



About the Company

We help our partners to connect electric vehicle drivers to charging stations.



Established

In 2013 by 18 energy utilities



Charging points

Over 2 500 around Europe



Offices

Berlin, Paris, Stockholm and Helsinki



Virta services in use



Connections through roaming



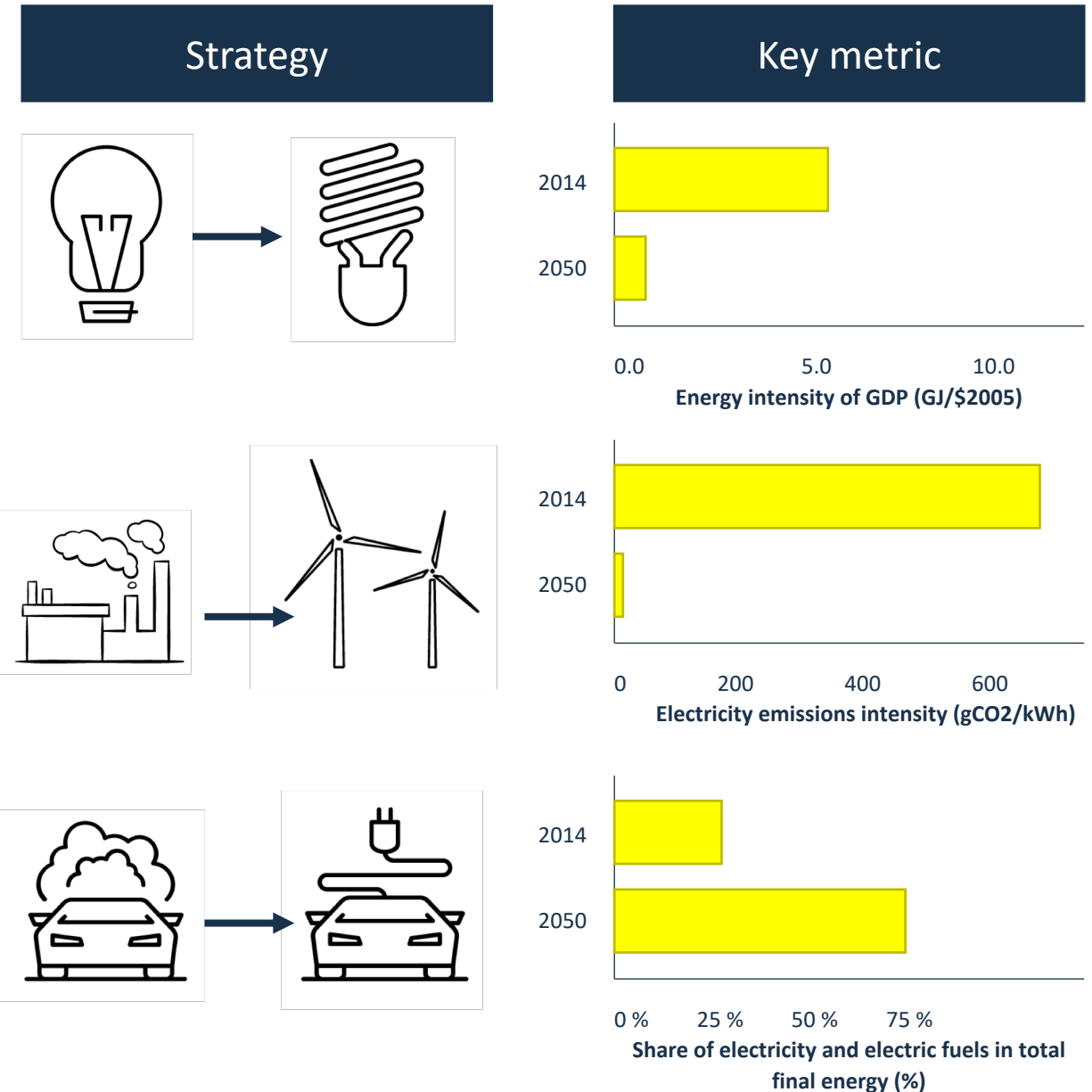
Clean energy disruption: **The opportunity**

