

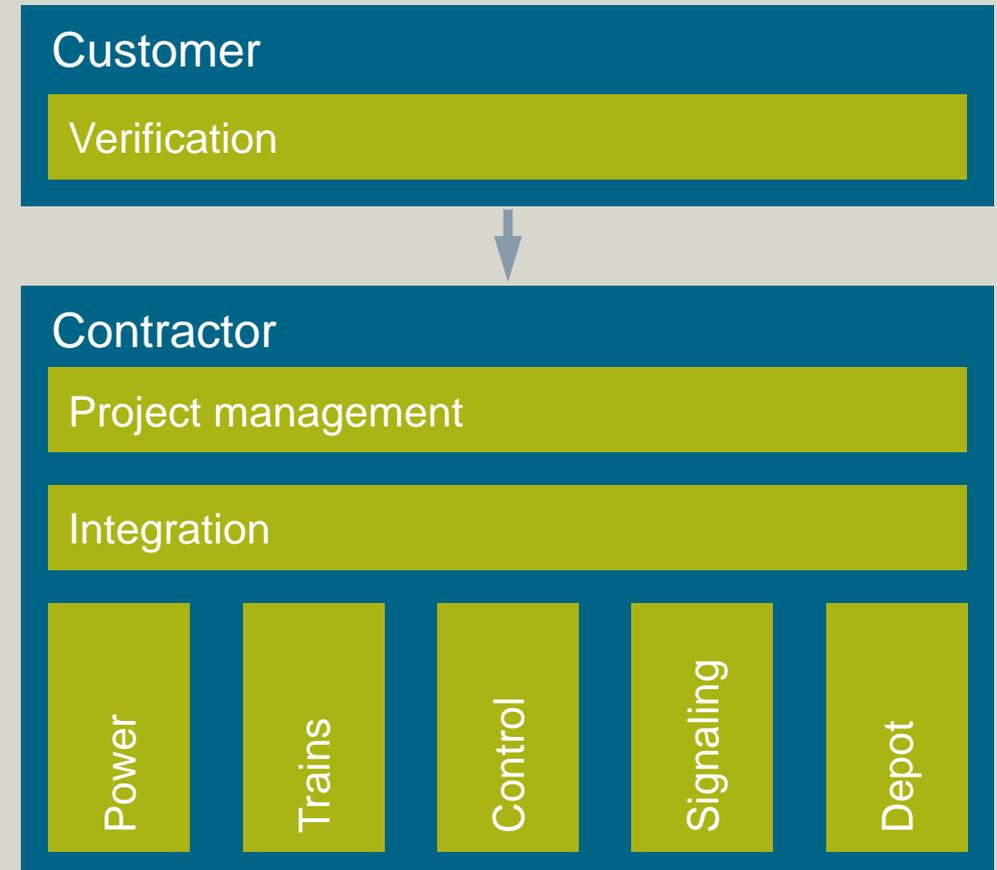
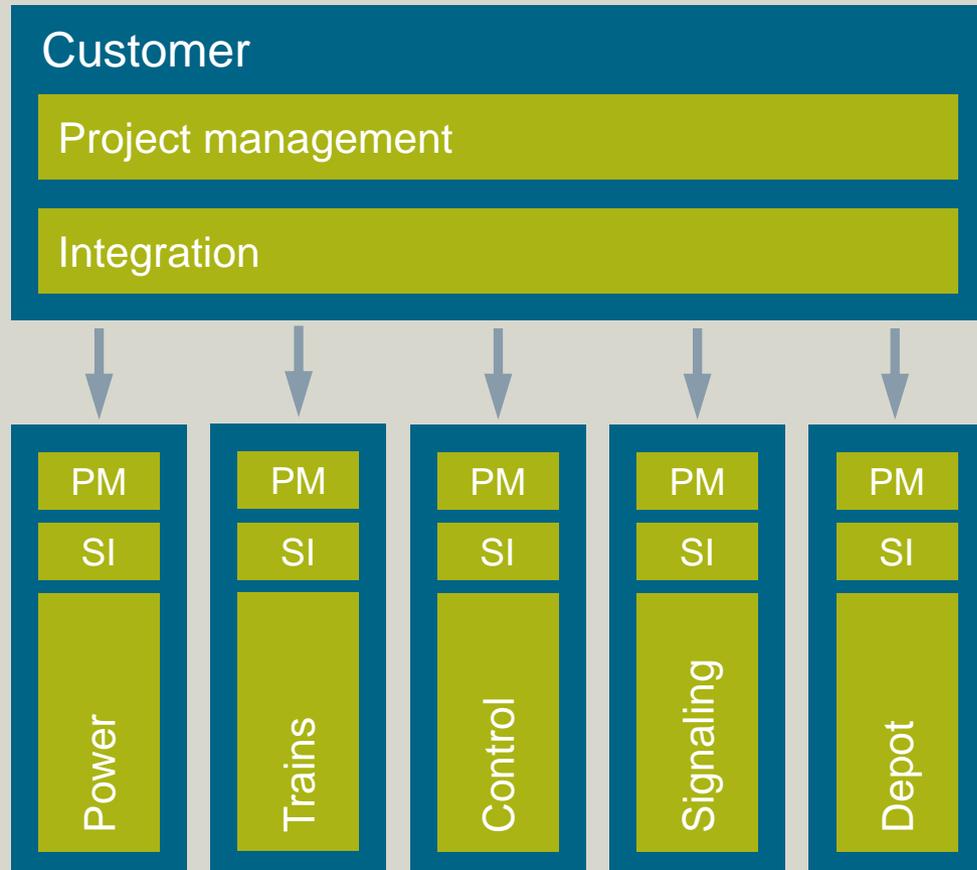
SIEMENS

A wide-angle photograph of the Qatar Education City People Mover System. The image shows a modern, open-air transit station with a large, curved, metallic canopy supported by white structural pillars. A white people mover vehicle is positioned on a track in the center. People are walking on the platform, and a yellow taxi is visible on the left. The background features a body of water and a sunset sky.

