Solving the Capacity Challenge

How to get capacity as fast as possible, where you need it, whenever you need it, at the scale you need to keep the business going.
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Introduction

“How do I get capacity as fast as possible, where I need it, whenever I need it, at the scale I need to keep the business going?” It’s a question on the minds of most tech giants. Delivering capacity quickly and efficiently — today and tomorrow. It’s not easy.

In this white paper, we’ll explore the trends driving that question, and the challenges they pose. We’ll explain how Aligned Energy resolves each of those challenges. And we’ll share an actionable checklist for finding a data center partner to help achieve success today and into the future.

Key takeaways

- Four key trends drive the need to deliver capacity as fast as possible, where it’s needed, whenever it’s needed, at the scale it’s needed to keep the business going — and make it evermore challenging to do so: 1) demand is huge, and rising fast; 2) demand is unpredictable; 3) demand is in new markets; and 4) demand is variable.

- Because those trends pose both near-term (tactical) and longer-term (strategic) challenges, they require both tactical and strategic solutions. Aligned Energy can address both.

- Solving the tactical challenge of ensuring the business can meet customers’ rapidly growing needs requires the ability to deliver capacity as quickly as possible. Aligned Energy can deliver multi-megawatts of provisioned capacity in less than 12 weeks. Risk is mitigated by our customer-centric approach.

- Solving the strategic challenge of meeting new capacity needs in the future requires future-proofing: the ability to scale vertically and horizontally as needed (even before the end of the contract term) around the world. To future-proof our clients’ deployments, Aligned Energy enables high, mixed, and variable densities in the same footprints without stranding capacity.

- To solve the strategic challenge of deploying at any scale around the world (including in emerging markets), Aligned Energy confronts emerging market challenges (power reliability issues, water and power constraints, and human capital constraints) to de-risk global deployments.
The trends

Though Gordon Moore’s prediction about how processing capacity would increase over time has held true, it’s hard to believe that he could have envisioned what the world would look like today. A computer, orders of magnitude faster than the first supercomputer, in everyone’s pocket. The ability to stream high-quality video, on a mobile phone, anywhere in the world. A company that starts the day with zero customers - and ends it with 100 million.

These are all products of a world in which demand for capacity is: huge, and rising fast; unpredictable; in new markets; and variable. There is no group more affected by these four trends than those who run the infrastructure at the foundation of it all – in the data center. For this group, the four trends drive the need to deliver capacity as fast as possible, where it’s needed, whenever it’s needed, at the scale it’s needed to keep the business going. And they make it evermore challenging to do so.

Demand is huge, and rising fast

Demand for compute, storage, and network capacity around the world is huge, and growing. Every day, we create 2.5 quintillion bytes of data. The digital universe is growing 40% each year.

An increasing share of that demand comes from video. According to Cisco’s latest analysis, it would take more than 5 million years to watch the amount of video that will cross global IP networks each month in 2021. It’s growing fast, too: Cisco predicts that Virtual Reality (VR) and Augmented Reality (AR) traffic will increase 20-fold between 2016 and 2021 globally.

IoT may be the most significant driver of future increases in demand around the world. A new Business Insider report projects that there will be a total of 22.5 billion IoT devices in 2021, up from 6.6 billion in 2016. The impact on data centers would be huge; according to industry veteran Mark Thiele, “If the numbers follow a historical precedent at all we will need roughly 400 million servers to support our 2020 IoT and technology demands. In order to have enough data centers for 400 million servers we would need to add another 4,000 massive data centers measuring roughly 400,000 sq. ft. with approximately 50 megawatts of power each.”

Demand is unpredictable

One of the key challenges associated with such huge and fast-growing demand is that it makes planning for compute, storage, and network capacity incredibly difficult – for even the best capacity planners. Joe Kava, Vice President of Data Centers at Google, explained it in a recent panel discussion: “When you build data centers for your own products, you’re able to stay ahead of the demand. You have historic data you can work with to make projections. But we’re no longer just building for our own products. With the public cloud, you’re building for everyone else’s products.”

