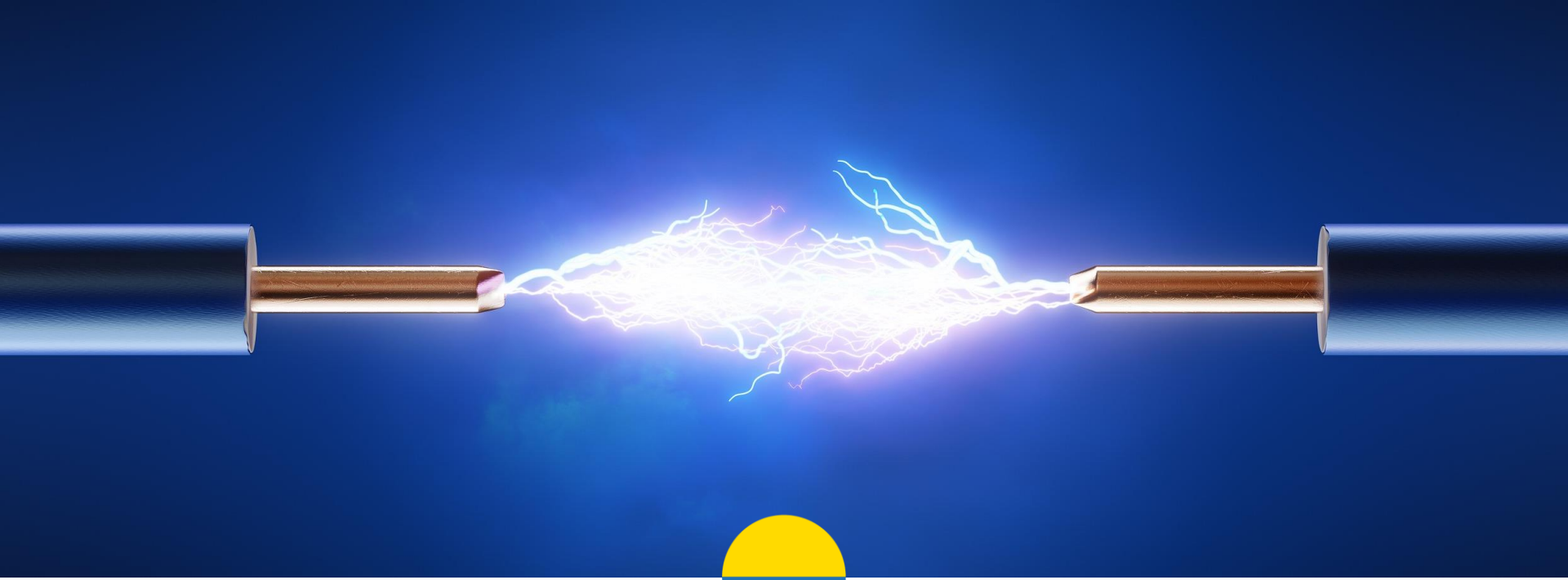


VATTENFALL

Green Marine Enabler!

Vattenfall – Green Marine Enabler

Agenda

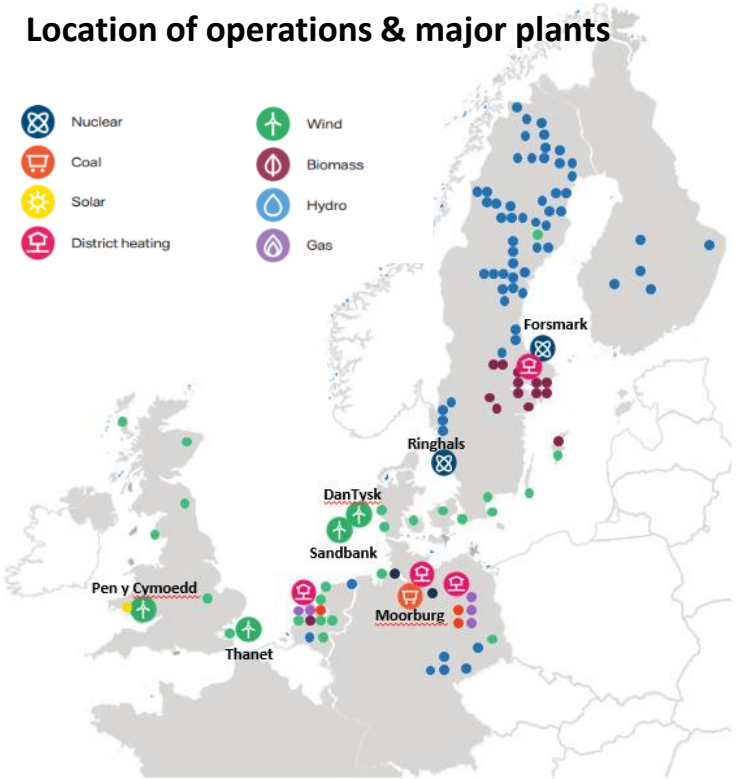
- Short intro on Vattenfall AB & Network Solution
- The Port as an ECO-System and its role
- Grid constrains & reality check
- Technical trends in the Green Shift
- Power as a Service – a green enabler?

