Improve data center speed to deployment

Off-site prefabricated and pre-engineered modular solutions

 Document ID.: Rev.:

Agenda

- Challenges – overarching data center and market drivers
- Complex project challenges and benefits of packaged solutions
- How to achieve speed and scalability
  - Packaging solutions
  - Integrated and prefabricated solutions
  - Prefabricated and pre-engineered solutions
- Full package benefits
- Timeline example
- Speed impact on revenue
- Examples of projects
- Conclusion

Market drivers

Growing demand

Since 2010…	Internet users worldwide have **doubled**	Global internet traffic has grown **12-fold** or 30% per year
Between Feb and mid-Apr 2020	Global internet traffic surged almost **40%**	Pandemic drove use of video streaming, video conferencing, online gaming and social networking
Future growth	Mobile internet users projected to increase from 3.8 billion in 2019 to **5 billion by 2025**	Internet of Things (IoT) connections is expected to double from 12 billion to **25 billion by 2025**

Source: https://www.iea.org/reports/tracking-buildings-2020/data-centres-and-data-transmission-networks

Market drivers causing the need for…

Speed and scalability

Growing demand requires improved speed of deployment – cutting data center lead times from several years to 18 months or less

To meet the speeds required many data centers are leveraging modular, prefabricated and pretested solutions

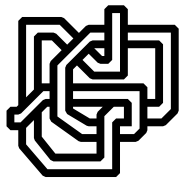
“Pay as you grow” - The need for speed and a fast return on investment drive the need for scalable and / or modular solutions

Availability of skilled construction personnel and tradespersons to meet the growing demand of the industry

Common customer challenges for complex projects

Vendor Management

- Managing performance of multiple vendors covering goods & services
- Challenging for customers with limited execution resource & experience dealing with certain vendors

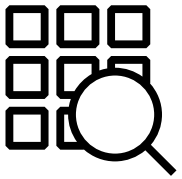


Contract Management

- Procurement resource to negotiate multiple supply agreements
- Project management of multiple contracts with differing, terms and conditions, payment schedules & warranties

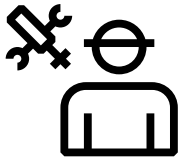
Equipment Compatibility

- Ensuring supply of goods & services from multiple vendors are technically compatible
- Can lead to extensive project delays during installation & commissioning



Schedule delay

- Management of deliveries across multiple vendors & ensuring technical compatibility between all elements are commons causes of project overrun



Schedule delay & cost overrun are common risks as project complexity increases

Speed and scalability – Data Center solutions

How to achieve speed and scalability

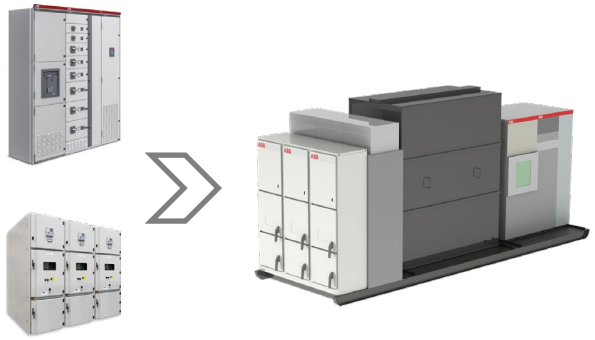
From Product to Solution

Packaging solutions

Product packages

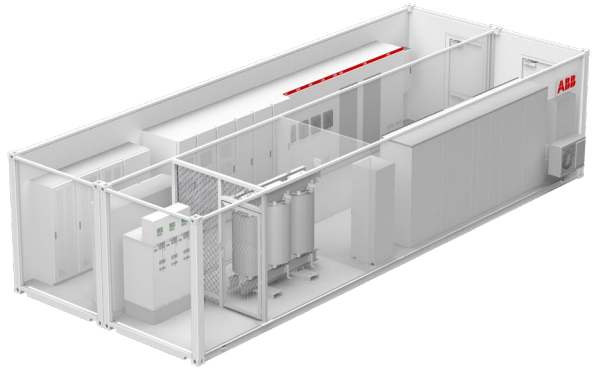
Integrated and prefabricated solutions

Custom eHouses, Skids



Predesigned, pre-engineered and integrated solution

Pre-defined eHouses, Skids and packages



Packaging solutions

Product packages

Scope

The Packaged Solution is offering a pre-engineered package with electrical and auxiliary equipment to be installed on-site with traditional construction methods.