Solution to fight climate change: Electrify everything with zero carbon power

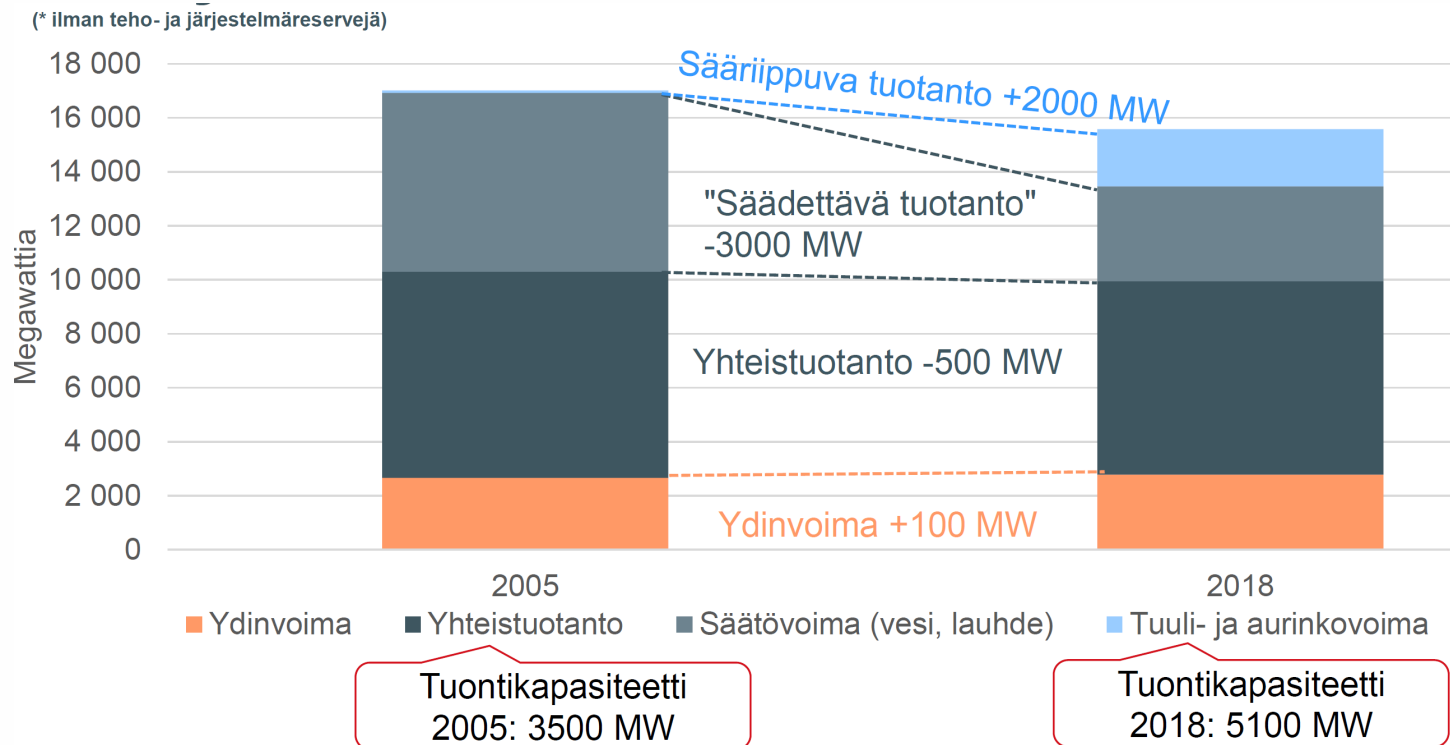
→ Three pillars for zero-carbon society:

1. Energy efficiency
2. Decarbonization of electricity production
3. Electrification of energy consumption

→ We have to stop investing in “less emitting technologies” and start to invest heavily in zero-emission technologies instead.

