



# Vattenfall Project Uppsala Battery

General English presentation

Arne Berlin 2022-11



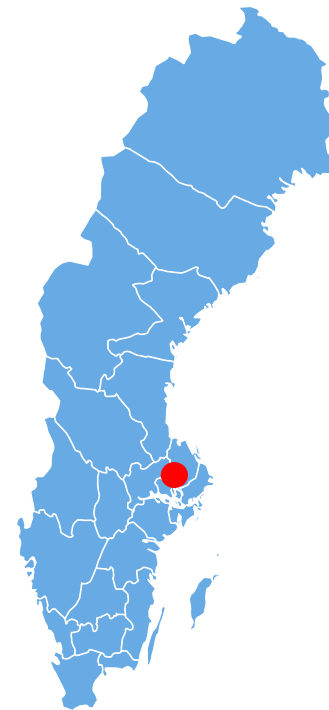
# Bottlenecks in the grid in Uppsala region

Uppsala expand fast and demand more transmission capacity from the grid.

Long time to built transmission lines.

Vattenfall wants to enable Uppsala's expansion

Can an energy storage solve the problem?



# Test something new – A Battery

- Transitional solution
- One year to build a battery plant
- Ten year to built a power line
- Secure an increased demand of power.
- Flexible



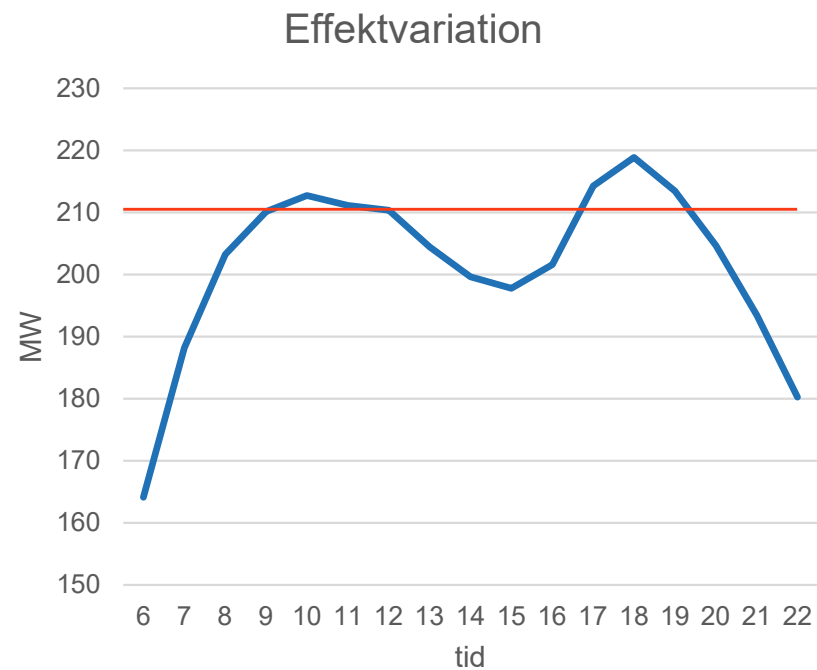
# En "powerbank" som jämnar ut

Ett batteri passar bäst för att:

- jämna ut ett effekt-flöde
- jämna ut effekt-obalans

Uppsala batteri kan säkerställa ökat effektbehov som motsvarar upp till 1700 nya villor.

Kapa effekttoppar – "Peak Shaving"



