

DANISH NATIONAL TRANSMISSION SYSTEM OPERATOR PERSPECTIVE

THE ROLE OF LONG-DISTANCE TRANSMISSION AND CROSS-BORDER ENERGY
FLOWS IN MID-CENTURY DECARBONIZATION

*Peter Markussen, Energinet Electricity System Operator, Head of
flexibility and ancillary services*

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Decarbonisation
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ELECTRICITY KEY ROLE IN DANISH GREEN TRANSFORMATION

Ambitious targets and development in Denmark's total electricity and energy consumption

2018



Electricity : 70 % RES
of 34 TWh

2030



Electricity : 100 % RES
of 45 TWh

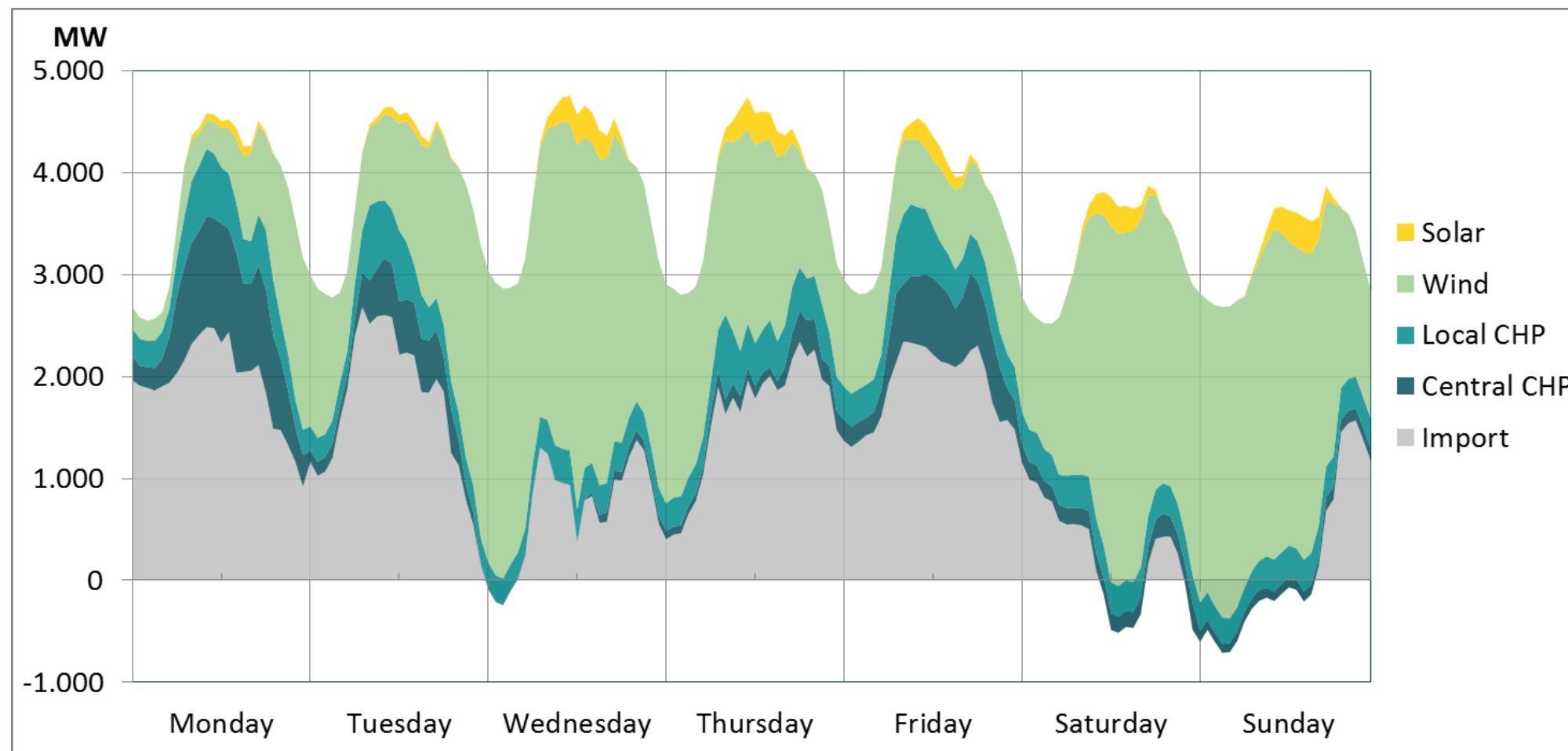
2050



Energy : 100 % RES
of 85 TWh

FLEXIBILITY IN THE ELECTRICITY SYSTEM CONDITION FOR HIGH SHARE OF RENEWABLES

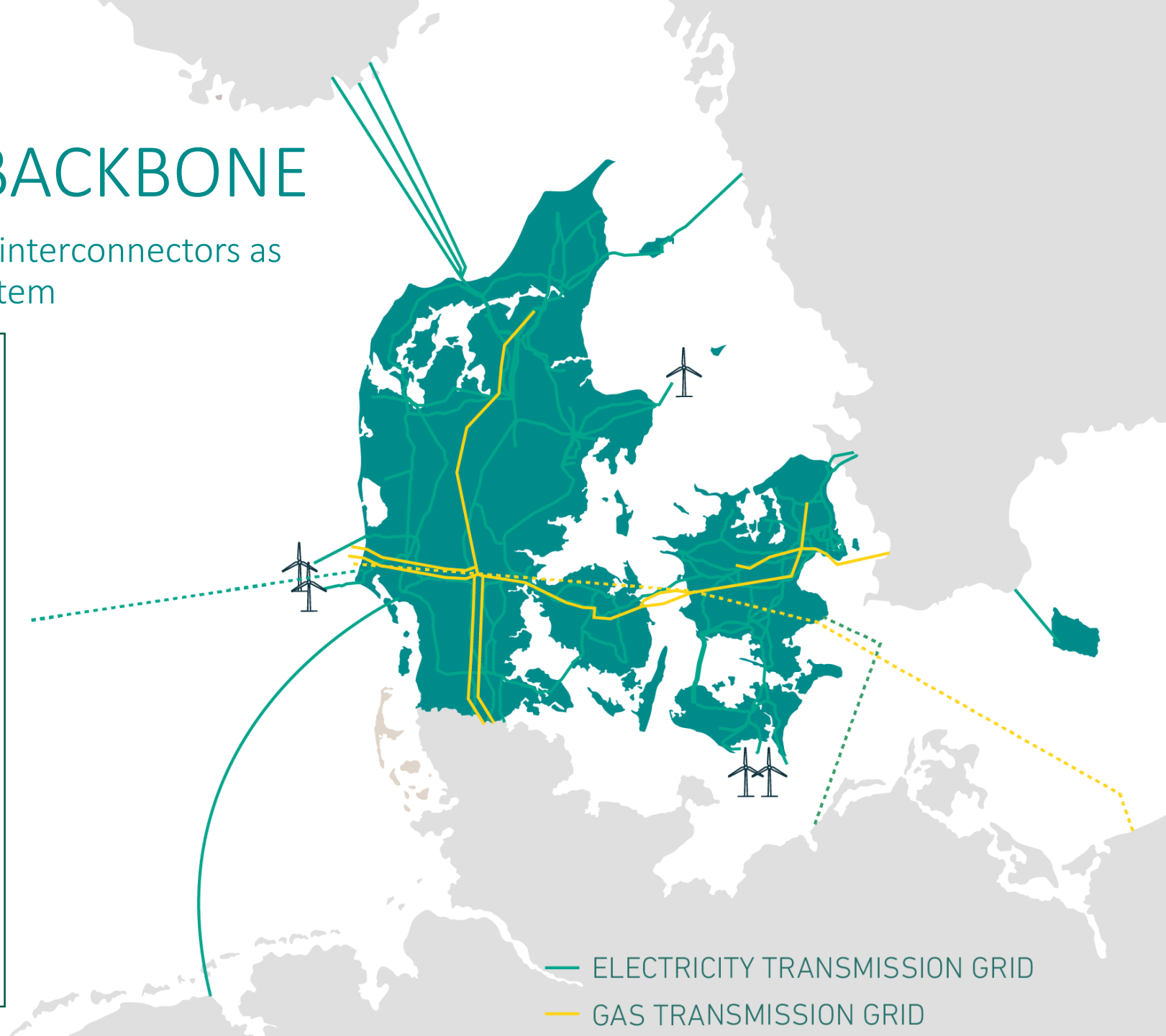
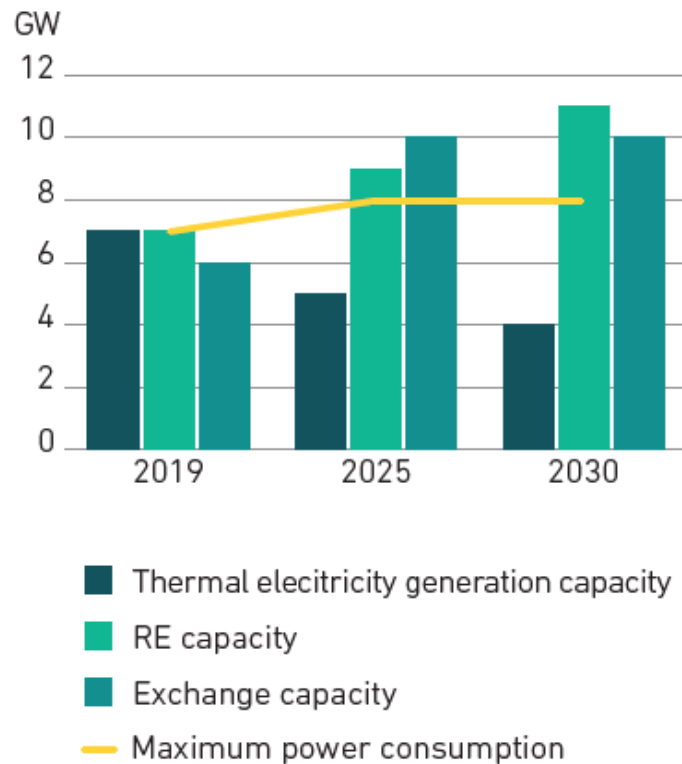
- Hourly dispatch in a autumn week in 2018



