

Rittal DataCube Container Datacenter



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Rittal DataCube

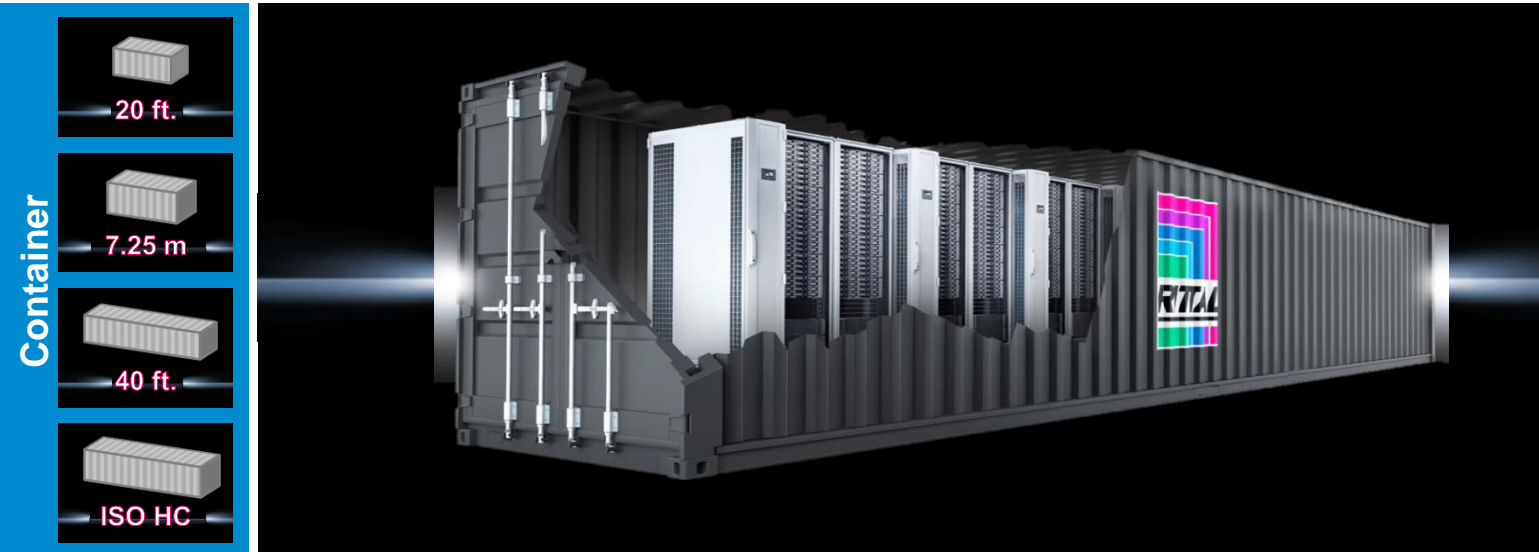
Datcenter Container

- 1 Facts & market trends
- 2 The Rittal datacenter container platform**
- 3 The modular principle for DC containers
- 4 Standardized container solutions
- 5 Innovation: Blue e+ Container
- 6 References

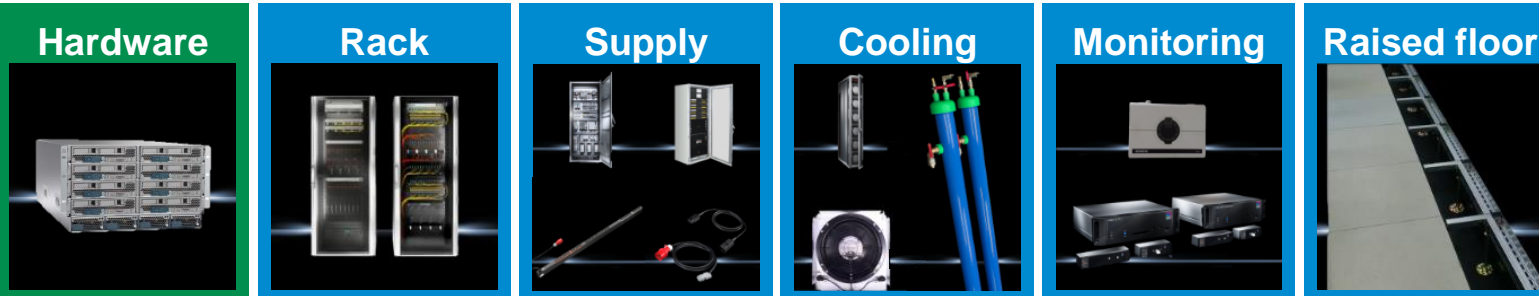
Rittal DataCube – Datacenter Container

The Rittal datacenter container platform

Flexible solution based on standard components

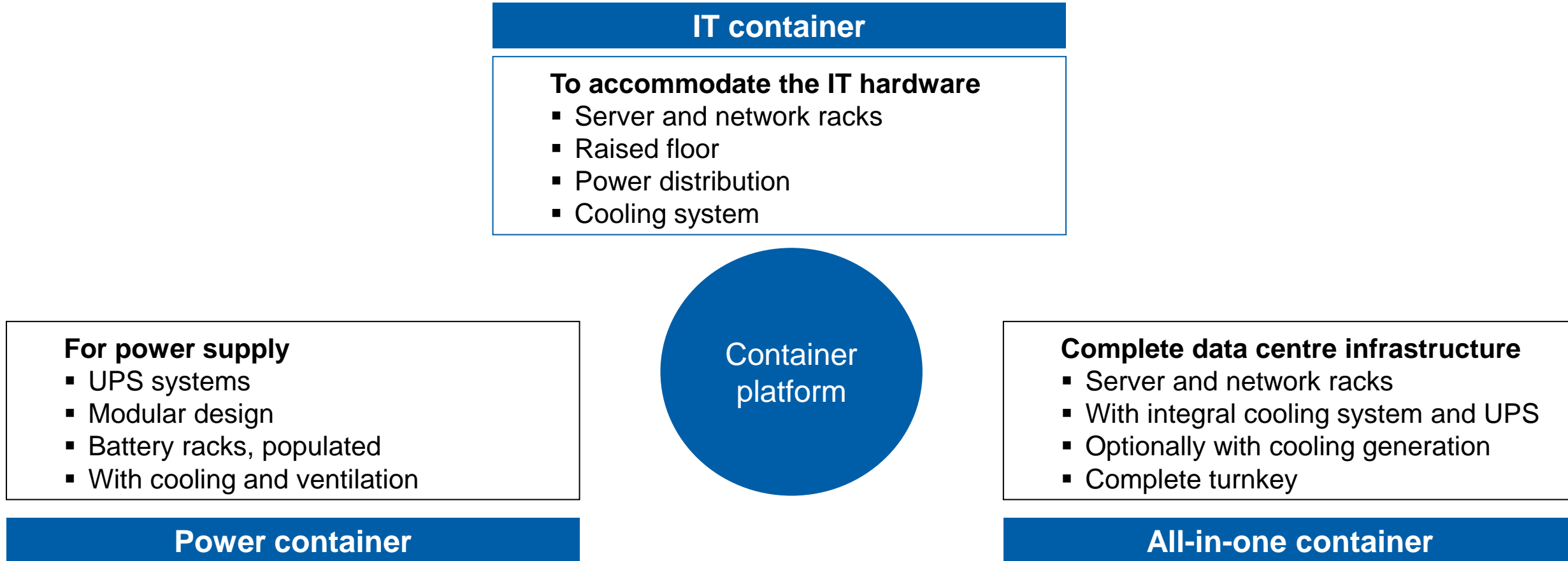


Rittal configures customised data centre containers using standardised components.



Rittal DataCube – Datacenter Container

The Rittal datacenter container platform*



*Container variants for different subsections

Rittal DataCube

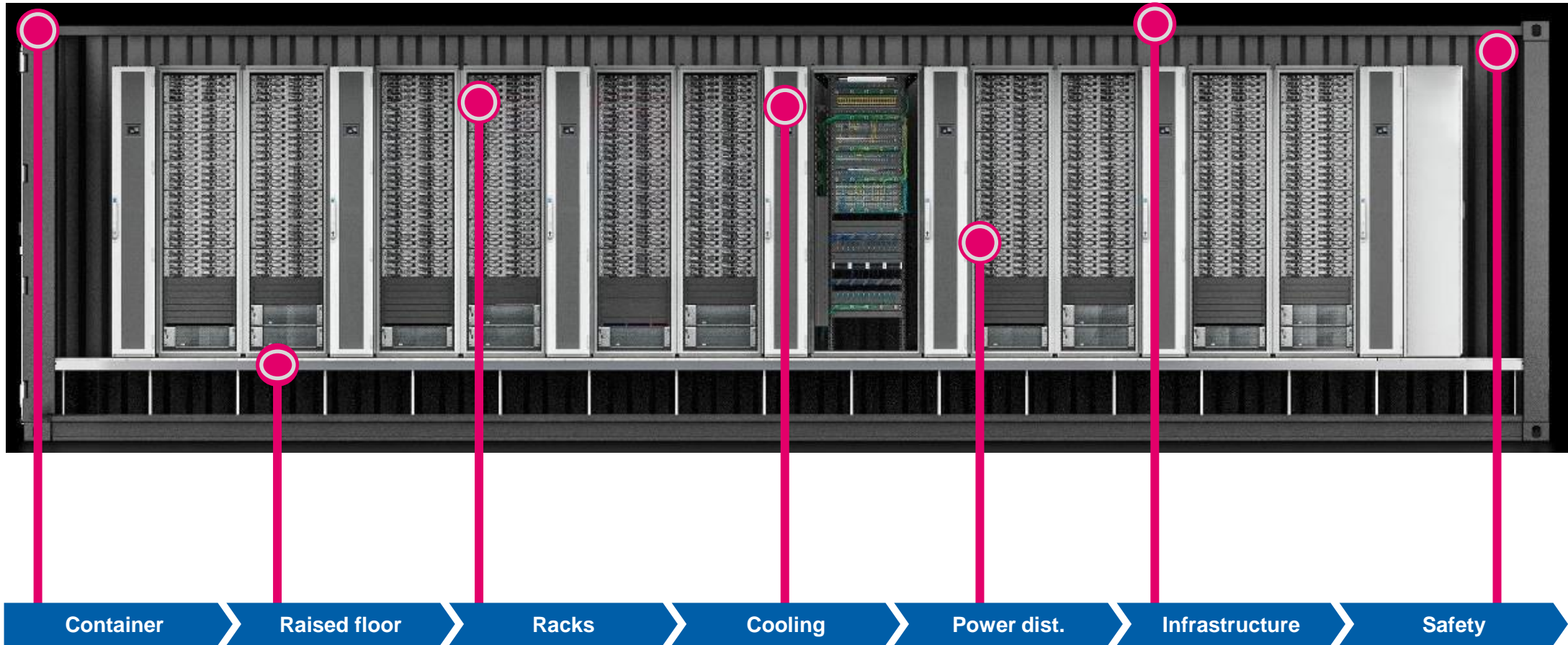
Datcenter Container

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- 2 The Rittal datacenter container platform
- 3 The modular principle for DC containers**
 - 3.1 Technical details**
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Rittal DataCube – Datacenter Container

