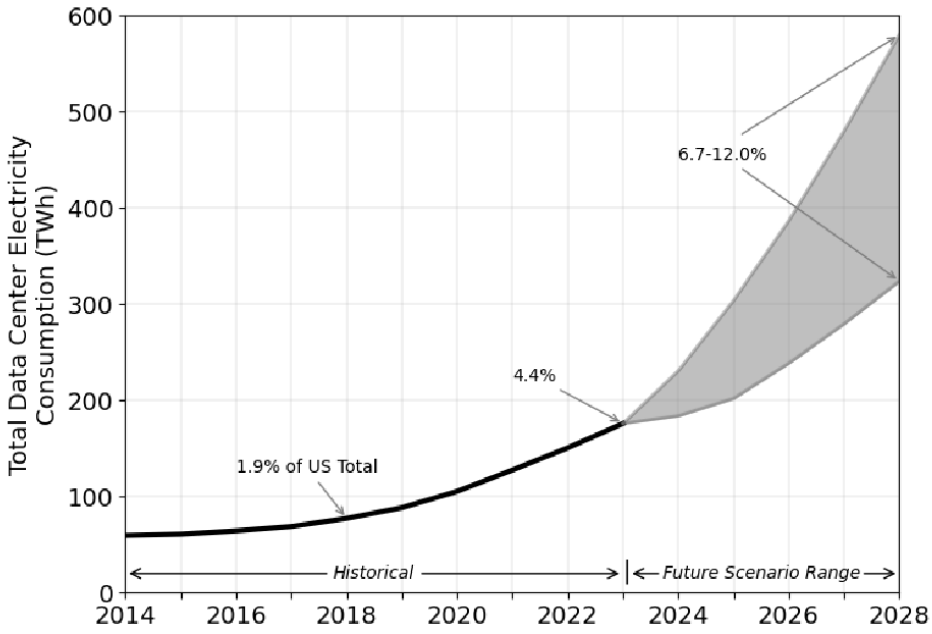

Figure 2 Total data center electricity use from 2014 through 2028[11]

A data center's energy demand can be influenced by multiple factors such as size and scale of the project (small enterprise data center or much larger hyperscale data center) (see figure 3), the number of servers, methods of cooling (air or liquid), types of computing (conventional vs. AI), and the implementation of alternative power generation and storage (renewables, microgrids, battery energy storage, etc.).

[10] Arman Shehabi *et al*., *2024 United States Data Center Energy Usage Report*, Lawrence Berkeley National Laboratory, December 19, 2024, LBNL-2001637, accessed January 2, 2026, https://doi.org/10.71468/P1WC7Q

[11] Shehabi et al., *2024 United States Data Center Energy Usage Report*, LBNL 2001637

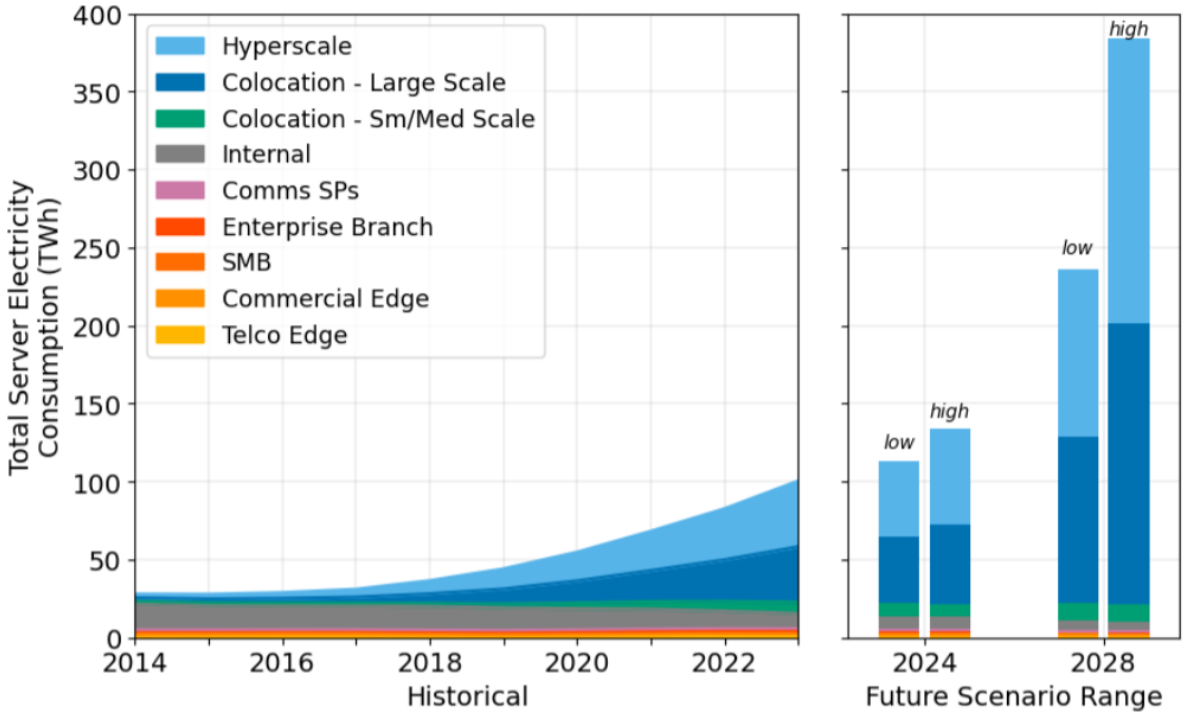

Figure 3 Server annual electricity use by space type from 2014 through 2028[12]

Power demands for conventional computing and AI computing can vary significantly based on the complexity of the computational tasks and the hardware required to perform them. AI computing relies heavily on large numbers of graphics processing units (GPUs) to support complex calculations, generative functions such as image and video creation, and ongoing model training needed to maintain or improve performance. Due to the energy-intensive nature of these processes, AI workloads have been estimated to require seven to eight times more energy than conventional computing operations in certain contexts.[13]

Anticipated energy for AI training and inference is expected to see very significant growth over the next 5 years as seen in the figure below (see figure 4).

[12] Shehabi et al., *2024 United States Data Center Energy Usage Report*, LBNL 2001637

[13] Massachusetts Institute of Technology. "Explained: Generative AI's Environmental Impact." MIT News, January 17, 2025, https://news.mit.edu/2025/explained-generative-ai-environmental-impact-0117

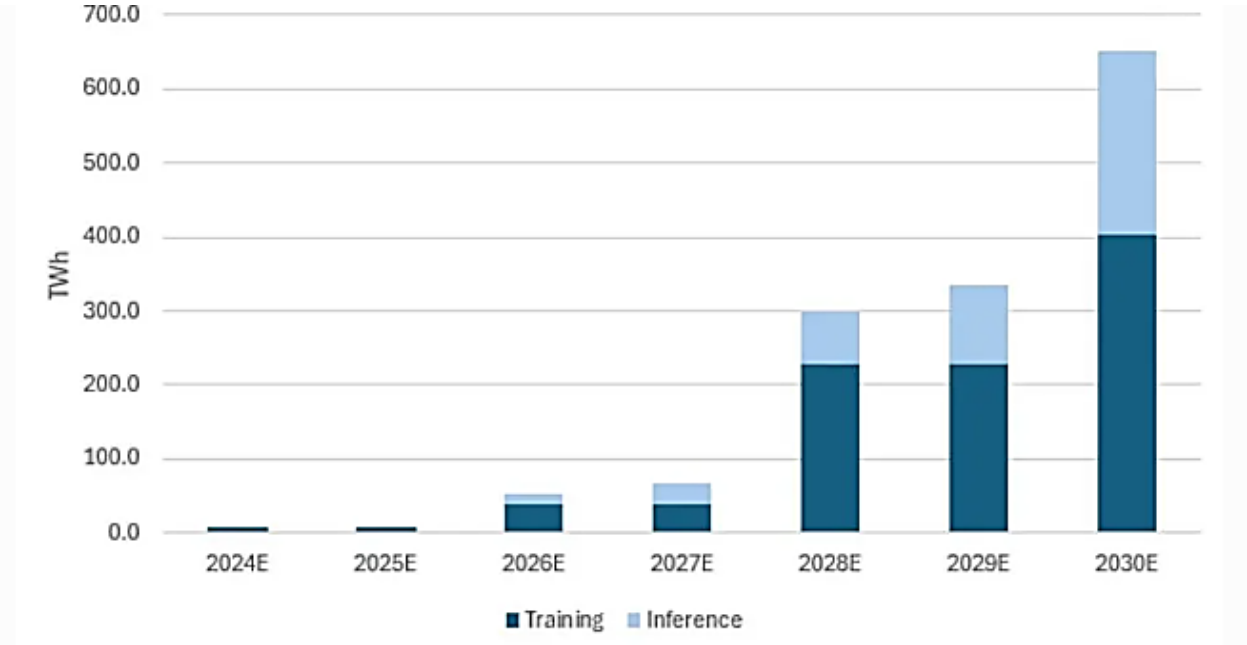

Figure 4 Generative AI Power Demand, AI Training and Inference[14]

Training is the initial phase in developing an AI model, during which the system learns by analyzing large volumes of data. This learning may occur through trial and error, by being shown examples of correct inputs and outputs, or through a combination of both methods.

Inference occurs after training and refers to the model's ability to apply what it has learned to new data. Models that are more thoroughly trained and carefully fine-tuned generally produce more accurate inferences, though results are never guaranteed to be perfect.[15]

This increased intensity may create additional and sometimes unpredictable impacts to the grid, particularly with respect to fluctuations in peak energy demand as computing loads scale up or down in response to AI processing needs.[16]

The utilization of AI servers within data centers is expected to increase over the next several years, which may significantly increase the overall power consumption of AI hyperscale data centers to figures far above that of conventional computational servers. (see figure 5).[17]

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[14] Beth Kindig, "AI Power Consumption: Rapidly Becoming Mission-Critical," *I/O Fund*, June 24, 2024, https://io-fund.com/artificial-intelligence/ai-platforms/ai-power-consumption-becoming-mission-critical

[15] Cloudflare, *"AI Inference vs. Training: What Is AI Inference?"* Cloudflare Learning Center, accessed January 13, 2026, https://www.cloudflare.com/learning/ai/inference-vs-training/

[16] MIT, "Explained: Generative AI's Environmental Impact," *MIT News*, January 17, 2025.

[17] Shehabi et al., *2024 United States Data Center Energy Usage Report*, LBNL 2001637

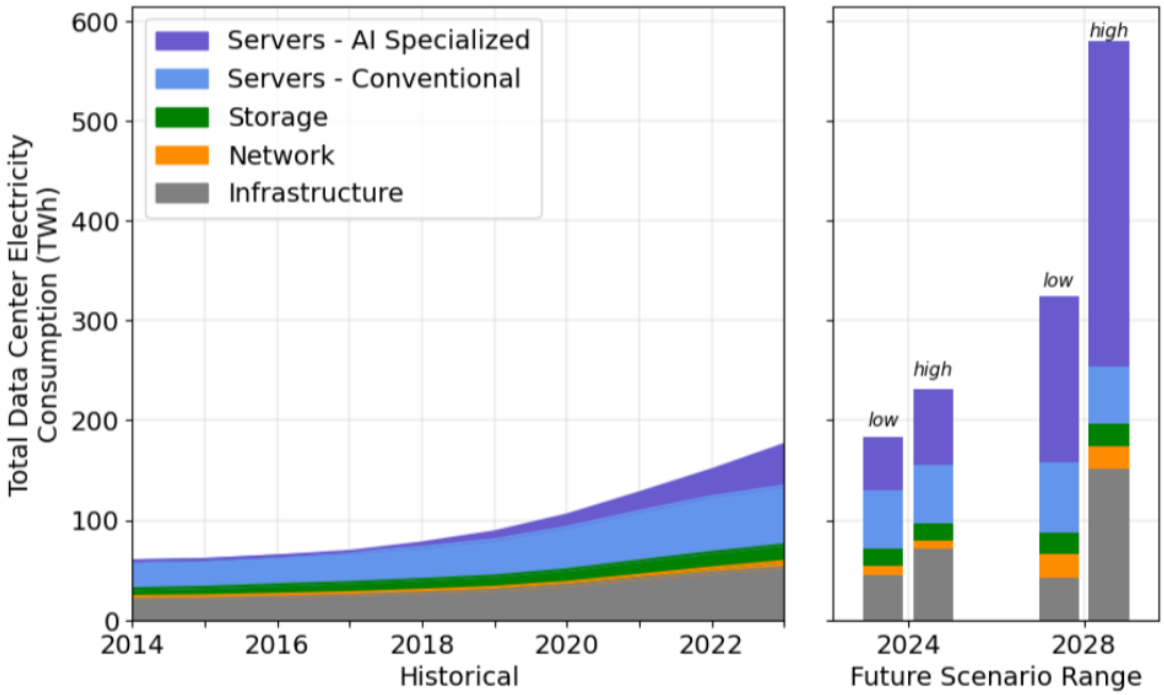

Figure 5 Total data center electricity use from 2014 through 2028 by equipment type[18]

2.1.2 POWER GRID CAPACITY AND RELIABILITY

NATIONAL LEVEL:

In the Department of Energy's (DOE) July 2025 *Resource Adequacy Report: Evaluating the Reliability and Security of the United States Electric Grid,* data centers are anticipated to add anywhere from 35 GW to 109 GW of energy demand in 2030 (see figure 6).[19] This will increase the mean peak load from its current average of 774 GW to 889 GW in 2030 if the models are accurate (figure 7). This will require energy providers to explore new opportunities and perhaps seek regulatory relief (environmental, land use, etc.) in order to create enough capacity and generation to meet the demand.[20]

[18] Shehabi et al., *2024 United States Data Center Energy Usage Report*, LBNL 2001637.

[19] U.S. Department of Energy, *Report on Evaluating U.S. Grid Reliability and Security: Resource Adequacy Report* (Washington, DC: U.S. Department of Energy, July 7, 2025), accessed January 2, 2026, https://www.energy.gov/sites/default/files/2025-07/DOE%20Final%20EO%20Report%20%28FINAL%20JULY%207%29_0.pdf

[20] The White House, *"Removing Barriers to American Leadership in Artificial Intelligence,"* Presidential Actions, January 23, 2025, https://www.whitehouse.gov/presidential-actions/2025/01/removing-barriers-to-american-leadership-in-artificial-intelligence/

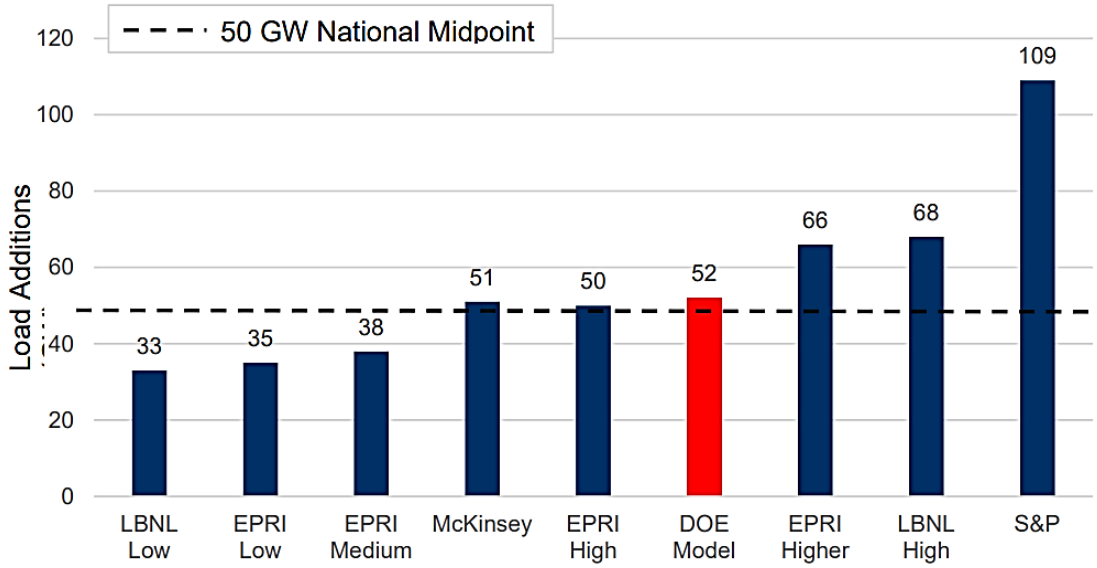

Figure 6 2024 to 2030 Projected Data Center Load Additions[21]

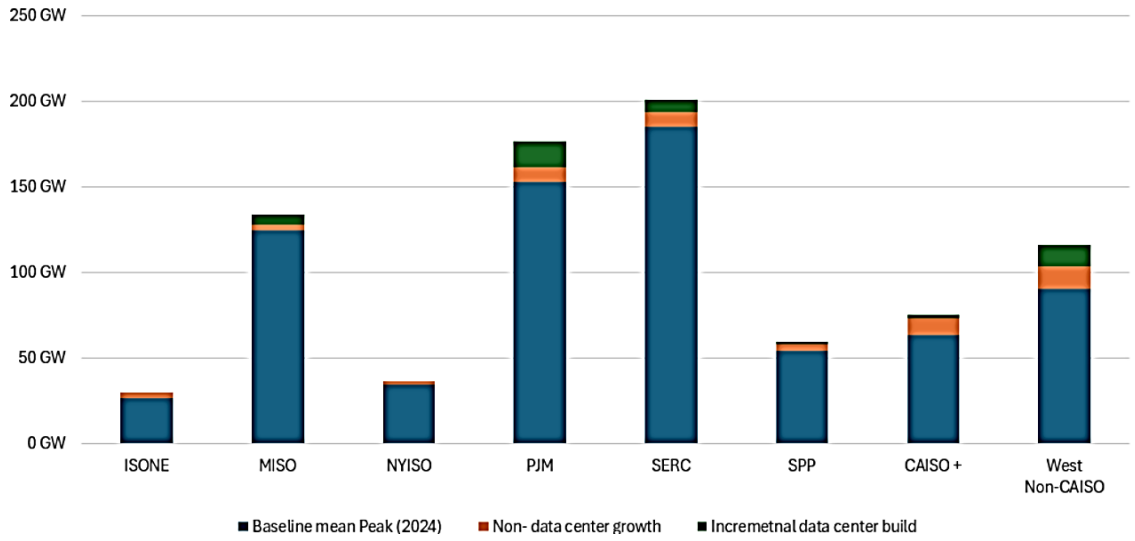

Figure 7 Mean Peak Load by Regional Transmission Organization (Current Case vs 2030 Case)[22]

The report's executive summary notes that:

> "The status quo of more generation retirements and less dependable replacement generation is neither consistent with winning the AI race and ensuring affordable energy for all Americans, nor with continued grid reliability (ensuring "resource adequacy"). Absent intervention, it is

[21] U.S. Department of Energy, *Resource Adequacy Report* (Washington, DC, July 7, 2025)

[22] U.S. Department of Energy, *Resource Adequacy Report* (Washington, DC, July 7, 2025)

impossible for the nation's bulk power system to meet the AI growth requirements while maintaining a reliable power grid and keeping energy costs low for our citizens.

