



**Terminal Operation in  
a changing world**



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Ports & Maritime  
Academy



- ▲ Founded 1912
- ▲ > € 115 mil. In sales
- ▲ > 750 employees worldwide (01.01.2017)
- ▲ 12 VAHLE trading companies worldwide (VAHLE South East Asia founded in 2016)
- ▲ Representations in 52 countries
- ▲ 100 % family owned



### Ship to Shore / Quay Cranes:

- ✓ Festoon Systems
- ✓ Motor driven cable reels
- ✓ Trench systems
- ✓ USMGX for automated cranes



### RMG / ASC Cranes

- ✓ Electrification with motor driven cable reels
- ✓ Electrification with conductor rails for high speed applications
- ✓ Data Communication
- ✓ Independent Absolute Positioning



### RTG Crane Electrification

- ✓ OEM Installations
- ✓ Retrofitting of existing equipment
- ✓ Implementation Data Communication
- ✓ Absolute Positioning
- ✓ Automation



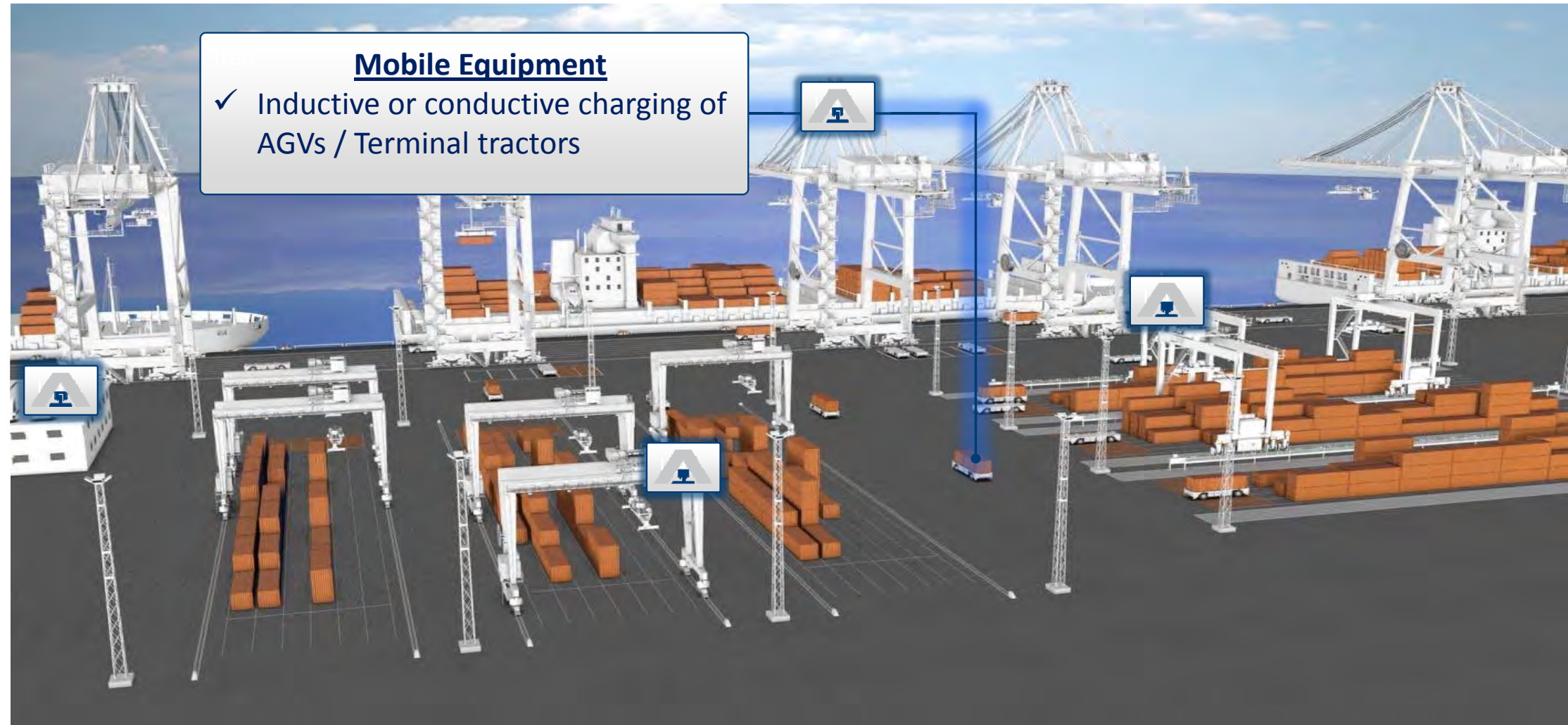
### Energy Management

- ✓ Energy storage technology up to 50MWh
  - Use of solar electricity
  - Feeding vessels and yachts while
  - operational infrastructure and
- ✓ Containerized Substations

