



**S4 energy**

# KINEXT OPPORTUNITIES

Smart Energy Storage Solutions –2022

# S4 ENERGY

## Dutch energy storage company

- Team of hardware and software specialists in energy storage
- Proprietary flywheel design - KINEXT
- Supplier of battery systems
- Proprietary Energy Management System
- Project engineering and execution capabilities

Quality  
Innovative  
Integral  
Pragmatic  
Transparent  
Turnkey  
Storage  
Energy  
Expertise  
Trust  
Carefree  
Industrial  
Integrity

# PRODUCTION LOCATION

- Proprietary production and assembly facility
- Strategic partnership with machine factory



# KINEXT ENERGY STORAGE

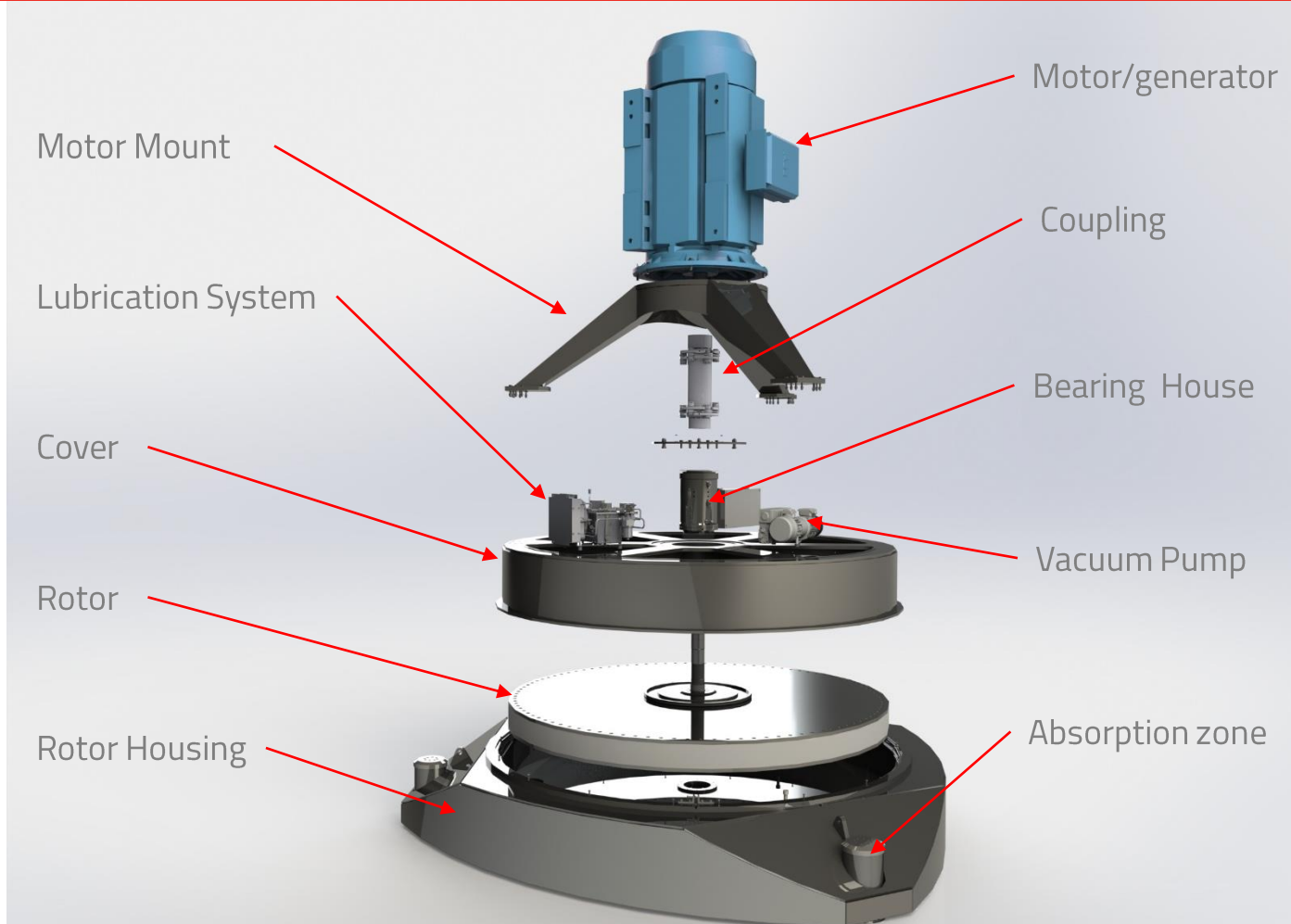
## KINEXT Energy Storage

Proprietary Kinetic Energy Storage

- Capacity: 30 kWh
- Stand-By Loss: 7 %/hr
- Power Capacity: 0.1 – 1 MW
- Cycle Efficiency: 92 %
- Response Time: 20 ms
- Lifetime: 20 years
- Lifetime: 1.000.000+ cycles
- Footprint: 4X4 meters
- Weight: 15 tons



# KINEXT ENERGY STORAGE

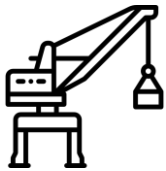


# UNIQUE SELLING PROPOSITION

- Absorbs / injects a lot of power in short period
- Instant charging and discharging
- No degeneration of energy capacity
- High power to energy ratio
- Scalable
- Modular
- Maintenance free
- Sustainable and reliable alternative to batteries
- Circular
- Made in Holland
- Lifetime >20 year

# APPLICATIONS FOR KINEXT

Cranes



Bridges



EV Fast Charging



Trains



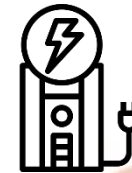
Electrical islands



Balance Production consumption



UPS & Backup Power



Storage



Generation



Grid

# S4 ANCILLARY SERVICES ALMELO

- 🔧 9 MW installation for ancillary services
  - 3 MW flywheel
  - 9 MW battery / 9 MWh battery
- 🔧 Combination of KINEXT and battery:  
Prolonged lifetime of the installation
- 🔧 Unique EMS Software, enabling:
  - Supply of FCR services
  - Trading on imbalance or intraday market
  - Integration of PV generation
- 🔧 In operation since 2018