The modular principle for DC containers: Technical details

The standard components



Rittal DataCube – Datacenter Container

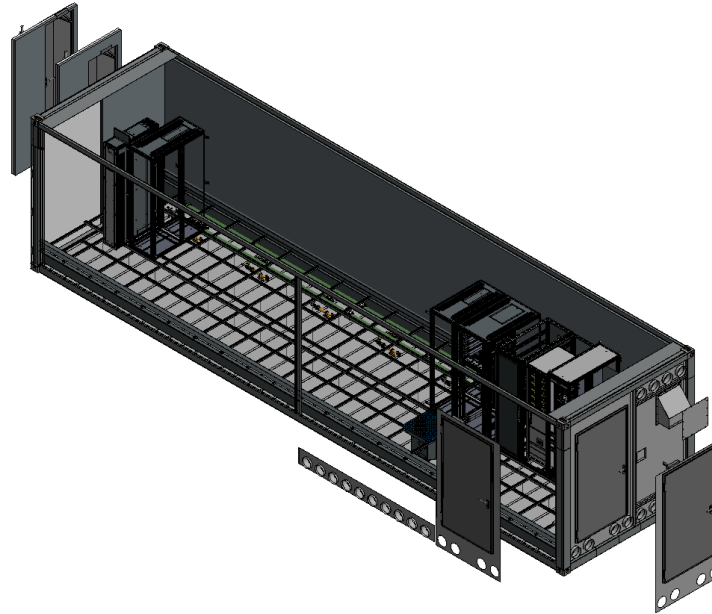
The modular principle for DC containers: Technical details

A data center within a container

Standard lengths

6085 mm (20 ft.)
7250 mm
12192 mm (40 ft.)

Other dimensions also possible*



Standard widths and heights

ISO HC* 2438 x 2896 mm
3x3: 3000 x 3000 mm

Other dimensions also possible*

*HC = "High Cube"

* The size of the container is limited by the possibility of transportation.

Container

Raised floor

Racks

Cooling

Power distribut.

Infrastructure

Safety

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Rittal DataCube – Datacenter Container

The modular principle for DC containers: Technical details

The physical container structure: Stability and protection

- Standard sizes are predesigned
 - Existing, tested construction
 - Tried-and-trusted design
 - Documentation and drawings
- Stable frame structure with protective wall units
 - Fully welded container frame
 - RAL 7035 with C4 protective paint - (further options on request)
 - Corrugated metal surface for enhanced stability
 - Wall insulation with non-flammable mineral wool (80mm), covered with galvanized steel-flat-sheet - (insulation with F30 - F90 panels on request)



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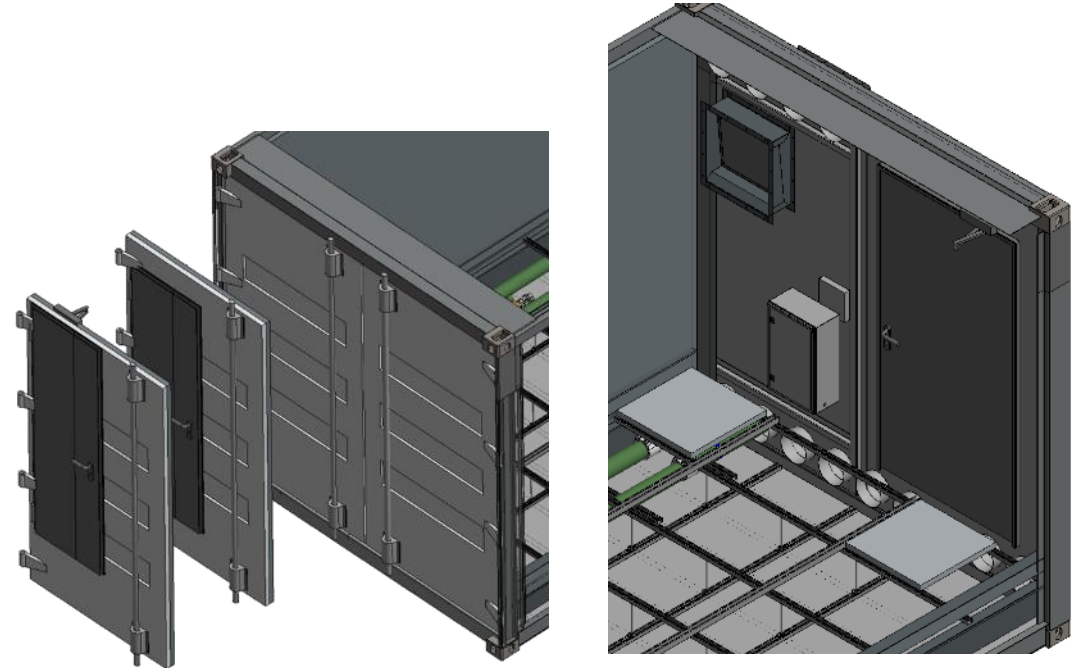
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The modular principle for DC containers: Technical details

Container components: Modular wall units with interfaces to the local infrastructure

- End face door provides central access
- Opposite this: Container door or wall
 - For incorporating the infrastructure and reduced assembly time
 - Optionally with second entrance door
 - Secure retrospective locking
- Cut-outs on the end face for
 - Bulkheads
 - Pressure relief valve
 - Battery ventilation
- Standardised cut-outs with reduced planning effort



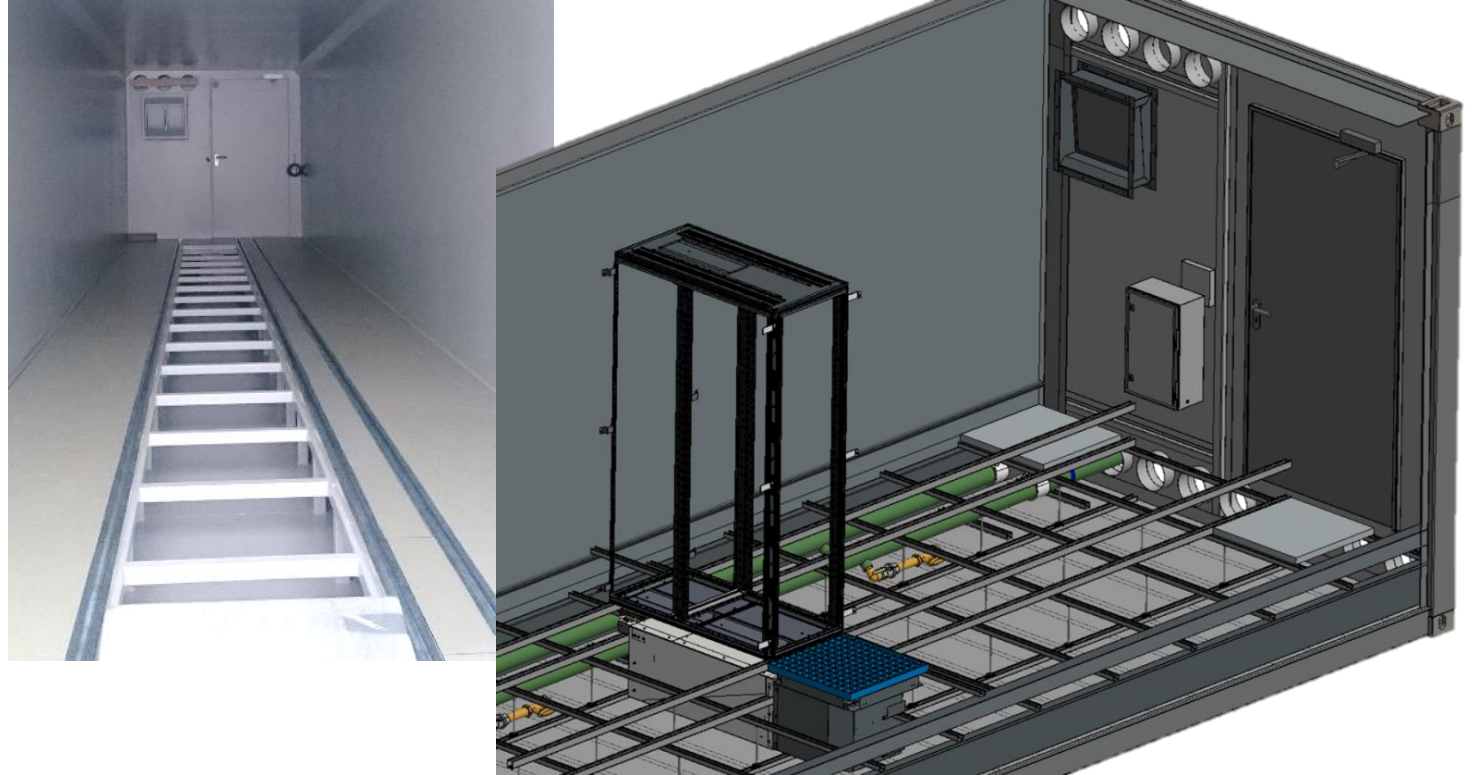
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The modular principle for DC containers: Technical details

