



Elhub - Powering Norway's Energy Data Management

The bumpy road to a well-functional Datahub for orchestration of markets processes, collection, calculation and settlement of metering data.

As well as entering the new area of gaining additional value and benefit from the stored data, including 100% fulfilment of GDPR-demands.

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Elhub AS
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Outline

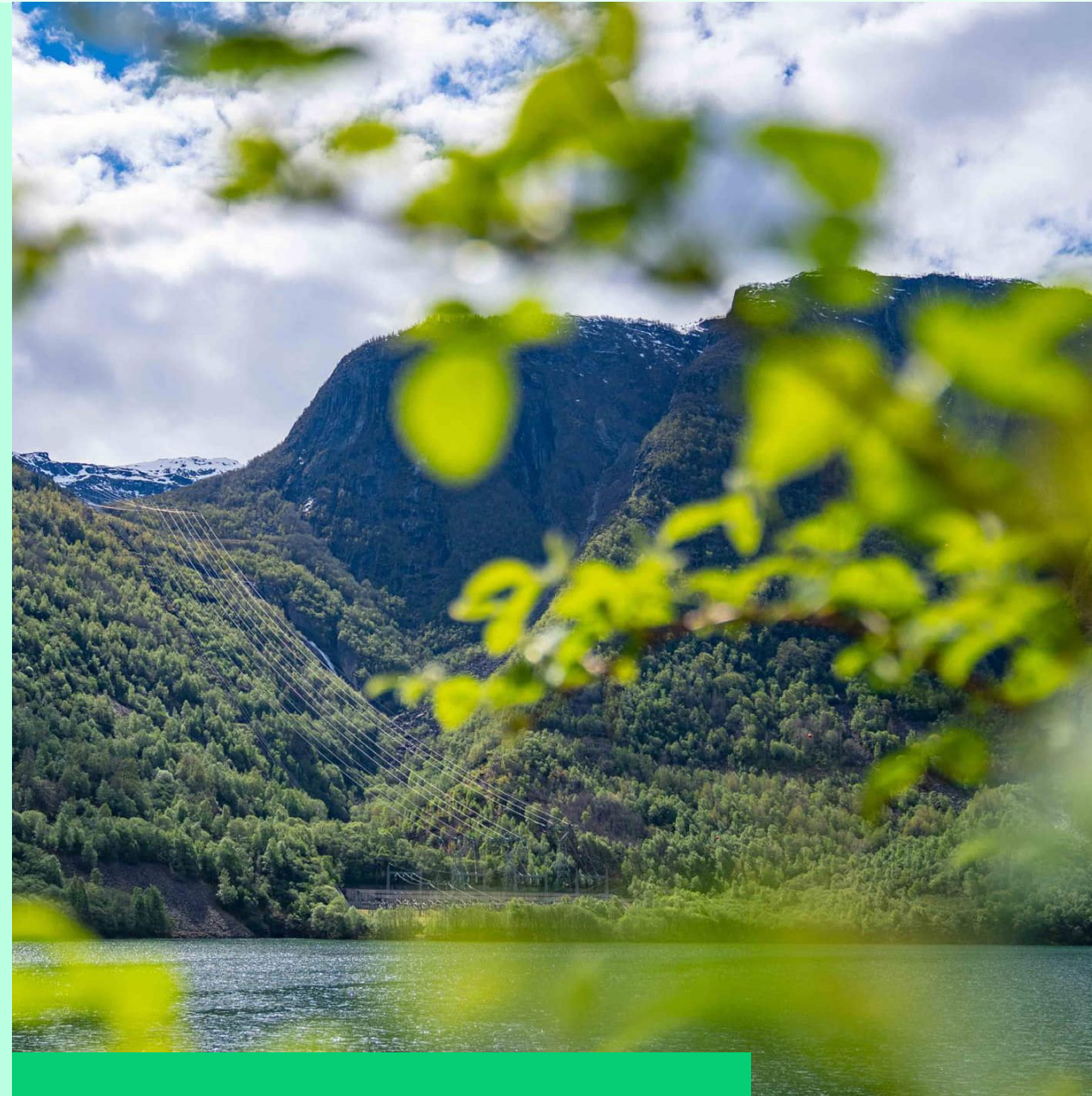
- 1) About Statnett SF
- 2) The new electricity era
- 3) **Evolving process - from idea to operational solution**
- 4) **Launching a full fletch operational system – A datahub**
- 5) **Hurdles and challenges**
- 6) **Uniqueness, the challenges and opportunities by a "Data vault"**
- 7) **Before new functionality – improve data quality and system robustness**
- 8) Sum up

About Statnett

About Statnett

Statnett is the system operator in the Norwegian energy system. Statnett is a state enterprise owned by the Norwegian state through the Ministry of Energy.

Our mission is securing power supply through operations, monitoring and preparedness around the clock.



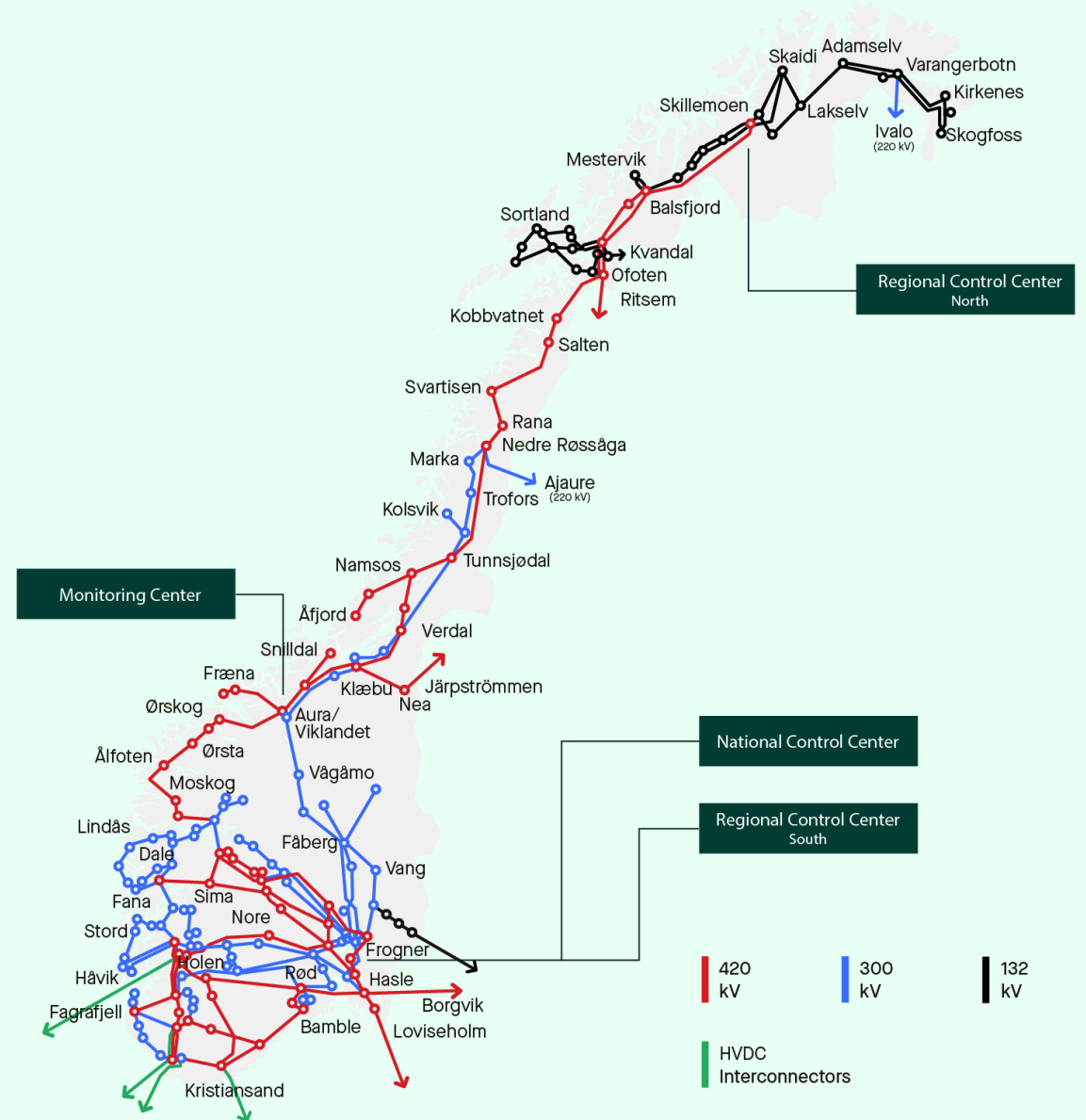
This is Statnett

Statnett is the system operator for the Norwegian power system.

Statnett operates approximately 11 400 km of high-voltage electricity grid and 2 300 km of high-voltage cables (subsea and ground). In addition, Statnett operates 236 substations.

The operation of the power system is continuously monitored by the national control center and two regional control centres.

Statnett is also responsible for interconnectors to Sweden, Finland, Denmark, Germany, Great Britain and the Netherlands.



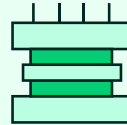
Statnett's strategy

Electrification for a New Era

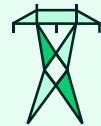
Statnett's strategic choices are influenced by the world around us, with climate challenges, energy transition, and increased geopolitical tensions.

Statnett will make the best possible use of the existing grid and build more network infrastructure than it has in a long time.

We will work sustainably, safely, and cost-effectively.



Increasing Capacity in the Existing Grid and Power System
We will efficiently connect more consumption and production faster than by expanding the grid.



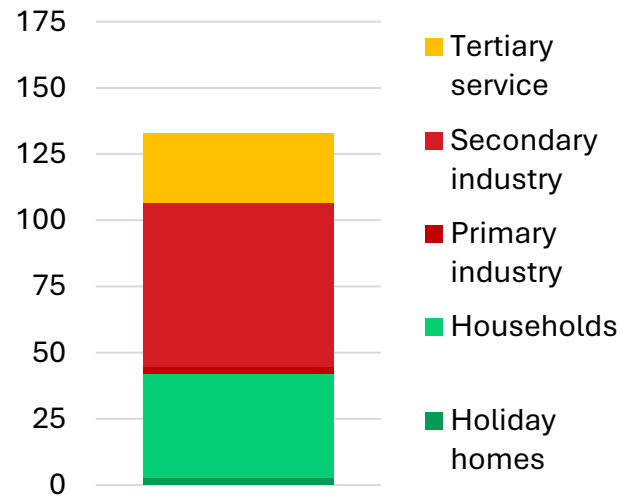
Plan and build the grid and power system faster and more efficiently
To meet future electricity consumption, we must build and upgrade the grid faster and more efficiently.



