Integrated Infrastructure 2030-2050: *Scenarios*

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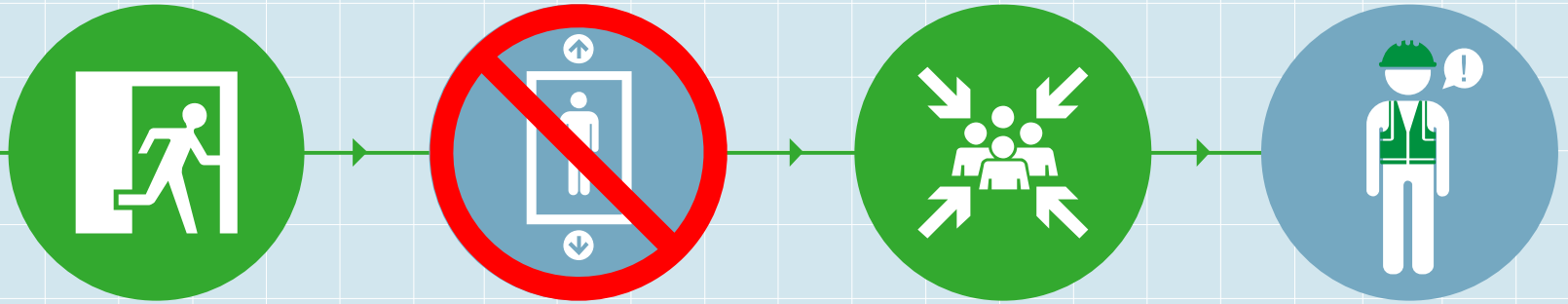
Energy System Planning

A moment for safety

Together we provide a safe working environment. We learn from mistakes and sharing ideas, concerns and asking questions are a matter of course.

We also draw attention to the following safety measures in case of evacuation of the premises