Raised floor to match the infrastructure

Two raised floor options:

- Modular
 - Different heights
 - Accommodation of various rack variants
 - Combinations supported
- Heavy-duty raised floor
 - Permanently welded
 - Specially reinforced



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The modular principle for DC containers: Technical details

Core component: Rittal VX IT rack

Standardised Racks (W: 600 mm / 800 mm)

- Size variants:
 - Height: 2.000 mm , 2.200 mm
 - Depths: 800 mm, 1.000 mm or 1.200 mm
 - Depths also dependent on container width
- Standardised versions including interior installation
 - Air baffle plates for separating hot and cold zone
 - Brush strips in roof plate, cable guide rail
 - Bottom plates
 - Optionally with spacers between the racks (50 mm)



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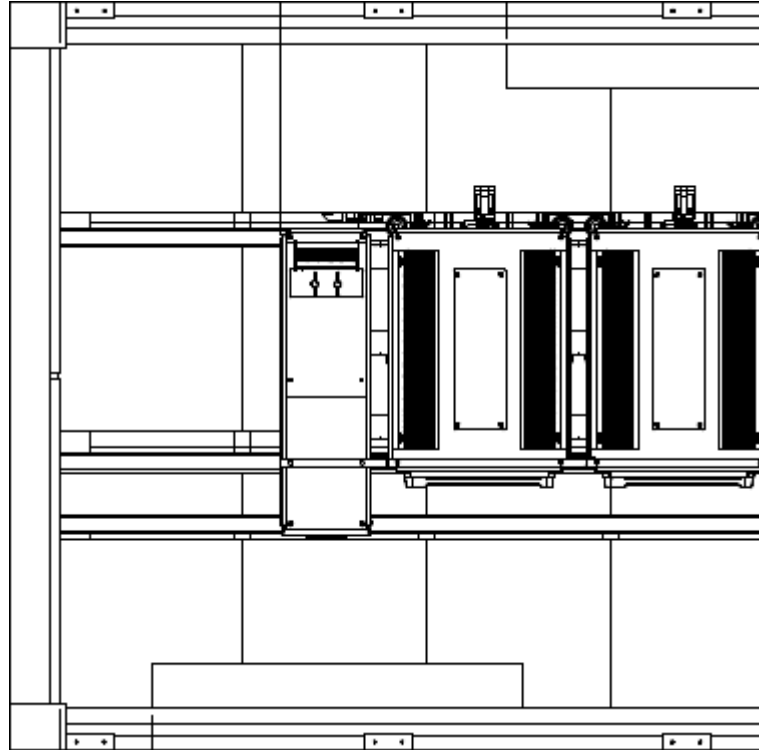
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The modular principle for DC containers: Technical details

Dimensions: Dependencies of rack and container sizes

Crosswise

- Escape route width:
 - Local regulations must be considered
 - Country-specific adoptions possible
- Components
 - Depth of racks and container width
 - Consider LCPs that are set forward (incl. handles)



Lengthwise

- Escape route length:
 - Local regulations must be observed (e.g. in Germany, 10 metres maximum)
 - Country-specific deviations possible
- Components
 - Overall container length
 - Access doors at end face
 - Partitions



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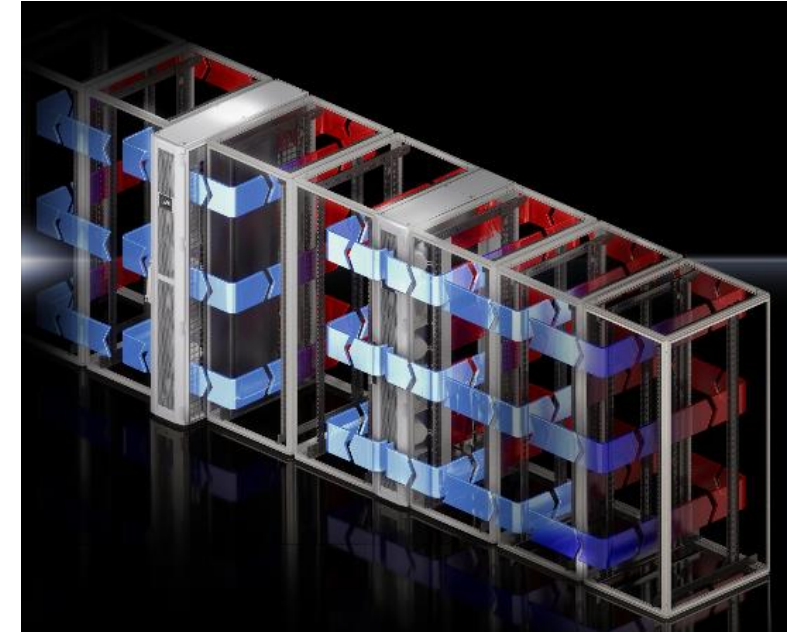
Rittal DataCube – Datacenter Container

The modular principle for DC containers: Technical details

Cooling concepts: Standard cooling solutions from the Rittal portfolio

Suited cooling with cold aisle and hot aisle

- Liquid Cooling Package (LCP) - Horizontal
 - 300 mm wide systems with fans and heat exchangers
 - Positioning between the racks
 - Water-based (CW) or refrigerant-based (DX)
 - Pipework in container is pre-installed
 - DX external units may be mounted on the container frame
- Blue e+ Outdoor cooling unit
 - High efficient cooling solution
 - Up to 5 kW/unit cooling capacity (@ $T_i = 22^\circ \text{C}$ / $T_u = 35^\circ \text{C}$)
 - Plug&Play solution, no extra piping / no external condenser



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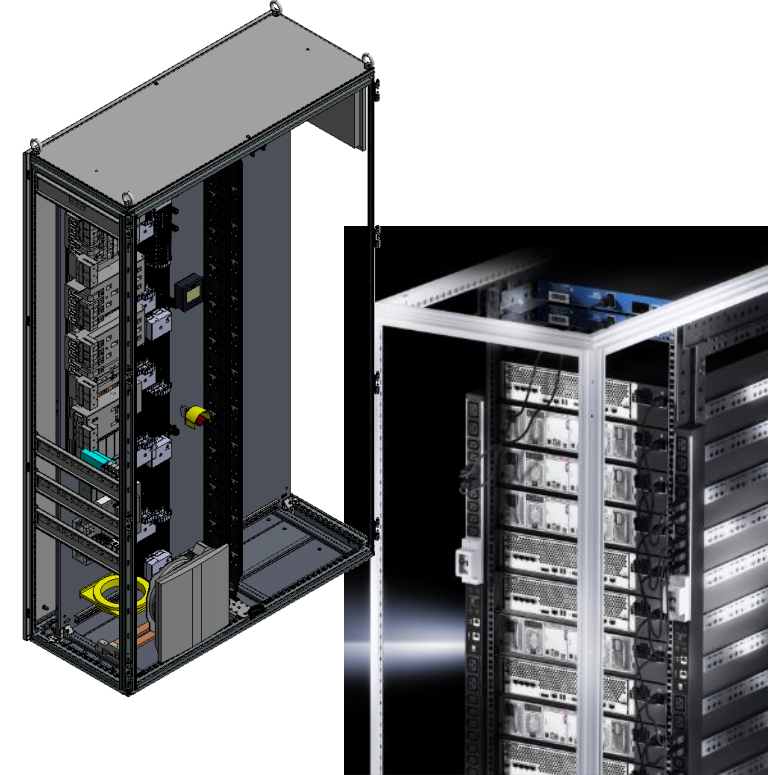
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The modular principle for DC containers: Technical details

Power distribution: Power supply concept

Modular, easily retrofitted distributor system

- Flexible distribution concept designed for the container solution
- Individual adaptation to customer requirements based on ABB Smisline
 - Designed for redundancy requirements
- IT power supply via A and B path
 - Up to 200 kW output per path as standard
 - Distribution in the rack via standard Rittal PDUs
- Infrastructure supply
 - Supply path for operationally non-critical infrastructure (lamps, sockets etc.)
 - Mounted in a Rittal AE



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The modular principle for DC containers: Technical details

Secure the power distribution: Uninterruptible power supply (UPS)

Integration of the UPS (including IT technology) into an all-in-one container

- Use of a modular ABB UPS “DPA UPScale”
 - Designed to the required IT output, 10 kW – 200 kW (in an all-in-one container)
 - Modular concept from the ABB product portfolio, including redundancy
- Autonomy time
 - Designed to the required IT output
- Supply of fresh air required by law due to battery degassing
 - Uses existing openings in the end facing wall
 - Active or passive ventilation with calculation of the air throughput



ABB



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The modular principle for DC containers: Technical details

Container infrastructure: Container configuration

- Air routing
 - Partitioning of hot/cold aisle above the racks with cable entry
 - Individual partitioning of technical/server zone with modular divider panels
 - Divider panels may be fitted with sliding doors
- Container infrastructure
 - LED lights and emergency lighting with battery
 - Switch, cable, service socket pre-fitted



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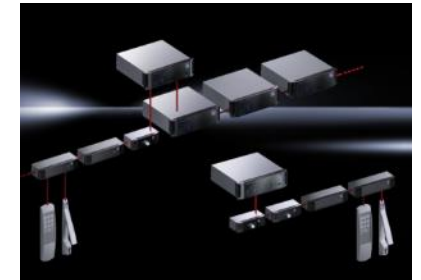
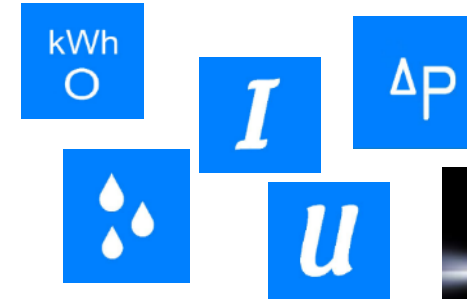
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The modular principle for DC containers: Technical details