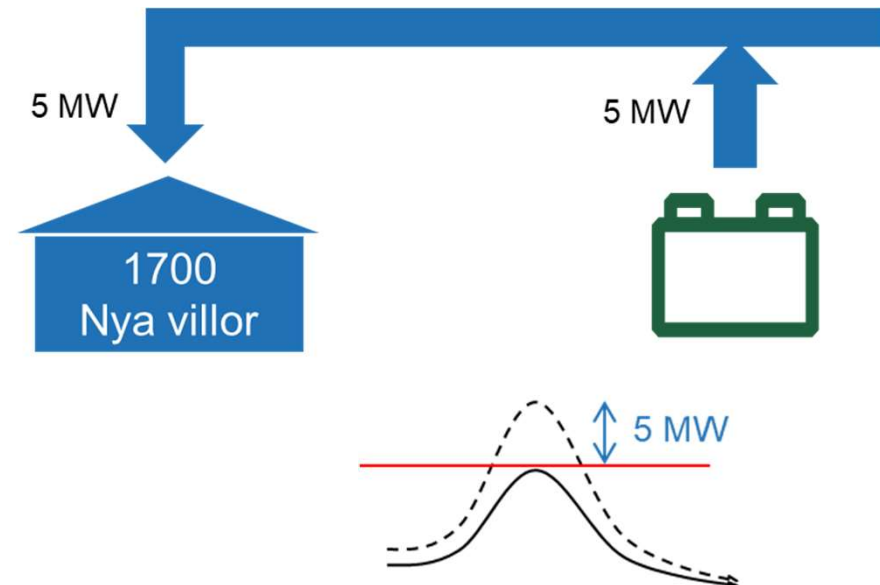
# A power bank that balances

A battery is best suited for

- Balances power unbalances
- Balances load flows

Uppsala battery can ensure increased power demand corresponding to up to 1,700 new villas.

Peak Shaving



# An innovations project

- Show how you can use a battery in a power system
- Functions → Services
- Participate in a flexibility market – demand response - CoordiNet
- Participate in the electricity market/frequency market.
- Define the battery in power system.
- Increase our knowledge



# A cooperation project

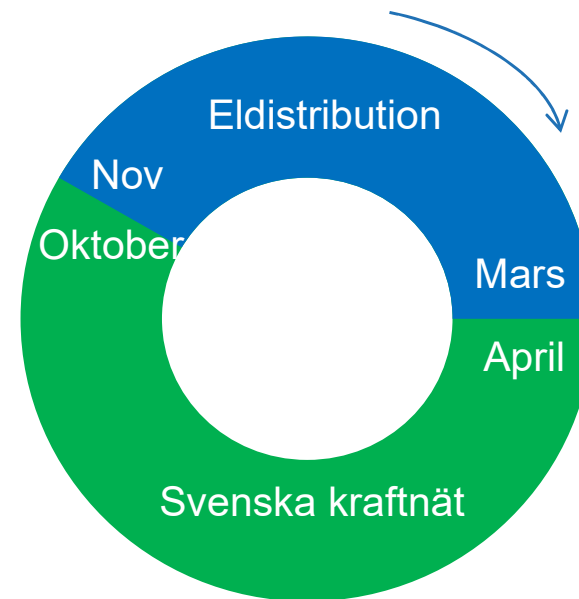
- The project is a cooperations project between Vattenfall Eldistribution och Vattenfall Network Solutions.
- Network Solutions will own the battery plant and deliver services to Eldistribution.
- **Uppsala municipality** show a great interest and engagement in grid capacity issues.



# Project main goal

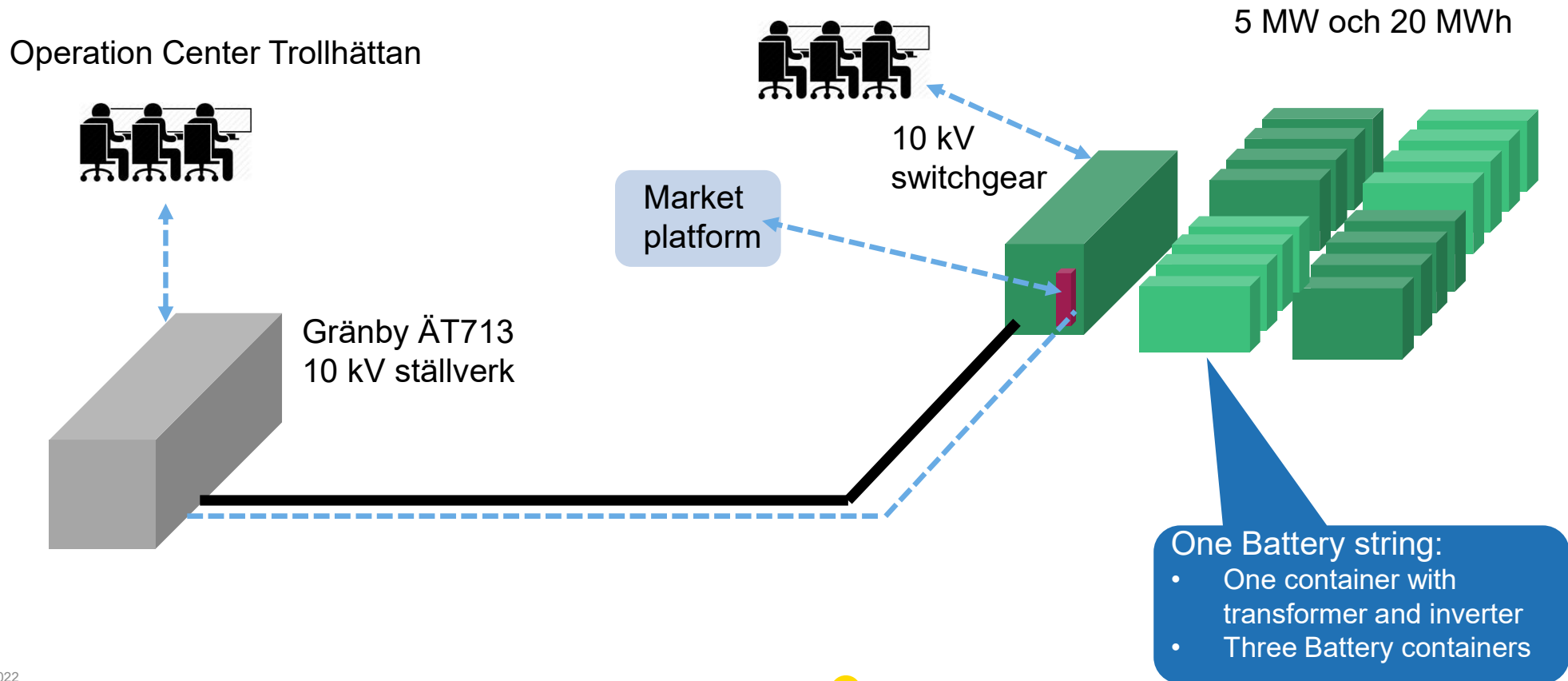
**Share the battery's services during the year**