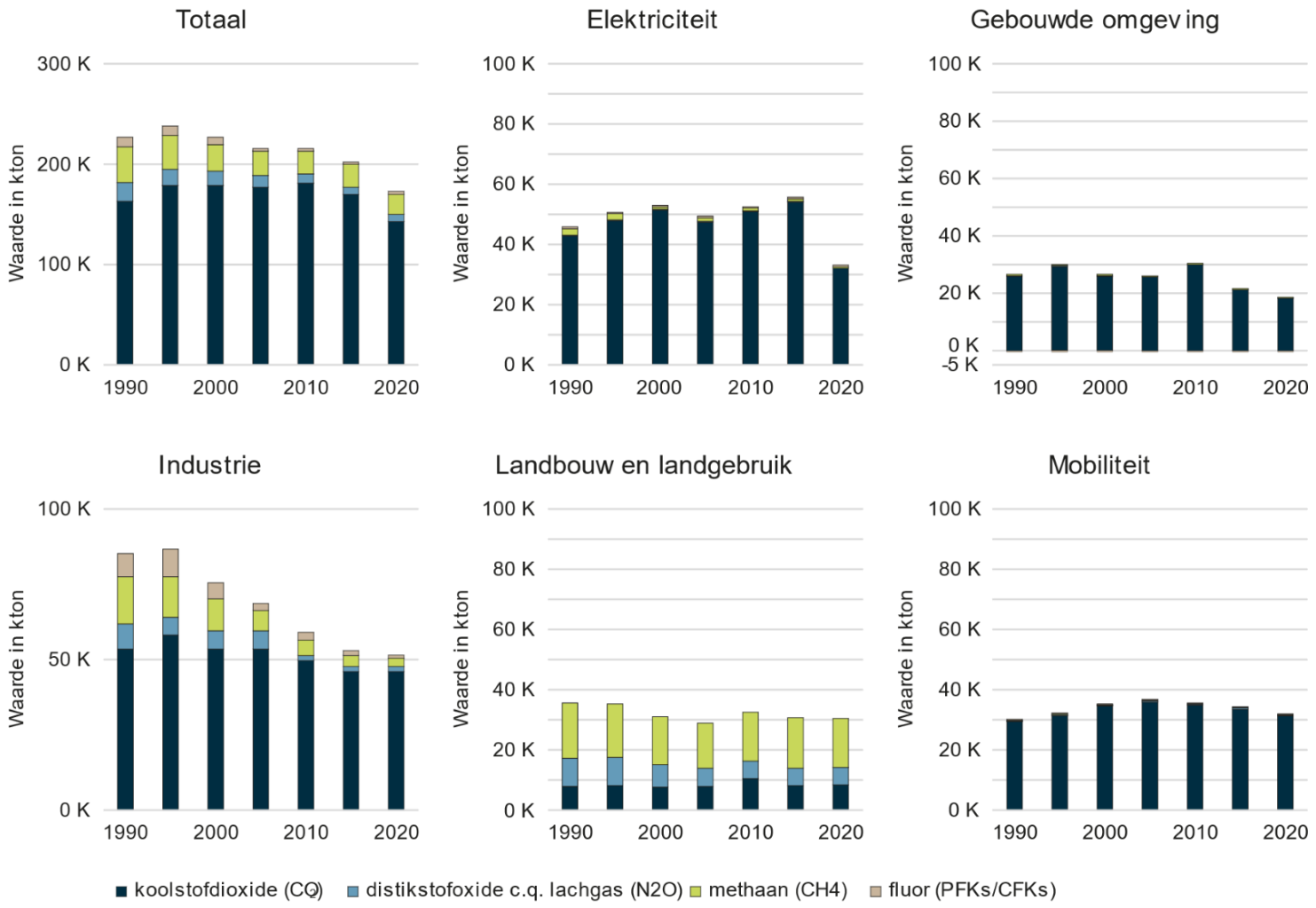
Follow the escape route as indicated

Use the stairs instead of the lift

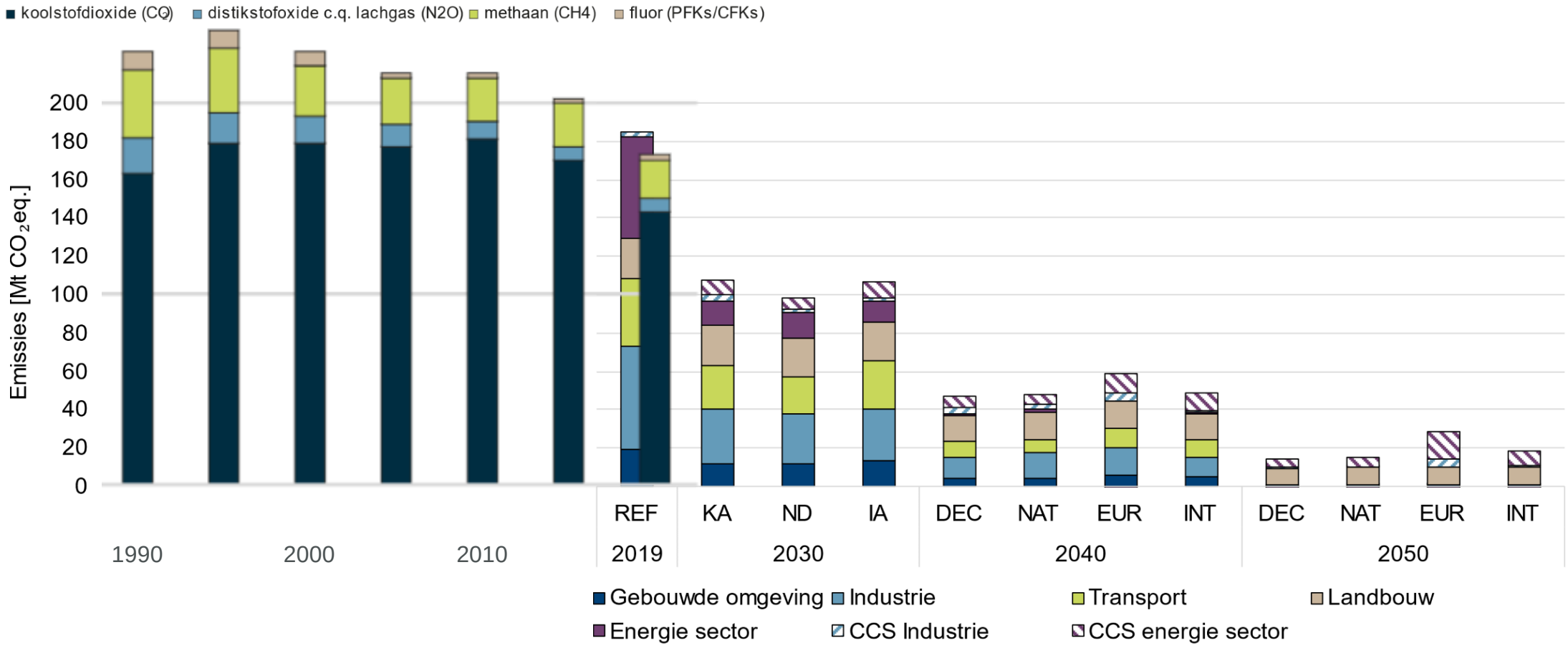
Go to the assembly point

Follow the instructions of the in-company emergency responder

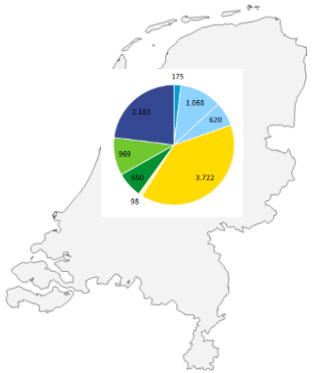
Emissions
Of the past



Emissions
In the future

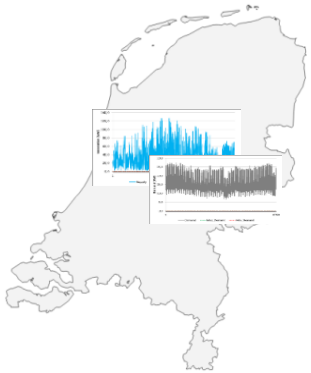


Process of scenarios
Steps



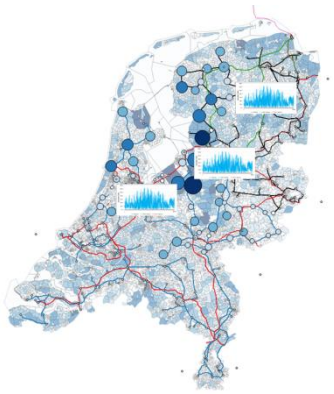
Supply & Demand

- Growth
- Technology changes
- Behaviour
- Energy carriers
- Renewable production



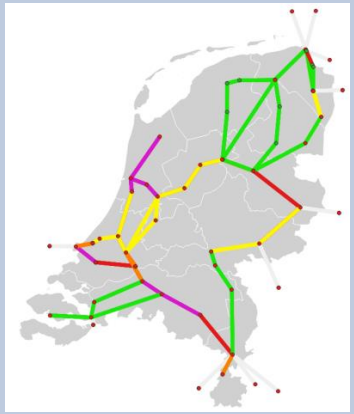
Flexibility

- Exchange
- Demand side response
- Curtailment
- Storage
- Conversion
- Powerplants