Qatar Education City People Mover System – for Innovative and Environmentally Friendly Mobility

Complete rail solutions

Advantages of turnkey projects vs. "single lot" approach



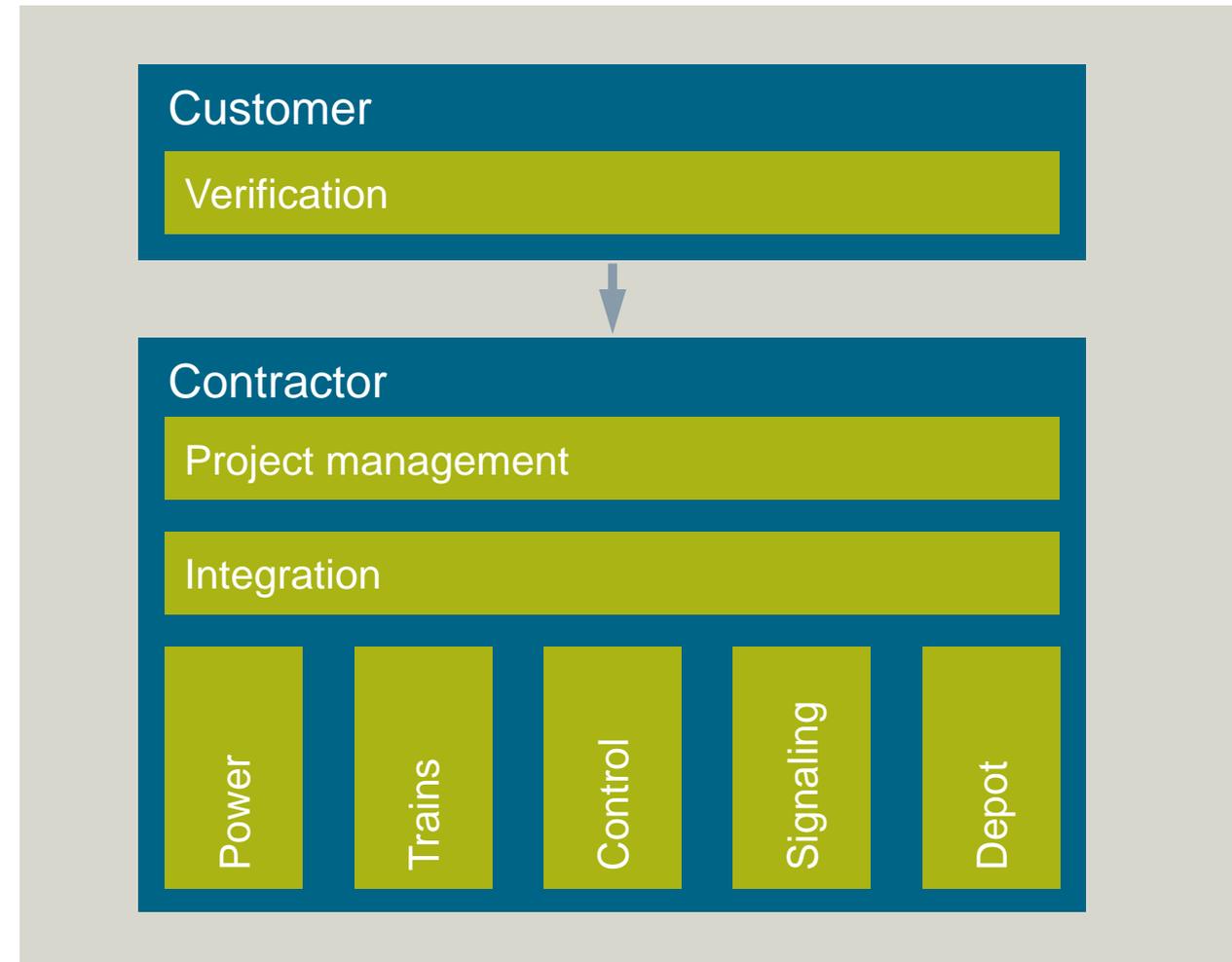
Complete rail solutions

Advantages of turnkey projects vs. "single lot" approach

Advantages of a turnkey project

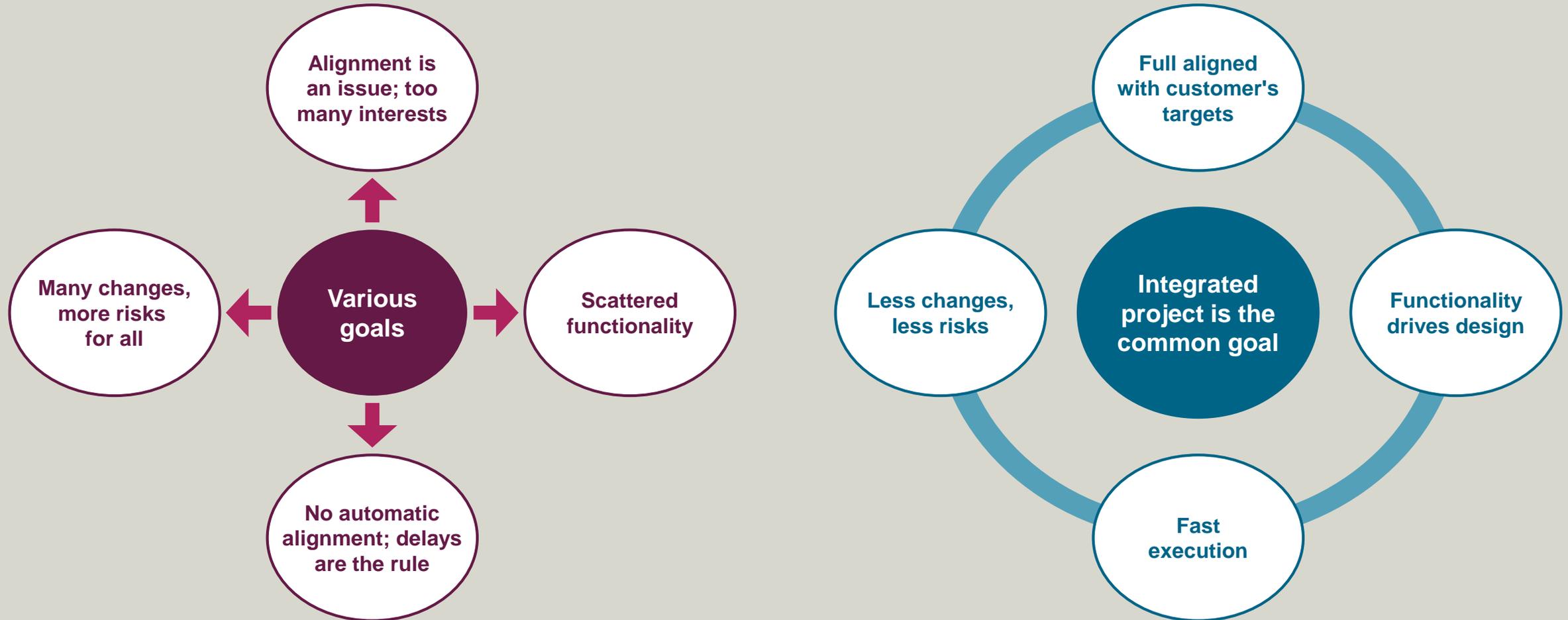
Everyone works toward the same goal!

