



Future-proof Cogeneration

Modelling for Use case 1:

Gas turbine for high-temperature **industrial** application in **Spain**



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Presentation for:



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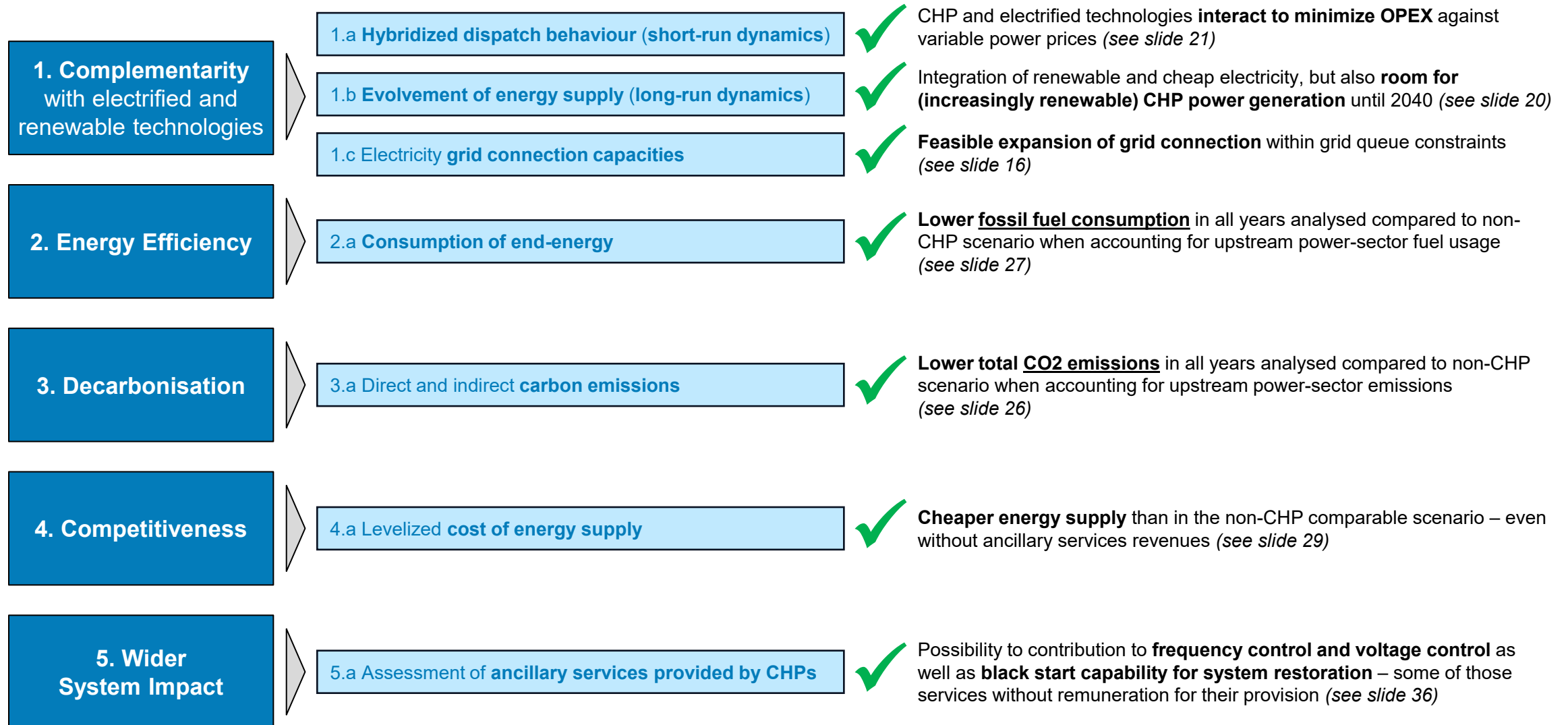
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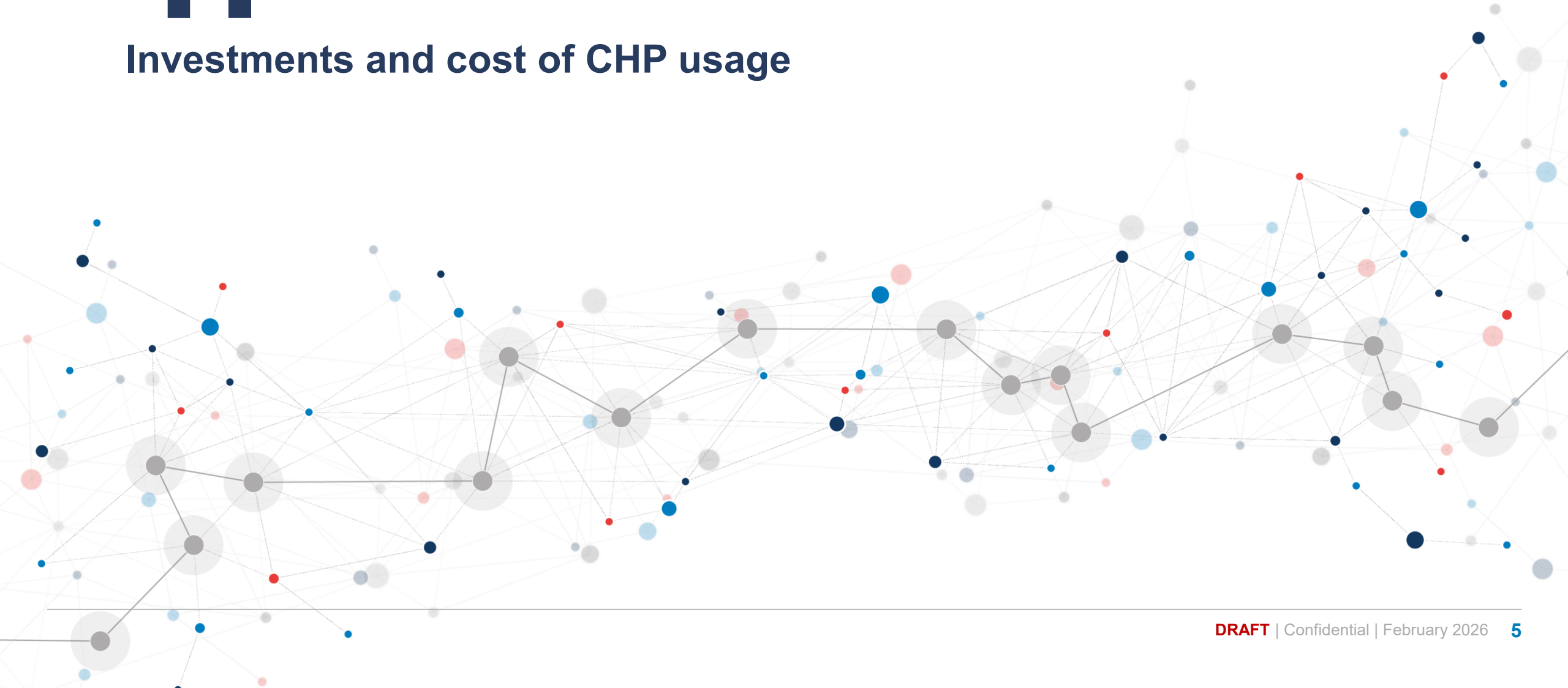


Summary: Spanish CHP Case Study Performance vs. Non-CHP Set-Up



1.

Investments and cost of CHP usage



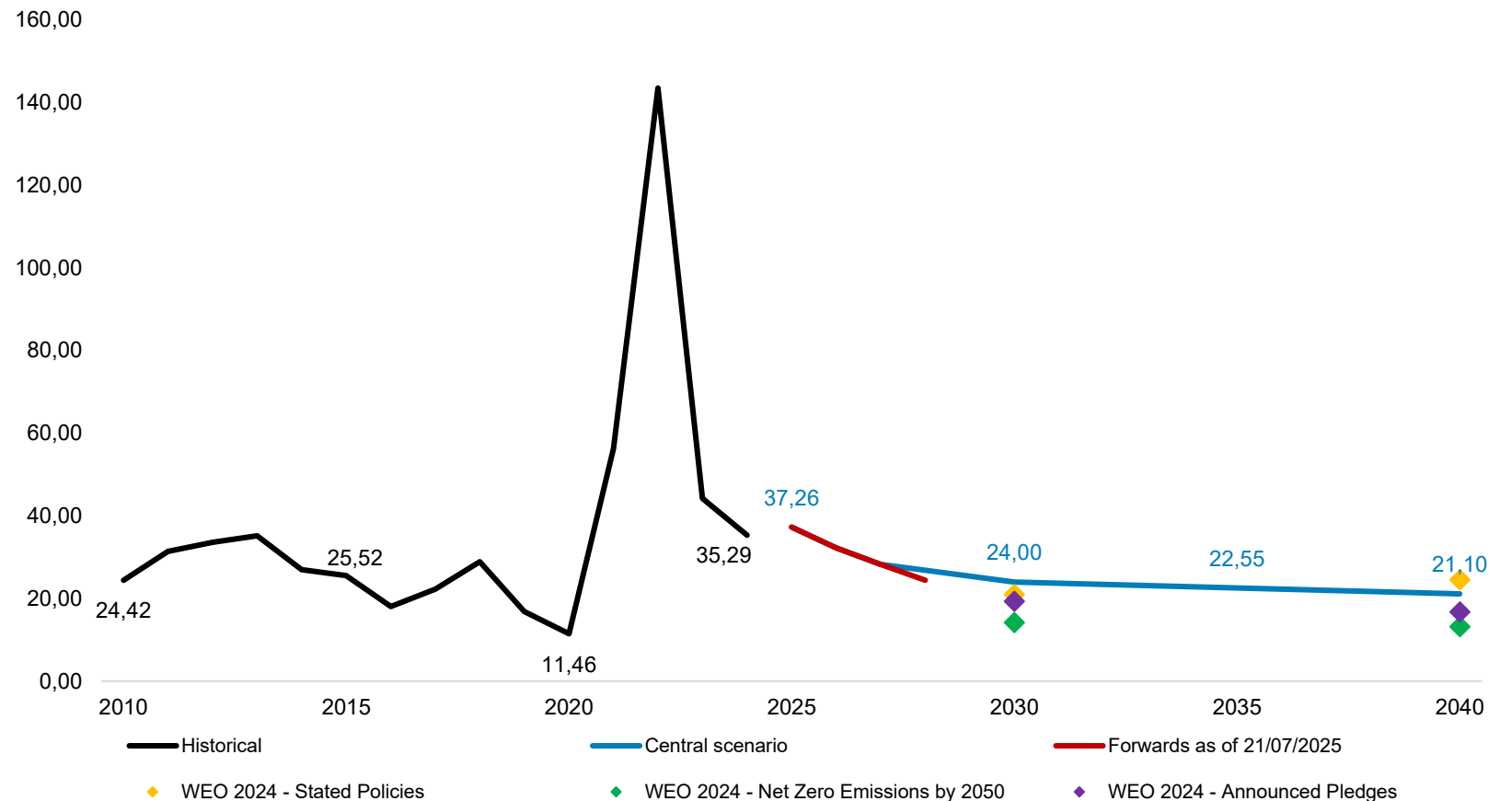


Natural gas prices

Natural gas prices are expected to rebalance in the short-term and converge towards US/EU spreads in the long-run.

- Gas prices are expected to gradually decrease back to more sustainable levels by 2030, once the LNG market rebalances. In the longer-term, prices converge to US Henry Hub gas price, with a mark-up considering transport cost, as the US LNG becomes the main gas supply for Europe.
- In the central scenario**, gas prices up until 2028 are based on forwards, while gas prices beyond 2028 converge towards the US Henry Hub central gas price in the long-term (from 2040 onwards), assuming the spread would remain around the LRMC of US LNG shipped to EU (c.4.5\$/MMBtu).

Gas price projections [EUR₂₀₂₄/MWh] [1] [2]



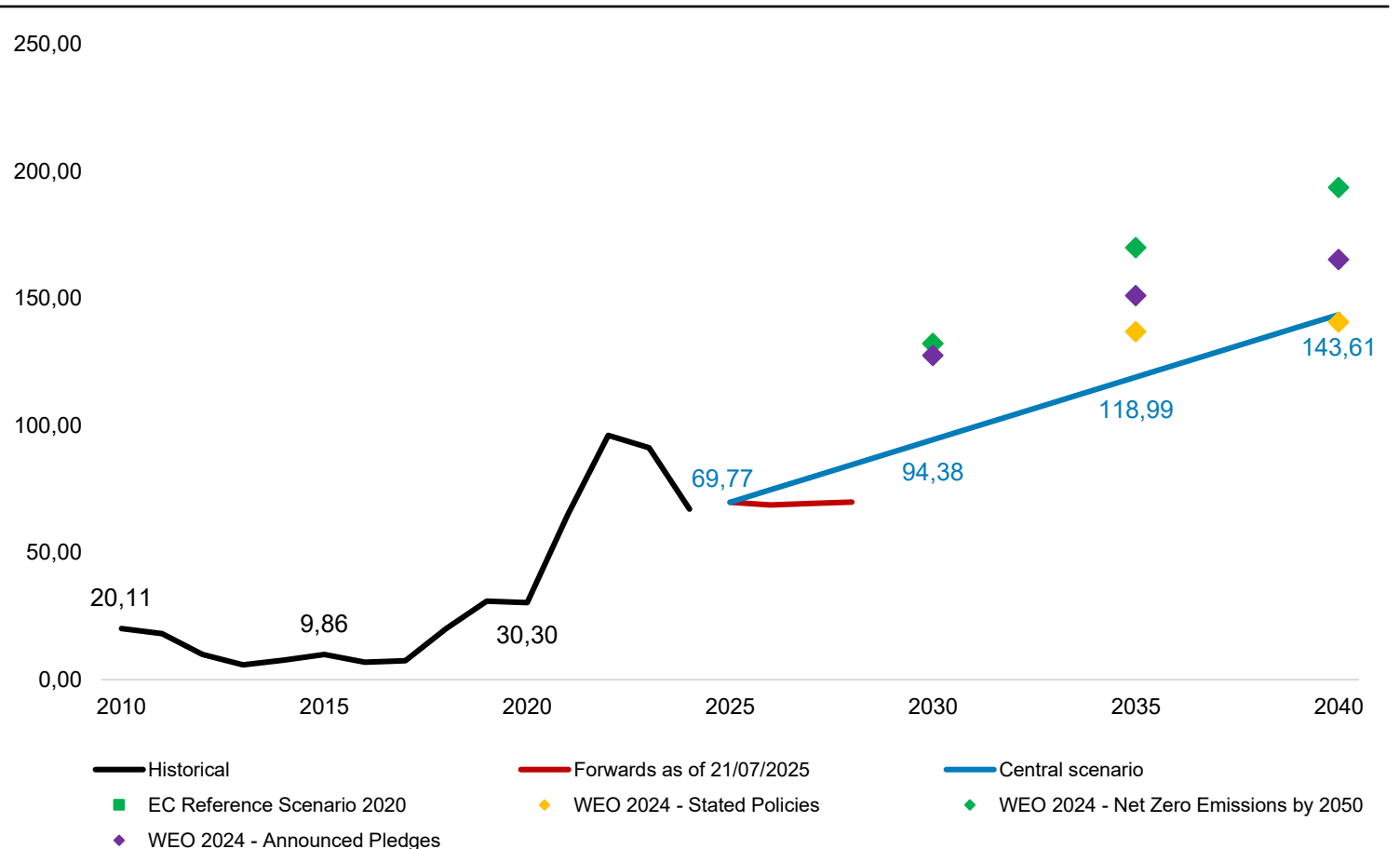


EU ETS price

The EU-ETS price reaches 144 EUR₂₀₂₄/t by 2040, in line with the EC’s baseline scenario (EC July 2021)

- Our central EU-ETS price reaches c.144 EUR₂₀₂₄/t by 2040, in line with the EC’s scenario.
- The level of the EU-ETS price depends on the level of decarbonisation assumptions, and the extent of support tools implemented to facilitate the deployment of clean technologies in the market.
- Indeed, in a world with less stringent norms and regulation, and scarce subsidies to promote low-carbon technologies, a very high CO2 price would be required to decarbonise the economy. This comes at the expense of social acceptance. The high EU-ETS scenario depicts a world in which decarbonisation is mainly CO2 price led, with higher CO2 prices.
- Conversely, in a world where decarbonisation would be mainly regulation-led, and strongly backed by subsidies, a lower CO2 price would be required to reach decarbonisation objectives.

EU-ETS price projection [EUR₂₀₂₄/t] [1] [2]



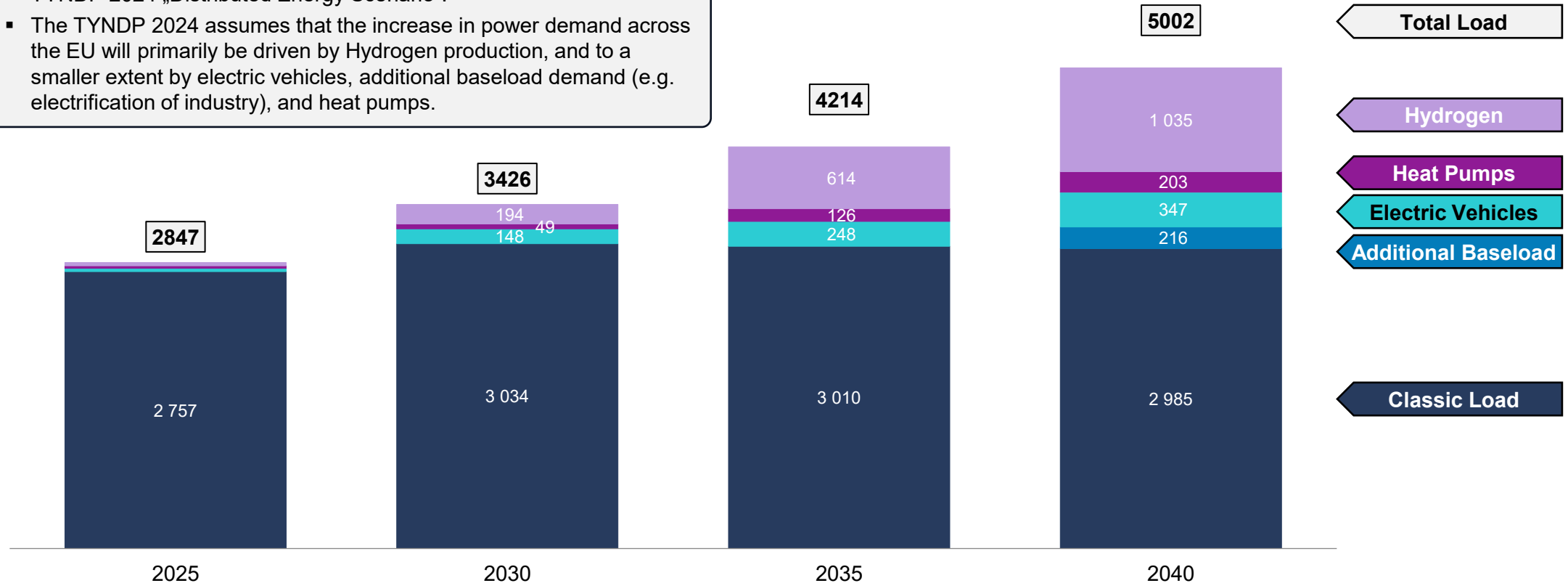


Europe: Power demand evolvement

The TYNDP 2024 DE scenario projects European power demand to nearly double by 2040

Assumption on European annual power demand [TWh/a] ^[1] ^[2]

- The projected power demand for EU27 follows the scenario of the TYNDP 2024 „Distributed Energy Scenario“.
- The TYNDP 2024 assumes that the increase in power demand across the EU will primarily be driven by Hydrogen production, and to a smaller extent by electric vehicles, additional baseload demand (e.g. electrification of industry), and heat pumps.