THE ELECTRICITY BACKBONE

Strong national transmission grid and interconnectors as backbone of the Danish electricity system

Expected development of capacity and peak load consumption in Denmark



MARKET BASED INTEGRATION OF RENEWABLES

Share of renewables

Integration of the next 50 % of renewables requires new market measures..

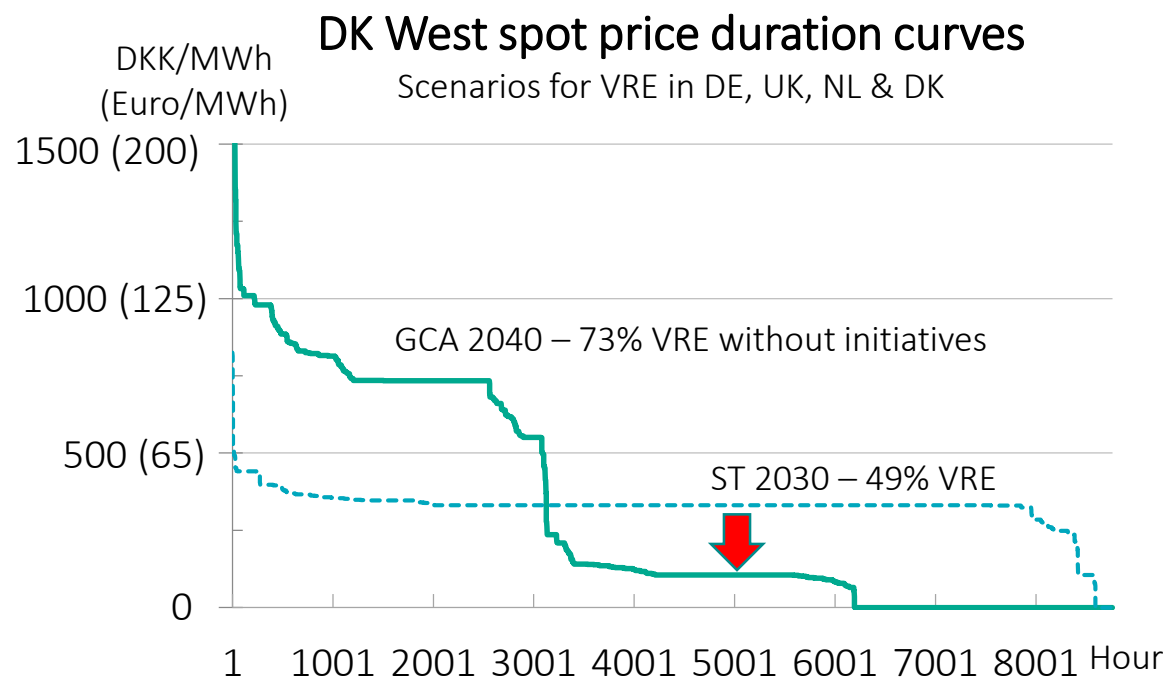
Increase value of electricity

- Local markets with flexibility from RE and demand
- Sector coupling (heat, power to x)
- International balancing markets
- New market participants and business models