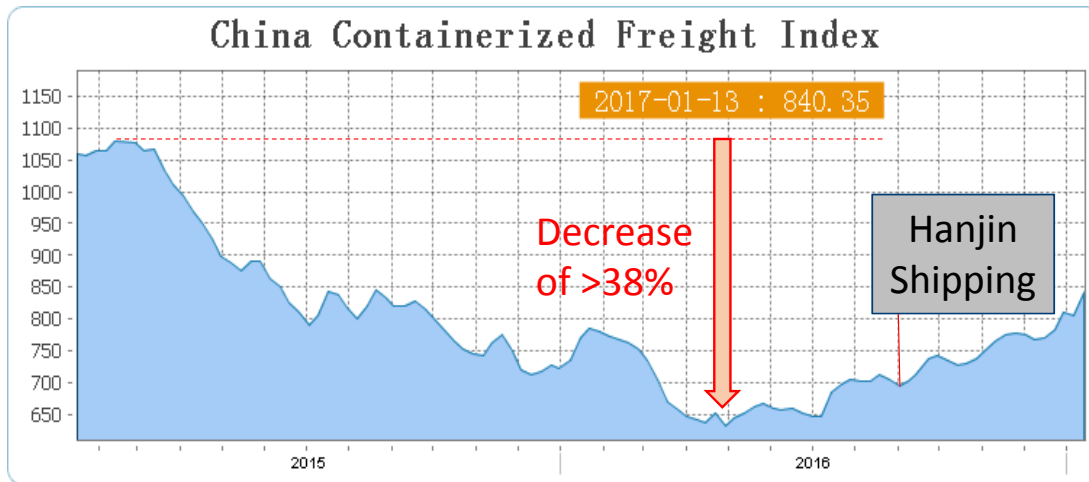


### Mobile Equipment

- ✓ Inductive or conductive charging of AGVs / Terminal tractors



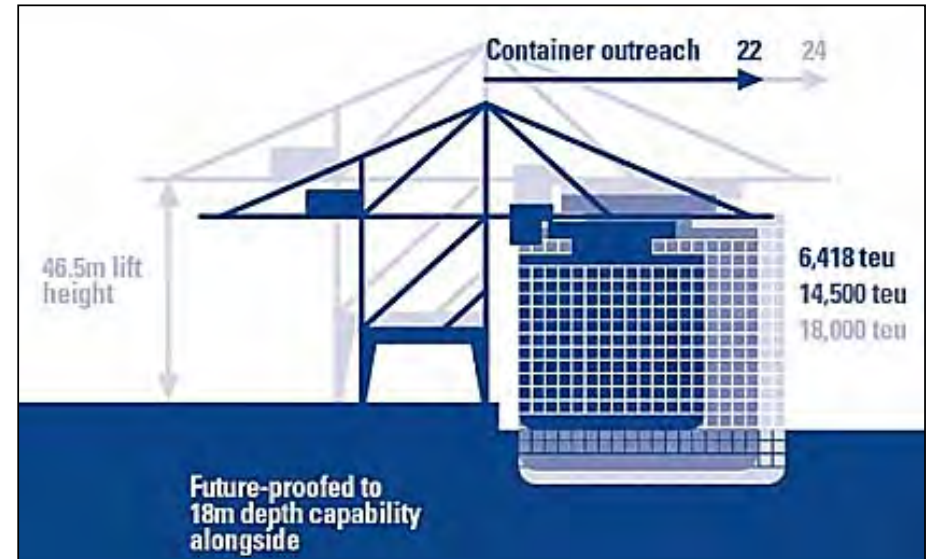
- Massive Supply-Demand imbalance