Monitoring: 24/7/365 automated

- Ambient monitoring: CMC III with individual sensors
 - Modular monitoring system
 - Individual selection of sensors from the CMC III product range
 - Alarm generated automatically if limits are exceeded
 - Network interface for linking to management systems
- Optional: “RiZone” DCIM software
 - Server-based monitoring software
 - Infrastructure monitoring
 - Monitoring of components in the data centre container
 - Individually adaptable to container equipment

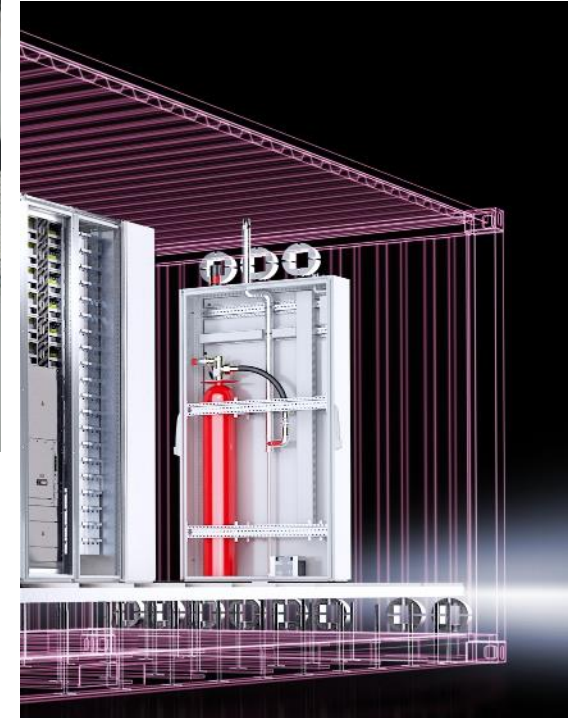


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The modular principle for DC containers: Technical details

Fire protection: Extinguisher system

- Country-specific early fire detection & extinguisher system
 - Extinguisher system depending on the place of use
 - Country-specific selection of extinguisher medium
 - Local requirements must be taken into account
 - Pressure relief in the container prepared for extinguisher system
 - Cable ducts may be used for the pipework of an external extinguisher system



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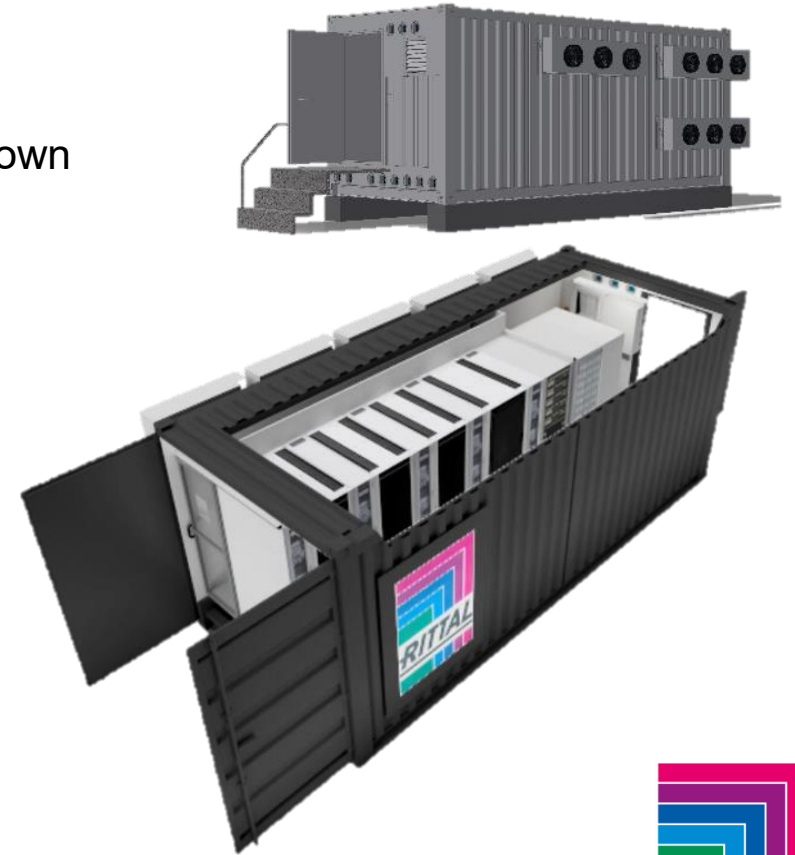
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The modular principle for DC containers: Planning

Planning and engineering of customer-individual containerized solutions

- Including all relevant demands upon the IT infrastructure
 - Number of necessary RU, number and types of racks
 - „IT-load“: Heat load, which is generated by the servers and has to be cooled down
 - Requirements for the redundancy
 - Outside conditions on site
 - Special demands by the customer, f.e. company policies
- The right complete solution for all demands
 - Use of standardized and proven components
 - Beginning with concept drawing, up to detailed drawings in 2D and 3D
 - Consideration of all requirements



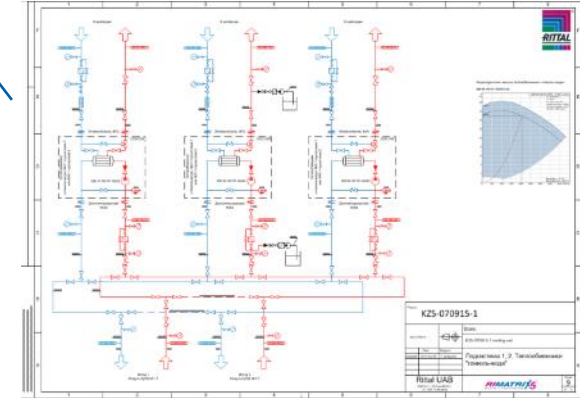
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The modular principle for DC containers: Planning

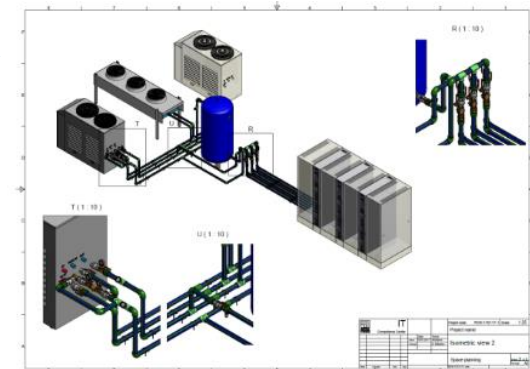
Designing cooling systems: Needs-oriented cooling systems

- Application-specific selection of cooling systems inside the container
 - Water-based for high cooling capacities
 - Refrigerant-based for single installations
- Design of the cooling generation
 - Chiller systems (including free-cooling functionality)
 - Optional with free-cooler and/or buffer tank

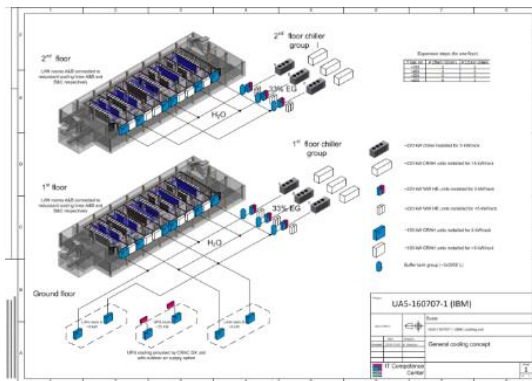
Schemes



Construction plans



Conceptual design

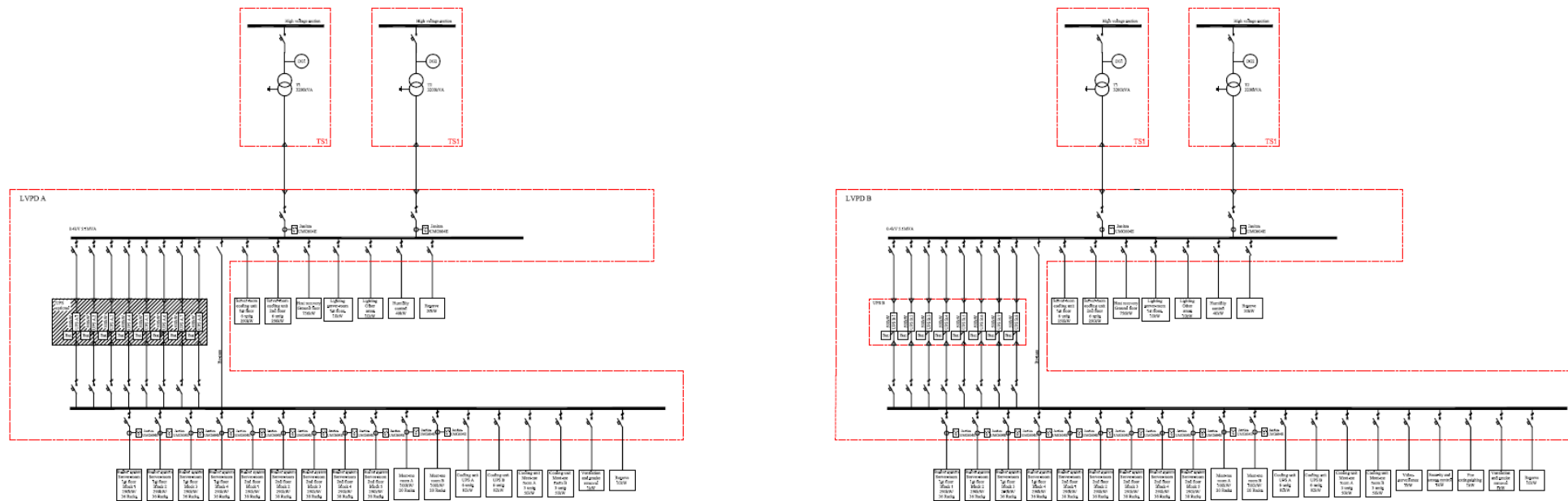


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The modular principle for DC containers: Planning

Designing energy distribution

- Circuit diagrams for the whole power chain – from the PDU up to the main distribution
- Designing and calculation based on the required redundancy level