Take the example of Pokémon GO. Launch traffic was 50x the company’s projections - now that’s scale. As Kava explained, “Ten or twenty years ago, it was implausible to come up with a business that could quickly gather 100 million users. Today, app developers can do that almost overnight.”

Demand is variable

The increasing volume of data is one thing. Compute loads also are becoming more dynamic as demand varies from month-to-month, day-to-day, hour-to-hour, and project-to-project. Ecommerce traffic spikes during the holidays, for example. Dynamic demand “follows the sun” – traffic to a search engine’s U.S. data centers is high during the day and lower in the middle of the night, though then traffic to its Asia data centers is high. Less predictable, but just as dynamic, are compute loads that ramp up and back down as DevOps tests new ideas, products, or services.

As video makes up an increasingly large share of that traffic, “operators need to consider how to deliver video content more efficiently.” Content Delivery Networks (CDNs) will be a significant part of the answer, carrying 71% of Internet traffic by 2021 – up from 52% in 2016.

Capacity at the edge will be critical for IoT as well. By 2019, nearly half of IoT data will be processed at the edge of the cloud, according to IDC. Edge processing is also likely to rise as tech giants explore more efficient, and more private, ways to run AI algorithms. Revolutions in machine learning have already significantly increased capacity demands in the cloud, and now tech giants are developing edge-based processing for those AI algorithms.

Demand is in new markets

The most rapid growth in demand for compute, storage, and network capacity is in emerging markets. According to Cisco, IP traffic is growing fastest in the Middle East and Africa, followed by Asia Pacific.
The challenges

Demand that is huge (and fast), unpredictable, in new markets, and variable challenges even the most sophisticated capacity planning models. So it’s easy to see why tech giants take a two-pronged approach to managing capacity: on one end, focused on delivering incremental capacity very quickly today; and on the other end, focused on developing new approaches to meet new capacity in the future.

For those who are focused on the near-term, tactical concern of delivering incremental capacity very quickly today, the challenge is:

› Mitigating the risk of not being able to support the needs of the business – in other words, delivering capacity as quickly as possible to ensure the business can meet customers’ rapidly growing needs.

For those who are focused on the longer-term, strategic concern of developing new approaches to meet future capacity, challenges include:

› Future-proofing current data center deployments against changes in IT requirements that will arise during the term of the lease.

› Supporting standard and high power densities and enabling scale both vertically and horizontally – without stranding power or space or having to reconfigure the data center footprint.

› Deploying capacity at any scale (from 500 kW to 50 MW and everything in between) around the world, including in emerging markets that have infrastructure and resource challenges – power reliability issues, power and water constraints, and human capital constraints.
The solutions

Because the prevailing trends pose both near-term (tactical) and longer-term (strategic) challenges, they require both tactical and strategic solutions. Aligned Energy can address both. Here’s how.

Resolving the tactical challenge of delivering capacity quickly while mitigating risk

Solving the near-term, tactical challenge of ensuring the business can meet customers’ rapidly growing needs requires the ability to deliver capacity where it’s needed, when it’s needed, as quickly as possible.

Multi-megawatts of provisioned capacity in less than 12 weeks

Aligned Energy specializes in delivering capacity quickly. We do it by combining highly scalable, factory-built components with pre-provisioned capacity on site that allows us to deliver multi-megawatts of provisioned capacity in less than 12 weeks:

- For highly scalable components, our supply chain ensures just-in-time delivery from the factory. We have the ability to install and test components in the lab. We can test the CACTUS cooler at actual conditions. Factory witness testing is done on our electrical at various levels. Level Five commissioning is done during the Cx phase in the field.

- At the same time, pre-provisioned capacity on site – pre-commissioned, pre-installed, and tested at scale – enables nearly on-demand capacity deployment.

When capacity can be delivered on demand, then future-proofing doesn’t require over-building for capacity well ahead of demand. Instead, clients rely on predictive analytics and set thresholds to alert them to upcoming capacity needs, and provision new capacity just in time.