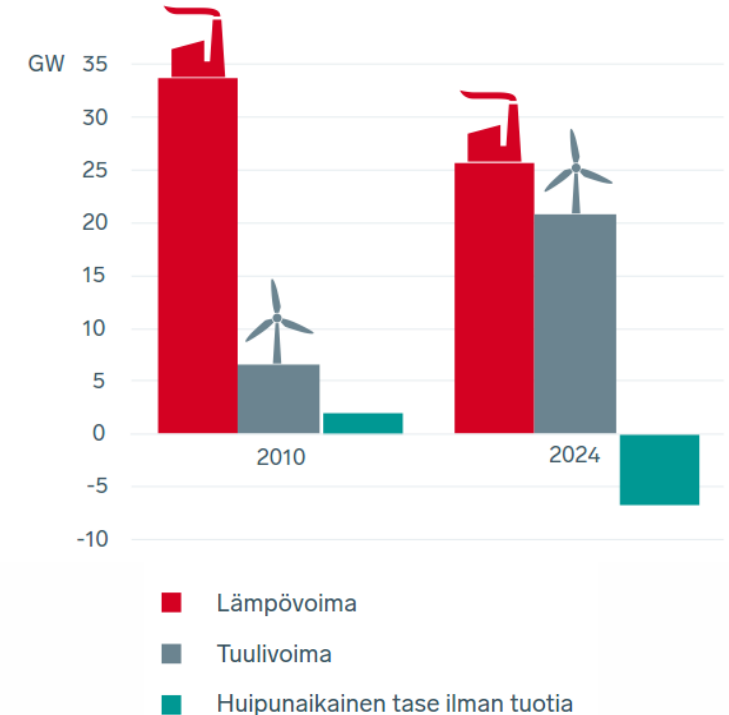


The need for demand response in Finland



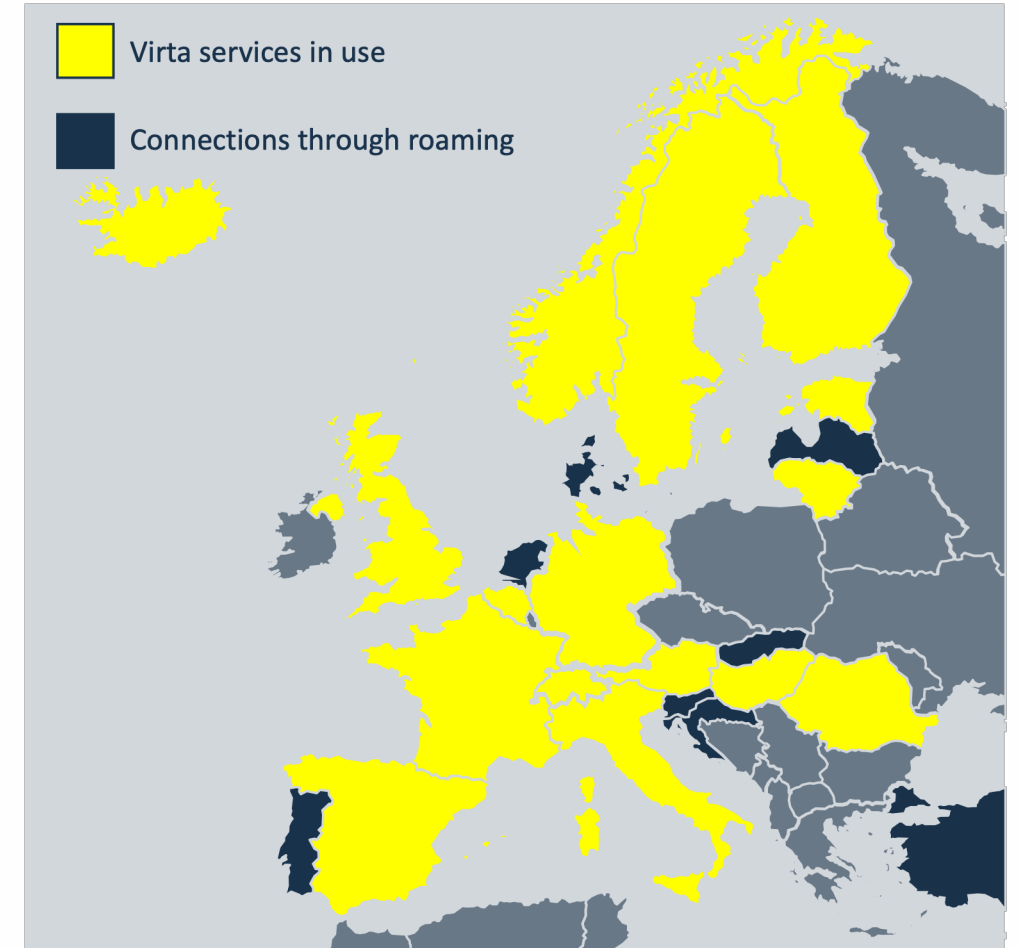