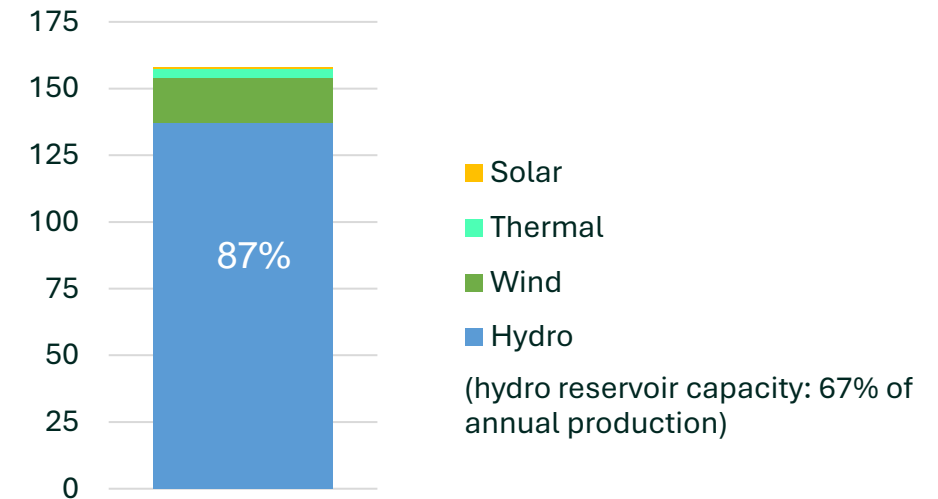
Increasing Robustness in Operations and Development
Investments in digitalization, system upgrades, and security solutions will provide us with a more robust grid and system.

Electricity system context Norway

Electricity demand: 133 TWh per year
(peak demand of 25 GW)

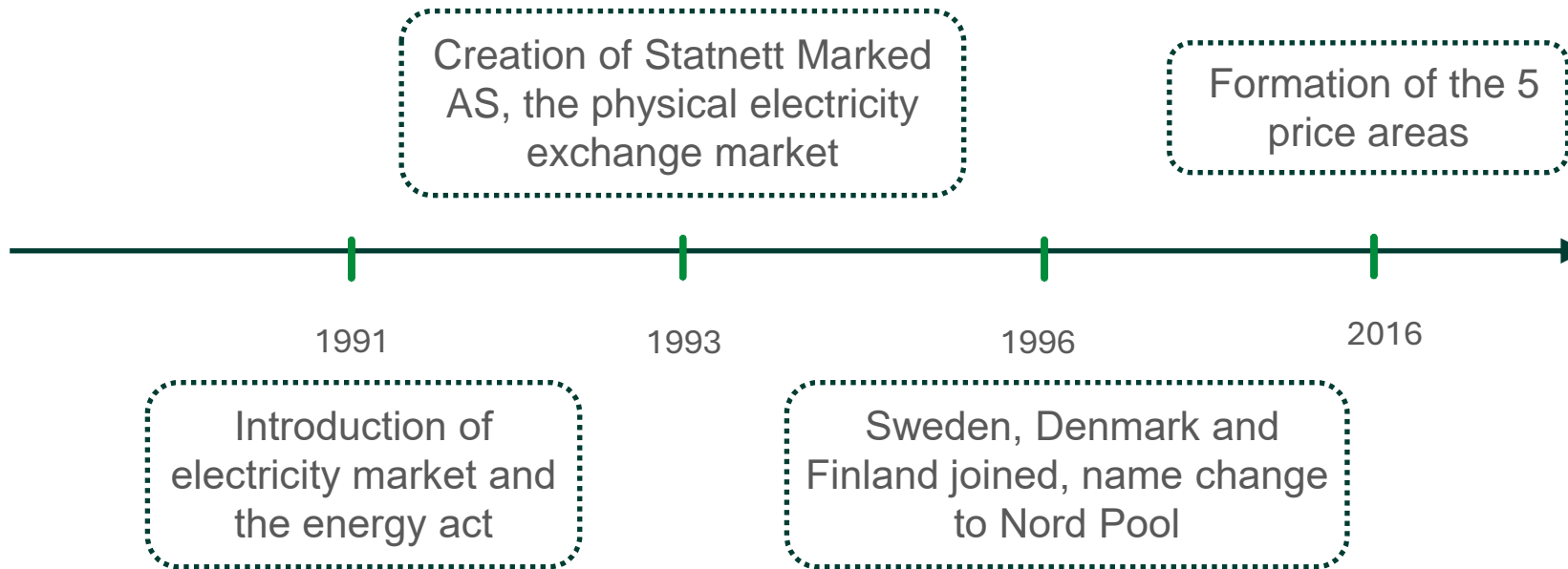


Electricity generation: 158 TWh per year

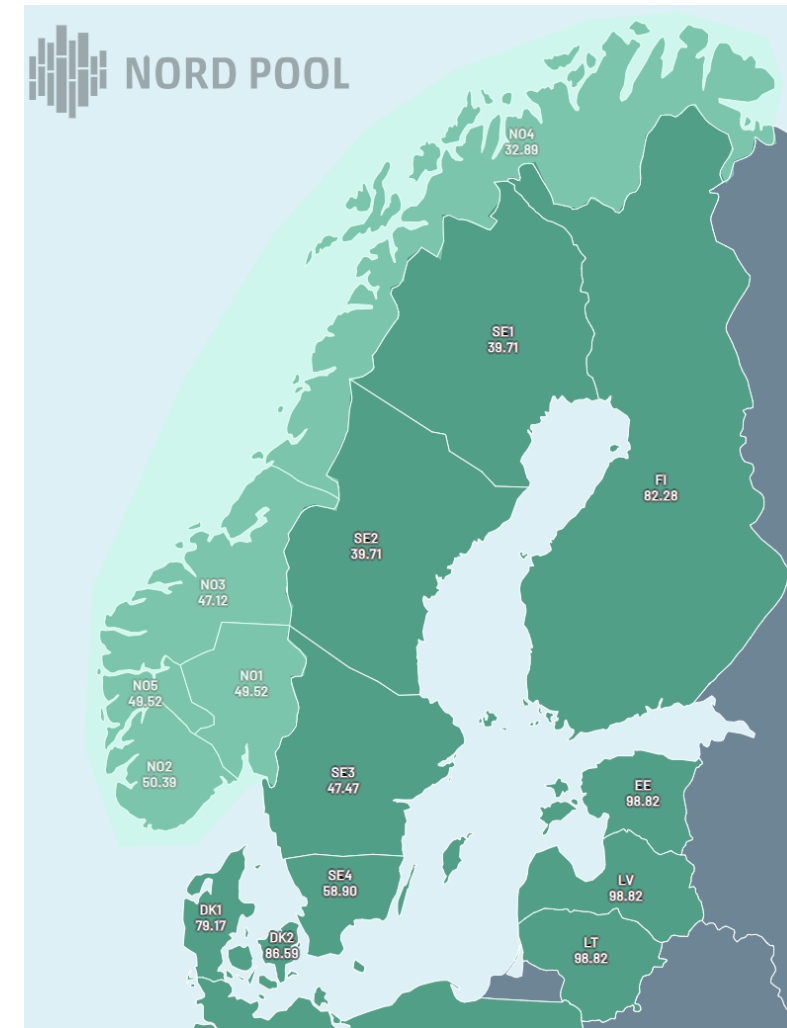


- 99 % coverage with **smart meters** and national database (Elhub)

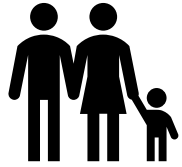
The Norwegian whole-sale market



- 96% of electricity demand traded via power exchange market Nordpool



Retail competition



Customers
3,250,000 in total
2,500,000 households



Retailers
> 100 electricity retailers



- New retailers: **Low entrance barriers**
- Customers: **Freedom to choose** retailer
 - 10 -20 % of the customers change retailer each year
 - Market share of largest retailer is 63%
 - Local grid company is supplier of last resort
- Main competition factor: **Price**
 - Increasingly important: User-friendliness, demand and price information in the retailer's **app + extra services** as smart charging of electric vehicle
 - For the Government – relatively low barrier to introduce electricity bill financial support schema – without destroy the market functionality
- Information: **Well informed customers**
 - Retailers are obliged to report all contract offers to Norwegian consumer council
 - Price comparison of all existing contracts available on the web



Evolving process – from idea to operational solution

- the central metering value

datahub for the electricity market i Norway

Main steps in the introduction of new market rules and a central datahub for the electricity market

elhub

2011-2013

Approve Laws and Regulatory processes



2013-2014

Develop Documentations and Detailed specifications

March 2015

June 2015

Regulations adjustments approved

Statnett public Procurement process – Elhub ICT-system

Agreement with Accenture, eMeter and Oracle

2015-2017

elhub

Design, Development, Implementation plan , Testing and Data migration

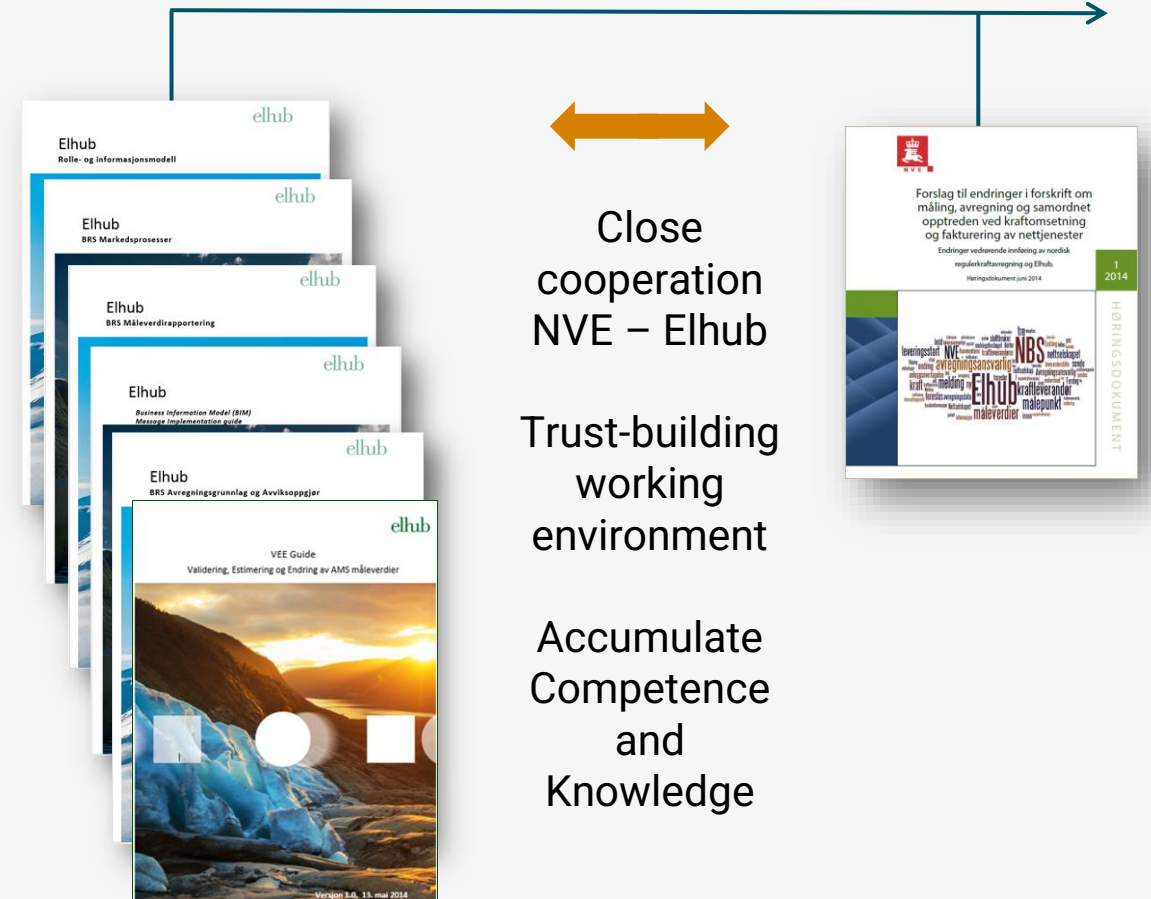
Go-live
18.02.2019

Elhub establishment orders and dependencies'