Grid Growth Must Match Pace of AI Innovation. The magnitude and speed of projected load growth cannot be met with existing approaches to load addition and grid management. The situation necessitates a radical change to unleash the transformative potential of innovation. Retirements Plus Load Growth Increase Risk of Power Outages by 100x in 2030. The retirement of firm power capacity is exacerbating the resource adequacy problem. 104 GW of firm capacity are set for retirement by 2030.

This capacity is not being replaced on a one-to-one basis and losing this generation could lead to significant outages when weather conditions do not accommodate wind and solar generation. In the "plant closures" scenario of this analysis, annual loss of load hours (LOLH) increased by a factor of a hundred."

STATE LEVEL:

In September 2025, the North Carolina Department of Environmental Quality (NCDEQ) released their annual *North Carolina Energy Security Plan* (NCESP*)*, to provide an assessment of the current state of energy, threats, vulnerabilities, consequences, and risks that may impact the state's energy security. The NCESP speaks to the rising demand for energy due to the combination of population growth, implementation of AI data centers, and on-going electrification trends such as that of rising electric vehicle (EV) sales.

The NCESP states that North Carolina is one of the top producers of agricultural products such as tobacco, sweet potatoes, poultry, eggs, and pork in the United States. Additionally, other key industries include aerospace; auto and truck manufacturing; biotechnology and pharmaceuticals; food processing; furniture manufacturing; information technology; plastics and chemicals, and textiles.[23] The U.S. Energy and Information Administrations (EIA) *North Carolina State Energy Profile* states that currently 13% of North Carolina's Gross Domestic Product (GDP) comes from manufacturing, with select energy-intensive industries such as chemical manufacturing, food and beverage, tobacco products, computer and electronics, and petroleum and coal products contributing to that total. Energy-intensive manufacturing is projected to significantly increase as the adoption and implementation of emerging technologies like AI become more utilized and developed.[24]

In order to reliably power North Carolina, substantial effort and investment are required to maintain and upgrade the State's electric grid, including the infrastructure used to generate, transmit, and distribute electricity across the state and the broader region. The electric grid consists of several key components, including power generation facilities (such as nuclear, renewable, and fossil-fuel resources); transmission networks (high-voltage lines, substations, and transformers); distribution systems that deliver electricity to end users; and an increasing use of energy storage systems, such as

[23] U.S. Energy Information Administration, *"North Carolina State Energy Profile,"* last updated February 20, 2025, accessed via EIA.gov, https://www.eia.gov/state/print.php?sid=NC

[24] North Carolina Department of Environmental Quality, *2025 North Carolina Energy Security Plan* (Raleigh: NCDEQ State Energy Office, September 29, 2025), https://www.deq.nc.gov/state-energy-office/2025-nc-energy-security-plan-final/open

battery energy storage systems and stored fuel, to support reliability and manage peak demand (see figure 8).[25]

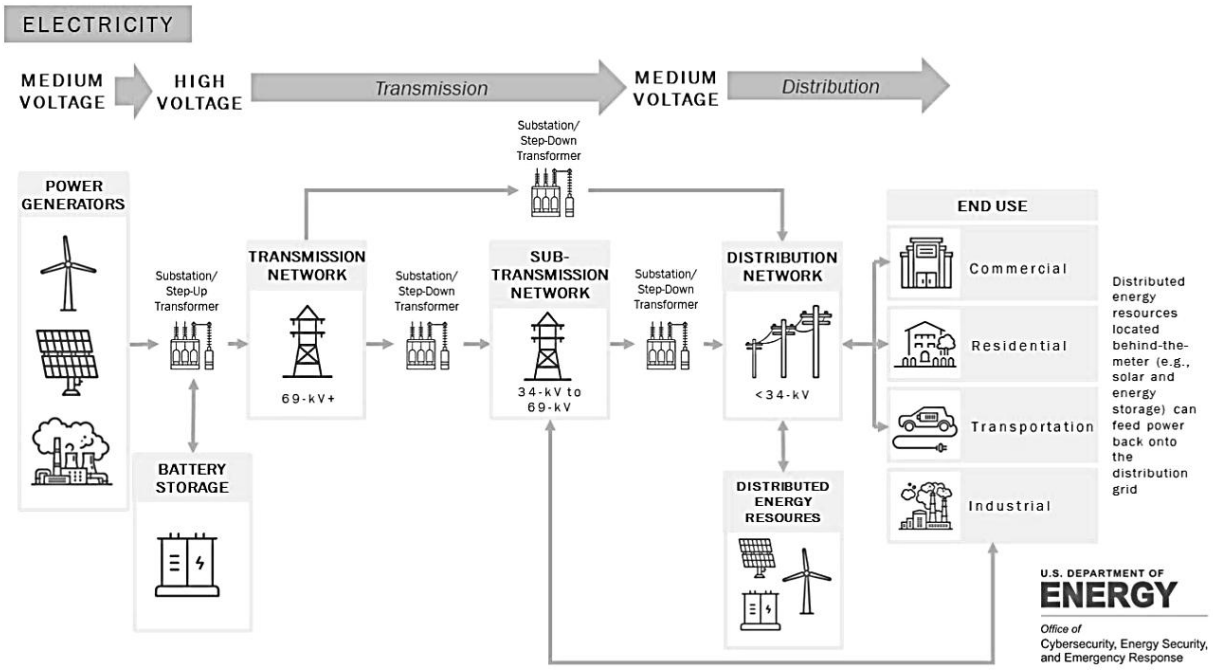

Figure 8 Electric Supply Chain[26]

Consumption of electricity in North Carolina has primarily been driven by factors such as population growth, expansion, or development of industry (data centers, biotech, manufacturing), and the increase in use of electric vehicles all contribute to the continual electrification of the state (see figure 9).[27]

[25] NCDEQ, *2025 North Carolina Energy Security Plan*.

[26] NCDEQ, *2025 North Carolina Energy Security Plan*.

[27] NCDEQ, *2025 North Carolina Energy Security Plan*.

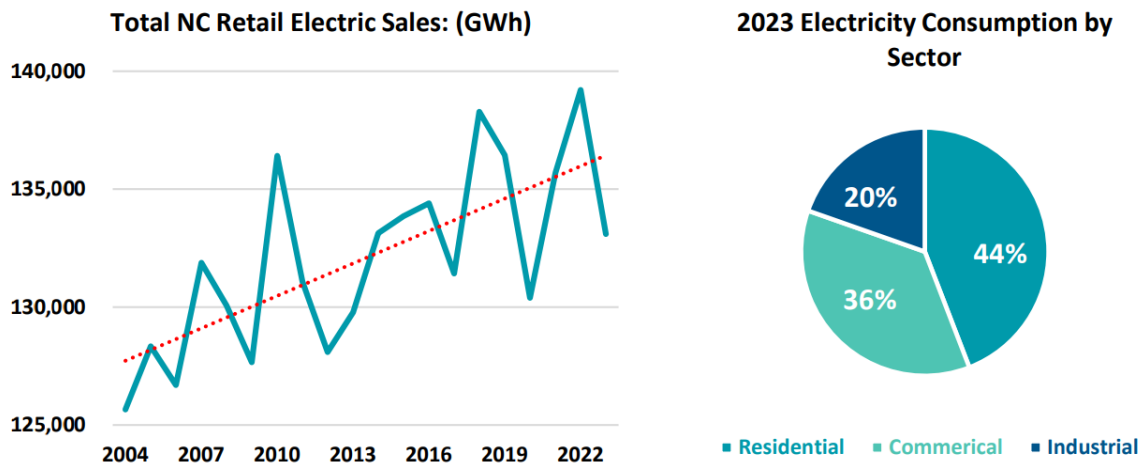

Figure 9 Total NC Electric Sales (2004-2023) & 2023 Electricity Consumption by Sector[28]

As demand for electricity grows, it will put new stress on the supply of energy and require increases in generation and capacity.

The maximum amount of electricity a power plant or generation facility can produce under ideal conditions is referred to as installed capacity and is typically measured in megawatts (MW). This is the capacity referred to as nameplate compacity, meaning it is the capacity available at the time of installation, but may not be the actual amount of power generated due to other factors that may inhibit the creation of electricity, such as weather (solar and wind) or maintenance. This is demonstrated during 2014 – 2023, where installed capacity for solar power increased, but during the same period actually contributed less generation due to other factors. (see figures 10 & 11).[29]

[28] NCDEQ, *2025 North Carolina Energy Security Plan*.

[29] NCDEQ, *2025 North Carolina Energy Security Plan*.

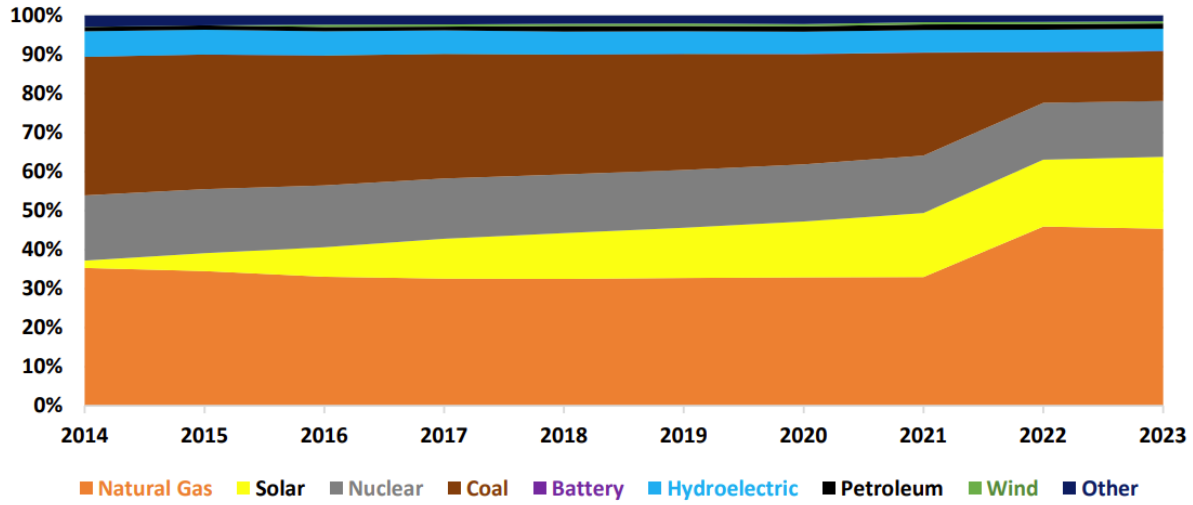

Figure 10 North Carolina Installed Capacity by Fuel Type (%)[30]

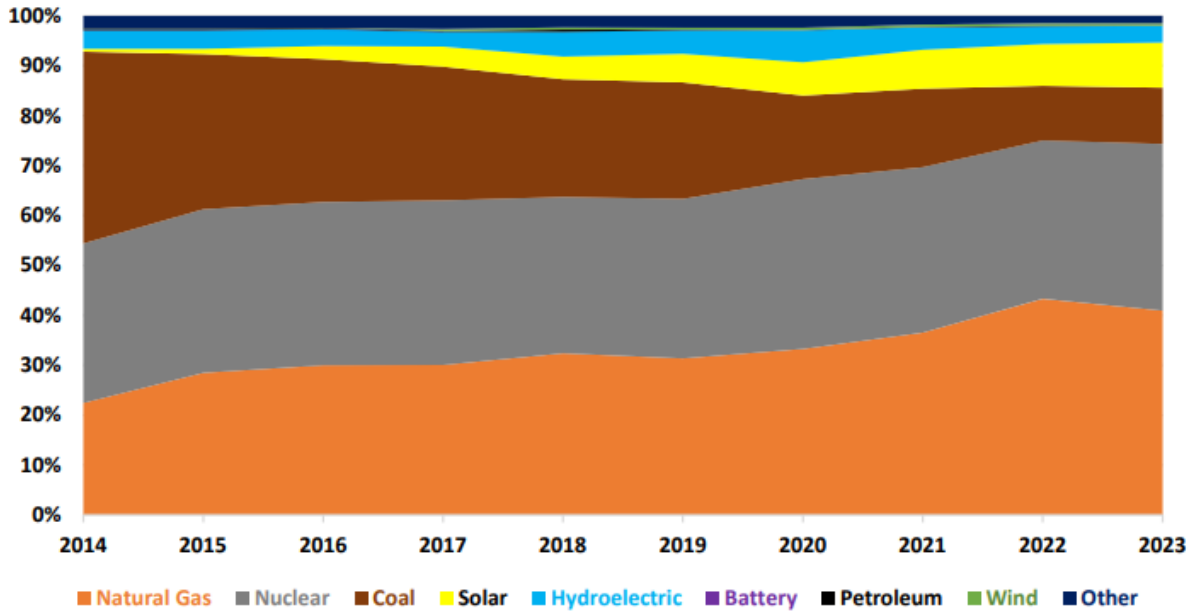

Figure 11 North Carolina Generation by Fuel Type (%)[31]

This highlights the importance of having a diversified power generation system so that no one form of generation contributes to a lack of energy.

As seen in figure 11 above, between 2014 and 2023 most of North Carolina's current power generation came from natural gas and nuclear power. The EIA states that in 2023, natural gas accounted for roughly

[30] NCDEQ, *2025 North Carolina Energy Security Plan*.

[31] NCDEQ, *2025 North Carolina Energy Security Plan*.

41% of the state's total generation, whereas nuclear power accounted for roughly 33% of generation, and renewables (solar, hydroelectric, biomass, and wind) accounted for roughly 15%, and coal making up 11%.[32]

Currently, North Carolina is one of the top 10 electricity-producing states, but due to the factors such as population growth, economic and development growth, and lack of natural resources (natural gas, coal, petroleum) North Carolina does not currently generate enough electricity within the state and must import from other states. [33] Energy providers will have to find new methods of generation to power the state in the coming years in order to decrease any potential disruptions of service and outages.

The North Carolina Utilities Commission's (NCUC) 2025 *Annual Report Regarding Long Range Needs for Expansion of the Electrical Generation Facilities for Service in North Carolina*, provides details on current and expected generation and anticipated demand.[34] Figure 12 below shows that the state's energy supply is heavily dependent on nuclear and fossil fuels to generate the necessary power for the state.

Utility	Duke Energy Progress	Duke Energy Carolinas
Coal	9%	11%
Nuclear	53%	41%
Net Hydroelectric	1%	1%
Natural Gas and Oil	25%	34%
Non-Hydro Renewables	3%	9%
Other Purchased Power	9%	5%

Figure 12 Total Energy Resources by Fuel Type of Investor-Owned Utilities in North Carolina for 2024 (actual generation produced)[35]

[32] EIA, *"North Carolina State Energy Profile"* (2025).

