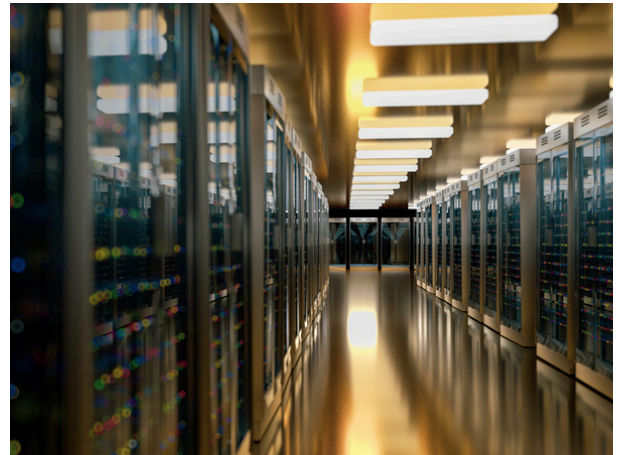


THE FUTURE OF DATA CENTERS: ENSURING POWER READINESS

While demand for electricity is growing, the largest growth these days tends to be seen in states that have the most new data centers. This has some significant implications for electric utilities.

According to a recent report from the U.S. Energy Information Administration (EIA), consumption of electricity in the U.S. commercial sector has recovered from pandemic levels with annual U.S. sales of electricity to commercial customers in 2023 totaling 14 billion kilowatt-hours (BkWh's), which is one percent more than in 2019.



However, that growth in commercial demand for electricity is concentrated in a handful of states that are experiencing rapid development of large-scale computing facilities, such as data centers. Electricity demand has grown the most in Virginia, which added 14 BkWh's, and Texas, which added 13 BkWh's. "Based on our expectation that regional electricity demand will grow, we revised our forecasts upward for commercial electricity demand through 2025," said the EIA.

Commercial electricity demand in the ten states with the most electricity demand growth increased by a combined 42 BkWh's between 2019 and 2023, representing growth of ten percent in those states over that four-year period.



These ten states are, in order of growth: Virginia, Texas, South Carolina, Arizona, North Dakota, Oklahoma, Florida, Utah, Nevada, and Oregon. By contrast, demand in the forty other states decreased by 28 BkWh's over the same period, a three percent decline.



1 - What recommendations does Finley Engineering have for its clients (distribution co-ops and muni's) in generating the new power needed to provide power to the increasing number of data centers that may be setting up in their territories?

In most cases, co-ops and muni's do not generate their own power, rather, they purchase it from power suppliers. Finley's recommendation for its clients would be to coordinate with their power suppliers immediately after receiving a request from a data center and have continuous coordination as much as possible throughout the entire process. Co-ops and muni's will need to run distribution studies to be able to serve their load as the end users, but the power suppliers will also need to run studies to be able to support the demand from a G&T and substation standpoint as well.

More specifically, Finley suggests that co-ops and muni's talk with their G&T (if a distribution coop) or other power provider (if a muni) in advance, to have a good understanding of that provider's capabilities to make major power requirement changes, both in terms of generation changes as well as any transmission changes, potential costs, timeframes, hurdles, and any risks involved.

One of the major difficulties in doing any advance discussions or planning is the unknown size of any potential data center project. Various conferences and conference side discussions attended by Finley have made mention of data center power requirements that potentially range anywhere from 20 MW's to 3,200 MW's. As such, advance research and planning is needed to identify multiple scenarios for different sized projects.

Additionally, research needs to be completed on location planning of data centers to have some semblance of other needs, such as water sources for cooling, climate and risk of disasters, availability of high bandwidth broadband capabilities, staffing capabilities, security risks, and many others.

2 – How can Finley clients deal with data center client demands related to the need for “power now” – pressing lead times and construction times?

First and foremost, they need to be up front and honest with their data center customers about how much demand they can currently serve, what it is going to take to serve the requested demand, and how long it will take to be able to serve that demand. This includes the initial analysis, staking and design, and construction, which includes long lead times for material for both the co-op and/or muni as well as the power supplier, whether they need generation/transmission/substation upgrades. One specific thing the co-op can do for their part is to seek out additional suppliers for materials and/or be open to using something out of the normal if it is available quicker than their standard construction material. This could present some complications, though, if the co-op has an alliance with a specific supplier and does not have the ability to purchase from other suppliers.