Vattenfall AB – the Essence

Basic facts

- One of Europe's largest producers of electricity & heat.
- 100% owned by the Swedish state.
- Core: Production, distribution, sales & energy solutions & services.
- Main markets: Sweden, Germany, Netherlands, Denmark & UK.
- Approx. 20,000 employees.

Location of operations & major plants



An attractive partner in the energy transition

- Examples of partnerships

Research project for a carbon dioxide-free steel industry

HYBRIT FOSSIL-FREE STEEL

VATTENFALL

Cooperation in large scale bio-diesel production

preem

VATTENFALL

Study on electrified cement production

CEMENTA
HEIDELBERGCEMENT Group

VATTENFALL

Storage projects at a number of wind parks

BMW

VATTENFALL

Market place for energy sharing

powerpeers
share your energy

VATTENFALL

Support of a major enterprise for battery production in Sweden

northvolt

VATTENFALL

Northern Europe's largest charging network for e-vehicles

InCharge

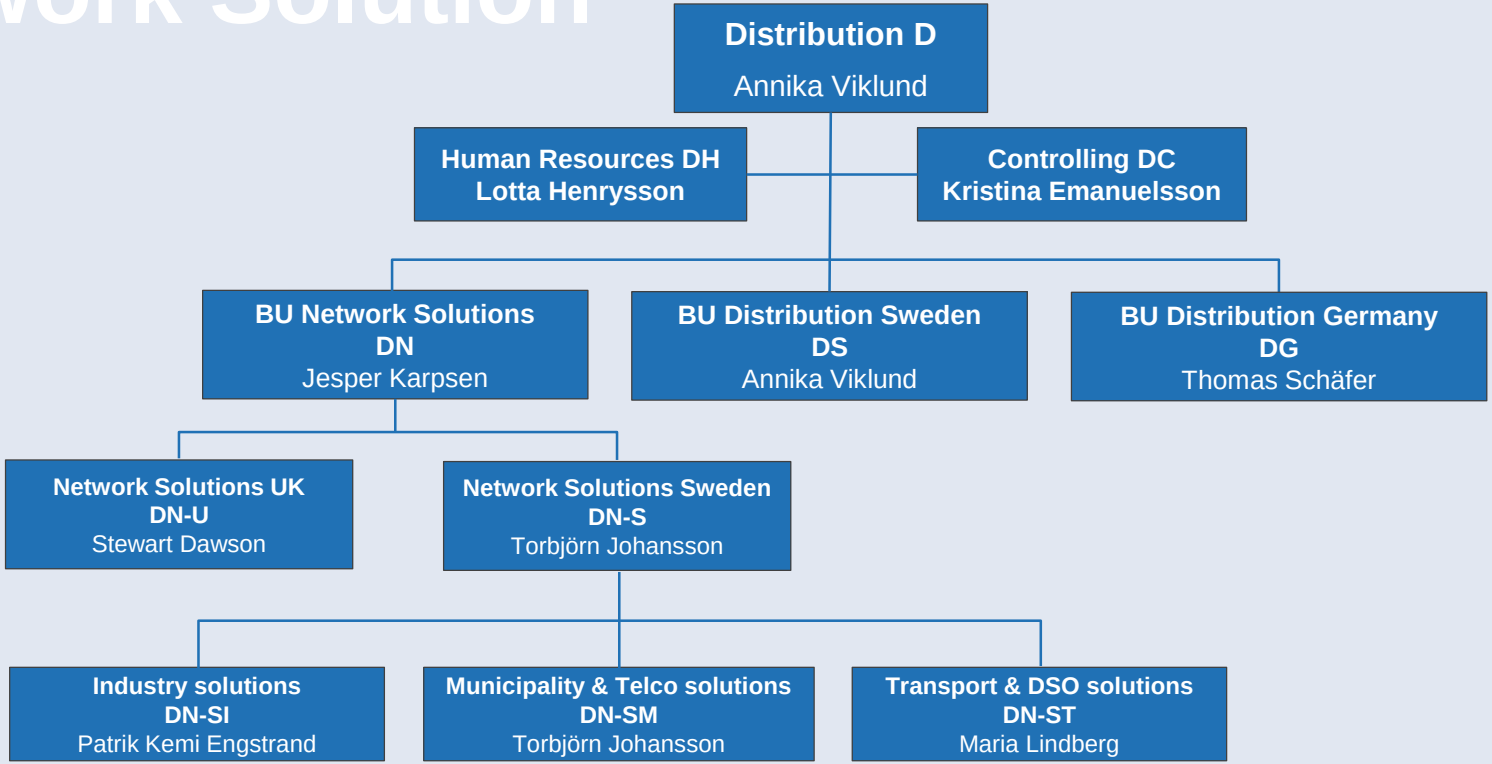
VATTENFALL

Attract industries to Sweden

NODE POLE

VATTENFALL

Network Solution

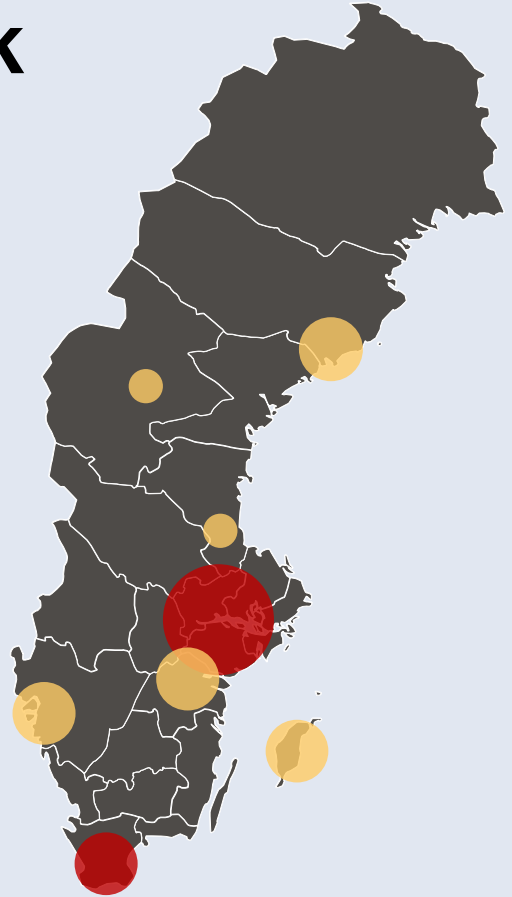


A port’s ECO-system