[33] EIA, *"North Carolina State Energy Profile"* (2025).

[34] North Carolina Utilities Commission, *Annual Report Regarding Long Range Needs for Expansion of Electric Generation Facilities for Service in North Carolina*, submitted December 19, 2025, accessed January 11, 2026, https://www.ncuc.gov/reports/longrange25.pdf

[35] NCUC, *Long Range Needs Report* (2025), https://www.ncuc.gov/reports/longrange25.pdf

Year	DEP Summer	DEP Winter*	DEC Summer	DEC Winter*
2018	13,029	15,876	17,779	19,077
2019	12,953	13,715	17,736	16,880
2020	12,966	12,196	17,405	16,132
2021	12,691	11,894	17,471	15,583
2022	12,896	13,149	18,098	16,282
2023	12,710	14,558	18,158	19,465
2024	12,864	14,181	18,641	18,689

Figure 13 Summer and Winter System-wide Peak Loads of Investor-Owned Utilities in North Carolina for 2018-2024 (MW)[36]

Utility	NC Retail Sales (GWh*)		NC Wholesale Sales (GWh*)		Total Sales (GWh*) (NC Plus Other States)	
	2023	2024	2023	2024	2023	2024
Duke Energy Progress	42,238	43,119	17,074	17,675	59,312	60,795
Duke Energy Carolinas	78,203	80,200	8,516	9,624	86,718	89,463

GWh = 1 million kilowatt-hours (kWh)

Figure 14 Electricity Sales of Investor-owned Utilities in North Carolina for 2023-2024[37]

Between 2026 and 2040, North Carolina's summer peak electricity demand is projected to grow at an average annual rate of approximately 1.2% to 2.0%, compared with 1.8% to 1.5% for winter peak demand. Figure 13 presents the system-wide average annual growth rates forecasted by the state's investor-owned utilities (IOUs).[38]

Utility	Summer Peak	Winter Peak	Energy Sales
Duke Energy Progress (2026 – 2040)	1.2%	1.8%	1.5%
Duke Energy Carolinas (2026 – 2040)	2.0%	1.7%	2.8%

Figure 15 Forecast Average Annual Growth Rates of Investor-Owned Utilities in NC (Energy Efficiency Included)[39]

[36] NCUC, *Long Range Needs Report* (2025), https://www.ncuc.gov/reports/longrange25.pdf

[37] NCUC, *Long Range Needs Report* (2025), https://www.ncuc.gov/reports/longrange25.pdf

[38] NCUC, *Long Range Needs Report* (2025), https://www.ncuc.gov/reports/longrange25.pdf

[39] NCUC, *Long Range Needs Report* (2025), https://www.ncuc.gov/reports/longrange25.pdf

DUKE ENERGY PROGRESS

Note: Staff reviewed published information in order to complete this section of the staff report; further discussion and coordination with Duke Energy staff may clarify and refine information found in this section.

Duke Energy's *2025 Carolinas Resource Plan* provides a breakdown of current and projected levels of generation and demand for the next 15 years. Duke plans to explore opportunities to create new storage and generation in order to meet the increase of demand for electricity in North Carolina.

PLANNED GENERATION (NEAR APEX)

Duke Energy's 2025 resource plan identifies planned additions of approximately 356 MW of standalone battery energy storage systems (BESS), in conjunction with continued deployment of utility-scale solar generation. These resources are intended to enhance system flexibility, support peak load management, and improve grid reliability.[40]

The plan also outlines a longer-term objective to develop an additional nuclear generating unit at the existing Shearon Harris facility, which would increase installed capacity from approximately 900 MW to a potential 1,800 MW. Due to the extensive regulatory, licensing, and permitting requirements associated with nuclear generation, including approvals from state and federal agencies, the development timeline for a new reactor is expected to take significant time.

2.1.3 ENERGY COST

Due to compounding factors such as aging infrastructure, grid capacity, increased demand for electricity, and the emergence of new technologies such as AI, power suppliers will need new investment in new power generation and infrastructure, which may increase the price of energy to meet the growing demand from both data center and non-data center uses. [41] To address this, Duke Energy Progress is proposing a base rate review to the North Carolina Utilities Commission (NCUC)[42], with an expected decision to be made by late 2026.

This review will explore rate increases to fund additional power generation within their service area. Should this proposal be approved, anticipated rate increases range from 5.4% – 13.9% in 2027 and from 3.6% – 4.8% in 2028, depending on the customer class (see figure 16).

[40] Duke Energy, *2025 Carolinas Resource Plan: Appendix H — Renewables & Storage* and *Appendix J — Nuclear* (Charlotte, NC: Duke Energy, 2025), accessed via Duke Energy's Carolinas Resource Plan document repository, https://www.duke-energy.com/our-company/about-us/irp-carolinas

[41] U.S. DOE, Report on Evaluating U.S. Grid Reliability and Security: Resource Adequacy Report.

[42] Duke Energy, *"Duke Energy Proposes New Investments in North Carolina to Boost Reliability and Support Economic Growth Across the State,"* press release, November 20, 2025, Duke Energy News Center, accessed January 2, 2026, https://news.duke-energy.com/releases/duke-energy-proposes-new-investments-in-north-carolina-to-boost-reliability-and-support-economic-growth-across-the-state

All impacts are compared to current revenues. 4% cap on year 2 is based on current revenues plus historic base increase. Using this base, overall year 2 increase is 3.8%[43]

Customer Class DEC	% Increase Jan. 1, 2027	% increase Jan. 1, 2028	Customer class DEP	% increase Jan 1, 2027	% increase Jan. 1, 2028
Overall	10.9%	4.1%	Overall	10.9%	4.1%
Residential	13.5%	4.5%	Residential	13.9%	4.3%
General service	7.3%	4.0%	SGS	9.8%	4.8%
Industrial	9.0%	3.7%	MGS	6.4%	4.3%
OPT (Business TOU)	8.3%	3.6%	LGS	5.4%	3.6%

Figure 16 Proposed Rate Changes by Customer Class – Duke Energy Progress, 2025[44]

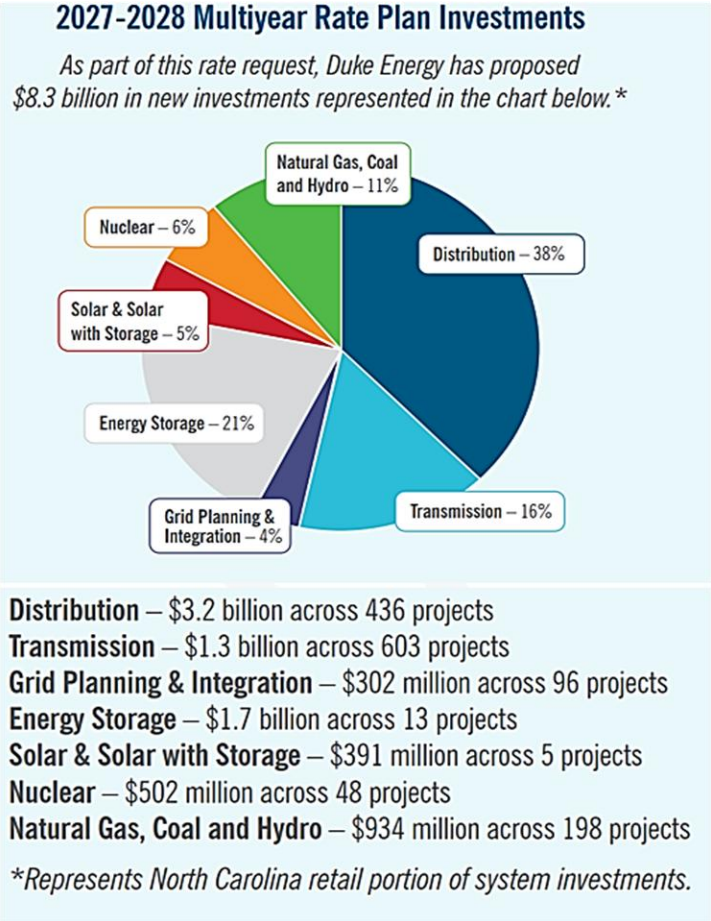

Figure 17 Duke Energy Multiyear Rate Plan Investments

Duke Energy has stated that the increase in rates would add $8.3 billion to new investments in various forms of generation and infrastructure[45] (see figure 17).

Large Load Users:

Since data centers are known energy-intensive uses, some communities have explored ways to ensure that these new developments are paying their fair share and not simply passing the burden on to other ratepayers. In South Carolina, Duke Energy Carolinas reached a settlement with the Sierra Club and other interested parties to begin the process of filing a petition to the South Carolina Utility Commission to review how utilities and regulators should handle new large load electricity users, such as data centers, manufacturing facilities and any other use exceeding 50 MW of power or more.[46] [47]

[43] Duke Energy, *2025 NC Rate Case Fact Sheet* (PDF), Duke Energy, accessed January 2, 2026, https://www.duke-energy.com/-/media/pdfs/for-your-home/rates/dep-nc/2025-nc-rate-case-fact-sheet.pdf?rev=5e6ca44339344d5f965cee50b1fc1f62

[44] Duke Energy, *2025 NC Rate Case Fact Sheet*.

[45] Duke Energy, *2025 NC Rate Case Fact Sheet*.

[46] Southern Environmental Law Center, *"Groups Reach Settlement with Duke Energy Progress on Rate Increase,"* press release (Columbia, SC: October 28, 2025), https://www.selc.org/press-release/groups-reach-settlement-with-duke-energy-progress-on-rate-increase/

[47] Duke Energy, *2025 NC Rate Case Fact Sheet*.

The review will consider the following items:

1. Minimum contract period and contract demand for billing purposes;
2. Collateral requirements;
3. Exit policies and restrictions on customer capacity reduction;
4. Treatment of generation, transmission, and administrative costs;
5. Interconnection costs, including opportunities to support grid-enhancing technologies to manage interconnection costs;
6. Optional tariff provisions for flexible interconnections; and
7. Optional tariff provisions for management of clean behind-the-meter resources and optional clean transition tariffs to enable direct selection of new clean energy resources.

The settlment states that the petition for this docket shall be filed no later than June 1, 2026.[48]

It remains to be seen if Duke Energy Progress will implement a similar process in North Carolina, or if they will pursue an alternative approach to address how large load users will be evaluated by the NCUC and what actions are taken to protect other ratepayers from undue burden.

2.1.4 POLICY CONSIDERATIONS & POTENTIAL MITIGATION MEASURES

To address potential data center energy related impacts, the Town may consider mitigation measures that promote operational efficiency while supporting the Town's goals related to public health, safety, infrastructure capacity, and environmental stewardship.

Potential measures for the Town's consideration may include:

- Evaluating if an Electrical Load Study detailing the project's anticipated diversified load and peak demand for both summer and winter seasons would help the Town understand any potential impact to the local grid.
- Encouraging data centers to set a Power Usage Effectiveness (PUE) ratio goal to maximize efficiency (perhaps a goal of 1.25 or lower) and to provide the Town with annual report on the data center's PUE.
- Evaluating alternative on-site generation or energy storage.

[48] Agreement and Stipulation of Partial Settlement Regarding Large Load Issues, Docket No. 2025-154-E, Public Service Commission of South Carolina, filed October 27, 2025, https://dms.psc.sc.gov/Attachments/Matter/f6124371-bd65-46fe-aeb6-0de7b66af0d3

2.2 WATER CONSUMPTION

2.2.1 WATER DEMAND

Data centers may require significant amounts of water as part of their daily operations, which may have direct and indirect impacts on the availability of drinking water at both the local and regional level. Large data centers may use 1 to 5 million gallons of water per day (MGD). In Apex, this equates to ~3,333 – 16,667 single family homes, ~4,000 – 20,000 multi-family units, or any combination thereof. Those demands pose a significant impact to existing finished water availability and infrastructure capacity.

COOLING

One of the primary ways a data center consumes water is through the cooling of equipment, particularly via liquid cooling systems. Smaller facilities, such as enterprise and small to medium colocation data centers, may be able to cool their server equipment effectively with minimal or no water, depending on the design and implementation of the onsite hardware. Hyperscale data centers often rely on air and/or liquid cooling depending on local regulations and the availability of water. It should be noted that some liquid cooling systems result in water loss through evaporation. Depending on the system, this loss can be as high as 30%. For example, for every 1 million gallons of water used, approximately 300,000 gallons may be lost to evaporation.

By 2028, it is estimated that hyperscale data centers could consume between 150 and 270 billion liters (39.6 and 73.1 billion gallons) of water annually (see figure 18).[49]

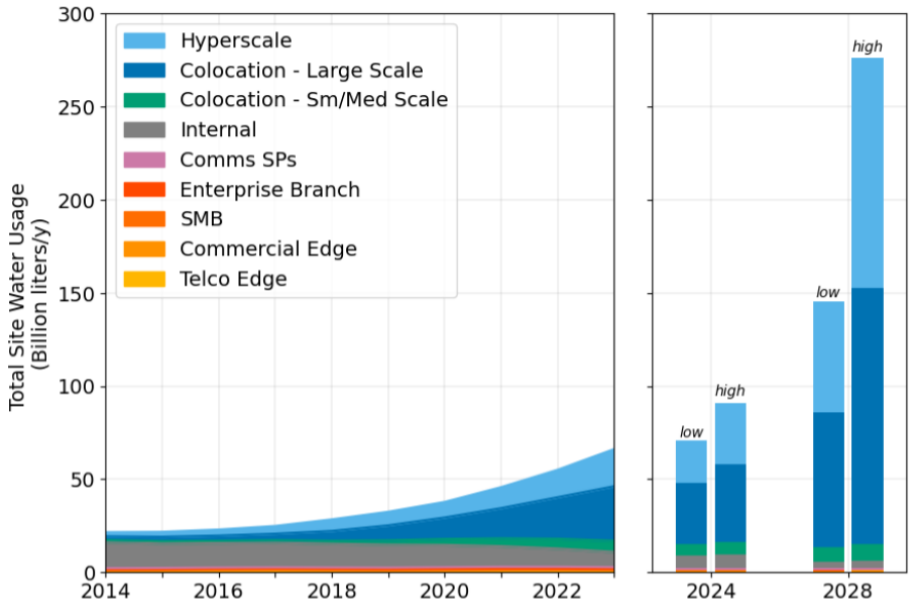

Figure 184 Direct water consumption by data center type[50]

[49] Shehabi et al., 2024 United States Data Center Energy Usage Report, LBNL 2001637.

[50] Shehabi et al., 2024 United States Data Center Energy Usage Report, LBNL 2001637.

2.2.2 COMPARING DEMAND ACROSS USES:

When evaluating a data center's water demand, it can be useful to compare it with the water demand of other development types (see Figure 19). This comparison allows the municipality to assess relative water use across land uses and determine whether the projected demand is consistent with adopted goals and policies.

USE	DESIGN FLOW RATE	APPROXIMATE OUTPUT/SIZE TO EQUAL 1.5 MGD	NOTES/LOCAL CONTEXT
Auto manufacturing	~39,000 gallons per unit[51]	~38 vehicles per day	A single plant may create up to 100,000 to 400,000 vehicles per year
Bioscience facility*	Facility 1: ~67,000 GPD Facility 2: ~1.1 MGD Facility 3: ~50, 860 GPD Facility 4: ~60, 544 GPD Facility 5: ~186,357 GPD	Facility 1 – ~22 comparable facilities Facility 2 - ~1.3 comparable facilities Facility 3 - ~29.5 comparable facilities Facility 4 - ~24.8 comparable facilities Facility 5 - ~8 comparable facilities	GPD is from regional bioscience facilities
Multi-family residential/Apartments	250 GPD/unit	~6,000 units	Comparable to several large apartment complexes
Single-family residential	300 GPD/unit	~5,000 homes	Roughly a small town's worth of housing
Hospital	300 gal/bed	~5,000 beds	Equivalent to multiple large regional hospitals
Grace Christian School (Apex)	~18,000 GPD	~83 comparable schools	Local reference point.
Felton Grove High School (Apex)	~35,250 GPD	~43 comparable schools	Local reference point.
Apex Light Industrial Phase 2	~69,130 GPD	~22 comparable buildings	Local reference point.

GPD = gallons per day
MGD = million gallons per day
*Range provided based on regional bioscience facility usage.

Figure 19 Water Use Comparison: 1.5 MGD (Comparable to a hyperscale data center)[52]

[51] Motor City Times, "How Much Water Is Needed to Manufacture a Car?" *Motor City Times*, accessed January 12, 2026, https://motorcitytimes.com/how-much-water-is-needed-to-manufacture-a-car/

[52] North Carolina Administrative Code, *Title 15A – Environmental Quality*, Chapter 02 – Environmental Management, Subchapter T – Waste Not Discharged to Surface Waters, accessed January 12, 2026, http://reports.oah.state.nc.us/ncac/title%2015a%20-%20environmental%20quality/chapter%2002%20-%20environmental%20management/subchapter%20t/subchapter%20t%20rules.pdf

2.2.3 TOWN OF APEX CAPACITY AND REGULATORY REQUIREMENTS

The Town of Apex receives potable drinking water from one (1) water treatment facility, the Cary/Apex Water Treatment Plan (CAWTP) and treats wastewater at two (2) water reclamation facilities, Apex Water Reclamation Facility (AWRF) and Western Wake Regional Water Reclamation Facility (WWRWRF). The Town of Apex is located in both the Cape Fear and Neuse River Basin, with the water supply of Apex coming from Jordan Lake, located within the Cape Fear River Basin.