Customer centricity

Overcoming the tactical challenge of delivering capacity quickly is all about mitigating risk – mitigating the risk of not being able to meet the needs of the business. It requires the ability to bring capacity online quickly, which requires a reliable data center partner that will deliver – a data center partner that is easy to work with, from initial discussions about requirements all the way through to day-to-day operations.

One way to mitigate the risk that a data center partner won’t deliver is to always use the same partner. But there are other ways as well, including choosing a data center partner with operational experience (a proven ability to deliver capacity quickly in different locations for different kinds of customers); an intense commitment to clients; and access to the capital necessary to deliver new capacity quickly:

- At Aligned Energy, our team members have decades of operational experience designing, building, delivering and operating data centers. We have delivered thousands of megawatts of capacity across the U.S. and Canada for customers from leading tech giants to highly regulated financial firms to innovative startups.

- And commitment to our clients is one of our core tenets. It shows in the speed with which we’ll respond to RFPs. In the flexibility we offer our clients. In the design of our data centers, which include amenities like drop-in office pods, showers, and kitchenettes. And it shows in the support our clients receive, including a 24x7x365 Operations Command Center, implementation liaison, and remote hands.

- Furthermore, we have access to capital through a $22 billion fund, ensuring that we can deliver net new capacity quickly.

All together, it’s easy to see why our clients consider us a true partner. It’s why our clients say things like Insight CIO Mike Guggemos said: “Insight sets a high bar for technology and our new data center was no exception. We needed a partner to build a data center that would meet our current and future needs as we optimize our operations.”
Resolving the strategic challenge of meeting new capacity needs in the future

Meeting tomorrow’s capacity needs also requires the ability to deliver quickly while mitigating risk. But there are other challenges, too. Solving those longer-term, strategic challenges requires future-proofing (the ability to scale vertically and horizontally as needed, even before the end of the contract term) and the ability to deploy at any scale around the world.

Future-proofing

Because demand for capacity is rising so fast, often unpredictable, and workloads increasingly variable, delivering capacity efficiently requires future-proofing current data center deployments against changes in technology - such as higher densities and variable workloads – that will arise long before the lease is up. That requires the data center to support high, mixed, and variable densities without stranding power or space or having to reconfigure the client’s footprint.

Aligned Energy future-proofs the data center by enabling high, mixed, and variable density – which enables vertical and horizontal scalability:

- **High density** - Our infrastructure supports high density up to 50 kW per rack in significantly less space, with a variety of rack configurations. Additional power and cooling can be easily installed at the rack level without reconfiguration of the rack layout. That means as densities increase clients don’t have to reconfigure rack layouts or add additional in-row cooling systems. That provides much more flexibility to efficiently deliver capacity, bridging densities of yesterday and today with densities of tomorrow.

- **Mixed and variable density** - Instead of having to dedicate space for lower-density applications or older hardware running at lower densities (with varying operating requirements for delta Ts and utilization), which may mean stranding capacity, Aligned Energy’s clients can run a 1 kW rack right next to a 50 kW rack because our close-coupled cooling solution removes heat from the source. Our infrastructure is efficient and stable under dramatically varying loads and delta Ts, which means it also accommodates the variability that comes with workloads that follow the sun and other demand fluctuations – again without stranding capacity.

- **Vertical and horizontal scalability** - Our factory-built, incrementally scalable infrastructure allows clients to increase capacity vertically and horizontally as needed, when needed, without operational disruption.

Deploying at any scale around the world

Because demand for capacity is rising fastest in new markets, meeting new capacity needs in the future will require the ability to deploy capacity in emerging markets that have infrastructure and resource challenges – power reliability issues, water and power constraints, and human capital constraints.

Aligned Energy’s approach confronts those issues and constraints to de-risk global deployments:

- **Overcoming power reliability issues** - In many emerging markets, the power grid is unreliable. Furthermore, data centers often represent an outsized demand on the grid. Add the variability of workloads, and it’s clear that there will be much more variability in both power supply and power demand in emerging markets. Our data centers can actually be capacitive, helping to resolve and protect the data center against frequency variability on the grid.