- A single contract with the customer for all services
- The contractor becomes a partner
- The contractor must have sufficient experience and be financially robust
- No competing lots – they all carry the risk together
- No integration risk for the customer
- The contractor is entirely responsible for the fulfillment of technical requirements
- Less potential for delays
- Easier to finance



Complete rail solutions

Advantages of turnkey projects vs. "single lot" approach



Siemens offers more than just system integration

Advantages of a turnkey project with Siemens

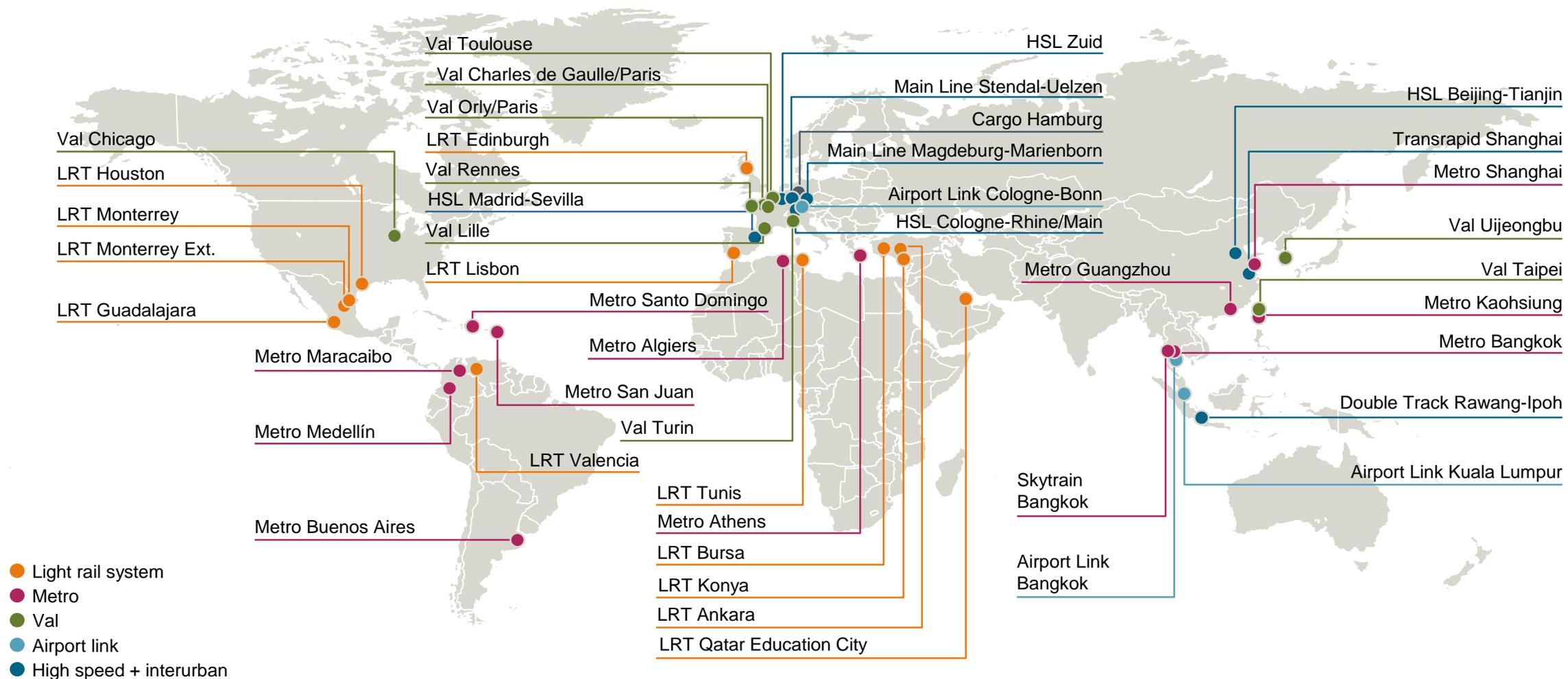
- Project management, system integration, coordination and technical solutions from a single source
- High-performance rail systems (vehicles, signaling systems, traction power supply and other infrastructure) from Siemens with proven interfaces
- Experienced employees with optimized processes and tools for implementation
- Customer training and customer support / consulting during commencement of operation
- Global maintenance and service organization for rail systems and infrastructure guarantee we are always close at hand for the customer during operation
- Support with project financing
- Financial strength
- Also successful in consortia with external partners
- Extensive global experience / references