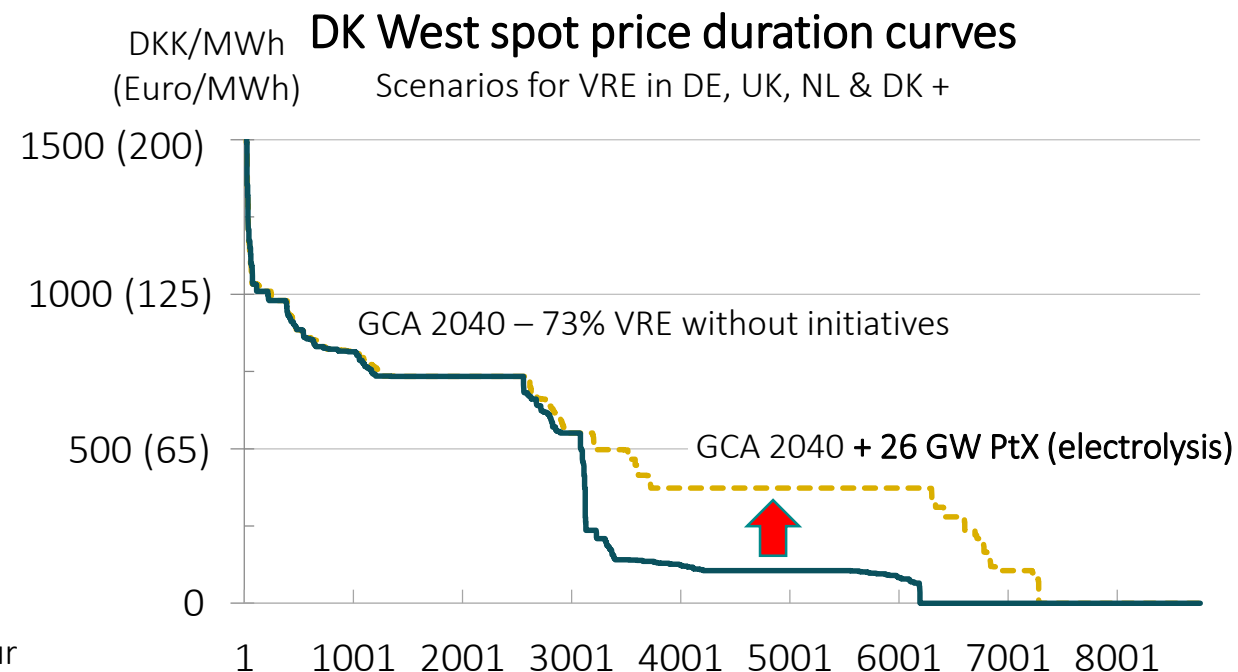
Reduce costs of electricity

- International electricity markets
- Flexible production from thermal power plants
- Traditional market participants

WIND POWER AND PV SUPPRESS ELECTRICITY VALUE – PtX RESTORES VALUE



Average market value for wind power and PV
reduced from 0.04 €/kWh to 0.02 €/kWh

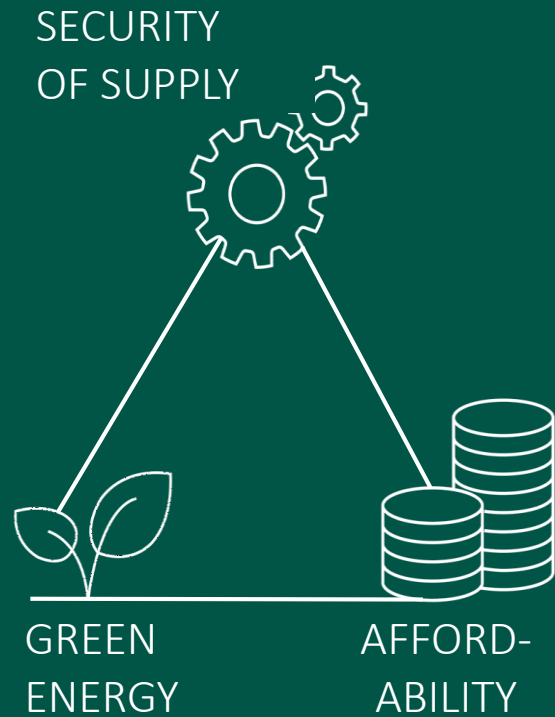


Average market value for wind power and PV
increased from 0.02 €/kWh to 0.04 €/kWh

Source: Ten year national development plan, TYNDP, scenarios

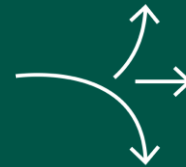
ALL SOLUTIONS NEEDED – AND FRAMEWORK FOR EFFICIENT EXECUTION

THE ENERGY TRILEMMA



TECHNICAL SOLUTIONS

Grid/
exchange



Storage



Power-to-x



Flexible
consump-
tion



FRAMEWORK CONDITIONS

Inter-
national
markets



Forecasts



Operational
cooperation



Inter-
national
regulation



BACK UP

ENERGINET

We own and operate the overall electricity and natural gas transmission system in Denmark.