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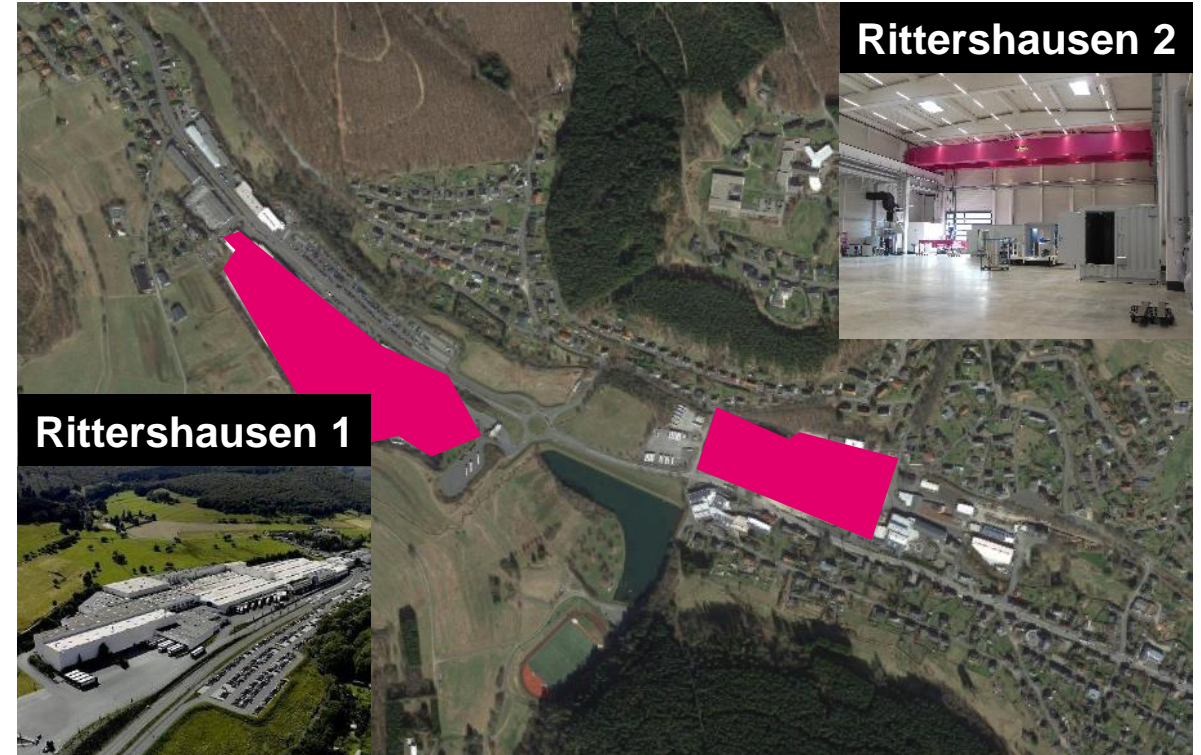
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The modular principle for DC containers: Mounting and installation

Production of containerized data centers: Ewersbach (near Rittershausen)

- Standardised assembly and logistics processes
 - Separation of assembly and logistics
 - Optimised material flow
 - Adapted to container manufacturing
- Scalable production capacity
- Automated planning processes
- High availability, short delivery times
 - Short delivery paths from Rittershausen 1
 - Stock held in small parts stores with order picking

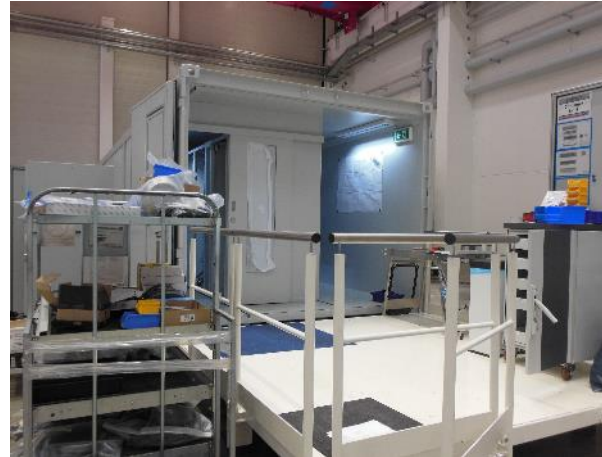


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The modular principle for DC containers: Mounting and installation

Impressions: Factory hall for configuring up to 4 IT containers simultaneously*

- Configuration bays
- Modified handling tools
- Shelf storage spaces
 - Individual part stocking
 - Order picking areas



*extendible to 8 bays

*Operational since 08/2018

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Standardized Container Solutions

Standardize flexibility

Component standardisation

- Regular requirement analysis of assemblies
 - Special assemblies that are frequently used but not yet included in the platform
 - Technical advancements
 - New features in the product range
- Include as part of the platform
 - Documentation
 - Compatibility/component testing

Continuous
improvement



Application standardisation

- Project solutions become pre-configured variants
 - Reuse technical data and construction plans
 - Complete documentation based on the preceding project
 - Tested solution, currently operational
- Modifications to individual components are supported
 - Less work to create a deviating variant



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Standardized Container Solutions

Pre-defined container solutions: Definition

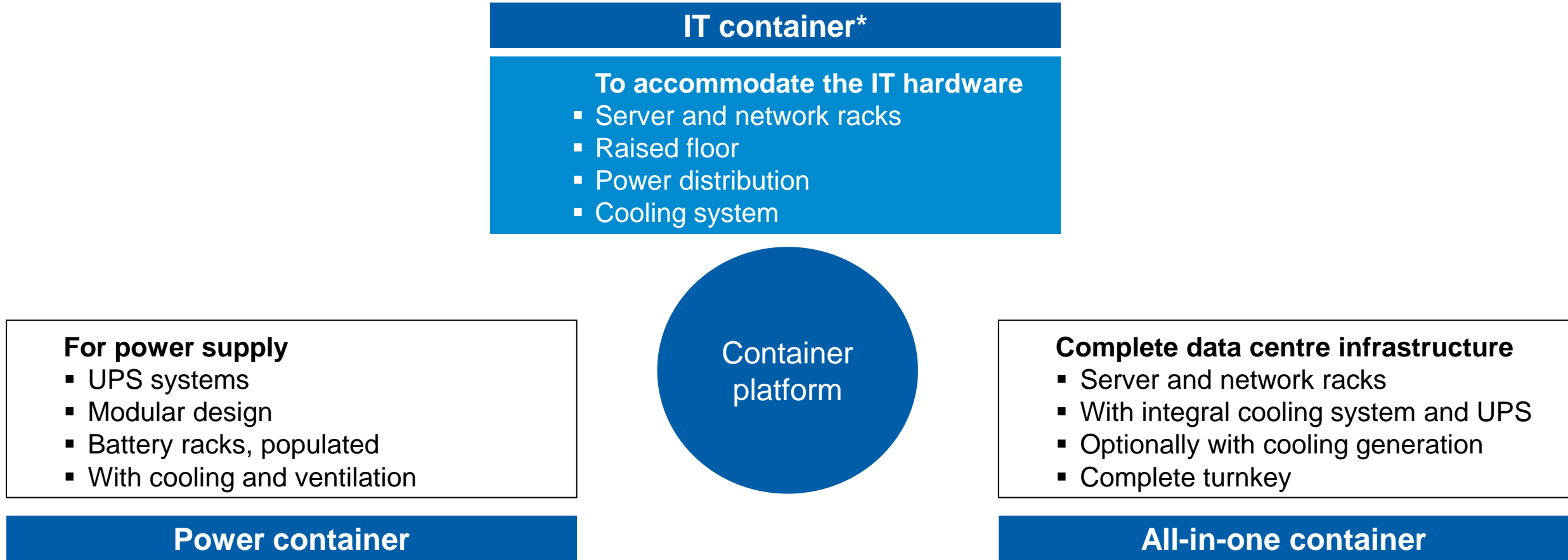
Predefined variants are not standard containers

- RiMatrix S:
 - Standardised, finished modules with **one Model No.**
 - Minimal flexibility but maximum efficiency
- Container platform:
 - Standardised, finished assemblies combined to form a solution
 - **Project-specific compilation** of a data centre container
- The “pre-defined variants” of the container platform are sample applications
 - Fully planned data centre containers, operated in existing applications
 - No separate Model No., but repetition of a project solution



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The Rittal datacenter container platform*



*Pre-defined container solutions

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Standardized Container Solutions

Pre-defined container solutions: IT container

- For SME and Edge applications
 - Pre-defined variants up to 100 kW without integral UPS



	RDC-IT 50/10-L-III	RDC-IT 60/12-L-II	RDC-IT 90/8-M-I	RDC-IT 100/10-L-II	RDC-IT 100/10-L-III
Overall output	50 kW	60 kW	90 kW	100 kW	100 kW
Output per rack	5	5	10	10	10
Cooling	LCP CW	LCP CW	ZUCS CW	LCP CW	LCP CW
Redundancy	2n	n+1	n+1	n+1	2n
Server racks	10	12	8	10	10
Network racks	1	1	1	1	1
Technical racks	1	1	1	1	1
Container size	40 ft x 3m x 3m	40 ft x 3m x 3m	7.25m x 3m x 3m	40 ft x 3m x 3m	40 ft x 3m x 3m

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Standardized Container Solutions