Customer benefits

Satisfied passengers and operators

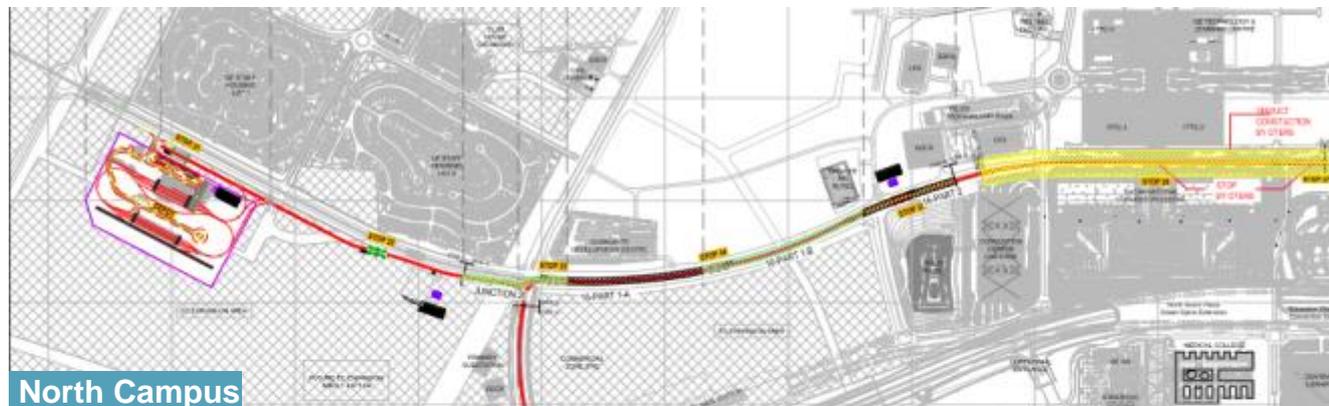
- Fulfillment of the highest safety standards for operation
- We have repeatedly proven the high performance and reliability of the integrated systems installed by us
- Optimized life cycle costs and our extensive range of maintenance services and other services can be scaled according to the customer's wishes

Turnkey references worldwide

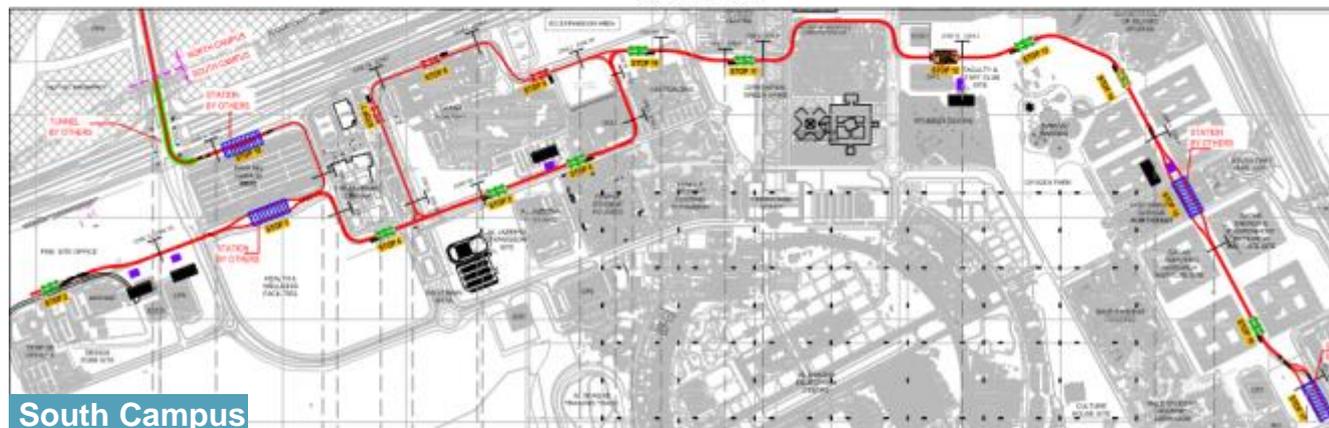


Qatar Education City People Mover System

Project overview



North Campus



South Campus

Customer	Qatar Foundation
Contract awarded	May 16, 2012
Route length	Approx. 12 km
Number of stations/stops	4 + 20
Vehicles	19 Avenio trams with HES energy storage
Operation mode	On-sight operation
Planned completion: North Campus	June 2016
Planned completion: South Campus	December 2016

"Through the desert without catenaries"

Special features of this project

First rail project in Qatar

High standards of design and architecture:

QEC is an expression of the future vision of Qatar

Catenary free operation between stations / stops

Use of a new type of hybrid energy storage system (HES)

High climatic requirements

- Daily temperatures over 50°C
- High humidity
- High dust load
- Occasional heavy rain

High safety requirements

Siemens will handle operation and maintenance for 3 years

Qatar Education City People Mover System

Project status (1)



Rail construction

2,5 km of rail already laid, rail construction of the North Campus should be completed by Dec 15, the South Campus by Jan 16



Depot

Construction of the depot, workshops and substation is well underway. The first Avenio is scheduled to arrive here in June



Stations / stops

Construction of the foundation with high requirements due to the unusual design of the stations, construction of the plant rooms (low set)



Power supply

Power cabling has started, transformers delivered, switchgear will be delivered shortly