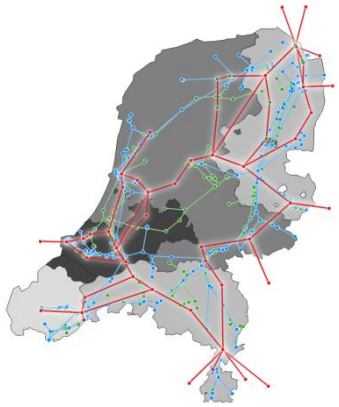
Regionalization

- Supply
- Demand
- Flexibility
- Exchange



Grid impact

- TSO/DSO grids
- Identification of infrastructure bottlenecks
- Understanding sources of impact
- Assumption changes for optimized impacts

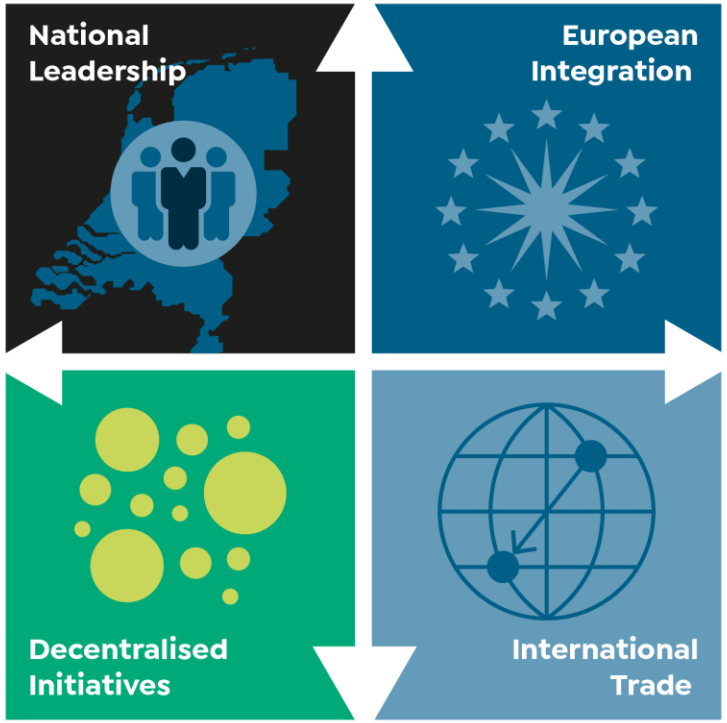


Pathways

- Necessary flexibility development
- Infrastructure solutions
- Estimation of cost, human resources, spatial impact and material use per scenario

Scenario directions
Storylines

Collective technology choices and management by government



Market-driven, individual solutions, with frameworks set by government

National focus, as self-sufficient as possible

International focus, with import possibilities

National Leadership

- Limited reduction in industry
- New synthetic molecules industry based on recycled carbon and DAC (direct air capture)
- Strong electrification
- Very high levels of renewable generation; limited nuclear
- Most district heating

European Integration

- No to very limited reduction in industry
- New synthetic molecules industry based on CCU and bio-carbon
- Green gas, also from imports, next to electrification and hydrogen
- CCS to continue and blue hydrogen
- Partially H_2 in built environment
- Base load of nuclear power

