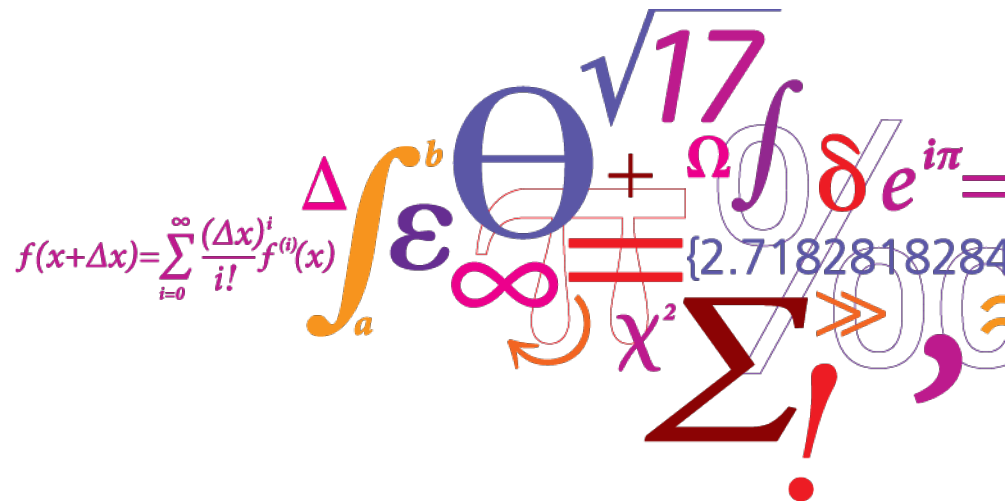


Future Gas – Annual Meeting 2018

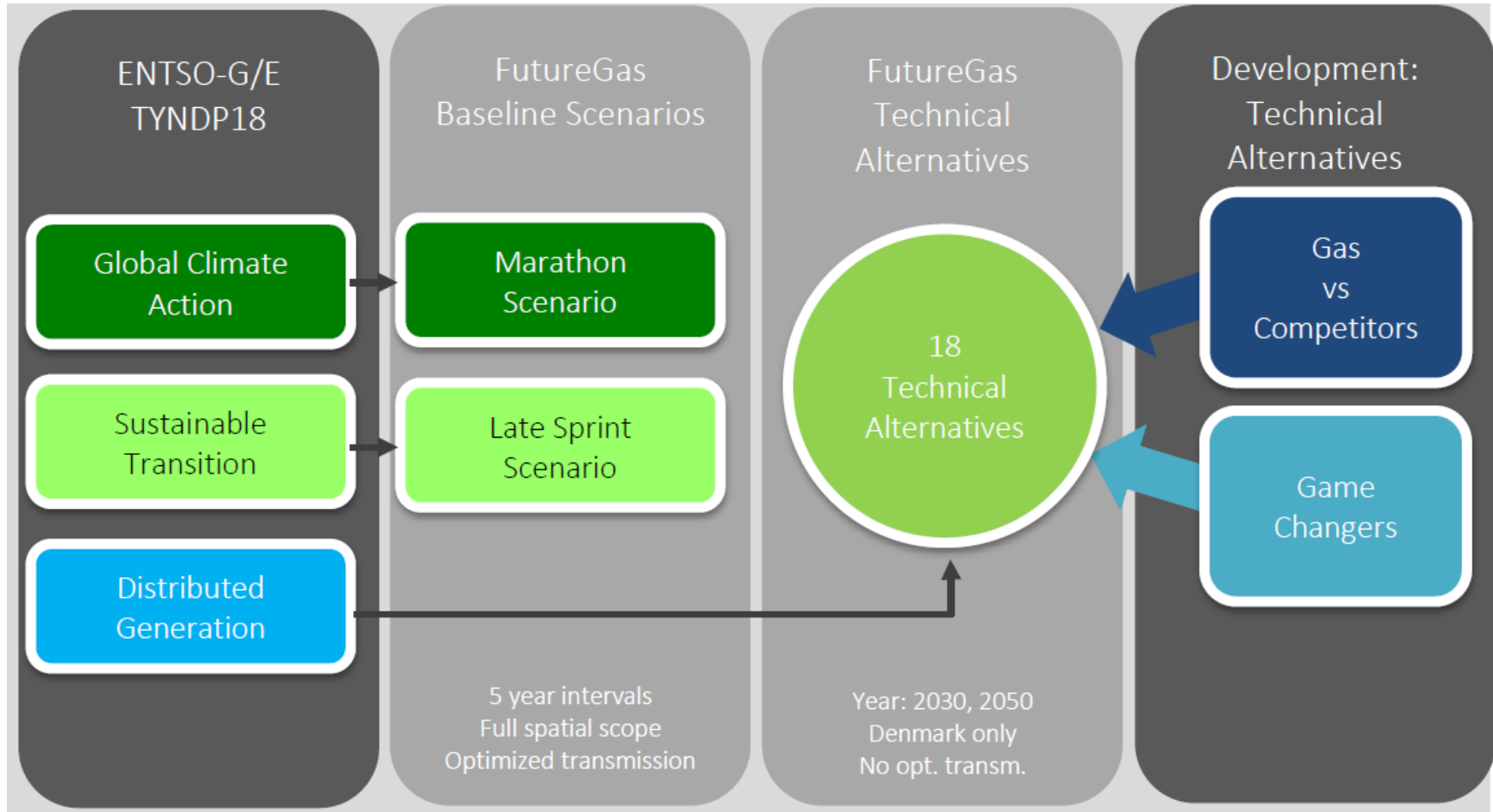
Scenarios – intermediate results

Frauke Wiese, Rasmus Bramstoft, Marie Münster,
Ida Græsted Jensen

11.09.2018



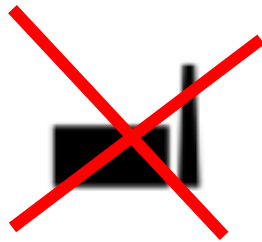
Future Gas Scenario Framework



Some restrictions and assumptions

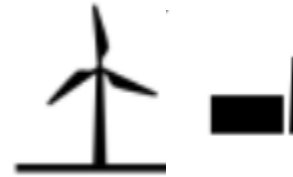
Additional Investments:

Interest rate:
 4 %
 generation
 3.25%
 transmission



Coal: No new investments

Not 2020:



Wind and natural gas

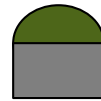
From 2030:



Transmission

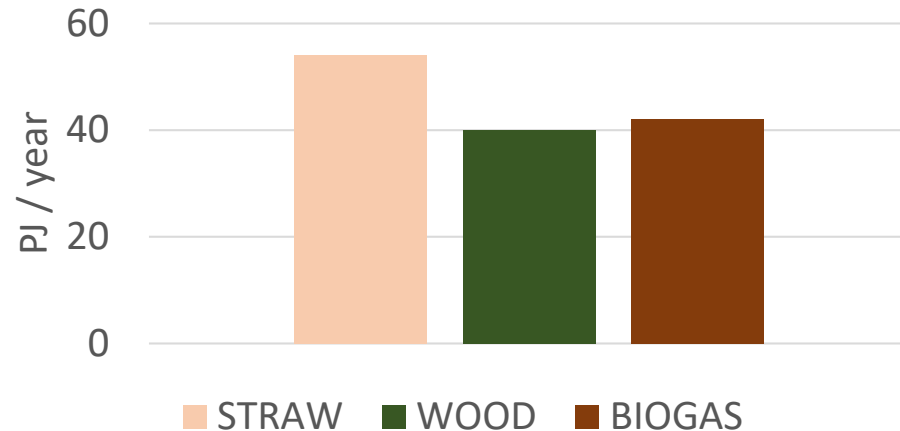


No subsidies and taxes



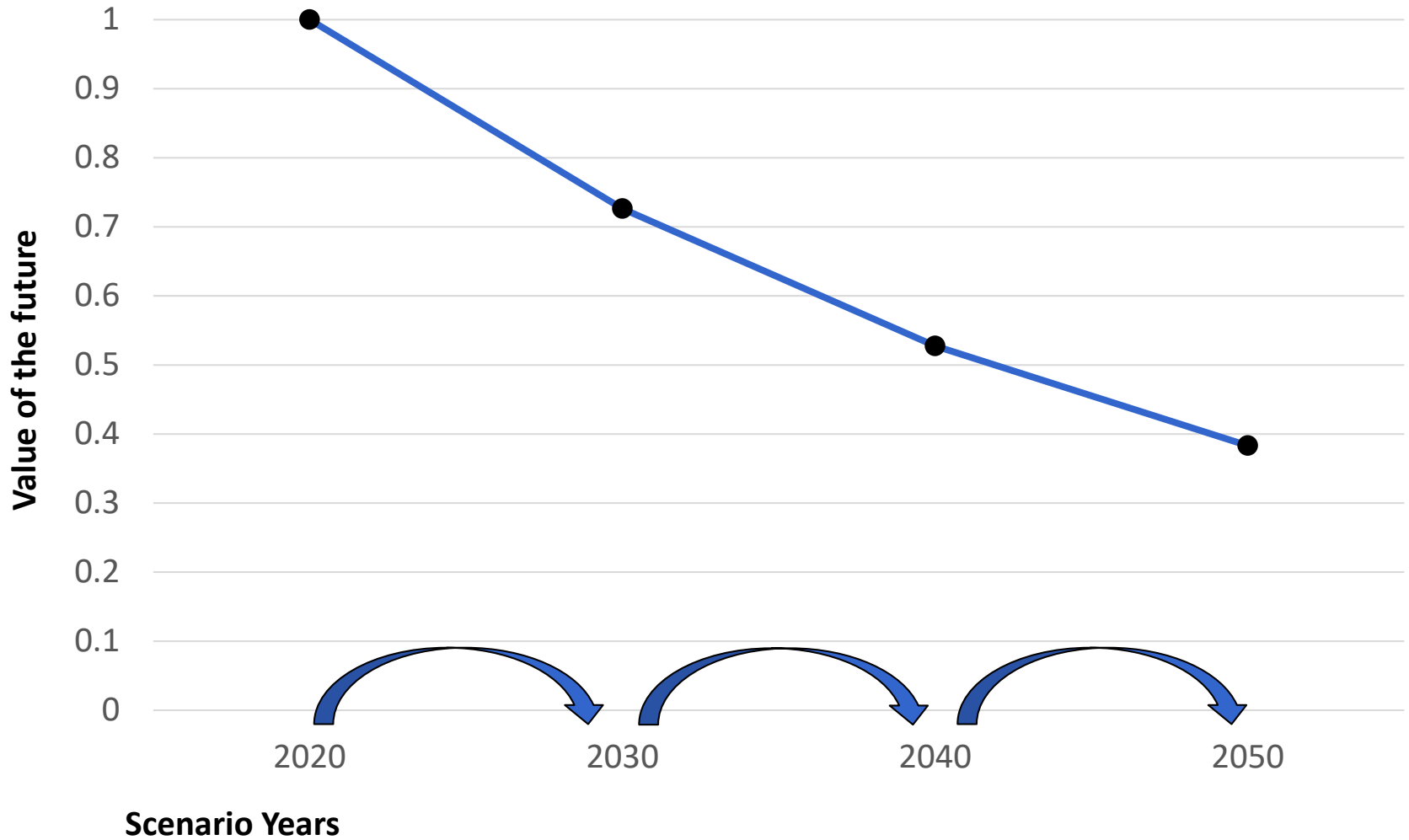
Biogas:
 5 PJ in 2020

Available bio-potential DK



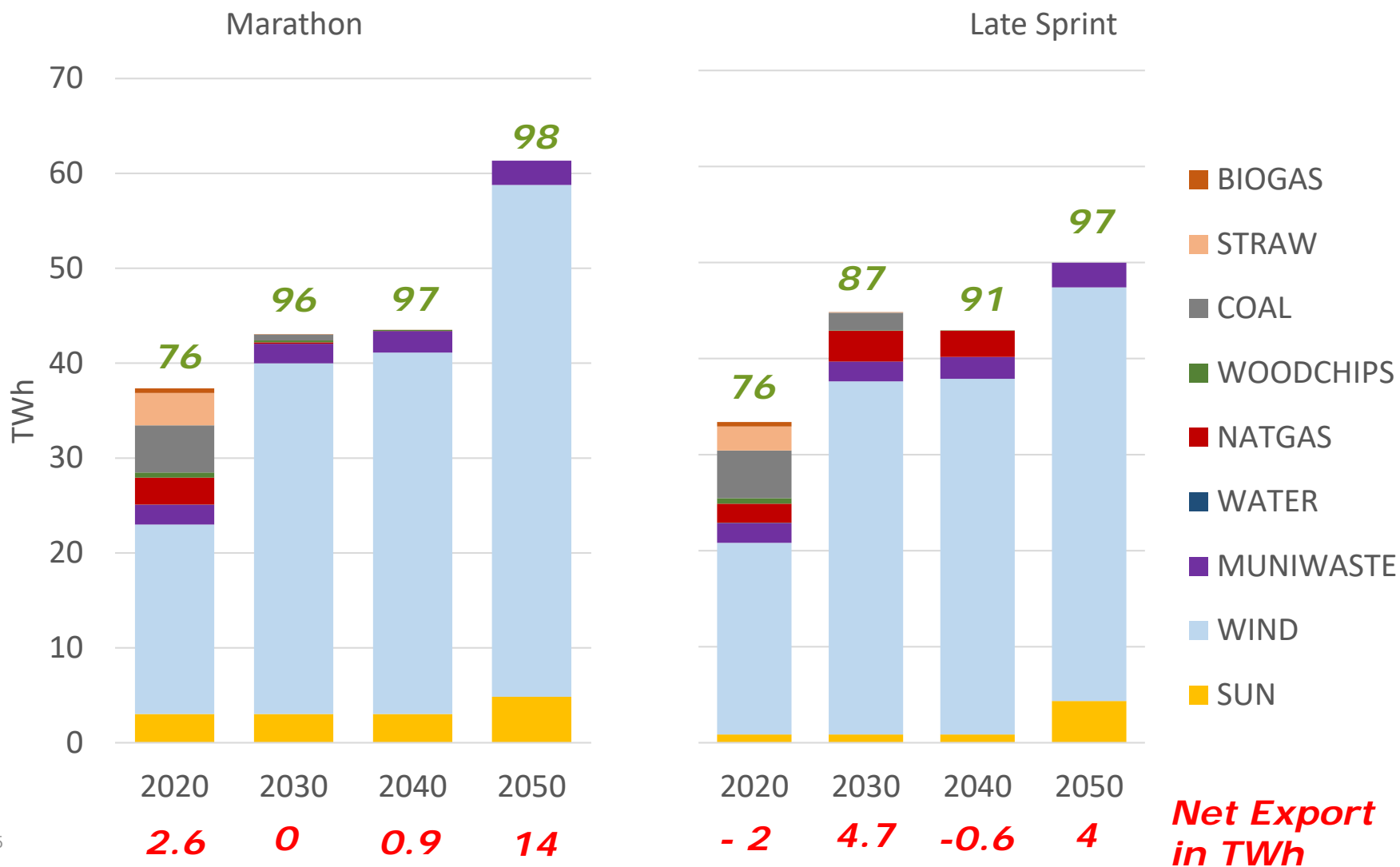
Taking knowledge about the future into account