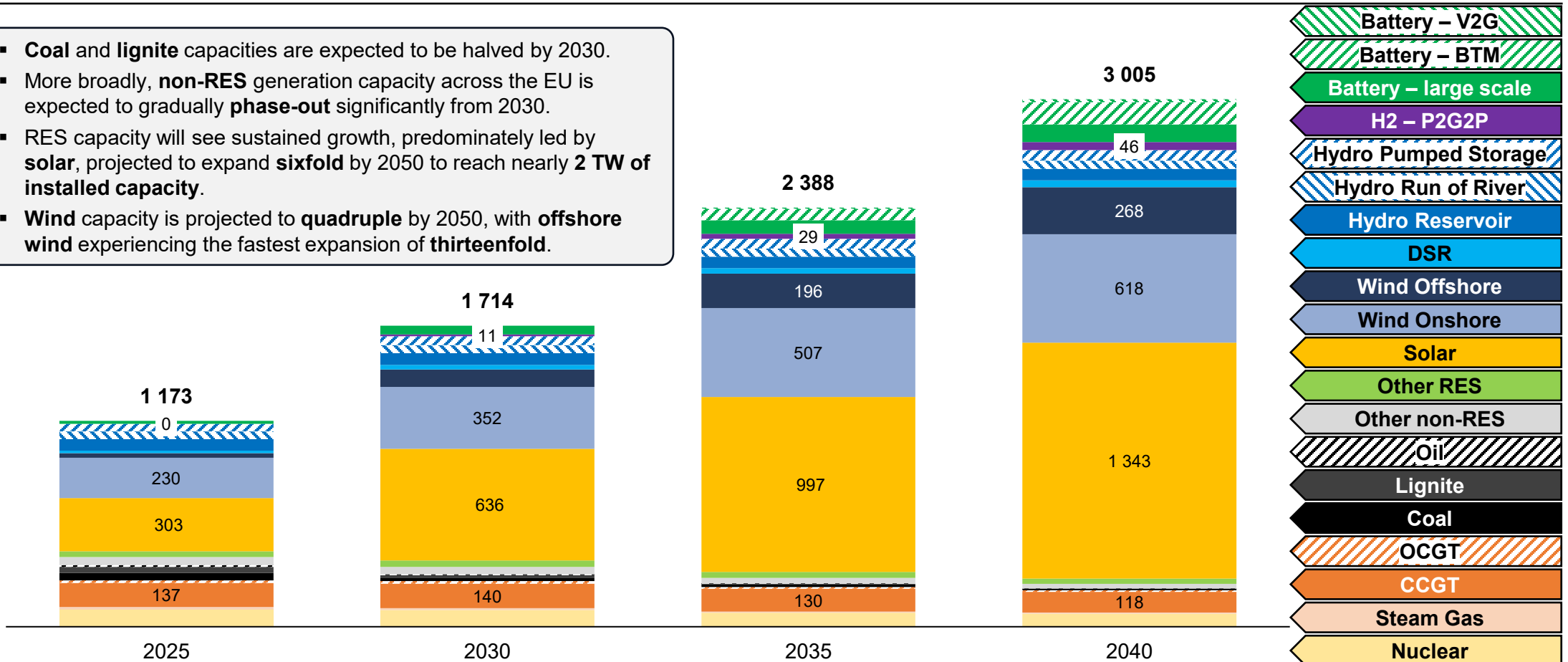


Europe: Power generation capacity mix evolution

European installed power capacity is expected to triple by 2050, with rapid expansion of RES capacity to compensate the decline in coal and lignite generation

European power generation capacity mix [GW]

- **Coal** and **lignite** capacities are expected to be halved by 2030.
- More broadly, **non-RES** generation capacity across the EU is expected to gradually **phase-out** significantly from 2030.
- RES capacity will see sustained growth, predominately led by **solar**, projected to expand **sixfold** by 2050 to reach nearly **2 TW of installed capacity**.
- **Wind** capacity is projected to **quadruple** by 2050, with **offshore wind** experiencing the fastest expansion of **thirteenfold**.



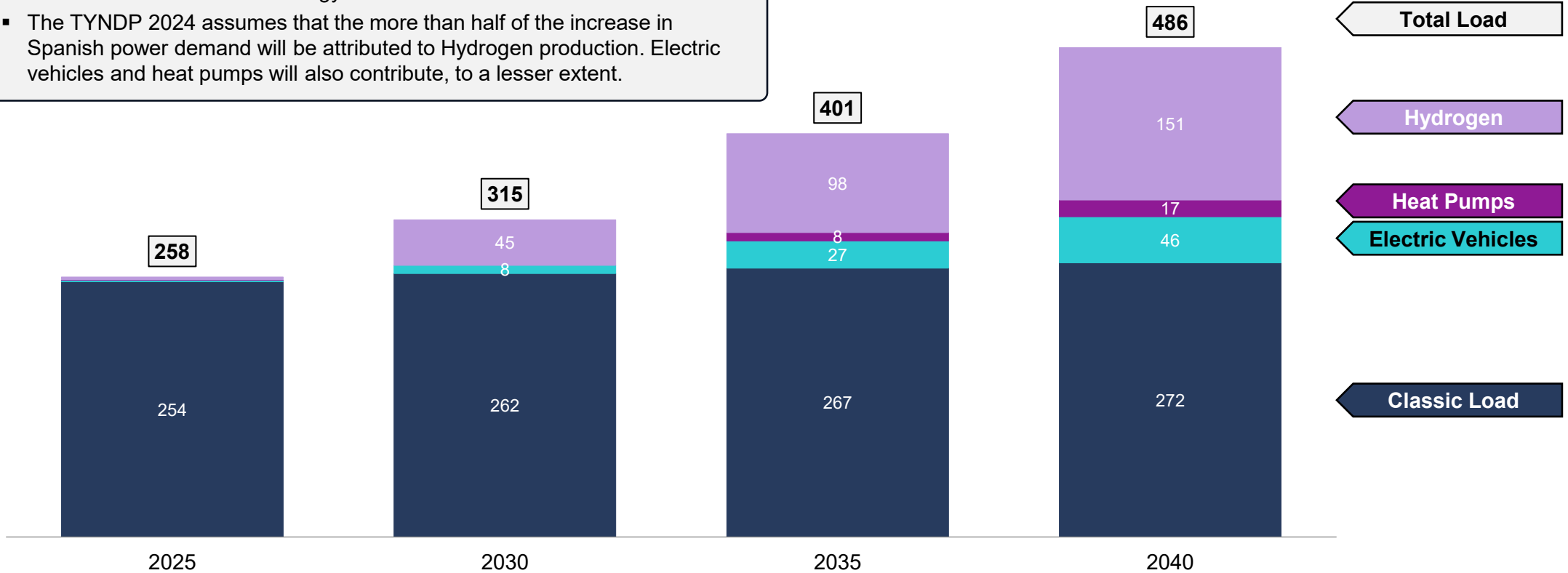


Spain: Power demand evolution

The TYNDP 2024 DE scenario expects Spanish demand to nearly double BY 2040

Assumption on Spanish annual power demand [TWh/a] [1] [2]

- The projected future Spanish power demand follows the scenario the TYNDP 2024 “Distributed Energy Scenario”.
- The TYNDP 2024 assumes that the more than half of the increase in Spanish power demand will be attributed to Hydrogen production. Electric vehicles and heat pumps will also contribute, to a lesser extent.



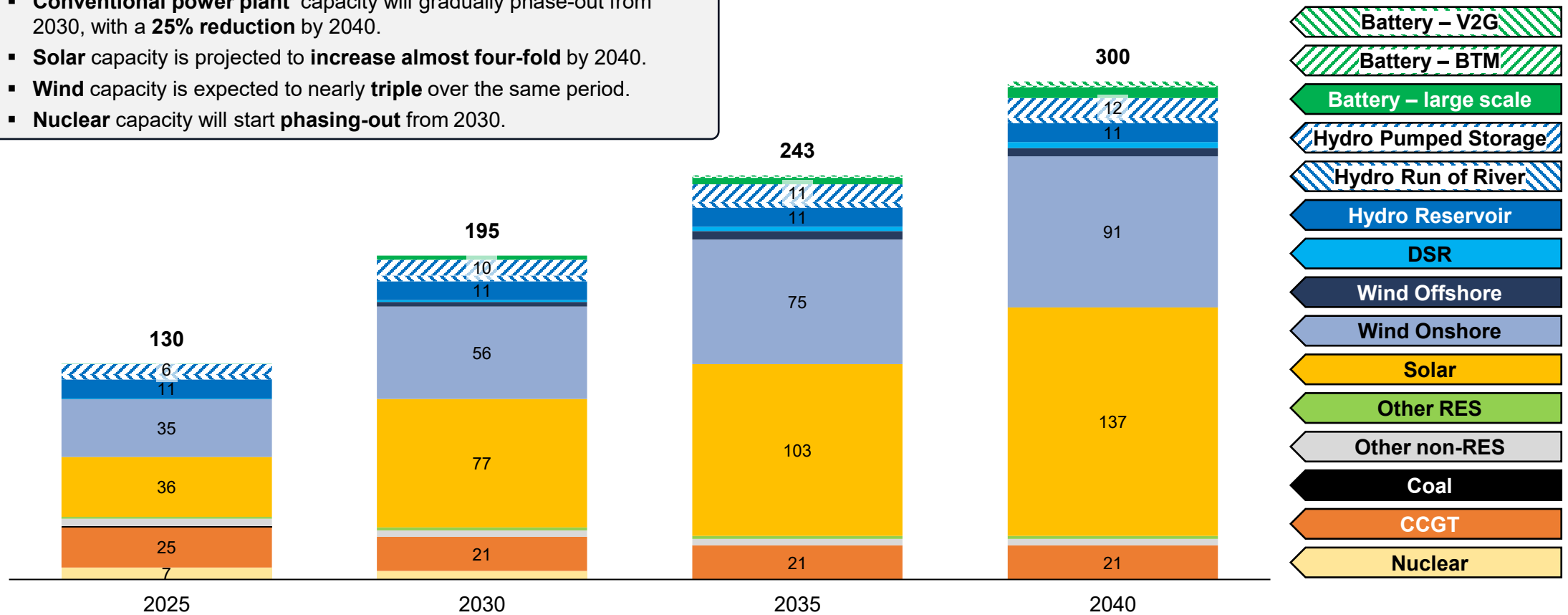


Spain: Power generation capacity mix evolution

Installed generation capacity in Spain is assumed to more than double, with RES capacity compensating nuclear and non-RES phase-outs.

Spain power generation capacity mix [GW]

- **Conventional power plant*** capacity will gradually phase-out from 2030, with a **25% reduction** by 2040.
- **Solar** capacity is projected to **increase almost four-fold** by 2040.
- **Wind** capacity is expected to nearly **triple** over the same period.
- **Nuclear** capacity will start **phasing-out** from 2030.

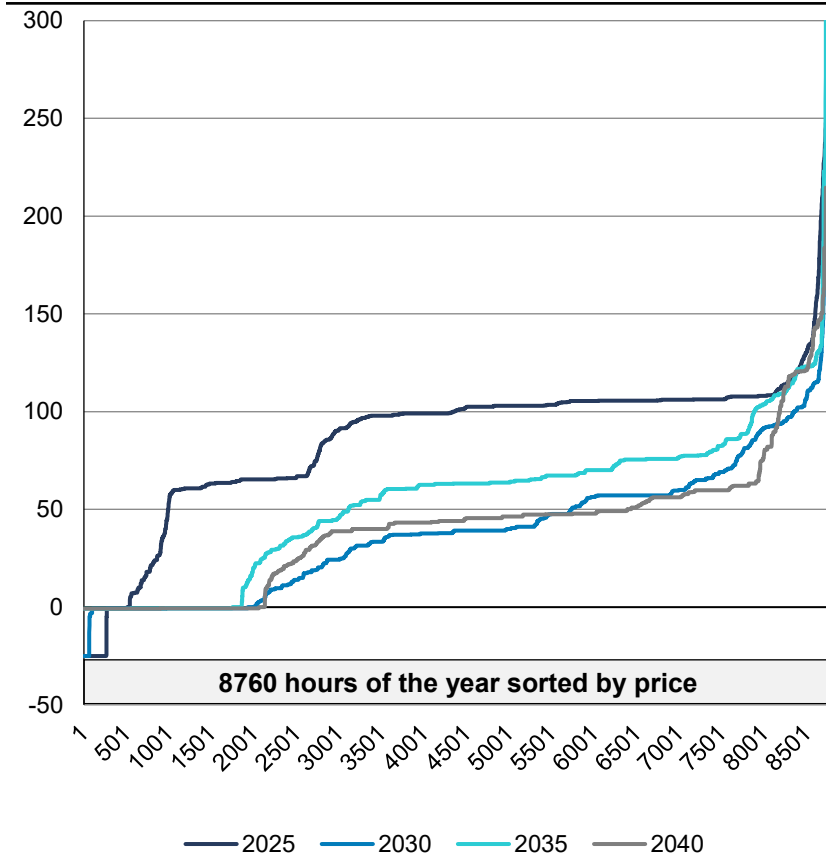




Structure of Spanish wholesale electricity prices

The number of zero (or negative) price hours is expected to increase significantly by 2030. The structure of modelled prices in 2030-2040 is similar to those for 2025 but increasingly impacted by RES deployment.

A) ES wholesale day-ahead power price curves [EUR₂₀₂₄ / MWh]

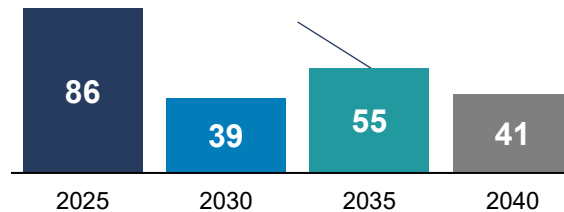


B) Average ES wholesale day-ahead power price [EUR₂₀₂₄ / MWh]

Note: On this slide we report modelled wholesale electricity prices – excluding all grid fees, system charges, retail mark-ups etc. These additional cost components are however taken into consideration in the modelling of the specific use case.

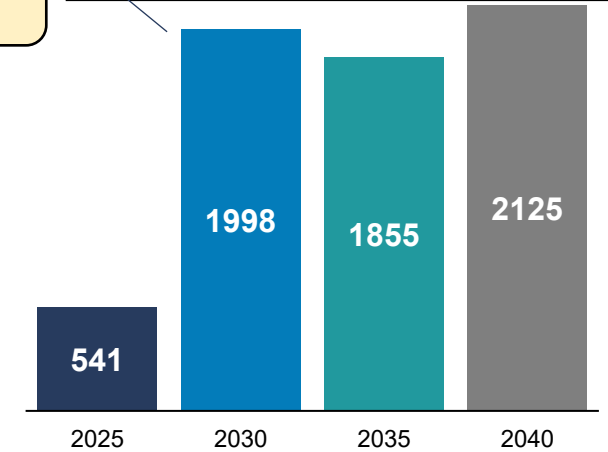
The price structure and price level is largely **driven by the capacity and demand assumptions of the ERAA and TYNDP scenarios.**

Temporary increase of baseload price due to phase-out of nuclear electricity generation. This is not a forecast, but a scenario assumption of the TYNDP – at this point, it is uncertain, if or when this phase-out will be implemented.



C) Annual number of hours with price <= 0 EUR / MWh in ES [#]

The substantial increase of zero-price hours (following from the TYNDP generation capacity assumptions) strongly impacts the on-site dispatch of heat-generating technologies (particularly e-boilers). It is uncertain if these price curves will materialize.



- We report modelled prices for the Spanish bidding zone. The underlying assumptions on installed capacities by generation technology and demand for electricity follow the assumptions of the TYNDP 2024 DE scenario and ERAA 2023 (for the entire European electricity system).
- The modelled annual baseload price drops from 86 EUR₂₀₂₄ / MWh in 2025 to 41 EUR₂₀₂₄ / MWh in 2040.
- The number of hours with negative or zero prices per year increases from c. 541h in 2025 to c. 2 125 h in 2040.

Digression: Comparison of Compass Lexecon vs. TYNDP power modelling

Prices modelled for the ITCN and ES bidding zones are structurally similar between the TYNDP and CL modelling of TYNDP assumptions. The CL modelling methodology results in higher variability of prices.

Wholesale day-ahead power price curves for **2035**

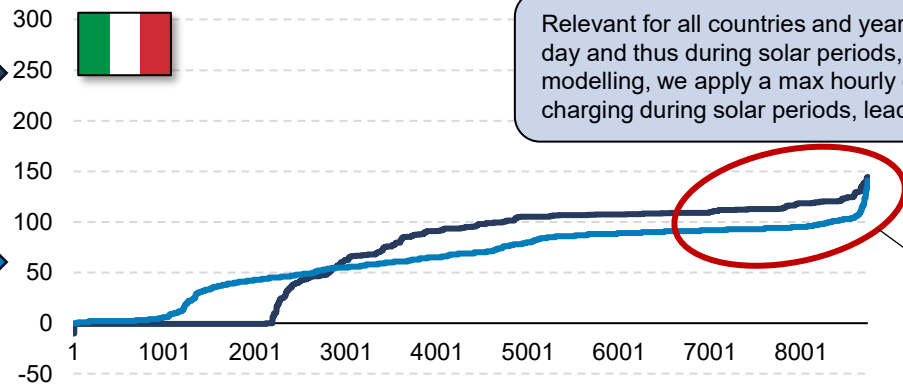
[EUR₂₀₂₄ / MWh]

Wholesale day-ahead power price curves for **2040**

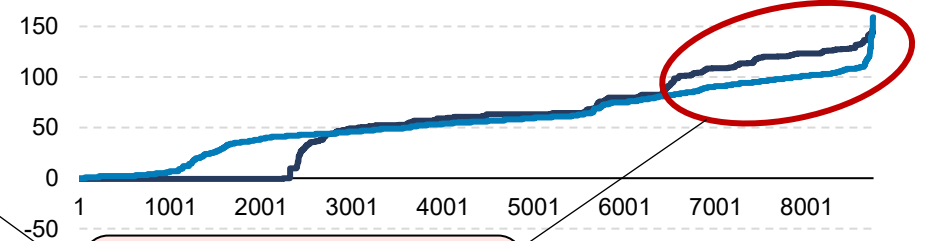
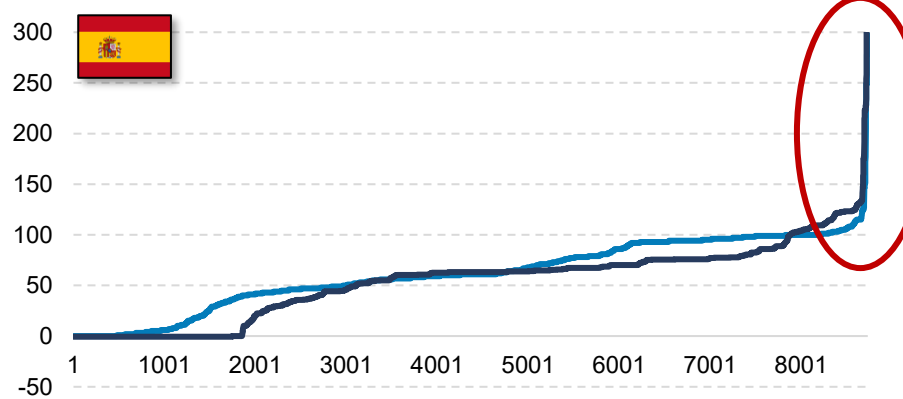
[EUR₂₀₂₄ / MWh]

CL modelling of TYNDP assumptions

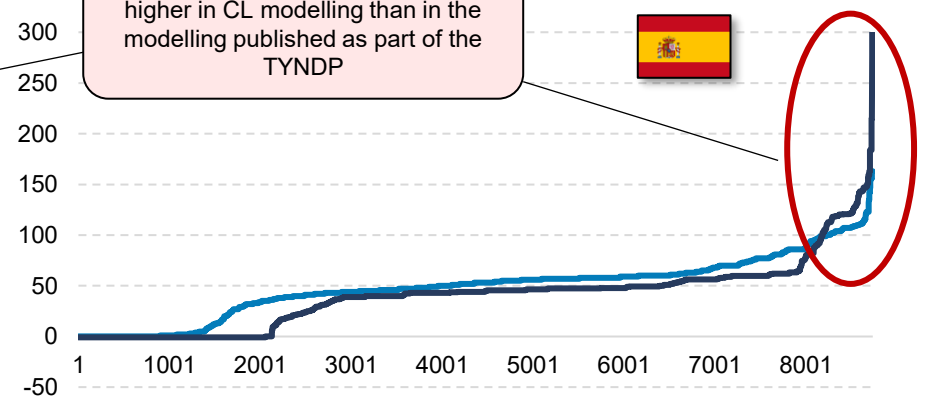
Modelling published in TYNDP



Relevant for all countries and years: In the TYNDP, EVs can charge up fully at any time during the day and thus during solar periods, limiting the number of price occurrences at 0€/MWh. In CL's modelling, we apply a max hourly charging profile per EV based on ENTSOE's past studies, limiting charging during solar periods, leading to lower prices during these periods.