WATER TREATMENT

Through a partnership with the Town of Cary, Apex owns 23% of the CAWTP, along with the Jordan Lake Intake Pump Station and three (3) raw water transmission lines. The CAWTP has a current capacity to produce 56 million gallons per day (MGD) of finished drinking water. Apex's average daily flow from the Cary/Apex Water Treatment Plant was 5.05 MGD in 2025.

WATER STORAGE

15A NCAC 18C .0805 requires a minimum of one-half day supply of the average daily demand to be stored via elevated storage. Apex currently operates three (3) elevated storage tanks: Mason Street Tank (0.5 MGD), Hunter Street Tank (1.0 MGD), and Tingen Road Tank (1.5 MGD), for a total of 3 MGD elevated storage. An additional tank is currently under construction at Pleasant Park with a 1.5 MGD capacity, expected to be completed in Fall 2026.

WASTEWATER TREATMENT

AWRF, owned by the Town of Apex, has a permitted capacity of 3.6 million gallons per day (MGD) with an average flow of 1.1 million gallons per day (MGD). AWRF is located within the Neuse River Basin serving the Middle Creek and portion of Williams Creek watersheds.

WWRWRF, co-owned with the Town of Cary, has a current permitted capacity of 18 MGD, prepped for a future expansion to 30 MGD. The Town of Apex owns 34% of WWRWRF and associated infrastructure, or 6.12 MGD. Apex's average daily flow at WWRWRF was 4.2 MGD in 2025. WWRWRF is located in the Cape Fear River Basin, serving the Beaver Creek, Little Beaver Creek, Big Branch, Little Big Branch, White Oak Creek, and a portion of Williams Creek watersheds. The Towns of Apex and Cary hold a joint-IBT (inter-basin transfer) certificate to allow transfer of a finite amount of water from the Cape Fear River Basin to the Neuse River Basin.

Expansion of WWRWRF to 30 MGD is programmed in the Town's Capital Improvement Plan, estimated to begin construction in 2031 at an estimated cost of $208M over the next 10 years to the partnership.

WASTEWATER PRE-TREATMENT

All wastewater entering the Town's collection system is required to conform with the Town's Pre-Treatment Ordinance, found in Division 4.5, Section 12-92 of the Town's Code of Ordinances. The objectives of this ordinance are the following:

- To prevent the introduction of pollutants and wastewater discharges into the municipal wastewater system which will interfere with the operation of the system or contaminate the resulting sludge.
- To prevent the introduction of pollutants and wastewater discharges into the municipal wastewater system which will pass through the system, inadequately treated, into the waters of the state or otherwise be incompatible with the system.
- To promote reuse and recycling of industrial wastewater and sludges from the municipal system.
- To protect both municipal personnel who may be affected by sewage, sludge, and effluent in the course of their employment as well as protecting the general public.
- To provide for equitable distribution of the cost of operation, maintenance, and improvement of the municipal wastewater system.
- To ensure that the municipality complies with its NPDES or non-discharge permit conditions, sludge use and disposal requirements and any other federal or state laws to which the municipal wastewater system is subject.

In addition to meeting the Town's ordinance for pre-treatment requirements, users of WWRWRF are also subject to the Town of Cary Ordinance.

2.2.4 POLICY CONSIDERATIONS AND POTENTIAL MITIGATION MEASURES

To address potential water use impacts associated with data centers, the Town may consider mitigation measures that promote operational efficiency while supporting the Town's goals related to public health, safety, infrastructure capacity, and environmental stewardship.

Potential measures for the Town's consideration may include:

- Encouraging or requiring the use of reclaimed water for equipment cooling applications.
- Limiting potable water use for non-cooling site needs, emergencies, or reclaimed water system maintenance periods.
- Encouraging or requiring the use of geothermal closed loop for cooling.
- Discouraging or prohibiting the use of groundwater for cooling.
- Considering adoption of a potable water surcharge to discourage domestic water use, support water conservation and infrastructure costs.
- Encouraging onsite storage of reclaimed water to serve the use for a 24-hour period minimum.
- Allowing a combination of air and liquid cooling methods to optimize efficiency and reduce waste.
- Requiring a water and sewer study detailing anticipated demand, necessary infrastructure and plant updates, and long-term operating impacts to the utility system

- Encouraging data centers to set a Water Usage Effectiveness (WUE) ratio goal to maximize efficiency (perhaps a goal of 0.5 or lower) and to provide the Town with annual report on the data center's WUE.[53] [54]
- Applying monitoring and reporting requirements that follow the Towns Sewer Use Ordinance and pretreat wastewater if needed to meet local limits.

2.3 ENVIRONMENTAL IMPACT

A data center may have environmental impacts in the form of light pollution, air quality, water quality and quantity, and contamination from onsite material.

2.3.1 LIGHT POLLUTION

Data centers are large investments in capital and high-end computing equipment that may store highly sensitive information regarding financial, medical, or in some instances national security-related information. As a result, data centers take security very seriously and tend to provide enough lighting to adequately monitor and ensure safety on the site.

Direct Impact: Artificial light such as that produced from exterior site lighting may directly impact human health and well-being by disrupting the circadian rhythm, which can be linked to sleep issues such as insomnia and delayed sleep-phase syndrome. Studies have also suggested that the disruption of the circadian rhythm caused by exposure to artificial light may also contribute to or in some cases, worsening existing conditions such as depression, high-blood pressure, attention deficit disorder, obesity, diabetes, and cardiovascular disease.[55]

Artificial lighting can directly affect wildlife by attracting certain organisms, such as insects, as well as the species that prey on them, while simultaneously repelling other species. These altered behavior patterns may contribute to habitat degradation by reducing the presence of species that provide essential ecological services but avoid artificially lit areas.[56]

Municipalities that do not have strong lighting standards may need to consider updating their ordinance or implementing lighting standards through zoning conditions to mitigate any unwanted light pollution created by the use. Section 8.6 *Exterior Lighting*, of the Town's Unified Development Ordinance (UDO), provides clear and actionable steps to address light pollution, by requiring a lighting plan that demonstrates compliance with adopted standards. This includes full cut-off fixtures that limit

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[53] *Water Usage Effectiveness (WUE) — Typical Values for Data Centers*, DataCentersX (accessed January 2026), https://datacentersx.com/energy-sustainability.html.

[54] *Measuring Energy and Water Efficiency for Microsoft Datacenters*, Microsoft (accessed January 2026), https://datacenters.microsoft.com/sustainability/efficiency/.

[55] American Heart Association, *Exposure to More Artificial Light at Night May Raise Heart Disease Risk*, November 3, 2025, https://newsroom.heart.org/news/exposure-to-more-artificial-light-at-night-may-raise-heart-disease-risk

[56] National Park Service, Synthesis of Studies on the Effects of Artificial Light at Night (U.S. Department of the Interior, March 24, 2025), https://www.nps.gov/articles/effectsoflight.htm

troublesome backlight, uplight, and glare, as well as programmable dimmers, maximum foot-candle limits, and lighting temperature standards.[57]

Any lighting concerns not fully mitigated by the UDO's exterior lighting standards will need to be addressed through suggested zoning conditions at the time of rezoning to further limit potential impacts on neighboring property owners and local wildlife. Such conditions may include additional standards for fixture height, additional shielding, and greater setbacks from the property lines.

2.3.2 AIR QUALITY AND GREENHOUSE GASES

Direct Impact: Emissions from onsite generators can release greenhouse gases and other air pollutants, including carbon dioxide (CO_2), carbon monoxide (CO), and nitrogen oxides (NOx). These emissions contribute to climate change and can degrade local air quality. Additional mitigation measures may be necessary to reduce or control the emissions from onsite power generation.[58]

Indirect Impact: In some instances, due to the need to generate additional energy to meet the demand, some fossil fuel power plants, like those that use coal, may have their life spans extended beyond their original retirement date to help meet the demand for electricity until newer plants are brought into service. When this occurs, it creates the potential for an increase in greenhouse gases and other air pollutants that may have negative impacts on communities near these power plants and thus results in indirect environment impact from excess energy demand. [59]

Diesel Emissions

The Environmental Protection Agency (EPA) states that exposure to diesel exhaust like that from diesel backup generators has been linked to serious health effects, including asthma and other respiratory illnesses, and can aggravate existing heart and lung conditions, particularly among children and older adults. These impacts can lead to higher rates of emergency room visits, hospitalizations, missed work and school days, and premature death.

2.3.3 WATER

Direct Impact: Large volume withdrawal from local water supply sources to meet the needs of large water users such as data centers may have serious impacts on both Town of Apex residents, neighboring communities, and wildlife in the process. In some circumstances where data centers have utilized groundwater, neighboring property owners have reported cases of well failure.[60]

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[57] Town of Apex Planning Department, *Unified Development Ordinance: Article 8 – General Development Standards (Sec. 8.6 Exterior Lighting)* (Town of Apex, NC, January 14, 2025), https://www.apexnc.org/DocumentCenter/View/562

[58] EPA (2025), Learn About Impacts of Diesel Exhaust and the Diesel Emissions Reduction Act, https://www.epa.gov/dera/learn-about-impacts-diesel-exhaust-and-diesel-emissions-reduction-act

[59] Duke Energy (2025), Chapter 1: Powering the Carolinas, 2025 Carolinas Resource Plan, https://www.duke-energy.com/.../01-chapter-1-powering-the-carolinas-web.pdf

[60] Frank Landymore, AI Data Centers Accused of Creating Major Problems for Local Water Systems, Futurism (July 19, 2025), https://futurism.com/ai-data-center-water

Indirect Impact: Power generation facilities require large amounts of water to cool, and as demand for energy grows, the need for more energy to meet that demand will indirectly require an increase in water use.[61]

2.3.4 GROUND & AIR CONTAMINATION

Data centers that store coolants, diesel, battery backups, or biocides for cooling tower treatment must comply with state and federal requirements for safe storage and use of potentially hazardous materials. However, equipment failure could result in leaks or spills of potentially hazardous materials, posing a risk to the local environment.

Additional consideration must be given to the use of open-loop (open-circuit) cooling systems that rely on evaporation to remove heat. These systems are typically exposed to sunlight and ambient atmospheric conditions and, as a result, may be susceptible to the introduction and growth of microbiological contaminants.[62]

The Centers for Disease Control and Prevention (CDC) notes that environments with characteristics such as biofilm buildup, warm water (77 – 113 degrees Fahrenheit), inadequate use of disinfectants, and water with little to no circulation can inadvertently create favorable conditions for the growth of bacteria such as Legionella.[63]

The development of Legionella can be naturally occurring in natural bodies of water or present in human-made building water systems and fixtures that include hoses, pipes, water filters, water heaters, showerheads, sink faucets, hot tubs, decorative fountains and water features, complex plumbing systems, cooling towers, etc. Cooling towers that do not adhere to the CDC's recommendations for Legionella treatment and prevention may contribute to the growth and spread of Legionella during normal operation.

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[61] Shehabi et al., 2024 United States Data Center Energy Usage Report, LBNL 2001637.

[62] Xuhui Yao, Fei Shen, Jie Hao, Lin Huang, and Benjamin Keng, "A Review of *Legionella* Transmission Risk in Built Environments: Sources, Regulations, Sampling, and Detection," *Frontiers in Public Health* 12 (2024): Article 1415157, https://pmc.ncbi.nlm.nih.gov/articles/PMC11309999/

[63] Centers for Disease Control and Prevention, *"Public Health Strategies for Legionella Control,"* last updated March 15, 2024, https://www.cdc.gov/control-legionella/php/public-health-strategy/index.html

The risk of Legionella spread associated with data centers is due to the evaporative cooling system's generation of fine water droplets (mist) that can aerosolize the bacteria. These droplets may be inhaled by individuals and lead to illness. Studies have stated that the risk of Legionella exposure is highest in built environments, such as residential, multi-use buildings, apartments, hotels, hospitals and schools.[64] However in rare cases research has shown that due to the aerosolization associated with cooling towers, the spread of Legionella may occur outside of the immediate area of the site, and under certain conditions, aerosolized mist may up to travel several miles from the source.[65]

The most common illnesses associated with Legionella exposure are Legionellosis and Legionnaires' disease (see sidebar). [66]

A hyperscale data center typically requires multiple cooling towers to dissipate heat generated by large-scale computing operations. Depending on facility size, redundancy requirements, and cooling design, a hyperscale data center may utilize anywhere from fewer than ten to several dozen cooling towers at full build-out.

Legionellosis & Legionnaires' disease

The CDC describes Legionellosis (aka Pontiac fever) as a mild illness that can include fever, headaches, and muscle aches.

Legionnaires' disease is a type of severe pneumonia with symptoms such as cough, fever, headaches, muscle aches, and shortness of breath, which may lead to lung failure and death. 1 in 10 people who get sick from Legionnaires disease will die due to complications from their illness.

To prevent the growth and spread of Legionella, the CDC has developed an assessment and operational toolkit that highlights the importance of managing temperature to ranges either below or beyond the ideal growth range of Legionella (77 – 113 degrees Fahrenheit), utilization of disinfectants (e.g. Chlorine, Chlorine dioxide, and Monochloramine, etc.), reducing potential stagnation of water flow (e.g. adequate pressure, reducing bends in pipe, etc.), and proper maintenance of equipment. [67] Adherence to these resources may help minimize the risk of releasing potentially harmful bacteria into the environment.

2.3.5 POLICY CONSIDERATIONS & POTENTIAL MITIGATION MEASURES

To address potential data center environmental impacts, the Town may consider mitigation measures that promote operational efficiency while supporting the Town's goals related to public health, safety, infrastructure capacity, and environmental stewardship.

Potential measures for the Town's consideration may include:

[64] Yao et al., "Legionella Transmission Risk in Built Environments," *Frontiers in Public Health* 12 (2024).

[65] M. R. Sala Ferré, C. Arias, J. M. Oliva, A. Pedrol, M. García, T. Pellicer, P. Roura, and A. Domínguez, "A Community Outbreak of Legionnaires' Disease Associated with a Cooling Tower in Vic and Gurb, Catalonia (Spain) in 2005," *European Journal of Clinical Microbiology & Infectious Diseases* 28, no. 2 (2009): 153–159, https://doi.org/10.1007/s10096-008-0603-6

[66] Centers for Disease Control and Prevention, *"About Legionnaires' Disease,"* last updated August 6, 2025, https://www.cdc.gov/legionella/about/index.html

[67] CDC, *"Public Health Strategies for Legionella Control."* March 15, 2024

- Applying existing UDO Section 8.6 *Exterior Lighting* and considering additional zoning conditions to address lighting concerns such as color temperature, brightness, fixture height, and light trespass.
- Considering the use of Tier IV or Tier IV equivalent backup generators to reduce the adverse impact on air quality.
- Considering the use of natural gas generators for emergency backup.
- Considering the use of spill containment berms, walls, and impermeable barriers to prevent off-site and ground contamination.
- Considering closed-loop cooling alternatives, such as geothermal systems (e.g., Pit Thermal Energy Storage) or reclaimed water, to reduce impacts on local aquifers and shared reservoirs.
- Considering the use a closed-loop cooling system that does not create a mist that can then carry the legionella bacteria into the environment, and that can demonstrate compliance with CDC and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Guideline 12 2023 *Managing the Risk of Legionellosis Associated with Building Water Systems* standards. [68]

2.4 NOISE

Noise generated by data centers presents unique challenges for both regulators and developers, primarily due to the need to balance continuous, 24-hour operations with effective mitigation of impacts on surrounding properties. Many existing noise ordinances and enforcement practices were not designed to address the operational characteristics of data centers and may be insufficient to manage their noise impacts.

Unlike many other land uses, data center noise can vary significantly in both sound level and frequency, often producing persistent low-frequency tones associated with cooling equipment, generators, and mechanical systems. As a result, noise mitigation measures that are effective for one industrial or commercial site may be ineffective for another. Factors such as topography, equipment type, equipment placement, cooling methods, distance to sensitive receptors, site layout, and existing vegetation can all influence how sound travels and how it is perceived off-site. These variables often necessitate site-specific noise mitigation strategies.