-- Limited foresight --

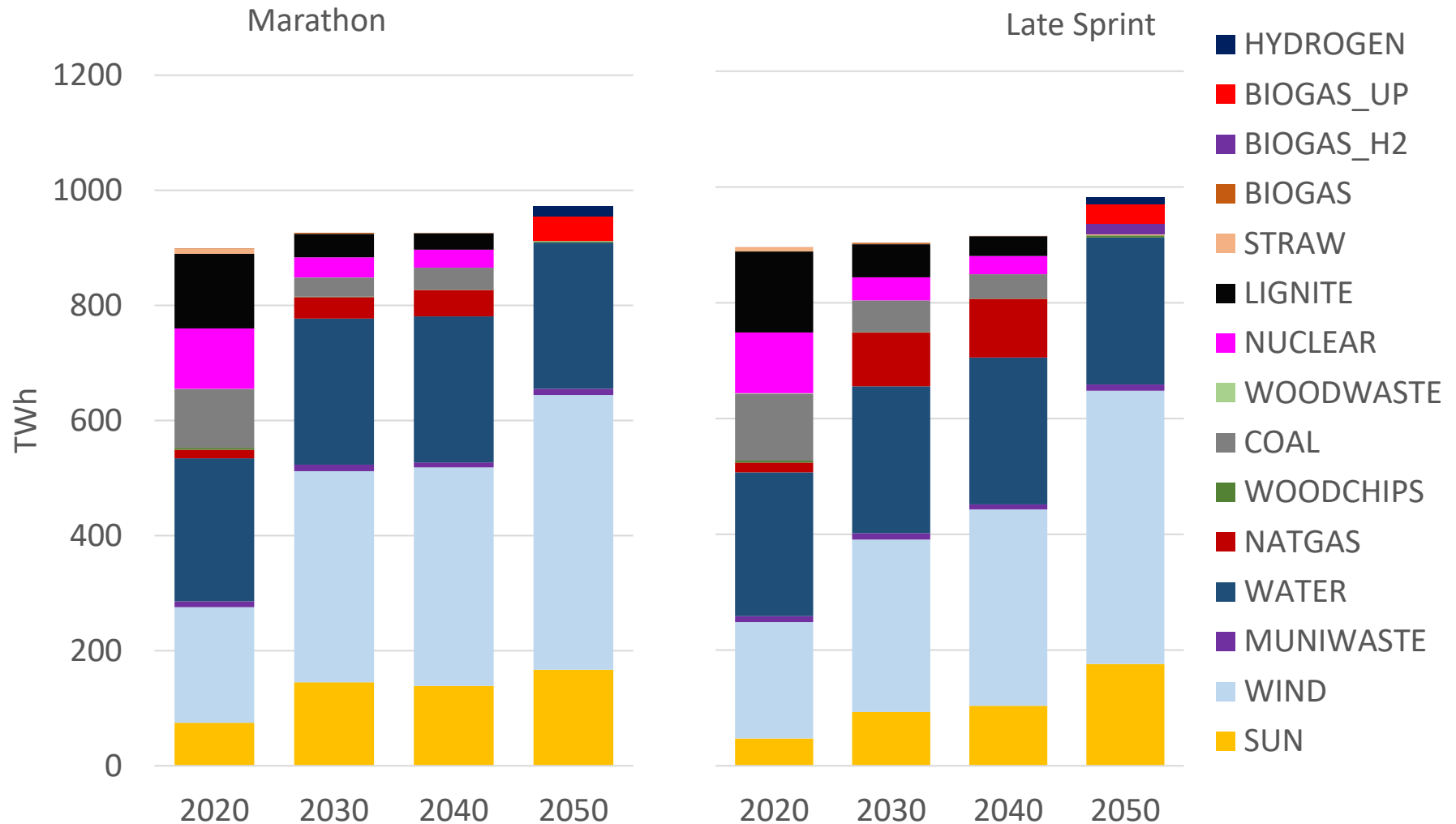


Electricity generation – DK

Renewable share in %

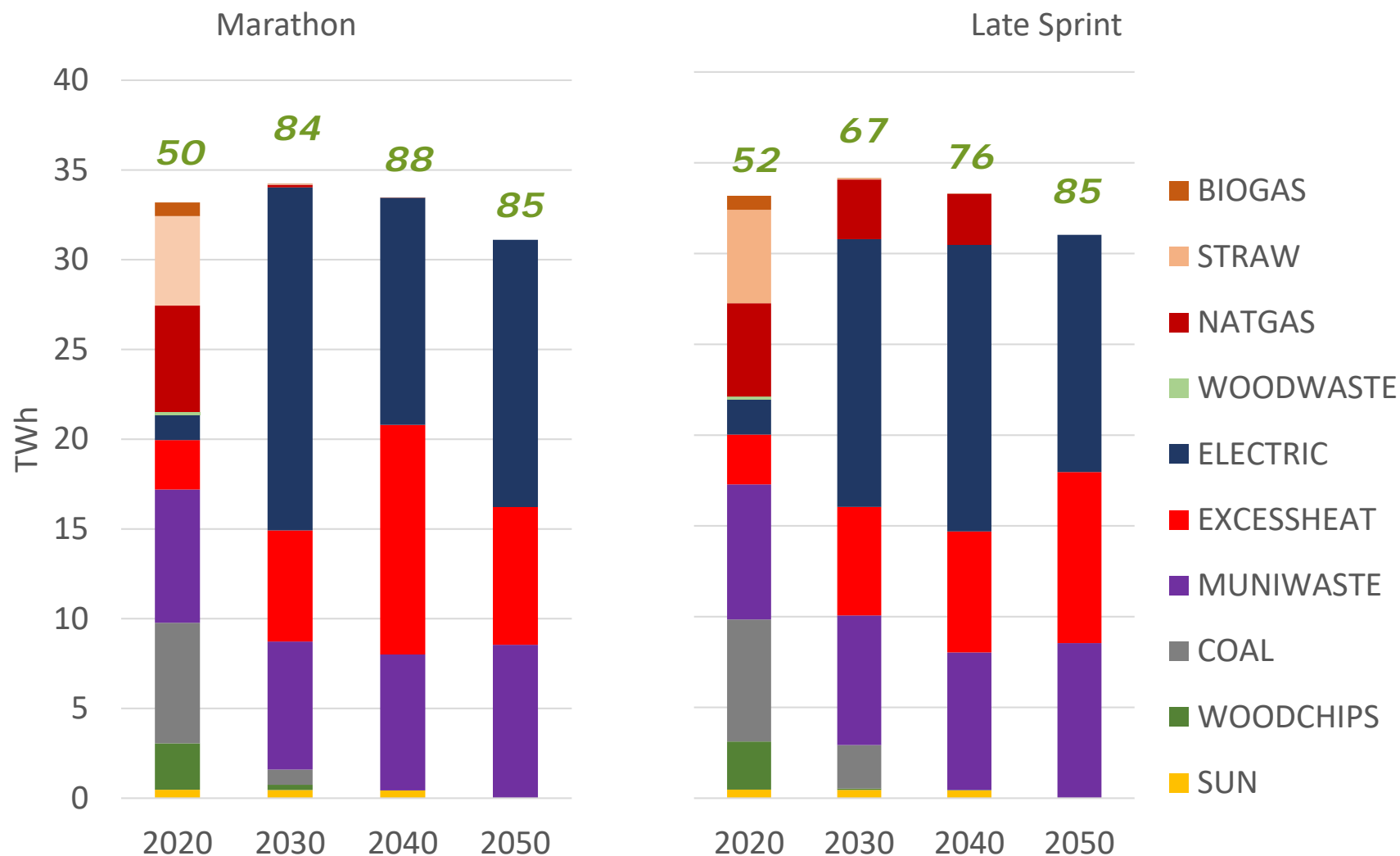


Electricity generation – DK, NO, SE, DE