Virtual grid: Grid Peak Shaving  
Virtual power plant: FCR-D





# Battery storage in Uppsala





40 BMW EV car batteries in one container

Transformer and inverter container



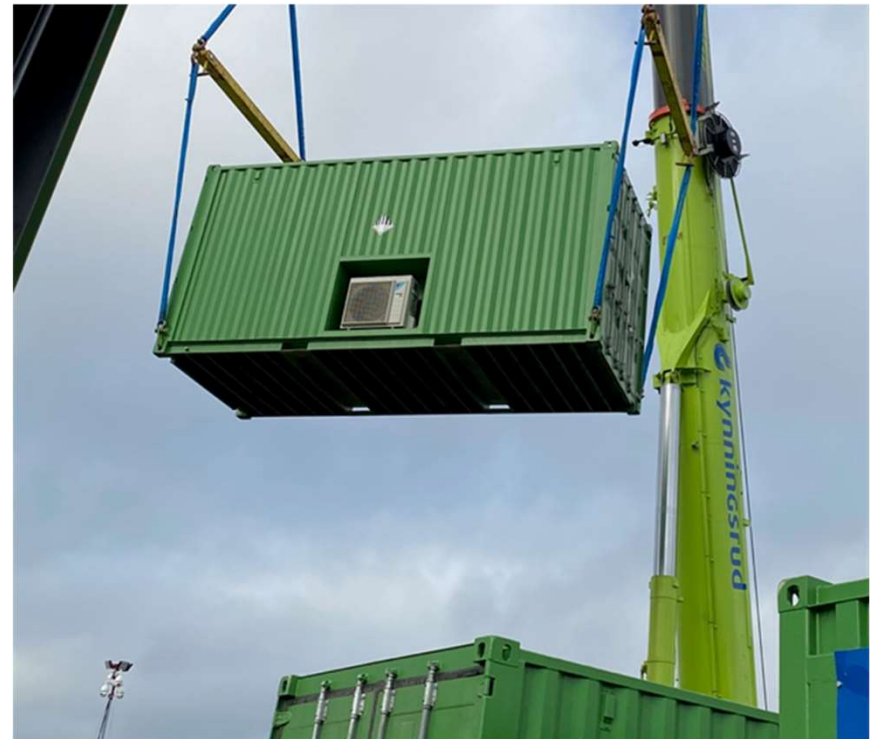


Thank's  
Arne Berlin Vattenfall Eldistribution



# Challenges

- Regulations, Contract terms for grid connection
- Define services
- Software issues, interface
- Fire protection, design to prevent fire and spread of fire
- Losses in the battery plant
- Digitized maintenance



# Dialog

## Utveckla stödtjänster

# Placering av batterier

## Produktions- anläggning

- Optimera produktionsanläggningen.
- Kompletterande tjänster till elmarknaden.