The rapid expansion of data centers in recent years has highlighted these challenges and prompted many municipalities to re-evaluate their noise regulations. In response, some jurisdictions now require comprehensive noise studies as part of the development review process. These studies may include: (1) baseline noise measurements prior to construction; (2) predictive modeling of noise levels at full

[68] American Society of Heating, Refrigerating and Air-Conditioning Engineers, ASHRAE Guideline 12-2023: Managing the Risk of Legionellosis Associated with Building Water Systems (Atlanta, GA: ASHRAE, 2023)

buildout based on site-specific equipment and operational characteristics; and (3) post-construction testing to verify compliance with modeled projections and applicable local noise standards.[69] [70]

Noise ordinances generally address data center noise using one or more of the following approaches:

1. **Source-based noise control**, which establishes sound limits measured at or near the noise source, typically at the property line of the site.
2. **Receiver-based noise control**, which evaluates noise based on its impact at the receiving location, often beyond the site boundary, and requires mitigation sufficient to protect nearby receptors.
3. **Path-based noise control**, which requires noise to be mitigated along its transmission path, such as through acoustical barriers, enclosures, or absorptive materials, before it reaches sensitive receptors.

Together, these approaches provide municipalities with tools to address data center noise in a manner that is both flexible and responsive to site-specific conditions.

2.4.1 DATA CENTER NOISE SOURCES

Data center noise can originate from sources such as air handling units, air-cooled chillers, cooling towers, server halls, and backup generators.[71] As previously mentioned above, unmitigated noise may have adverse impacts on neighboring communities' health, and enjoyment of life and property. In some cases, noise pollution has been shown to adversely impact an individual's cardiovascular, sleep, and mental health.[72] For this reason it is vital that municipalities consider all the potential impacts and work together with professionals such as acoustical experts to ensure the best standards and methodology to limit any such adverse impact.

AIR HANDLING UNITS

Air handling units serve two primary functions within a data center: (1) providing adequate ventilation to remove heat and airborne contaminants, and (2) maintaining acceptable operating temperatures within server halls. These units are typically located on the rooftop. The quantity of air handling units may be significantly higher than that of typical office and industrial uses. When operating

[69] Prince William County Planning Office, *"DPA2023-00019: Data Center Ordinance Advisory Group,"* Prince William County Government, accessed January 13, 2026, https://www.pwcva.gov/department/planning-office/data-center-ordinance-advisory-group/

[70] Peter Cary, "Some Cities Suffering from Data Center Noise Turn to Tough Limits," *Prince William Times*, February 27, 2023, https://www.princewilliamtimes.com/news/some-cities-suffering-from-data-center-noise-turn-to-tough-limits/article_2aa7fb8c-b6aa-11ed-8626-5738aae2f76c.html

[71] Nick McCabe, *Sound Solutions for Data Centers: A Guide to Noise Control*, Acoustical-Consultants.com (November 26, 2024), https://acoustical-consultants.com/industrial/environmental-noise/a-guide-to-noise-control-in-data-centers/

[72] Jennifer Biddle, *"How Noise Pollution Quietly Affects Your Health,"* Center for Occupational and Environmental Health, University of California, Davis, June 2, 2025, https://coeh.ucdavis.edu/research/how-noise-pollution-quietly-affects-your-health

simultaneously, air handling units can generate combined noise levels above the typically accepted decibel level near residential uses.[73]

AIR-COOLED CHILLERS

Data centers commonly rely on two types of chillers: liquid chillers and air-cooled chillers. Liquid chillers are generally housed within the building, whereas air-cooled chillers are installed either at ground level or on the roof. Air-cooled chillers are a notable source of exterior noise due to the operation of large fans and compressors used to expel heat from the facility. These components can produce noise levels comparable to high-intensity transportation sources such as airplanes and represent a significant contributor to overall site noise.[74]

COOLING TOWERS

Cooling towers function by receiving heated water from the facility's liquid chillers and dispersing heat into the atmosphere. The cooled water is then recirculated back into the system. This process involves multiple mechanical components operating simultaneously, which can generate noise. Data centers typically employ one to several dozen cooling towers, often located on rooftops.[75]

SERVER HALLS

Within server halls, individual servers are equipped with internal fans to prevent overheating critical components such as processors and circuit boards. This noise is generated within the building and may be less likely to affect surrounding residential areas.

BACKUP GENERATORS

Data centers are designed to operate continuously, with minimal tolerance for service interruptions. To maintain operations during power outages, facilities are equipped with diesel-powered backup generators. When activated, these generators can emit noise levels of up to approximately 110 dba. Although generator use is typically infrequent and limited to emergency events or testing conditions, their operation can result in substantial short-term noise impacts on adjacent properties.[76] [77]

Additionally, large electricity users, including data centers, may be required to participate in Duke Energy's PowerShare / Mandatory 50 program, which includes both voluntary economic curtailment hours and mandatory emergency events.[78] Voluntary or non-emergency hours allow customers to reduce load for financial incentives and are limited to a defined number of hours (50) per year, as

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[73] Data Center Knowledge, *What Are the 5 Main Causes of Noise in Data Centers?* March 17, 2025, https://www.datacenterknowledge.com/data-storage/what-are-the-5-main-causes-of-noise-in-data-centers-

[74] Data Center Knowledge, *"What Are the 5 Main Causes of Noise in Data Centers?"*

[75] Data Center Knowledge, *"What Are the 5 Main Causes of Noise in Data Centers?"*

[76] McCabe, *Sound Solutions for Data Centers*.

[77] Data Center Knowledge, *"What Are the 5 Main Causes of Noise in Data Centers?"*

[78] Duke Energy, *PowerShare Carolinas* (brochure, 2025), accessed January 2, 2026, https://www.duke-energy.com/-/media/pdfs/for-your-business/powersharecarolinasbrochure.pdf?rev=3242848612d546d48e418c2292759054

confirmed in a regulatory interpretation by the U.S. Environmental Protection Agency.[79] Emergency events, by contrast, are mandatory load reductions called when the grid is under stress typically during an Energy Emergency Alert (EEA) to maintain reliability and prevent outages. The hours and conditions for these emergency events are set in each customer's service agreement. Further conversations will be needed with Duke Energy to see if a hyperscale data center will be a part of this plan, or if they will have customer specific non-emergency usage requirements set per their service agreements.

2.4.2 HIGH VS LOW FREQUENCY NOISE

This section focuses on practical methods for understanding and evaluating both high- and low-frequency noise, which is measured in hertz (Hz), which is the unit that describes the pitch or frequency of sound. Noise levels are typically expressed in decibels (dB), using different weighting scales to reflect how sound is perceived.

The most commonly used scale is A-weighted decibels (dBA), which adjusts measurements to emphasize mid-range frequencies that are most easily heard by the human ear (20Hz-20 kHz). For this reason, dBA is widely used in municipal noise ordinances and regulatory standards. However, dBA tends to de-emphasize low-frequency sound, which means deeper, bass-like noise may not be fully represented even when it is noticeable or disruptive.

To better account for low-frequency noise, measurements may also be taken using C-weighted decibels (dBC). The dBC scale places less filtering on low-frequency sound and therefore provides a more accurate representation of bass and rumble generated by large mechanical equipment. Comparing dBA and dBC levels can help identify whether low-frequency noise is a contributing factor to perceived impacts.[80]

Noise generated by data centers can vary significantly depending on equipment type, cooling methods, and operating conditions, making mitigation strategies highly site-specific. Effective noise regulation can also differentiate between impulse noise (short, sudden sound events), intermittent noise (noise that cycles on and off), and continuous or constant noise (steady, ongoing sound).

In addition to overall decibel limits, it may be appropriate to utilize octave band analysis, which evaluates sound within specific frequency ranges to identify tones or frequency bands that may be particularly disruptive or out of compliance with a municipality's noise ordinance. This approach is especially useful for identifying low-frequency or tonal noise that may not be apparent through dBA measurements alone.[81]

The chart below shows various noise decibel levels along with the source and the potential effect and perception of the noise:

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[79] U.S. Environmental Protection Agency, *Response to Duke Energy Request for Regulatory Interpretation on Mandatory 50 Program* (EPA publication), February 27, 2025, https://www.epa.gov/system/files/documents/2025-05/response-to-duke-energy.pdf?

[80] David A. Nelson, *Tutorial – Environmental Noise Measurement and Interpretation* (Prince William County, VA: Department of Public Works, October 23, 2024), accessed January 12, 2026, https://www.pwcva.gov/assets/2024-10/1618%20Tutorial%20-%20Environmental%20Noise%20Measurement%20and%20Interpretation%202024%20OCT%2023_0.pdf

[81] Vibration Research, *"Octave Analysis in ObserVIEW,"* accessed January 2026, https://vibrationresearch.com/blog/octave-analysis-obserview

Noise Source	Approx. Decibel Level (dB)	Potential Effect / Perception
Jet take-off (80ft)	150	Risk of severe physical injury; possible eardrum rupture at close range
Aircraft carrier deck	140	Extremely painful; immediate risk of hearing damage
Military jet take-off with afterburner (50 ft)	130	Painful; immediate hearing damage likely
Thunderclap; chain saw; oxygen torch	120	Threshold of pain for many individuals; hearing damage possible with short exposure
Jet flyover (1,000 ft); live rock music; horn noise – train (100 ft)	110	Very loud; hearing damage likely with short exposure
Gas lawn mower (3ft)	100	Hearing damage possible in as little as 15 minutes; ~8× perceived loudness of 70 dB
Diesel Truck (50ft) General Freight Train (100ft) Lawn mower (100ft)	90	Hearing damage possible with prolonged (8-hour) exposure; ~4× as loud as 70 dB
Garbage disposal (3ft); dishwasher; factory noise;	80	Hearing damage possible with long-term exposure; ~2× as loud as 70 dB
Passenger car at 65 mph; freeway traffic; vacuum cleaner (10ft); radio or TV	70	Upper range may be annoying to some individuals
Conversation in restaurant or office; background music; AC unit (100 ft); heavy traffic (300ft)	60	Generally comfortable; normal conversation level
Quiet suburb; conversation at home	50	Quiet; minimal disturbance
Library; bird calls; urban ambient sound floor	40	Very quiet
Quiet rural area	30	Extremely quiet
Whisper; rustling leaves	20	Barely audible
Breathing	10	Near the threshold of hearing

Figure 20 Levels of Noise in Decibels (dB) [82] [83]

[82] Illinois Department of Transportation (2015), Highway Traffic Noise – Noise Fundamentals, https://idot.illinois.gov/…/highway-traffic-noise----noise-fundamentals-111215.pdf

[83] American Academy of Audiology, *Levels of Noise in Decibels (dB) Poster* (2023), https://www.audiology.org/wp-content/uploads/2023/09/PR23-Poster-Noise-Chart-8.5x11.pdf

2.4.3 POLICY CONSIDERATIONS & POTENTIAL MITIGATION MEASURES

To address potential data center noise impacts, the Town may consider mitigation measures that promote operational efficiency while supporting the Town's goals related to public health, safety, infrastructure capacity, and environmental stewardship.

Potential measures for the Town's consideration may include:

- Providing measurable and enforceable use standards and/or zoning conditions that address both high-frequency and low-frequency noise.
- Prioritizing the utilization of pre-construction and post-construction noise studies prepared by a qualified, third-party acoustical professional to evaluate compliance with adopted standards.
- Prioritizing maximum allowable noise levels at property lines (for example, 55 dBA and 50 dBC, or limits established as defined number of decibels above existing above ambient conditions) with additional mitigation evaluated if standards cannot be maintained.
- Exploring best practices for when the use of backup generators is appropriate (e.g., emergency operation and maintenance activities).
- Encouraging generator testing and maintenance to defined daytime hours (e.g., 10:00 a.m. to 4:00 p.m.) to minimize community impacts.
- Encouraging minimum separation distances between sound-generating equipment and property lines and encouraging placement of such equipment behind principal structures to provide additional shielding.
- Encouraging the use of parapet walls to screen all rooftop equipment. UDO Sec. 5.2.4.B.2[84] allows parapet walls to extend no more than 5 feet above the allowable height of the building, so the actual building height may need to be reduced in order to accommodate the needed parapet wall height.

2.5 LAND USE

2.5.1 ZONING

Many municipalities choose to only allow larger data centers such as large colocation and hyperscale data centers in industrial zoning districts. In recent years, states such as Virginia have seen counties with significant concentrations of existing data center development amend their zoning ordinances to limit

[84] Town of Apex, *Unified Development Ordinance: Article 5 – Measurements* (Apex, NC: Town of Apex, 2024), accessed via https://www.apexnc.org/DocumentCenter/View/550

by-right development (e.g., require conditional zoning, special use permits, etc.) and update noise ordinance standards, supplemental use standards, and design standards.[85] [86] [87]

2.5.2 SITE SELECTION

Site selection will depend on the type of data center development that is being explored. For instance, enterprise and internal data center uses may be considered more accessory in nature, and it may be appropriate to allow in areas where commercial and office uses are permitted. Meanwhile, colocation and hyperscale data centers should be considered as the primary use for their sites and will likely require larger amounts of land, water, and energy to operate. Therefore, these types of data centers should be sited in industrial zoning districts that are in close proximity to existing infrastructure that is easily extendable.

Where not enough consideration on the site location was given, large-scale data centers in other communities have been built within several hundred feet of existing residential developments. As a result, some adjacent property owners have reported that ongoing noise from on-site cooling systems and generators has significantly disrupted their quality of life.[88]

2.5.3 DESIGN AND AESTHETICS

SITE DESIGN AND LAYOUT

Hyperscale data centers may be developed as single large buildings or as campus-style configurations consisting of multiple warehouse-scale structures. In addition to the primary buildings, these sites typically include secondary structures and equipment such as fuel tanks, backup generators, and electrical infrastructure (e.g., transformers and substations).

Due to the scale and intensity of hyperscale data center development, thoughtful site design and layout standards are important to promote efficient use of the site while minimizing potential noise, visual, and operational impacts on neighboring properties and surrounding communities. Some jurisdictions have addressed these concerns by requiring larger setbacks, wider buffers, enhanced screening, and limitations on the placement of potentially disruptive site elements in relation to adjacent uses.

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[85] Fairfax County Department of Planning and Development, *Data Centers: Report and Recommendations* (Fairfax County Government, January 9, 2024), https://www.fairfaxcounty.gov/planning-development/sites/planning-development/files/Assets/Documents/PDF/data-centers-report.pdf

[86] Prince William County Department of Planning, *DPA2023-00019: Data Center Ordinance Advisory Group*, Prince William County Government, accessed January 7, 2026, https://www.pwcva.gov/department/planning-office/data-center-ordinance-advisory-group/

[87] Loudoun County Department of Planning & Zoning, *Data Center Standards & Locations*, Loudoun County Government, accessed January 7, 2026, https://www.loudoun.gov/5990/Data-Center-Standards-Locations

[88] Dan Merica and Jesse Bedayn, "As Data Centers Proliferate, Conflict with Local Communities Follows," *AP News*, August 23, 2024, https://www.apnews.com/article/data-centers-artificial-intelligence-technology-amazon-google-56b84cbb94942039754282afb076a87b

ARCHITECTURAL STANDARDS

Hyperscale data centers are designed similarly to large warehouse buildings, but instead of materials, they are full of high-end computing equipment. The building design and layout may vary from municipality to municipality based on their current design standards. In some jurisdictions, limited or no architectural design standards have been applied, resulting in utilitarian or industrial-style facades that, in certain cases, have generated adverse community responses. To address this, some communities like those in Prince William County, Virginia, where they established a data center overlay district to implement specific design standards to require changes in building height, building recesses and projections, fenestration elements (including windows and faux windows), and other design features intended to improve visual compatibility with surrounding development.[89]

2.5.4 DECOMMISSIONING & REUSE OF THE SITE

From a planning and land use perspective, the ability to reuse or redevelop a hyperscale data center site is closely tied to the removal or retention of the former-use infrastructure. Retaining high-hazard systems may limit the range of feasible future uses, increase permitting complexity, and impose additional building and fire protection requirements on future tenants. Conversely, full decommissioning of former-use systems generally increases flexibility for adaptive reuse and supports a broader range of employment, commercial, or industrial uses consistent with adopted land use policies. Due to the variability of potentially hazardous elements associated with the hyperscale data center use, it may be advisable for jurisdictions to have the developer provide a decommissioning and reuse plan in the event operation of the data center use is terminated.

Under the North Carolina Building Code (NCBC), a change in occupancy for an existing building requires evaluation of the building in relation to the proposed new use.[90] Approval of a permit for a new occupancy generally assumes that equipment, materials, and infrastructure associated with the former use have been removed unless their continued presence is expressly proposed and evaluated as part of the new occupancy.