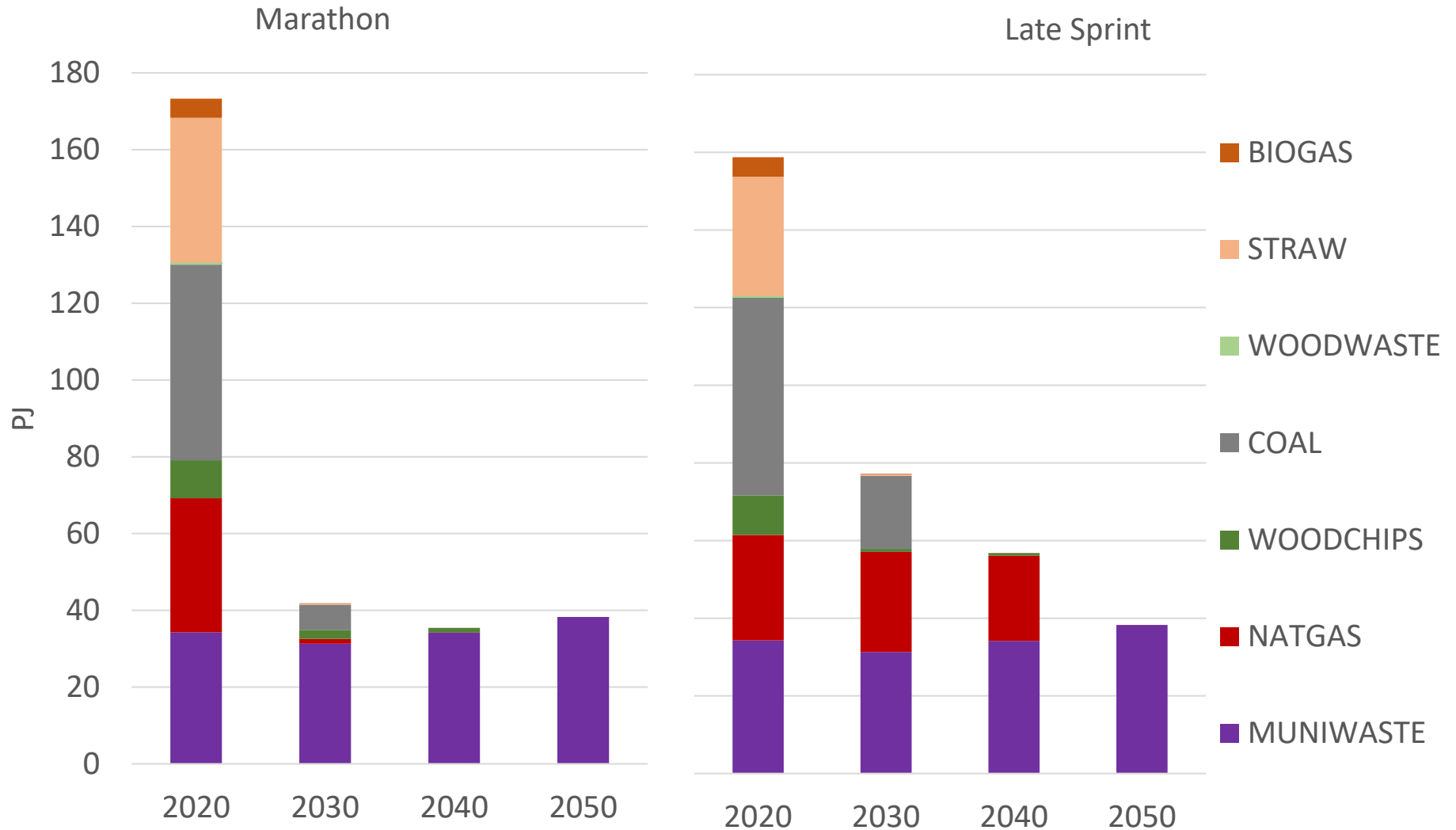


District heat generation – DK

Renewable share in %

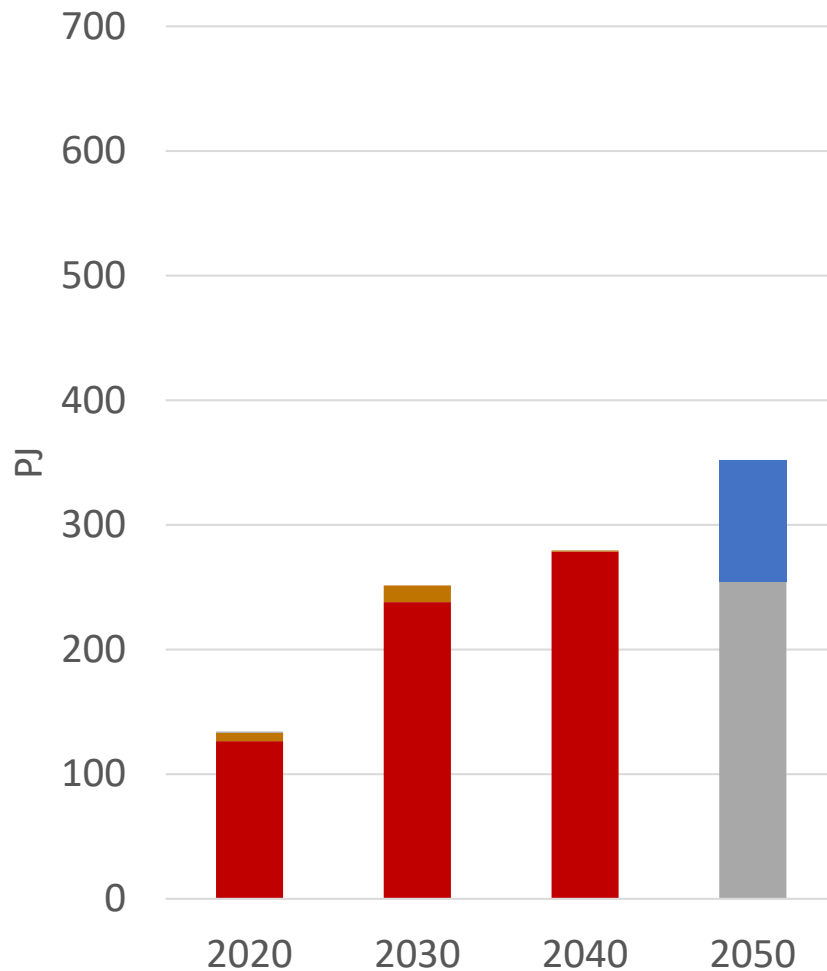


Fuel consumption for electricity and district heat - DK

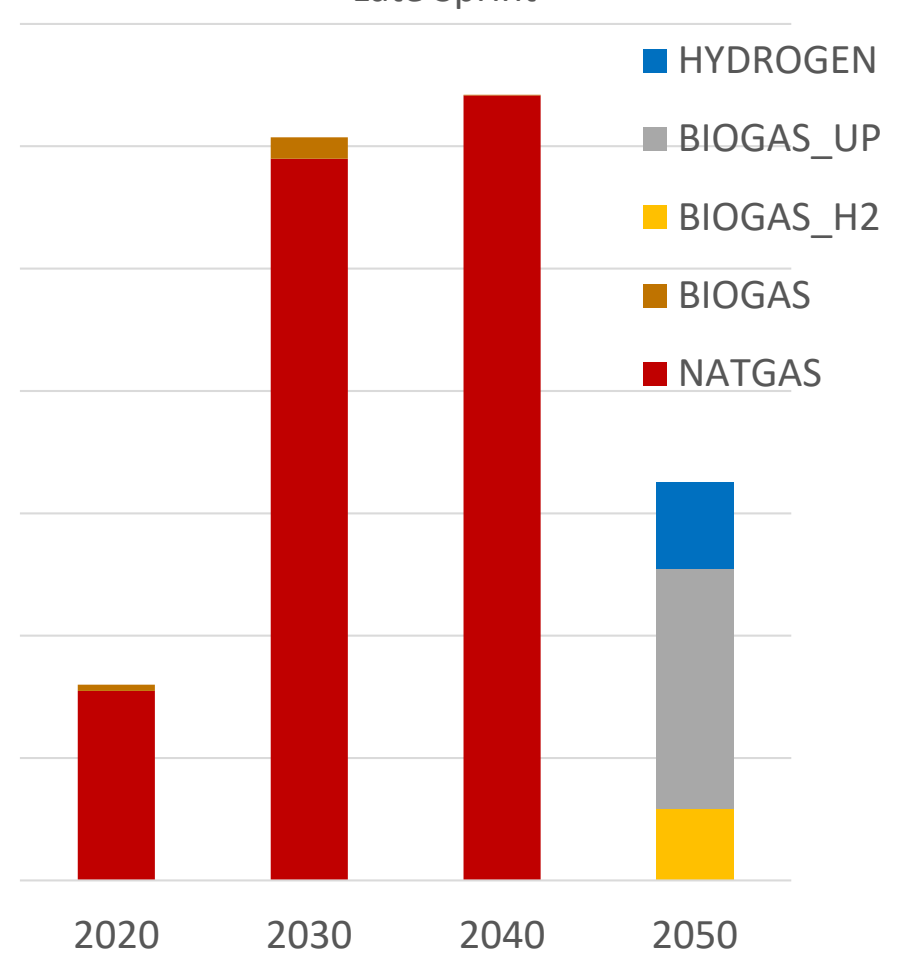