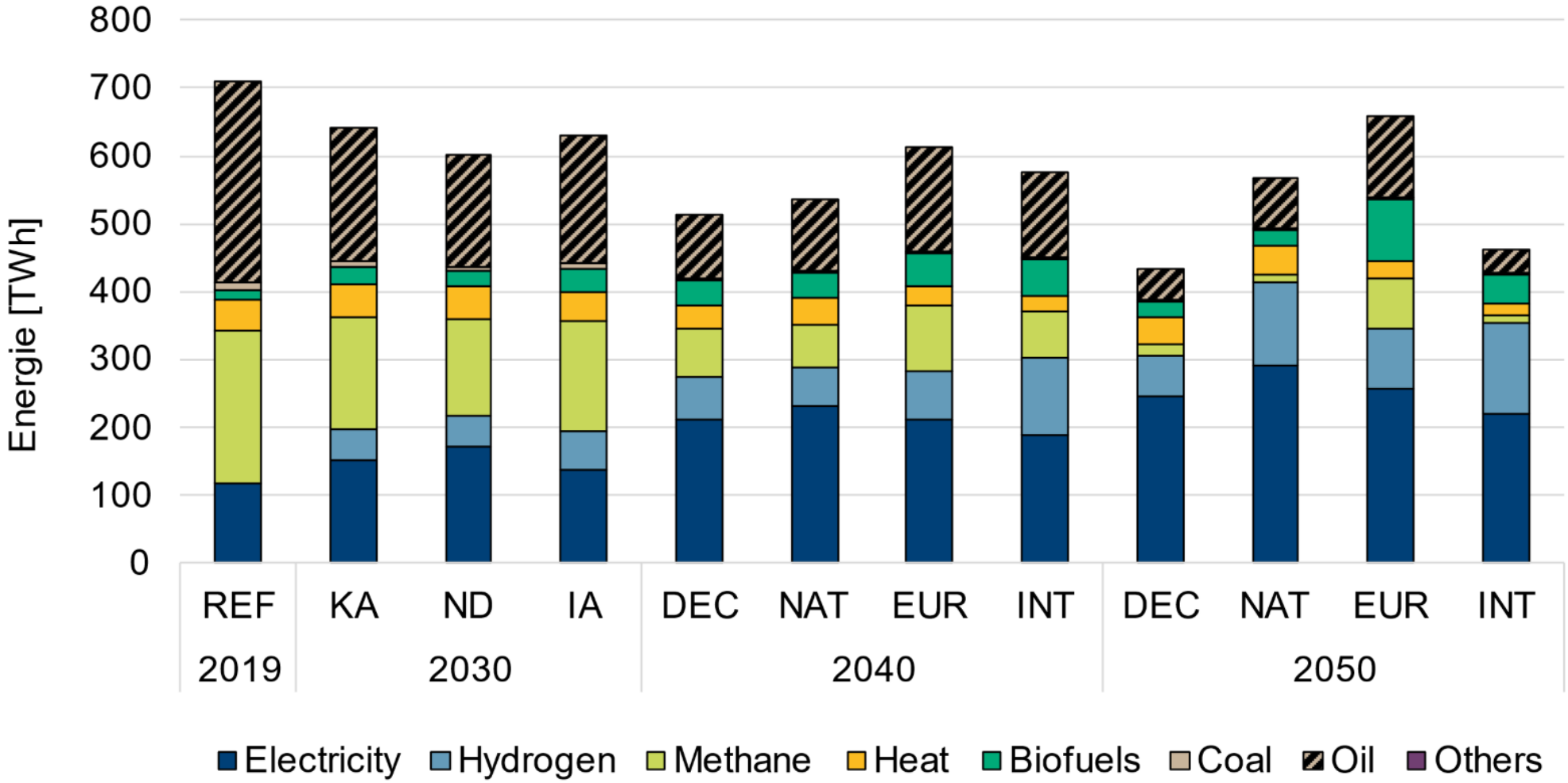
Decentralised Initiatives

- Strong reduction in energy-intensive industry
- Certain industries leave the Netherlands
- Strong electrification, but also hydrogen in industry
- Very high levels of renewable generation
- Energy hubs

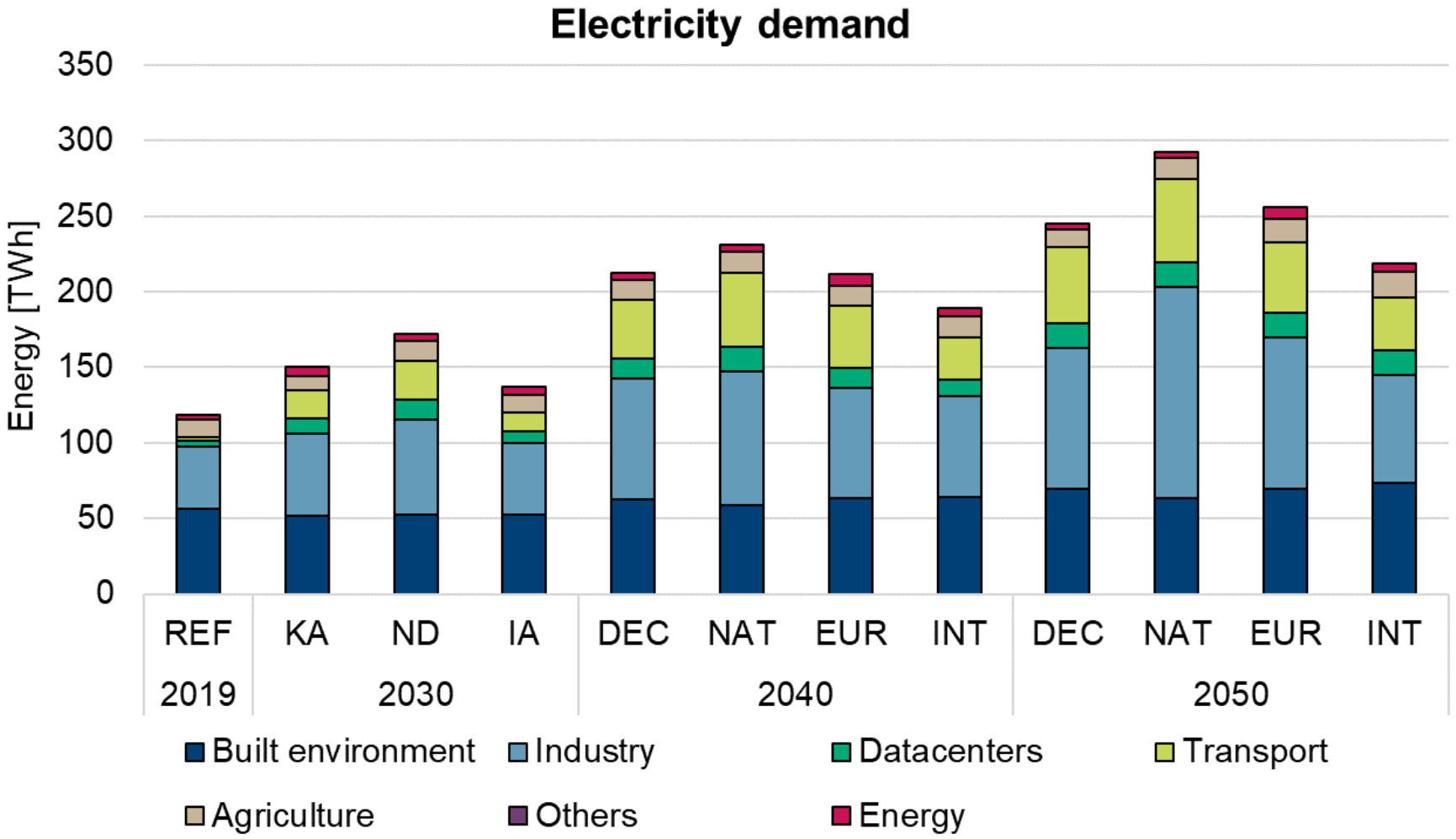
International Trade

- Strong reduction in energy-intensive industry
- Certain industries move abroad
- Substantial amounts of hydrogen, next biofuels, CCS, DAC and electrification
- High H_2 imports
- Built environment fully H_2