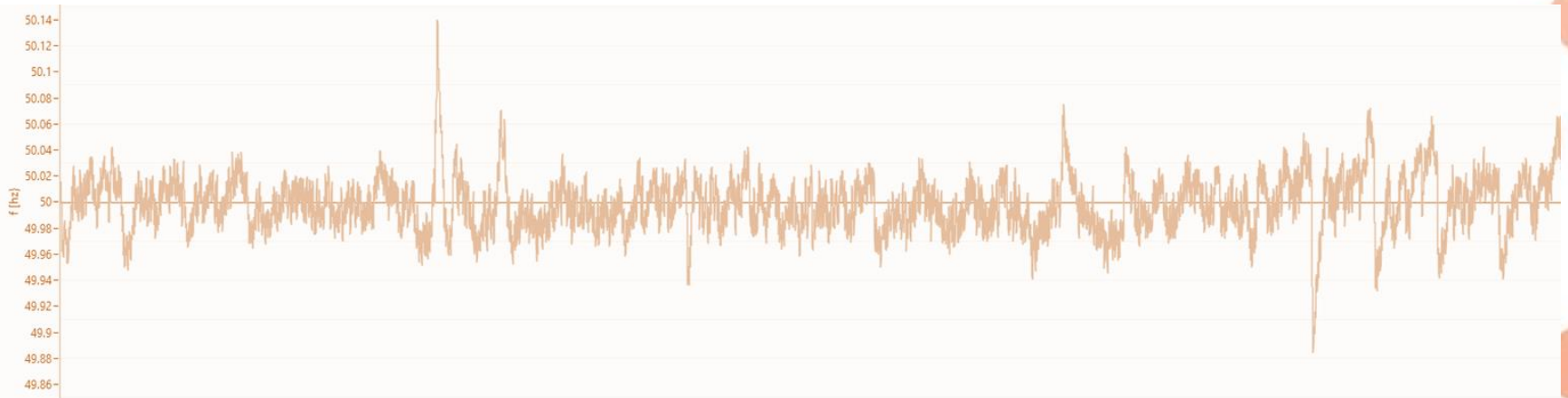


# S4 ANCILLARY SERVICES HEERHUGOWAARD

- 🔌 10 MW installation for ancillary services and windturbine support
  - 3 MW flywheel
  - 10 MW/9 MWh battery
- 🔌 Start of operation Q4 2021



# FREQUENCY OF THE GRID



Grid frequency on an average working day

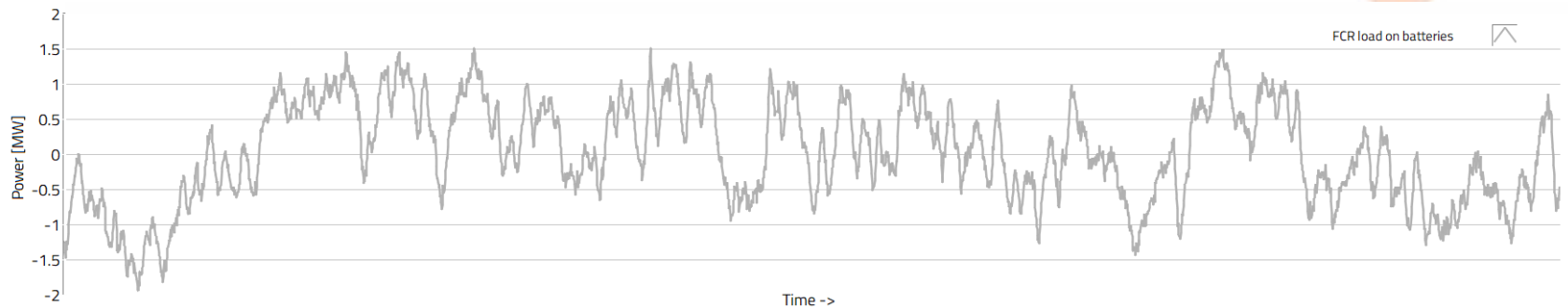


24 hour grid frequency around 50 Hz



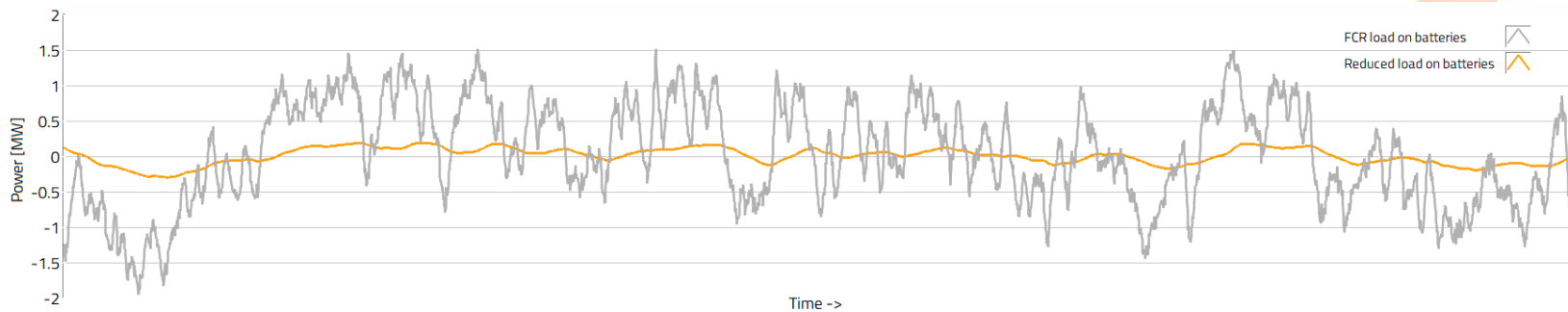
Large variations in transitions in the morning and evening at the hourly crossings