E-Consumption through E-Mobility is everywhere

Grid constrains & reality check

- Challenges:
  - Demographics
  - Electrification
  - New industries (Datacenters)
  - Internet of things (new tracking, logistics and autonomous)
  - New Production/renewables
  - Long permission process (Both local and main)
- Future:
  - Smarter Grids
  - 2-way communication
  - Direct-balancing

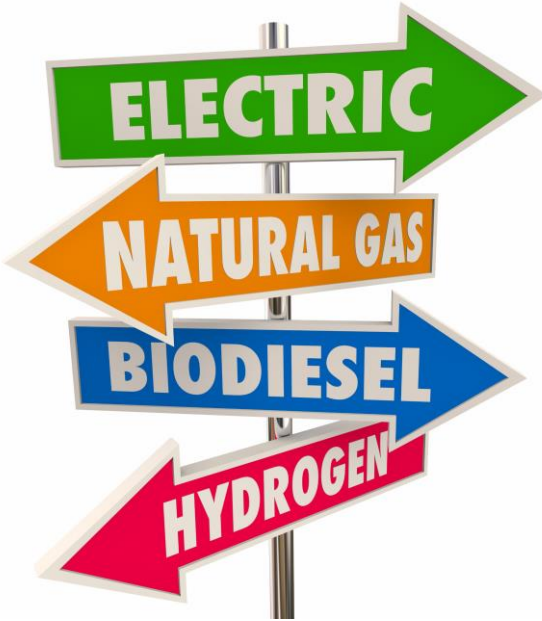


Technical trends

- Emission regulation & climate change
- Society demand clean air and a zero-emmision future
- Technology in terms of power electronics and battery solutions rapidly improving
- Shorter battery-operations is here today
- Autonomous operation strongly linked to electric drive-trains

Technical trends (cont)

- Batteries projected not ideal for the bigger/ longer/heavier means of transport
- Hydrogen in combination with batteries have a future
- LNG currently has a great push - although not green
- The future port an essence in the shift towards fossil-free marine operations
- The Port as a natural hub require new infrastructure – PaaS
- Grid & power supply meeting demand and technology evolving – what then?