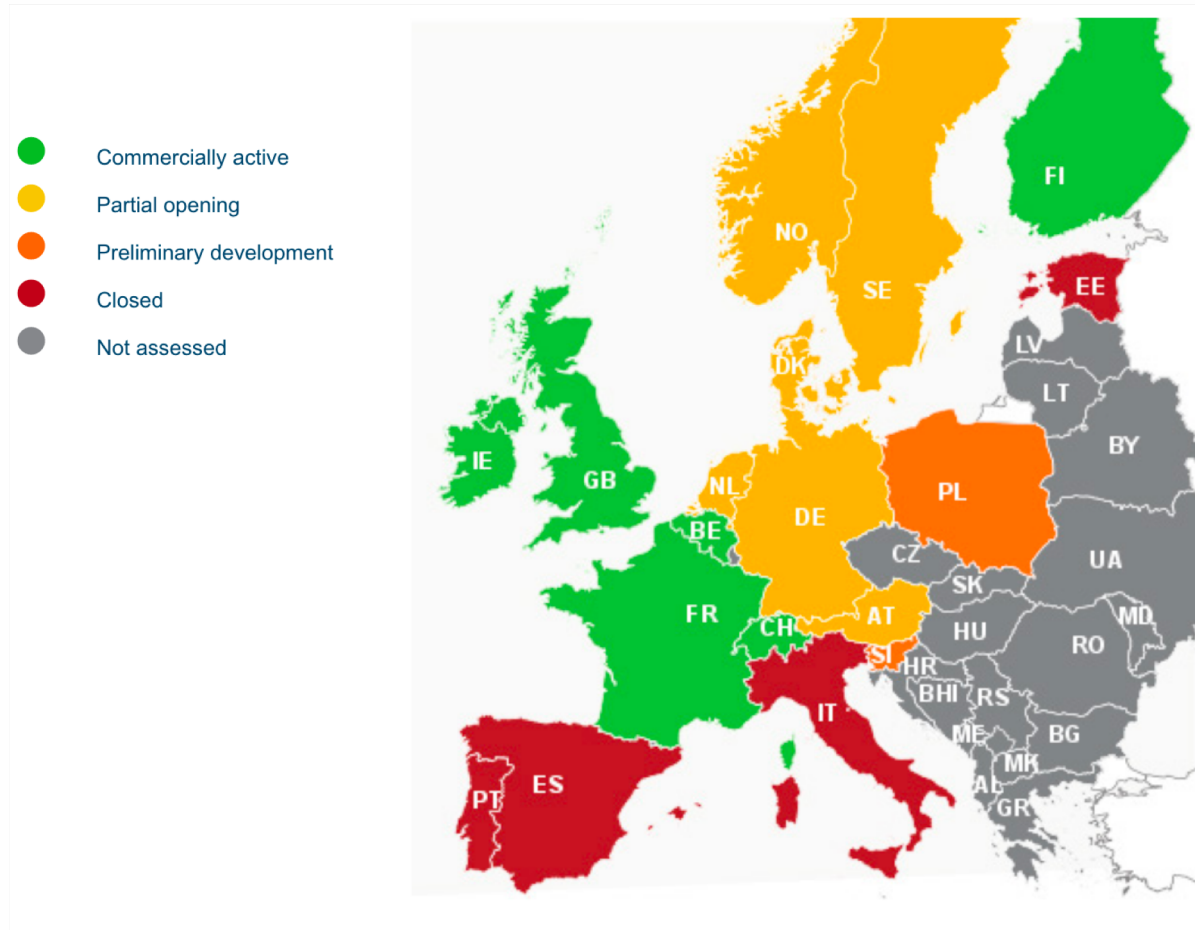
Graph sources: Fingrid 2018

Tuotantorakenteen muutos



Demand response markets in Europe...