- Capacity is already high - Supply growth outpaced demand growth by more than 2% in 2016



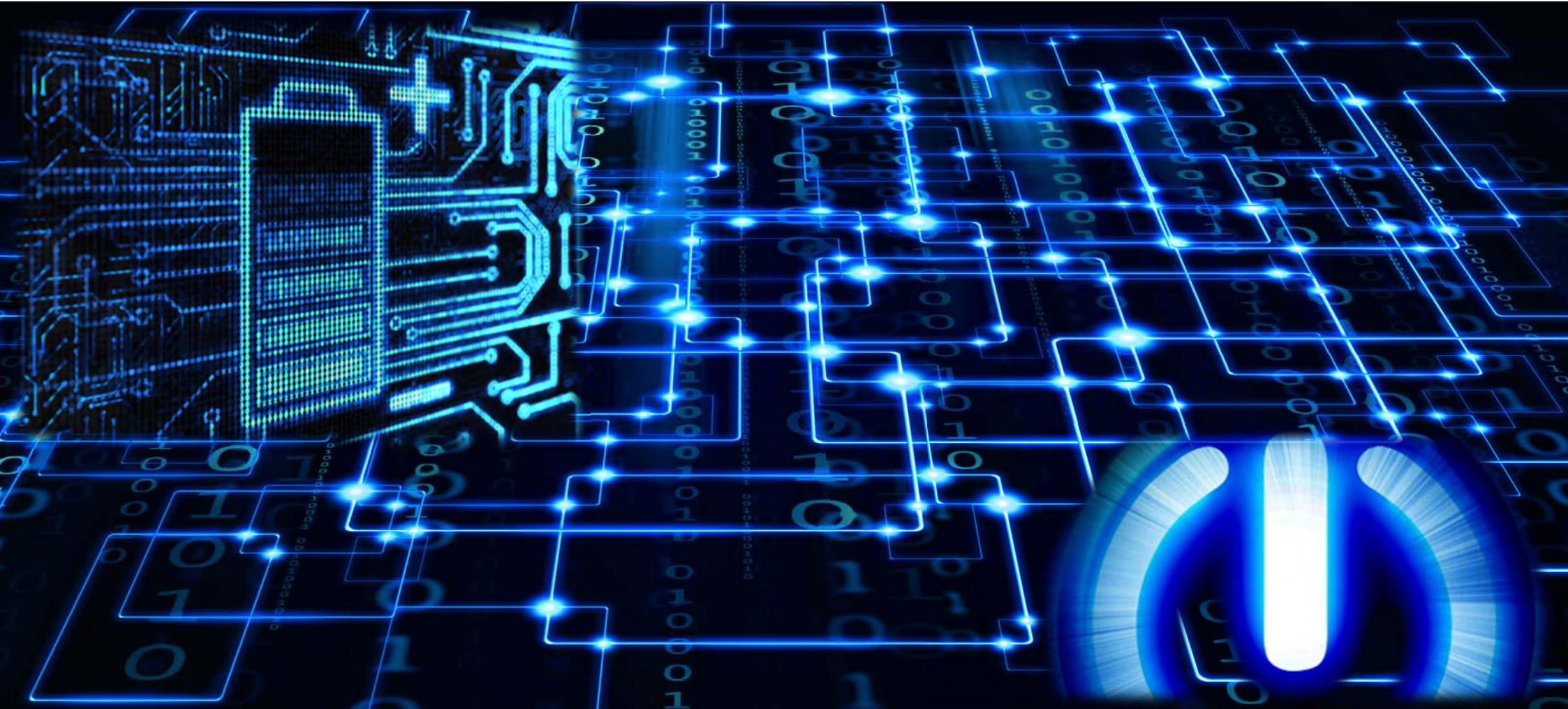
- Investment for Terminal Operators to serve the bigger sized Container Vessels