Solutions are covering wide voltage range, standards and technologies around the world.

ABB offers global coverage with local execution knowledge

Typical equipment

- Medium voltage switchgear up to 40,5 kV
- UPS with different batteries technologies
- Low voltage switchgear with different protection degrees and busbar insulation
- Circuit breakers with asset monitoring and controlling units
- Associated controls
- 3rd party equipment for complete solutions

Key benefits

Engineered for high reliability

Designed for field installation

All equipment is type tested according to their relevant standards

FAT of system in a controlled factory environment

Multiple control packages to fulfill different requirements and needs

Available solutions for virtual troubleshooting and remote assistance

One stop shop – to simplify your project execution

Packaging solutions

Benefits

1 stop shop. Easier vendor management

Coordinate product delivery with one set of terms and conditions

3rd party products from preselected and approved vendors

Eco efficient portfolio to support sustainability goals

Optimized and scalable technical solutions from industry experts

Virtual factory tours and acceptance tests

Online troubleshoot and technical support possibilities

Wide portfolio and offering to cover industry need

Integrated and prefabricated solutions

Custom eHouse

Scope

An eHouse typically consists of electrical equipment for power distribution and auxiliary equipment in a compact solution. It can be mounted on slab or piers and is ready to operate in the field with minimum installation, commissioning and start up time.

eHouse solutions are prefabricated electrical buildings that can accommodate a wide range of electrical equipment.

eHouses fulfill many global and local standards.

Typical equipment

- Electrical building with HVAC and aux circuits.
- Medium voltage switchgear
- UPS with different batteries technologies
- Low voltage switchgear with different protection degrees and busbar insulation
- Circuit breakers with controlling units
- Associated controls
- 3rd party equipment for complete solutions

Key benefits

Engineered for efficient environmental controls in order to extend the life of the equipment

eHouses built, equipment installed and FAT performed in controlled factory environment