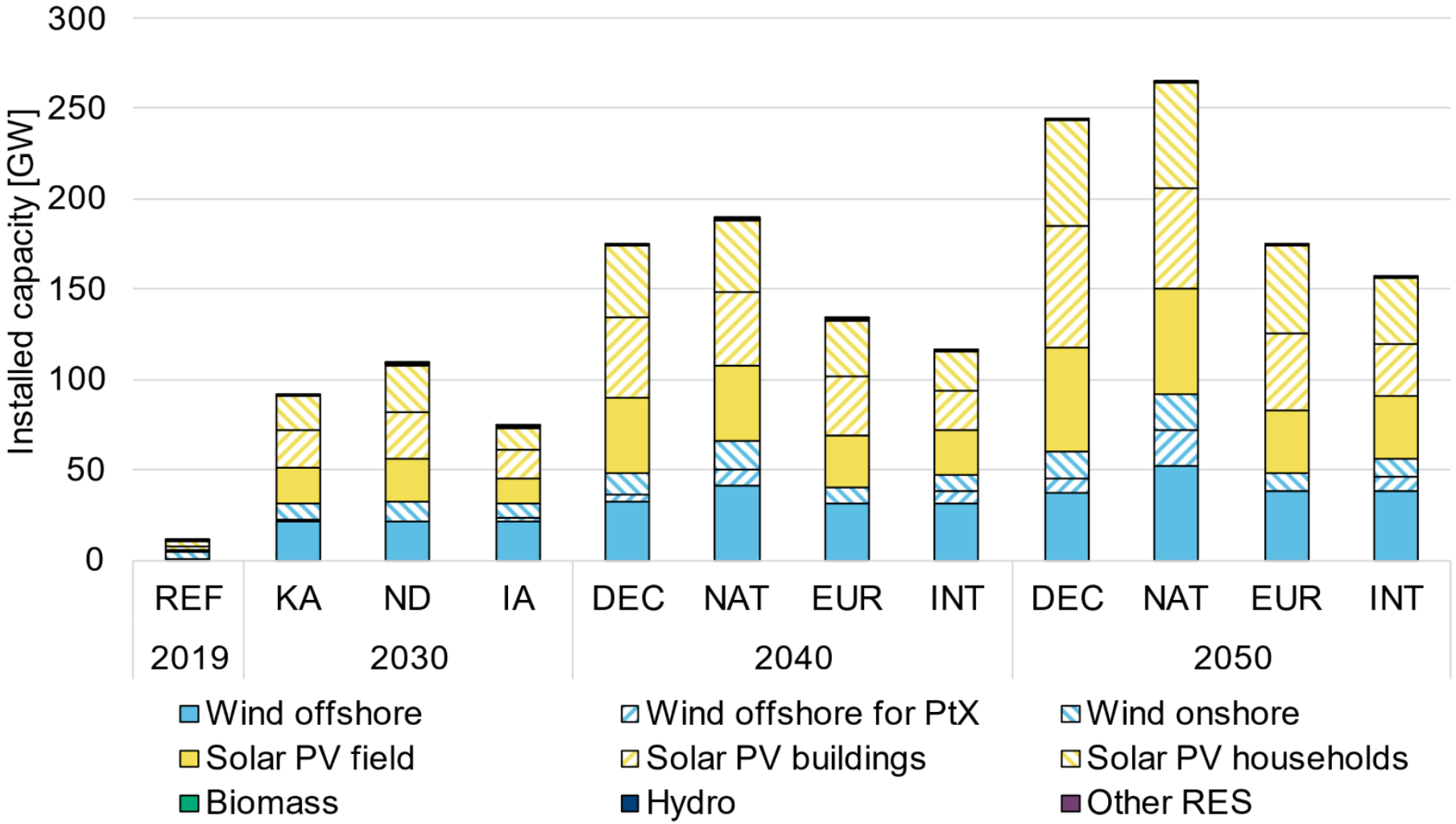
Energy demand
Energy carriers



Electricity demand
Volume

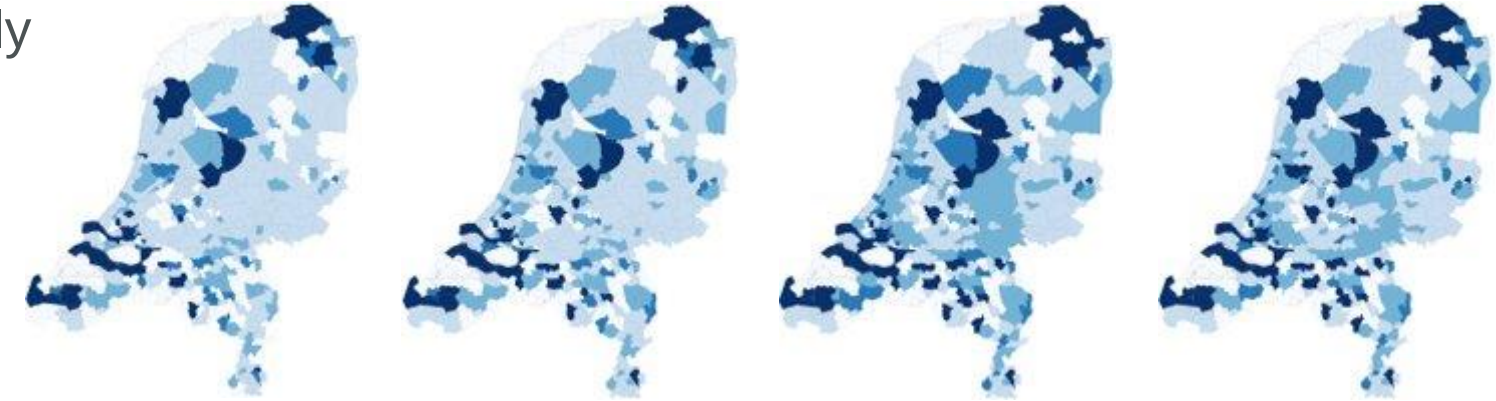


Renewable supply
Capacity



Regionalisation
Supply & Demand electricity

Supply

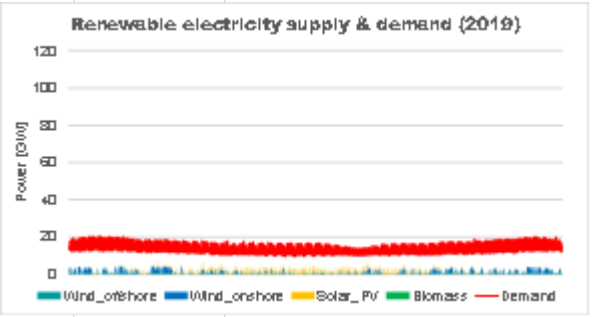


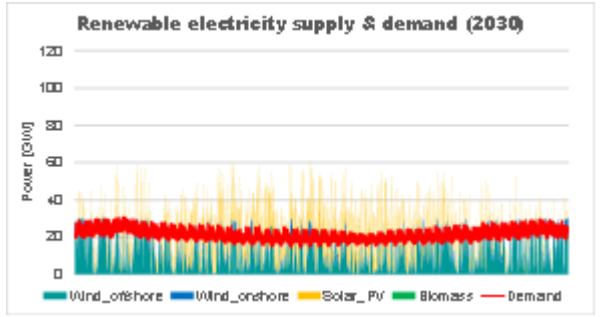
GWh/km²
< 1
1 – 5
5 – 10
10 – 15
> 15

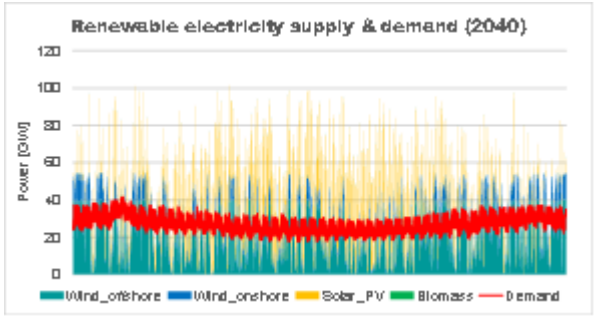