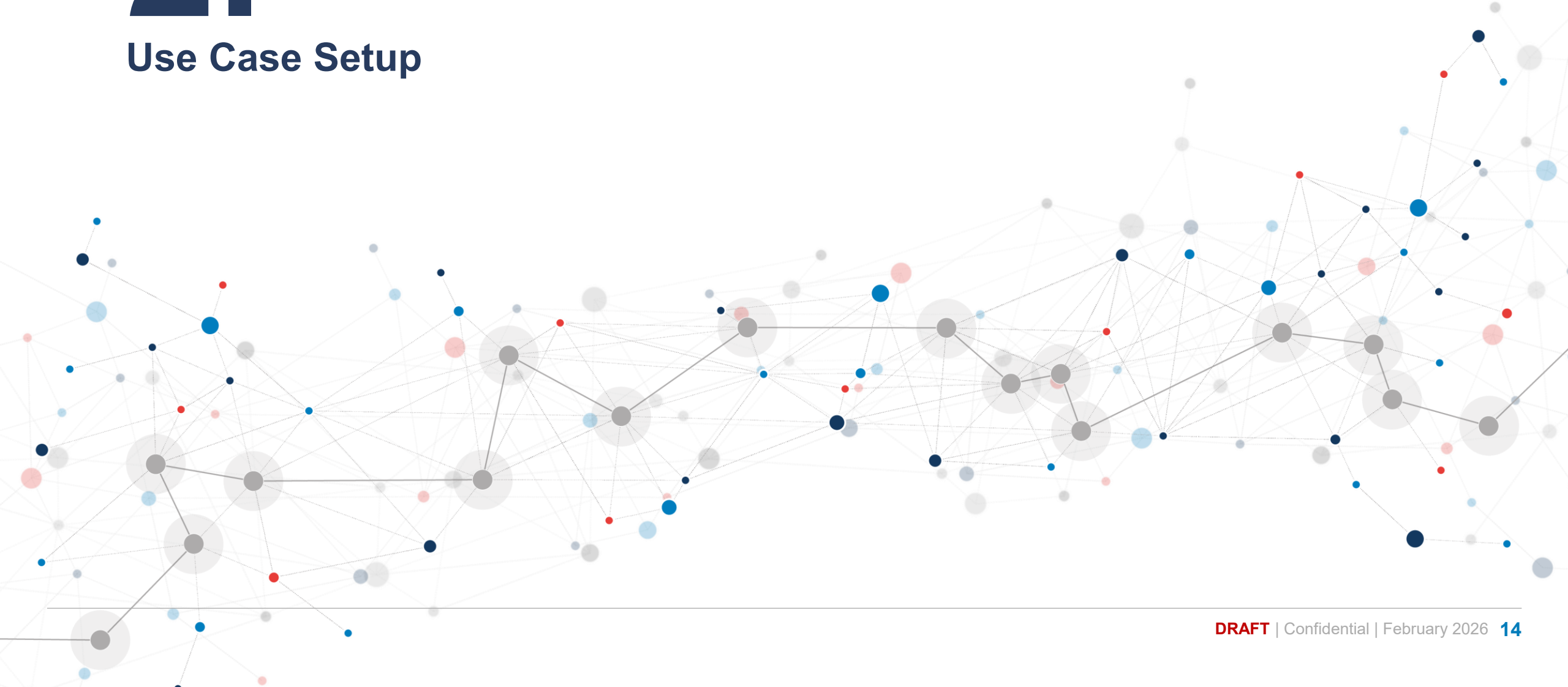


In tendency, CL prices are slightly higher in CL modelling than in the modelling published as part of the TYNDP



2.

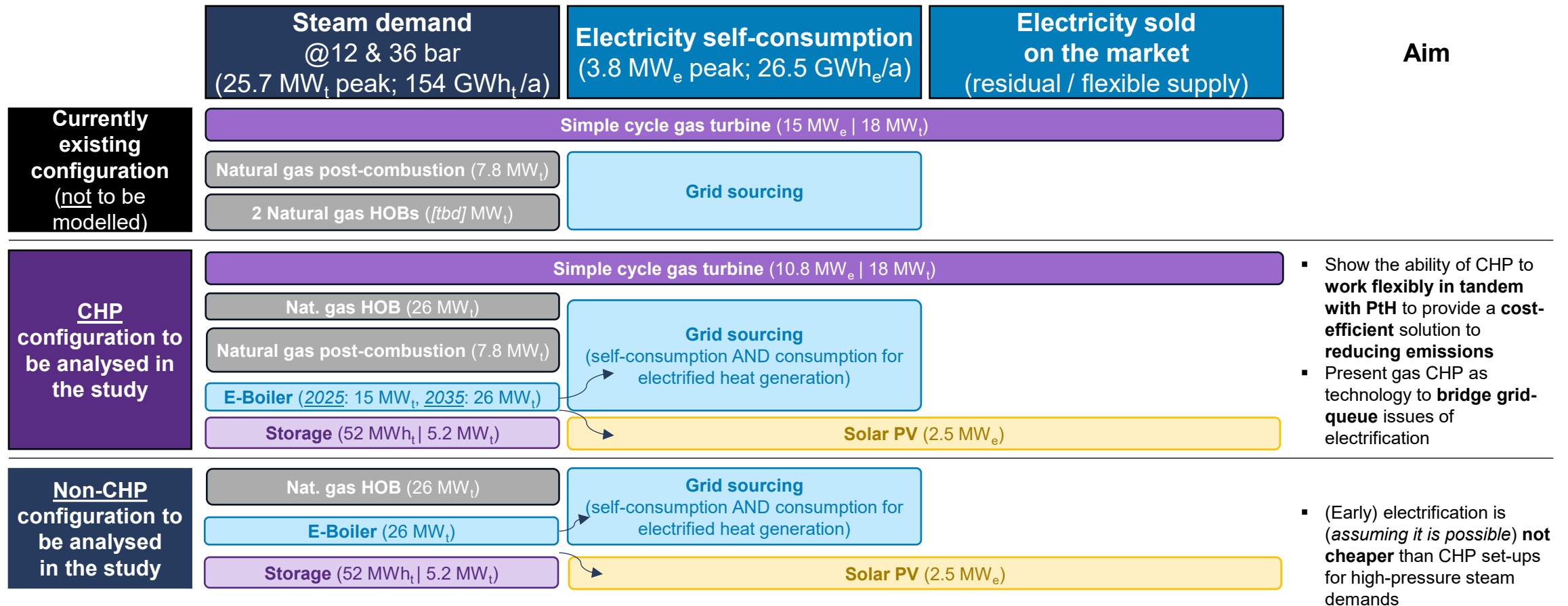
Use Case Setup





Structure of the Spanish gas turbine use case

We have received very detailed data for an existing CHP configuration in Spain. Based on this, two configurations to be analysed in the study were specified: a CHP and a non-CHP configuration.

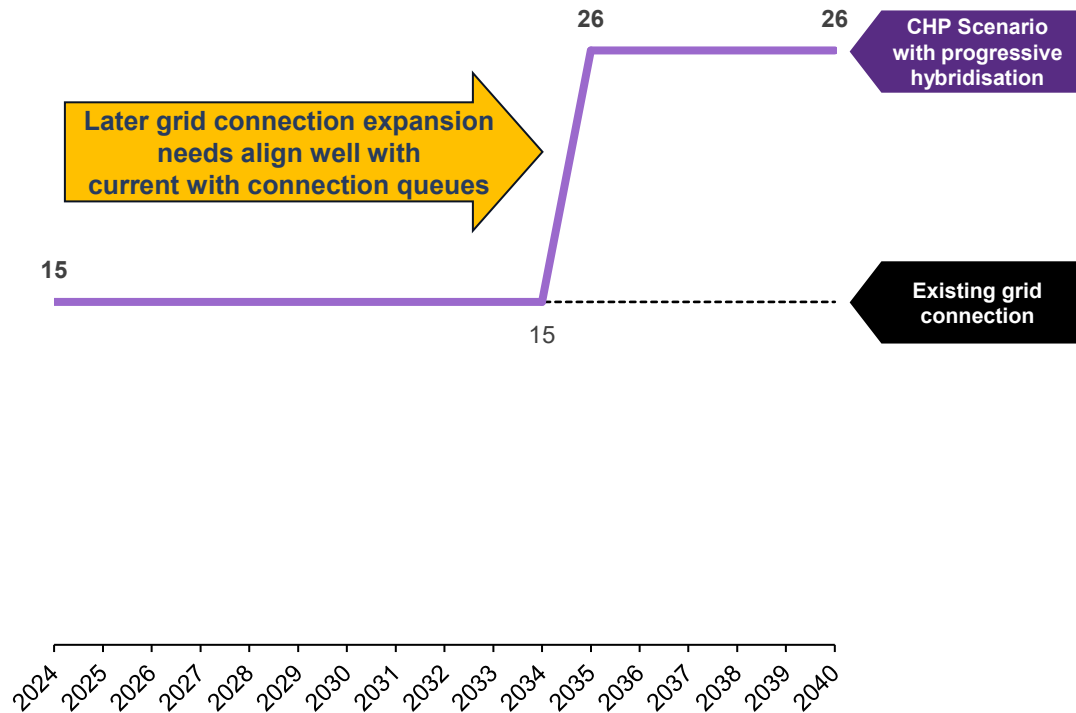




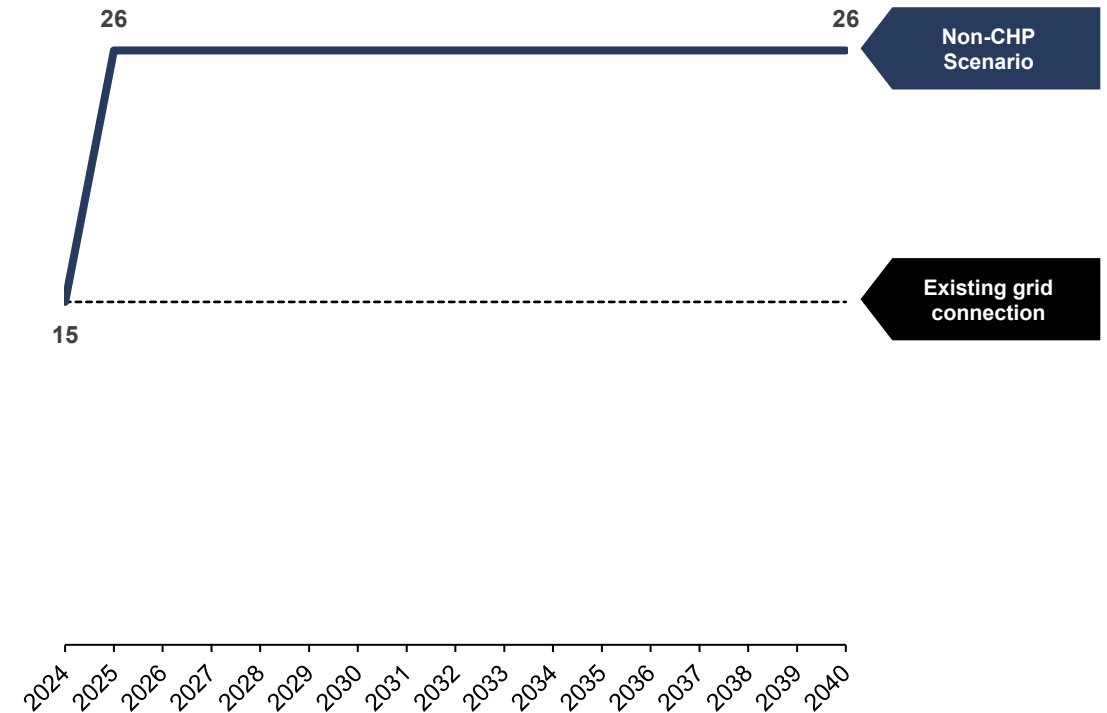
Complementarity: Grid Connection Capacity

CHP usage allow to delay the need for the expansion of grid connection capacities while still allowing for the progressive integration of Power-to-heat (“hybridization”).

Electrical grid connection capacity evolution – CHP Scenario [MW]



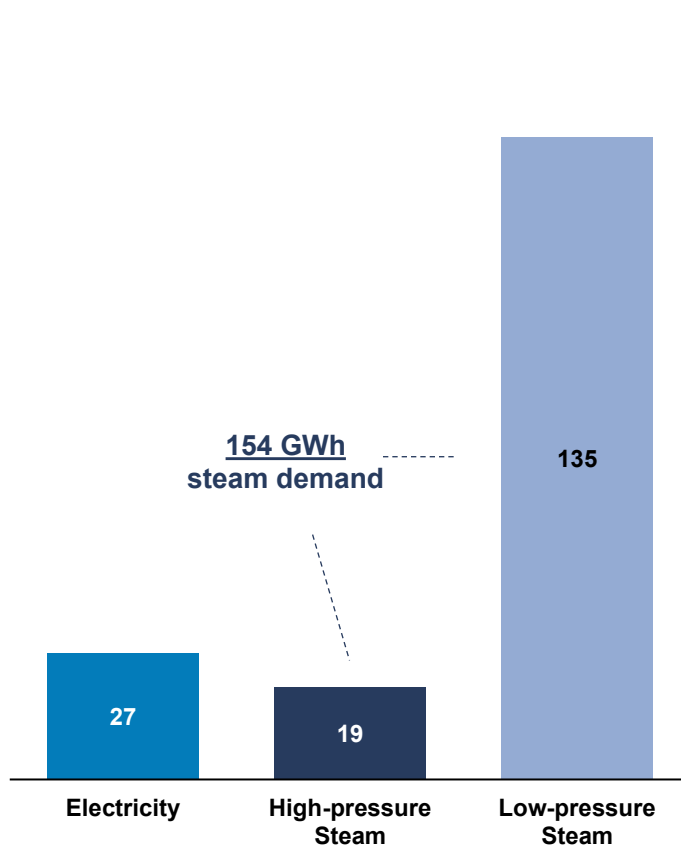
Electrical grid connection capacity evolution – CHP Scenario [MW]



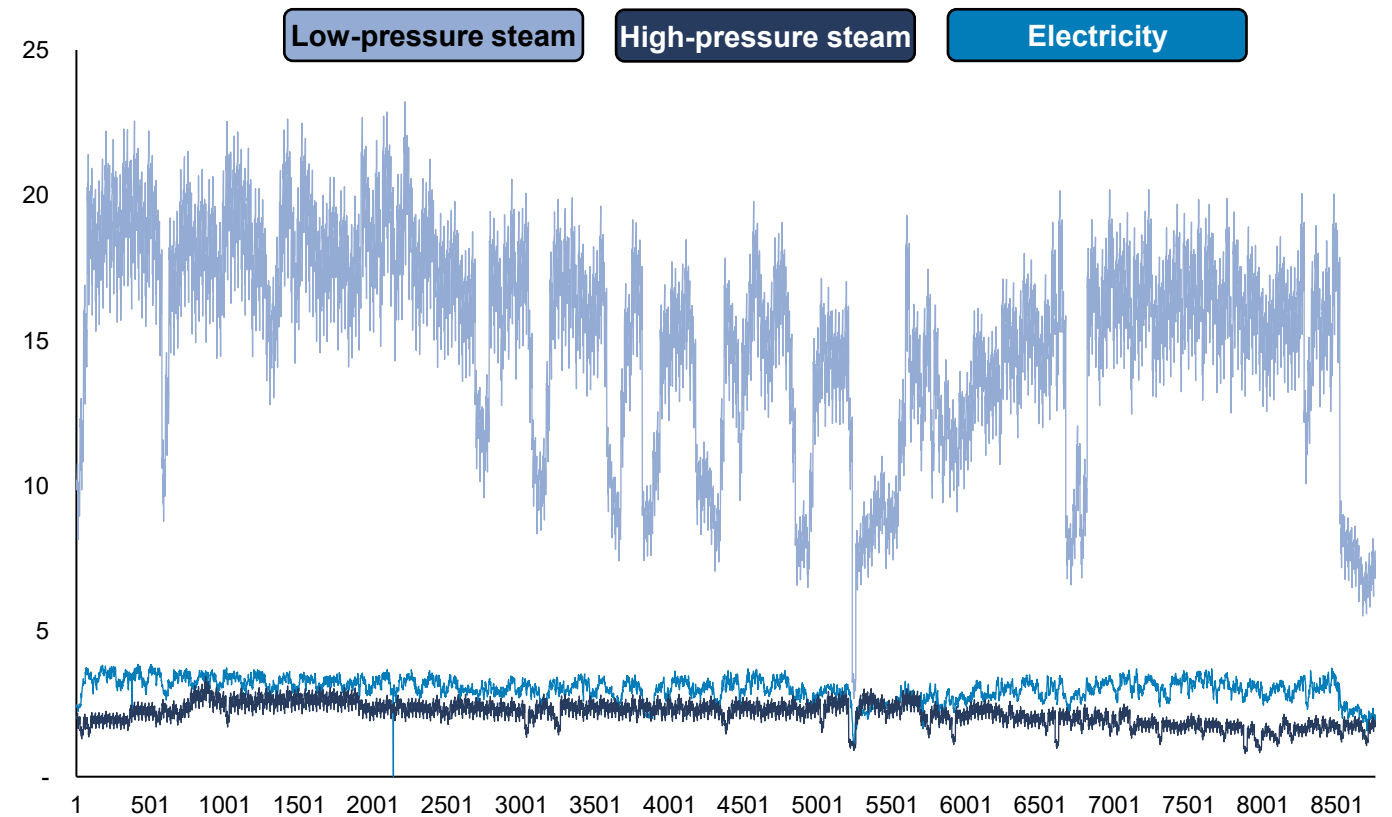
Energy Demand

There is substantial hourly variation in the consumer's demand for steam and electricity. Steam demand substantially exceeds demand for electricity.