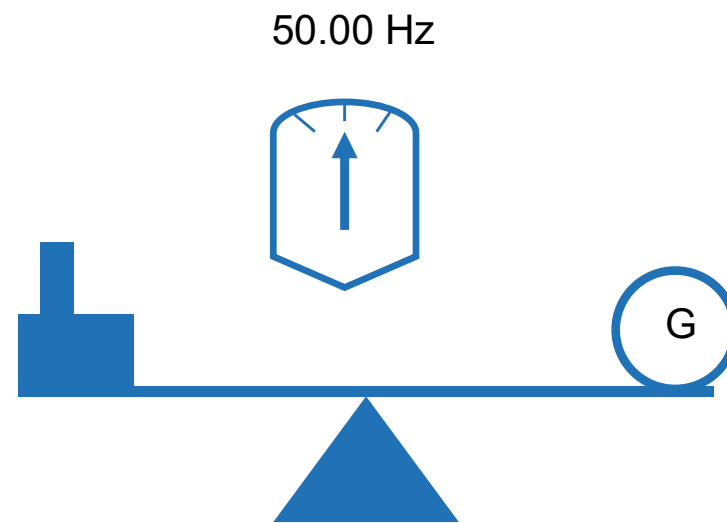
## Distributions- nätet

- Tjänster till elmarknaden.
- Kompletterande tjänster till elnätet.

## Elförbrukare

- Optimera nätutnyttjande / tariffoptimering.
- Kompletterande tjänster till elmarknaden

# Effektbalans i växelströmsystemet

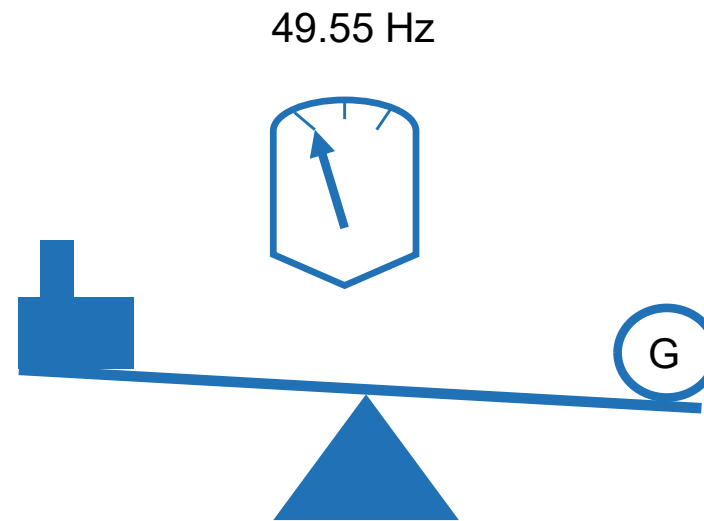


**FCR-N**

Svk stödtjänster  
säkerställer  
effektbalans

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# Plötslig obalans i elsystemet