- Maintain the handling charges by reducing the operational expenses







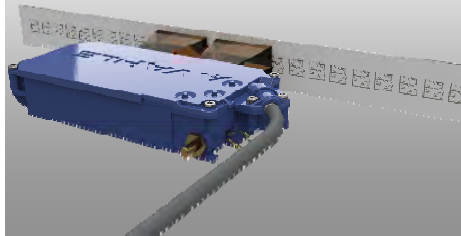
## Electrification: flexible

- Electrification by **Conductor Rails**
- **Automated Power Connection** for block changes
- Automated **seamless switching**



## Positioning: accurate

- **Absolute Positioning System** independent from external influences
- Position **accuracy** up to  $\pm 1 \text{ mm}$
- **PN / PB / Ethernet** Interfaces for Plug and Play Integration



## Data Communication: safe

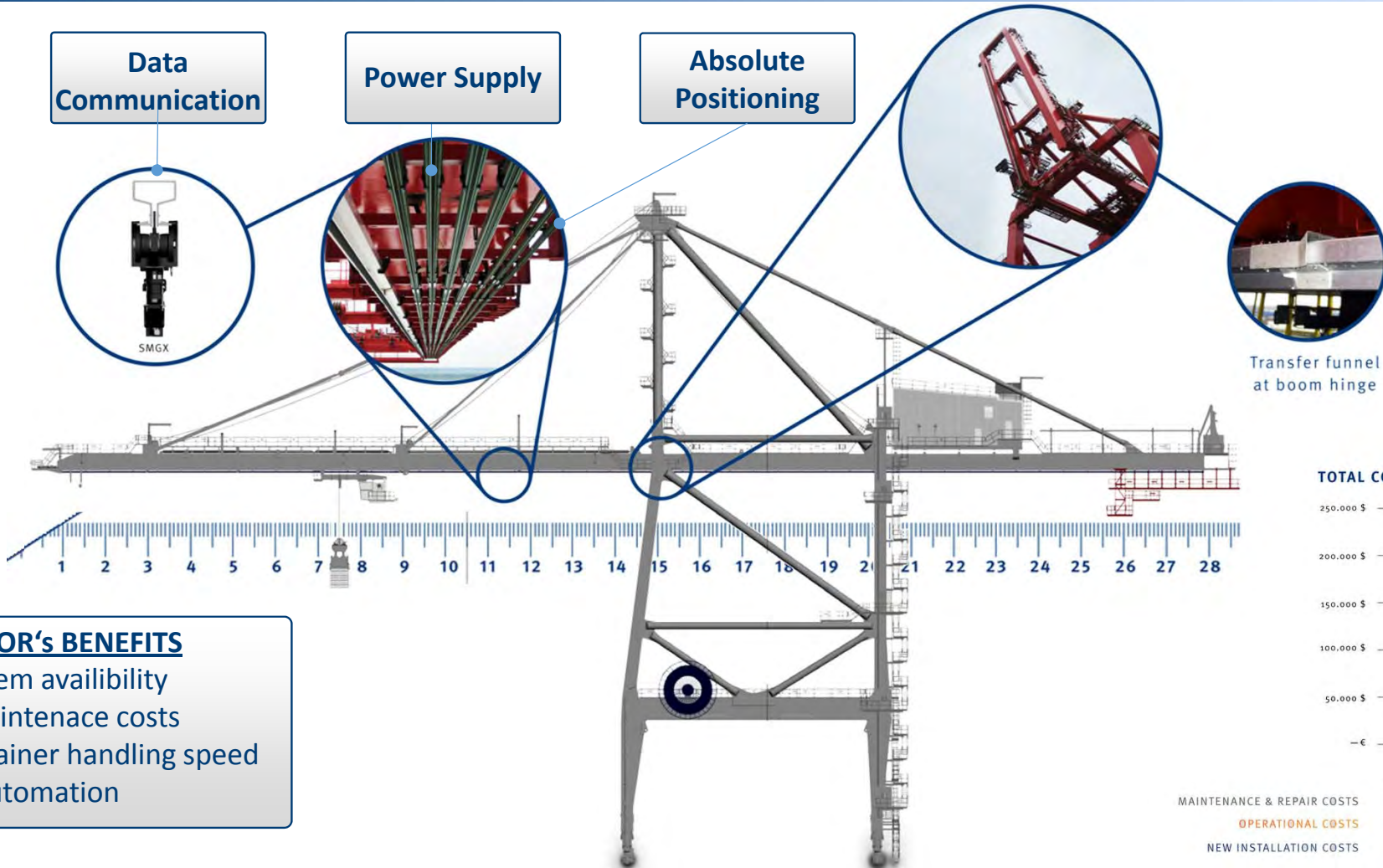
- **Highly shielded data communication**
- Up to **100Mbit/s** gross rate
- **Low latency times**
- Interfaces **Ready for Automation** - Ethernet, Profinet & Profinet Safe