# STORAGE FOLLOWS GRID PATTERN



- 🔧 Storage installation follows grid frequency pattern
- 🔧 Power output proportional to frequency deviation
- 🔧 Pattern requires swift and steep variations from charging to discharging
- 🔧 Requires high annual energy throughput

# HYBRID KINEXT-BATTERY SET UP



- 🔌 Reduction of throughput on batteries with 50%
- 🔌 Lower power demand in batteries
- 🔌 Reduction of the need for cooling and load management
- 🔌 Doubles the lifetime of the batteries
- 🔌 KINEXT is first in line to follow rapid frequency/power variations
- 🔌 Sustainable and affordable hybrid storage solution

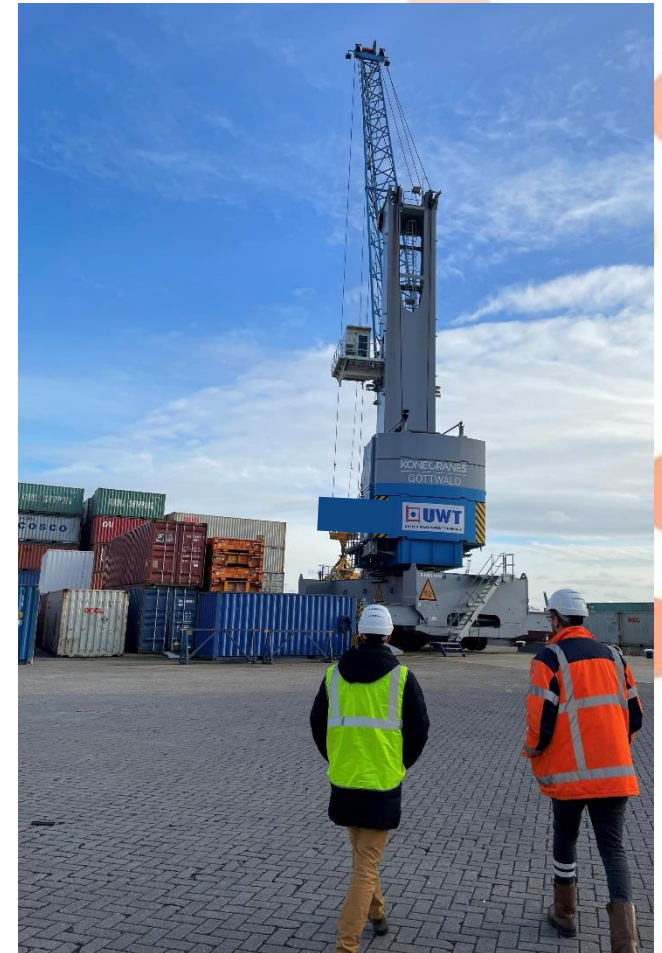
# CRANE CASE

## Crane characteristics:

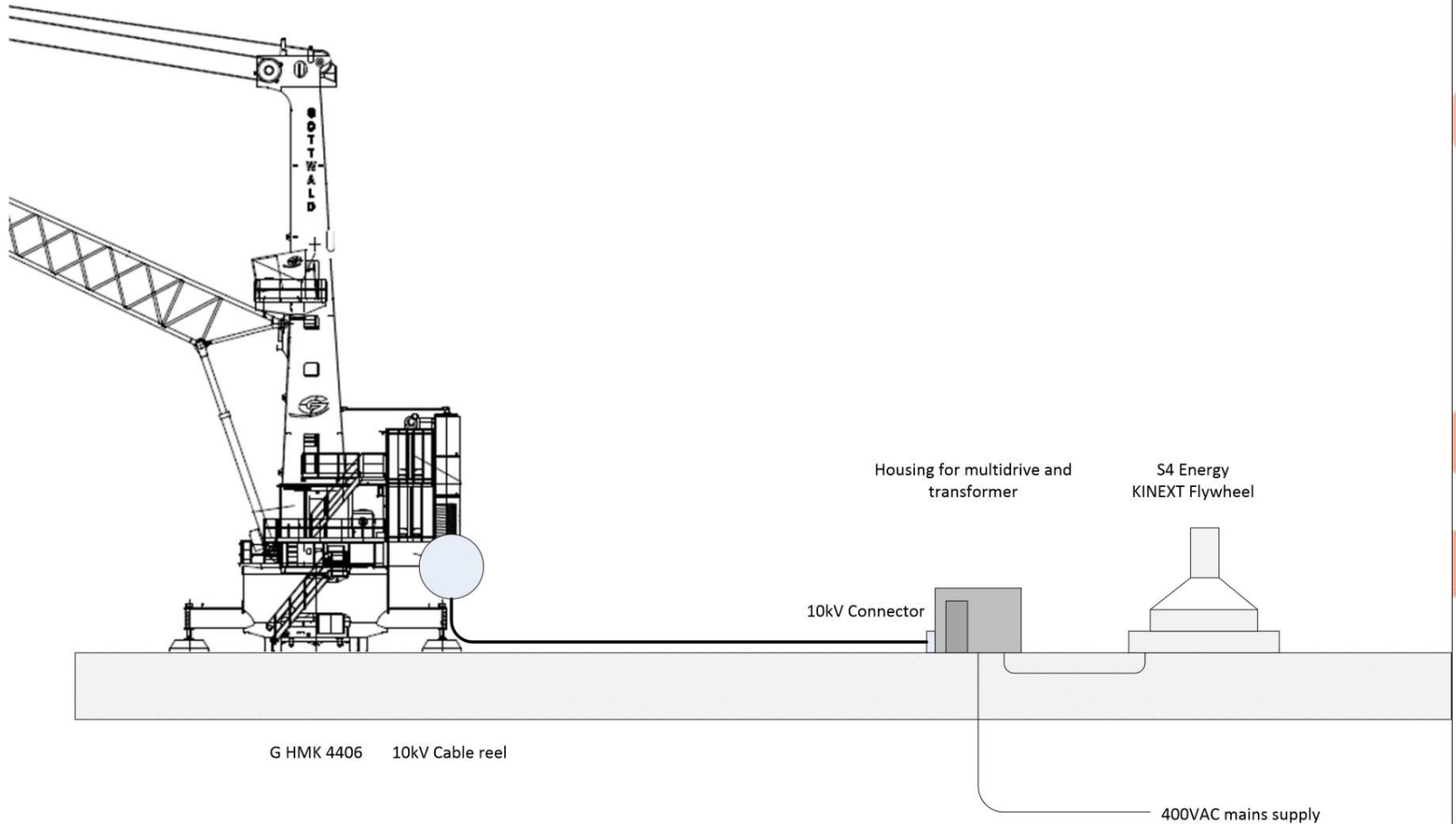
- 🏗️ Electrical crane, diesel powered
- 🏗️ Prepared for full electric
- 🏗️ Crane operates 18-20 hours per day  
5,5 day per week
- 🏗️ Diesel consumption: >200.000 l/y