Annual energy demand by type [GWh_el, GWh_th]



Hourly demand profile [MW_el, MW_th]

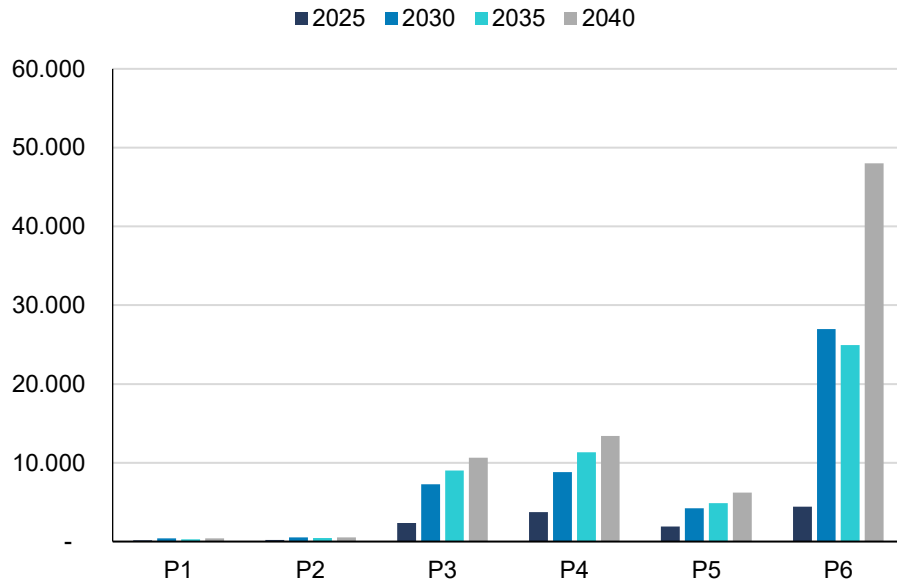




Cost-reduction by avoiding most-expensive capacity-based grid fees

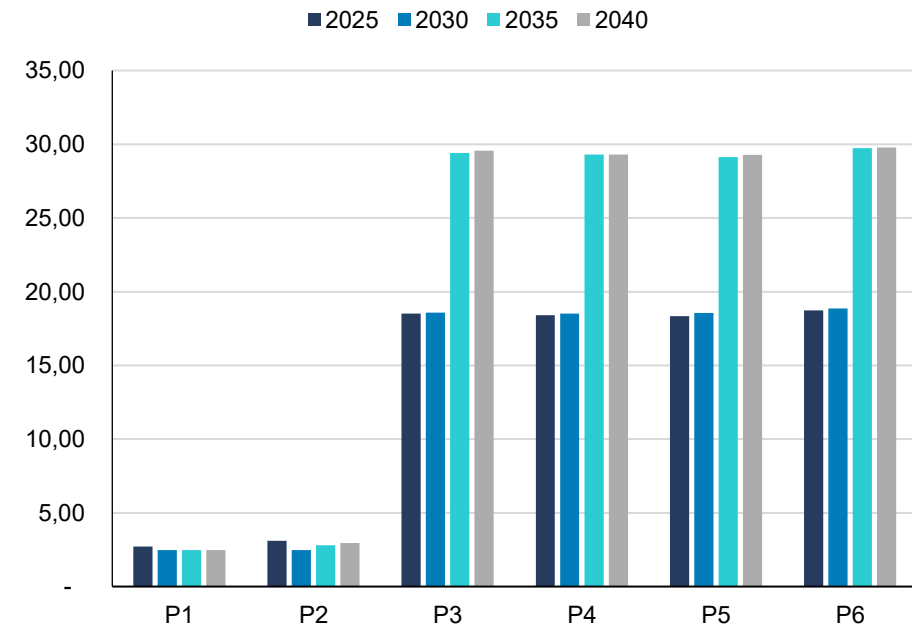
We restrict Pth generation to hours of fee types P3-P6. This strikes a balance of avoiding high capacity-based grid fees while still allowing to benefit from low electricity prices.

Annual Volume of Electricity (MWh) by tariff type (CHP Case)



| EUR / MWh | P1 | P2 | P3 | P4 | P5 | P6 |
|-----------|------|------|------|-----|-----|-----|
| | 45.2 | 25.2 | 11.9 | 6.4 | 2.5 | 1.4 |

Peak Load (MW) by tariff type (CHP Case)

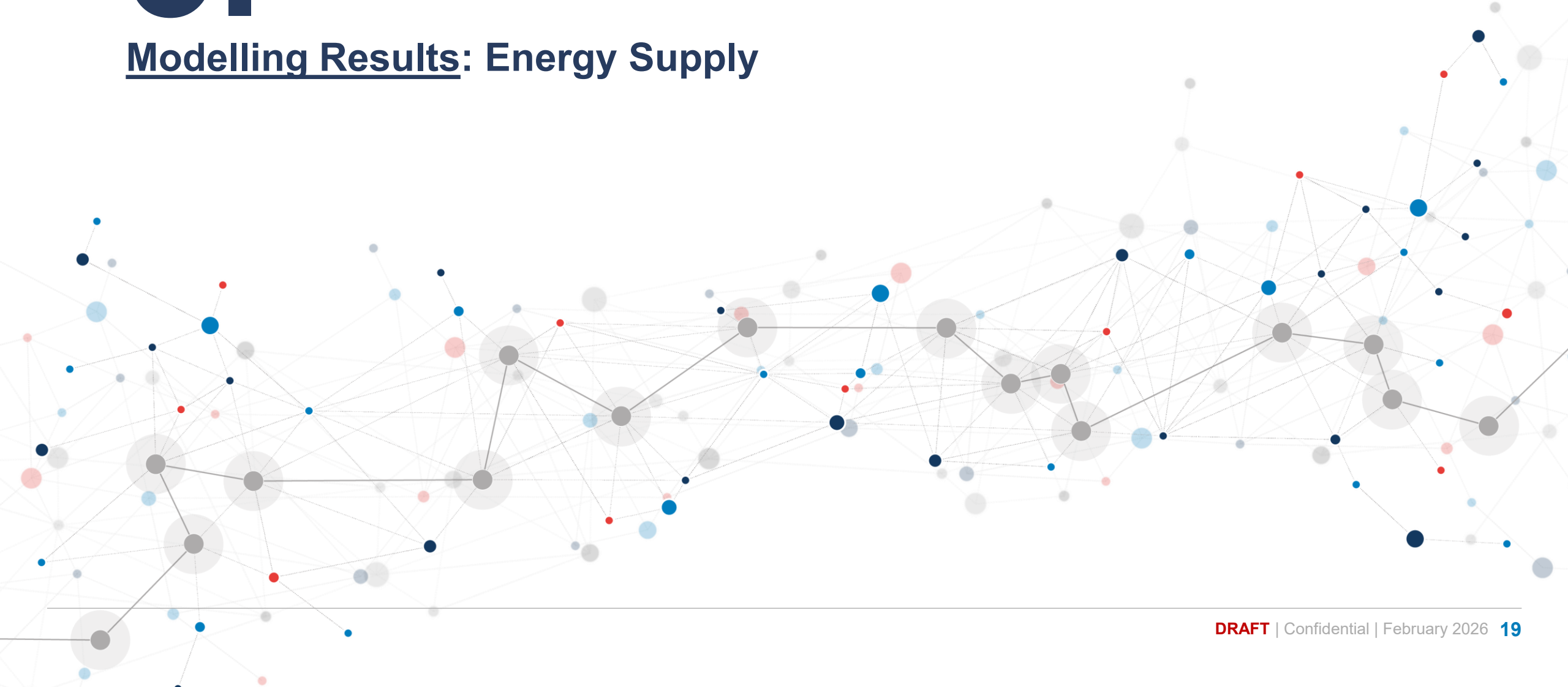


| EUR / MW | P1 | P2 | P3 | P4 | P5 | P6 |
|----------|--------|--------|-------|-------|-------|-----|
| | 28 792 | 15 078 | 6 559 | 5 172 | 1 933 | 916 |

Volume- and capacity-based fees include: transport & distribution component of grid fees, electricity system charges, fees for capacity payments
 The restriction on P3-P6 follows from separately testing and comparing cost when allowing P2-P6, P3-P6 and P4-P6.

3.

Modelling Results: Energy Supply



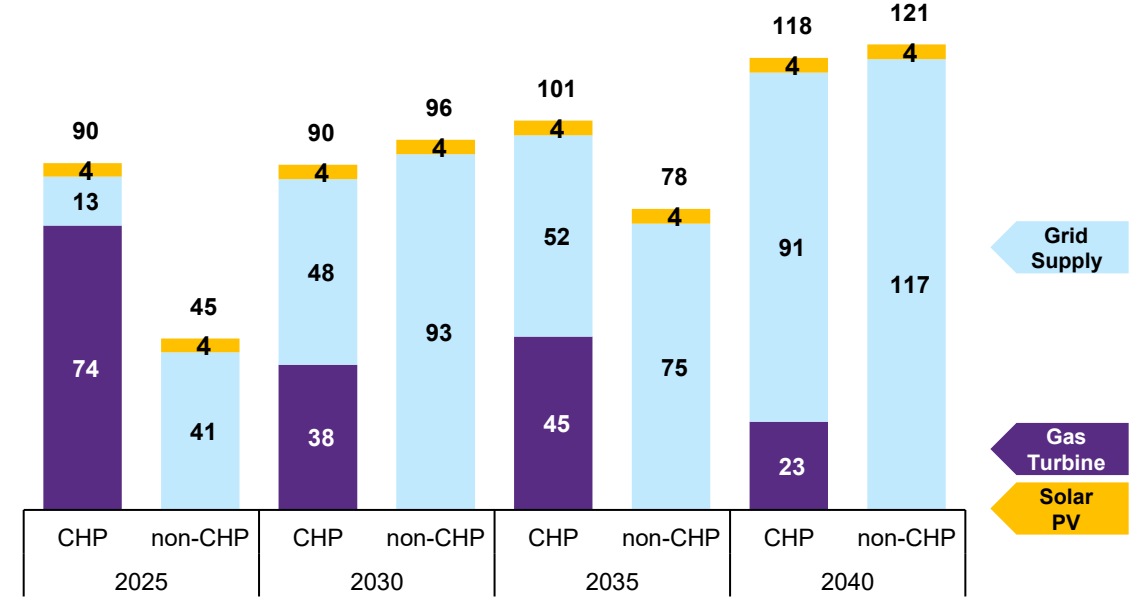
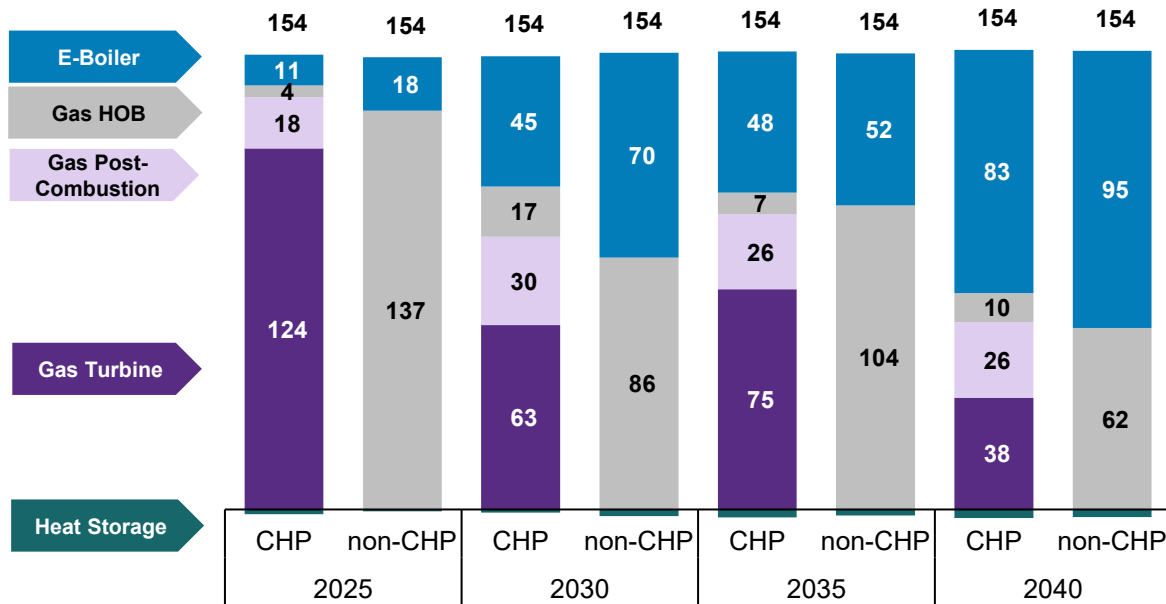


Supply of steam and electricity (by year and scenario)

In both scenarios, steam demand is increasingly met via electrified steam generation. Volumes of electricity generated by the turbine decrease over time.

Annual thermal supply by production type [GWh_{th}/a]

Annual electricity generation and purchase by type of sourcing [GWh_e/a]



- Annual thermal demand remains constant over time, but the generation technology shares change.
- In the CHP scenario, gas turbine and gas post-combustion produce heat alongside electricity, reducing the need for usage of gas HOBs.
- In both scenarios, heat supply is increasingly electrified, with the PtH boiler rapidly expanding its contribution from 2030 onwards.
- Heat storage consistently helps meet thermal demand using locally generated heat, but on an annual basis increases heat demand (negative annual impact) due to losses.

- In the CHP scenario, electricity supply comes from (i) onsite generation by the turbine, (ii) from the grid and (iii) to a lesser extent on-site PV production. This covers both on-site needs and allows for selling electricity on the day-ahead market.
- In the non-CHP scenario, all electricity is sourced from the grid and used solely to meet on-site factory demand and PtH needs.
- The CHP scenario results in higher total electricity supply, driven by on-site generation exceeding local demand.
- Electricity supply increases over time in both scenarios, reflecting the growing PtH electricity needs.

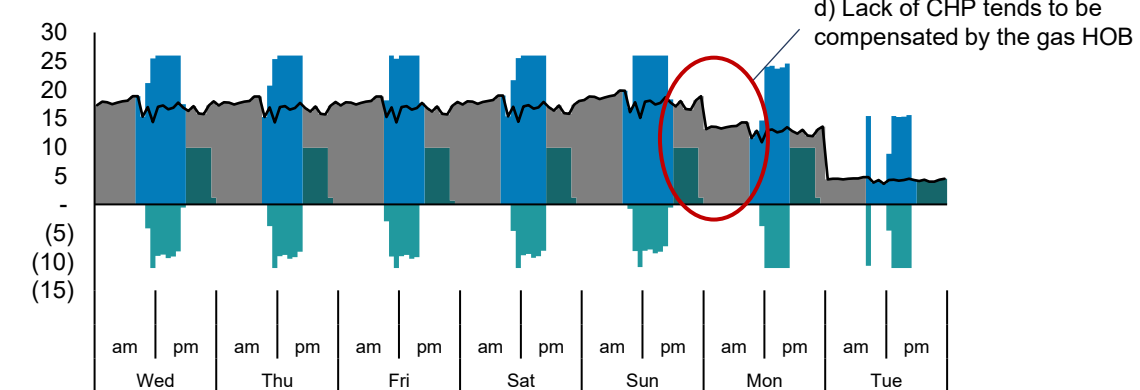
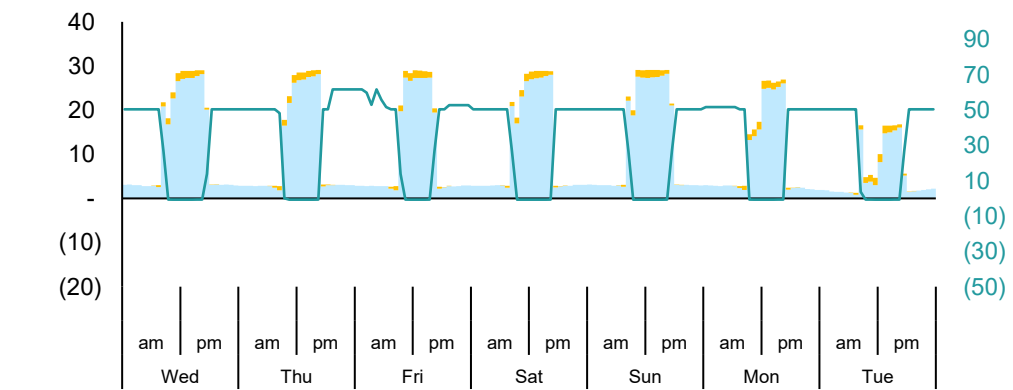
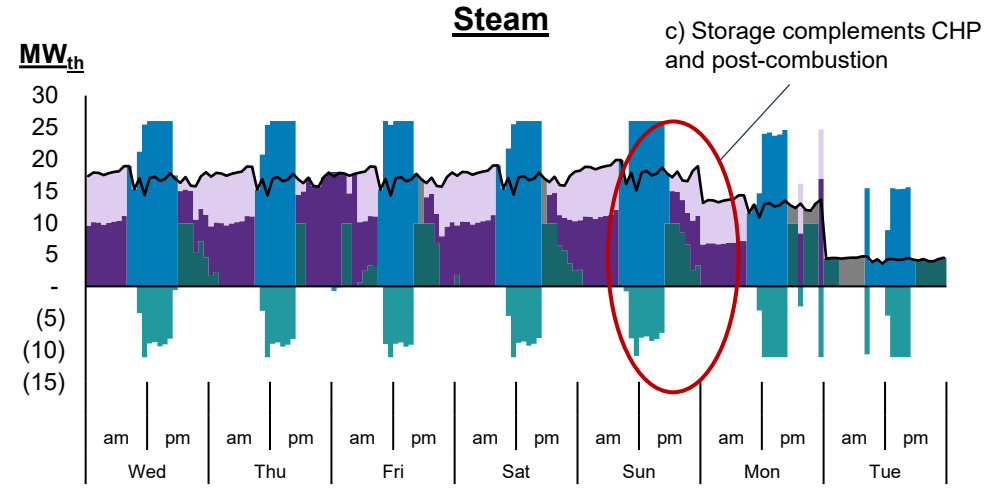
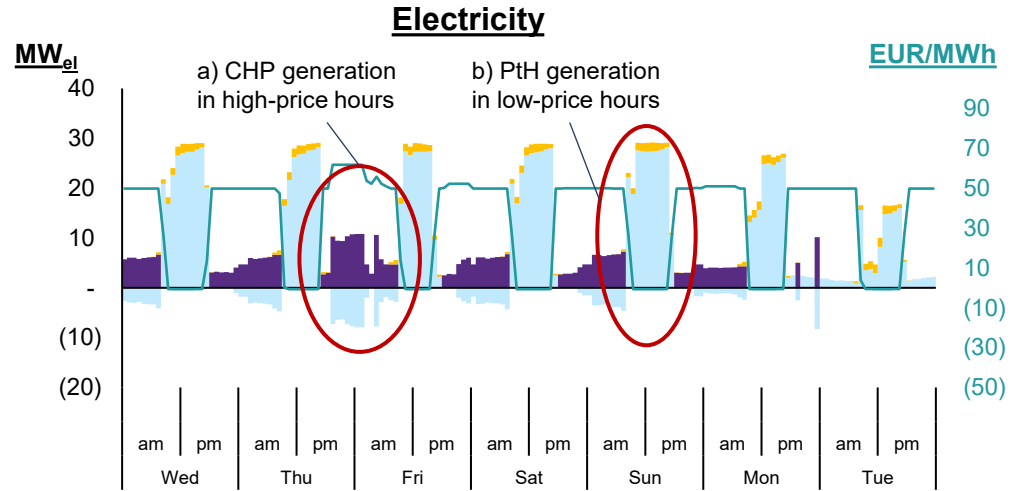


Hourly dispatch for supply of steam and electricity during a week in 2040

Electric and thermal demands are met dynamically by methane, PtH and heat storage.