Natural and renewable gas consumption DK, NO, SE, DE

Marathon

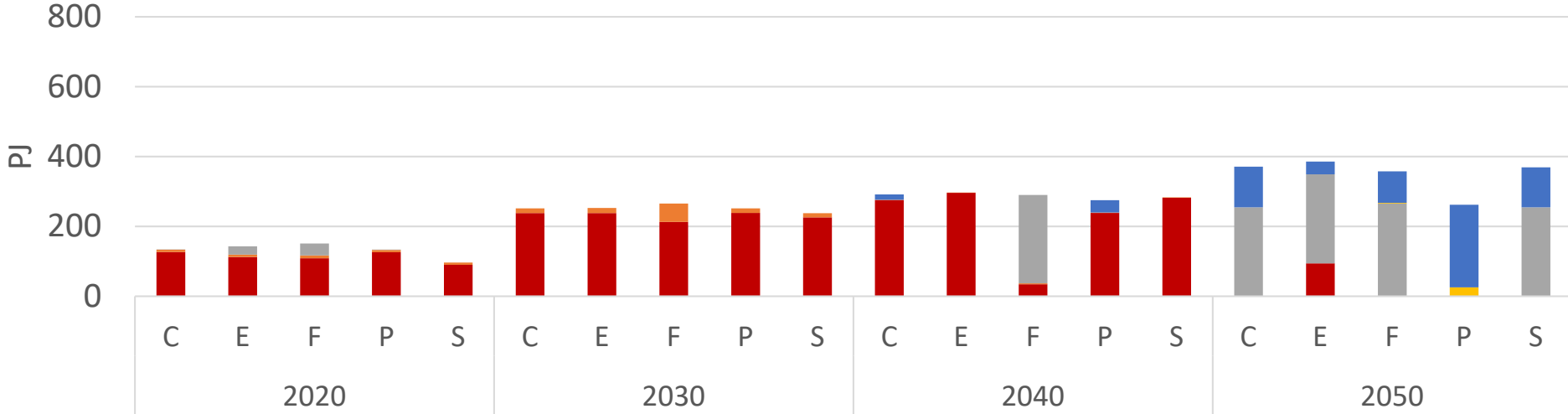


Late Sprint

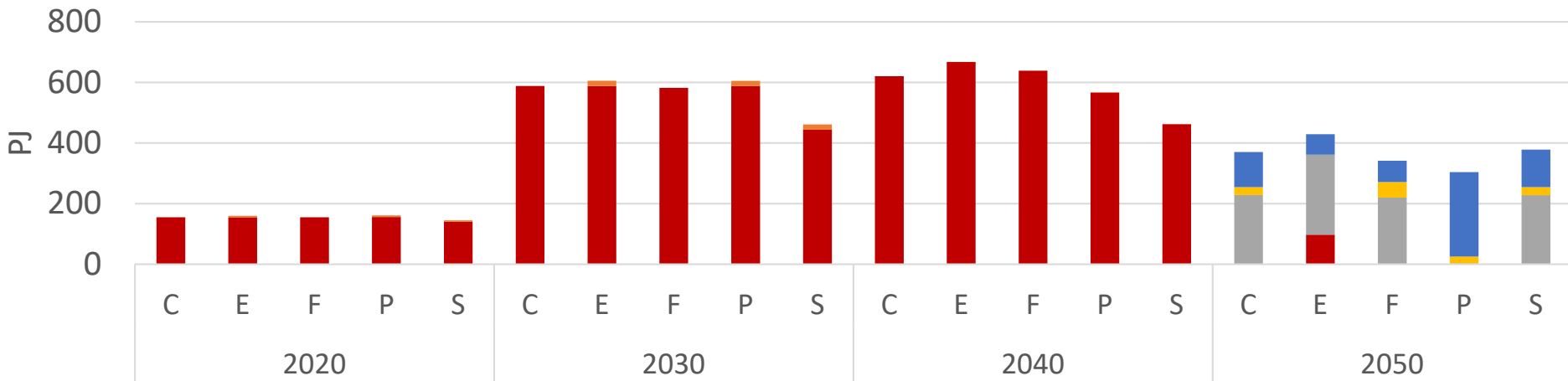


Sensitivity Analysis - Gas usage – DE,DK,NO,SE