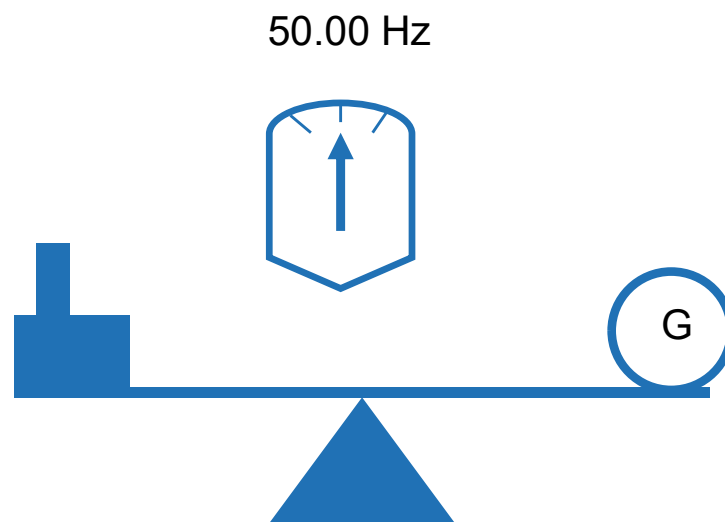
**FCR-D**

FCR-D är en  
"standby" resurs  
som passar  
batterier

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# Effektbalans återställd

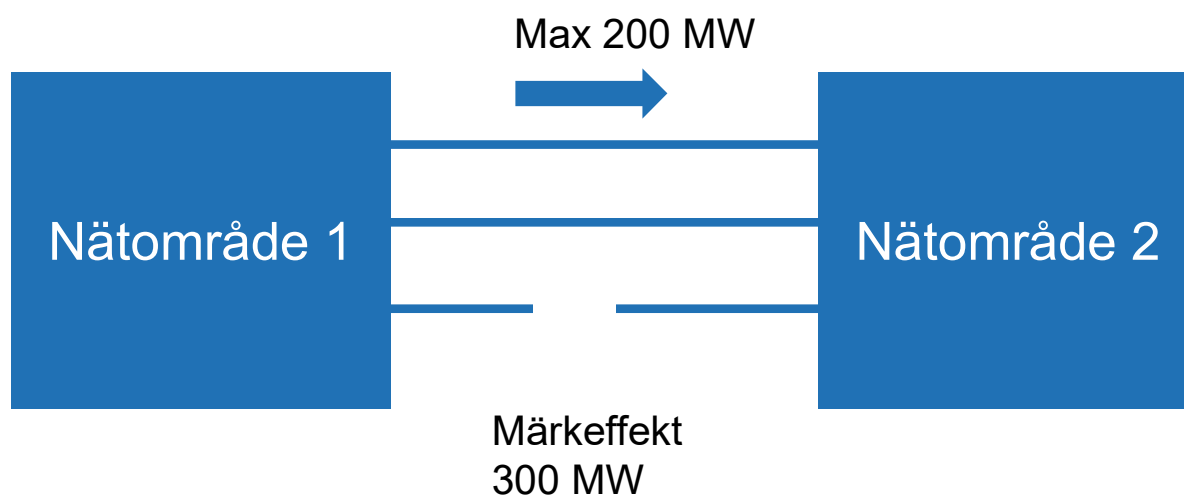


**FCR-N**

Balansansvariga  
har återtagit ny  
effektbalans

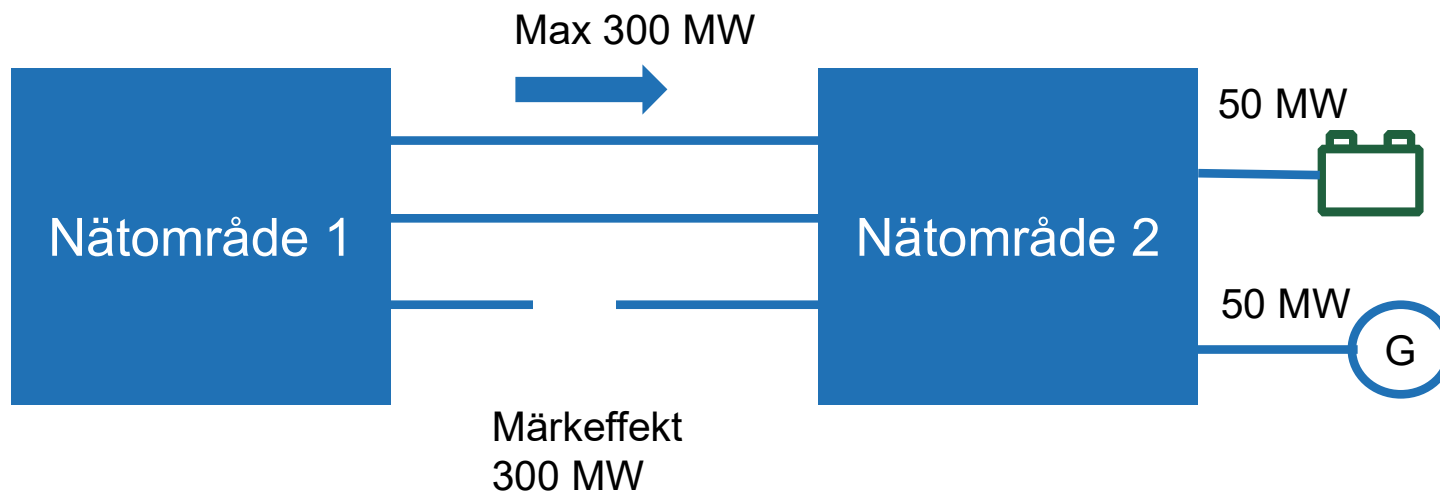
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# Effektflöde mellan två nätområden



**N-1**

# Öka överföringsförmågan



**N-1**

FPC-D ??  
Fast Power Compensation Disturban  
*En standby tjänst som triggas av  
ledningsfel*