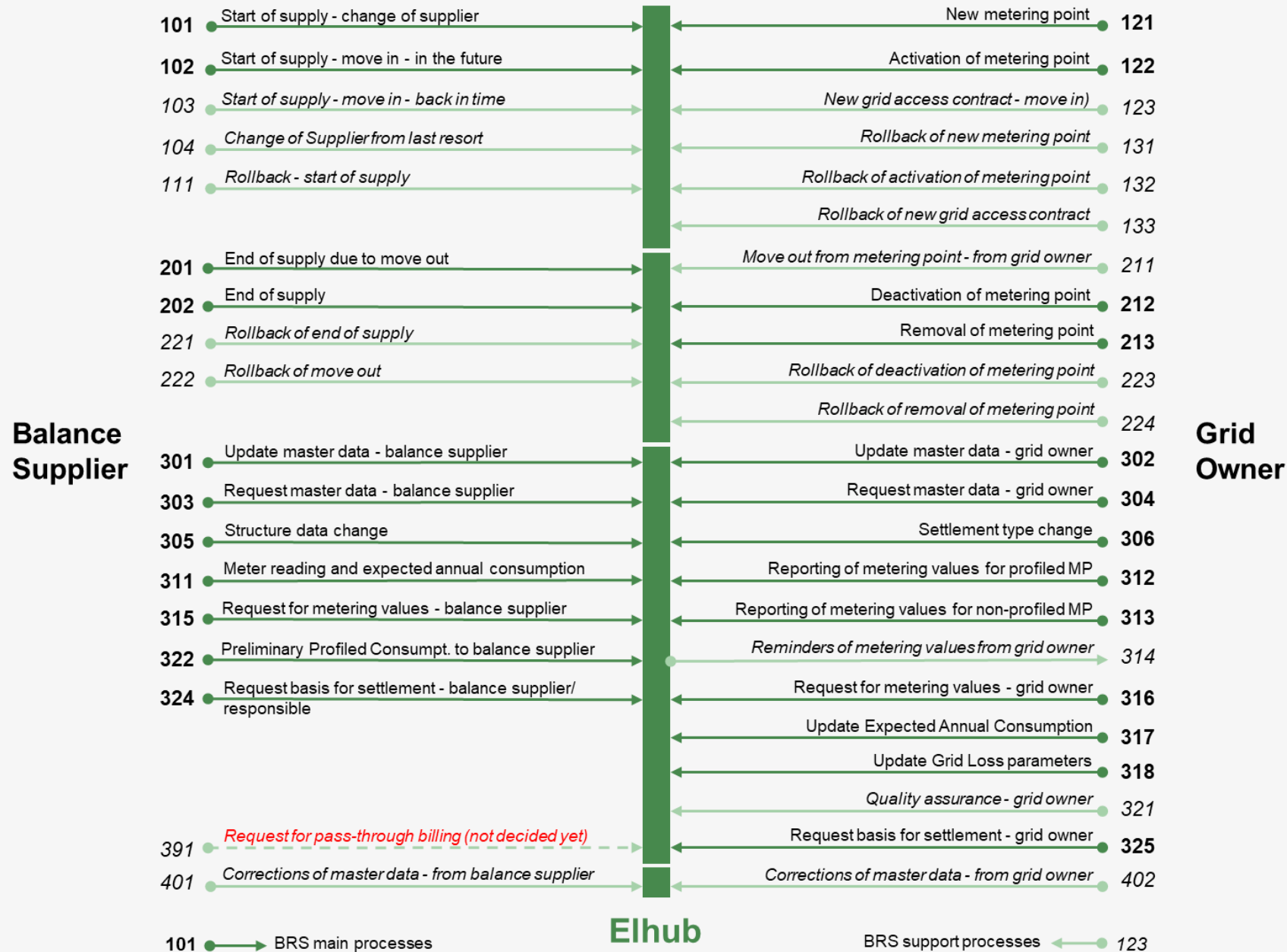
- Recommendations and how we did it:
 - Clear cut Role responsibility in the project cooperation (Advisor vs Regulator)
- NVE(Regulator) – Writing Regulations, regulate and executing audits of Elhub.
- Statnett/Elhub – Design, develop, implement and operational management of a datahub.
- Tight cooperation to secure a secure, efficient, transparent and operational well design solution
- Develop Regulations and Rules that are practical executable and to the benefit of the end-users, the market actors and give socio-economic benefit to society.
- Place the regulations on the "right" detail level and make sound evaluation on what to regulate and what to put into branch standards
- Clear cut definition on role content, responsibility for information and tasks between the market actors.
- Branch councils and Branch user-groups to discuss issues and conclude – choice of content in market model.


Winter 2013/2014

June 2014



New business processes defined BRS-NO-*nnn*





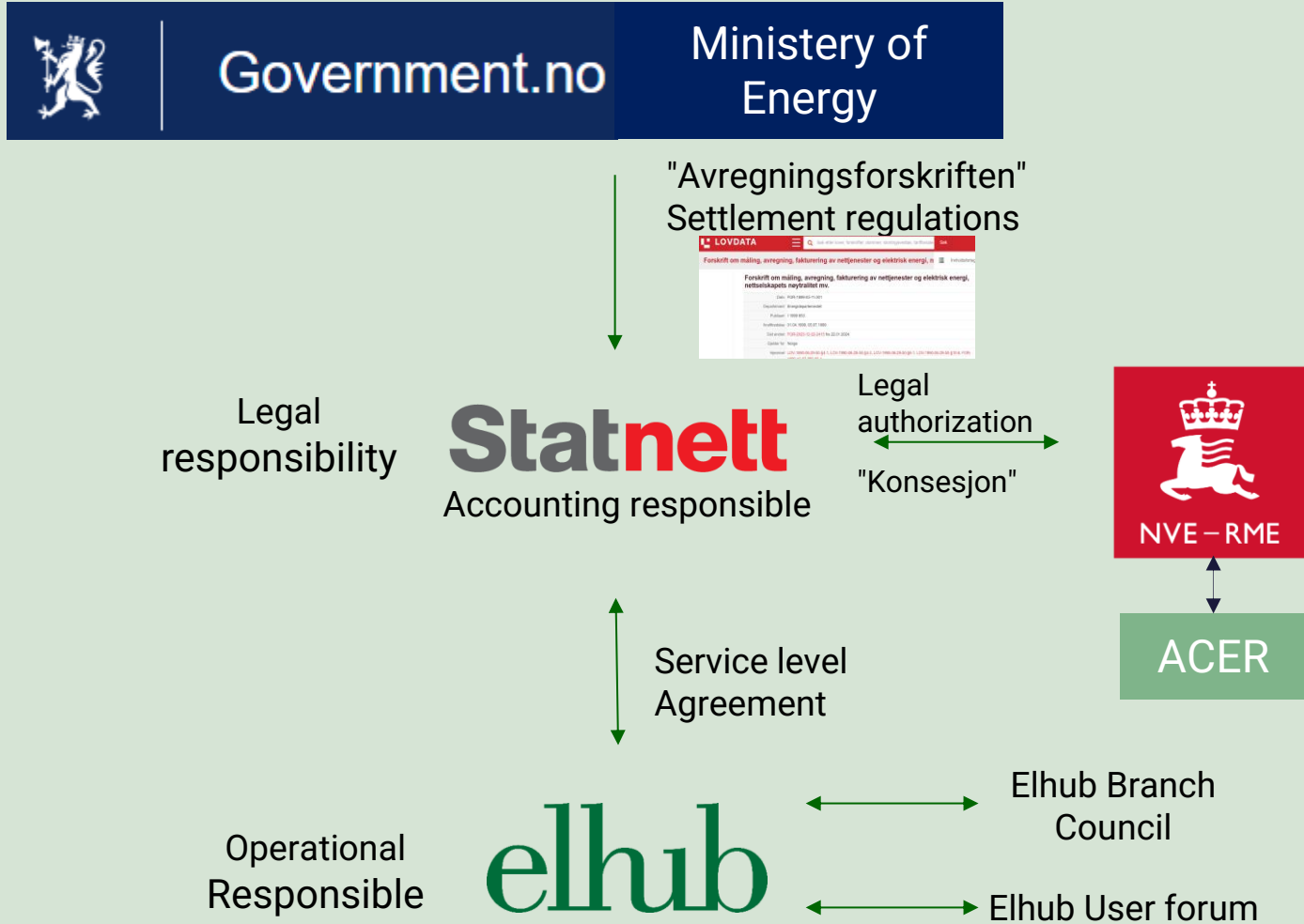
Launching a full fletch operational system – A datahub

- the central metering value

datahub for the electricity market i Norway

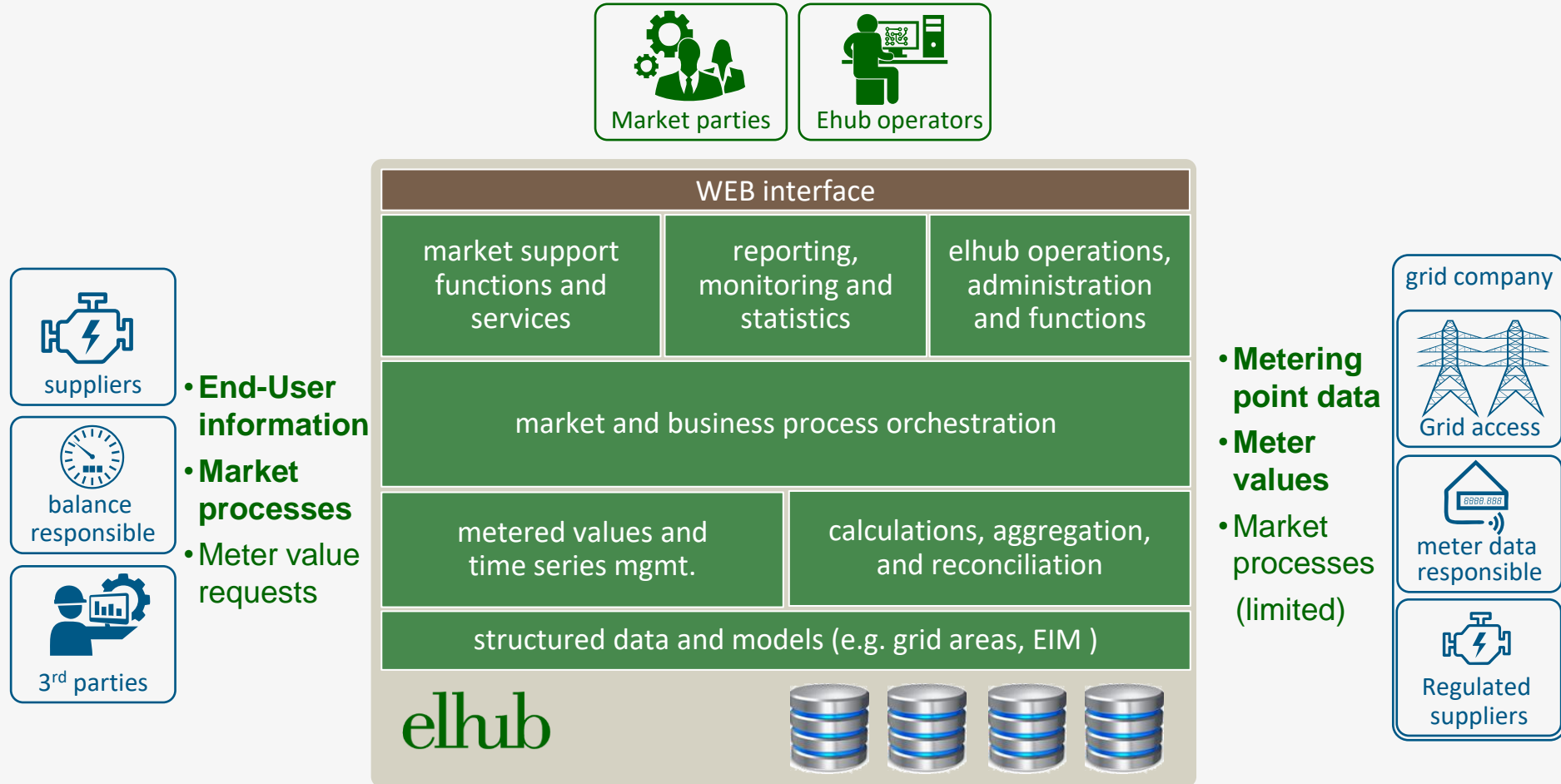
"The development of Elhub will contribute to the modernisation of the power industry and enable efficient use of smart metering (AMS) through more efficient communication and data management. " (Sic. NVE/Regulator)

Elhub?