In sum, the most effective way is to know as much as possible beforehand. One of the first and main things that Finley can do for clients is various types of planning services. Organizations ask for many types of plans such as construction work plans, short term plans, long term plans, and overall strategic plans, or what some call master plans. If an organization knows its full capabilities of its electric system, and if it knows what it would take to add capabilities to different parts of their system in advance, it would help discussions greatly, especially when they involve pressing timeframes to make decisions.

3 – What specific challenges do Finley clients face related to transmission demands for these new data centers?

As noted earlier, larger co-ops may own and operate transmission and substation facilities as well as distribution facilities, but a lot of smaller co-ops do not. And most muni's do not own or operate a significant amount of transmission facilities.

If they do, then it is basically the same - the need to run the studies to see the impact. And with transmission, there are a lot of studies and contingencies that need to be analyzed with large demand loads. If new transmission lines are required, that is a “beast” in itself because, in most cases, the PUC will allow for 1.5 miles of new transmission line construction before a project has to go through a Certificate of Convenience and Necessity (CCN) process, which is a three-year process at a minimum.

4 – What specific challenges do Finley clients face related to distribution demands for these new data centers?

One challenge is determining where the load is and how utilities are going to be able to serve the end user without violating any voltage drop or loading criteria. Can they serve the load with one meter, or do they need multiple meters?



Can they serve the load on one feeder from the substation, or do they need multiple feeders? Do they have capacity at an existing substation, or will a new substation be required? What operating voltage will be needed to serve the load? Is the load going to take primary voltage or secondary voltage? If they want secondary voltage, the co-op will need to supply the transformers, and they may be very large transformers for the demand. In addition, if they are supplying the transformer, should two be ordered to have a backup in case, because they probably don't normally stock that size in the yard? How are they going to sectionalize the load in case of a fault? Will they have to use different construction standards to support the load, including using a larger conductor than they normally stock? All of these questions and many more need to be addressed in the study to serve the demand.

5 – Are there any specifically effective ways for Finley clients to deal with easement issues?

Past experience has shown that co-ops and muni's put the burden of obtaining the easement on the data center customer. The data center customer will need to reach out to the land owner and arrange for obtaining the easements. These easements forms need to be the co-op standard easement, but, if that needs to get changed, then attorneys will need to get involved. Typically, co-ops do not pay for easements, which is why they put the burden on the customer, because the customer may be more likely to pay for an easement if the land owner requests one. However, the co-op can assist the customer by letting them know who the land owners are and providing contact information, etc. Also, we have seen instances where the co-op talks to the landowner as well, since most of them already have some relationship with the co-op. Again, though, it is still up to the customer to obtain the final easement. In addition, there may be some deals that could go along with the process. We have seen situations where a co-op would provide a service to a water well on another portion of the land owner's land in exchange for an easement in this specific area. Easement requirements could vary by location.

6 – What other ways can Finley help its clients who are facing these challenges related to the proliferation of data centers nearby?

In addition to the assistance mentioned above, Finley can help clients with the voltage drop and load flow analysis on the distribution side (and the transmission side if needed). As part of the distribution analysis, we can do a substation capacity analysis to determine if there will need to be upgrades required if it is from an existing substation, or maybe that if the load is large enough the only way to serve them would be from a new substation and possibly a dedicated substation. We can do this analysis and try to have a quick turnaround time, as this is the first part of the whole process, and what needs to happen on the staking/design/construction is dependent on what the analysis shows. Finley may also be able to offer this as an EPC project (engineering, procurement, construction), where we do all the analysis and design work, secure material and construction crews, and manage the construction from start to finish to take a lot of the burden off the co-op's or muni's shoulders.

There are other services Finley can provide:

- One of the first and main things that Finley can do for clients is various types of planning services. Unrelated to data centers, typically organizations ask for many types of plans such as construction work plans, short term plans, long term plans, and overall strategic plans or what some call master plans. These plans could include information related to data centers if the client requests it in advance.

- Finley can also offer any or all of its full complement of services, such as electric system design, budgeting/pricing, permitting, ROW, easements, environmental filings, make-ready engineering, GIS/CAD, construction inspections, various types of studies, funding application assistance, and project management.

- Finley can also assist with coordination between the many parties that may be involved in the electric needs for a data center project.

About the Author



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Chris is a professional engineer with over 19 years of experience in electric utility consulting, focusing on distribution system planning. He is proficient in using software like WindMil and CYME for load flow, arc flash studies, and other analyses. Chris has worked with over 20 electric cooperatives, municipals, and utilities, managing complex projects and overseeing budgeting and scheduling.

He holds a B.S. in Electrical Engineering from the University of Texas, San Antonio, and is a licensed P.E. in several states. Chris is also a member of IEEE, NSPE, and TSPE.