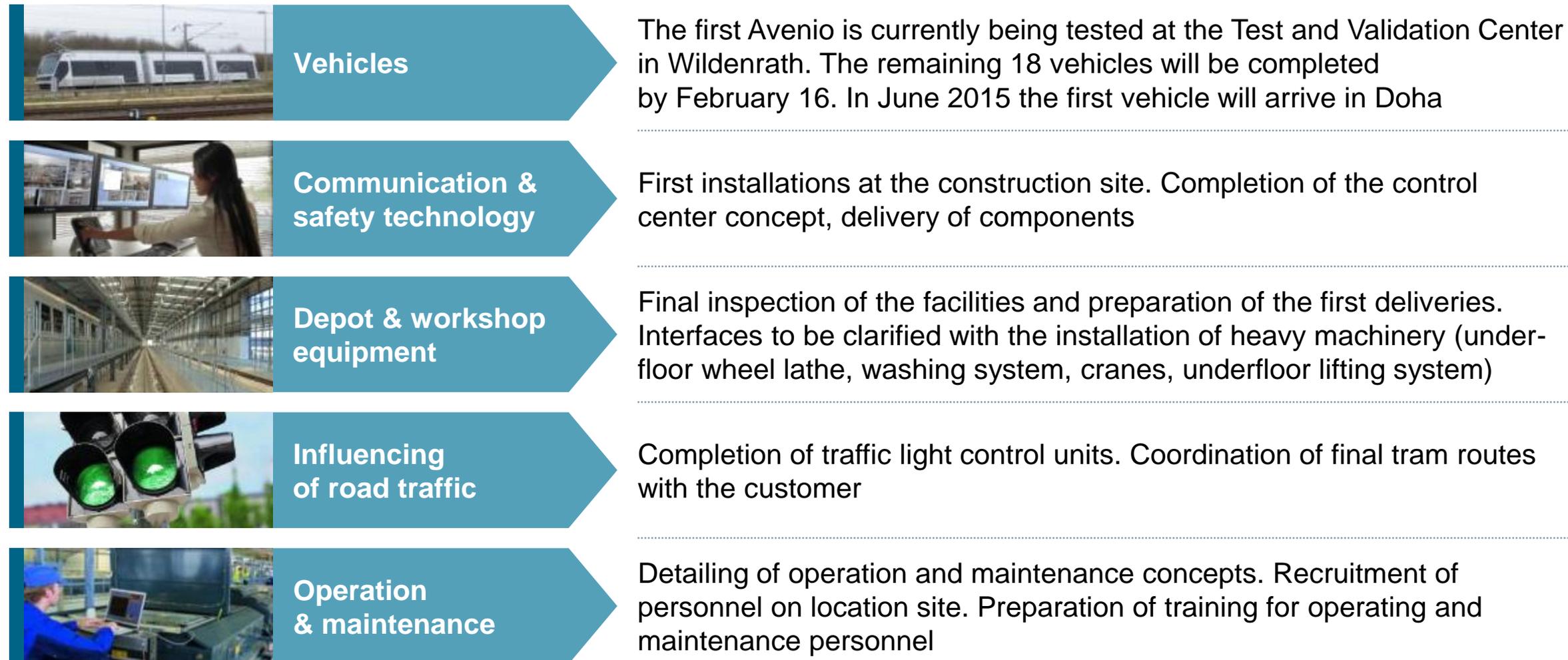


Signaling system

Production of signaling components

Qatar Education City People Mover System

Project status (2)



SIEMENS



Qatar Education City People Mover System – the Avenio Tram

Our trams

The result of more than 130 years of experience



- Single car
- No overhead line



- Single-articulation vehicle
- More than 500 units (for Munich, Nuremberg, Frankfurt/M, other cities)



- Multi-articulation vehicle
- More than 550 units (for Bern, Amsterdam, Melbourne, other cities)



- Single-articulation vehicle
- 64 units (Lisbon, Budapest)



- Single- or multi-articulation vehicle
- Optimal synthesis of experience and innovation

Berlin 1881:
World's first tram

1992 – 2000
GT trams

1996 – 2010
Combino

2005 – 2009
Combino Plus

Today
Avenio / Avenio M

Avenio

Maximum benefits for operators, passengers and the environment

The synthesis of experience and innovation



Made for every infrastructure and every tram system



Made for every need and for more passengers



Made for your cityscape and your budget



Proven and reliable from the first day on

Light, quiet and comfortable

The ultimate in passenger capacity

Design meets lifelong economical operation

Avenio

A modular configuration kit for individual customer needs

Vehicle lengths



Number of passengers for different vehicle widths¹⁾

	2.30 m	2.40 m	2.65 m	
18 m	35 + 69 = 104 24 + 79 = 103	46 + 64 = 110 36 + 73 = 109	46 + 76 = 122 36 + 86 = 122	MD BD
27 m	53 + 108 = 161 42 + 118 = 160	70 + 101 = 171 50 + 122 = 172	73 + 119 = 192 52 + 140 = 192	MD BD
36 m	69 + 153 = 222 52 + 170 = 222	90 + 146 = 236 72 + 164 = 236	94 + 166 = 260 72 + 192 = 264	MD BD
45 m	89 + 189 = 278 68 + 211 = 279	120 + 174 = 294 96 + 200 = 296	127 + 201 = 328 96 + 235 = 331	MD BD
54 m	105 + 233 = 338 80 + 260 = 340	138 + 222 = 360 112 + 250 = 362	142 + 256 = 398 112 + 292 = 404	MD BD
63 m	128 + 265 = 393 104 + 292 = 396	170 + 247 = 417 144 + 276 = 420	179 + 286 = 465 144 + 326 = 470	MD BD
72 m	149 + 303 = 452 116 + 341 = 457	190 + 239 = 429 160 + 326 = 486	198 + 336 = 534 160 + 382 = 542	MD BD

1) Number of seats + Standing room 4 persons per m²
MD = Mono-directional vehicle; BD = Bi-directional vehicle

Avenio

Doha Education City (Qatar)



Number of vehicles	19 vehicles
Year of delivery	2015 - 2016
Configuration	3 cars (bi-directional operation)
Wheel arrangement	Bo' 2' Bo'
Vehicle length	27,700 mm (over coupling)
Vehicle width	2,550 mm
Gauge	1,435 mm
Capacity (4 P/m²)	165 incl. 56 seats/3 tip-up seats
Floor height	350/435 mm
Special features	Adaptation to climatic conditions; Vehicle for fully catenary-free operation (hybrid-storage UltraCaps + Battery); WiFi and Infotainment

Avenio

Doha Education City (Qatar) interior and testing

Design philosophy:
"From the shade came the light"



Validation Test
in Vienna Climate Wind Tunnel (RTA)





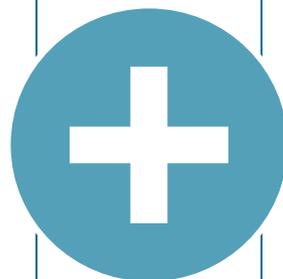
Qatar Education City People Mover System – Catenary Free Operation