## Control systems: modular

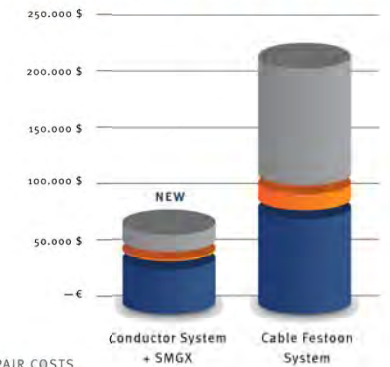
- **Autosteering**
- **Power measurement**
- **Remote Maintenance**
- **Operating data acquisition**





Transfer funnel at boom hinge

### TOTAL COST OF OWNERSHIP ANALYSIS



MAINTENANCE & REPAIR COSTS  
OPERATIONAL COSTS  
NEW INSTALLATION COSTS

Source: APM Terminals

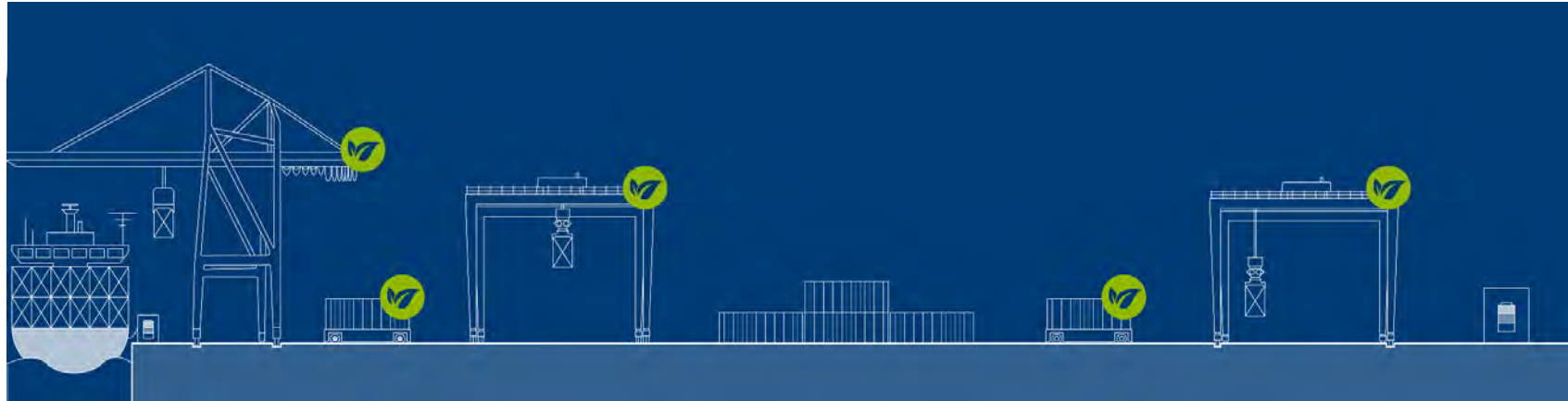
### OPERATOR'S BENEFITS

- Highest system availability
- Reduced maintenance costs
- Fastest container handling speed
- Ready for automation

