



CINeLDI

Centre for intelligent electricity distribution
- to empower the future Smart Grid

Transition to the future flexible and intelligent grid

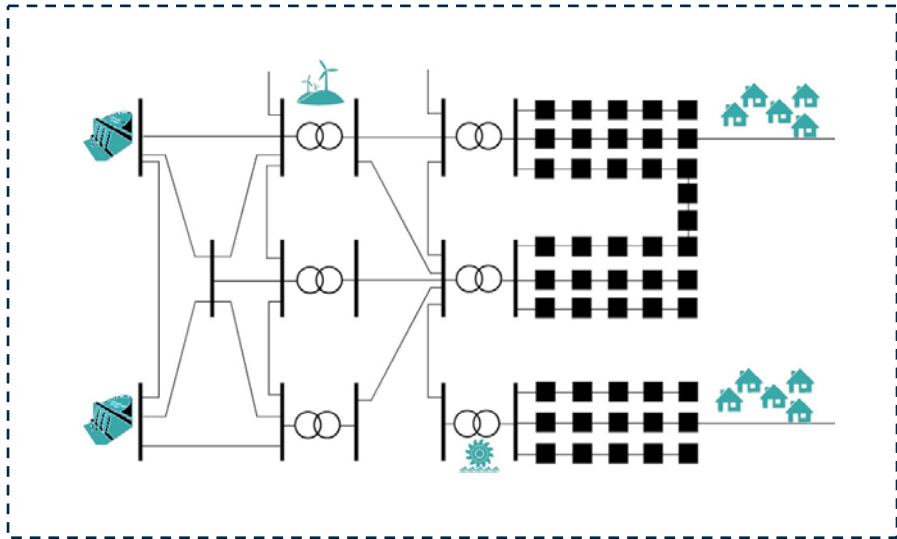
Webinar, 2022-09-19

Gerd Kjølle, Centre Director FME CINELDI, Chief Scientist, SINTEF



CINELDI facilitates the transition to the future flexible, intelligent and robust distribution grid