Demand

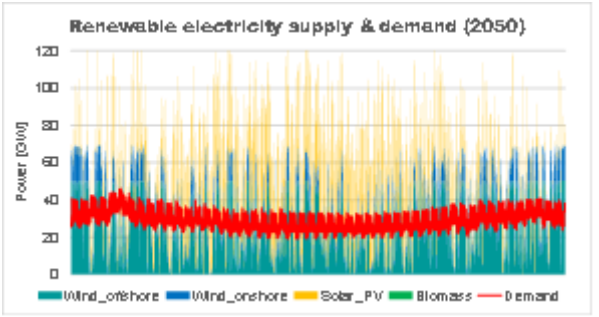
GWh/km²
< 1
1 – 5
5 – 10
10 – 15
> 15

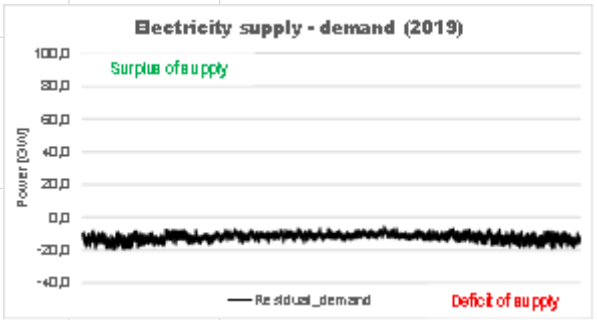
Flexibility need
Over the years

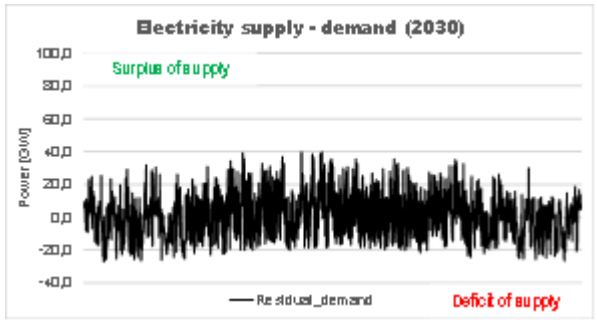


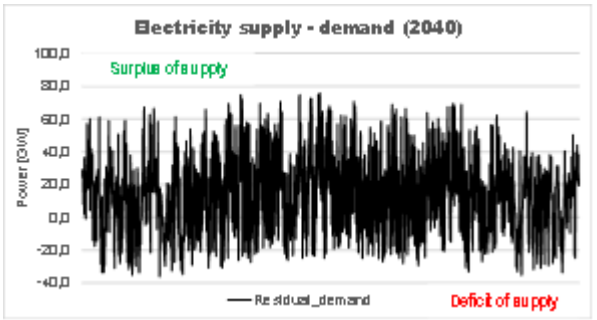


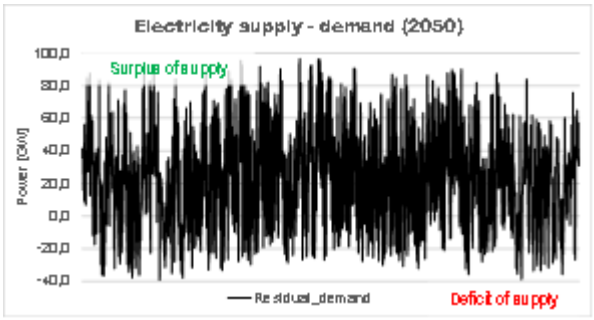


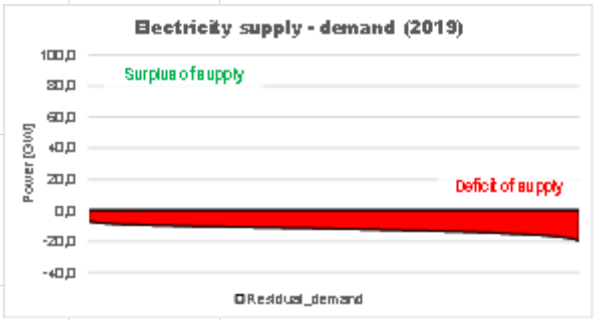


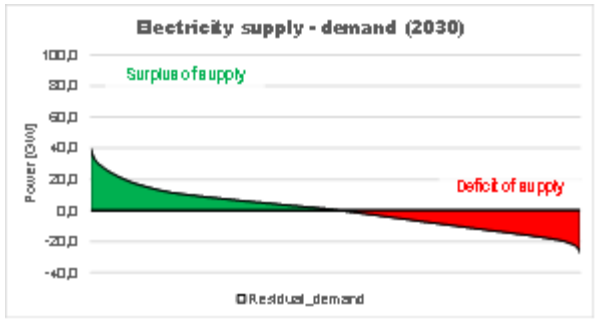