# Terminal Operators

In a changing world – 15 years ago







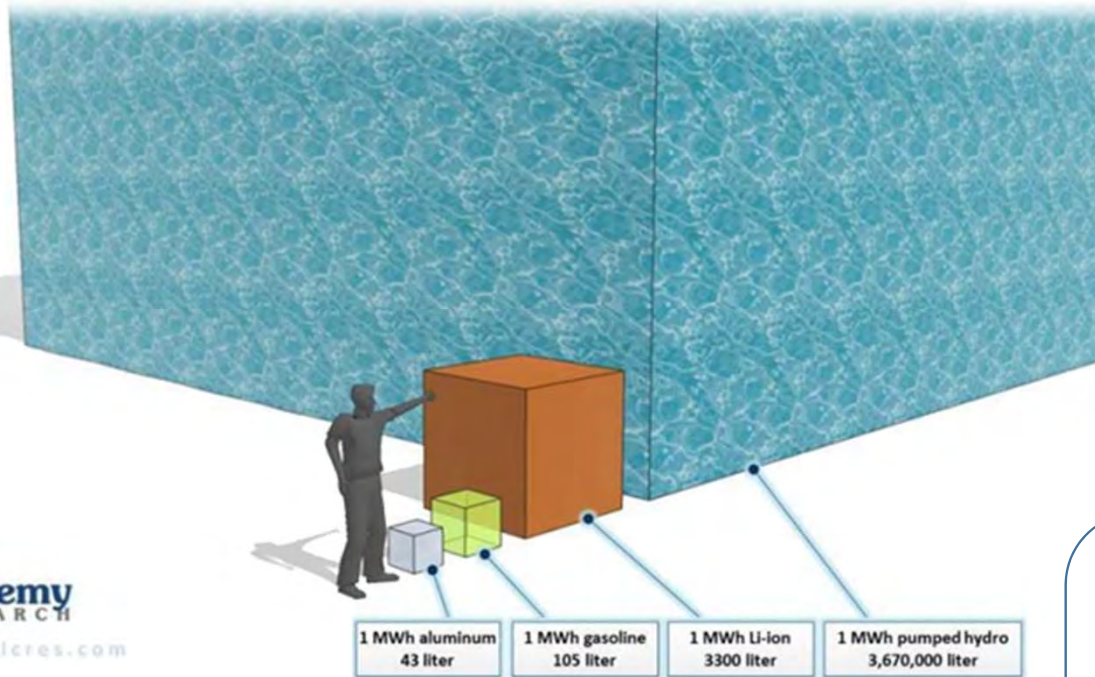
### YOUR BENEFITS

- Economic
- Efficient
- Ecological

### Non steady power-sources:

- Sun
- Wind
- Water

### Energy density comparison



### Energy Storage Technology (LiFePO<sub>4</sub>)

Modular Energy Storages from 1 kW up to 50 MW capacity available

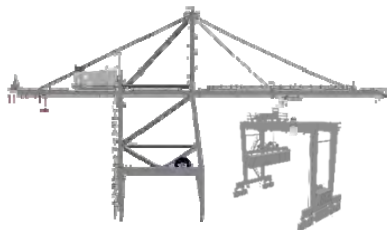
- Peak load management (operational cost savings)
- Power oscillation damping
- Voltage support and control
- Black start capabilities