... where Virta is active

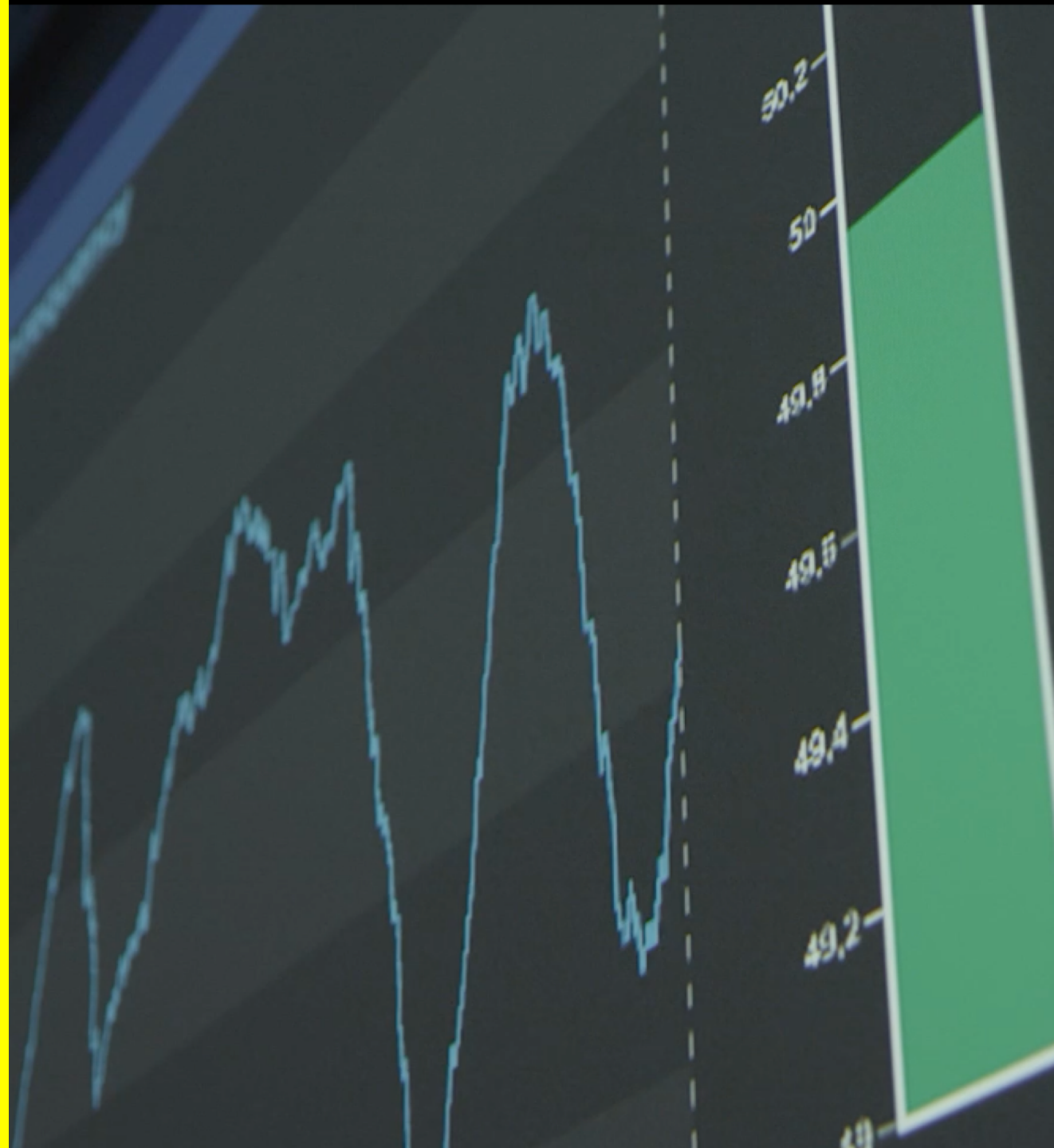


Source: Smart Energy Demand Coalition (SEDC) Mapping Demand Response in Europe Today, 2017