Pre-defined container solutions: IT container

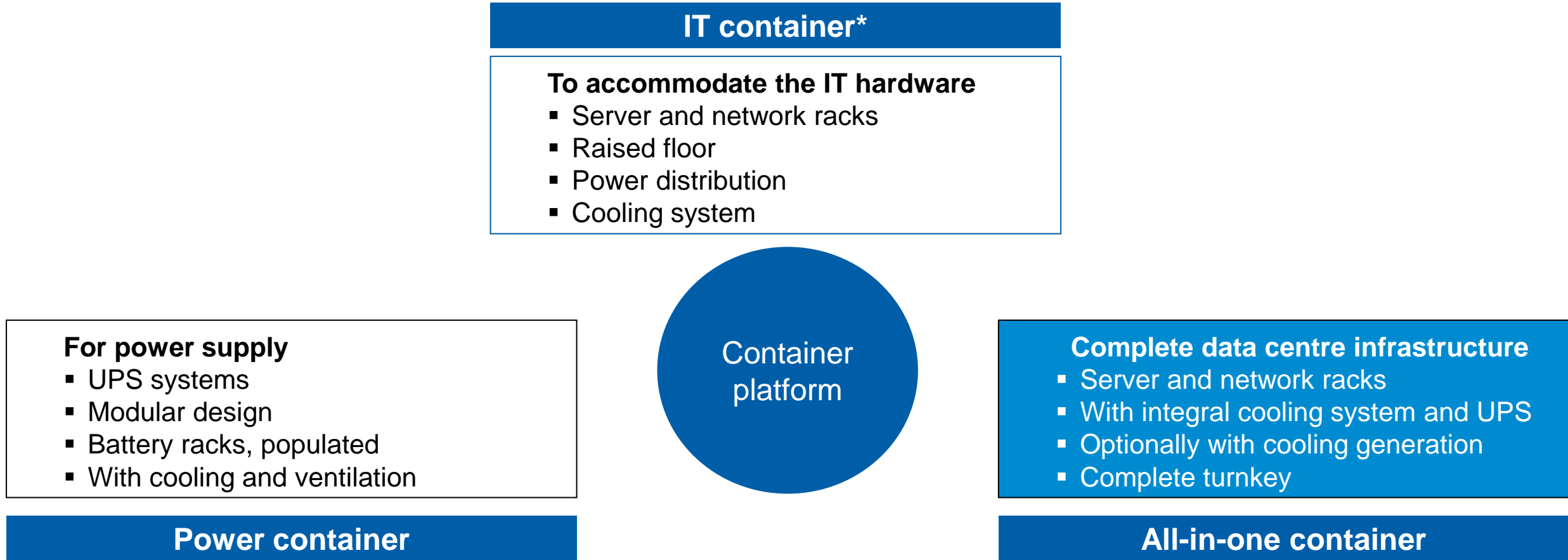
- For SME and Cloud applications
 - Pre-defined variants up to 200 kW without integral UPS



	RDC-IT 200/10-L-II	RDC-IT 200/10-L-I	RDC-IT 200/10-ISO L-I
Overall output	200 kW	200 kW	200 kW
Output per rack	20	20	20
Cooling	LCP CW	LCP CW	LCP CW
Redundancy	n+1	n+1	n+1
Server racks	10	10	10
Network racks	1	1	1
Technical racks	1	-	-
Container size	40 ft x 3m x 3m	40 ft x 3m x 3m	40 ft ISO-HC

Rittal DataCube – Datacenter Container

The Rittal datacenter container platform*



*Pre-defined container solutions

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Standardized Container Solutions

Pre-defined container solutions: All-in-one container

- For SME and Edge applications
 - Pre-defined variants up to 60 kW with integral UPS



	RDC-AIO 35/3-M-II	RDC-AIO 45/8-L-II	RDC-AIO 60/6-M-I
Overall output	35 kW	45 kW	60 kW
Output per rack	10 (server r.) / 5 (network r.)	5 / 5	10 / 0
Cooling	LCP DX	LCP DX	ZUCS CW
Redundancy	n+1	n+1	n+1
Server racks	3	8	6
Network racks	1	1	1
Technical racks	-	-	1
Container size	7.25m x 3m x 3m	40 ft x 3m x 3m	7.25m x 3m x 3m

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Standardized Container Solutions

Pre-defined container solutions: All-in-one container

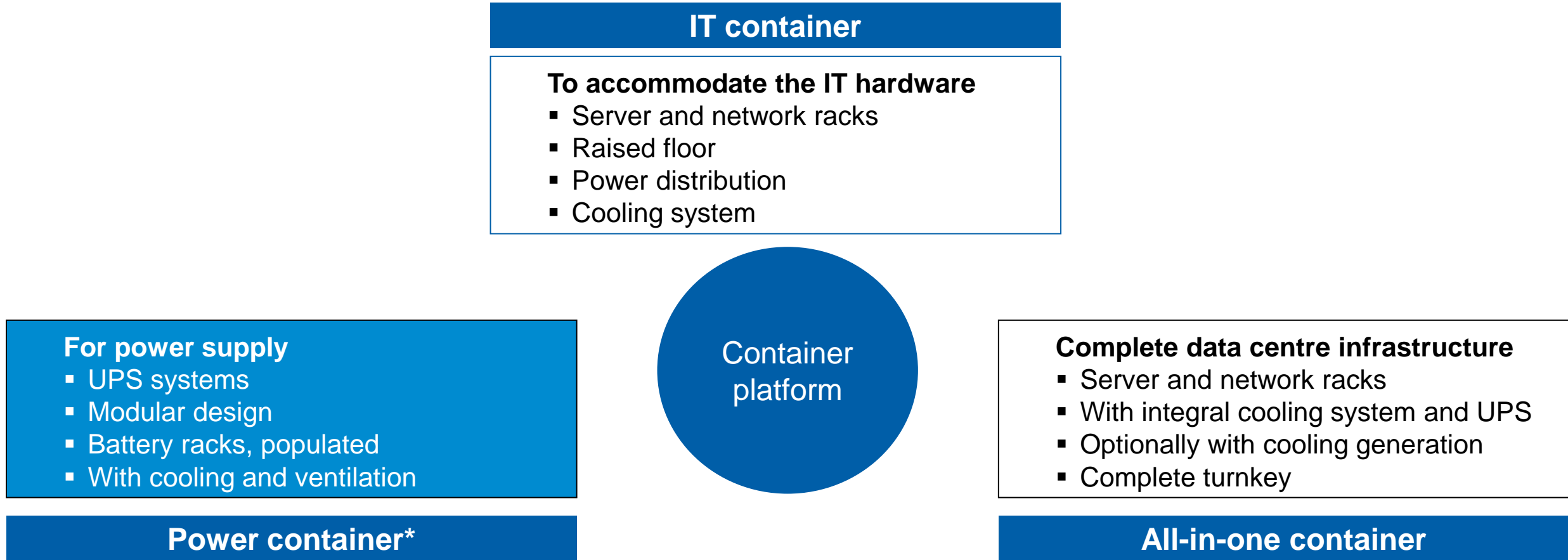
- For SME and Cloud applications
 - Pre-defined variants up to 180 kW with integral UPS



	RDC-AIO 90/8-L-II	RDC-AIO 180/16-L-II
Overall output	90 kW	180 kW
Output per rack	10 (server r.) / 5 (network r.)	10 / 5
Cooling	LCP CW	LCP CW
Redundancy	n+1	n+1
Server racks	8	2 x 8
Network racks	1	2 x 1
Technical racks	-	-
Container size	40 ft x 3m x 3m	40 ft x 3m x 3m

Rittal DataCube – Datacenter Container

The Rittal datacenter container platform*



*Pre-defined container solutions

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Containers for infrastructure

Pre-defined infrastructure container: Power container

- Complete UPS systems with batteries and related infrastructure
 - UPS modules, batteries and sub-distributor
 - Physical container structure designed for UPS operation
 - To fit pre-defined IT container variants



	RDC-P 250/10-ISO S-II	RDC-P 500/10-L-III	RDC-P 1000/5-L-II
Overall output	250 kW	500 kW	1 MW
Paths	2, parallel	2, parallel	2, parallel
UPS System	DPA 250	DPA 250	DPA 500
Module redund.	n+1	n+1	n+1
Cooling system	LCP DX	LCP CW	LCP CW
Container size	20 ft ISO-HC	40 ft x 3m x 3m	40 ft x 3m x 3m

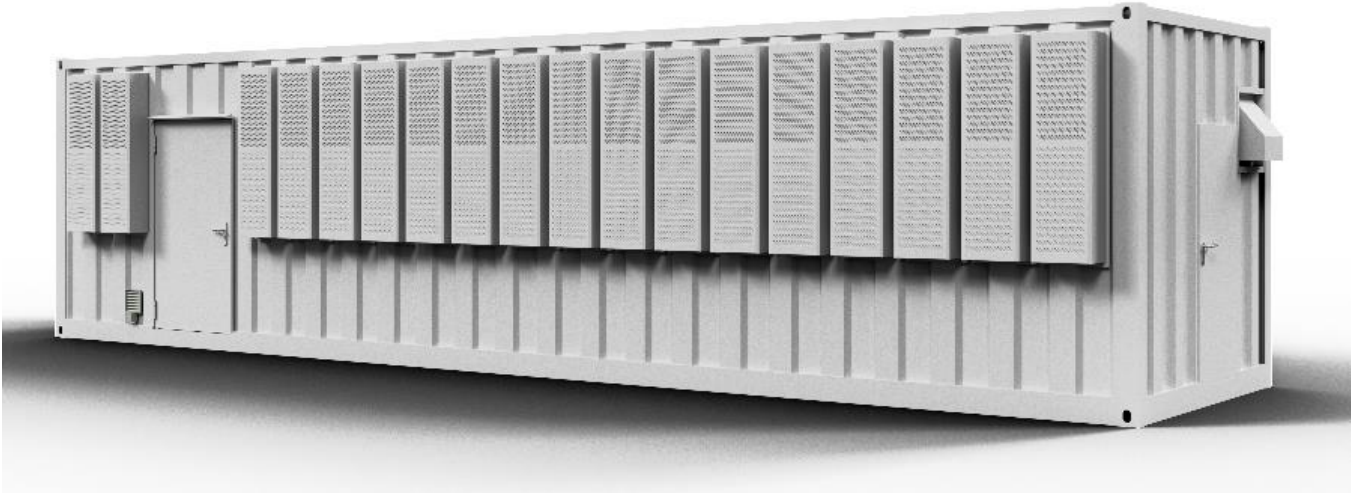
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Innovation: Blue e+ Container