Marathon

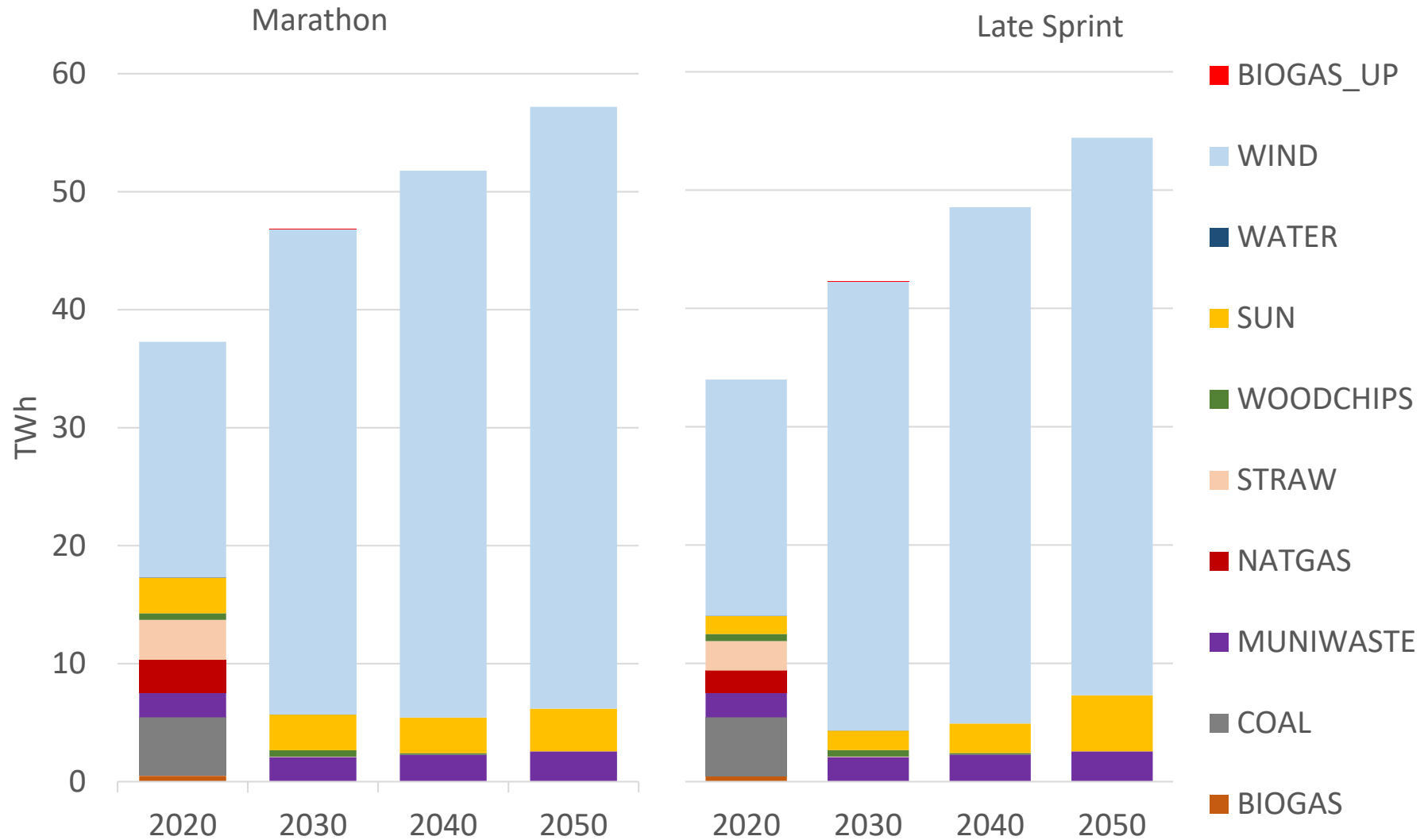


Late Sprint



2030 – zero emissions – according to the 2° goal

Electricity consumption - DK



Short comparison Marathon – Late Sprint

Cumulative **CO₂-emissions**:

-> **1.4 times higher in Late Sprint**

Natural **gas use for EL and DH** in DK

-> **2x in Late Sprint** compared to Marathon

Renewable Gas for EL and DH

-> **DK: none** for EL and DH

-> DE: H₂: 97 PJ Marathon - 71 PJ Late Sprint

BiogasUP: 255 PJ Marathon – 196 PJ Late Sprint

Transmission DK – other countries **higher in Marathon**

-> Capacity: 1.6 times more new transmission capacity in Marathon

-> Exports: 2.8 times more exported electricity in Marathon

Marathon lead to a more integrated system – sectors and countries

Next steps

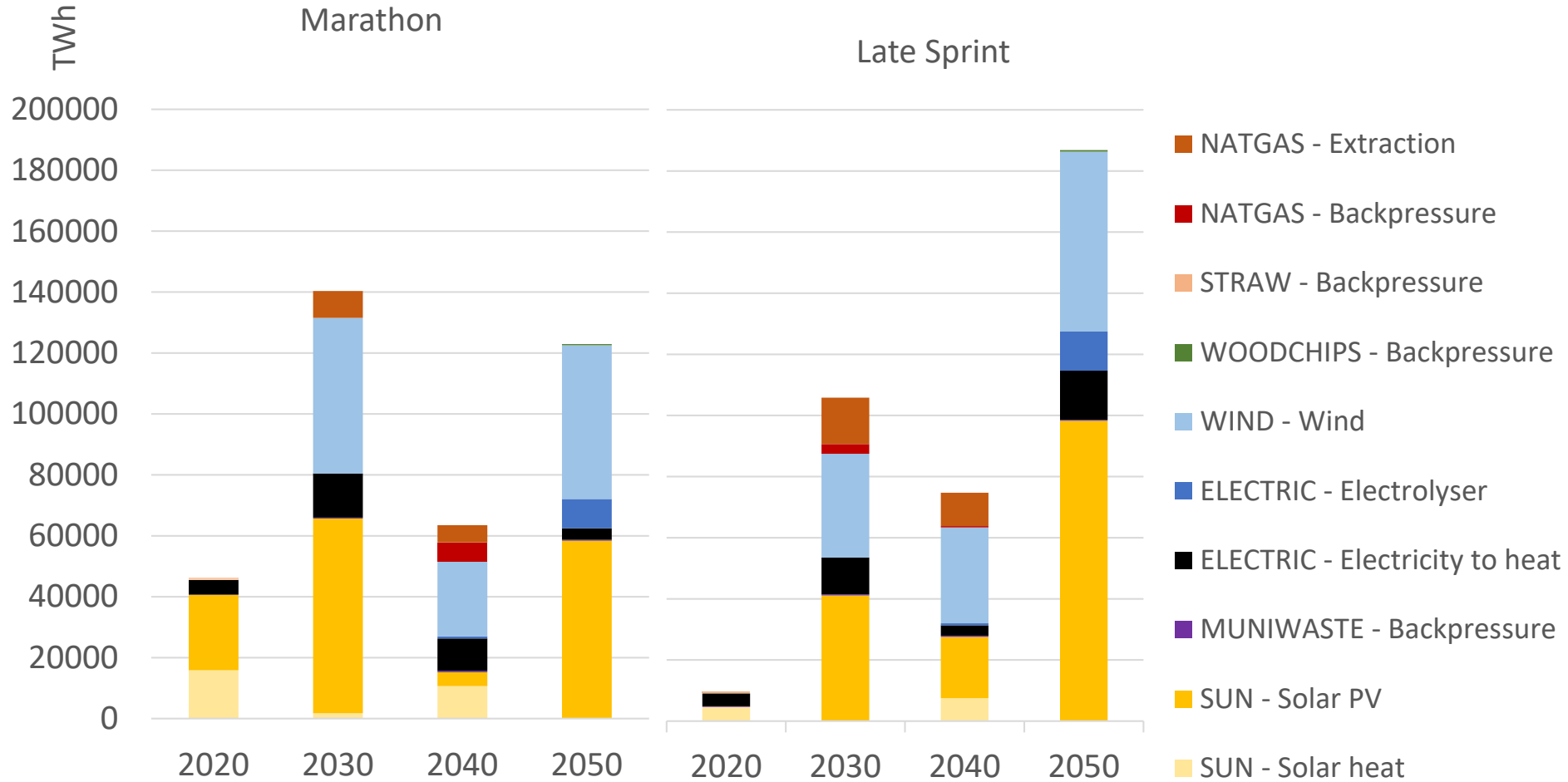
- Other sectors
 - Residential
 - Industry
 - Stronger Linkage to TIMES (Transport) and OptiFlow (Transport Fuels)
- Technical Alternatives
- More countries (UK and Poland)
- Subsidies and Taxes (WP6)
- Infrastructure (Energinet)