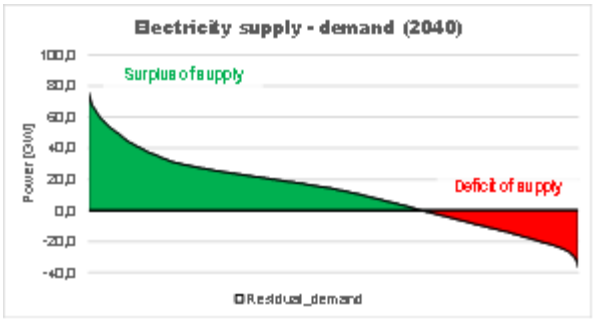


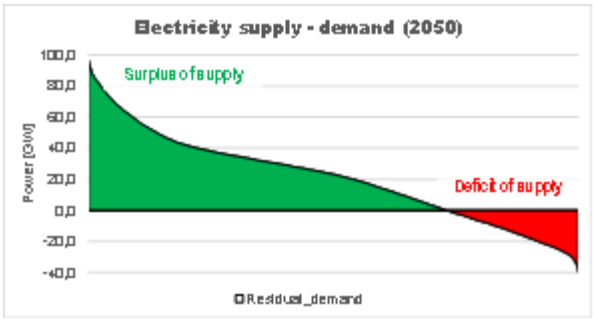




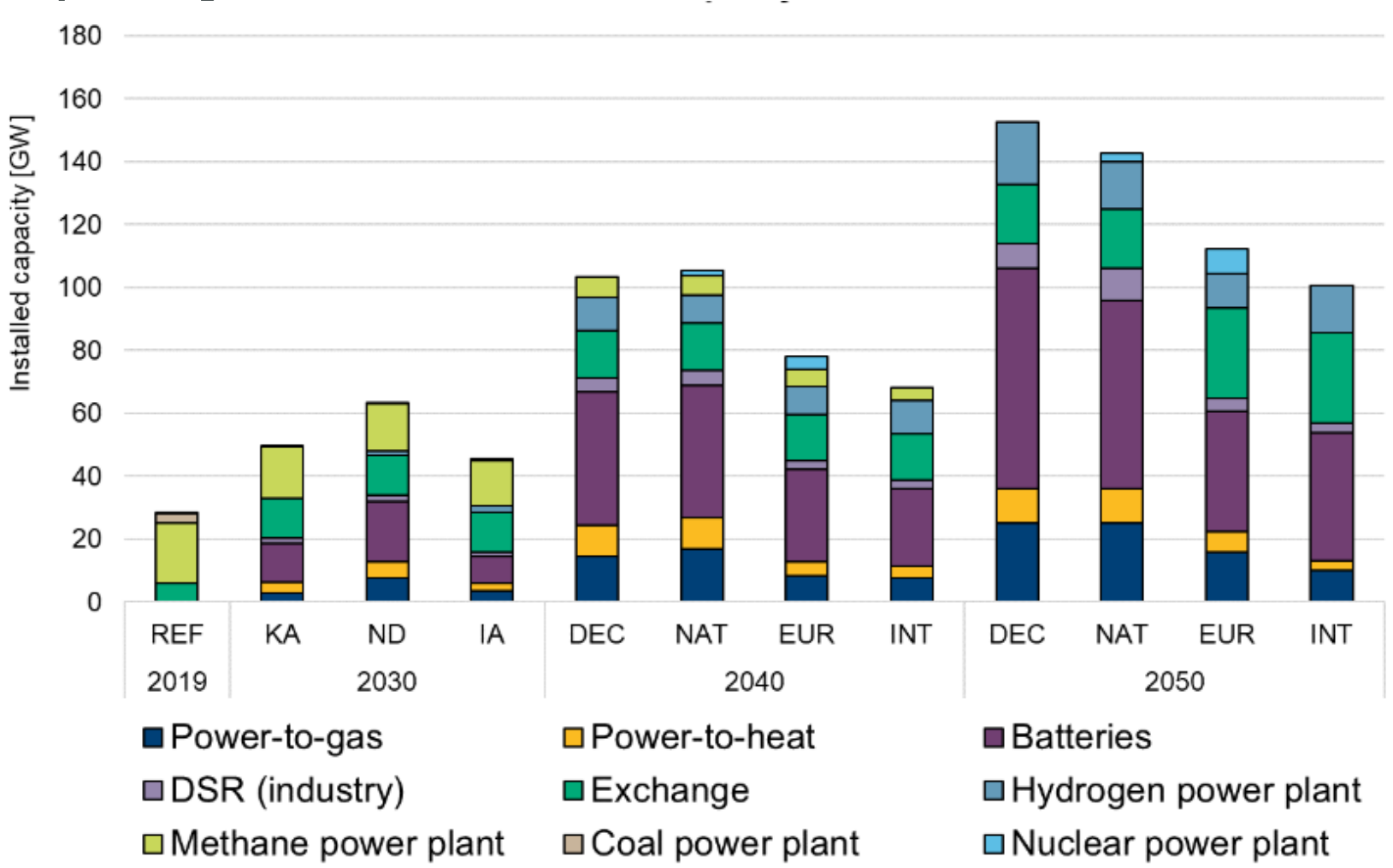






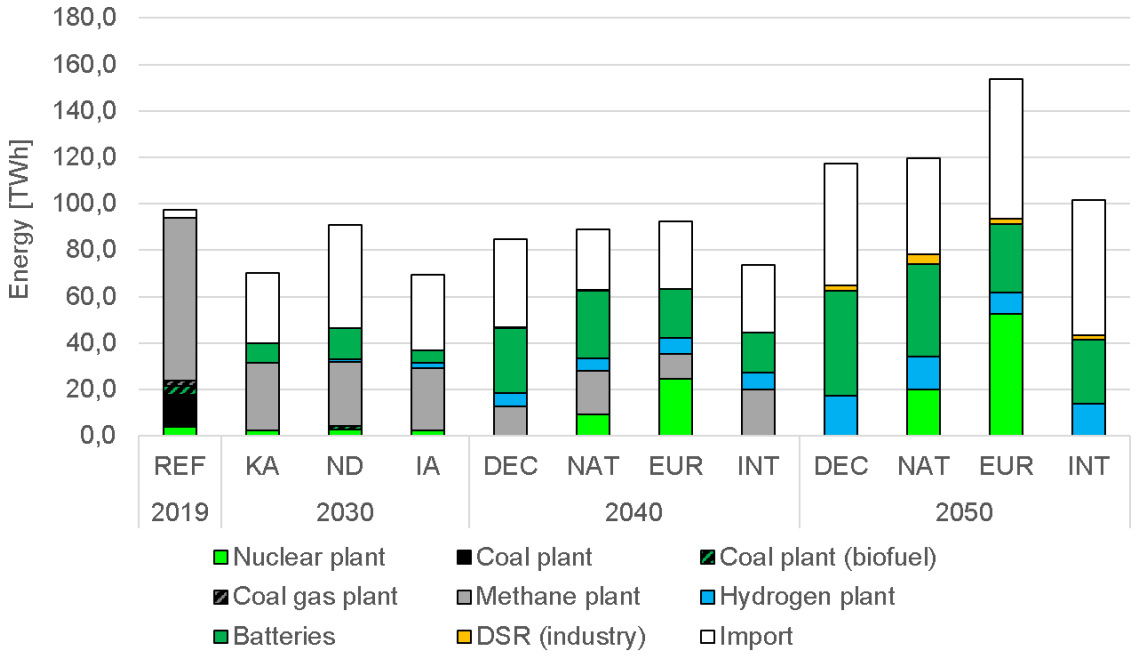


Flexibility
Capacity

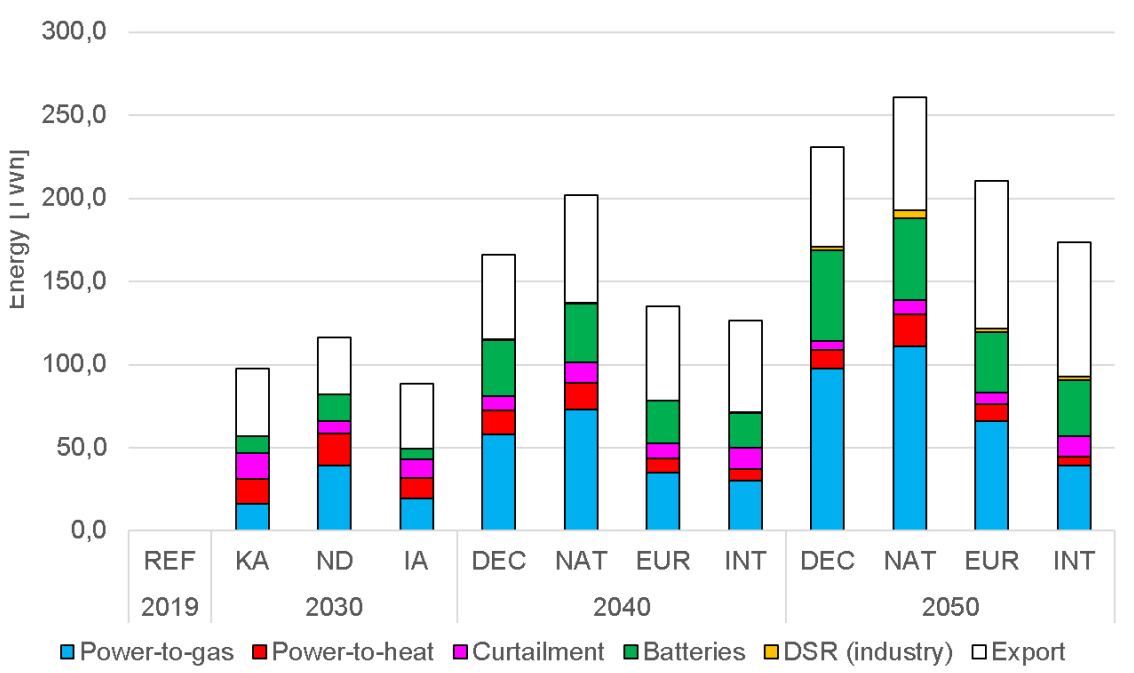


Flexibility
Volume

Balancing shortage



Balancing surplus



Conclusion
Long story short

- We would love to have clarity on what is going to happen in the future so we may be efficient
- We need offshore wind and other renewable energy to supply for expected demand
- We need flexibility both from supply and demand
- Energy infrastructure will be undergoing an enormous transformation
- Climate goals are still possible

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Lighting the way ahead together

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