CHP Scenario

Non-CHP Scenario

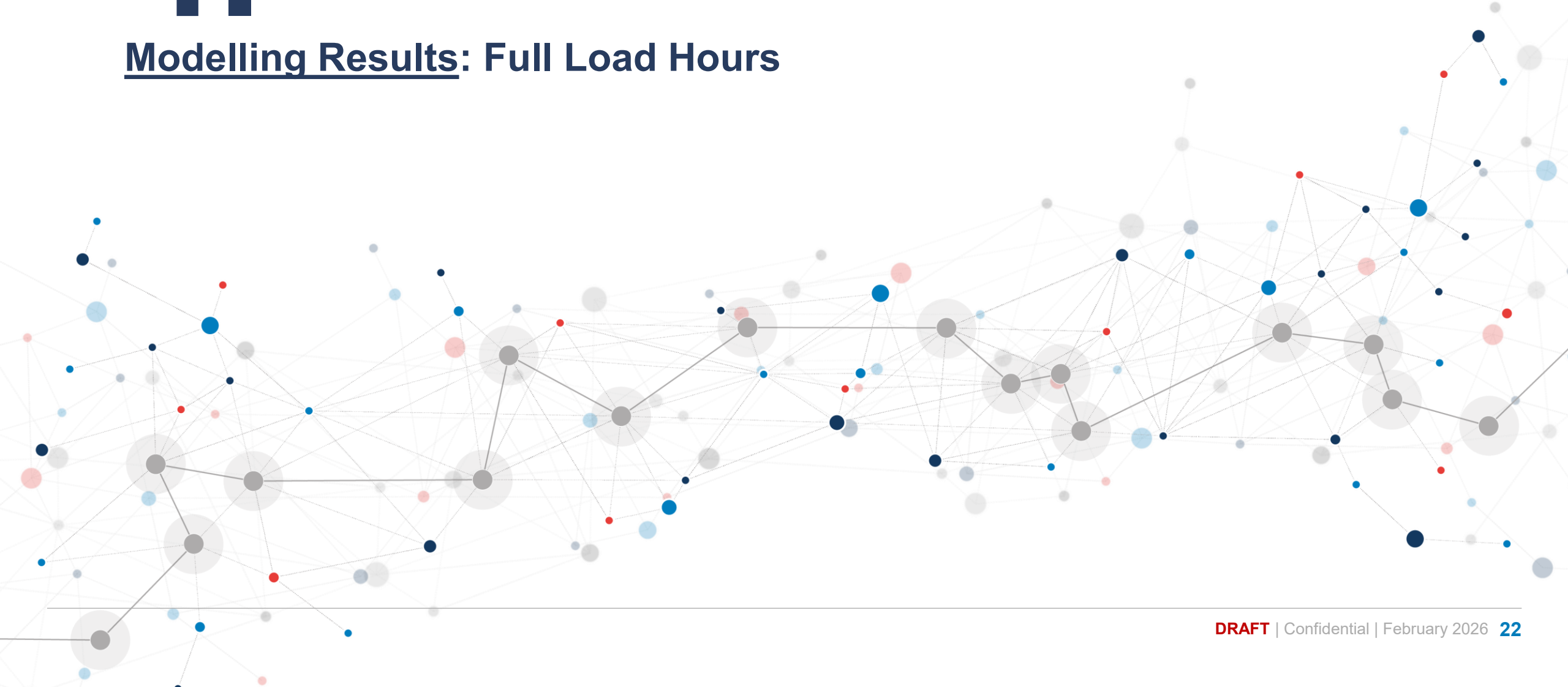


Grid Supply CHP Generation Solar Generation DAM Price

Heat Storage - Injection Heat Storage - Withdrawal PtH
Gas Turbine (Simple-Cycle) Gas Post-Combustion Gas HOB
Heat Demand

4.

Modelling Results: Full Load Hours

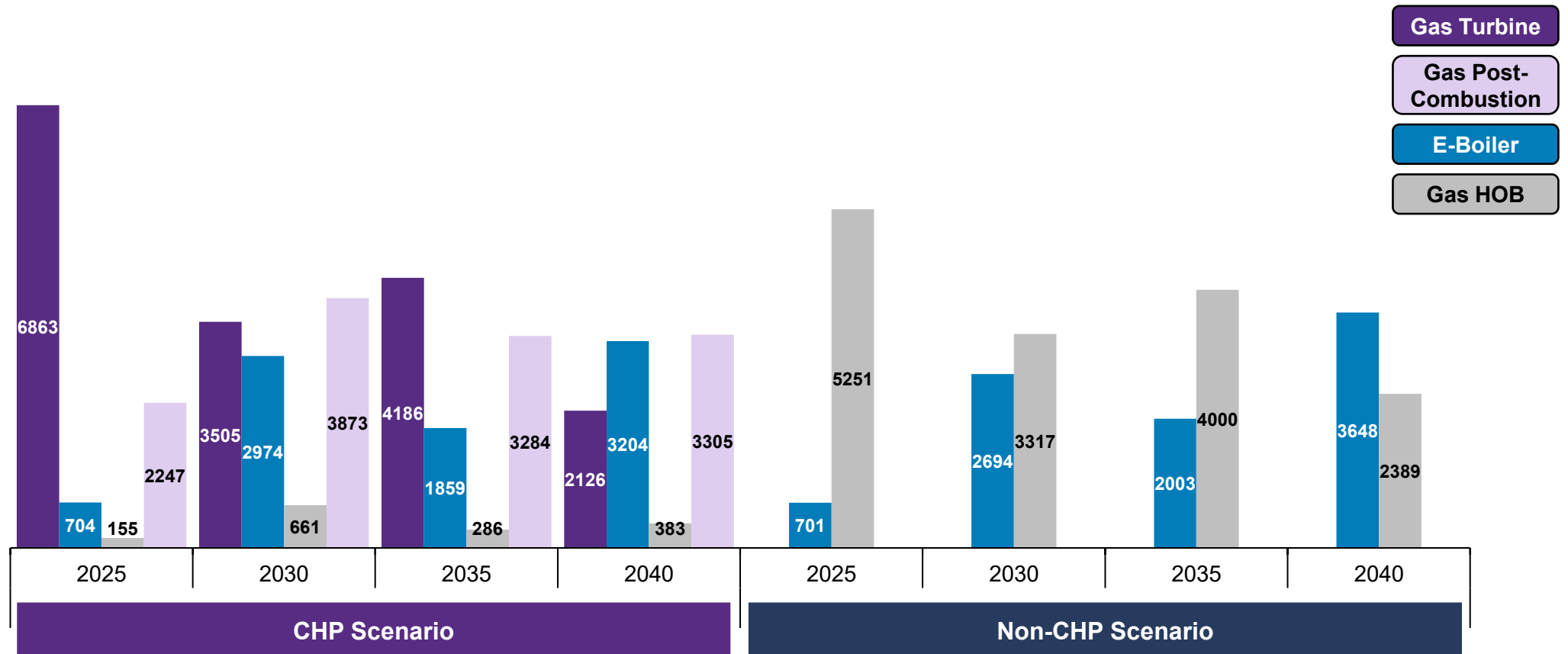




Comparison of Full Load Hours in Both Scenarios

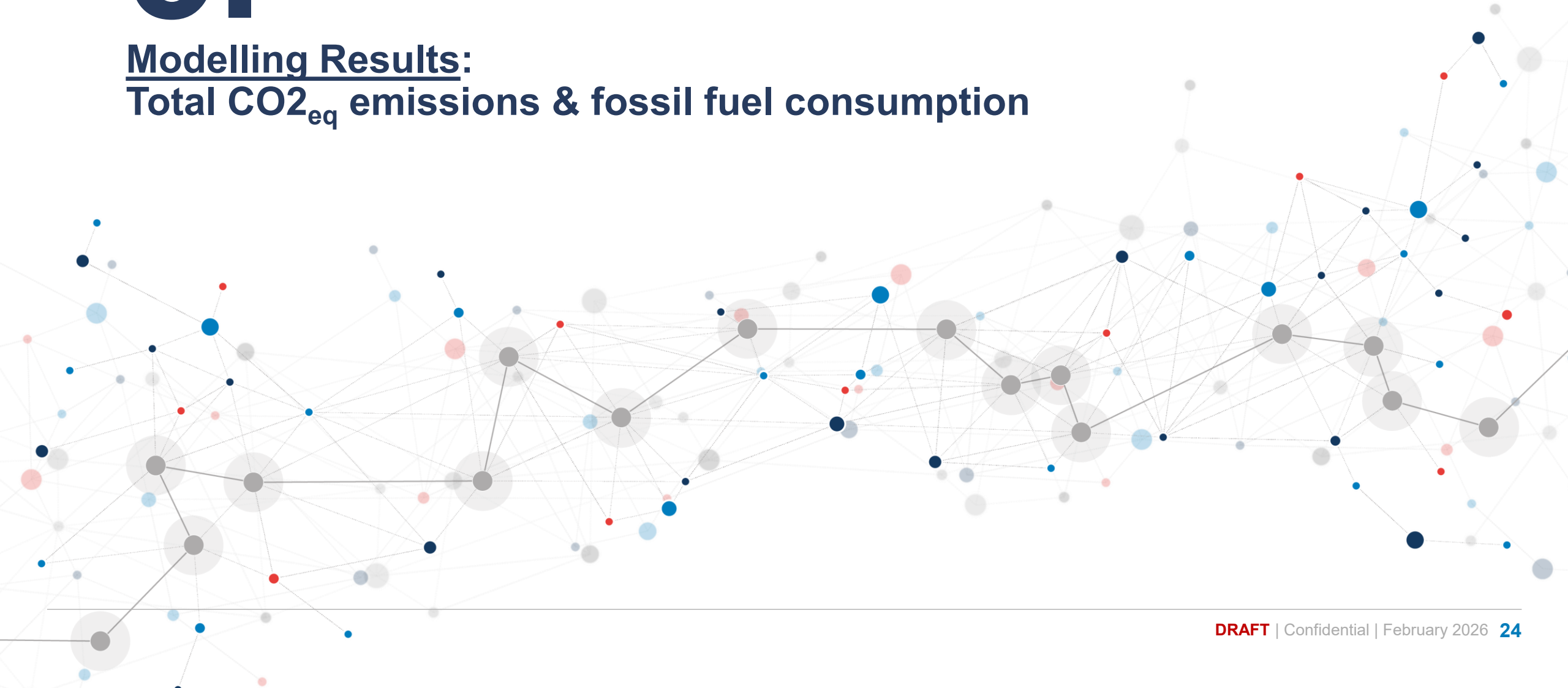
The run times of the gas turbine decline substantially until 2040. Full-load hours of power-to-heat generation quadruples in both scenarios.

Full load hours in both the CHP and non-CHP case, per calendar year [hours]



5.

Modelling Results: Total CO₂_{eq} emissions & fossil fuel consumption

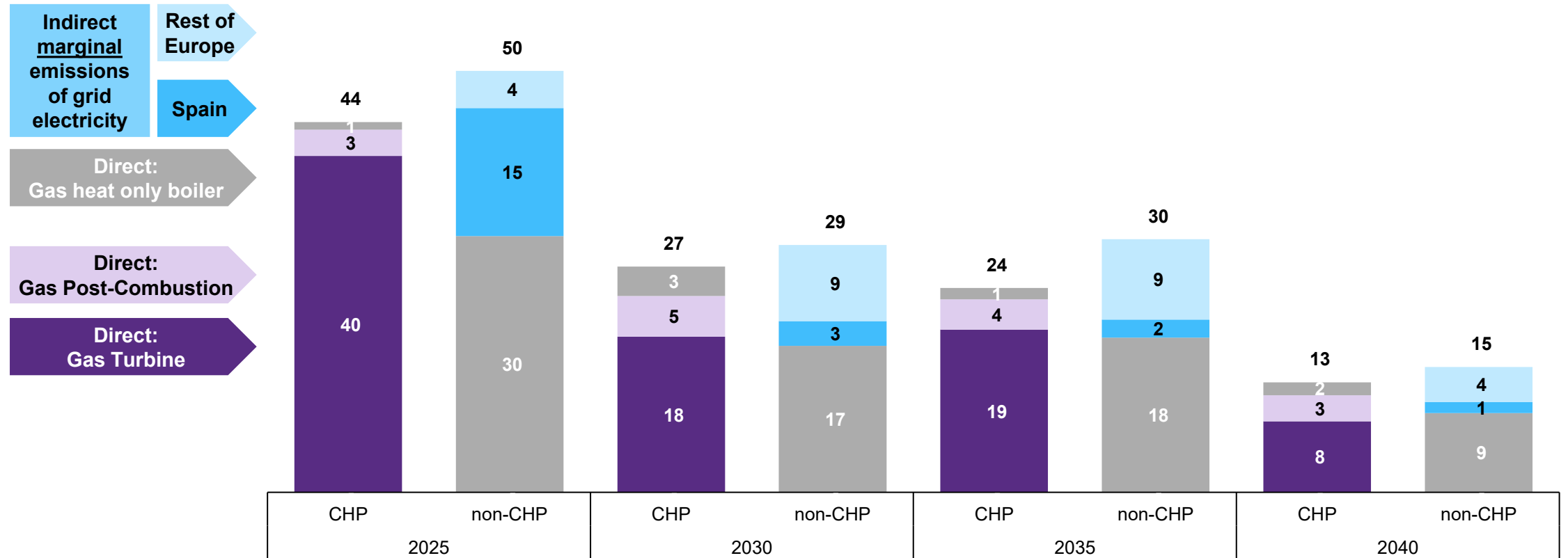




Comparison of total CO₂_{eq} emissions

The inclusion of a gas turbine CHP reduces total emissions in all years modelled compared to the non-CHP scenario.

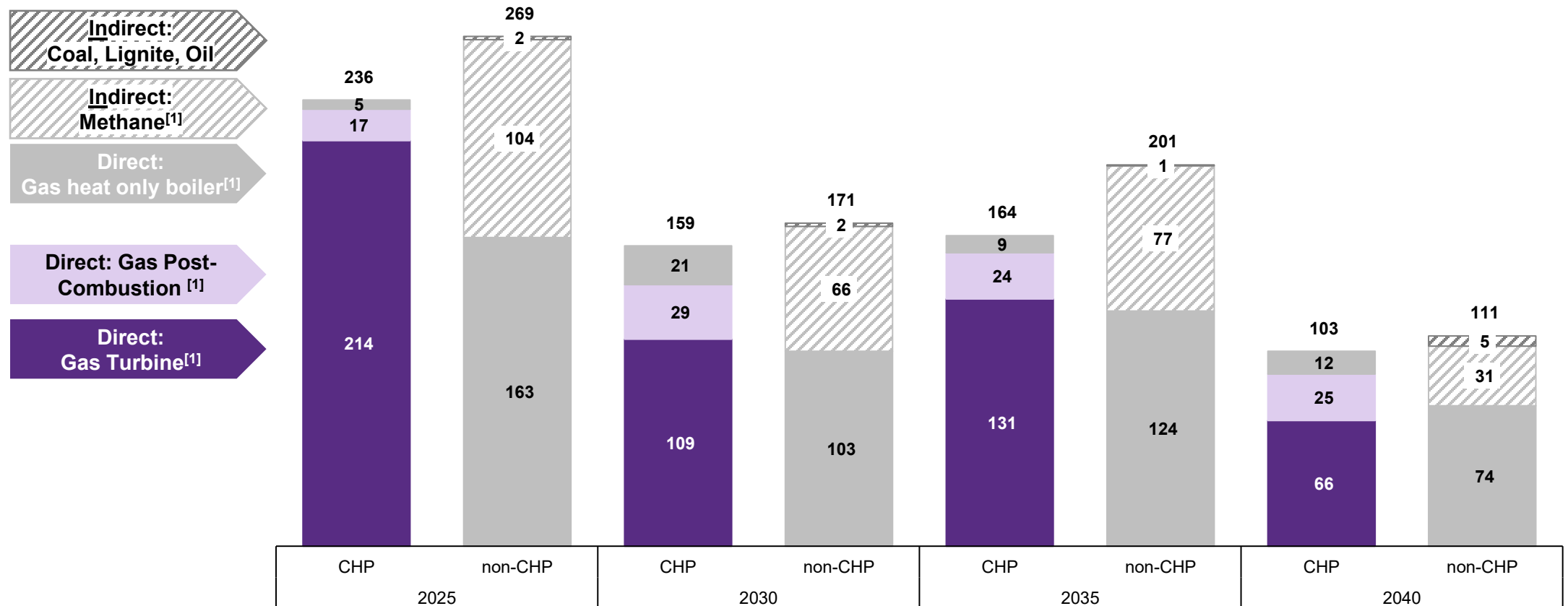
Total associated emissions by calendar year and scenario [kt of CO₂eq]



Comparison of total fossil fuel consumption

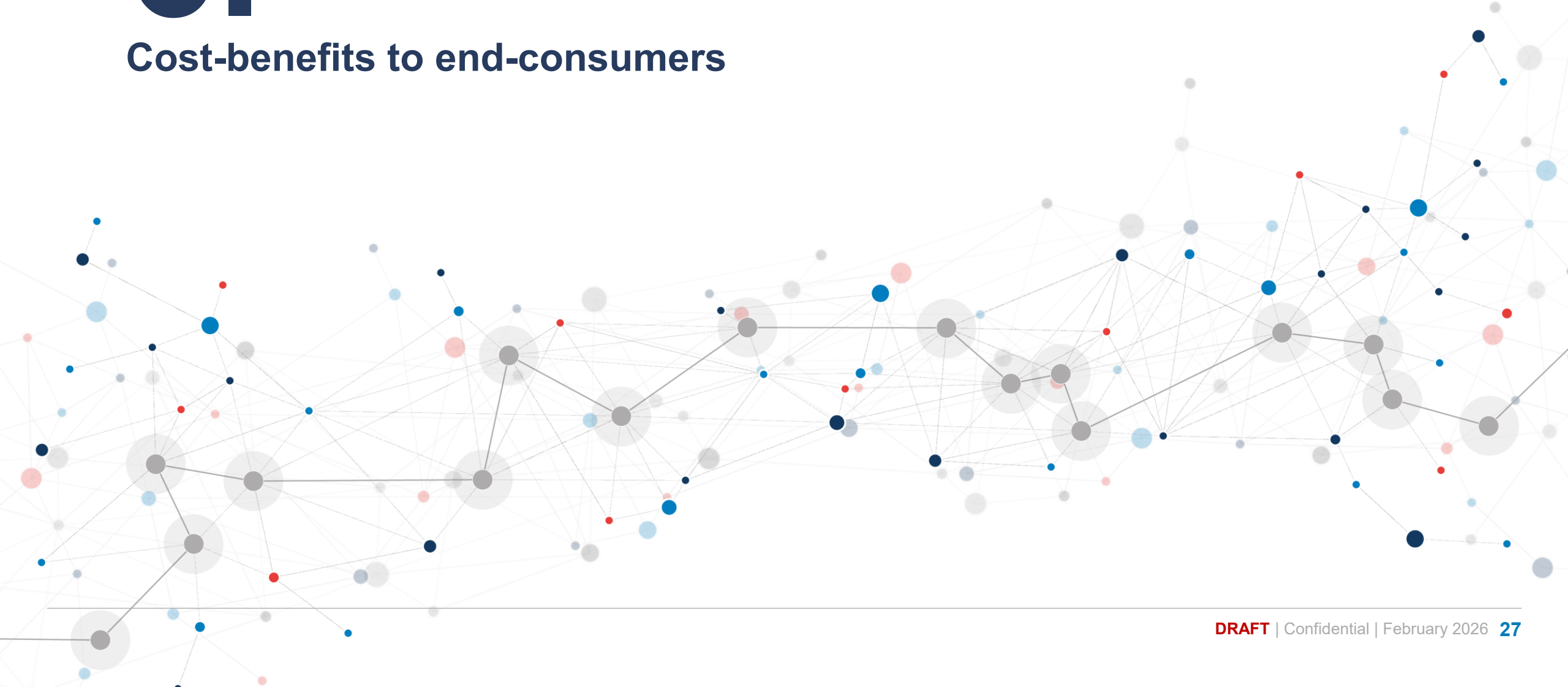
When taking into account upstream fossil fuel consumption of the power sector, fossil fuel consumption in the CHP case is lower than in the non-CHP comparable in all years.