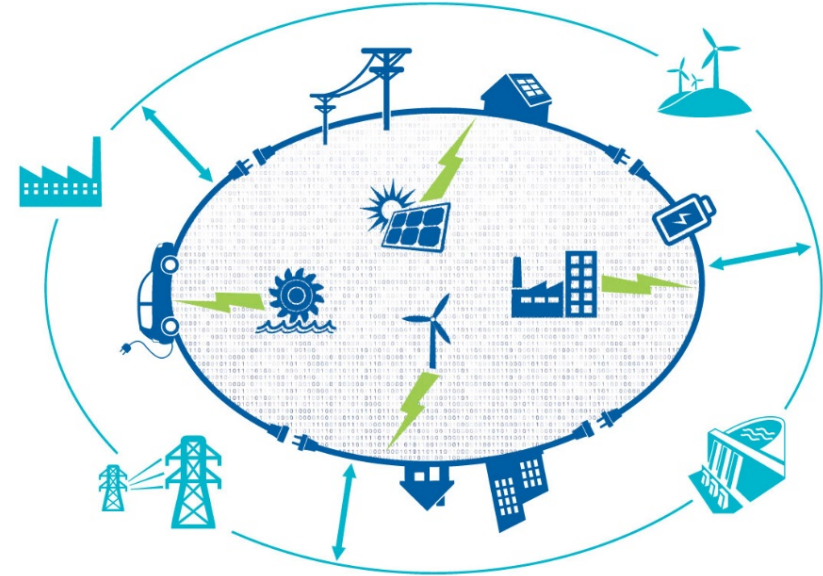
The current power system



Power flow direction



The future power system



Flow in both directions



Research areas

Smart grid development and asset management



Smart grid operation



Interaction DSO/TSO



Microgrids/ Local Energy Communities



Flexible resources in the power system



Smart grid scenarios and transition strategies



Pilot projects supporting the research – in four thematic areas

**Fault handling and
self-healing**



**Sensing and digital
monitoring**



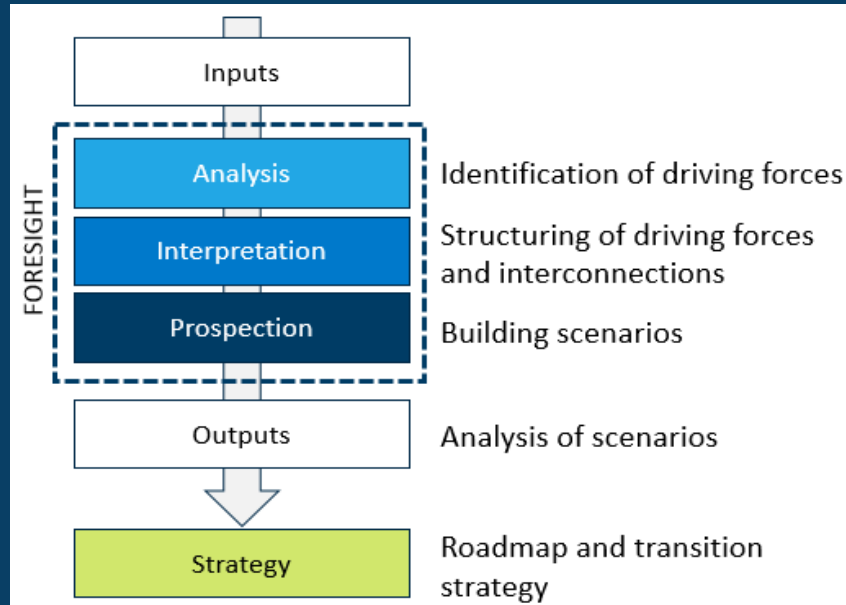
**Application of
AMR/grid data**



Flexibility



Driving forces and scenarios – Foresight process 2017-2019 – updates 2022



Foresight process in FME CINELDI



Link: <https://www.sintef.no/projectweb/cineldi/results/reports2/>

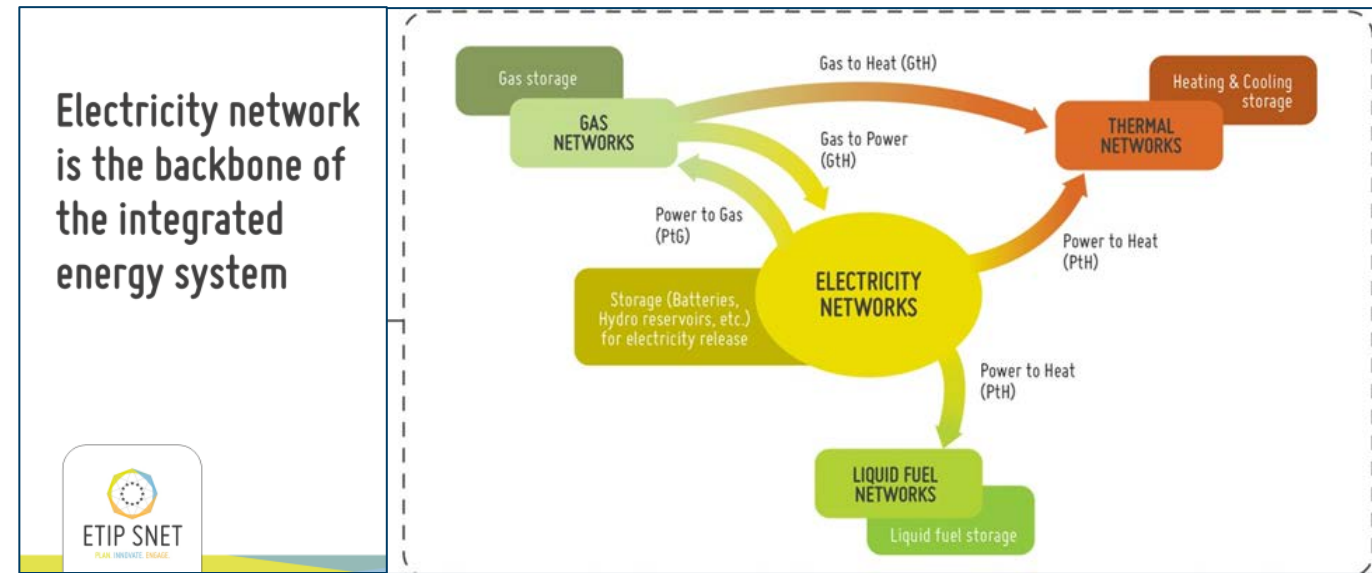


T. S. Hermansen, H. Vefsnmo, G. Kjelle, K. Sand: *Driving forces for intelligent distribution system innovation – results from a foresight process*, CIRED 2019, June 2019

G. Kjelle, K. Sand, E. Gramme: *Scenarios for the future electricity distribution grid*, CIRED 2021, Sept. 2021

Key drivers for the transition

- Decarbonisation → Electrification
- Digitalisation
- Customer orientation
- Energy system integration
- Sector coupling
- Security of electricity supply



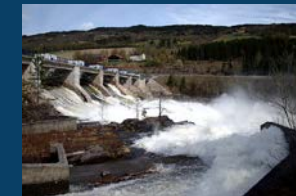
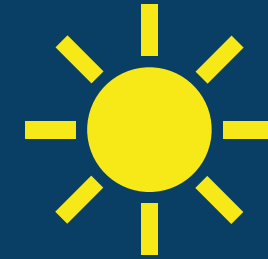
<https://www.etip-snet.eu/etip-snet-vision-2050/#>