Flexible in space to accommodate a large number of equipment

All equipment is type tested according to their relevant standards

One piece delivery, optimized logistics and reduced exposure to site issues

Factory integrated unit - to speed up your project execution

Integrated and prefabricated solutions

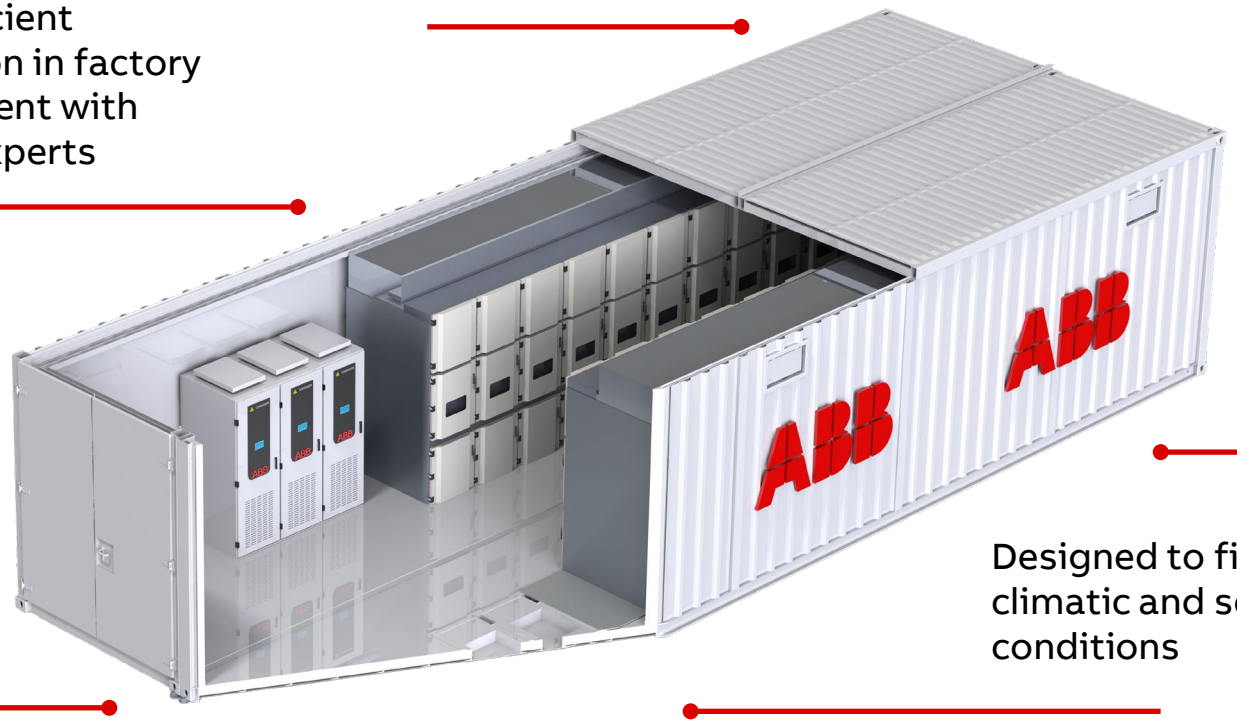
Prefabricated, custom eHouses

Tailor made eHouse for customer specified solution and configuration

Designed for service personnel safety

Safe, efficient production in factory environment with factory experts

Prefabricated solutions improve lead times by up to 30%



Plug and play solutions allow different modules to be connected easily

Off-site build reduces the risk of schedule delays and cost overruns

eHouses are designed in standard dimensions to optimize logistic costs

Designed to fit specific climatic and seismic conditions

Integrated and prefabricated solutions

Custom Skid

Scope

The Skid is a frame mounted, compact solution for electrical distribution and auxiliary equipment, and is ready to operate in the field with minimum installation, commissioning and start up time - as an alternative to traditional on-site building construction.

Skids are available for indoor or outdoor solution.

A skid is designed to be transported in one piece to site. Split sections are designed for on-site easy connection

Typical equipment

- Skid with mounted electrical equipment and interconnections.
- Medium voltage switchgear
- UPS with different batteries technologies
- Low voltage switchgear with different protection degrees and busbar insulation
- Circuit breakers with controlling units
- Additional equipment depending on topology
- 3rd party equipment for complete

Key benefits

Skids are built, equipment installed and FAT performed in controlled factory environment to limit and reduce site issues

Skids are delivered to site in single or multi units. Multi units are delivered with all required interconnections for fast installation.