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Customer Advantages

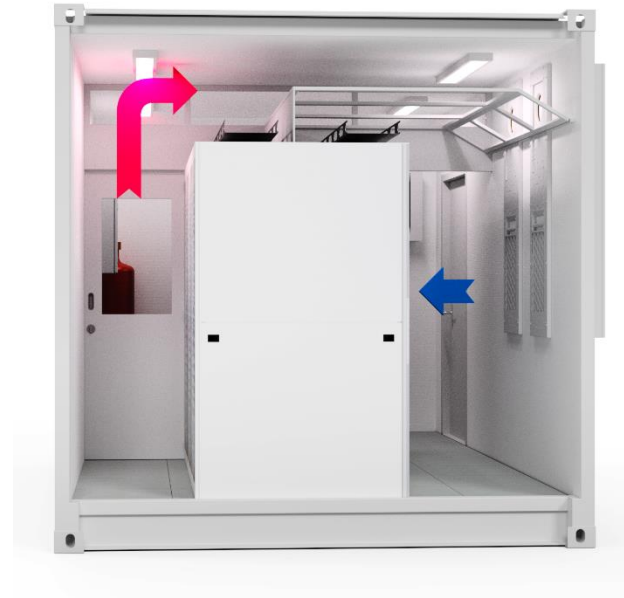


- **Savings** in CAPEX and OPEX
- **Simple** technical solution, air routing
- **Low service needs** and robust
- **Unique Selling Point USP**

TCO



- **Lead Time** one week
- **Comparing** up to four air con solutions
- **Report** of 10 pages capital values operational expenditures



Tools

- Renderings
- View on Total Cost of Ownership
- Digital Walkthrough
- Computational Fluid Dynamics

Rittal DataCube – Datacenter Container

Innovation: Blue e+ Container

Total Cost of Ownership (TCO) analysis - Cooling

Example IT Load: 60 kW – N+1 redundancy

CAPEX

4 pcs. conventional DX-cooling solution (20 kW cooling capacity) → 77.120,- €

13 pcs. Blue e+ outdoor (~ 5,0 kW cooling capacity) → 65.650,- €

Savings

11.470,- € for this invest

~ 17,5% less costs

OPEX [Calc. 0,10 €/kWh - maintenance twice a year]

4 pcs. conventional DX-cooling solution (20 kW cooling capacity) → 13.766,04 €

13 pcs. Blue e+ outdoor (~ 5,0 kW cooling capacity) → 10.304,03 €

Savings

3.462,01,- € per year

~ 15,4% less costs

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Innovation: Blue e+ Container

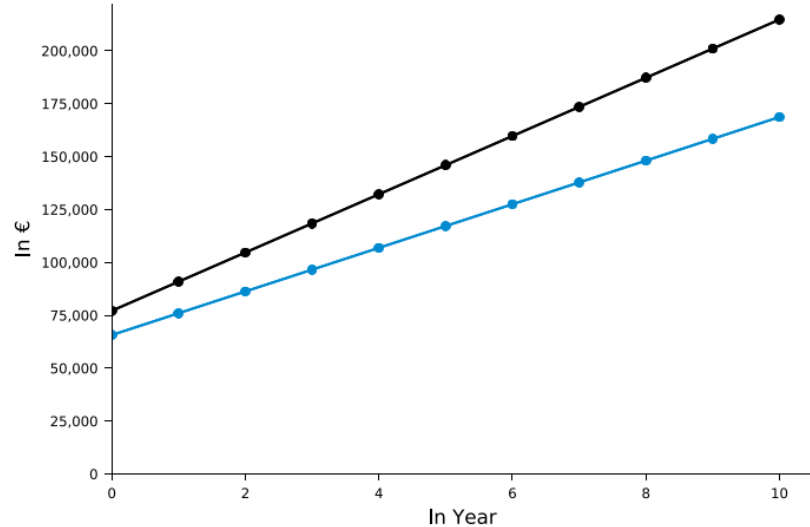
Total Cost of Ownership (TCO) analysis - Cooling

Example IT Load: 60 kW – N+1 redundancy

Cooling System TCO in 10 years

4 pcs. conventional DX-cooling solution (20 kW cooling capacity) → **214.780,37 €**

13 pcs. Blue e+ outdoor (~ 5,0 kW cooling capacity) → **168.690,33 €**



Total Savings in 10 years :



46.090,04 € [27,32 % less costs!]



322.200,38 kWh



118 tons of CO2 emissions

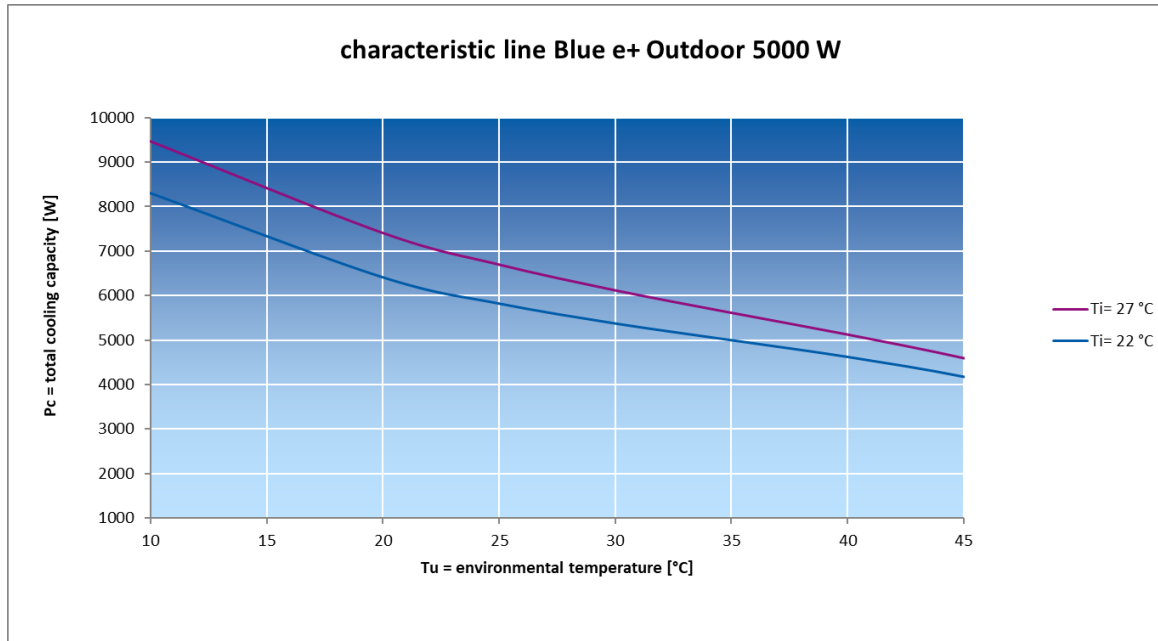
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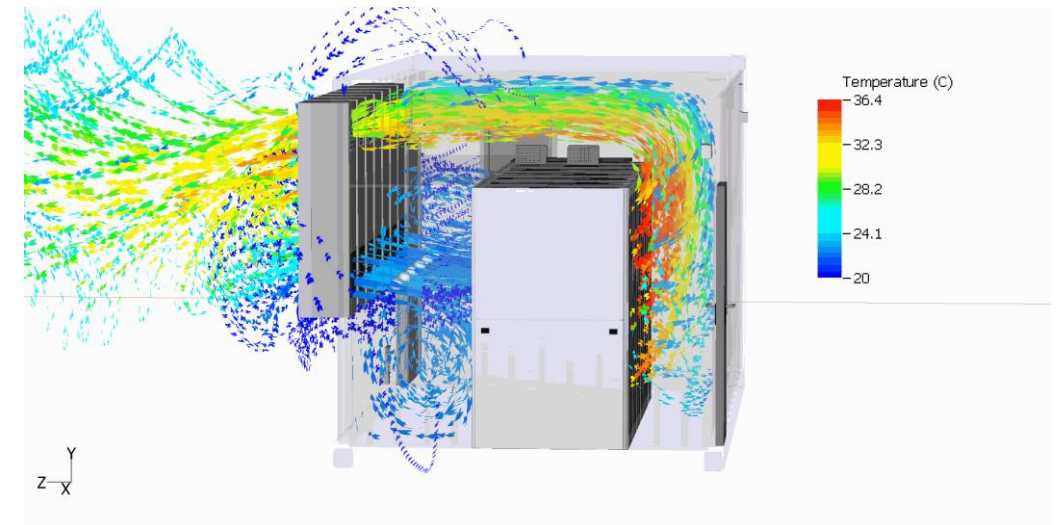
Efficient Hybrid-Cooling-Technology

- Increased cooling capacity at lower ambient temperatures due to speed-regulated components and a passive cooling with heat pipe technology



CFD

- **Lead Time** one week
- **Simulation** of digital twin acc. to requirements of the customer
- **Pointing** out potential for optimization



Rittal DataCube – Datacenter Container

Innovation: Blue e+ Container

Video Blue e+ outdoor container



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- 5 Innovation: Blue e+ Container
- 6 References**

Rittal DataCube – Datacenter Container

References: Rittal supports the digitalization at a global player

Edge Data Center in a container: thyssenkrupp Steel – Germany

The customer

- thyssenkrupp Steel, Duisburg, approx. 27,000 employees
- Leading provider of high quality steel

The Challenge

- Digitisation of close to production processes demand a secure, standardised and high available IT infrastructure
- Big data, fast availability of data with low latency
- Growing automation of the production IT

The Solution

- Rittal Data Center Container (RDC) with standardized components of the container platform for quick installation of the infrastructure
- Installation next to production sites as Edge DC
- High physical security



„The Rittal Data Centre Containers are an essential part of our integrated security concept and meet our requirements for the highest security standards.“
Dr. Michael Kranz, CIO at thyssenkrupp Steel

Rittal DataCube – Datacenter Container

References: Fast and secure



Rittal DC container: ene't GmbH – Germany

The customer

- System vendor for the German energy industry
- Founded in 2002 in Hueckelhoven

The challenge

- Effective and high available DC
- Fast implementation and high demands for IT security as well as a redundant infrastructure and best energy efficiency

The solution

- Two Rittal DC container, equipped with standardized components from the Container platform
- 6 LCP Inline (Liquid Cooling Packages), cold and warm aisle containment, UPS systems, CMC III monitoring solution, VX IT racks



“We are completely satisfied with the container solution Rittal has provided, as it enables us to meet our high availability requirements for the data centre infrastructure.”