Siemens Catenary Free Solution

Hybrid Energy Storage System

Capacitors

Capacitor units ensure highest performance and short charging times



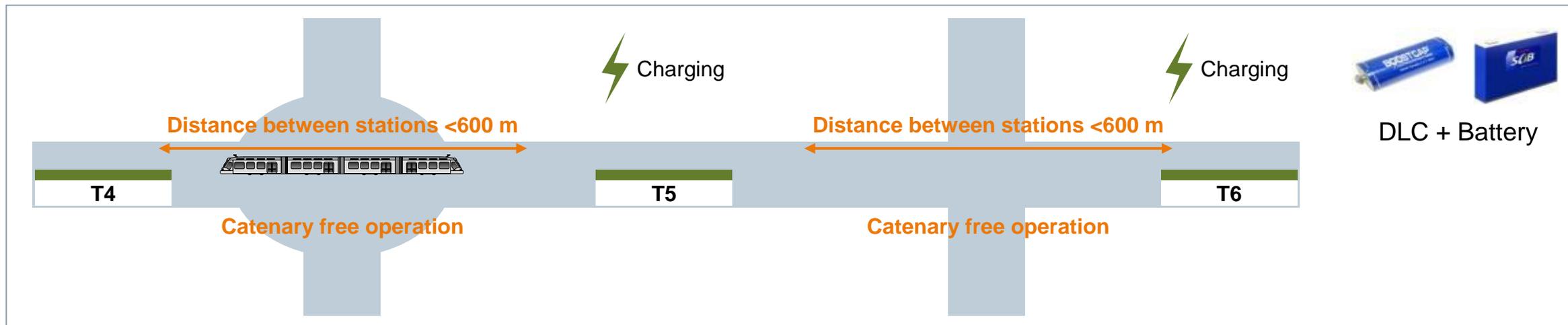
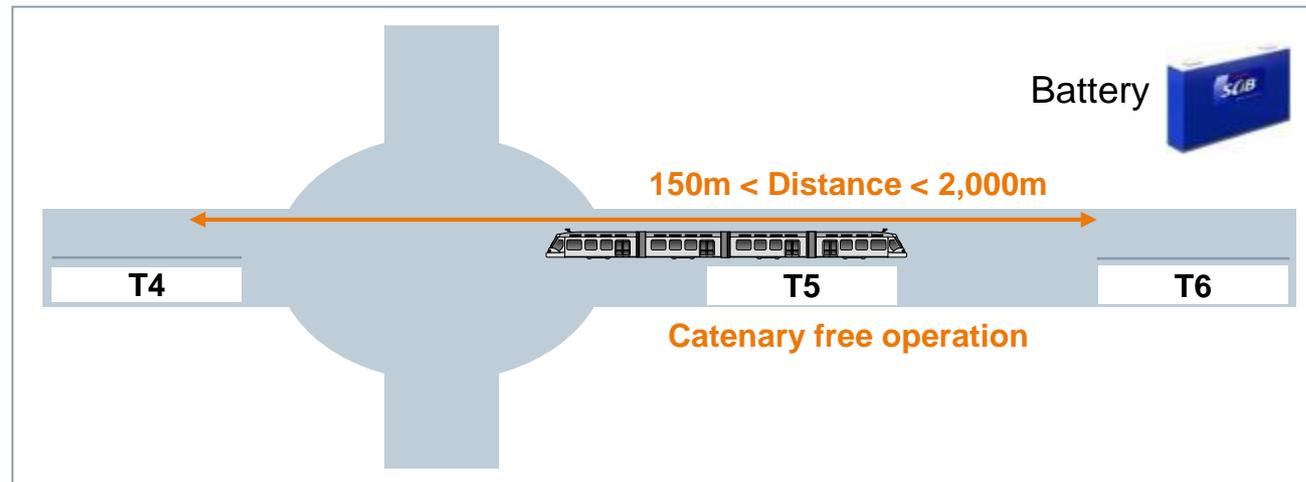
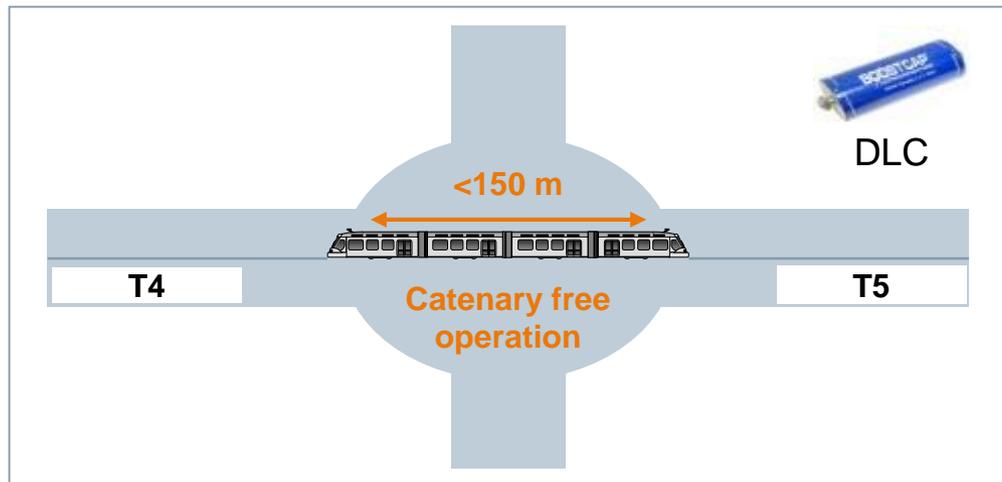
High performance batteries

Batteries provide highest energy capacity for unexpected stops and longer sections without catenary