All equipment is type tested according to their relevant standards

Easy access to equipment for visual inspection and service

Optimized logistics

Factory integrated unit - to speed up your project execution

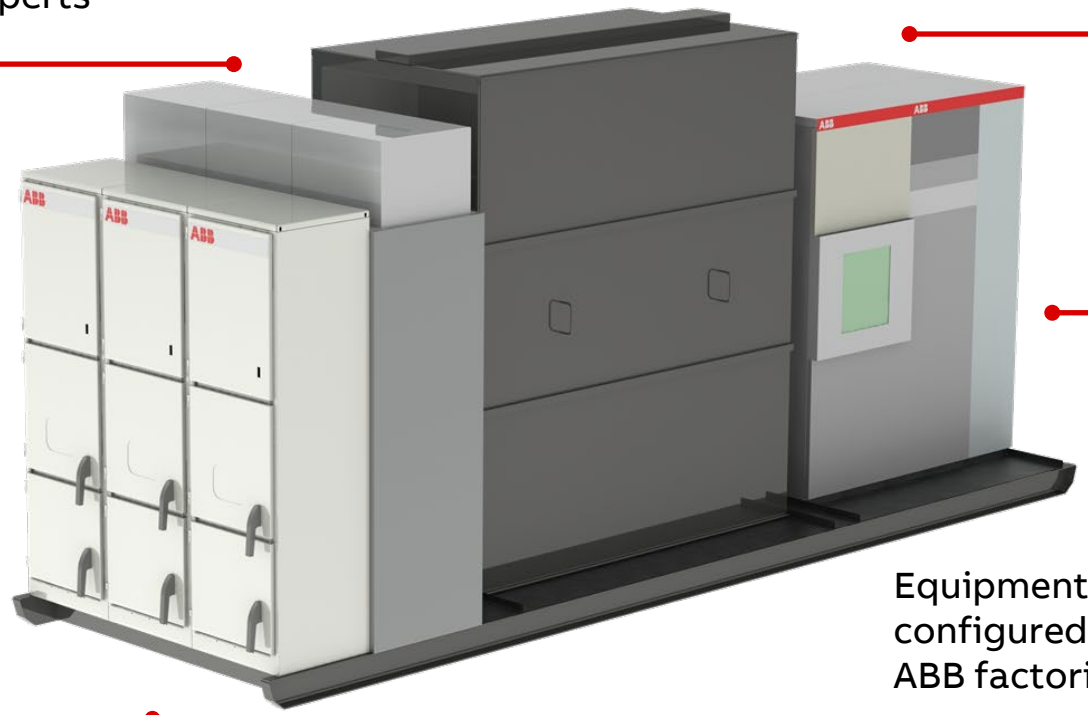
Integrated and prefabricated solutions

Prefabricated, custom Skids

Safe, efficient production in factory environment with factory experts

Minimal site works for equipment installation and commissioning

Equipment installed and interconnections done in factory



Prefabricated solutions are integrated and tested before leaving the factory – lowering installation & commissioning

Simpler site assembly with modular solution, unload, connect and test

Off site build. Reduce risk of schedule delays and cost overruns

Skids are designed to tolerate transport and lifting with equipment installed

Equipment tested and configured by experts in ABB factories

Prefabricated, pre-engineered integrated solutions

Pre-defined eHouses, Skids and packages

Scope

Predefined product and solutions are designed for standard data center architectures considering industry and international product standards. Selection of different packages enables benefits for rapid deployment of data centers to address challenges like speed, installation, commissioning and logistics.

ABB offers global coverage with local execution knowledge

Typical equipment

- Electrical equipment delivered as packages or installed in eHouse or on Skid
- Medium and low voltage switchgear with busway connections
- UPS with different batteries technologies
- Circuit breakers with controlling units
- Associated controls
- 3rd party equipment for complete solutions

Key benefits

Significantly reduced design cycle compared to traditional stick-built solutions

Pre-defined and pre-engineered for optimized solutions and rapid speed to deployment

Solutions are built, equipment installed and FAT performed in controlled factory environment

All equipment is type tested according to their relevant standards

Prefabricated, pre-engineered – future standard for data center deployment

Improve speed to deployment

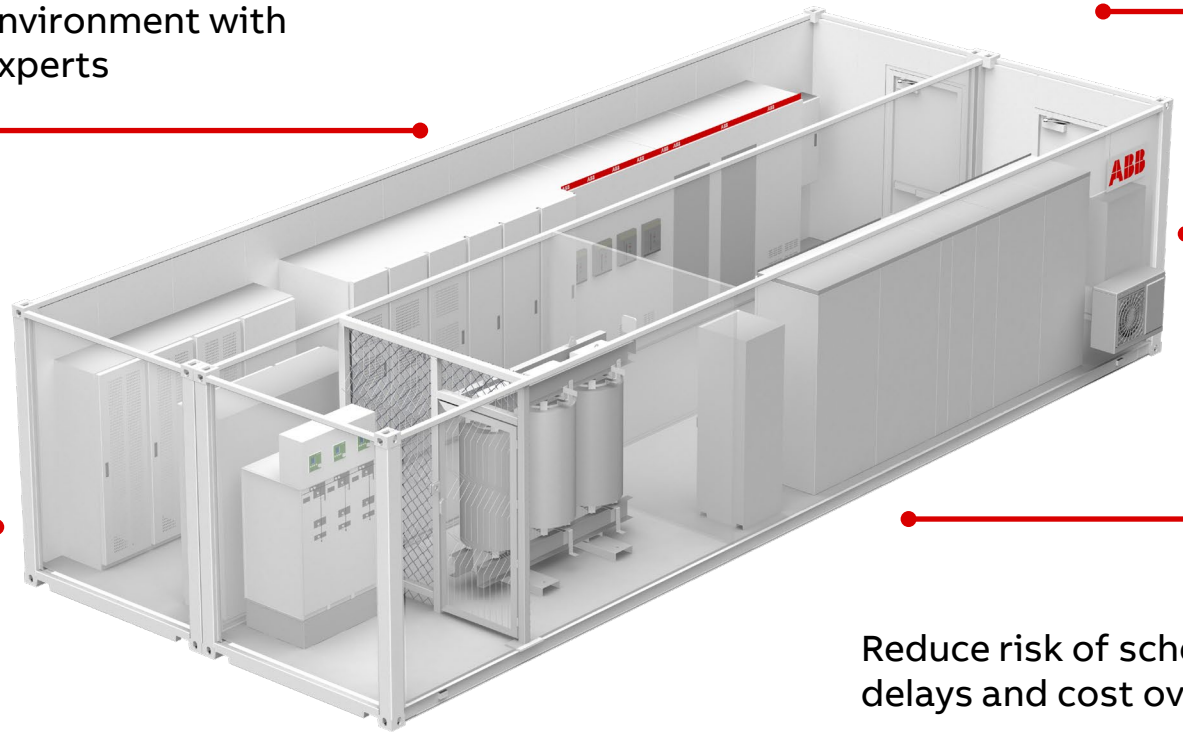
Prefabricated, pre-engineered integrated solutions