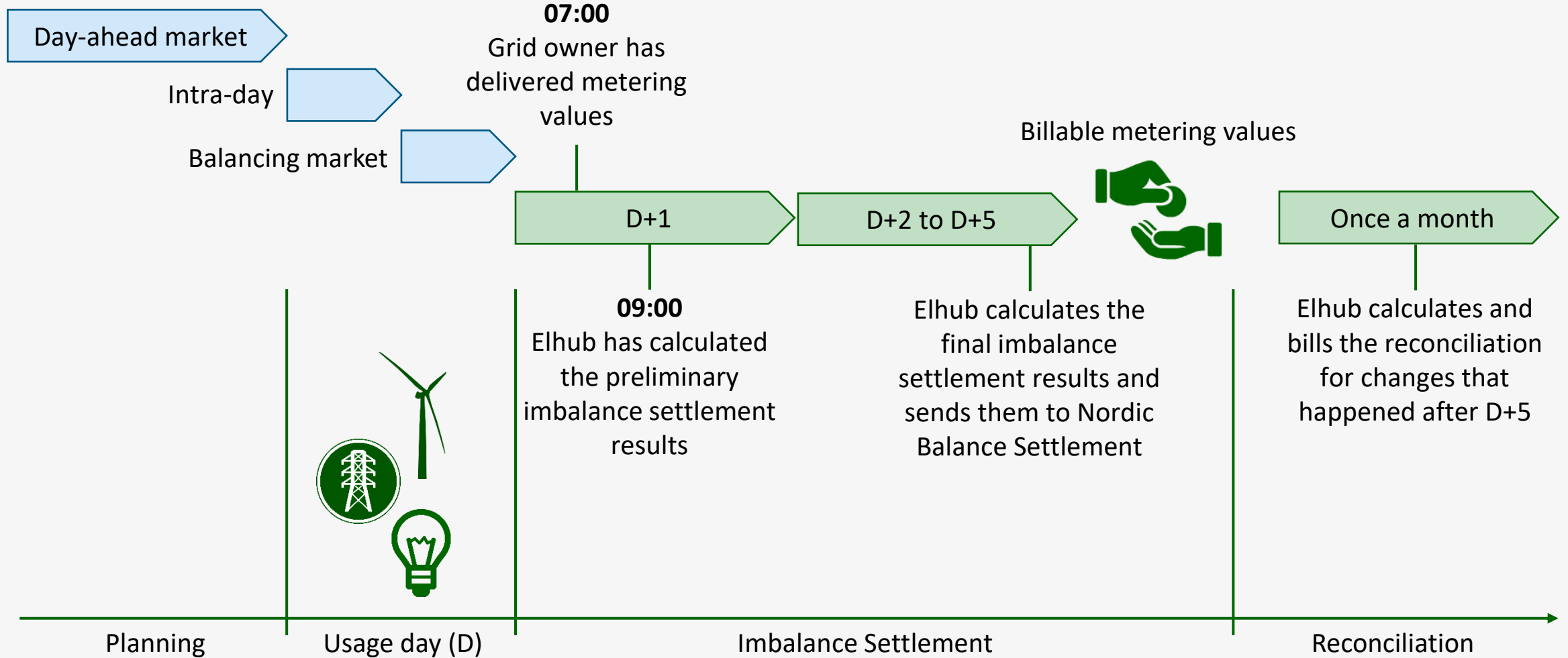


- 100% owned Statnett affiliate
- IT – development company
- ~ 80 employees + hired consultants
- Development cost approx 650 MNOK i 2019
- Metering value and market process orchestration
- 0,5 PB of stored data (increasing)
- 100 millions metering value every day, will increase by introducing 15min MTU

The elhub solution

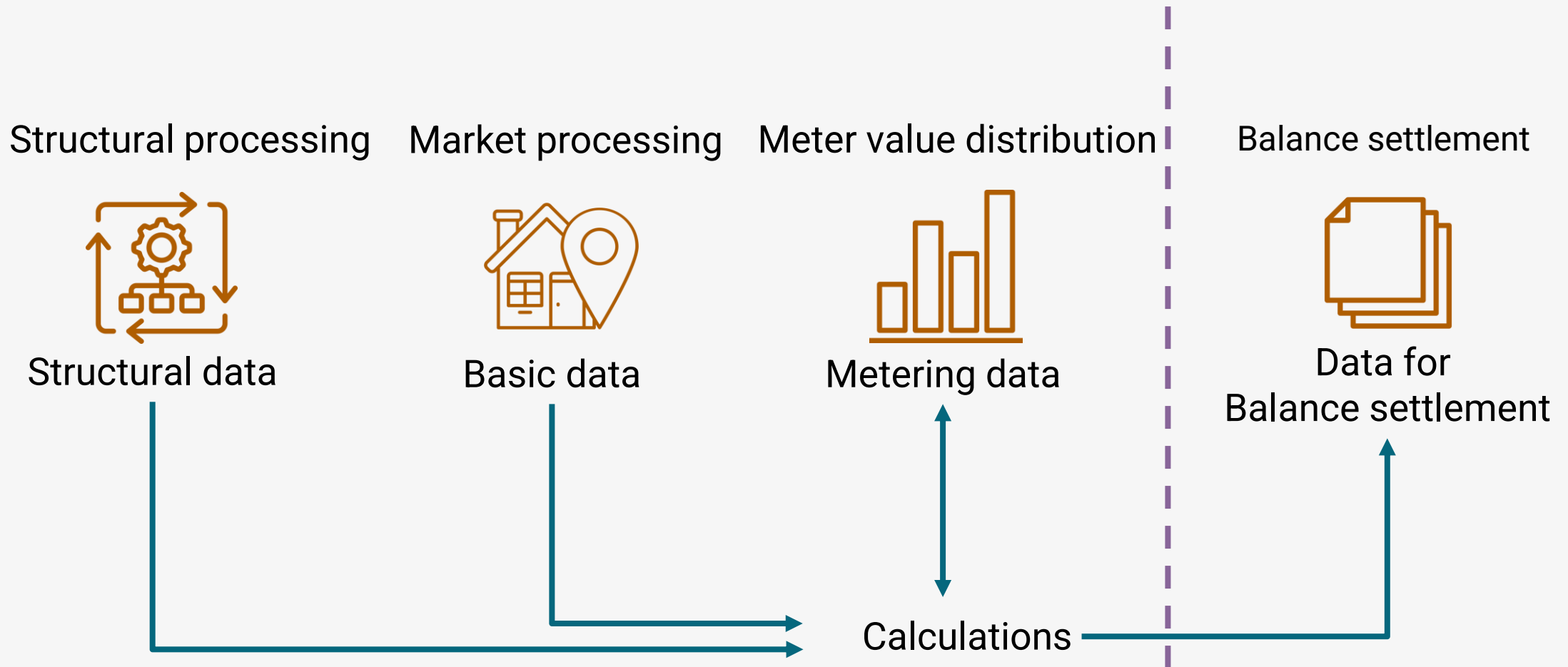


Timeline for imbalance settlement and reconciliation



Ehubs Core operations;

- secure, efficient and transparent settlement execution





Hurdles and challenges

- the central metering value

datahub for the electricity market i Norway

Digital interaction across the electricity value chain

Digitalised value chain covering end-user consumption, Production and Grid exchange

Statistics og analytics

140 Balance Suppliers



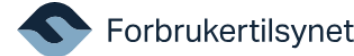
58 Third-parties



End-users

elhub.no
<https://elhub.no> › om-
 Min side - Elhub

Nordic Balance settlement



elhub

- Hourly/15min metering values from approx. 3.6 mill. Metering points
- End-user Metering point information
- Metering point information
- New functionality under construction



125 Grid Companies,
 Whereas approx. 70 holds majorities of end-users

Hjem / [Måleverdier](#) / [Måleverdier for Østkroken](#)

Måleverdier for Østkroken

Velg en fane for å se type måleverdier (f.eks. forbruk eller produksjon). Trykk på søylene for å endre tidsoppløsning. Du kan laste ned en måned om gangen ved å klikke på Last ned-knappen.

Forbruk



← ↻ 🏠 🔒 https://api.elhub.no/intro

elhub Introduction APIs

Welcome to Elhub API Services

Elhub is developing APIs to support our vision of sharing more data with the public and end users. public, empower end users with data and promote innovation in the energy market.

We are just starting out with the development, and will publish documentation of each new API as

APIs

Under **API** you can find an overview of our current APIs, what data they provide and how to use the page with technical documentation. Use the base URL <https://api.elhub.no> when accessing the en

Terms of use

As of now we only provide public data with limited restrictions to the service, but we will update th advise all users to not cause unnecessary traffic or overload our servers.

General information about the service

- Public APIs are open for everyone and do not require any authorization.
- Any future APIs with personal or business sensitive data will require strict access control.

Graf - strømproduksjon

Grafen viser aggregert statistikk om utviklingen i strømproduksjonen per døgn for hver produksjonstype og hvert prisområde fra 01.01.2021. [Datasettet grafen er basert på finner du her.](#)

Strømproduksjon pr måned

Prisområde

- Velg alt
- NO1
- NO2
- NO3
- NO4
- NO5

Produksjonstype

- Velg alt
- Annen kraft
- Solkraft
- Termisk kraft
- Vannkraft
- Vindkraft

År	januar	februar	mars	april	mai	juni	juli	august	september	oktober	november	desember	Totalt
2021	17 458 452,63	14 415 423,28	13 800 520,32	12 444 947,33	12 081 791,86	11 422 491,18	11 048 602,22	10 398 800,87	11 235 149,64	12 356 565,33	14 418 719,95	16 050 304,20	157 131 768,81
2022	15 079 245,40	12 963 850,13	14 625 686,15	11 149 622,95	10 779 333,10	11 479 548,69	10 672 435,09	10 466 507,25	8 578 919,96	11 019 130,80	14 328 435,04	14 854 776,82	145 987 491,38
2023	14 144 280,47	13 785 016,81	14 327 380,06	12 004 871,84	11 123 428,80	11 330 772,59	11 481 413,28	12 198 852,85	12 010 683,91	13 379 132,22	14 291 803,68	13 972 972,27	154 050 608,79
2024	15 570 904,35	14 178 338,20											29 749 242,55

Produksjon pr år | **Strømproduksjon pr mnd** | Strømproduksjon pr dag | Strømproduksjon pr time | Produksjon pr produksjonstype

Microsoft Power BI | < 2 av 5 > | 94%



Uniqueness, the challenges and opportunities by a "Data vault"

- the central metering value

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Live energy trades Brattøra

2023-04-28 09:00:00

Want to know more?