Backup

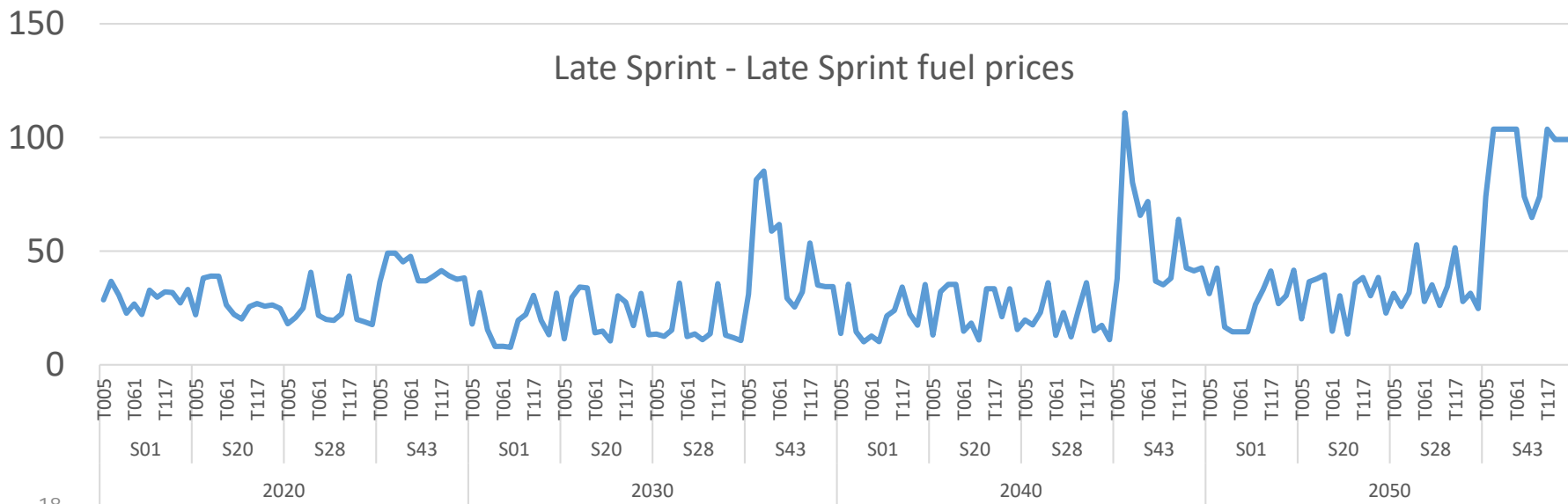
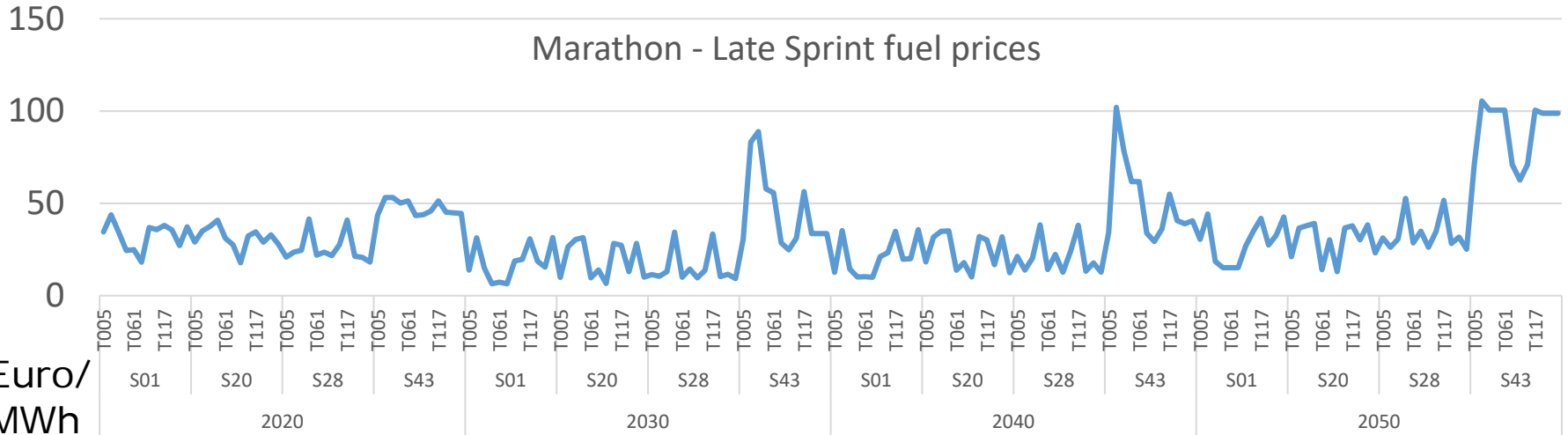
Sensitivity analysis

Short name	Description	Change
C	Costs for all hydrogen technologies	-30%
E	Emission factor for biogas	-20.75 kg CO ₂ equ/GJ
F	Fuel price for renewable gas	-30%
P	Reduction of biomass potential	-90% for biomass and biogas
S	Costs for solar technologies	-30%

New installed capacity – DK,NO,SE,DE



Electricity Prices – same Fuel prices



Average electricity prices

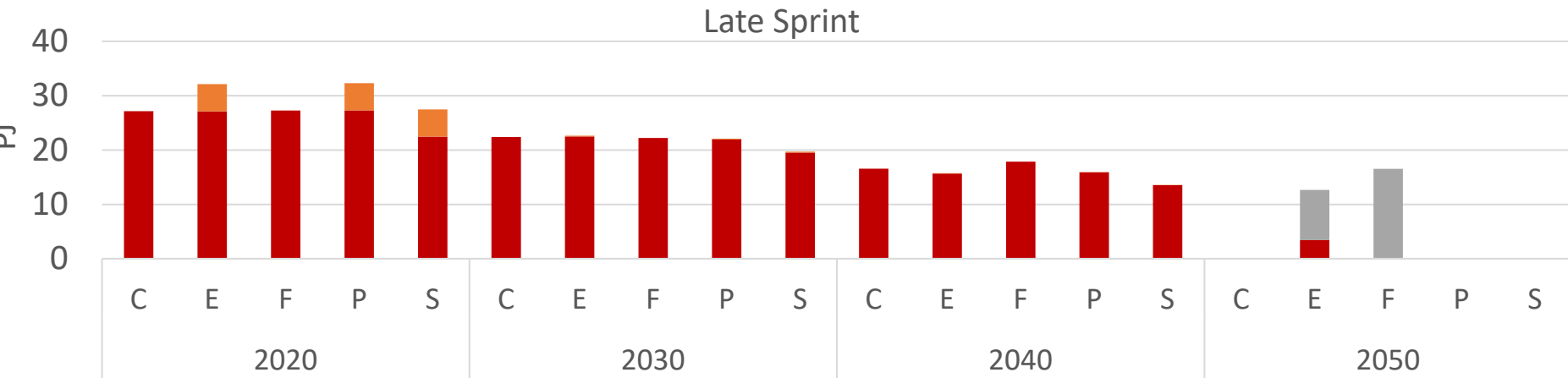
Marathon

ModelYear	Average of OMONEY/MWh
2020	34.24651554
2030	24.79759711
2040	29.0477362
2050	45.52541341
Grand Total	33.40431557

Late Sprint

ModelYear	Average of OMONEY/MWh
2020	30.66123364
2030	26.16458431
2040	30.52011154
2050	45.74381124
Grand Total	33.27243518

Sensitivity Analysis - Gas usage – DK



■ NATGAS ■ BIOGAS ■ BIOGAS_UP

2030 – zero emissions – according to the 2° goal

Electricity consumption – DK, NO, SE, DE