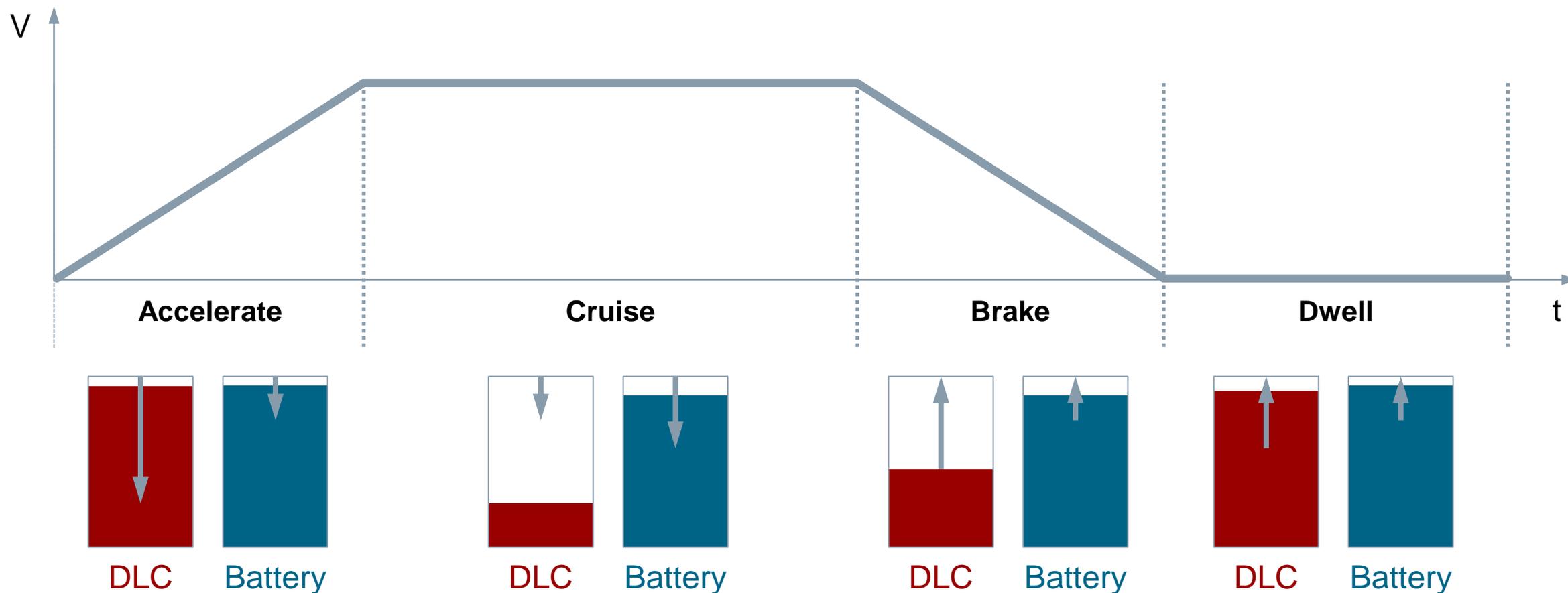
Siemens Catenary Free Solution

Applications of the Hybrid Energy Storage System



Siemens Catenary Free Solution

How the Hybrid Energy Storage System works



Siemens Catenary Free Solution

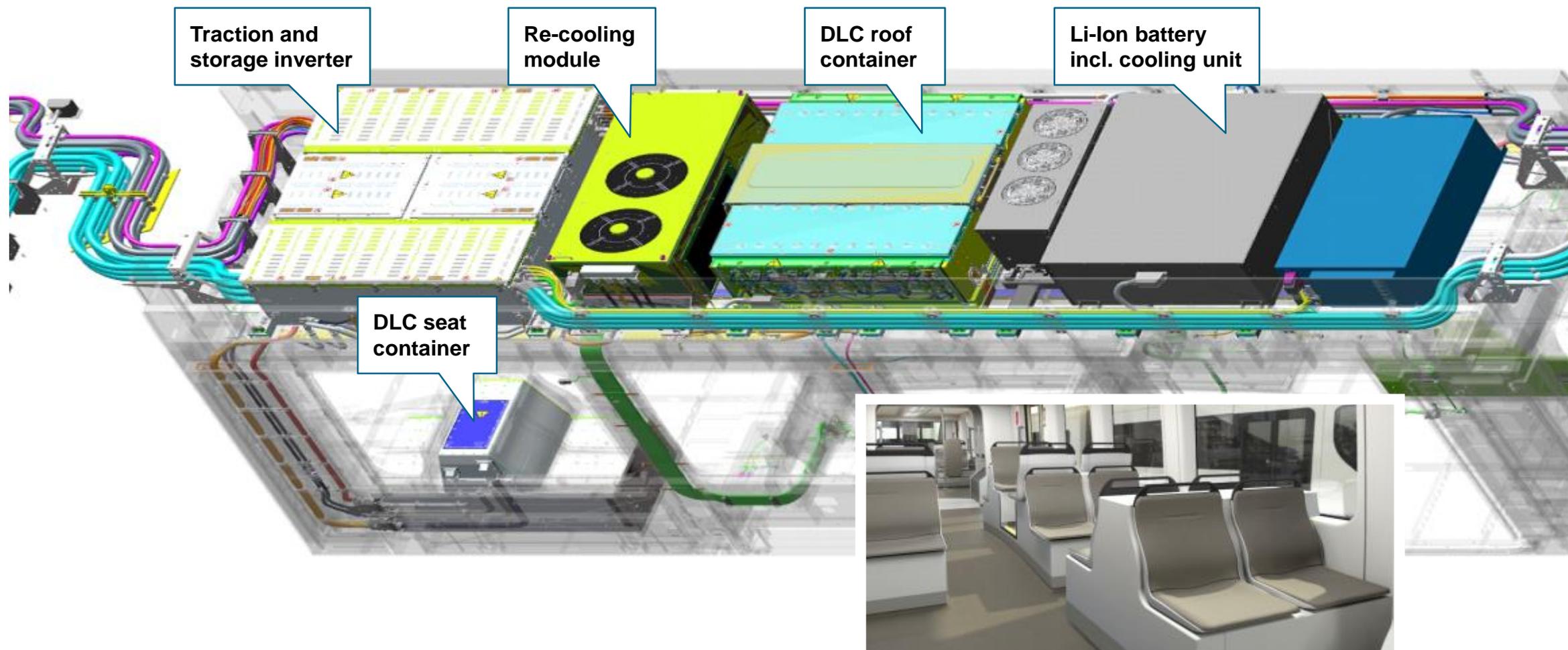
Technical implementation in Education City

Charging process at the stations – challenges and realization:

- Application of rigid conductor rails in stations and stops only
- Avoiding of arcing during the charging process
- Use as much energy as possible during the dwell time
- Automatic energy flow control / optimization of by operation prediction
- No "intelligence" in charging stations – vehicle controls the charging by itself