Where systems such as bulk diesel fuel storage, fuel tanks, battery energy storage systems, or similar high-hazard equipment are proposed to remain in place, those elements must be considered in determining the applicable occupancy classification under the North Carolina Building Code and operational requirements under the North Carolina Fire Code (NCFC).[91] [92] The presence of such systems may result in all or a portion of the building being classified as a higher-hazard occupancy, even if the

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[89] Prince William County, *Prince William County Code of Ordinances: Data Center Opportunity Zone Overlay District* (Code § 32-509), accessed January 2, 2026, https://library.municode.com/va/prince_william_county/codes/code_of_ordinances?nodeId=CH32ZO_ARTVOVDI_PT509DACEOPZOOVDI

[90] International Code Council, *North Carolina State Building Code: Chapter 3 — Occupancy Classification and Use*, in *2024 North Carolina State Building Code: Building Code* (NCBC2024V1.0), accessed January 2, 2026, https://codes.iccsafe.org/content/NCBC2024V1.0/chapter-3-occupancy-classification-and-use

[91] ICC, *NC State Building Code: Chapter 3 — Occupancy Classification and Use*.

[92] International Code Council, *North Carolina State Fire Code: Appendix E — Hazard Categories (E103)*, in *2024 North Carolina State Building Code: Fire Prevention Code* (NCFC2024V1.0), accessed January 2, 2026, https://codes.iccsafe.org/content/NCFC2024V1.0/appendix-e-hazard-categories#NCFC2024V1.0_Pt07_AppxE_SecE103

primary proposed use would otherwise qualify as a standard warehouse or industrial use. In those cases, the building would be required to meet all applicable code provisions associated with the higher hazard classification, including fire protection systems, fire separation, egress, and life safety requirements.

The Building Code does not regulate the methods by which hazardous materials or former-use equipment are removed or where those materials are transported or disposed. Those activities are regulated through separate environmental, fire safety, and waste management programs. Consistent with standard permitting practice, issuance of a demolition permit for a fuel tank or similar system presumes that all hazardous contents have been removed and the system rendered safe prior to demolition.

Private electrical substations and similar utility infrastructure may either remain in place to serve a new occupancy or be disconnected and removed as part of decommissioning. Given the significant cost and value of such equipment, it is common for owners to remove or transfer these assets separately from the building. If a private substation remains in place and is intended to continue in service, all required safety clearances, protective systems, and access provisions must remain in compliance with the NC Building Code, NC Fire Code, and the National Electrical Code (NEC). Updated electrical documentation, including a current single-line diagram, would be required to reflect the new tenant, electrical loads, and configuration.

HAZARDOUS MATERIAL REMOVAL

The decommissioning or reuse of a hyperscale data center site that has hazardous materials will be required to take the following action:

1. **Final Hazardous Materials Inventory and Reporting**

   Before any decommissioning begins, the facility would be required to:

   - Submit a complete inventory of all hazardous materials stored or used on site, including quantities, Safety Data Sheets, and locations. In North Carolina, certain facilities must file Emergency Planning Community Right to Know Act (*EPCRA*) *Tier II/Section 311 chemical inventories* with the State Emergency Response Commission (SERC) and Local Emergency Planning Committee (LEPC) if thresholds are exceeded.

2. **Hazardous Materials Closure Plan**

   Per the North Carolina Fire Code (NCFC):

   - The Fire Code Official can require a permit application for permanent closure of a hazardous materials storage, handling, or use facility.
   - Such applications must be submitted at least 30 days before termination of hazardous material operations and can require an approved facility closure plan.

3. **Change of Occupancy / Compliance**

   Before a new occupancy can be approved:

- Per the NC Fire Code (Section 102), a change of occupancy cannot occur unless the building is brought into compliance with current fire and existing building codes.
- This means all fire protection systems, safety signage, egress routes, and hazardous material provisions must meet the requirements appropriate for the new use — including removal or mitigation of old hazards from the data center use.

4. Inspection and Approval

Before approving the redesigned site for its new use:

- Apex Fire Department Risk Management Division will perform a thorough inspection to confirm all hazardous materials are removed.
- They will confirm fire protection systems (alarms, suppression, egress) meet code for the new occupancy classification or be maintained based on the hazard.
- Only after these inspections will conditional approval be granted.

Before a data center site can be repurposed:

1. Inventory and report all hazardous materials per NC, Wake County LEPC, and EPCRA requirements.
2. Remove all hazardous substances, with proper disposal and contractor verification per RCRA (Resource Conservation and Recovery Act) requirements.
3. Document and certify site safety, including contamination testing as required.
4. Coordinate with fire and environmental authorities for inspections and final approvals.
5. Comply with fire and building code requirements for the new certificate of occupancy.

2.5.5 POLICY CONSIDERATIONS & POTENTIAL MITIGATION MEASURES

To address potential impacts associated with data centers and land use, the Town may consider a range of mitigation measures that align with the Apex's Unified Development Ordinance (UDO), to balance operational efficiency with the Town's goals related to public health, safety, infrastructure capacity, environmental stewardship, and community character.

Potential measures for the Town's consideration may include:

- Following best practices for data center application review, including conditional zoning and developer agreements.
- Finalizing amendments to the Unified Development Ordinance (UDO) to create the data center use, definition, and related supplemental standards.
- Applying existing UDO Article 9 *Design Standards* and considering additional zoning conditions to address architectural concerns such as building massing, fenestration, facade articulation, and materials.
- Encouraging maximum height standards or minimum setback distances for data center structures to limit visual impact.
- Encouraging internal placement of equipment and screening of rooftop or ground-mounted equipment when internal placement is not practicable.
- Limiting hyperscale data center development to zoning districts intended for industrial use.

- Evaluating minimum site area thresholds (e.g., 100 acres or more) to ensure adequate separation from surrounding land uses and infrastructure.
- Prioritizing enhanced setbacks and wide buffers (e.g., 200' – 1,000') that prioritize the use of berms and the preservation of existing mature vegetation.
- Encouraging the applicant to provide a decommissioning and reuse plan to address long-term site viability and potential future redevelopment.
- Prioritizing minimum separation distances between potential hazard areas (such as fuel storage tanks and battery energy storage systems) and sensitive land uses, including schools, daycare facilities, hospitals, and similar uses.
- Encouraging early installation of perimeter buffers and screening in initial phase to mitigate visual impacts during construction and operation.

2.6 ECONOMIC IMPACT

2.6.1 EMPLOYMENT GENERATION

Communities may see data centers as a new source of jobs, but this may not always be the case. In 2024, the Joint Legislative Audit and Review Commission of Virgina (JLARC) created the report, *Data Centers in Viriginia,* that reviewed employment figures associated with data centers and have found that data center development and operation generate relatively few long-term jobs, providing limited employment benefits to the local area.

CONSTRUCTION JOBS

The JLARC's report highlighted how new data centers may provide an increase in temporary construction jobs which may provide a short-term economic boost to area, but long-term employment is typically limited due to high automation, with only a small number of staff needed to operate the facilities.[93]

FULL-TIME DATA CENTER JOBS

Large data centers may have few employees onsite for day-to-day operations. Research in areas with large concentrations of data development has found that the floor area to employee ratio can be as high as 5,000 square feet to one employee. This means a 250,000 square foot facility may only need to employ 50 full-time staff to manage the data center operation.[94]

Even though data centers do not generate many permanent jobs, they do tend to be well-paying. In 2022, technology professionals earned an average of $108,100 annually, network support technicians

[93] Joint Legislative Audit and Review Commission (JLARC), *Data Centers in Virginia*, Report No. 598 (Richmond, VA: Commonwealth of Virginia, December 9, 2024), https://jlarc.virginia.gov/pdfs/reports/Rpt598.pdf

[94] Joint Legislative Audit and Review Commission (JLARC), *Data Centers in Virginia*, Report No. 598 (Richmond, VA: Commonwealth of Virginia, December 9, 2024), https://jlarc.virginia.gov/pdfs/reports/Rpt598.pdf

$76,060, and data center roles range from $42,000–$149,000, exceeding the 2024 U.S. median income for both female and male nonfamily households was $44,870 and $58,000.[95] [96]

2.6.2 TAX REVENUE

Data centers are subject to ad valorem property taxes for real and personal property, this includes real (e.g., buildings and land) and business personal property (e.g., equipment inside the building). Assessments for both real and business property are conducted by the Wake County Tax Office.

Using Wake County's 2024 assessed values the average data center has a $38,000,000 of real value and $115,000,000 of business personal property value (see figure 20). It should be noted that the business property value is subject to depreciation.

Type	Per $100	Apex Property Tax (Estimate)
Real Value	$380,000	$135,280
Business Personal Property	$1,150,000	$409,400
	Total	$544,680

Figure 20 Estimated Apex Property Tax from Data Centers.

Depreciation of data center business personal property may be more volatile than traditional real property due to the high concentration of equipment. This equipment depreciates a significantly faster rate than real estate assets. While rebuilds and upgrades may restore value, there is limited historical data to reliably project or guarantee long-term outcomes (see figure 20).

Business Personal Property (BPP) of $115,000,000			
Year	Depreciation	BPP Per $100	Property Tax Estimate
Installed	-	$1,150,000	$409,400
1	20%	$920,000	$327,520
2	39%	$701,500	$249,734
3	59%	$471,500	$167,854
4	80%	$230,000	$81,880
5	95%	$115,000	$20,470

Figure 21 Business Personal Property Estimated Tax and Depreciate Values

[95] U.S. Census Bureau, *Income in the United States: 2024*, Current Population Reports P60-286 (Washington, DC: U.S. Government Printing Office, September 2025), https://www.census.gov/library/publications/2025/demo/p60-286.html

[96] Work In Data Center Team. *Data Center Technician Salary Guide 2025*. WorkInDataCenter.com, November 4, 2025. https://www.workindatacenter.com/resources/data-center-technician-salary-guide-2025

2.6.3 INFRASTRUCTURE

PUBLIC UTILITIES

Data centers have both immediate direct and indirect impacts on utility systems due to large and inconsistent flow demands. To meet the necessary demands, as noted throughout sections above, data centers may construct additional infrastructure or provide a monetary contribution toward infrastructure upgrades and improvements. While those initial contributions reduce the burden on the utility to meet the necessary demands, there are indirect economic impacts the utility for perpetuity. These economic impacts may include additional necessary personnel to operate and maintain additional infrastructure, lifetime operations and maintenance costs, and reduction in available water supply.

2.7 TRAFFIC GENERATION

2.7.1 DATA CENTER TRAFFIC

As mentioned in Sec. 2.7.1 *Employment Generation,* data centers typically have few employees onsite and do not generate any significant traffic once in operation. This can make data centers an appropriate type of development where there are already concerns related to existing traffic levels.

2.7.2 POLICY CONSIDERATIONS & POTENTIAL MITIGATION MEASURES

To address potential traffic impacts associated with data centers, the Town will consider mitigation measures that align with Apex's Unified Development Ordinance (UDO) Section 13.19, which establishes thresholds for Traffic Impact Analyses (TIA) at 1,000 daily trips or 100 trips during a peak hour.

The actions the Town may take include:

- Evaluating traffic impacts using Land Use Code (LUC 160) in the ITE Trip Generation Manual (11th Edition), which defines a data center as a free-standing warehouse-type facility primarily used for off-site storage of computer systems, applications, and secure data. Some facilities may include maintenance areas and small office spaces and may be occupied by single or multiple tenants.
- Recognizing that LUC 160 reports an average daily trip generation rate of 0.99 trips per 1,000 square feet, while acknowledging that sample sizes are small and additional data may be needed to refine anticipated trip generation.
- Coordinating with NCDOT's Congestion Management group, as recommended, to evaluate trip generation methodology on a case-by-case basis.
- Requiring coordination between Town staff, NCDOT (if involving NCDOT maintained roadways), the applicant, and the applicant's traffic engineer to determine the scope of any trip generation letter or full TIA.
- Considering mitigation measures identified in a TIA or traffic letter, such as turn lanes, signal modifications, or other operational improvements, to maintain roadway safety and capacity.
- Encouraging coordination between Town staff, the applicant, and the applicant's traffic engineer to determine the scope of any trip generation letter or full TIA.

- Considering mitigation measures identified in a TIA or traffic letter, such as turn lanes, signal modifications, or other operational improvements, to maintain roadway safety and capacity.

2.8 PUBLIC HEALTH & SAFETY (POTENTIAL HAZARDS & EMERGENCY PREPAREDNESS)

2.8.1 HAZARDS

Data centers may have many potential hazards located onsite as part of their daily operations that should be accounted for when assessing a municipality's ability to monitor and respond to any potential risk.

CHEMICAL HAZARDS

To maintain the necessary cooling equipment onsite (liquid or air), data centers may have large volumes of coolants, refrigerants, and biocides. If these materials are not stored and handled in alignment with state and federal regulations or in case of system failure, there is a chemical hazard risk.

FIRE & EXPLOSION HAZARDS

Stored Fuel: Data centers that utilize backup generators will require onsite storage of fuel via tanks (diesel) or pipelines (natural gas). The volume of fuel stored onsite varies based on several factors, including the number and size of generators, the required level of redundancy[97], and the duration of runtime the facility is designed to maintain during a utility outage.

A tier III or IV hyperscale data center with an electrical demand of approximately 300 MW must be capable of sustaining operations without interruption during an outage. Assuming generators with a maximum capacity of 2.5 MW are used, such a facility would require approximately 120 generators operating in parallel to maintain full load. To support this level of operation, hyperscale data centers may store hundreds of thousands to millions of gallons of diesel fuel onsite, depending on the targeted runtime (e.g., 24, 48, or 72 hours) and fuel reserves.

For context, in 2011 Motiva Enterprises received approval to construct an additional single diesel storage tank approximately 48 feet in height and 110 feet in diameter, with a storage capacity of roughly 2.55 million gallons (see figure 22). This example illustrates the scale of onsite fuel storage that may be required to support backup generators serving large industrial or energy-intensive facilities. Some facilities may choose to utilize additional storage tanks.

Figure 22 Google Map Aerial View of the Motiva Enterprise fuel tank at 2232 Ten Ten Rd, Apex, NC (approx. 35.718°N, 78.815°W).

[97] Uptime Institute, Tier Classification System, Uptime Institute, https://uptimeinstitute.com/tiers

Battery Energy Storage Systems (BESS): A Battery Energy Storage System (BESS) is a system that uses batteries to store excess energy on-site. This energy may be generated from renewable sources or purchased from a power provider during non-peak hours. Stored energy is typically discharged during peak demand periods, during service interruptions, or, in some cases, sold back to the power provider to help offset peak grid demand and improve system reliability.

BESS facilities generally consist of modular container units that can house approximately 200 to more than 1,000 battery modules per container, depending on container size, configuration, and system design (see Figure 23). Larger BESS installations may include multiple such containers to meet operational and capacity needs. A range of battery chemistries may be used, including lithium-ion, lead-acid, sodium-ion, and emerging solid-state technologies, depending on project objectives and performance requirements. Each battery type presents distinct operational characteristics, hazards, and limitations, which may necessitate specialized safety equipment, monitoring systems, and training.[98]

Several key hazards associated with BESS facilities warrant careful consideration[99]:

1. **Thermal Runaway:**
   Batteries like lithium-ion can experience thermal runaway, a condition in which a battery cell overheats and triggers a self-sustaining internal chemical reaction. This process can result in rapid temperature escalation and significantly increase the risk of fire or explosion.

2. **Toxic and Flammable Gas Emissions:**
   Fires involving battery systems may release hazardous gases, including hydrogen, carbon monoxide, carbon dioxide, methane, hydrogen fluoride, and other volatile organic compounds (VOCs), depending on battery chemistry and system design. These emissions pose risks to human health and complicate emergency response efforts.

3. **Stranded Energy:**
   "Stranded" energy refers to hazardous electrical energy that remains within a BESS even after the system is damaged or believed to be fully discharged. This residual energy can create ongoing risks of electrical shock, arc flash, arc blast, and delayed fire or re-ignition, which may occur minutes to days after the initial incident.

4. **Particulate and Environmental Hazards:**
   Thermal runaway events can result in the combustion of battery materials and associated system components, generating hazardous soot and fine particulate matter. In addition to active battery materials, enclosures, wiring, and connectors may become involved, contributing to air quality concerns, health risks, and potential environmental contamination.

[98] BSLBATT Lithium, *What Are the Different Types of Battery Energy Storage Systems?*, BSLBATT (October 24, 2025), https://bslbatt.com/blogs/types-of-battery-energy-storage-systems-comparison-guide/

[99] Joglar, *Landscape of Battery Energy Storage System Hazards & Mitigation Strategies* (NFPA FPRF, 2023).

Collectively, these hazards present challenges for fire suppression, emergency response, and post-incident site remediation, underscoring the importance of appropriate system design, site location, operational controls, and coordination with fire and emergency services.[100]

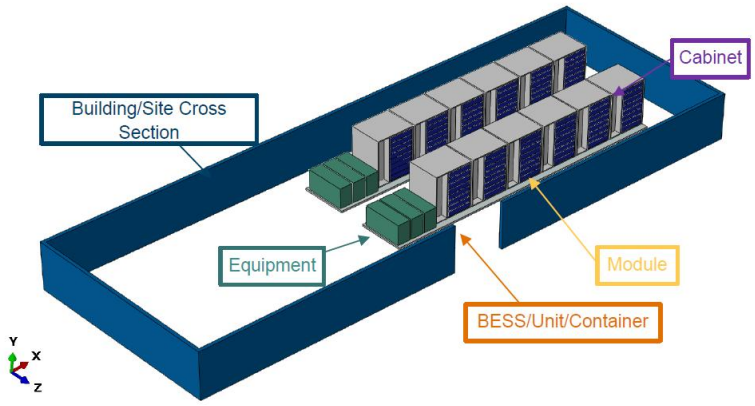

Figure 23 Pictorial representation of a BESS site or a BESS Building Cross-Section[101].