Total associated fossil fuel consumption by calendar year and scenario [GWh]



6.

Cost-benefits to end-consumers



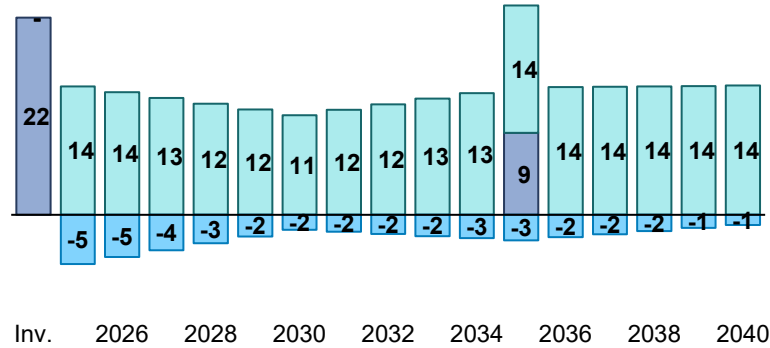


Net Present Value of Cash-Flows Comparison (2025-40)

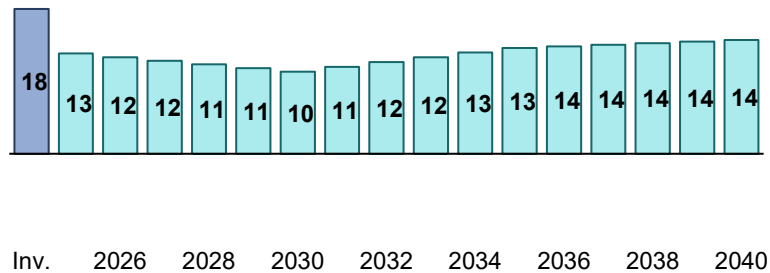
From a levelized total-cost (i.e. NPV) perspective, the OPEX-advantage overcompensates for the CAPEX-intensity of the CHP setup.

Cost (+) and Revenue (-) Components [Mio. EUR_{nom}]

CHP Scenario



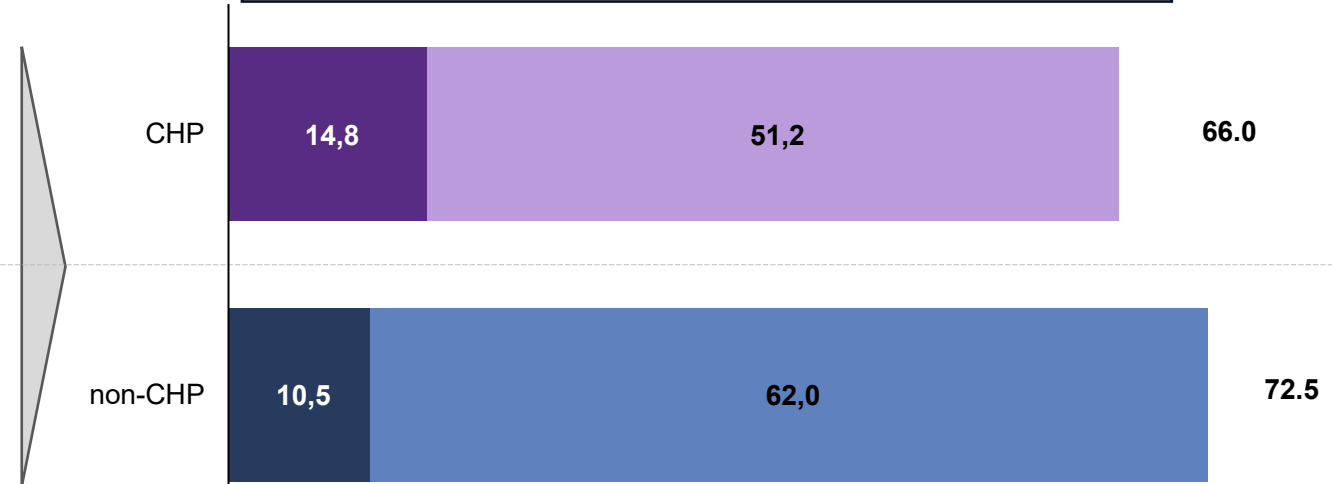
Non-CHP Scenario



■ CAPEX ■ OPEX ■ Revenue Electricity

Comparison of “Levelized Cost of Energy (LCOEn)” [EUR_{nom} / MWh]

$$LCOEn = \frac{NPV (CAPEX + OPEX)}{NPV (steam + heat + electricity demand)}$$



Revenues only include day-ahead market revenues, but not any additional revenue obtainable from participating in ancillary services markets, capacity mechanisms etc.

CAPEX

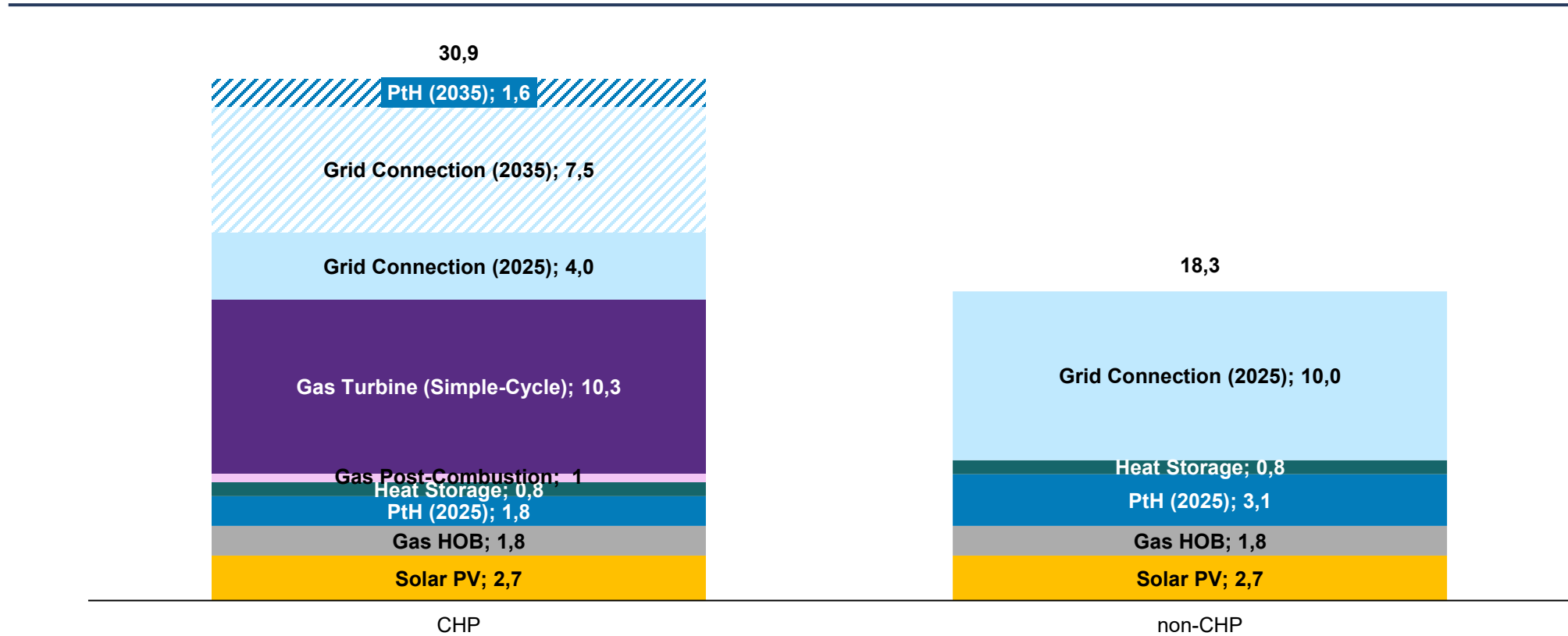
OPEX



CAPEX Comparison

Upfront investment is higher in the setup including a gas turbine.

Comparison of CAPEX (undiscounted sum) [Mio. EUR_{nom}]



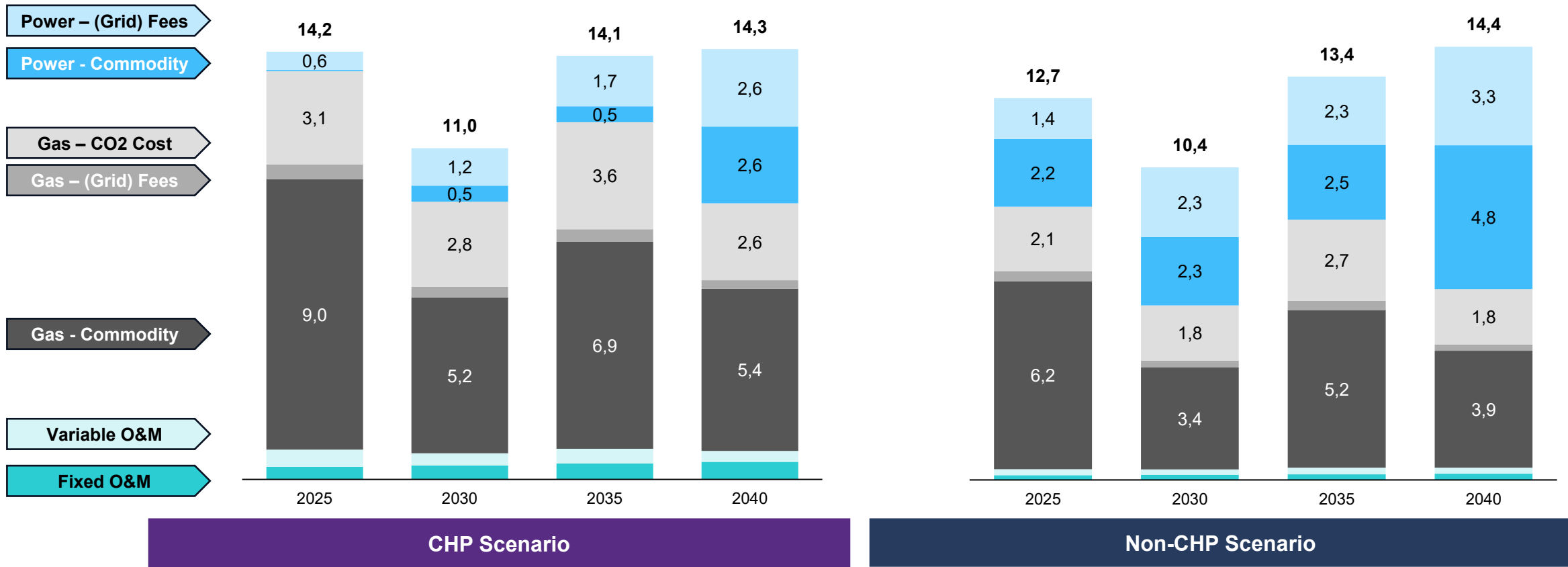


OPEX (energetic & non-energetic) Comparison

Before accounting for the revenue from selling electricity, OPEX tend to be slightly higher in the scenario including a CHP.

OPEX in CHP Scenario [Mio EURnom]

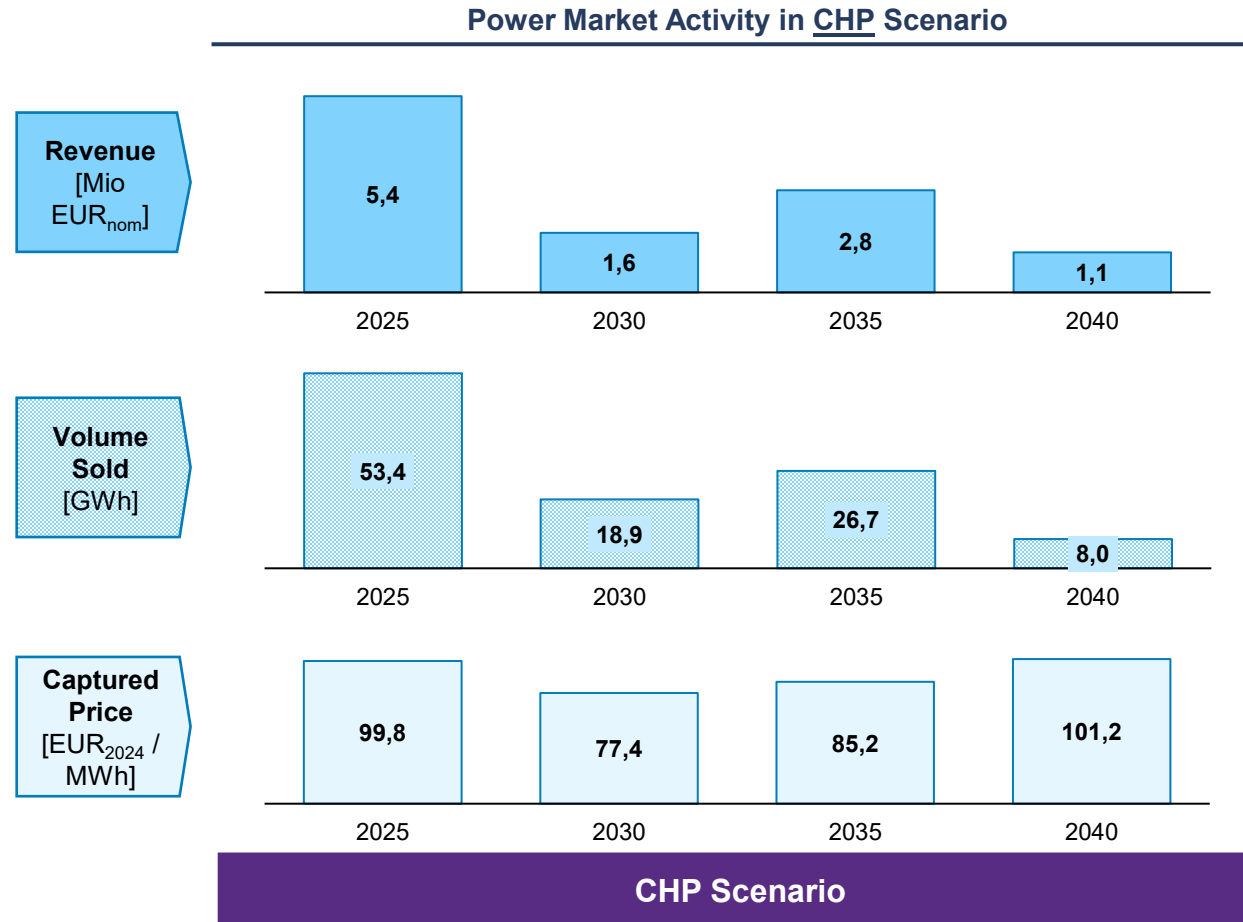
OPEX in non-CHP Scenario [Mio EURnom]





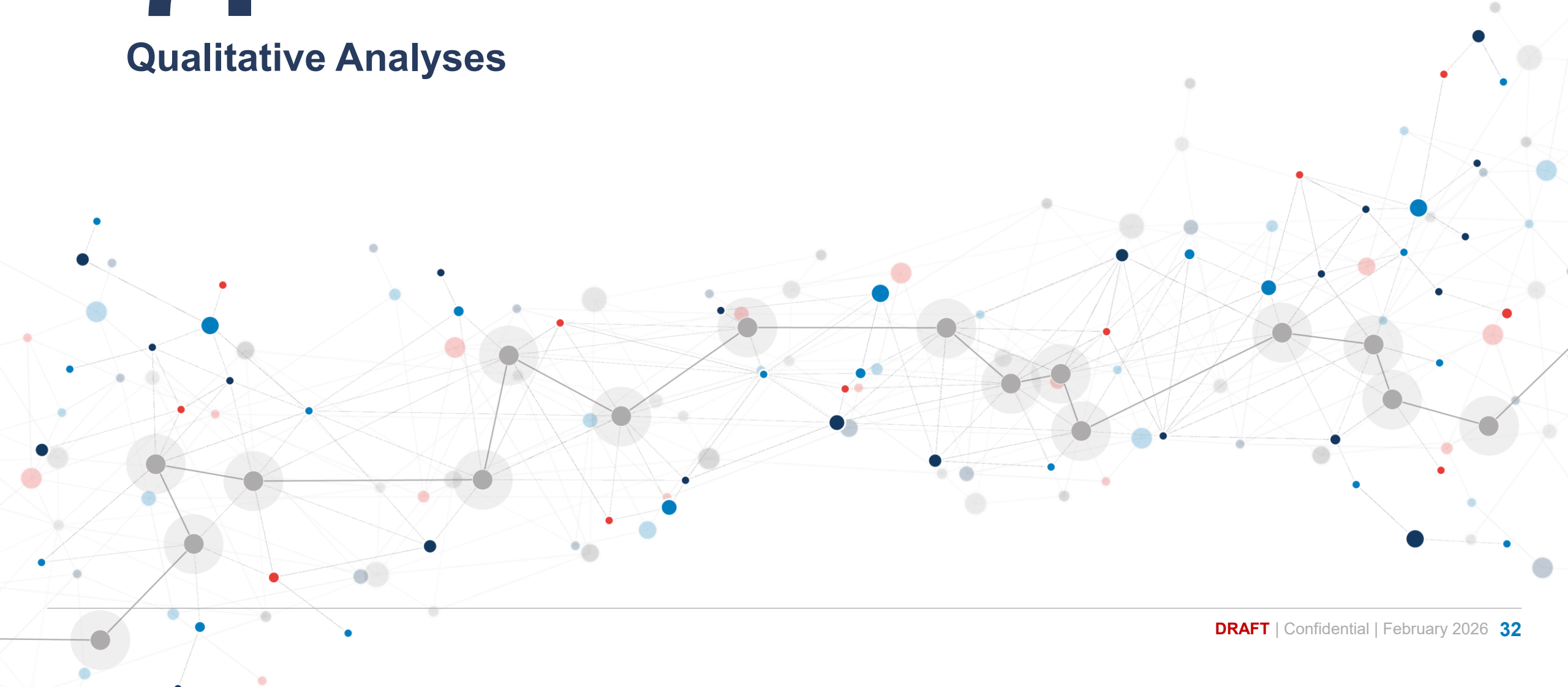
Power Market Revenue (CHP-scenario only)

Power market revenues decrease over time. This is driven by a reduction in volumes sold. Captured prices are relatively flat over time.



