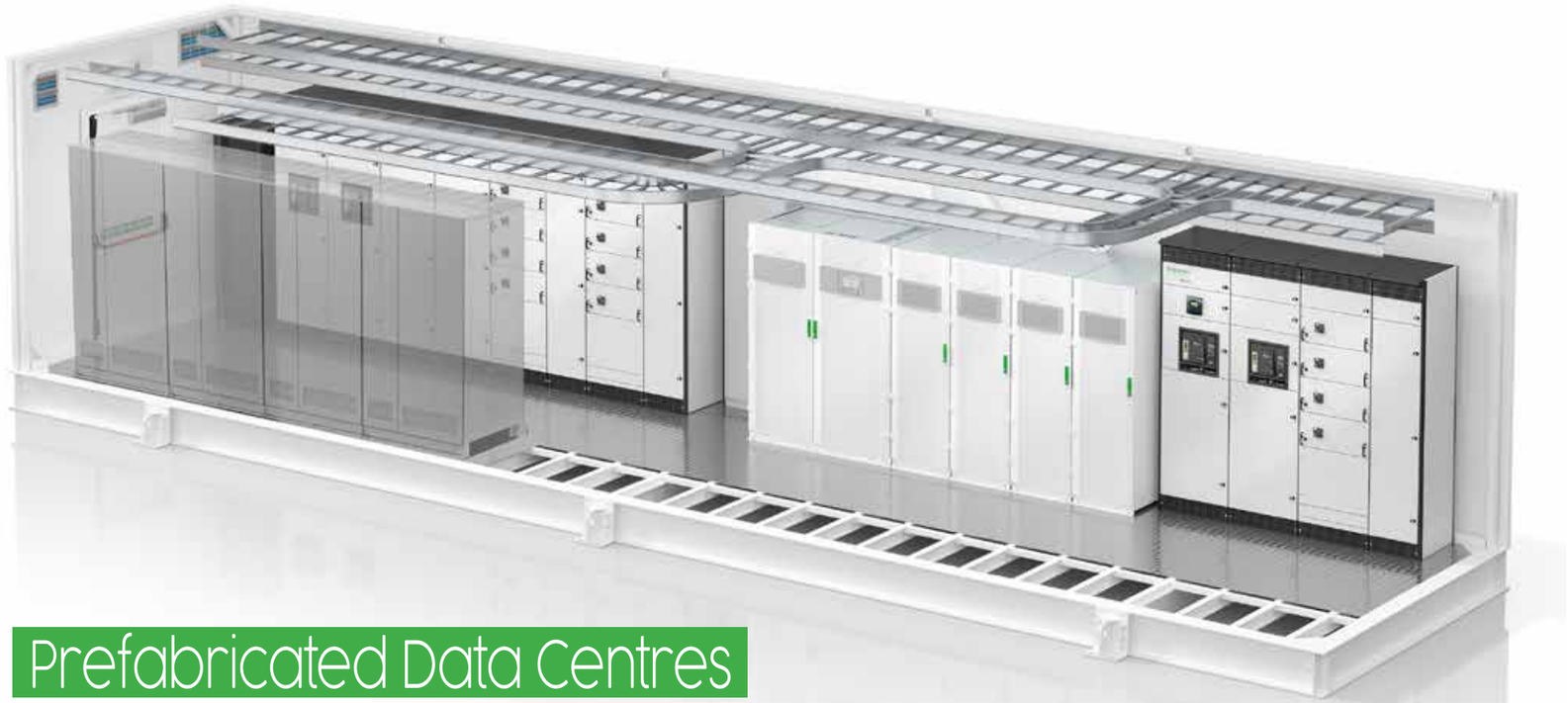

Prefabricated Data Centres Offer Significant Cost Advantages Over Traditional Builds

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As today's businesses continue to embrace digital transformation, demand for new data centre capacity remains high. New technologies such as the Internet of Things (IoT), 5G networks, edge computing environments and Artificial Intelligence (AI) applications have increased in number and use, driving operators to think more closely about the way data centres are designed and deployed.

Given the highly competitive nature of the data centre market, today's owners have many options when looking to add capacity quickly and cost effectively. However, one thing remains consistent in their requirement, that the infrastructure remains reliable, efficient and flexible enough to adapt to ever-changing service demands. Moreover, it must be quick to deploy and work predictably, as planned, once operational.

Rapid deployment, flexibility and scalability

There are, of course, many design and deployment options for today's data centres. They include traditional-built, on-premise facilities and the adoption of the prefabricated, modular approach, where pre-tested, pre-configured and self-contained modules are delivered direct to site, requiring a minimum of assembly. For those operators looking to adopt a mixed or hybrid approach, prefab can also be integrated within an existing, purpose-built data centre.

Although not new, prefabricated data centres are a disruptive technology, transforming the way customers design and build data centres. By removing time and cost from facility construction and upgrades, prefab enables the industry to address the unpredictable nature of growth and technological advance through predictable data centre performance.

Schneider Electric's EcoStruxure Ready™ Prefabricated Data Centres offer significant advantages over traditional builds. They comprise pre-engineered, pre-assembled and pre-tested physical infrastructure systems, delivered as standardised modules direct to the customer site in as little as 12 weeks.

The choice of prefab can encompass one or all of the key data centre functions including IT racks, cooling, uninterruptible power supplies (UPS), distribution and switchgear. In many cases the sizes range from small, single rack, edge computing solutions, to data hall-sized prefabricated infrastructure modules.