Movitz & Vattenfall

Charging

Drive-Line

Batteries

Power as a Service = Funksjonslösning


Investments
Future & Technology Proof
Maintenance & Operations
Planning & Installations
Ownership & Responsibility
Risks
Total supplier
Linking technologies
Modern & Energy-effective
Modular solutions
Compatibility

The sustainable ECO-system
- Applications and Services

Local Production

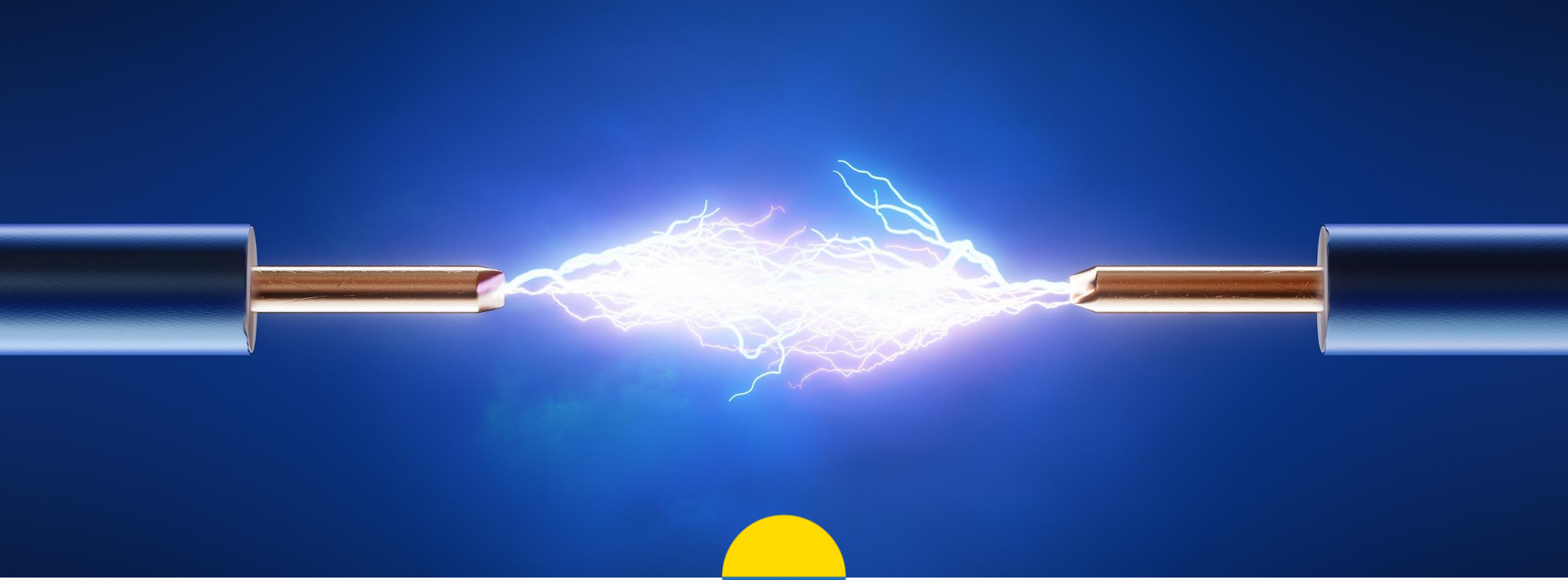
- Generators
- Solar Power
- Wind
- Hydrogen & Fuel Cells
- Wave/Tidal
- Others

Distribution

- Transformers & Switchgears
- Frequency Converters
- Batteries (mobile & stationary)
- Reserve Power
- Peak Shaving
- Steering & controlling
- Sale & Savings

Consumption

- Shore side power
- Facilities
- Lighting
- Charging/E-Mobility
  - Buses
  - Trucks
  - Term. Tractors
  - Cars etc. & community
  - Vessels



VATTENFALL

Tack!

karstein.hilsen@vattenfall.com https://www.linkedin.com/in/karsteinhilsen/