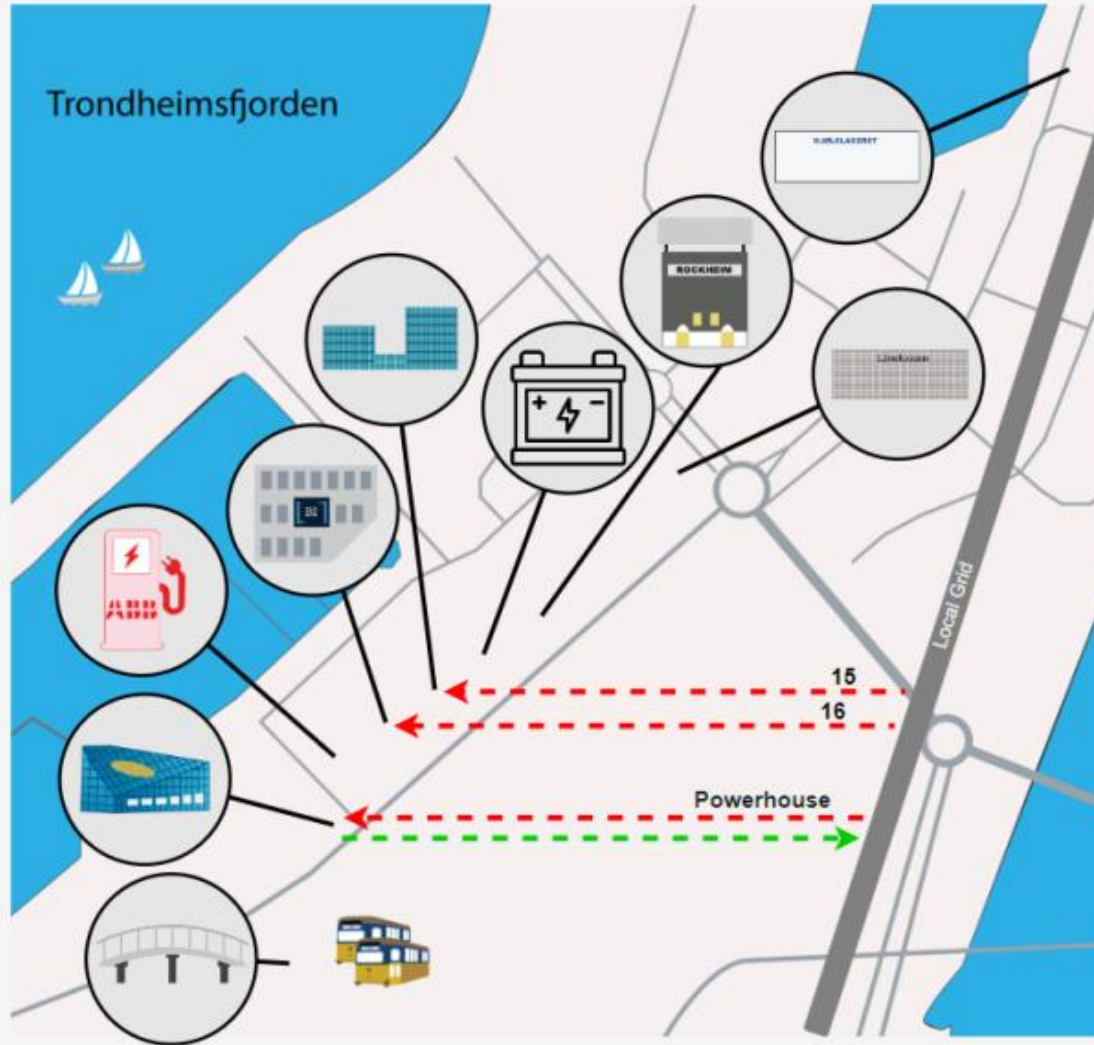
ANEO



volue



SKANSKA

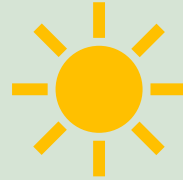


■ Sold ■ Bought

	Kjøllaseret	0.00 MW	Kjøl og frys
	Lånekassen	0.00 MW	Lånekassen
	Rockheim	0.00 MW	Rockheim
	Battery	0.00 MW	Battery
	Brattørkaia 15	182.34 kW	←
	BI Campus	12.07 kW	←
	V2G	0.00 MW	
	Powerhouse	4.90 kW -199.31 kW	← →
	Bridge Sjøgangen	0.00 MW	

hub

Solar self production and feed-in tariffs



- Installed solar capacity: 640 MW (almost all rooftop)
- Consumption:
 - Self consumption around 50%
 - Allowed to virtually share production with other customers on the same property since 1 October 2023
- Prosumers can get "plus contracts" from retailers:
 - Feed-in to grid below 100 kW
 - Appr. 29 000 prosumers (83 % households)
 - No grid fees and taxes on production
 - Price for feed-in production follows spot price (+/- x)
 - Some retailers offer contracts with "virtual batteries"

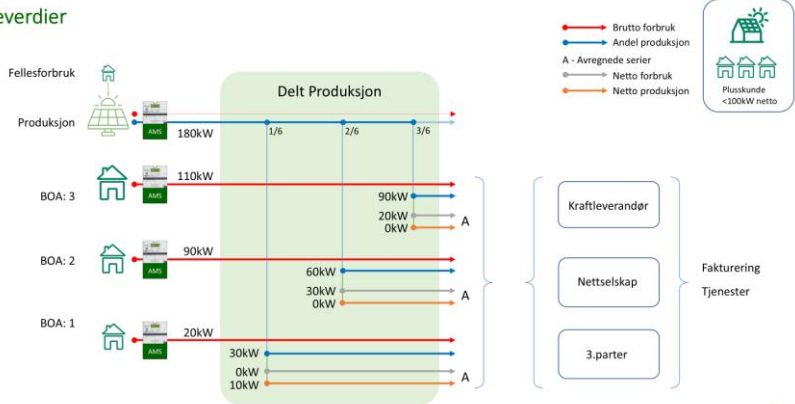


Picture generated by Microsoft Copilot

Elhubs solution for shared production

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Måleverdier



Et forenklet eksempel

elhub

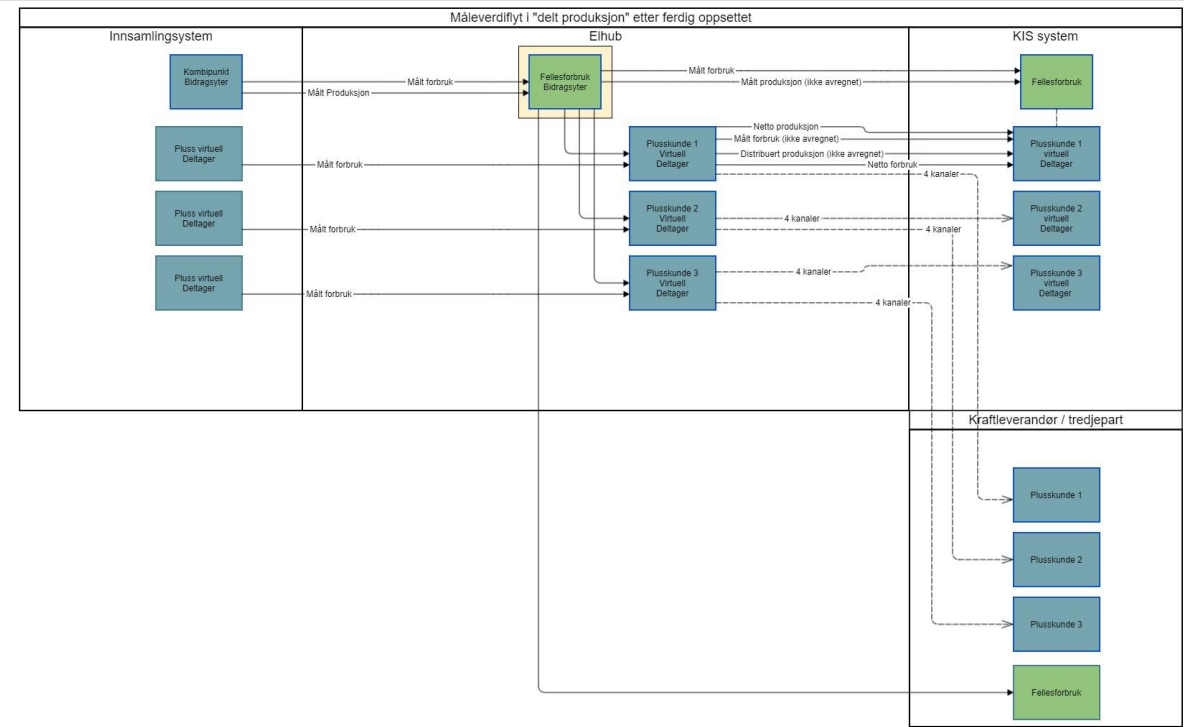
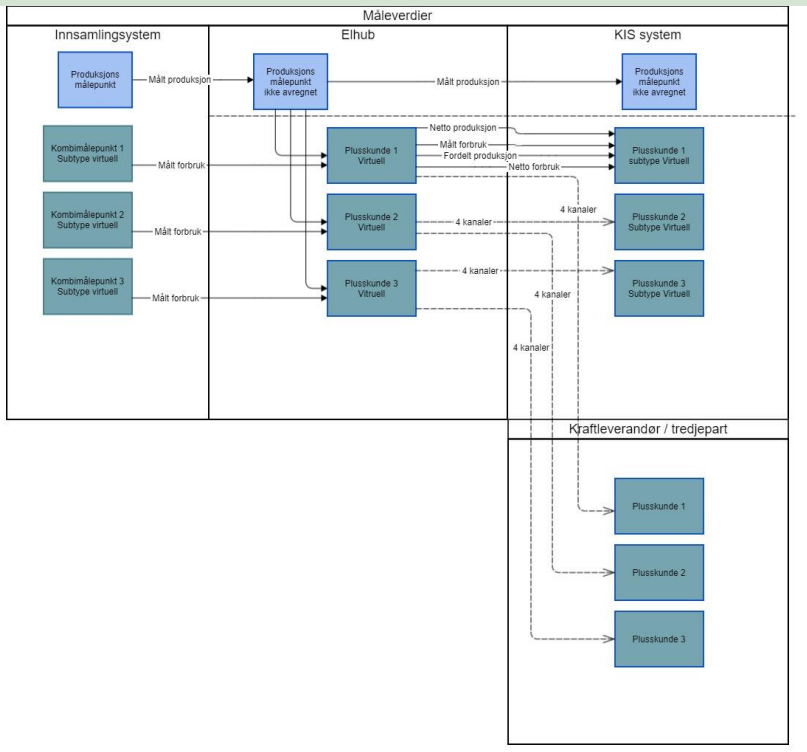