### Infrastructure



### Cranes



### Mobile Equipment

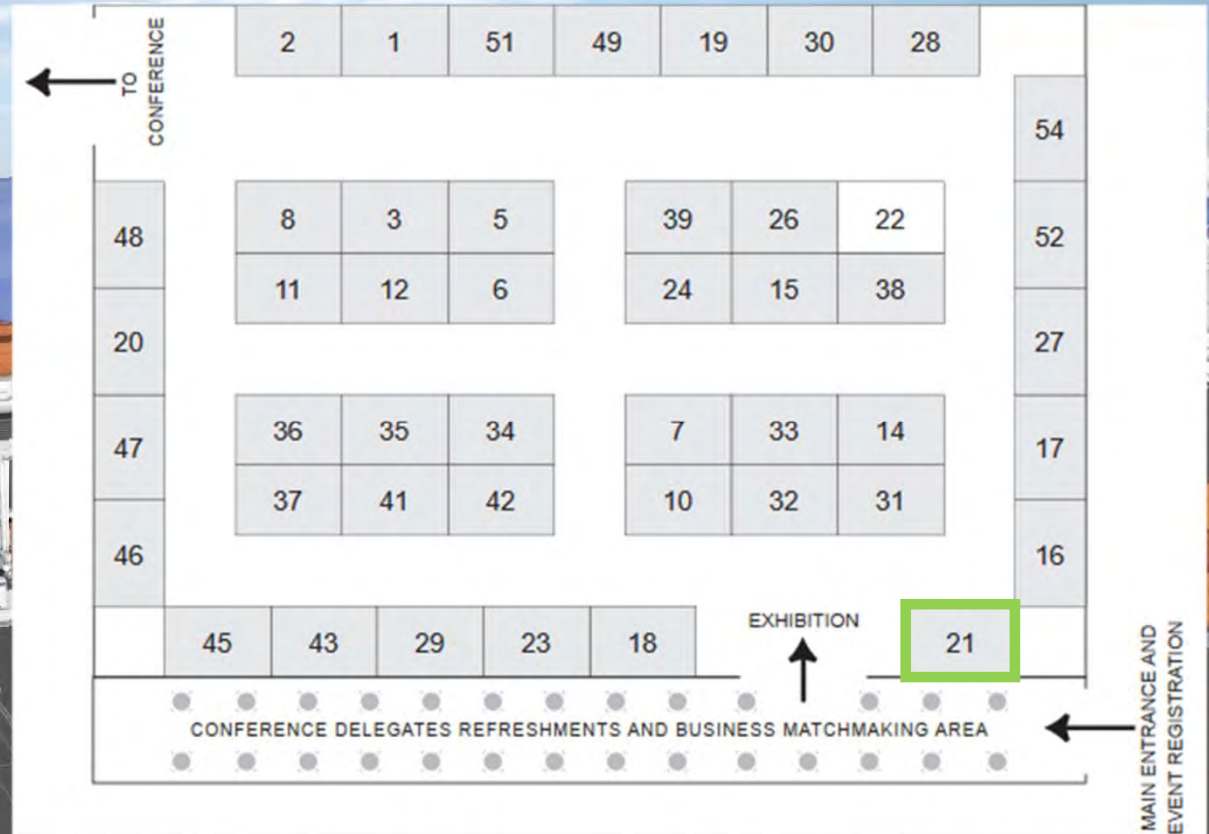


Thank you very much for your attention!

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