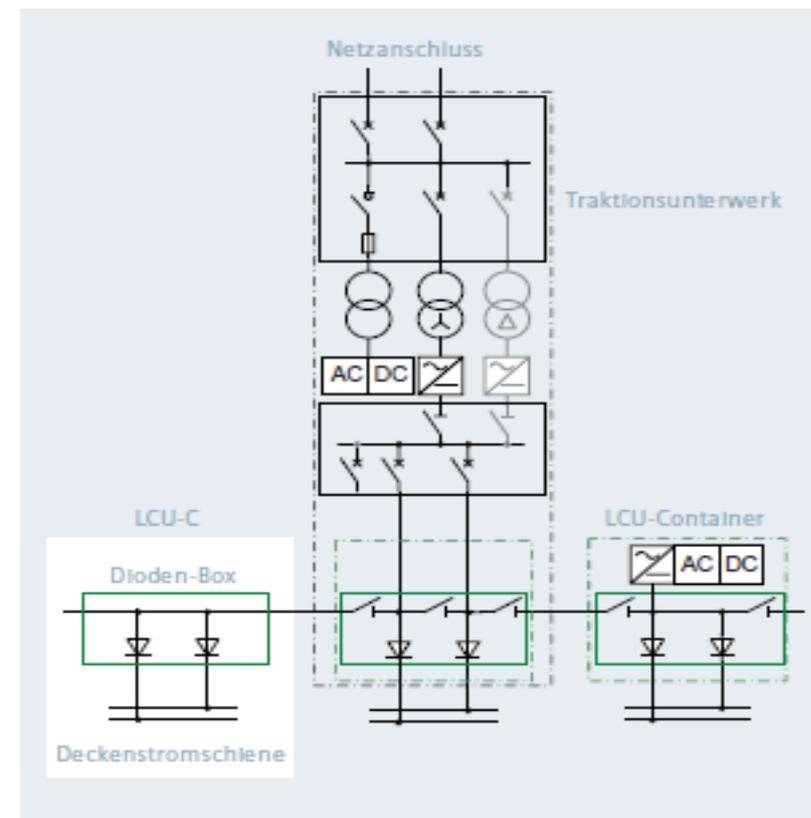
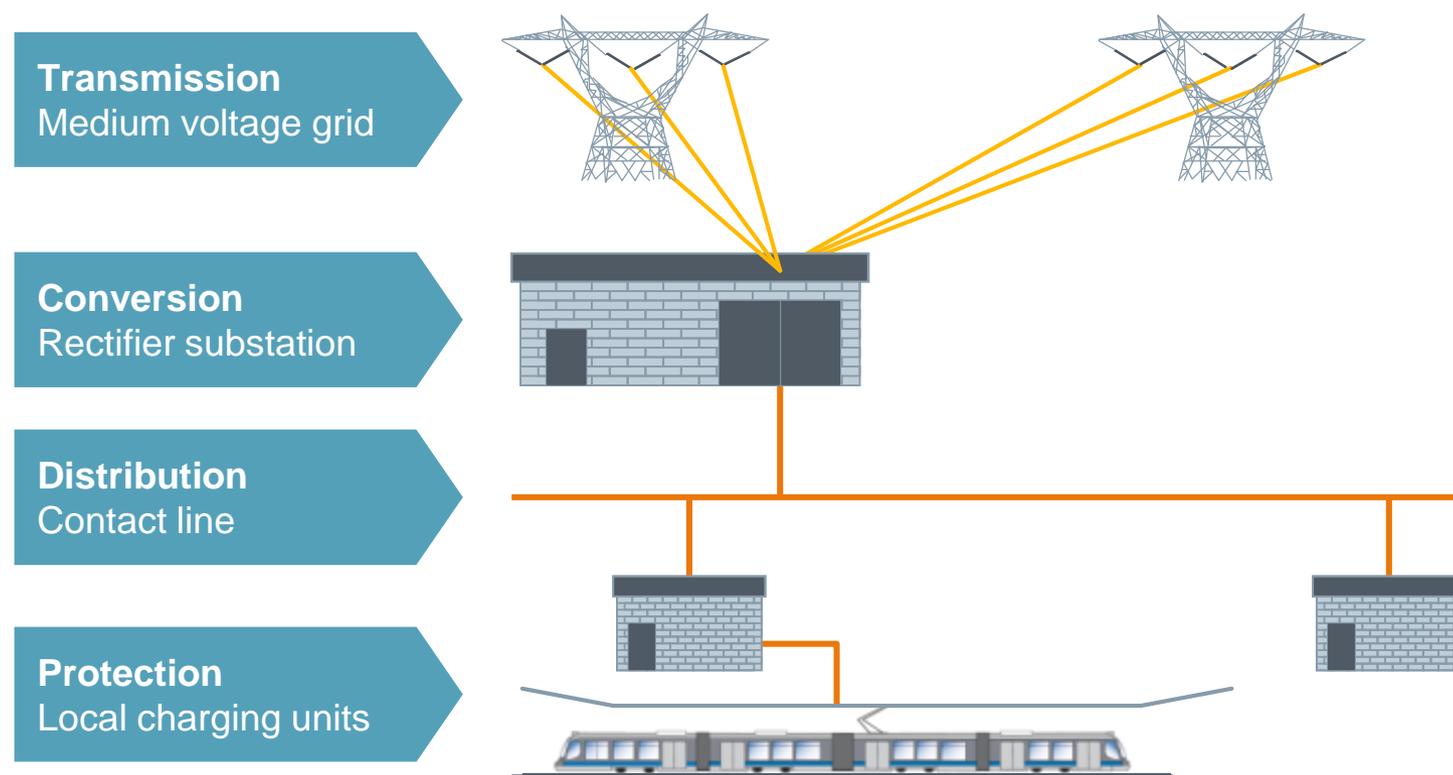
Siemens Catenary Free Solution

Technical implementation in Education City



Siemens Catenary Free Solution

Charging infrastructure



- Decentralized, conventional rectifier substations along the line generate power in a defined quality
- Centralized local charging units in each stop distribute the charging power and protect all equipment for a safe charging process

Siemens Catenary Free Solution

Benefits of an energy storage solution

Safety

- Enhanced safety, no danger by magnetic fields and touch voltages
- No impact on road construction and maintenance
- No influence by sand, water, flooding ...

Environmental

- Up to 25% energy savings
- Up to 25% lower CO₂ emissions
- No additional weight > compensated through light and optimized vehicle construction

Maintenance

- Low operation costs
- Maintenance free technology / no complex switching technology
- Easy to extend and upgrade

Market

- Participation in world future technology
- Open systems, no dependency on one supplier



SIEMENS



Thank you for your attention

Siemens Press Conference, PCW Wildenrath, 2015-04-21