7.

Qualitative Analyses





Ancillary Services that can be provided by Simple Cycle Gas Turbines

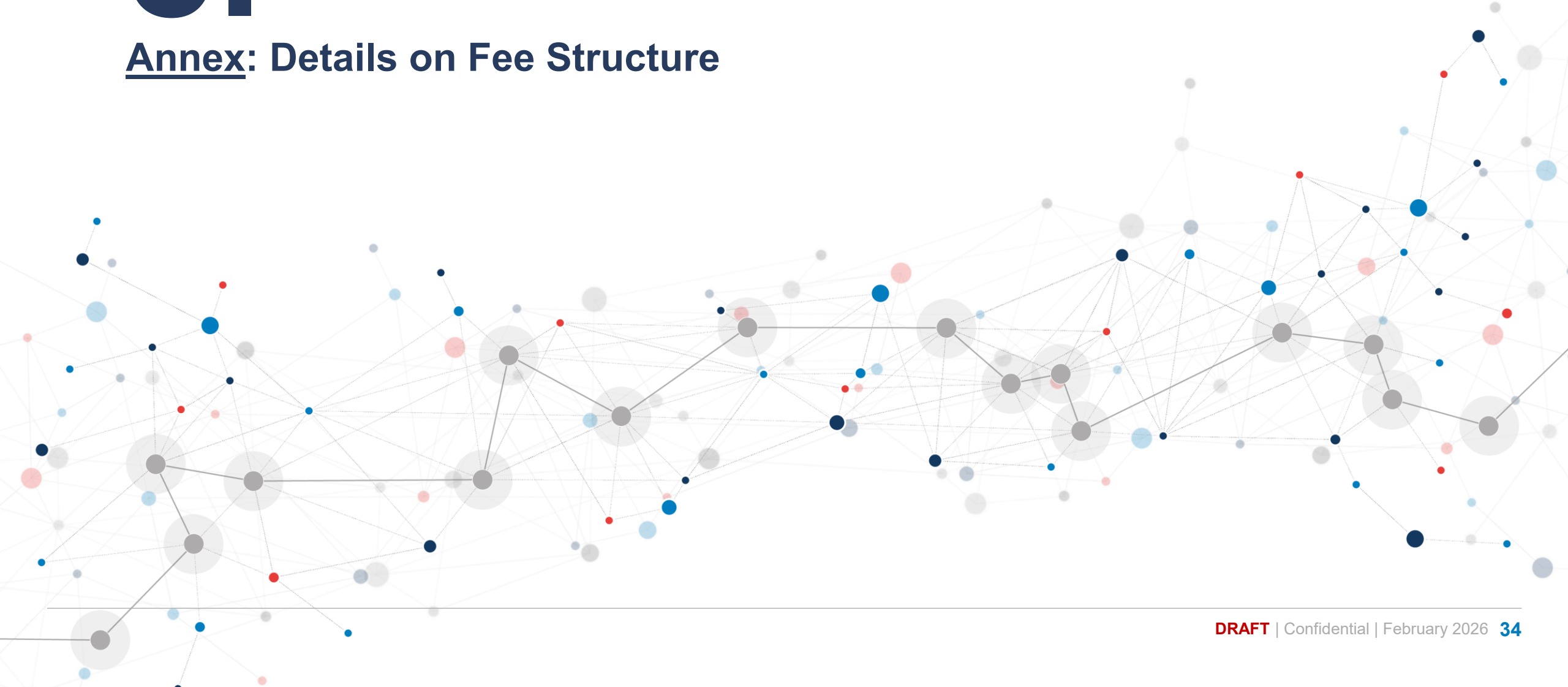
SCGTs can provide essential services to the Iberian grid, some of which are (currently) not remunerated.

| | Types of Ancillary Service (not all provided by SCGT) | Provided by SCGT? ^[1, a] | Spanish application | Paid? ^[2-5] | Details ^{2-5]} |
|---|--|--|--|------------------------|---|
| A. Inertial response | A.1 Synchronous Inertial Response | • | — | | — |
| | A.2 Virtual Inertial Response | | — | | — |
| B. Primary frequency control | B.1 Primary Frequency Response | • | Frequency Containment Reserve (FCR) | | ▪ Unpaid mandatory service for all generators that are technically capable of providing it |
| | B.2 Fast Frequency Response | | — | | — |
| C. Secondary & Tertiary frequency control | C.1 Frequency Regulation | • | automatic Frequency Restoration Reserve (aFRR) | • | ▪ Market-based remuneration, optional participation ▪ Capacity payment (€/MW) based on marginal pricing + energy payment (€/MWh) |
| | C.2 Spinning Reserve | • | manual Frequency Restoration Reserve (mFRR)^[b] | • | ▪ Market-based remuneration, optional participation ▪ Energy mobilised (€/MWh) is remunerated based on pay-as-clear scheme (merit-order) |
| | C.3 Non-Spinning Reserve | • | | | |
| D. Replacement reserve | D.1 Replacement Reserve | • | Replacement Reserve (RR) | • | ▪ Market-based remuneration, optional participation ▪ Energy mobilised (€/MWh) is remunerated based on a pay-as-clear scheme (merit-order) |
| E. Economic dispatch | E.1 Flexible Ramping Capability | • | — | | — |
| F. Voltage control | F.1 Steady-State Reactive Response | • | Voltage Control service | • | ▪ Mandatory service for share of capacity ▪ Operators can receive a bonus for provision of higher share of reactive capacities |
| | F.2 Dynamic Reactive Response | • | | | |
| | F.3 Fast Post-Fault Active Power Recovery | | — | | — |
| G. System restoration | G.1 Black Start Capability | [•] | Black Start Capability | • | ▪ Not mandatory, mainly provided by hydroelectric plants ▪ Fixed remuneration for annual remuneration, capacity payment and compensation for periodic capacity tests |

Service not provided by SCGT
 Service can be provided by SCGT but is not remunerated
 Service is remunerated and can be provided by SCGTs

8.

Annex: Details on Fee Structure

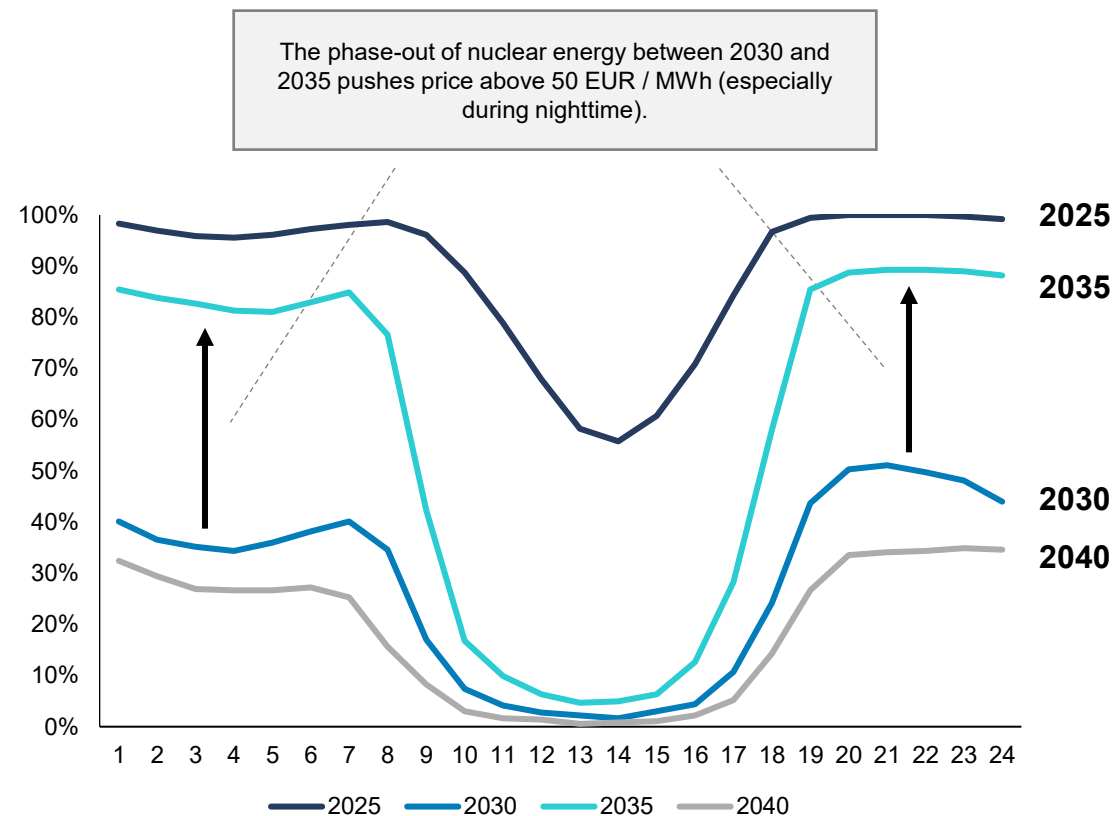


Electricity fees and modelled wholesale electricity prices

The majority of hours of the year fall into fee category P6 (which covers weekends and nights). In 2030 and 2040, modelled prices regularly remain below 50 EUR / MWh – even at night during low-fee hours (“P6”).

| Hours per year in the price band ▲ Hour of the day ▼ | Price band | | | | | |
|--|------------|------------|------------|-------------|------------|-------------|
| | P1 | P2 | P3 | P4 | P5 | P6 |
| 1 | 0 | 0 | 0 | 0 | 0 | 365 |
| 2 | 0 | 0 | 0 | 0 | 0 | 365 |
| 3 | 0 | 0 | 0 | 0 | 0 | 365 |
| 4 | 0 | 0 | 0 | 0 | 0 | 365 |
| 5 | 0 | 0 | 0 | 0 | 0 | 365 |
| 6 | 0 | 0 | 0 | 0 | 0 | 365 |
| 7 | 0 | 0 | 0 | 0 | 0 | 365 |
| 8 | 0 | 0 | 0 | 0 | 0 | 365 |
| 9 | 0 | 89 | 41 | 64 | 67 | 104 |
| 10 | 89 | 41 | 64 | 67 | 0 | 104 |
| 11 | 89 | 41 | 64 | 67 | 0 | 104 |
| 12 | 89 | 41 | 64 | 67 | 0 | 104 |
| 13 | 89 | 41 | 64 | 67 | 0 | 104 |
| 14 | 89 | 41 | 64 | 67 | 0 | 104 |
| 15 | 0 | 89 | 41 | 64 | 67 | 104 |
| 16 | 0 | 89 | 41 | 64 | 67 | 104 |
| 17 | 0 | 89 | 41 | 64 | 67 | 104 |
| 18 | 0 | 89 | 41 | 64 | 67 | 104 |
| 19 | 89 | 41 | 64 | 67 | 0 | 104 |
| 20 | 89 | 41 | 64 | 67 | 0 | 104 |
| 21 | 89 | 41 | 64 | 67 | 0 | 104 |
| 22 | 89 | 41 | 64 | 67 | 0 | 104 |
| 23 | 0 | 89 | 41 | 64 | 67 | 104 |
| 24 | 0 | 89 | 41 | 64 | 67 | 104 |
| SUM | 801 | 992 | 863 | 1051 | 469 | 4584 |

Share of hours with price above 50 EUR / MWh (by hour of the day) [%]



Average volume charge fees

We apply time-variable electricity grid fees and levies.

| Band Fee |
|----------|
| P6 |
| P5 |
| P4 |
| P3 |
| P2 |
| P1 |

Average volume charge fees (by month and hour of the day, split between weekdays and weekends) [€/MWh]

| Hour | January | | February | | March | | April | | May | | June | | July | | August | | September | | October | | November | | December | |
|------|---------|-----|----------|-----|-------|-----|-------|-----|-----|-----|------|-----|------|-----|--------|-----|-----------|-----|---------|-----|----------|-----|----------|-----|
| | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE |
| 0 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 1 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 2 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 3 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 5 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 6 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 7 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| 8 | 25.2 | 1.4 | 25.2 | 1.4 | 11.9 | 1.4 | 2.5 | 1.4 | 2.5 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 2.5 | 1.4 | 11.9 | 1.4 | 25.2 | 1.4 |
| 9 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 10 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 11 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 12 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 13 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 14 | 25.2 | 1.4 | 25.2 | 1.4 | 11.9 | 1.4 | 2.5 | 1.4 | 2.5 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 2.5 | 1.4 | 11.9 | 1.4 | 25.2 | 1.4 |
| 15 | 25.2 | 1.4 | 25.2 | 1.4 | 11.9 | 1.4 | 2.5 | 1.4 | 2.5 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 2.5 | 1.4 | 11.9 | 1.4 | 25.2 | 1.4 |
| 16 | 25.2 | 1.4 | 25.2 | 1.4 | 11.9 | 1.4 | 2.5 | 1.4 | 2.5 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 2.5 | 1.4 | 11.9 | 1.4 | 25.2 | 1.4 |
| 17 | 25.2 | 1.4 | 25.2 | 1.4 | 11.9 | 1.4 | 2.5 | 1.4 | 2.5 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 2.5 | 1.4 | 11.9 | 1.4 | 25.2 | 1.4 |
| 18 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 19 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 20 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 21 | 45.3 | 1.4 | 45.3 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 11.9 | 1.4 | 45.3 | 1.4 | 11.9 | 1.4 | 11.9 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 45.3 | 1.4 |
| 22 | 25.2 | 1.4 | 25.2 | 1.4 | 11.9 | 1.4 | 2.5 | 1.4 | 2.5 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 2.5 | 1.4 | 11.9 | 1.4 | 25.2 | 1.4 |
| 23 | 25.2 | 1.4 | 25.2 | 1.4 | 11.9 | 1.4 | 2.5 | 1.4 | 2.5 | 1.4 | 6.4 | 1.4 | 25.2 | 1.4 | 6.4 | 1.4 | 6.4 | 1.4 | 2.5 | 1.4 | 11.9 | 1.4 | 25.2 | 1.4 |

Average PtH electricity consumption in the CHP scenario in 2025

The PtH does not consume electricity during the P1 & P2 bands (which we block) but still uses electricity during nights, weekends as well as spring and fall.

| Band Fee |
|----------|
| P6 |
| P5 |
| P4 |
| P3 |
| P2 |
| P1 |

Average PtH electricity consumption across all scenarios (by month and hour of the day, split between weekdays (WD) and weekends (WE)) [MWh]

| Hour | January | | February | | March | | April | | May | | June | | July | | August | | September | | October | | November | | December | |
|------|---------|-----|----------|-----|-------|-----|-------|------|------|-----|------|-----|------|-----|--------|----|-----------|-----|---------|-----|----------|------|----------|-----|
| | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE |
| 0 | 0.7 | 0.8 | 0.1 | - | 1.4 | - | - | - | 0.7 | - | - | - | - | - | - | - | - | - | - | - | 1.6 | 0.7 | - | - |
| 1 | 1.4 | 0.1 | 0.8 | - | 1.4 | - | - | - | 0.7 | - | - | - | - | - | - | - | - | - | 0.1 | - | 1.6 | 2.1 | 1.2 | 0.3 |
| 2 | 1.4 | 1.9 | 0.9 | - | 2.1 | - | - | - | 0.7 | - | - | - | - | - | - | - | - | - | 0.1 | - | 2.3 | 4.4 | 1.4 | 0.3 |
| 3 | 1.4 | 2.4 | 0.9 | - | 2.1 | - | - | - | 0.7 | - | - | - | - | - | - | - | - | - | 0.1 | - | 2.5 | 4.8 | 1.4 | 2.0 |
| 4 | 1.4 | 2.5 | 0.9 | - | 2.1 | - | - | - | 0.7 | - | - | - | - | - | - | - | - | - | - | - | 1.4 | 3.4 | 1.6 | 2.9 |
| 5 | 1.4 | 0.2 | 1.0 | - | 1.8 | - | - | - | 0.7 | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 2.1 | 1.8 | 1.4 |
| 6 | 0.9 | 0.1 | 0.9 | - | 1.6 | - | - | - | 0.7 | - | - | - | - | - | - | - | - | - | - | - | 0.9 | 0.3 | 0.7 | 0.3 |
| 7 | 0.3 | - | 0.2 | - | 0.9 | - | - | - | 0.7 | - | 0.6 | - | - | - | - | - | - | - | - | - | 0.8 | 0.3 | 0.7 | - |
| 8 | - | - | - | - | 1.5 | - | 1.9 | - | 2.7 | - | 1.1 | - | - | - | - | - | - | - | 0.5 | - | 1.1 | 0.3 | - | - |
| 9 | - | - | - | - | - | 1.5 | 4.7 | - | 4.9 | - | 1.8 | 0.6 | - | - | - | - | 0.0 | - | 1.7 | 1.9 | - | 2.1 | - | 0.1 |
| 10 | - | - | - | - | - | 2.8 | 7.9 | 3.8 | 7.5 | 3.9 | 5.0 | 1.7 | - | - | 1.2 | - | 3.0 | - | 2.5 | 1.9 | - | 5.1 | - | 0.3 |
| 11 | - | 0.3 | - | 1.1 | - | 6.0 | 10.3 | 5.6 | 10.0 | 6.7 | 6.4 | 3.1 | - | - | 2.4 | - | 4.1 | 0.5 | 5.4 | 1.9 | - | 9.5 | - | 0.2 |
| 12 | - | 2.2 | - | 2.7 | - | 8.3 | 10.9 | 11.3 | 11.5 | 6.7 | 7.1 | 5.0 | - | - | 3.4 | - | 6.3 | 1.9 | 7.6 | 3.8 | - | 11.0 | - | 0.3 |
| 13 | - | 3.5 | - | 3.1 | - | 9.8 | 11.5 | 11.3 | 11.6 | 8.3 | 7.1 | 5.0 | - | 0.6 | 4.1 | - | 5.8 | 1.9 | 7.1 | 4.0 | - | 11.1 | - | 0.3 |
| 14 | - | 3.5 | - | 1.5 | 9.5 | 9.4 | 10.9 | 9.4 | 11.6 | 8.3 | 7.1 | 3.3 | - | - | 3.8 | - | 4.9 | 1.9 | 5.4 | 2.6 | 6.5 | 9.3 | - | - |
| 15 | - | 2.1 | - | - | 7.8 | 5.8 | 10.8 | 7.5 | 10.1 | 7.4 | 5.7 | 3.3 | - | - | 1.4 | - | 3.3 | - | 2.8 | 1.9 | 3.7 | 7.8 | - | - |
| 16 | - | 0.4 | - | - | 4.9 | 1.5 | 7.4 | 1.9 | 6.9 | 3.3 | 4.1 | 1.7 | - | - | - | - | - | - | 0.8 | 1.9 | 2.3 | 1.1 | - | - |
| 17 | - | - | - | - | 1.4 | 0.1 | 0.8 | - | 2.7 | - | - | 1.7 | - | - | - | - | - | - | - | - | 0.4 | 0.2 | - | - |
| 18 | - | - | - | - | - | - | - | - | 0.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 19 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 20 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 21 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 22 | - | - | - | - | 0.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.2 | - | - | - |
| 23 | - | - | - | - | 0.9 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.6 | 0.1 | - | - |

Average PtH electricity consumption in the CHP scenario in 2040

The PtH only runs when the fees are low, never running when fees are in the highest categories “P1” & “P2” (because we block these times).