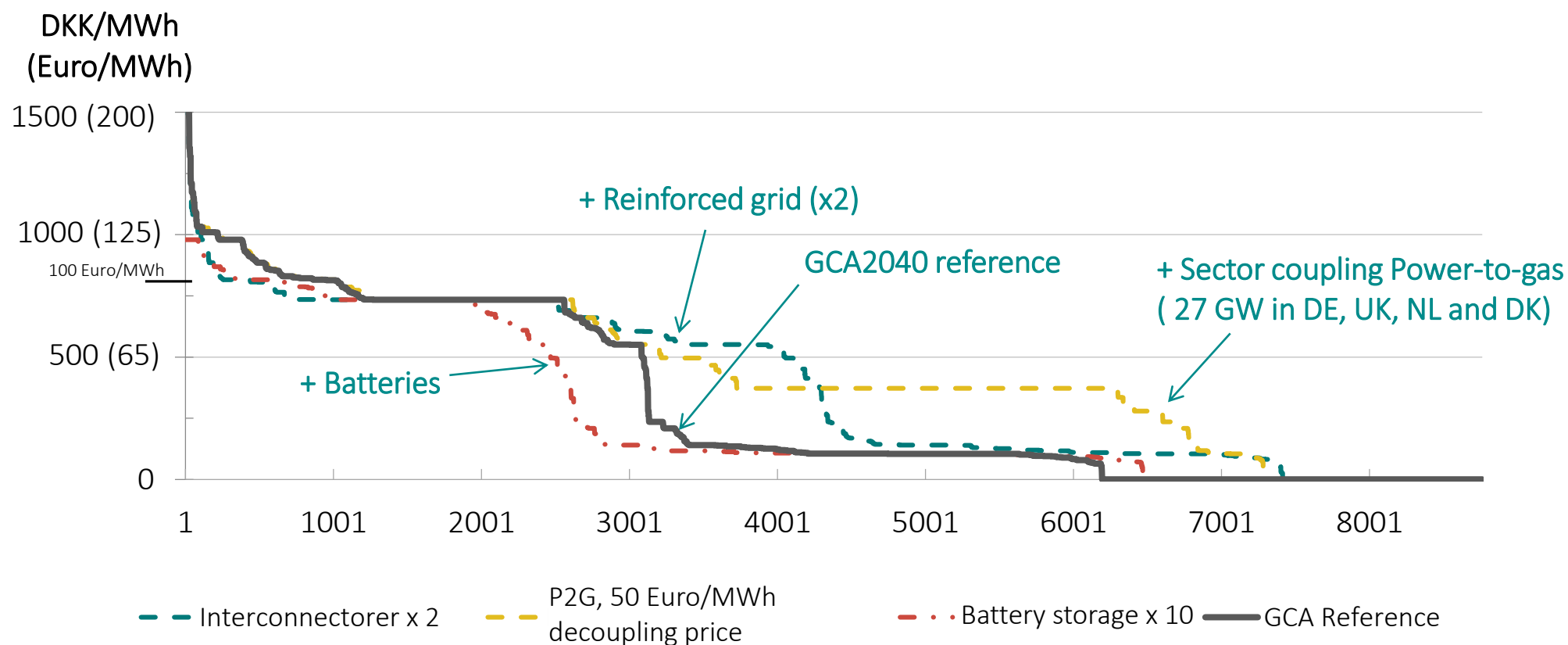
Our tasks are to integrate renewable energy and ensure security of supply in Denmark

- Independent public enterprise owned by the Danish Ministry of Energy, Utilities and Climate
- ~ 1.300 employees – 8 locations and headquarter in Fredericia
- Mission to ensure reliable energy for society
- Vision to create balance in a renewable energy system



OTHER SOLUTIONS TO INCREASE FLEXIBILITY AND INCREASE VALUE OF RENEWABLES

DK West spot price duration curves GCA 2040



Source: Ten year national development plan, TYNDP, scenarios and Energinet calculations