- **Overcoming water and power constraints** - Water and power constraints pose a challenge in many places, but emerging markets are often particularly resource constrained. In a location where there isn’t enough water and electricity for populations, adding heavy data center demand to the mix could prove unsustainable. Aligned Energy’s award-winning cooling system enables free cooling in most climates, reducing data center water use by up to 85% and energy use by up to 80%.

- **Overcoming human capital constraints** - The data center talent gap, present even in developed markets, is often worse in second- and third-tier cities and emerging markets. The more that data center infrastructure can be built in the factory according to tested practices and with proven partners, the less reliance is on local talent for building and maintaining the data center. In addition, our infrastructure optimization portal facilitates global asset management, including supply chain, even as complexity rises.

In addition to de-risking global deployments, the same aspects of the Aligned Energy approach that enable us to deliver multi-megawatts of provisioned capacity in less than 12 weeks also resolve the any-scale challenge. The combination of highly scalable, factory-built components with pre-provisioned capacity makes it as easy to deploy 500 kW of new capacity as it is to deploy 50 MW.
For both tactical & strategic needs, Aligned Energy provides options

**Colocation**
We have data centers in Plano, TX and Phoenix, AZ.

**Build-to-scale standard delivery**
This is a rapidly scalable and repeatable delivery model for data center builds in new markets outside of Dallas and Phoenix. The delivery model utilizes our technologies and supply chain partners (the same ones we used for our colocation facilities) to deliver data centers in other markets.

**Build-to-scale custom delivery**
For build-to-suits, our standard build-to-scale offering can be customized to the client’s existing strategies and technologies. It utilizes our supply chain partners, or the client’s. For retrofits or upgrades, clients may purchase and integrate our cooling technology or Data Center Services Optimization (DCSO) solution independently to improve efficiency and capacity in their existing data centers.
**Bottom line**

We live in a world characterized by capacity demand that is huge (and rising fast), unpredictable, in new markets, and increasingly variable. Those trends drive the need for tech giants to deliver capacity as fast as possible, where it’s needed, whenever it’s needed, at the scale it’s needed to keep the business going – and also make it evermore challenging to do so.

At Aligned Energy, we respond to both the near-term tactical challenges and the longer-term, strategic challenges with an adaptive data center approach that enables us to deliver capacity quickly and mitigate risk today, and meet tomorrow’s needs by future-proofing the data center and confronting emerging market challenges.

**15 Questions to ask data center providers**

1. How quickly can you deliver (#) MWs of capacity in (location)?
2. Can you share examples of clients for whom you have delivered (#) MWs of capacity in (location), and how quickly?
3. Can you help me deploy 500 kW? Efficiently?
4. Can you help me deploy 50 MW? Efficiently?
5. What kind of experience does your team have operating a data center?
6. How many MW has your team operated in their management careers?
7. How do you future-proof current data center deployments against changes in technology?
8. What is the highest density I can run without half-filling or spreading racks apart – without stranding capacity?
9. If I want to increase density per rack (i.e., vertically scale) how can I do that?
10. What are the contractual mechanisms that enable me to vertically scale before my current contract term ends?
11. If I want to increase my footprint (i.e., horizontally scale) how can I do that? Will I get contiguous space?
12. In what geographies can you deploy capacity?
13. If you can deploy in emerging markets, how do you deal with power reliability issues? How about power and water constraints? And human capital constraints?
14. Can you help me deploy 500 kW in an emerging market?
15. Can you help me deploy 5 MW in an emerging market?

**Talk through these 15 questions with an Aligned Energy solutions architect**

Contact us at [alignedenergy.com/contact](http://alignedenergy.com/contact)

**About Aligned Energy**

Aligned Energy is an infrastructure technology company that offers cloud, enterprise, and service providers colocation and build-to-scale data center solutions. Our intelligent infrastructure allows us to deliver data centers as a utility-accessible and consumable in the amount and moment needed. By reducing the energy, water and space needed to operate, our technology innovations offer businesses a competitive advantage by improving reliability and their bottom-line, while helping secure the health of the planet.

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