2.8.2 EMERGENCY PREPAREDNESS

The Town's ability to serve and respond to potential emergency situations will be paramount to the safety of both the development and neighboring communities. The following sections summarize considerations provided by Town departments related to emergency preparedness and response.

FIRE DEPARTMENT

The Apex Fire Department (FD) is an all-hazard emergency response agency that is organized with career staff and proper equipment to address any emergency incident that may occur within the Apex fire district. Currently, the Apex Fire Department staffs 8 fire companies and 2 battalion chiefs within 6 strategically located fire stations. Each day, 34 professional firefighters are assigned within each of our stations to provide 24/7 coverage in the Apex Fire District. The Town has approved an additional fire station on the western side of Apex, and this station is planned to house 2 additional fire companies (engine & ladder), increasing the Apex resource allocation to 10 fire companies with 42 personnel each day. This station is needed to provide additional resources on the western side of Apex in efforts to achieve the fire department's response time goals of both our first arriving fire suppression unit and the total effective response force. This new station is currently on the Town's Capital Improvement Plan (CIP) to open in 2030-2031, but at this time has not been funded.

In addition to the current Apex resources listed above, Apex FD has the following agreements in place to address the need for additional resources when required:

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[100] U.S. Environmental Protection Agency, Battery Energy Storage Systems: Main Considerations for Safe Installation and Incident Response, accessed December 19, 2025, https://www.epa.gov/electronics-batteries-management/battery-energy-storage-systems-main-considerations-safe

[101] Joglar, *Landscape of Battery Energy Storage System Hazards & Mitigation Strategies* (NFPA FPRF, 2023).

- Apex entered into a special agreement with Cary and Morrisville Fire Departments in 2019, forming a group called CAM (Cary, Apex, Morrisville). This agreement aligned all 3 departments to create a response structure that operates as 1 large fire department. All 3 towns maintain 3 separate fire departments and fire districts and respond to emergencies as 1 agency that share a dispatch center, response guidelines, and standard training practices. The CAM group is comprised of 18 fire stations.
- Apex has mutual aid agreements with all 17 fire departments in Wake County and the 2 fire departments in Chatham County that border Apex.
- Apex has an annual contract with the North Carolina Regional Response Hazardous Material Team 4.

Every fire district has unique characteristics to include special hazards that require additional planning, training, resources, etc. Apex is not unfamiliar with unique hazards, protecting an area with major highways and railways that transport hazardous materials each day, 2 large fuel terminals, and a nuclear power plant.

Apex FD conducts risk assessments based on many factors and that information is used to create a response plan to address the critical tasks that would need to be accomplished at the scene of an emergency incident to mitigate the situation. This process also includes the creation of a pre-incident plan for such a facility that outlines emergency response measures for the property and plans that guide community preparedness and measures to include evacuations and long-term mitigation, if required.

Any development that is interested in building in Apex must meet all outlined requirements and regulations that have been adopted (including all fire codes). Developments are evaluated in consideration of concerns, such as available fire flow fire department access, sites within IPZ (Isolation Protection Zone) which can determine the final approval process.

The proposed data center in the New Hill area has sparked concern in multiple areas to include emergency response. The Apex Fire Department has heavily researched data centers to become informed of the operations, components, and risks that are associated with such a facility. This research has included reviewing available information and data through trusted sources within the fire service industry and direct conversations with fire departments that currently have data centers, to include ones that have had fires. We have also consulted the NC Office of State Fire Marshal, National Fire Protection Association, and other subject matter experts.

Data center fires are rare but can pose a moderate-risk incident if a fire were to occur and not be controlled by on-site fire suppression systems and/or first arriving effective response force, making them a target hazard for fire departments. This type of incident would be considered low probability/high consequence (placing it in a moderate risk classification), which is not an uncommon risk type we encounter here in Apex or in any area in the country. These facilities are unique and are ever-changing, but fire code and the National Fire Protection Association (NFPA) provide requirements and guidance to address these types of facilities. These facilities are protected with multiple fire detection and suppression systems (water and non-water suppression systems, using gaseous or powder-based agents to extinguish fires). Proper emergency response plans and training are key for facilities such as a data center and will aid in a successful response during an emergency.

Between 2014-2023, there were reported 22 instances of fires or explosions world-wide involving data centers, 10 of them in the U.S. There are around 11,800 data centers in the world, with the U.S. having ~4,000 to 5,500 as of March 2025. It needs to be noted that the 22 incidents labeled as “fires” range

from minor fires (contained to one room of the building) to some major fires that exceeded the room of origin. Based on the above statics that were reported, only 0.184% of the data centers in the US had a fire and 0.195% in the world.[102]

POLICE DEPARTMENT

As the Town evaluates the potential development of a large-scale data center within Apex, it is important to acknowledge several public safety and policing considerations associated with facilities of this type. While data centers can provide significant economic benefits, they also introduce unique operational demands that must be anticipated and planned for to ensure continued community safety, organizational readiness, and appropriate resource allocation.

1. First Amendment Activity and Demonstrations

   Large data center projects across the country have increasingly drawn public demonstrations, protests, and organized First Amendment activities. These events frequently relate to environmental concerns, energy usage, or construction impacts. The Apex Police Department (APD) fully supports lawful expression; however, such gatherings require careful planning to ensure public safety, maintain traffic flow, and protect both participants and critical infrastructure.

   Key considerations include:

   - The need for proactive event monitoring, intelligence gathering, and liaison with protest organizers when possible.
   - Deployment of personnel to manage peaceful assemblies while ensuring the protection of private property and the uninterrupted operation of nearby businesses.
   - Contingency planning for counter-protests, civil disobedience, and spontaneous demonstrations.

2. Increased Security Checks and Critical Infrastructure Protection

   Data centers are frequently categorized as critical infrastructure due to their technological assets, energy demands, and national-level cyber-physical connections. As such, they may become targets for criminal activity, trespassing, vandalism, or politically motivated actions.

   APD may need to:

   - Conduct increased patrols and security checks, particularly during sensitive periods (construction, commissioning, high-profile outages, or geopolitical events).
   - Integrate the site into routine critical infrastructure assessments and emergency pre-plans.
   - Coordinate regularly with facility security teams for information sharing, threat updates, and emergency planning.
   - These activities require consistent staffing and may place additional strain on existing patrol resources.

[102] Dgtl Infra. *Data Center Fires: A Detailed Breakdown with 22 Examples*. Accessed January 2026. https://dgtlinfra.com/data-center-fires/

3. Emergency Access and Operational Independence

   Given the sensitive or restricted nature of many data centers, the police department must ensure that officers can access the facility in emergencies without unnecessary delays or dependence on on-site staff.

   This includes:

   - Pre-establishing secure access procedures for both emergency and after-hours responses.
   - Ensuring APD has direct access to relevant areas of the property during time-sensitive events such as alarms, medical emergencies, or security breaches.
   - Clarifying expectations with the facility operator regarding gate access, credentialing, and key control.
   - Any delays in gaining entry hinder the Department's ability to protect life and property.

4. Community Concerns and Increased Calls for Service

   Even when operations run smoothly, data centers can generate community complaints related to:

   - Noise (HVAC systems, backup generators)
   - Light pollution
   - Traffic
   - Contractor activity
   - Environmental concerns
   - Perceived public safety risks

   The majority of these complaints—regardless of whether they are police matters—are typically routed to APD as the initial point of contact. This will likely increase call volume and necessitate ongoing coordination with other Town departments for appropriate follow-up and resolution.

5. Traffic and Construction Impacts

   The construction phase of a data center can significantly impact local roadways due to heavy equipment, frequent deliveries, and a large contractor workforce. Post-construction, traffic patterns may remain elevated depending on staffing levels and ongoing maintenance activity.

   Impacts may include:

   - Increased collisions or near-miss incidents due to large vehicle movements.
   - Road obstruction complaints.
   - The need for periodic traffic control or special patrol assignments.
   - Longer-term roadway wear or congestion.
   - APD may also need to coordinate with NCDOT, Town Engineering, and facility leadership to mitigate traffic impacts and ensure safe ingress and egress.

6. Specialized Response Considerations

   Data centers often house large quantities of electrical equipment, lithium-ion batteries, cooling systems, and backup generation infrastructure. In emergency situations—particularly fire,

hazardous material releases, or electrical failures—response may require specialized equipment or training.

Public safety considerations include:

- The need for detailed pre-incident planning with APD and Fire.
- Potential need for additional PPE or tools for safe ingress.
- Coordination with the Fire Department on rescue procedures, evacuation routes, suppression methods, and incident command.
- Understanding of any high-voltage, chemical, or battery-related hazards that may affect law enforcement operations.

7. Alarm Response and False Alarms

   Data centers typically utilize extensive alarm and monitoring systems. Historically, facilities of this nature can generate high volumes of alarms—security breaches, access control notifications, and sensor alerts—some of which default to police response.

   Key considerations:

   - Increased demand on APD for alarm verification response.
   - Possible need for specialized training on interpreting alarm categories.
   - Developing clear expectations with facility management to reduce unnecessary dispatches.

8. After-Hours Activity and Contractor Presence

   These sites frequently operate 24/7 and may involve after-hours vendor access for maintenance, upgrades, or emergency repairs. APD often becomes the first responder for:

   - Suspicious persons calls.
   - Verification of contractor authorization.
   - Securing the premises during system outages.
   - This adds to routine patrol workload.

While these challenges are manageable with proper planning and resource support, they represent meaningful impacts to police operations that should be considered as the Town evaluates this project.

2.8.3 POLICY CONSIDERATIONS & POTENTIAL MITIGATION MEASURES

FIRE DEPARTMENT

The Apex Fire Department will ensure any facility, including data centers, complies with the Fire Code in effect at the time of plan submittal. This includes, but is not limited to, NFPA 75 (Standard for the protection of Information Technology Equipment), NFPA 76 (Standard for the Fire Protection of Telecommunications Facilities) and NFPA 855 (Standard for the installation of Stationary Energy Storage Systems (ESS). Additionally, all hazardous materials at the facility will be documented and managed in coordination with the Wake County Emergency Management HazMat Planner, ensuring compliance with applicable regulations and proper logging procedures.

Below are a few additional steps we would take as part of our process for a data center:

- **Early and Frequent Engagement**: Apex Fire Department Risk Management Division (Fire Marshal's Office and Emergency Management) would meet with the project applicant at the onset and throughout development to ensure that robust preventative measures are in place.
- **Independent Fire Protection Review**: We could request that the applicant bring in an independent fire protection expert, with technical knowledge specific to data centers and BESS systems. One recommendation would be to use **UL Solutions**, which has expertise in this area.
- **Water Supply and Runoff Containment**: These are two areas where we would not consider variances. The site would need to demonstrate that it can meet our standards without exception.
- **Training and Guidance**: Implementation of needed training and guidance related to emergency response to data centers. The Apex Fire Department has a copy of a "response manual" produced by Loudoun County VA (known as the Data Center Alley) that provides detailed information related to proper training and response. [103] [104]

3. COMPARATIVE BENCHMARKING WITH OTHER MUNICIPALITIES

This section will provide information on how other municipalities regulate data centers within their jurisdiction.

3.1.1 CHARLOTTE, NC

Charlotte, North Carolina is home to several data centers of varying size. As of January 15, 2025, a 122-acre new 48MW Tier 4 hyperscale data center campus has been announced. The project will feature four buildings, with construction planned to start in March 2026. The facility will support AI, fintech, and hybrid cloud workloads.[105]

Charlotte classifies data centers as "Telecommunications and Data Storage Facility" and defines the use as "A facility, accessed only by employees, that houses computer systems and associated components, related to the transmittal and receiving of information, including but not limited to, telecommunications systems, telecommunication and telephone switching systems, cloud storage systems, and server farms."

The Charlotte UDO has specific design standards, open space requirements, and developmental standards for each of these zoning districts. In addition to zoning and use specific standards the UDO regulates exterior lighting, architectural features, landscaping, screening, and tree preservation. Noise is addressed in the City's Noise Ordinance.

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[103] International Association of Fire Fighters, "Data Centers Are Booming — and Fire Fighters Must Adapt to New Challenges," *IAFF*, accessed January 2026, https://www.iaff.org/news/data-centers-are-booming-and-fire-fighters-must-adapt-to-new-challenges/

[104] Brian Ross, AICP, and Monika Vadali, *"Battery Energy Storage Systems," Zoning Practice*, American Planning Association (March 1, 2024), https://www.planning.org/publications/document/9286237/

[105] City of Charlotte, *Unified Development Ordinance (COMPLETE-UDO_June.16.25),* adopted text, effective June 16 2025, accessed January 2026, https://charlotteudo.org/wp-content/uploads/2025/06/COMPLETE-UDO_June.16.25.pd

The following is a summary of the standards for all development of data centers within Charlotte within their respective zoning districts:

Zoning Districts Where Permitted

- Data centers are permitted by right use in the General Commercial (CG), Regional Commercial (CR), Institutional Campus-2 (IC-2), and Research Campus (RC), Manufacturing & Logistics-1 (ML-1), Manufacturing & Logistics -2 (ML-2), Innovation Mix-Use (IMU), and Uptown Core (UC) Zoning Districts.

Setbacks, Building Siting & Height:

- Commercial Districts (CG, CR): Frontage Setback typically 20–36 feet from the future back of curb, Side Setback often 0 feet, Rear Setback typically 10 feet or more depending on context, Maximum Building Height ~50 feet (up to ~65 feet with UDO bonus).
- Manufacturing & Logistics (ML-1, ML-2): Frontage Setback primary arterials/boulevards ~36–40 feet, secondary streets ~16–36 feet, Side Setback 0 feet, Rear Setback 10 feet, Maximum Building Height 80 feet (subject to FAA notification if over ~200 feet).
- Campus & Research (IC-2, RC): Taller, campus-scale buildings with setbacks and heights that vary by frontage and context; generally higher than commercial districts, supporting mid-rise/urban forms.
- Innovation Mixed Use (IMU): Setbacks similar to commercial/industrial builds based on frontage; heights typically align with commercial/ML standards with potential bonus heights.
- Uptown Core (UC): Urban form with minimal setbacks; heights are significantly taller than other districts and depend on location and frontage.

Mechanical Equipment: Ground-mounted and rooftop mechanical equipment shall be screened from public roadways and adjacent properties using principal building elements, vegetation, or opaque screening (walls, panels, parapets) compatible with the building design. Generators and critical equipment should be enclosed or integrated into the building where possible. Utility equipment accessory to a data center (e.g., transformers) must be set back at least 20 feet from required setbacks and screened by a Class C landscape yard.

Buffers and Screening: Landscape and screening must meet UDO Article 20 requirements, including screening of service areas and loading docks. Buffers are context-dependent: properties adjacent to residential districts should include trees, shrubs, or berms as needed for visual separation. Where adjacent property is nonresidential or industrial, buffers may be reduced or waived. Electrical substations may require 12–15-foot solid walls around equipment.

Lighting: Exterior lighting must prevent light spill or glare onto adjacent properties, especially residential, and meet maximum illumination standards per UDO Article 16. Use full cut-off or semi cut-off fixtures to minimize glare and sky glow. Lighting fixture height limits are often up to 35 feet in commercial and industrial districts.

Noise and Performance Standards: Data center operations must comply with performance standards Article thing of the City's Code of Ordinances and with UDO Article 16 regarding noise, vibration, dust,

odor, and other environmental impacts. Noise is measured at the property line using sound level meters calibrated to dB(A) and dB(C) scales.

Chronic commercial, construction, and industrial noise that has been identified as a chronic source of objectionable noise may be designated as a "Chronic Noise Producer" and may have to develop and implement a noise mitigation plan intended to bring the noise to acceptable levels.[106]

- Designation of Chronic Noise Producer:
    - The CMPD Chief of Police (or designee) may designate a business or construction site as a chronic noise producer.
    - Factors considered include:
        1. Number and frequency of valid noise complaints.
        2. Proximity and physical relationship to complaining locations.
        3. Severity of sound events both observed and measured.
        4. Times and days of the week of noise events.
        5. History of cooperation and efforts to address complaints.
        6. History and context of the location, including preexisting activities or entertainment area designation.
    - Upon designation, the Chief shall notify the business and refer it to Housing & Neighborhood Services (H&NS) along with supporting documentation.
- Initial Meeting with H&NS (Housing & Neighborhood Services):
    - H&NS schedules a mandatory meeting with the designated business.
    - At the meeting, H&NS and the business review the basis for designation and any evidence provided by the business.
    - H&NS determines whether a Noise Mitigation Plan is warranted.
      o If a plan is not warranted, H&NS notifies the business and CMPD, and no further action is taken.
- Noise Mitigation Plan (if warranted):
    - H&NS and the business jointly develop and sign a plan.
    - Plan elements may include:
        1. Restrictions on days or hours of noise-producing activity.
        2. Placement, orientation, and operation of sound-producing equipment.
        3. Structural modifications (sound attenuation, baffling).
        4. Self-monitoring and reporting requirements.
        5. Implementation schedule.
        6. Review schedule for revision or termination.
- Non-Cooperation:
    - A business may be designated as non-cooperative if it:
        1. Fails or refuses to participate in good faith.
        2. Refuses to agree to a noise mitigation plan.
        3. Fails to implement or comply with an agreed plan.