Safe, efficient production in factory environment with factory experts

„Pay as you grow“ - modular and scalable portfolio to support future growth

Eco-efficient portfolio for sustainable future data centers

Optimized delivery cycle from engineering to execution



Electrical equipment prepared for comprehensive overlook with digital layer

Prefabricated, pre-engineered solutions can improve lead times by up to 50%

Simpler site assembly with modular solution - unload, connect and test

Reduce risk of schedule delays and cost overruns

Data Center pre-engineered solutions

Always updating with new designs! Check with your salesperson for the latest releases.

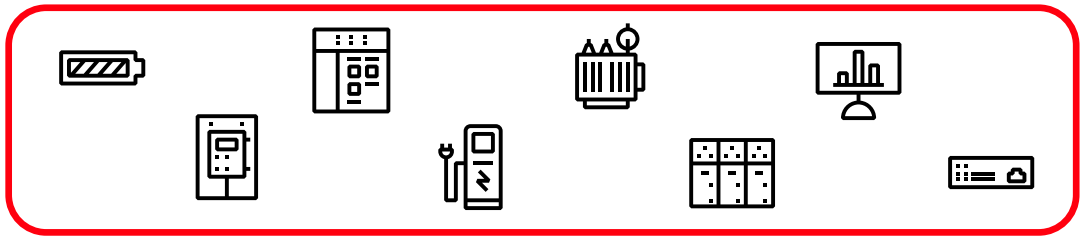
Power		Sub segment			Standard		Installation			Topology
UPS capacity per block		Colo	Enterprise	Hyperscale	IEC	ANSI	eHouse	Skid	Pkg	Topology
0.5	MW	X	X		X	X	X	X	X	System + System
0.75	MW	X	X		X	X	X	X	X	System + System
1.25	MW	X	X		X	X	X	X	X	System + System
1.5	MW	X	X		X	X	X	X	X	System + System
2	MW	X	X			X	X	X	X	System + System
3	MW	X	X			X	X	X	X	System + System
1	MW	X	X		X	X	X		X	3N/2
1.5	MW	X	X		X	X	X		X	3N/2
2	MW	X	X			X	X		X	3N/2
2.5	MW	X	X			X	X		X	3N/2
3	MW	X	X			X	X		X	3N/2
4	MW	X	X			X	X		X	3N/2
4.8	MW	X	X			X	X		X	3N/2