Driving a Lower TCO

The prefabricated approach offers many advantages, including increased speed of deployment and a lower total cost of ownership (TCO). In terms of both capital cost and ongoing operating expenses, prefab modules allow the user to build as required, deploying only the infrastructure expected to meet the demand. It is inevitable that when building in the traditional way, the designer will over-provision and build excess capacity in terms of power and cooling infrastructure from the outset. This naturally increases upfront capital costs and may result in under-utilised capacity.

With the prefabricated approach, standardised modules are built and pre-tested at the factory, leaving a minimum of on-site configuration work to be completed. This results in lower capital costs as less infrastructure is deployed at the start of a facility's operational life. It also lowers operational costs, as less redundant equipment is left in wait for capacity demands to increase. Reliability, too, is enhanced as prefab modules are engineered according to standardised reference designs.

Energy Efficiency and PUE

With the growing concern for more energy efficient and sustainable use of power in today's critical infrastructure environments, the operational efficiency of the data centre can be significantly improved when using prefab, as operators can build to meet a specific measure of Power Usage Effectiveness (PUE).

PUE is the ratio of the total power consumed by a data centre, to that consumed by its IT load. The metric is well-known and remains particularly important in the industry, more so to customers seeking to outsource their data centre requirements who may incur the energy costs of an inefficient facility.

Having a small IT load in a site with excess cooling capacity, for example, will result in a higher PUE rating. Right-sizing infrastructure capacity according to the IT load is key when looking to reduce PUE. For end-users, with concerns about the cost of power, the ability to reduce net energy consumption will inevitably result in lower electricity bills and a lower carbon footprint associated with computing operations. For customers of colocation service providers, low PUE is an indication that their energy bills are not excessively inflated due to inefficient electrical and mechanical infrastucture.

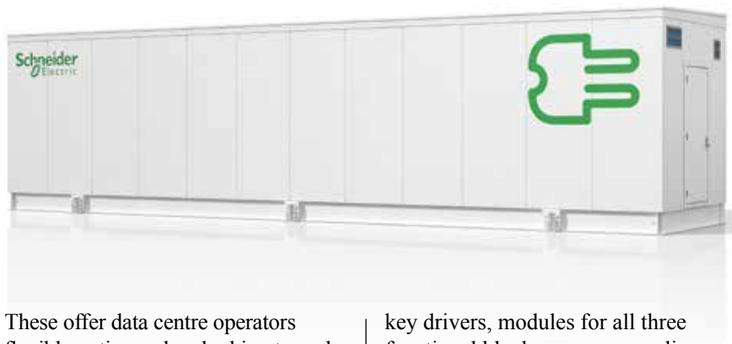
Modular Power and Cooling

Modular construction continues to remain a popular trend within the IT industry and extends throughout all the infrastructure supporting the data centre including racks, servers, power protection and distribution, and cooling equipment. Prefabricated power modules, for example, are available as functional blocks, incorporating switchgear, uninterruptible power supplies (UPS) and backup batteries, transformers and panel boards.

Cooling modules, which are essential for maintaining operating temperatures at an optimal level, comprise a variety of systems, many of which can be located outside the building housing the IT equipment. They include air chillers, storage tanks, condensers and dry coolers, evaporative coolers, pumps, fans and ducting. Typically, cooling is a major consumer of facility power and so the design of the overall cooling effort focuses very strongly on efficiency, so that its power consumption, and consequently the data centre's PUE rating, can be optimised.

Fully prefabricated data centres comprise all of the essential functional blocks, including power, cooling, IT equipment and Cloud-based Data Centre Infrastructure Management (DCIM) Software in a single unit. This can include smaller micro data centres used in edge computing environments, all the way up to large single steel ISO containers, which can be extended and blocked together to form larger, on-premise data halls.

Depending on the customer requirement, non-ISO standardised enclosures can be installed inside, or as ruggedised units outside. ▶



These offer data centre operators flexible options when looking to scale up capacity quickly. ‘Skid mounted’ modules, in which all machinery at point of manufacture is permanently mounted in a frame, also allow power modules to be shipped easily and securely as a single unit.

Final Considerations

Depending on the requirement and the accompanying business case, data centre operators have many options when considering how to deploy new data centre capacity. Where scalability and rapid deployment are key drivers, modules for all three functional blocks—power, cooling and IT space—can be deployed in a single unit; either as an ISO container or as a prefabricated building.

The mixed, or hybrid, prefabricated approach is typically used to add capacity to an existing data centre when demands have peaked. In this case, individual power or cooling modules can be deployed quickly and reliably to boost capacity, allowing the user to take advantage of pre-engineered and pre-tested equipment, which can be added to existing plants both quickly and cost-effectively.

Speed of deployment is another self-evident advantage of using prefabricated infrastructure. In terms of TCO calculations, comparisons between using a prefab or traditional-built approach will depend on the exact size requirements of the customer.

Cost comparisions by Schneider Electric, detailed in White Paper #164, “TCO Analysis of a Traditional Data Centre vs. a Scalable, Prefabricated Data Centre” have shown that the savings accrued from deploying a prefabricated data centre, compared to a traditional-built data centre, can be as much as 27.2% in capital expenditure (CAPEX) and 31.6% in operating expenses (OPEX) over a period of 10 years.

Clearly, the prefabricated approach offers today’s owners significant advantages in terms of speed of deployment, efficiency, scalability, reliability and cost savings.