The Virta services: Convergence of mobility and energy

While you sleep, your EV works for the planet

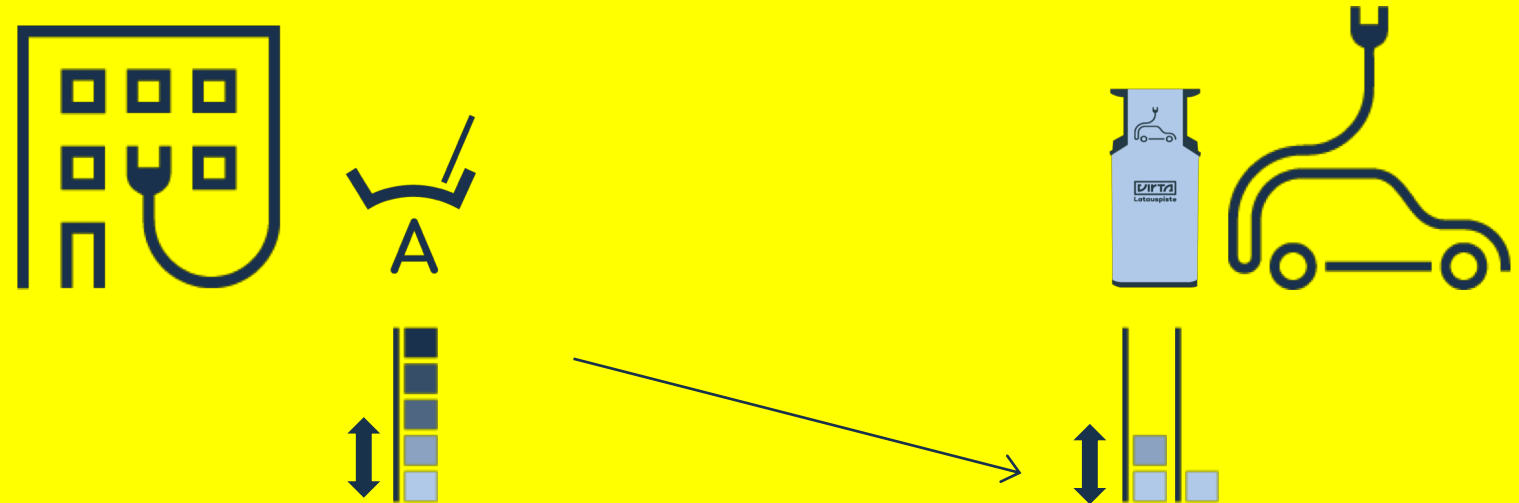
1. Dynamic load management
2. Demand response based on eg. grid frequency or market price
3. Stationary Storages integration
4. V2G bidirectional charging
5. User Engagement, SPOT price optimisation



Dynamic Load management: Grid connection load limit control

Automatic dynamic load management. Charging power is reduced when there are other major loads.

The feature is charging hardware agnostic cloud service.



Local measurement of non-EV –loads and possibility to set limit according to grid connection capacity

Automatic dynamic load management based on availability of power

Frequency containment reserves

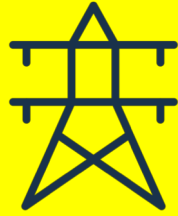
- Virta's system enables aggregators to use EV's as reserves for demand response
- Charging events can be automatically controlled with the frequency of the electrical grid
- When the grid overloads and the frequency drops, EV charging powers are brought down
- The need to adjust typically occurs a few times a day and lasts max. 1 min, so it has no practical effect on the charging experience

Grid Frequency

Charging Power

49.92 Hz

Battery Storage Operator



- Aggregate smart battery storages with a internet connection with no geographic limitations
- Provide battery storage services to companies and consumers
- Sell ancillary services to DSO's and TSO's