[106] ARTICLE III. - NOISE | Code of Ordinances | Charlotte, NC | Municode Library

- H&NS notifies the business and CMPD of non-cooperative status.
- If the business cures the issues that caused the designation, H&NS removes the non-cooperative designation and notifies the business and CMPD.

3.1.2 MAIDEN, NC

Maiden is located in western North Carolina and hosts a 500,000-square-foot Apple Inc. hyperscale data center, which was built in 2009 and was recently approved for expansion in 2025. The town is also seeing continued investment with Microsoft in the process of constructing a separate data center facility.

The Apple Inc. hyperscale data center is classified as the use "Industrial Service" and is located in the Town's US 321 Corridor District Zoning District. According to Sec. 4.3 of Maiden's Unified Development Ordinance, the first stated goal of this zoning district is to "promote a sensitive conversion of farmland and vacant land to more urban uses"; the district is intended to function like a Planned Development district.

The following is a summary of the use standards required for all data centers:

- Proposals for development in this district must have access to a major or minor thoroughfare.
- Buildings are permitted up to 75 feet tall and required setbacks vary from 50'-100' depending upon the adjacent use.
- A 35' buffer is required along all roads, except US 321 where a 50' buffer is required. A 75' buffer is required adjacent to residential properties.

3.1.3 LOUDOUN COUNTY, VA

Loudoun County is located within "Data Center Alley" in Virginia. It is home to approximately 200 data centers of varying sizes. The county is currently in the midst of a multi-phase review of their data center policies and regulations that focus on updating their Comprehensive Plan and Zoning Ordinance to meet the current opportunities and challenges associated with data center development. Areas of focus for their research include noise standards (e.g., noise studies, decibel limits, barriers, etc.), architectural design standards, utility definitions and policies, onsite power generation, energy storage, parking, etc.[107]

In February 2025, the Loudoun County Board of Supervisors approved Phase 1 of their data center update in the form of a Comprehensive Plan Amendment (CPAM) that designated data centers as a conditional use in the 2019 General Plan and a Zoning Ordinance Amendment (ZOAM) that requires Special Exception (SPEX) approval for data center uses within the Industrial Park (IP), General Industry (GI), and Mineral Resources-Heavy Industry (MR-HI) zoning districts.

Phase 2 of the process is currently in progress with anticipated recommendations to be delivered to the Loudoun County Board of Supervisors sometime in early 2026.

Currently, data centers are allowed as a Special Exception, which requires legislative approval. The following is a summary of the use standards required for all data centers:

- Design and Architectural Standards
    - Principal façade requirements apply to all building façades that:
        - Face existing or planned public roads; or
        - Face adjacent residential development, approved residential plans, or zoning districts that permit residential uses; or
        - Face properties with existing or approved civic, institutional, commercial, or community-serving uses.
    - Principal façades must incorporate architectural variation at regular intervals (no less frequent than every 150 feet or three times the building height), including:
        - Fenestration or fenestration combined with a green-wall treatment; and
        - A change in material, pattern, texture, color, or accent elements.
    - When multiple principal façades are required, all such façades must be consistent in design, materials, and detailing.
- Fenestration Requirements
    - Fenestration must comprise at least 30% of the total surface area of each principal façade.
    - Individual fenestration bays may not exceed 7.5% of the total façade area.
    - Fenestration must be distributed both horizontally and vertically and be compatible with other façade design elements.
- Green-Wall Treatment
    - Green walls may substitute for up to 50% of the required fenestration coverage.
    - Green-wall coverage must be distributed horizontally and vertically across the façade.
    - The property owner is responsible for ongoing maintenance, repair, and replacement.
- Data Center Mechanical Equipment Façades
    - Where two opposing principal façades are required, one façade facing a public road may be designed as a mechanical equipment façade.
    - Mechanical equipment must be partially or fully screened using architectural screening methods that allow adequate ventilation.
    - The façade must still incorporate material or design variation at required intervals.
- Main Entrance Feature
    - Each data center must provide at least one clearly identifiable main entrance.
    - The entrance must be architecturally emphasized through projection, recess, or material differentiation.
    - Foundation plantings or enhanced landscaping must cover at least 50% of the façade length associated with the entrance.
- Site Design and Operations
    - Loading and Service Areas
        - Only one building façade may contain loading bays.
        - Loading areas, refuse areas, and mechanical equipment must be fully screened from public roads and adjacent properties.

    - Ground-mounted equipment may not be located in front yards and must be separated from residential uses.
    - Mechanical Equipment
        - All mechanical equipment must be shown on the site plan.
        - Screening may include perforated materials to allow ventilation.
    - Utilities are subject to applicable utility standards.
- Transportation and Access
    - Data centers must comply with general transportation standards, except where mid-block passageways are otherwise required.
    - Multi-use trails must be provided where required by buffer or steep slope regulations.
- Setbacks, Massing, and Transitions Adjacent to Residential Uses
    - Parking areas must be set back at least 50 feet from residential properties or be separated by natural screening or berms.
    - Structures must be set back a minimum of 200 feet from residential properties.
    - Building massing must vary at intervals of no more than 150 feet or three times the building height.
    - Upper-story step-backs of at least 15 feet are required above the second story or above 40 feet, whichever is lower.
- Noise, Lighting, and Environmental Controls
    - Generator testing is limited to specified daytime hours depending on the season.
    - Generators may otherwise operate only for emergency or backup purposes.
    - Noise Studies and Mitigation
        - Noise studies are required in accordance with applicable standards.
        - Acoustic barriers are required where data centers are adjacent to residential uses.
        - Soundproofing measures must be implemented as necessary to meet noise limits.
- Lighting and Glare
    - A photometric plan is required.
    - Maximum illumination standards apply to prevent light spillover onto adjacent properties.
- Landscaping, Buffering, and Screening
    - Required buffers must meet specified plant unit compositions and percentages.
    - Buffer Type C with an earthen berm of at least six feet is required where applicable.
    - Gateway Corridor buffer standards apply when triggered.

3.1.4 FAIRFAX COUNTY, VA

Fairfax County is located within “Data Center Alley” in Virginia. On December 6, 2022, the Board of Supervisors authorized a multi-year update to the Countywide Policy Plan known as Plan Forward. Phase 1 was adopted on December 9, 2025, and Phase 2 is anticipated to begin in 2026. In 2025, Fairfax County also amended their zoning ordinance to enhance use standards associated with data centers.

Currently, data centers are allowed either by right or as a Special Exception, which requires legislative approval. The following is a summary of the use standards required for all data centers:

- Equipment for cooling, ventilating, or otherwise operating the facility, including power generators or other power supply equipment, that can't be fully enclosed must be screened by a wall or similar barrier. Ground mounted equipment and any accessory electrical substation must be screened from view from abutting lots and from rights-of-way by a visually solid wall or a building. This standard does not apply to solar panels.
- Gross floor area maximums are set by zoning district category but can be exceeded with special exception approval.
- Data center buildings shall be located at least 200' from the lot line of a Residential district or property developed with a residential use.
- When located adjacent to a Residential district or use and located on the ground, any equipment for cooling, ventilating, or otherwise operating the facility (including any power generator or other power supply equipment) must be either located at least 300' from the lot line or separated from the lot line by the principal data center building. Lesser distances may be allowed with special exception approval.
- Prior to site plan approval, a noise study must be submitted demonstrating that the operation of the data center will comply with the Noise Ordinance. In addition, prior to issuance of a Nonresidential Use Permit, a post-construction noise study must be submitted demonstrating that the operation complies with the Noise Ordinance.
- Required architectural standards vary depending upon adjacent use and whether the use is permitted by right or by special exception.

3.1.5 FREDERICK COUNTY, VA

Frederick County, VA is located in northern Virginia, approximately 75 miles northwest of Washington, DC. The following is a summary of the requirements for all data centers:

- Prior to the approval of a rezoning application or conditional use permit, the following shall be provided:
    - A site assessment to examine the sound profile of the data center on residential units and schools located within 500 feet of the data center property boundary.
    - A site assessment evaluating the effect of the proposed facility on: (i) ground and surface water resources; (ii) agricultural resources; (iii) parks; (iv) registered historic sites; and (v) forestland on the data center site or immediately contiguous land.
    - Details of any new or existing substations that will be used to serve the data center and the anticipated transmission voltage required to serve the data center.
- Generator testing and cycling shall be limited to weekdays (Monday to Friday) between the hours of 8:00 a.m. to 5:00 p.m. and comply with the County Code.
- Mechanical equipment:
    - Ground-mounted mechanical equipment shall be prohibited in the primary setback.
    - Ground-mounted and rooftop mechanical equipment shall be screened from public roadways and adjoining properties on all sides.

    - All generators shall be enclosed with a manufacturer-approved enclosure or located within the primary structure.
    - Other mechanical equipment. An opaque screen shall be provided by either the principal building, louvered wall, or equivalent screen approved by the Zoning Administrator. The maximum height of the opaque screen should correspond to the tallest piece of equipment being shielded from view.
- Setback and screening requirements.
    - Structures must be set back at least 200' from the common property line when adjoining land is zoned RA, RP, R4, R5 and MH1. Otherwise, the base zoning district dimensional standards shall apply.
    - A category C full-screen-type buffer shall be provided around the perimeter of the property. If the adjoining property is zoned B3, TM, M1, or M2, no buffer is required.
- Noise and noise monitoring.
    - The applicant shall submit an Environmental Noise Impact Assessment prepared by a qualified full member of the Acoustical Society of America (ASA), a member of the Institute of Noise Control Engineering (INCE), or a member of the National Association of Acoustical Consultants (NCAC). The purpose of such noise impact assessment, modeled in SoundPLAN, CadnaA, or accepted equivalent, shall model anticipated noise levels resulting from facility operation and establish a baseline noise level prior to approval of a rezoning or conditional use permit.
    - A noise study certifying noise levels shall be conducted 12 months after the issuance of the first certificate of occupancy (CO) and every five years thereafter. Each noise study shall be submitted for review to the Zoning Administrator and/or his/her designee to assess the actual impact of the completed project.
    - The measurement of sound or noise must follow specific standards.
    - If the post construction noise study exceeds the maximum noise level permitted, additional noise mitigation strategies, improvements, or operational changes shall be required.
    - Any equipment necessary for cooling, ventilating, or otherwise operating the facility, including power generators or other power supply equipment on the property, whether ground-mounted or roof-mounted, shall include low-noise emission fans, acoustic wraps for compressors and oil separators, and an acoustic perimeter, which may include a perimeter around a group of individual chillers, which may be louvered or solid. Other sound-attenuation measures may be required by the Zoning Administrator.

3.1.6 PRINCE WILLIAM COUNTY, VA

Prince William County is located within “Data Center Alley” in Virginia and is to home to 44 existing and 15 approved or under construction data centers. In July 2022, Prince William County Board of Supervisors directed staff to review and propose new amendments to address noise concerns related to data centers.

Since then, Prince William County has passed amendments to update their Design & Construction Standards Manual (DCSM) and their zoning ordinance to address data center impacts such as noise and design guidelines.

Applicability and Establishment

- A Data Center Opportunity Zone Overlay District may be established by the Board of County Supervisors on land:
    - Located near high-voltage transmission lines (115 kV or greater); and
    - Planned or zoned for office or industrial uses.
- The Overlay District is:
    - Created and amended by ordinance, following a resolution of the Board of County Supervisors.
    - Mapped geographically and overlays the existing zoning district.
- Both the underlying zoning regulations and the Overlay District regulations apply.

Zoning Districts Where Permitted

- Data centers are permitted by right within the Overlay District in:
    - O(L), O(M), O(H), O(F)
    - M-1, M-2, M/T
    - Designated office or industrial land bays within PBD and PMD districts.

Design and Architectural Standards

- Principal façades include all building façades that face Major arterials or Interstate highways.
- New principal façades must avoid undifferentiated surfaces by incorporating at least two of the following:
    - Changes in building height
    - Step-backs or recesses
    - Fenestration
    - Variation in materials, pattern, texture, or color
    - Use of accent materials

Mechanical Equipment Screening

- Ground-mounted and rooftop mechanical equipment must be screened from:
    - Major arterials
    - Interstates
    - Adjacent residentially zoned or planned properties
- Screening may be provided by:
    - The principal building
    - Existing vegetation preserved on-site or within buffer easements
- Where building or vegetation screening is not available, equipment must be screened by:
    - Visually solid fencing
    - Screen walls or panels
    - Parapet walls
    - Other opaque screening materials compatible with the building façade
- The Planning Director may waive screening requirements where equipment is determined to have no adverse visual impact.

Buffering and Landscaping

- A buffer yard is required where a data center abuts residentially zoned or planned properties.
- In lieu of standard DCSM buffer requirements:

    - A Type C buffer must be provided on an earthen berm:
        - Minimum height: 6 feet
        - Maximum slope: 2:1
- Buffer planting must meet DCSM standards.
- As an alternative, the Planning Director may approve:
    - Preservation of natural topography and vegetation
    - Supplemented planting where necessary
    - Placement outside a six-foot-tall solid fence
    - Provided the alternative offers equivalent visual screening

Fencing Standards

- Fencing is permitted, subject to the following:
    - Chain-link fencing and barbed wire are prohibited along public or private street frontages.
    - Fencing along streets must not include visually intrusive deterrent devices.
- Alternative compliance may be approved where visibility is reduced through landscaping or design techniques.

Floor Area Ratio (FAR) Incentives

- Within the Overlay District, data centers may achieve an increased FAR of up to 1.0, provided all other development standards are met.
- Outside the Overlay District, increased FAR may be requested through a special use permit.

Substations

- Electrical substations must be screened from:
    - Major roads
    - Residentially zoned or planned properties
- Screening includes:
    - Ten-foot-tall opaque fencing when facing residential uses
    - Compliance with all other DCSM buffering and landscaping requirements

Environmental Context Protections

- Noise
    - Regulate steady-state or impulse sound occurring on either a continuous or intermittent basis.

3.1.6 EDGECOMBE COUNTY, NC

Edgecombe County, NC adopted new standards for Cryptomining Operations and Data Centers on November 3, 2025. The following is a summary of the standards for this use:

- Except for data centers proposed within the M-2 General Industrial District, uses subject to these standards shall only be established in accordance with the procedures and requirements in Section 2.3.5, Conditional Rezoning, or Section 2.3.16, Planned Development. In no instance shall a cryptomining operation be permitted on a lot within a conventional zoning district.
- Such use shall receive an annual zoning compliance permit.
- Minimum setback of 100’ from any lot line. Increases to 500’ from any residentially zoned property or use and 1,000’ from existing or approved public or private school, congregate care use, or child day care.
- Landscaping shall be provided per the ordinance except that an opaque fence, wall or berm is required adjacent to residential uses Additional landscaping may be required to ensure compliance with maximum noise levels.

- Noise
    - The use shall be engineered to maintain a maximum noise threshold of 60 dBA or less at all times, as measured at the lot line. The Planning Director may require a noise study prepared by acoustical engineer at any time prior to issuance of a Certificate of Occupancy, upon receipt of a noise complaint, as part of required annual renewal of a Zoning Compliance Permit, or as needed to ensure compliance with these standards is maintained.
- Utility Usage
    - Electric. Applicant shall provide written verification stating there is adequate capacity on existing supply lines and substation(s) to serve the proposed use at peak operational levels while also serving the needs of other electricity users in the service area and that the use will not cause electrical interference or fluctuations in line voltage on or off the premises. This shall be updated annually.
    - Utilization of electricity generated from a renewable energy source, such as wind or solar, are strongly encouraged.
    - Potable Water. Applicant shall provide written verification stating there is adequate capacity available from existing water sources to ensure there is adequate potable water capacity available to serve the proposed use at peak operational levels while also serving the needs of other users in the service area; and the use will not cause a loss in water pressure necessary to maintain functional fire protection off the premises. This shall be repeated annually.
- On-site power generation devices (including fuel storage areas), whether permanent or temporary, shall be fully enclosed by building or a masonry wall of a minimum height exceeding the height of the tallest portion of the device, and shall be considered principal structures for the purpose of determining minimum required setback from all lot lines.

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