Timeline and benefits

Packaging & Solutions brings the full package to the customer

Without Packaging & Solutions

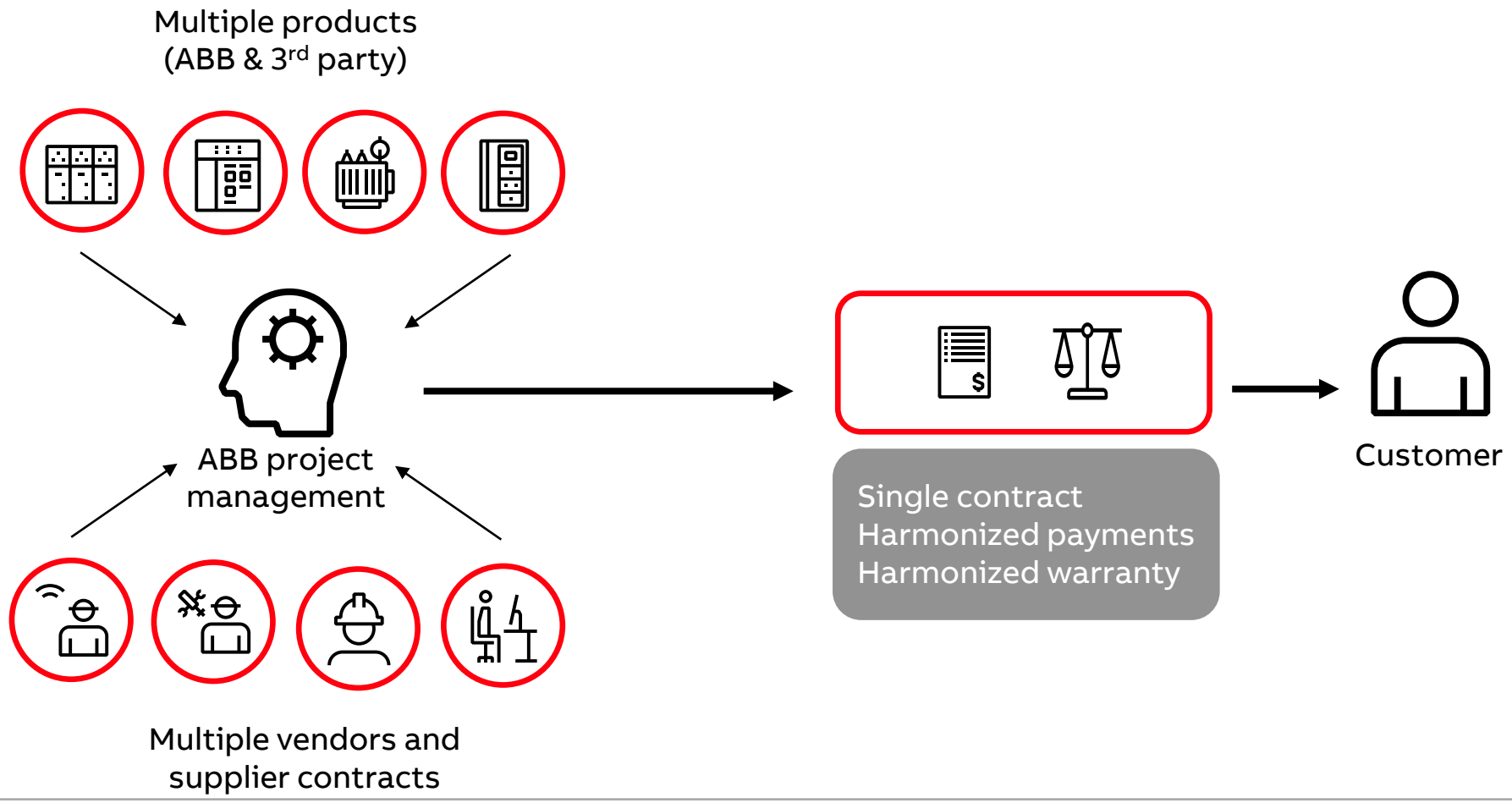
With Packaging & Solutions



- Integrated solutions
- Simplified project management
- Single contract
- Reduced risk
- Schedule predictability