Geographical limited industrial area location

Multi-apartment buildings

Limited geographical area of houses

Limited geographical area of farm buildings



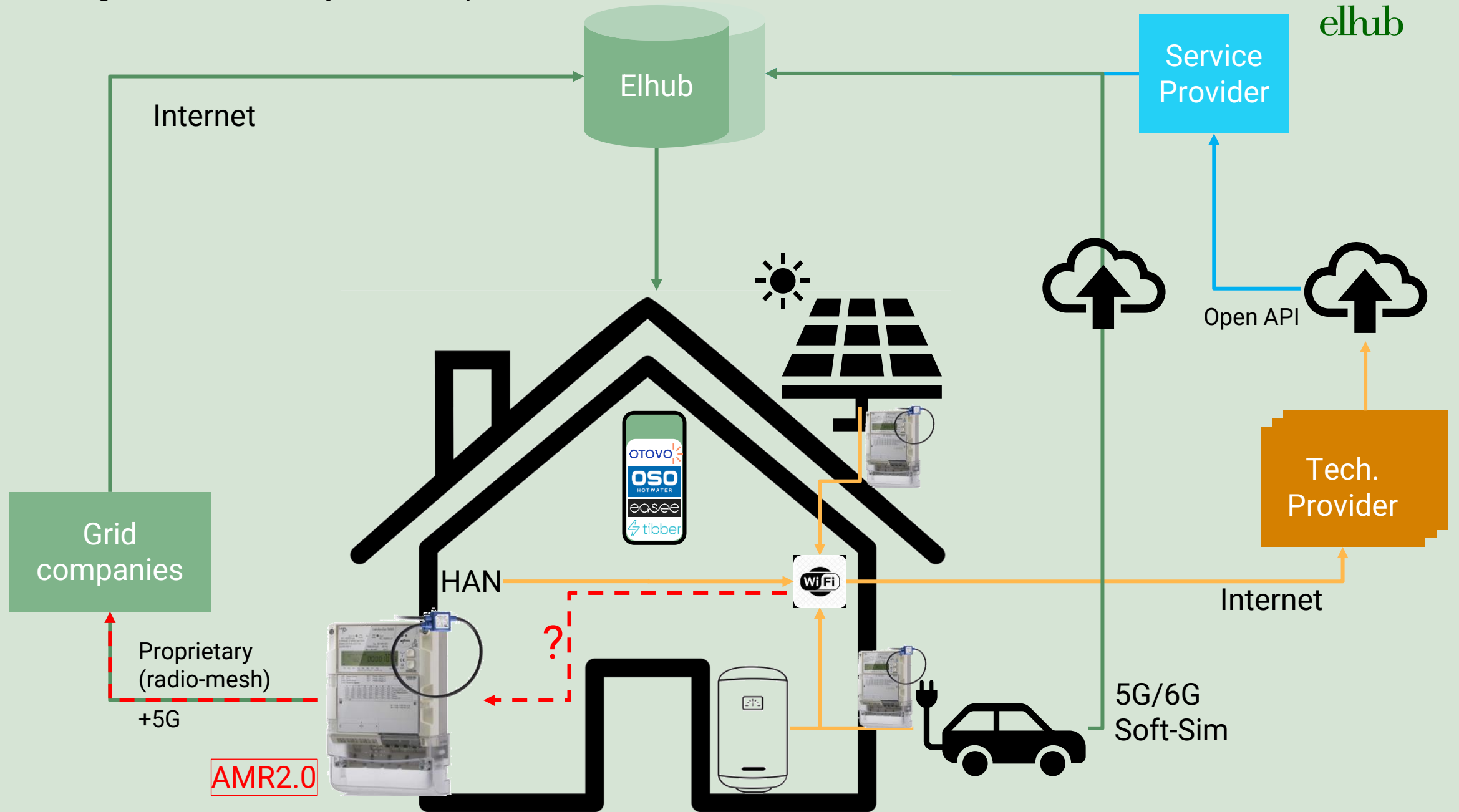


**Before new functionality –
improve data quality and system
robustness**

- the central metering value

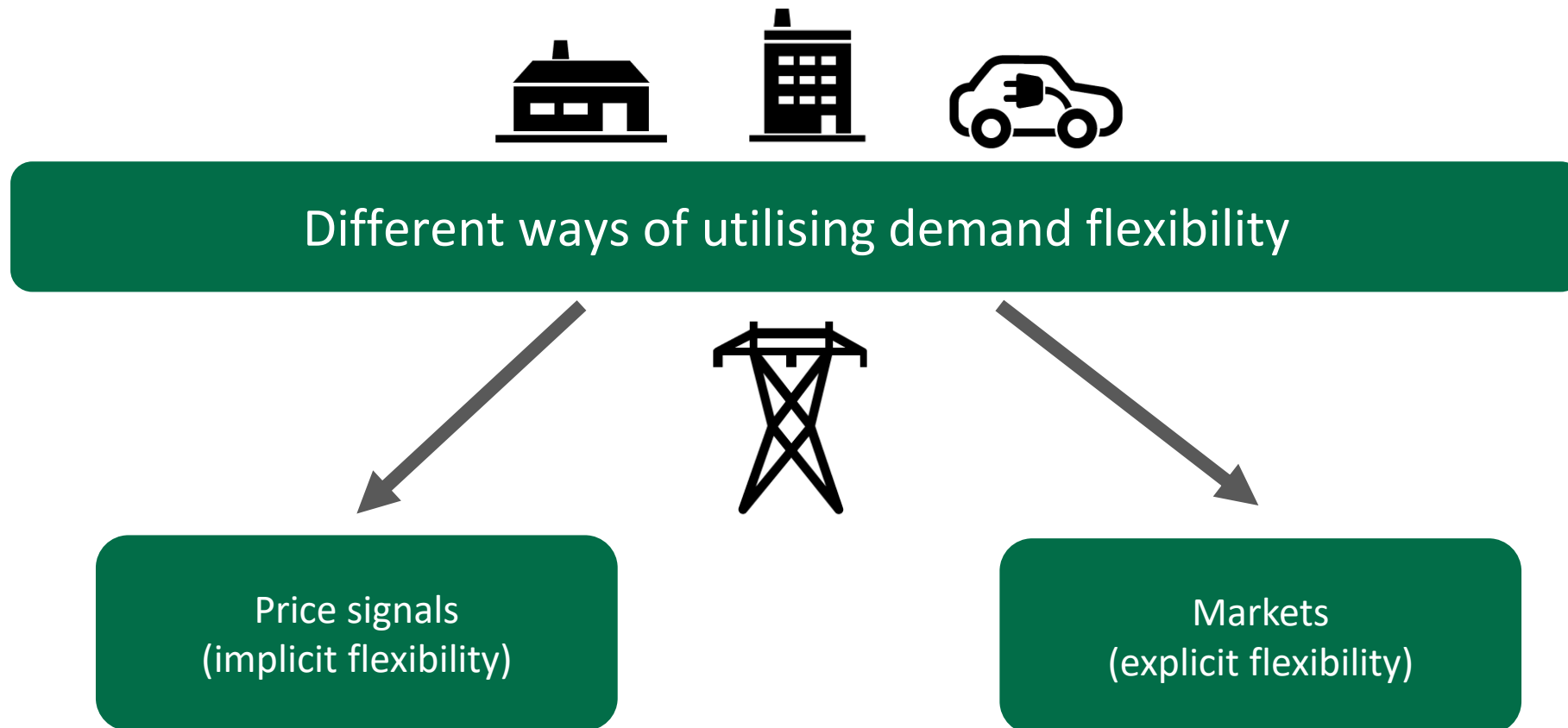
datahub for the electricity market i Norway