Electrification; new consumption and production



- Data centres
- Industrial processes
- Fish farming
- Construction sites
- Hydrogen production
- Electric transport
- Battery factories
- Local Energy Communities (LEC)

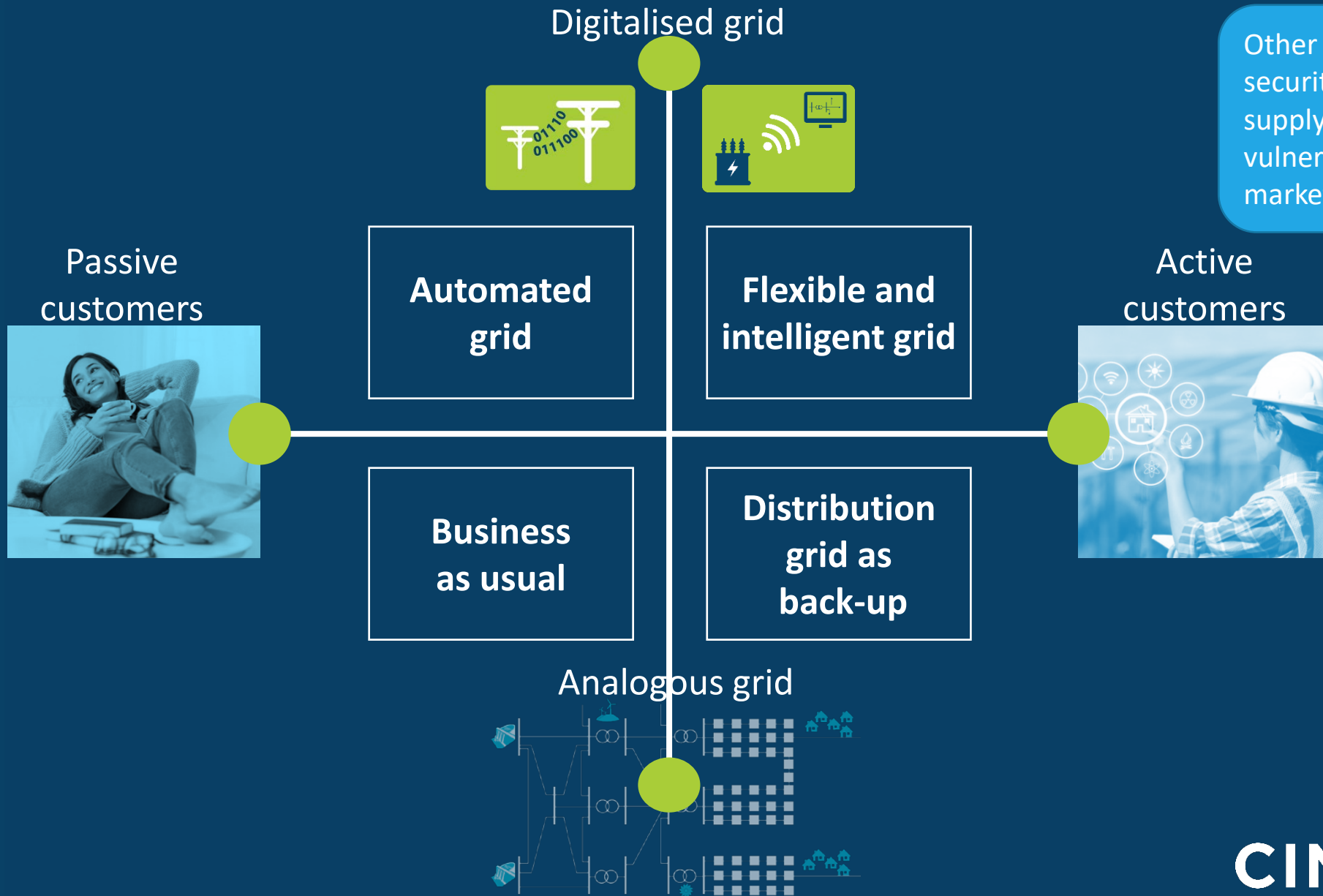
- Solar power
- Wind power
- Hydro power



- New types of energy storage
- Interaction with other energy carriers
- Sector coupling

Consumption, production and energy storage can be flexible resources in the power system

Scenarios for the future distribution grid



Mini scenarios

Example

- *A mini scenario is a probable event, development or action of significance for the future distribution system*
- CINELDI has developed > 130 mini scenarios