Pre-engineered product packages

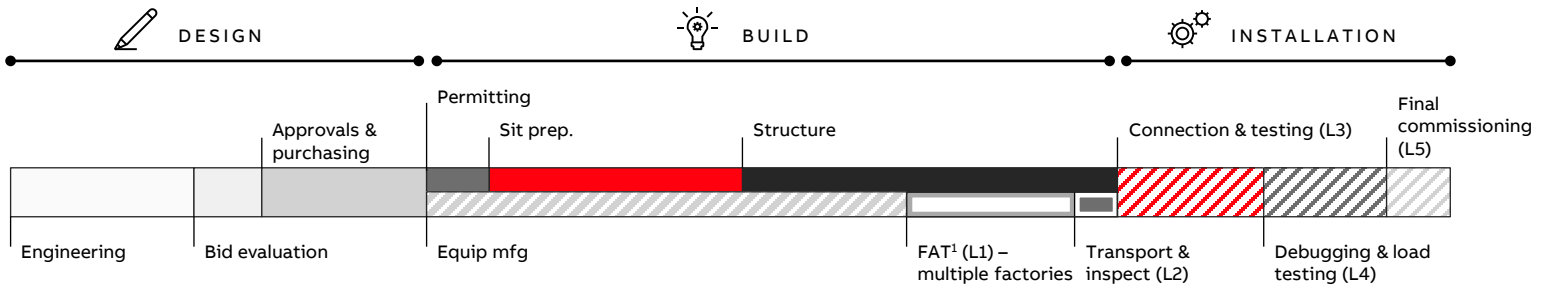
Simplify whole value chain



Improve speed to deployment with prefabricated solutions

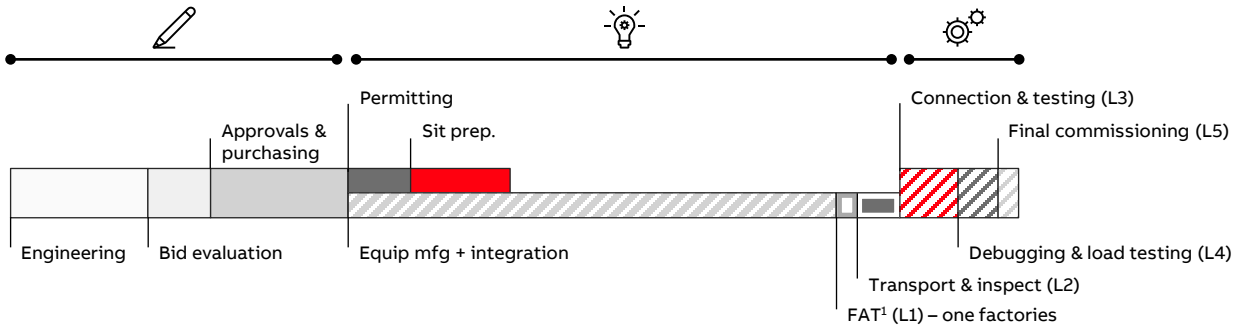
1

Traditional on-site build “stick built”



2

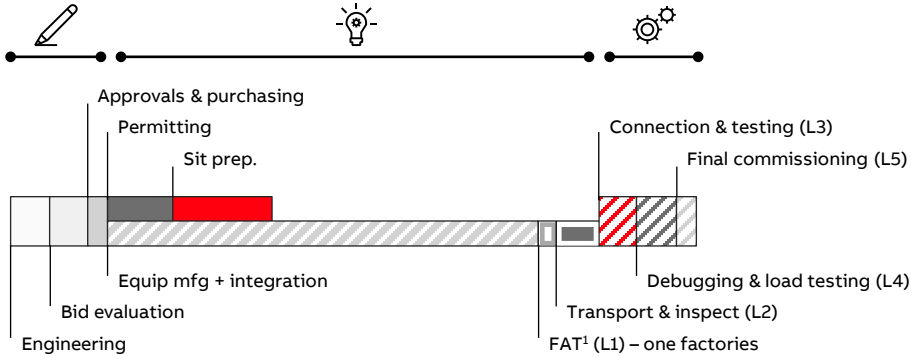
Prefabricated off-site eHouse or skid



30%
improvement over traditional

3

Predesigned, prefabricated off-site eHouse or skid



50%
improvement over traditional

20%
improvement over prefabricated

1. Factory Acceptance Testing

Speed impact on revenue

Colocation example

Factors that improve speed to deployment:

- Concurrent build and manufacturing
- Turnkey modular and scalable solutions
- Pre-engineered - reduced need for engineering and approvals
- Prefabricated - reduced integration and siteworks need
- Plug and play - reduced commissioning and troubleshooting need

Mitigate the risks of:

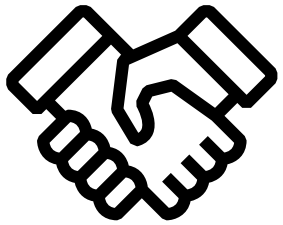
- Labour shortage
- Cost and time slippage
- Logistics challenges

	Revenue by 6 months*	Revenue by 9 months*	Revenue by 12 months*	Revenue by 18 months*
6 months build	$0	$4.5M	$9M	$18M
9 months build	$0	$0	$4.5M	$13.5M
12 months build	$0	$0	$0	$9M
18 months build	$0	$0	$0	$0

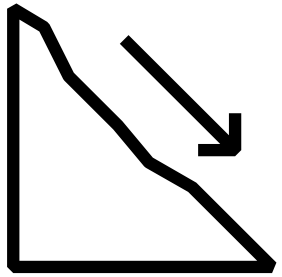
*Based on a 10MW lease at $150 per kW per month

Start earning revenue as soon as possible!