Roland Hambach, Managing Director, ene't GmbH

Rittal DataCube – Datacenter Container

References: A finely honed IT infrastructure solution



Machine manufacturer opts for RiMatrix S: Johann Modler GmbH – Germany

The customer

- Johann Modler, Aschaffenburg, Bavaria
- A specialist manufacturer of grinding machine, est. in 1921

The challenge

- Shortage of space in the server room and insufficient computing power
- Relocation of printers to keep out equipment emissions

The solution

- Modular, standardised Rittal RiMatrix S data centre in a container
- CMC III monitoring system



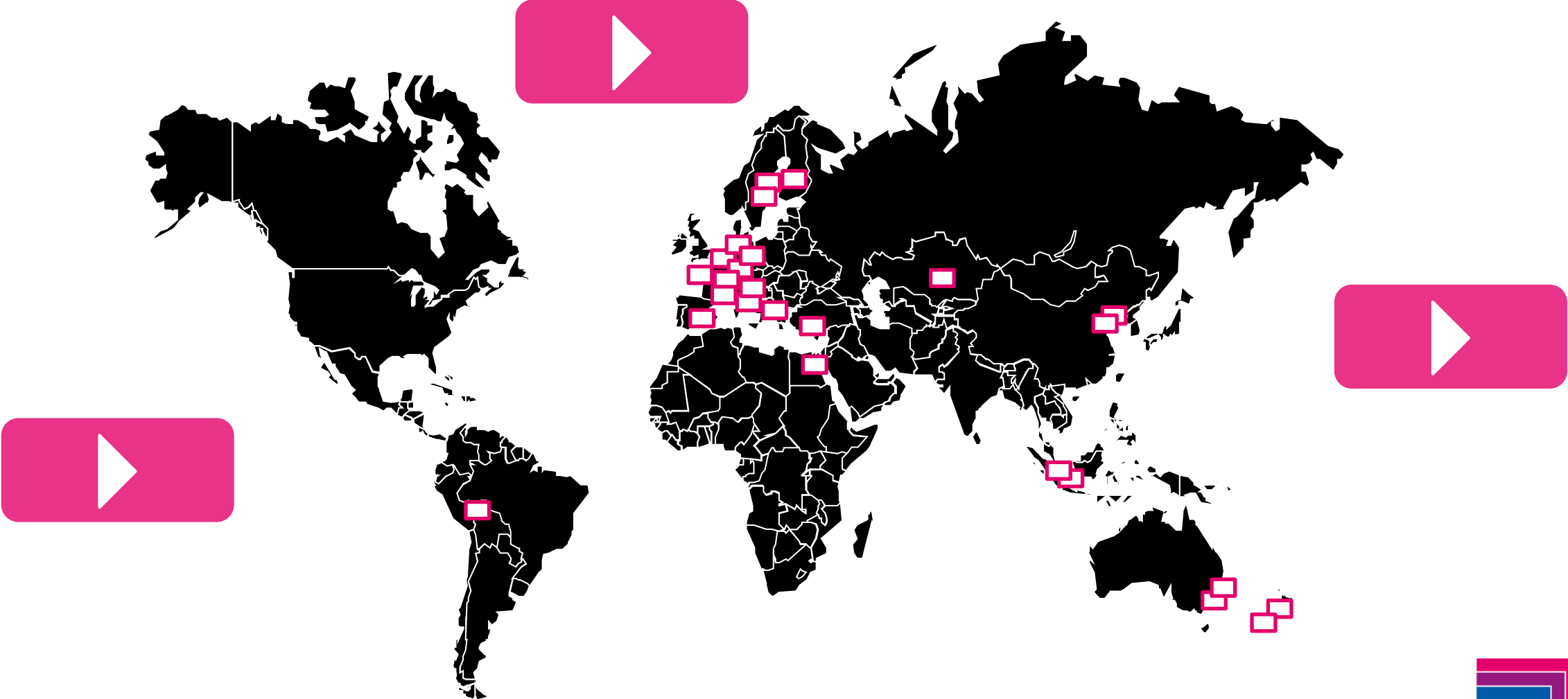
“RiMatrix S can be costed easily and deployed very quickly. So it’s the ideal solution for Modler.”

Christina Klang, Chief Operating Officer

Rittal Container Solutions

Customized Cluster Solutions

Global References

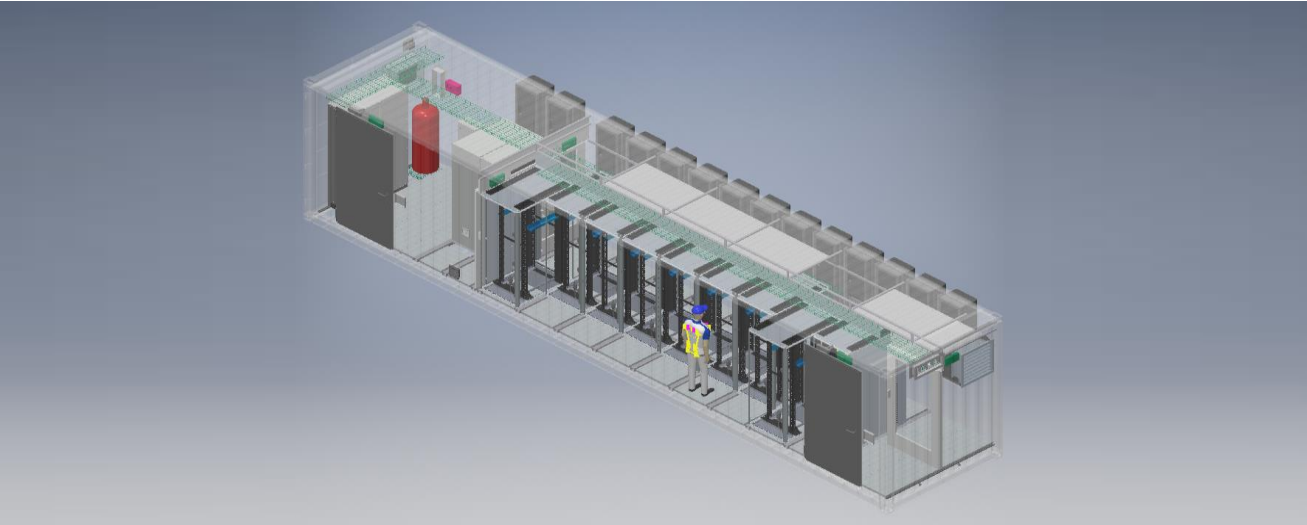


 RITTAL Containerized Data Center



Rittal DataCube – Datacenter Container

Impressions of realized projects



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CLIMATE CONTROL

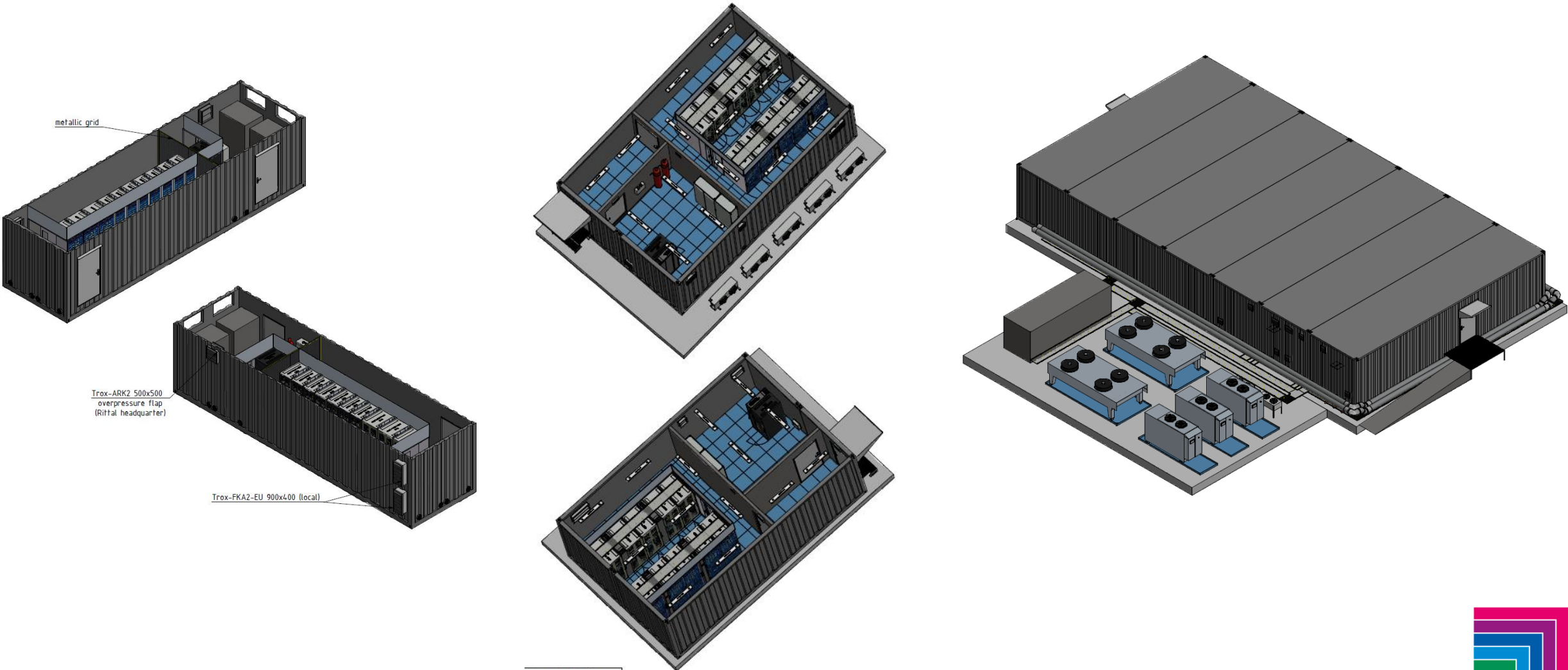
IT INFRASTRUCTURE

SOFTWARE & SERVICES



Rittal DataCube – Datacenter Container

Impressions of realized projects



Thank you.

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