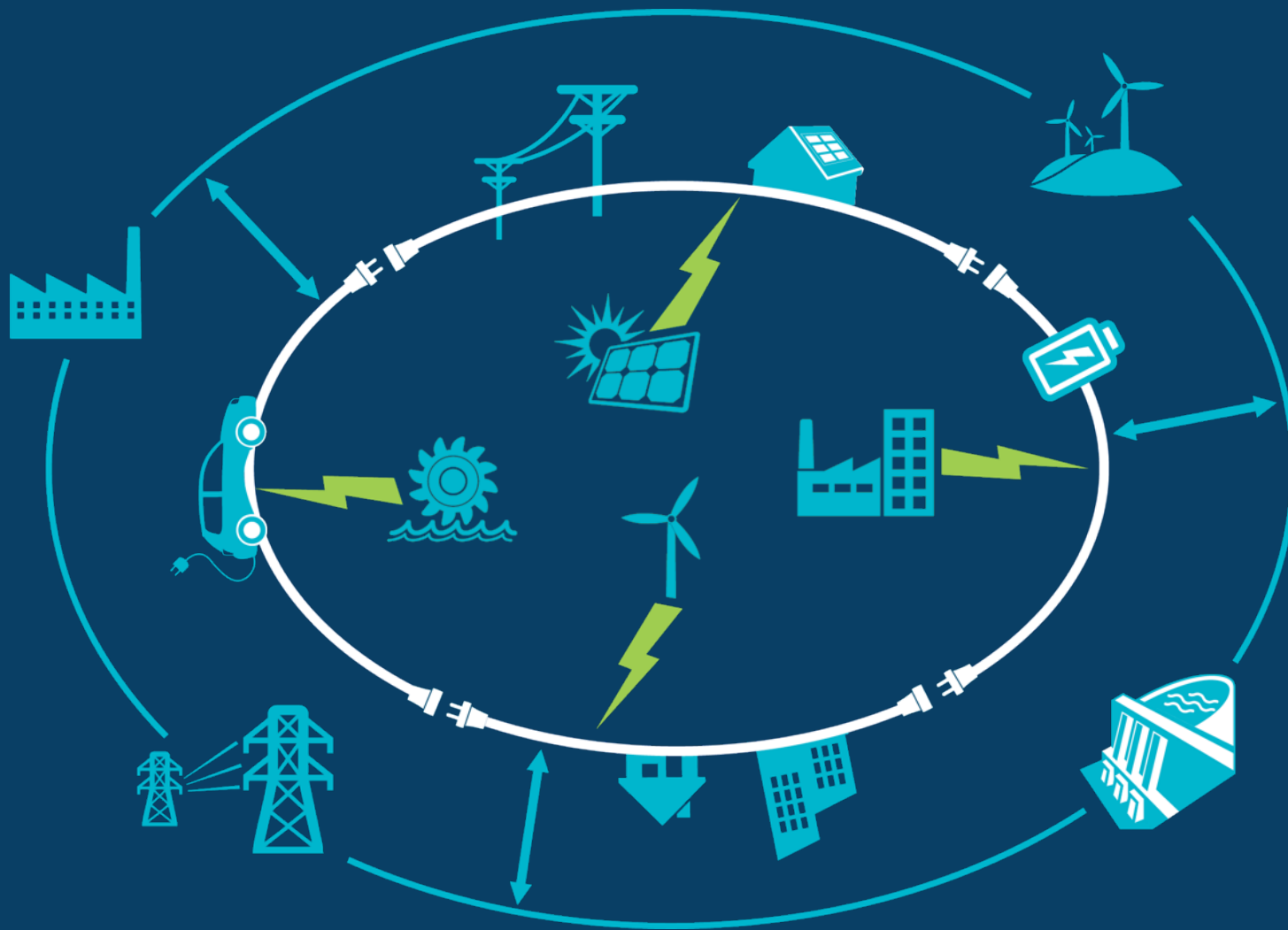
From peak power to stable loads

“Increased electrification of ferries (or charging stations for EVs) lead to capacity challenges in the grid due to fast power-intensive charging. The ferry companies invest in large on-shore battery packages for local energy storage. This results in stable grid load seen from the grid and possibilities for flexibility services/ grid support in high load and grid fault situations”

Transition strategy (to be developed 2022-2024)

- A holistic strategy contributing to a sustainable electricity grid
- Purpose and target groups?
- Input:
 - Driving forces and scenarios
 - Results from research and pilot projects
- Output?
 - Guidelines, recommendations: short/medium/long term
 - From knowledge to implementation, concrete needs, knowledge gaps





-  cineldi.no
-  [CINELDI_FME](https://twitter.com/CINELDI_FME)
-  blog.sintef.com/
-  [linkedin.com/
company/cineldi/](https://linkedin.com/company/cineldi/)



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