Battery Storage Bundle

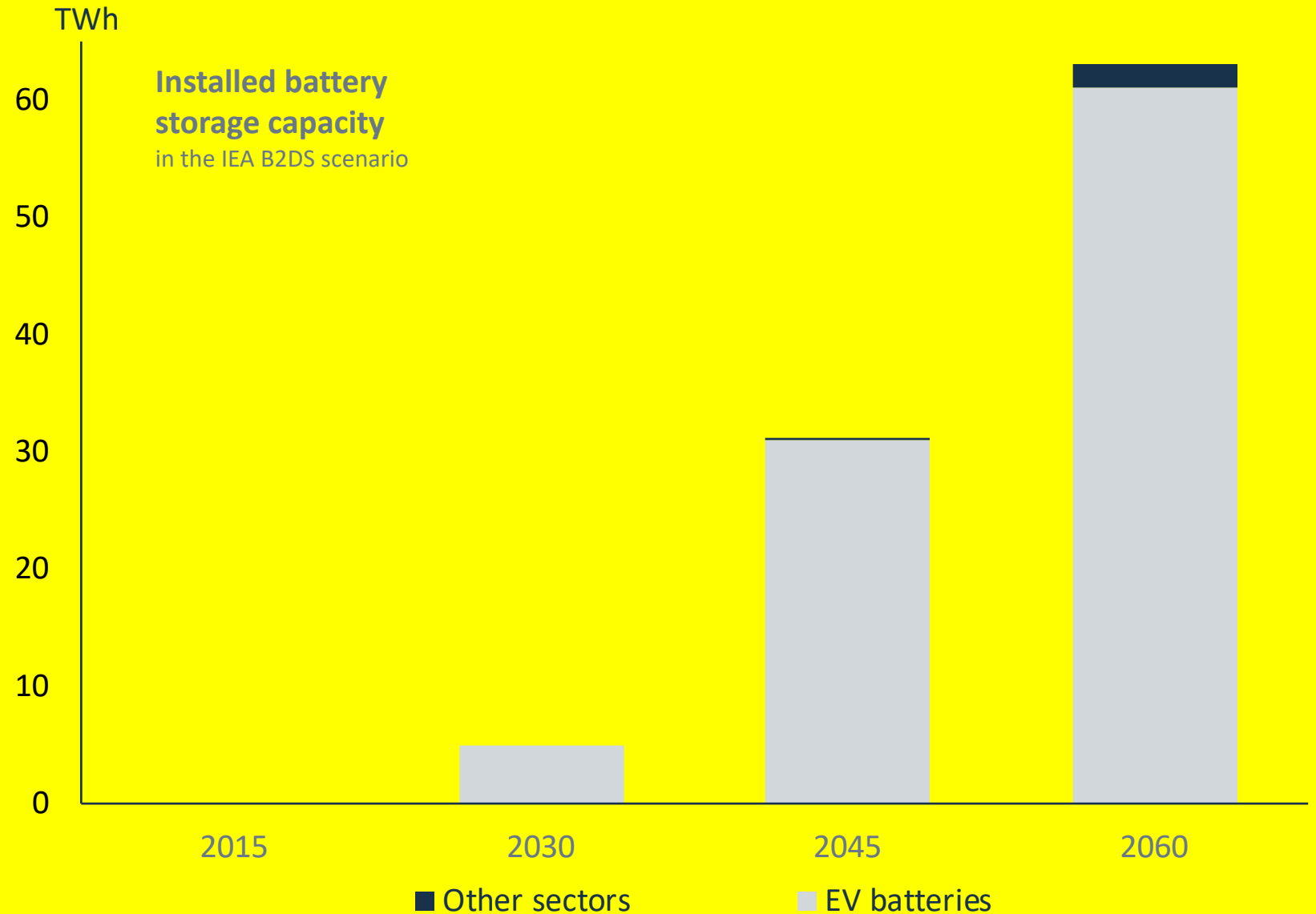


- Optimize grid connections and get more value from high-power charging and large charger installations with integrated battery storage service
- The service includes preconfigured battery storages connected to Virta's cloud service, enabling smart management and optimization features

EV's are big batteries on wheels

The vast majority of future energy storage capacity will have four wheels.

EV's bring batteries to the energy system with close to zero incremental cost



Source: IEA Electricity well below 2 degrees: from challenges to opportunities 2017

Bidirectional charging

- The new vehicle-to-grid (V2G) standards allow us to use EV's as distributed battery energy storages
- In practice we connect V2G compatible charging devices and control their bidirectional charging events
- EV's can be used side-by-side with stationary energy storages and renewable energy production



Charging optimized by the energy price



- Charging events are optimized based on (e.g. Nord Pool) Spot electricity prices and individual energy needs
- Optimization can also be overridden by selecting hours manually
- The service works as consumer-driven demand response with effective incentives



Virta is a Recognised thought leader in services converging mobility and energy

→ Recent awards underline Virta unique vision and capabilities in proving demand response services for the energy industry on digital as-a-service basis.

"Virta is described as a catalyst, bringing value to the industry by allowing energy utilities to support the energy production with electric vehicles."

Frost&Sullivan, 10/2018



Best in the industry Frost & Sullivan Technology Innovation Award 10/2018



Winner, Energy and Innovation Award
EnergyWeek
3/2018



Winner, Best Mobility
Concepts & Software eMove
360° Award for Electric
Mobility
10/2017

We charge.

Juha Karppinen

Director, Virta Energy

juha.karppinen@virta.global

www.virta.global