## Target:

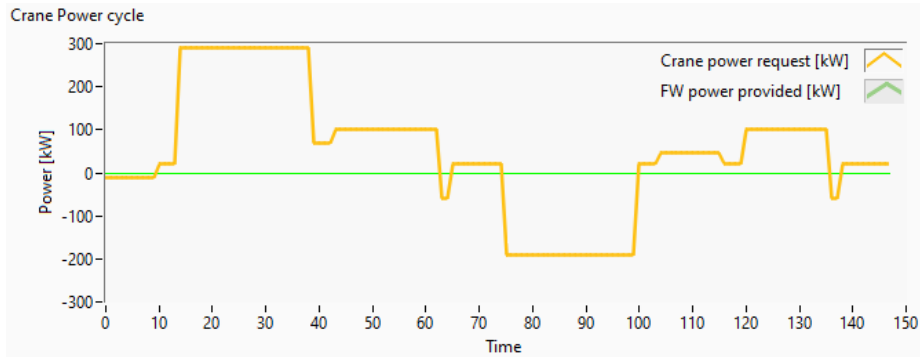
- 🏗️ Convert main source of energy from diesel to electricity
- 🏗️ Minimal adjustments to the crane setup
- 🏗️ Maintaining reliability



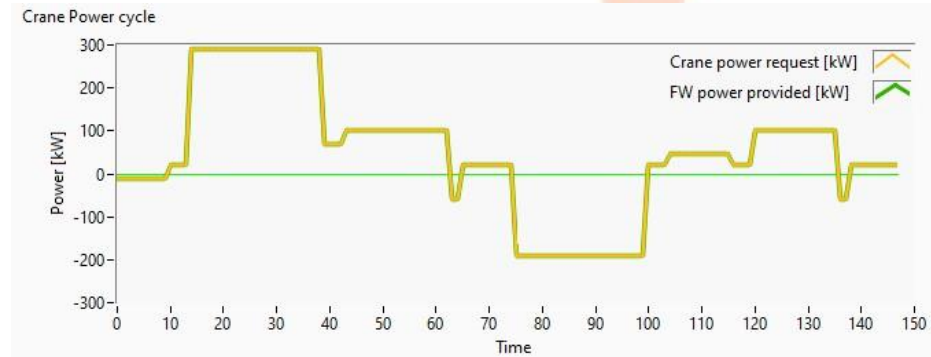
# CRANE AND FLYWHEEL SETUP



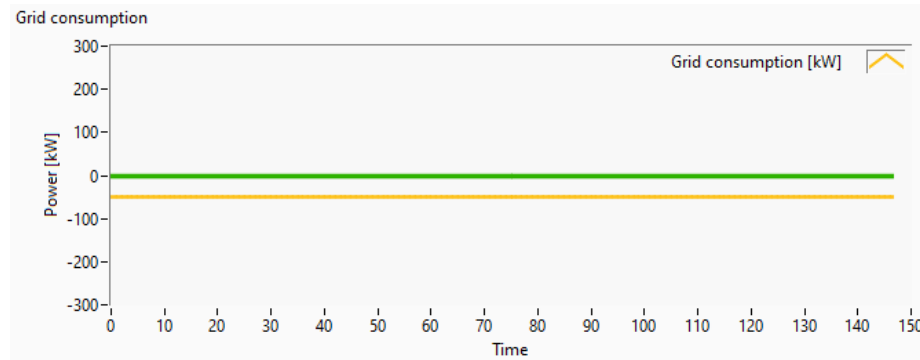
# CRANE AND FLYWHEEL POWER



Stand alone crane power demand



Crane power demand provided by flywheel






As a result: grid consumption for crane + flywheel setup is a low and constant power

# PEAK SHAVING

## PREVENT OR POSTPONE GRID CONNECTION UPGRADES

Kinext flywheel offers instant delivery of high power to shave the peaks on the demand side.

-  Avoid or postpone grid connection enlargements
-  Save annual costs
-  No waiting time for grid upgrade







Karin Husmann

S4 Energy Nederland B.V.  
Westplein 6  
3016 BM Rotterdam  
The Netherlands  
T: +31 (0)6 15 35 26 19

E: [karin@s4-energy.com](mailto:karin@s4-energy.com)  
W: [www.s4-energy.com](http://www.s4-energy.com)