The challenge - a few of many future aspects

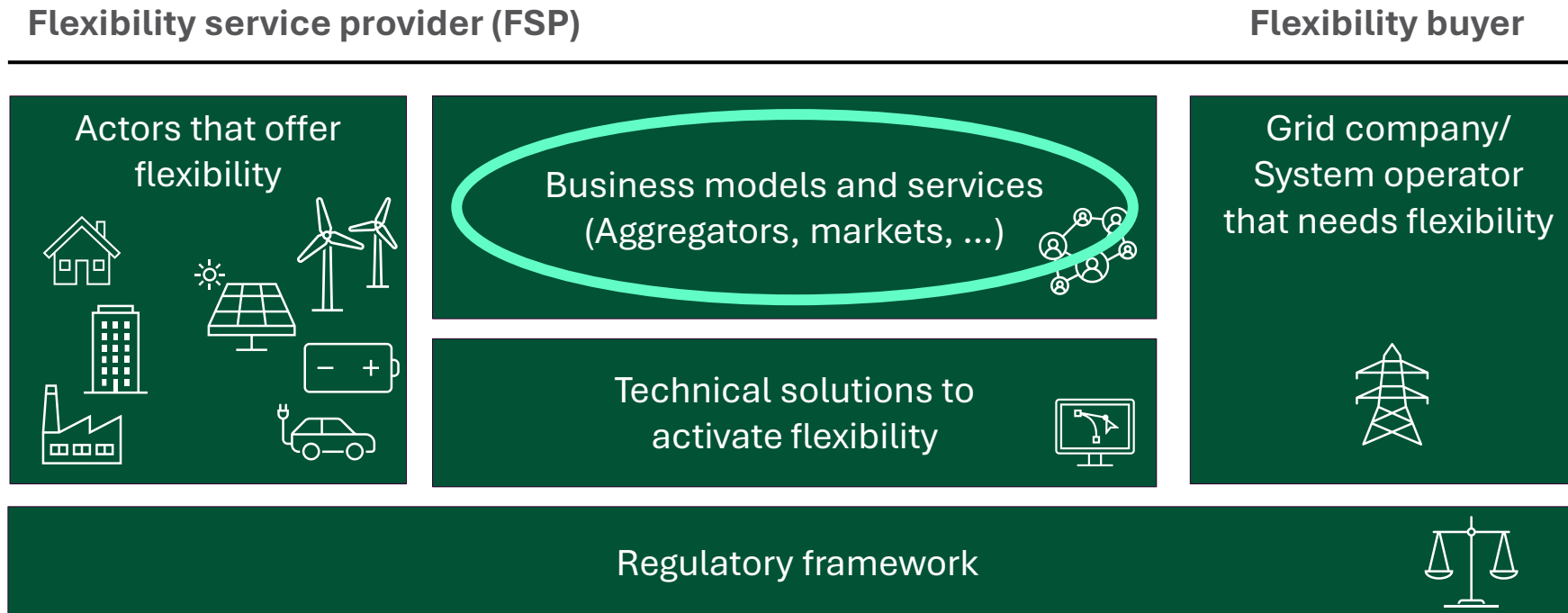


Demand flexibility in the power system

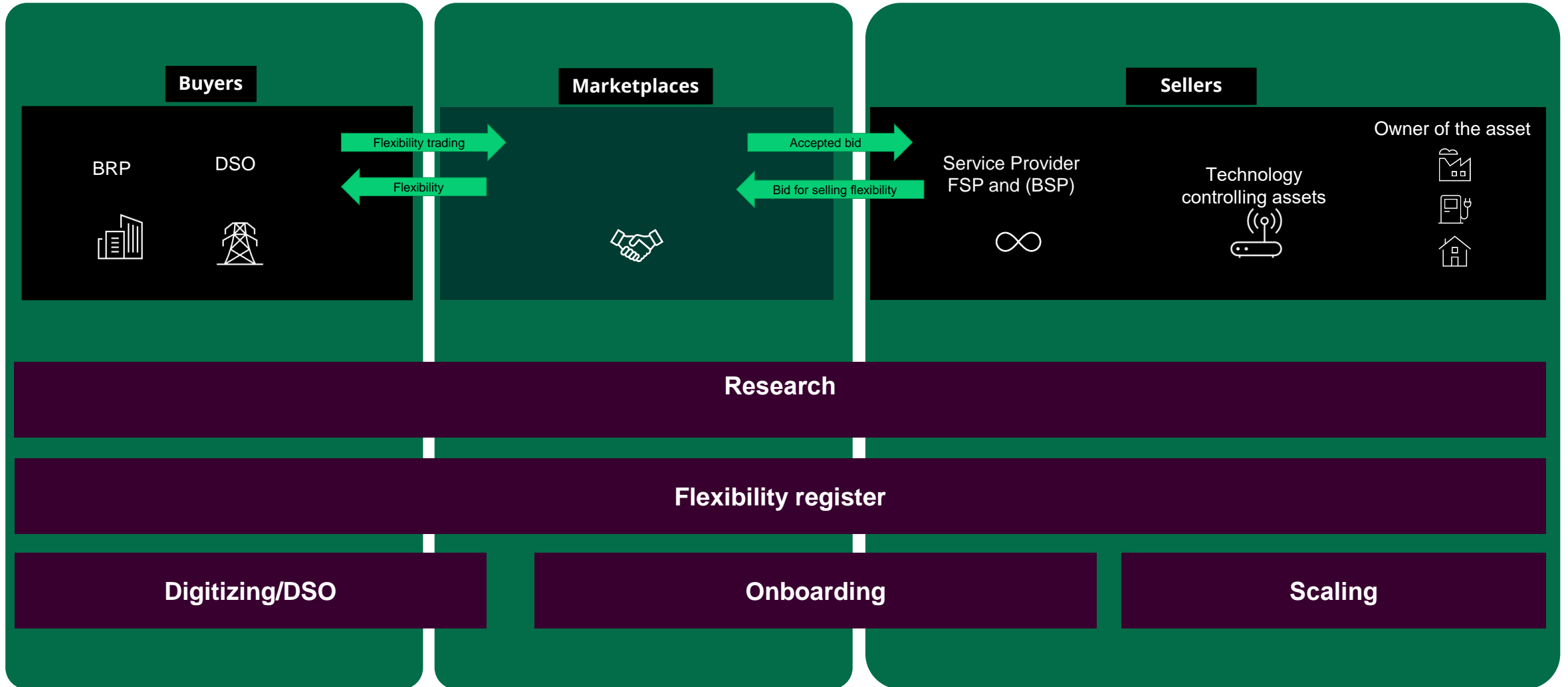
- Demand flexibility: end users change their electricity usage from their normal consumption patterns



We need a complete and complex value chain to release sufficient amounts of flexibility

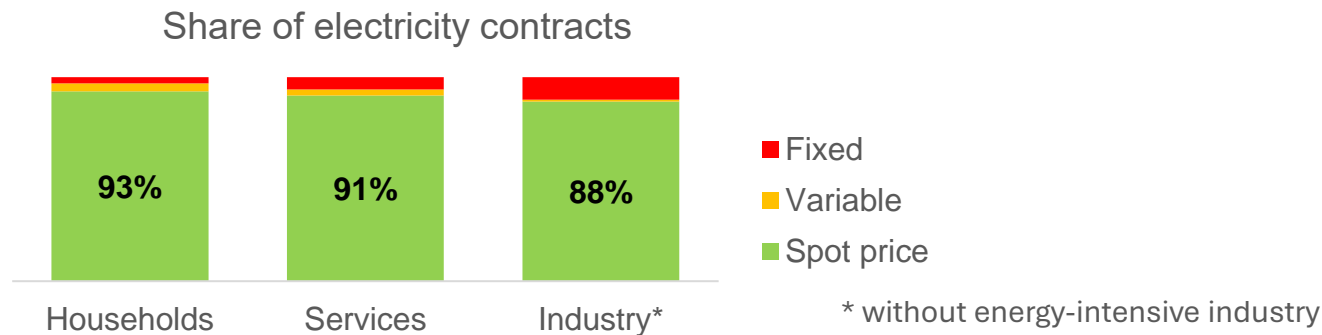


Focus on local markets (DSOs)



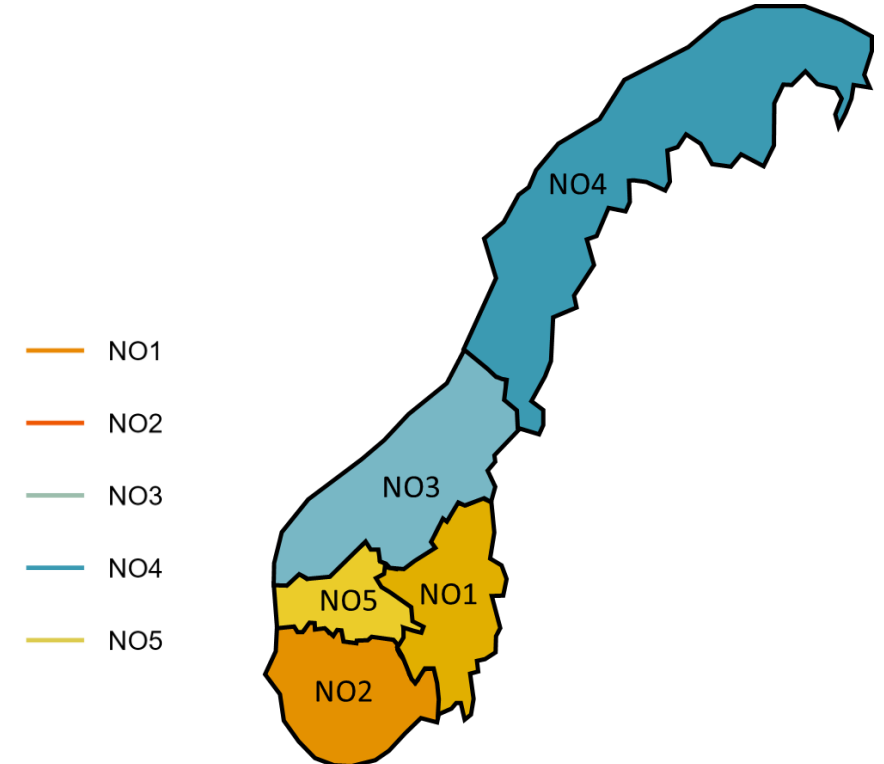
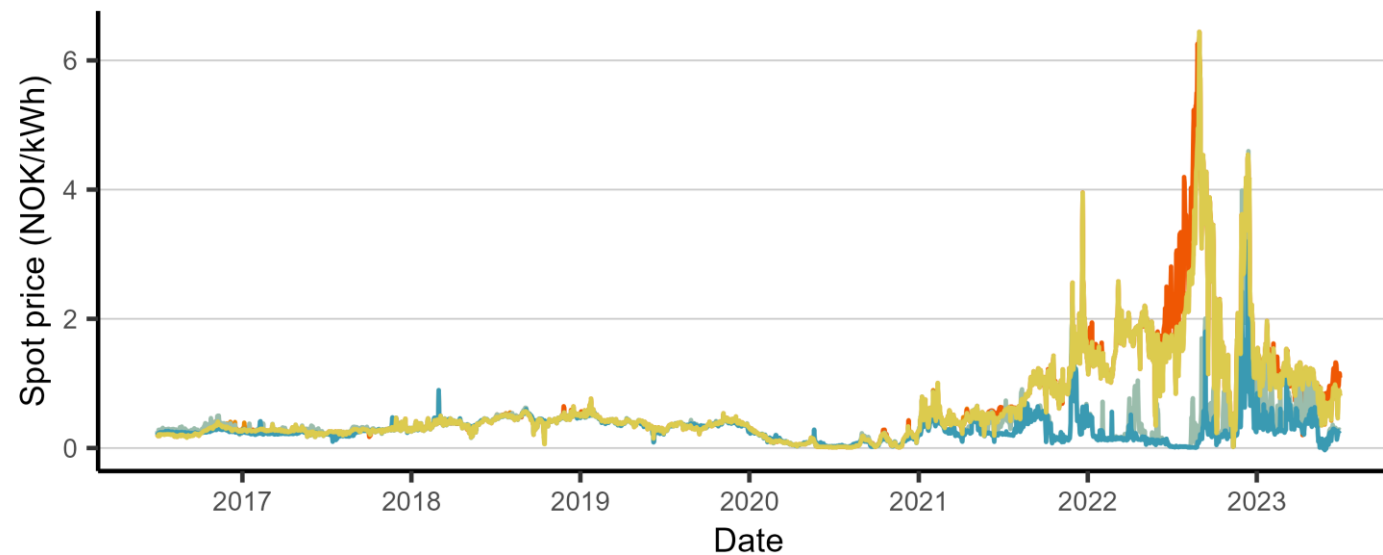
Electricity demand Norwegian households

- Average demand **households**: 15,000 kWh per year (for comparison: Bulgaria 4.200 kWh)
- 80 % have electric heating (direct and heating pump) → temperature dependent demand
- 80 % use electric warm water boiler
- 24 % of private cars are electric
- 99 % coverage with **smart meters** and national database (Elhub)



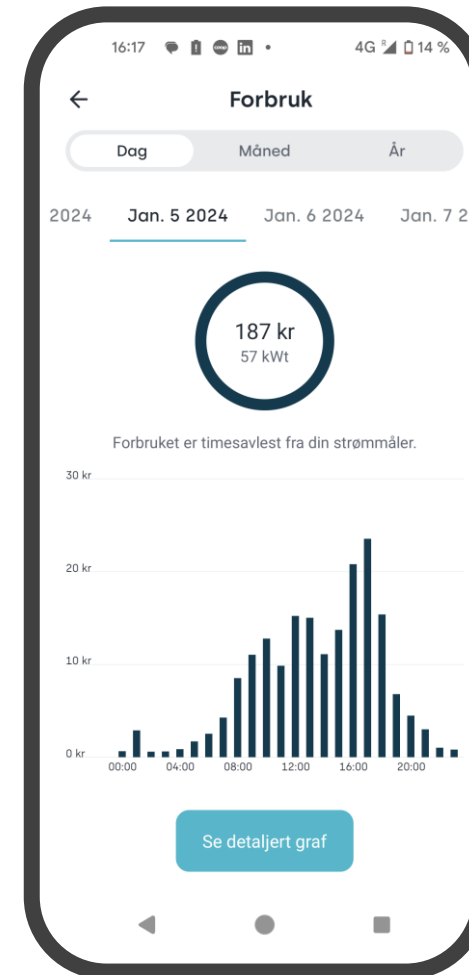
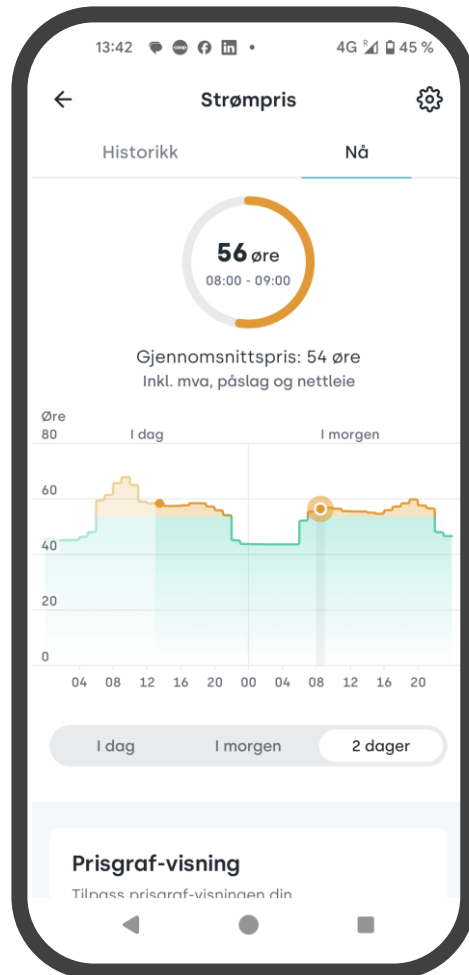
Energy crisis and electricity prices