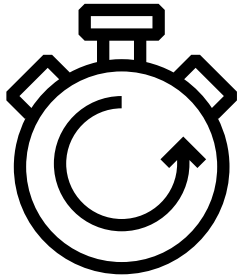
Pre-engineered product packages and prefabricated modules deliver



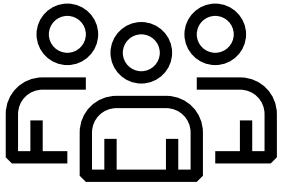
Commercial and execution simplicity



Risk mitigation



Reduced installation and energization period



Reduced client resources

Commercial & schedule predictability of outcome

Why partner with ABB for your prefabricated and predesigned solutions

Ensure supply
ABB's global footprint provides a vast network of suppliers and factory locations

Local support & service
Locations in 100+ countries and over 100K employees

Complete portfolio
Solutions for GB, IEC, and ANSI standards and ability to harmonize across all standards

Domain expertise
100+ years electrical / utility connection knowledge to ensure data center design meets local codes and standards

Lifecyle management
Ensure long-term management of the electrical system with ABB's digital solutions

Reduce risk
Cutting-edge technology built to the highest quality standards

Ease of doing business
One stop shop with a common project manager and harmonized terms, payment schedules and warranty

Avoid costly schedule delays
Library of pre-engineered solutions, optimized for footprint, scalability and ease of deployment

Project examples

Project example

4 indoor skids connected via busway

Large hyperscale data center project

- All cells on skids
- Skids included ATS, switchboards, UPS modules, battery cabinets
- Busway mounted to and shipped on skids
- Interconnecting busway installed in field

Project example

eHouse

Financial data center, USA

Challenge:

Keep up with new data demand of 2.7 zettabytes

With conventional brick-and-mortar data centers builds taking up to 24 months, they were not a sustainable competitive strategy

Solution: Modular containerized system

Partnering with the company's new IT Container platform, ABB coupled its modular containerized system to provide faster data center expansion and new energy efficiencies

Benefit: Fast build, low usage efficiencies and high UPS efficiencies

The customer deployed new data center capacity at existing facilities in 4-6 months, bringing new power usage efficiencies as low at 1.05 and uninterruptable power supply energy operating efficiencies of up to 99%.

Project example

Packaged solution

GIGA Data Centers

The challenge:

USA-based GIGA data centers had acquired a long, rectangular building suitable for conversion into a data center.

GIGA wanted to create a critical power distribution design that was fully scalable to allow for further pay-as-you-grow expansions.

The solution:

Together, GIGA and ABB worked to design a system that would support 60 MW of IT load. Amazingly, the first phase of the data center conversion was completed in less than six months.

Subsequently, ABB collaborated with GIGA's mechanical, electrical and plumbing (MEP) consultants to design a flexible, scalable and efficient packaged solution based on a system plus system topology. This design is scalable and has the capability of expanding in increments of 2 MW of IT load.

Per requirements, capable of expanding in 2MW blocks.

Packaged solution

Conclusion

- The ever-increasing need to generate, collect, distribute and process data is driving the data center industry build data centers at record speeds.
- A complex project like a data center that historically took years to build are now being built in less than 18 months.
- One way data centers are building faster is leveraging off-site, modular, prefabricated and pretested solutions. These solutions are also ideal to scale as demand grows and substantially reduce the number of construction and tradespersons needed on-site.
- There are several options to achieve speed and scalability:
  - Packaged solutions or product packages
  - Integrated and prefabricated solutions such as eHouses & skids
  - Predesigned, pre-engineered and integrated solutions
- These solutions offer a variety of benefits such as
  - Commercial and execution simplicity
  - Mitigate client risk
  - Reduce speed to deployment by up to 30% with prefabricated solutions and up to 50% with pre-engineered solutions
  - Reduced client resources from design work to commercial evaluation, project administration through on-site installation and commissioning
- Why partner with ABB
  - Ensure supply with a comprehensive portfolio and global footprint
  - Local support and service personnel
  - Domain expertise
  - Library of pre-engineered solutions optimized for footprint, scalability and ease of deployment


ABB