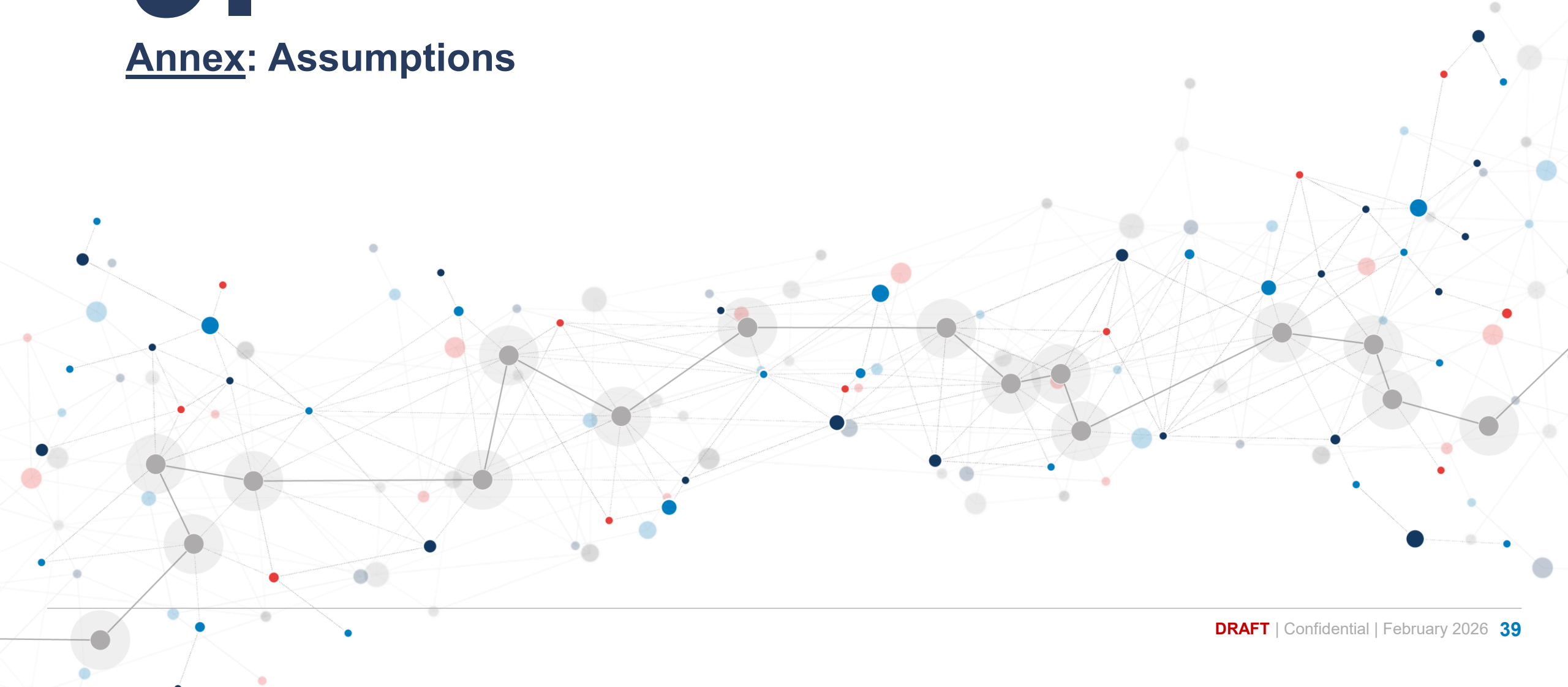
| Band Fee |
|----------|
| P6 |
| P5 |
| P4 |
| P3 |
| P2 |
| P1 |

Average PtH electricity consumption across all scenarios (by month and hour of the day, split between weekdays and weekends) [MWh]

| Hour | January | | February | | March | | April | | May | | June | | July | | August | | September | | October | | November | | December | |
|------|---------|------|----------|------|-------|------|-------|------|------|------|------|------|------|------|--------|------|-----------|------|---------|------|----------|------|----------|------|
| | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE | WD | WE |
| 0 | 10.7 | 11.3 | 11.1 | 14.2 | 12.7 | 10.4 | 1.4 | 1.3 | 0.8 | 2.2 | 0.7 | 0.4 | 0.5 | 0.4 | - | - | 0.8 | 1.6 | 0.8 | 0.9 | 17.4 | 16.3 | 12.3 | 13.0 |
| 1 | 11.9 | 14.6 | 12.8 | 14.7 | 13.3 | 12.5 | 1.7 | 1.5 | 0.9 | 2.4 | 0.3 | 0.5 | 0.5 | 0.6 | 0.0 | 0.1 | 1.2 | 2.8 | 1.0 | 1.6 | 18.5 | 16.9 | 13.1 | 13.4 |
| 2 | 12.9 | 17.1 | 14.9 | 15.2 | 12.5 | 15.5 | 1.8 | 1.9 | 0.9 | 2.4 | 0.4 | 0.5 | 0.6 | 0.6 | 0.1 | 0.1 | 1.3 | 1.5 | 1.6 | 4.1 | 19.6 | 16.8 | 16.0 | 13.4 |
| 3 | 12.9 | 16.7 | 15.9 | 15.1 | 12.6 | 16.3 | 1.9 | 1.9 | 0.9 | 2.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.3 | 0.1 | 1.5 | 1.5 | 1.6 | 5.1 | 19.8 | 16.4 | 18.2 | 14.0 |
| 4 | 12.9 | 17.3 | 16.1 | 15.3 | 13.2 | 16.5 | 2.0 | 2.0 | 0.9 | 2.4 | 0.5 | 0.5 | 0.6 | 0.6 | 0.3 | 0.3 | 1.6 | 1.5 | 1.9 | 5.4 | 23.4 | 18.7 | 18.4 | 14.6 |
| 5 | 12.6 | 15.4 | 16.1 | 15.1 | 13.3 | 16.2 | 2.0 | 2.1 | 0.9 | 2.5 | 0.7 | 0.5 | 0.6 | 0.7 | 0.3 | 0.3 | 1.7 | 1.6 | 2.0 | 5.5 | 24.4 | 19.8 | 18.5 | 14.7 |
| 6 | 12.9 | 15.5 | 15.9 | 15.2 | 13.3 | 13.1 | 2.1 | 2.1 | 0.9 | 2.5 | 0.7 | 0.7 | 0.7 | 0.7 | 0.4 | 0.3 | 1.7 | 1.6 | 2.2 | 2.4 | 24.7 | 19.6 | 18.2 | 14.8 |
| 7 | 11.4 | 12.9 | 13.2 | 15.0 | 13.6 | 14.7 | 2.6 | 11.3 | 2.0 | 8.2 | 4.8 | 4.0 | 3.5 | 4.5 | 1.7 | 1.1 | 2.3 | 2.2 | 3.5 | 6.2 | 24.7 | 18.6 | 16.0 | 13.2 |
| 8 | - | 13.9 | - | 18.5 | 10.0 | 19.6 | 18.0 | 21.0 | 18.7 | 20.4 | 12.6 | 15.0 | - | 17.4 | 6.6 | 12.2 | 8.1 | 12.8 | 5.0 | 15.5 | 10.7 | 19.9 | - | 13.2 |
| 9 | - | 17.5 | - | 22.1 | - | 25.1 | 21.9 | 24.6 | 19.4 | 20.4 | 15.2 | 13.1 | - | 14.1 | 13.2 | 12.7 | 15.3 | 14.8 | 15.2 | 20.7 | - | 22.7 | - | 11.9 |
| 10 | - | 19.9 | - | 25.5 | - | 25.3 | 23.7 | 26.0 | 22.3 | 21.2 | 19.3 | 16.0 | - | 16.6 | 17.0 | 17.6 | 21.2 | 19.6 | 21.6 | 22.0 | - | 25.3 | - | 14.7 |
| 11 | - | 17.5 | - | 26.0 | - | 24.9 | 24.1 | 26.0 | 23.6 | 23.3 | 20.8 | 16.1 | - | 19.8 | 19.7 | 21.0 | 22.7 | 22.4 | 22.1 | 23.3 | - | 25.8 | - | 18.0 |
| 12 | - | 21.1 | - | 26.0 | - | 25.3 | 25.9 | 26.0 | 25.0 | 25.8 | 24.4 | 20.9 | - | 23.3 | 23.5 | 24.2 | 25.0 | 25.8 | 24.1 | 24.8 | - | 26.0 | - | 20.0 |
| 13 | - | 21.9 | - | 26.0 | - | 26.0 | 25.9 | 26.0 | 25.2 | 25.8 | 24.9 | 24.2 | - | 24.6 | 24.1 | 24.3 | 25.7 | 25.9 | 22.9 | 24.8 | - | 26.0 | - | 20.0 |
| 14 | - | 20.8 | - | 26.0 | 24.0 | 26.0 | 25.9 | 26.0 | 25.4 | 25.7 | 24.7 | 23.9 | - | 25.2 | 23.9 | 24.0 | 25.1 | 24.8 | 23.0 | 24.7 | 23.9 | 26.0 | - | 17.1 |
| 15 | - | 18.5 | - | 24.2 | 24.0 | 26.0 | 25.9 | 26.0 | 25.5 | 25.8 | 24.4 | 24.0 | - | 25.3 | 24.0 | 24.1 | 22.5 | 20.7 | 18.2 | 21.5 | 21.7 | 20.3 | - | 10.3 |
| 16 | - | 14.1 | - | 24.5 | 20.9 | 26.0 | 21.3 | 26.0 | 22.8 | 25.8 | 19.2 | 21.2 | - | 24.7 | 15.2 | 18.9 | 8.8 | 15.4 | 8.0 | 13.9 | 12.8 | 14.9 | - | 6.9 |
| 17 | - | 7.2 | - | 16.4 | 5.3 | 19.0 | 9.0 | 13.2 | 11.6 | 12.9 | 7.3 | 15.7 | - | 17.9 | 2.1 | 1.0 | 1.2 | 2.4 | 1.8 | 2.4 | 3.5 | 9.2 | - | 5.6 |
| 18 | - | 6.9 | - | 7.4 | - | 4.6 | 0.1 | 0.9 | - | 6.5 | 1.5 | 1.8 | - | 7.6 | - | - | - | 1.2 | 0.3 | 2.0 | - | 8.3 | - | 5.3 |
| 19 | - | 7.8 | - | 8.5 | - | 5.1 | 0.4 | 0.2 | - | 2.2 | - | 1.1 | - | 0.8 | - | - | - | 1.4 | 0.2 | 0.1 | - | 12.1 | - | 6.3 |
| 20 | - | 9.5 | - | 8.1 | - | 4.9 | 0.5 | 1.1 | - | 1.9 | - | 0.8 | - | 0.6 | - | - | 0.0 | 0.7 | 0.1 | 1.1 | - | 12.4 | - | 7.2 |
| 21 | - | 9.5 | - | 8.8 | - | 4.9 | 0.7 | 0.5 | - | 1.9 | - | 0.2 | - | 0.1 | - | - | 0.1 | - | 0.3 | 0.3 | - | 13.9 | - | 7.3 |
| 22 | - | 10.2 | - | 11.0 | 2.7 | 9.0 | 1.0 | 0.8 | - | 2.3 | 0.0 | 0.1 | - | 0.1 | - | - | 0.4 | 0.1 | 0.6 | 1.8 | 2.0 | 18.0 | - | 8.4 |
| 23 | - | 10.5 | - | 11.5 | 3.0 | 10.7 | 1.1 | 1.0 | - | 2.5 | 0.2 | 0.2 | - | 0.2 | 0.2 | - | 0.6 | 0.3 | 0.9 | 2.1 | 2.3 | 18.9 | - | 9.2 |

9.

Annex: Assumptions





Avoided grid loss assumptions

We apply EC reference values to account for avoided grid losses from CHPs supplying power at lower voltage levels.

- Providing electricity with CHPs at a lower voltage level **reduces grid losses** compared to electricity generated and transmitted from higher-voltage levels.
- To **quantify** the avoided grid loss, we use the **reference values provided by EU regulation^[1]**. The EC established these reference values to assess the efficiency of cogeneration units, and their use is mandatory for member states to classify high-efficiency cogeneration^[2]. The definition of high-efficiency cogeneration is used primarily to classify district heating networks as “Efficient District Heating” according to the EED.
- The reference correction factor depends on where the electricity is consumed:
 - **Off-site consumption:** Feeding electricity into the grid at lower voltage levels reduces grid losses by bypassing the multiple voltage transformation steps required for large-scale producers
 - **On-site consumption:** Short transport distances reduce grid use and further minimizes transmission & distribution losses.

Reference correction factors according to EU regulation^[1]

| Connection voltage level | Correction factor | |
|--------------------------|-------------------|---------|
| | Off-site | On-site |
| < 0.45 kV | 0.888 | 0.851 |
| 0.45 – 12 kV | 0.918 | 0.891 |
| 12 – 50 kV | 0.935 | 0.914 |
| 50 – 100 kV | 0.952 | 0.936 |
| 100 – 200 kV | 0.963 | 0.951 |
| 200 – 345 kV | 0.972 | 0.963 |
| ≥ 345 kV | 1 | 0.976 |

Spanish use-case

Application to Spanish use case - 50% (A) and 100% (B) self-consumption:

A CHP is connected at a **voltage level of 0.45 – 12kV** and **50%** of the electricity is **self-consumed**.

Correction factor: $50\% \times 0.918 + 50\% \times 0.891 = \mathbf{0.9045}$
Power corrected for avoided grid losses: $1 \text{ MWh} / 0.9045 = \mathbf{1.101 \text{ MWh}}$

Therefore, considering avoided grid losses, 1 MWh produced by the CHP is **equivalent to 1.101 MWh** produced off-site at $\geq 345 \text{ kV}$.

B CHP is connected at a **voltage level of 0.45 – 12kV** and **100%** of the electricity is **self-consumed**.

Correction factor: $100\% \times 0.891 = \mathbf{0.891}$
Power corrected for avoided grid losses: $1 \text{ MWh} / 0.891 = \mathbf{1.122 \text{ MWh}}$

Therefore, 1 MWh produced by the CHP is **equivalent to 1.122 MWh** produced off-site at $\geq 345 \text{ kV}$.



Assumptions: Operational Parameters

| Asset | Asset Type | Parameter | Value | Unit | Source |
|----------------------------|------------|-----------------------------|----------------|---------------------|-------------------------------------|
| Gas Turbine (Simple-Cycle) | CHP | Installed Capacity | 10.8 | MW_el | -- |
| | | Minimum Stable Load | 2.48 | MW_el | DEA |
| | | Heat Rate | 2.89 | MWh_gasHHV / MWh_el | Excel File (Julio Artiñano Pascual) |
| | | Power-to-Heat Ratio | 0.6 | -- | DEA |
| | | Start-up time | 0.5 | h | DEA |
| Gas Post-Combustion | HOB | Installed Capacity | 7.8 | MW_th | Julio Artiñano Pascual |
| | | Efficiency | 105 | %_HHV | Julio Artiñano Pascual |
| Gas Heat-only Boiler | HOB | Installed Capacity | 26 | MW_th | -- |
| | | Efficiency | 84 | %_HHV | DEA |
| E-Boiler | HOB | Installed Capacity | see s. 12 | MW_th | -- |
| | | Efficiency | 100 | % | DEA |
| Solar PV | Elec-only | Installed Capacity | 2.5 | MW_el | -- |
| | | Production Profile | Hourly profile | -- | PVGIS |
| Heat Storage | Storage | Storage Size (Volume) | 52 | MWh_th | -- |
| | | Charge & Discharge Capacity | 5.2 | MW_th | -- |
| | | Heat Injection Efficiency | 99 | % | DEA |
| | | Heat Withdrawal Efficiency | 96 | % | DEA |
| | | Heat Loss | 0.04 | % per hour | DEA |



Assumptions: CAPEX & non-energetic OPEX

| Asset | Asset Type | Parameter | Value | Unit | Source |
|-----------------------------|------------|----------------------------------|-----------|----------------------------|---------------------|
| Gas Turbine (Simple-Cycle) | CHP | CAPEX | 952 216 | EUR / MW _{el} | DEA |
| | | Fixed Operation & Maintenance | 25 436 | EUR / MW _{el} / y | DEA |
| | | Variable Operation & Maintenance | 7.00 | EUR / MWh _{el} | DEA |
| Gas Post-Combustion | HOB | CAPEX | 78 264 | EUR / MW _{th} | DEA |
| | | Fixed Operation & Maintenance | 2 544 | EUR / MW _{th} / y | DEA |
| | | Variable Operation & Maintenance | 1.40 | EUR / MWh _{th} | DEA |
| Gas Heat-only Boiler | HOB | CAPEX | 78 264 | EUR / MW _{th} | DEA |
| | | Fixed Operation & Maintenance | 2 544 | EUR / MW _{th} / y | DEA |
| | | Variable Operation & Maintenance | 1.40 | EUR / MWh _{th} | DEA |
| E-Boiler | HOB | CAPEX | 91 308 | EUR / MW _{th} | DEA |
| | | Fixed Operation & Maintenance | 1 396 | EUR / MW _{th} / y | DEA |
| | | Variable Operation & Maintenance | 1.20 | EUR / MWh _{th} | DEA |
| Solar PV | Elec-only | CAPEX | 1 067 201 | EUR / MW _{el} | DEA |
| | | Fixed Operation & Maintenance | 13 003 | EUR / MW _{el} / y | DEA |
| | | Variable Operation & Maintenance | 0.00 | EUR / MWh _{el} | DEA |
| Electricity Grid Connection | - | CAPEX for 15 MW _{el} | 4.00 | Mio. EUR ₂₀₂₅ | Workshop |
| | | CAPEX for 26 MW _{el} | 10.00 | Mio. EUR ₂₀₂₅ | workshop |



Assumptions: Fees & Levies (in 2025)

| No. | Parameter | Value ^[1] | | | | | | Unit | Source |
|--|---|---|-----------|----------|----------|----------|----------|--|---------------------------------|
| Electricity – tariff group 6.1 TD (transport & distribution) and tariff group 3 (system charges & charges for capacity payment) | | | | | | | | | |
| | | P1 | P2 | P3 | P4 | P5 | P6 | | |
| 1 | Transport & distribution fee (capacity-based) | 23.669055 | 12.513915 | 4.696330 | 3.309245 | 0.069965 | 0.062286 | EUR / kW _{el} | BOE-A-2024-26218 |
| 2 | Transport & distribution fee (volume-based) | 0.027104 | 0.011894 | 0.004726 | 0.002739 | 0.000122 | - | EUR / kWh _{el} | BOE-A-2024-26218 |
| 3 | Electricity System Charges (capacity-based) | 5.122811 | 2.563728 | 1.862840 | 1.862840 | 1.862840 | 0.853802 | EUR / kW _{el} | BOE-A-2024-26218 |
| 4 | Electricity System Charges (volume-based) | 0.017674 | 0.013092 | 0.007069 | 0.003535 | 0.002266 | 0.001414 | EUR / kWh _{el} | BOE-A-2024-27289 |
| 5 | Charge for Capacity Payments (volume-based) | 0.00049 | 0.000225 | 0.00015 | 0.000113 | 0.000113 | - | EUR / kWh _{el} | BOE-A-2024-27289 |
| Gas | | | | | | | | | |
| 6 | Aggregated Fees | c. 1.5 - 2 (5% of current gas wholesale price at PVB) | | | | | | EUR ₂₀₂₅ / MWh _{gas} | E-mail (Julio Artiñano Pascual) |



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