- Sharp increase of electricity prices in autumn 2021 due to European energy crisis
- Southern bidding areas in Norway most affected



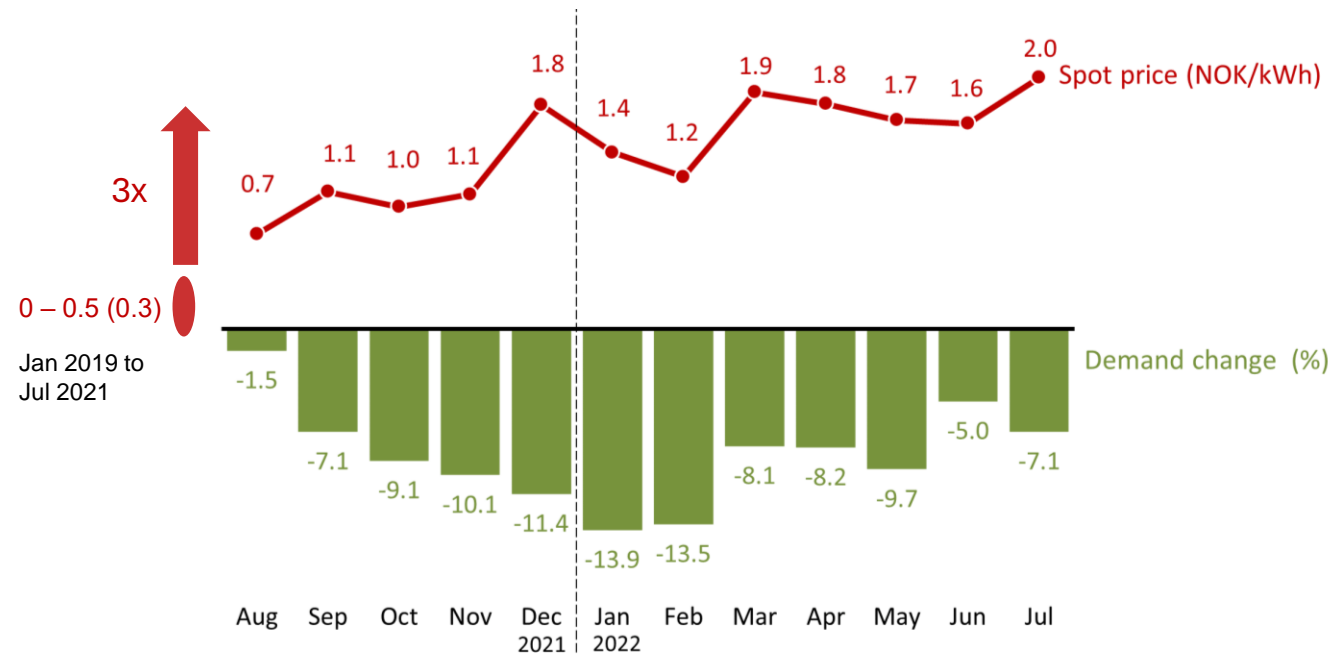
Price information households

- General price development: media
- Short-term variations in spot price: apps from electricity supplier, grid utilities, etc.

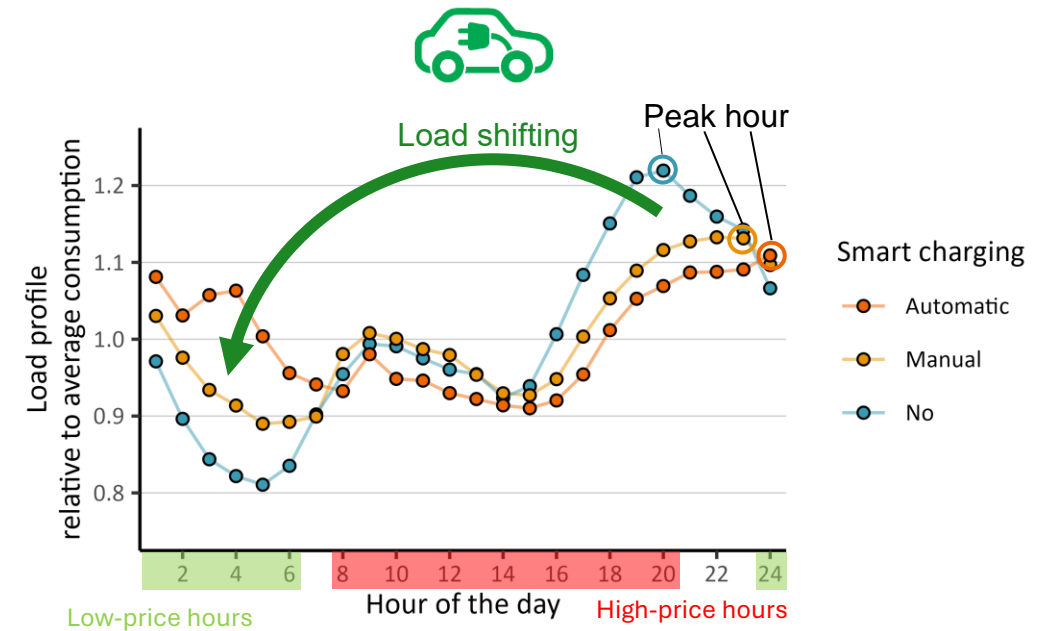


Price response households

Fast response when electricity prices increased winter 21/22

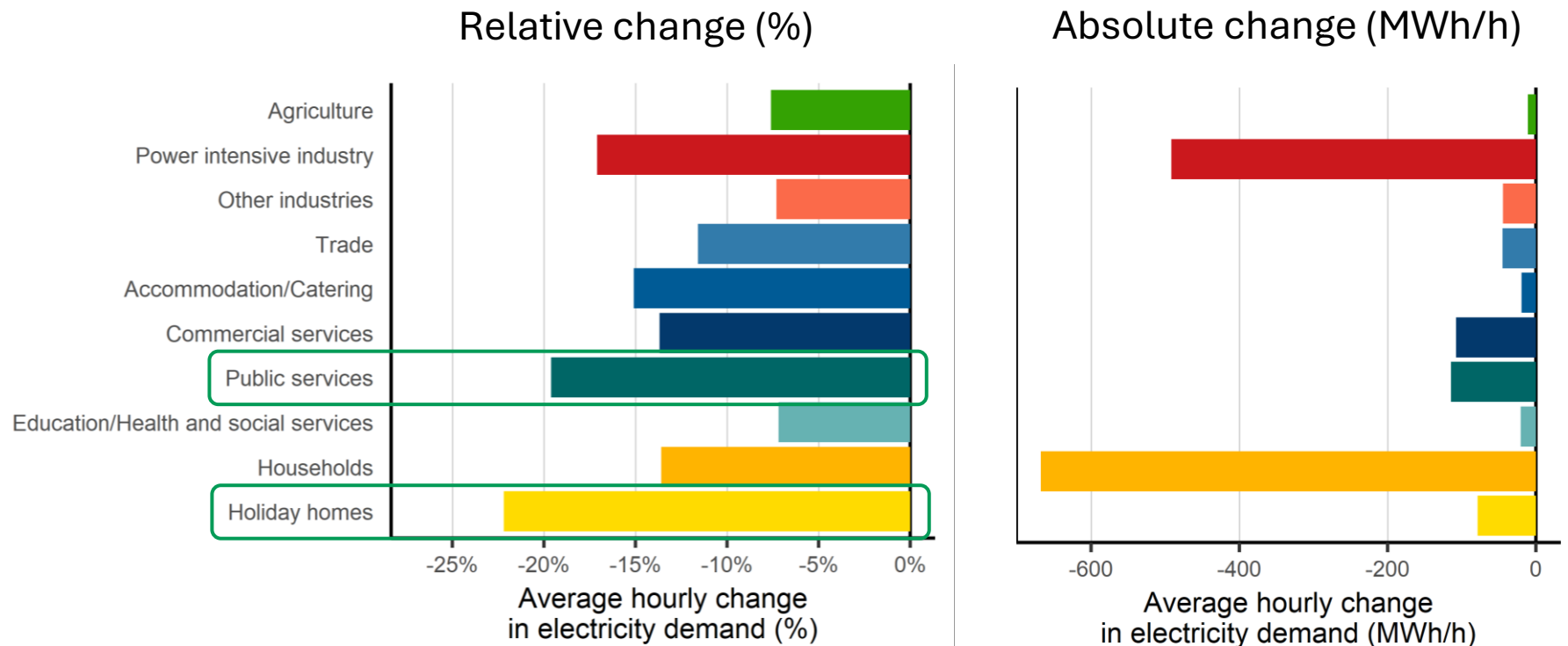


Intraday load shifting of electric car charging to low price hours



Price response consumer groups

- Price response winter 2022/23
- Little short-term price response (price variations on daily or hourly scale)



To Sum up – build trust!

- You are not alone ! – seek knowledge and experience from other TSO that have done the Datahub-route
- Without fully support by the Regulator, Authorities, Politicians and Market actors - there will be no executable Datahub projects
- Include all the market actors in the project execution – you are one team !
- Start with the BRS – Business Requirement Specification process – how shall the market work ?
- Define and agree on which Market roles that must and could be in place
- For metering value quality assurance and completeness– a common VEE guide must be in place (Validate, Estimate, Edit)
- What is your business case and financial model for executing such a project – plan for Benefit analysis
- Define the project goal, a reasonable timeline, data quality goal and benefit goal, including tangible and intangible parameters
- Agree on market design - Work agile when designing an IT- solution for execution of the common goals on ICT solution
- Make data quality to an important asset as well as "privacy by design" principles, and enough duration(years) for data storage
- Think possible needs after GO-live, when decide goal etc. – New demanding functionality will evolve...
- Do not forget to roll-out AMR meters... and have safe, secure and enough capacity on communication
- HAVE FUN and challenge each other to the benefit for all 😊



Thank you for the opportunity !

For further information, take a closer look at
www.elhub.no

[Retail market - NVE](#)

[The power market - Norwegian Energy](#)

[Network Codes Home](#)

[ACER Recommendation 01/2025 - Demand
Response Network Code](#)