EU Taxonomy

[redacted] EnBW

[redacted] Siemens Energy

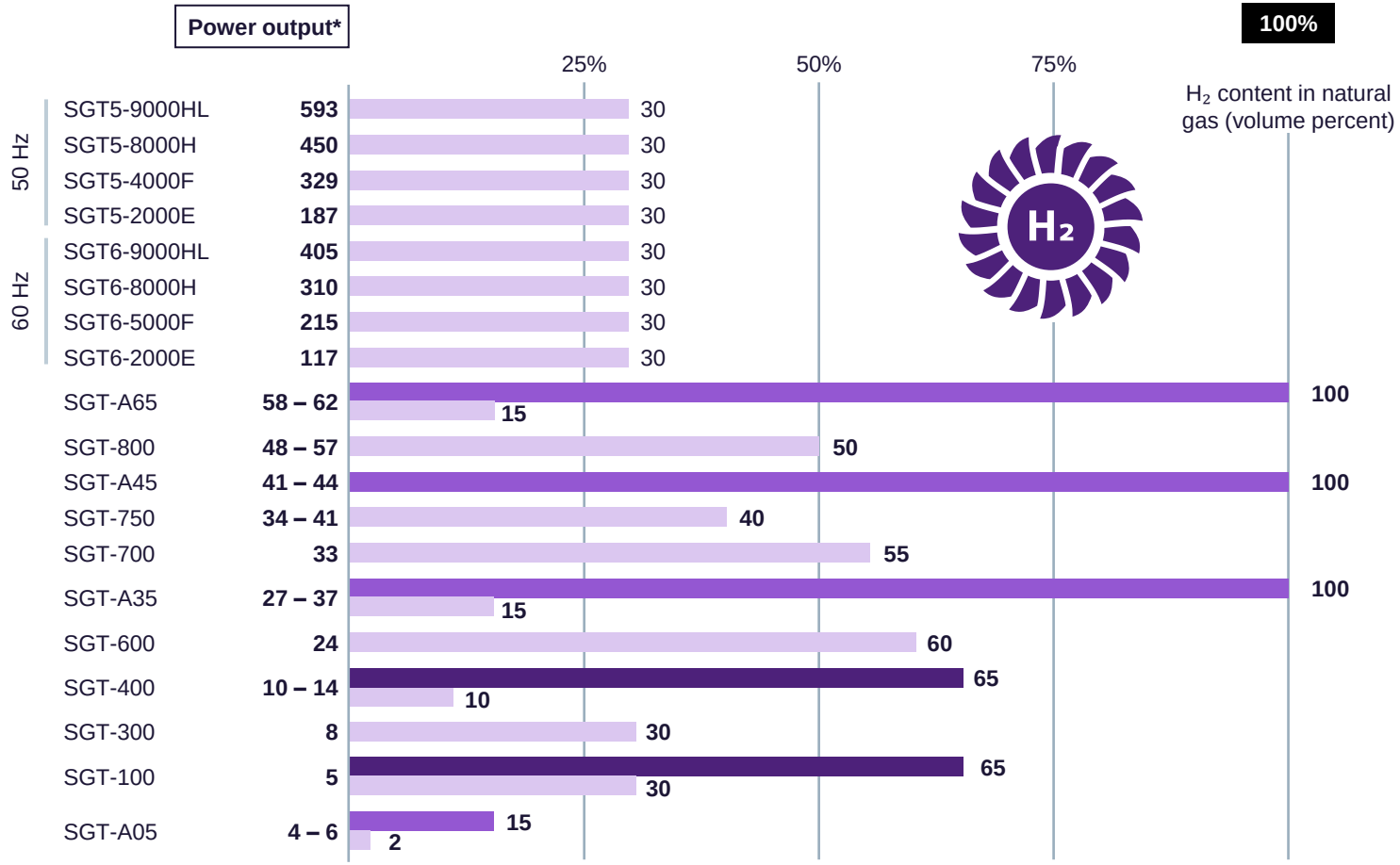
Key Challenges

100gCO2/kWh even for transitional activities

262gCO2/kWh as “doing significant harm”

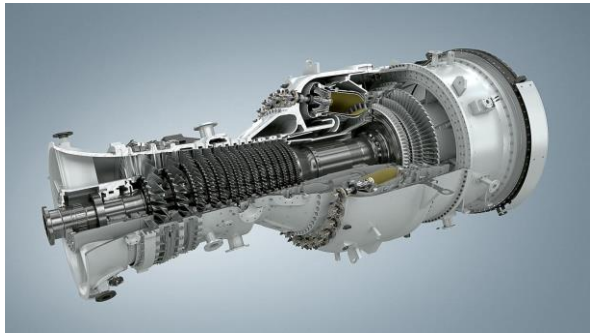
Technology Readiness
Our mission: 100% hydrogen

Siemens gas turbines H_2 capacities



Source: Siemens ***** MW, ISO, base load, natural gas version 2.0, March 2019 DLE burner WLE burner Diffusion burner (with unabated NO_X emissions)

Example - Industrial GTs: 250gCO2/kWh require 50 vol % hydrogen co-firing



more than **370** gas turbines sold worldwide

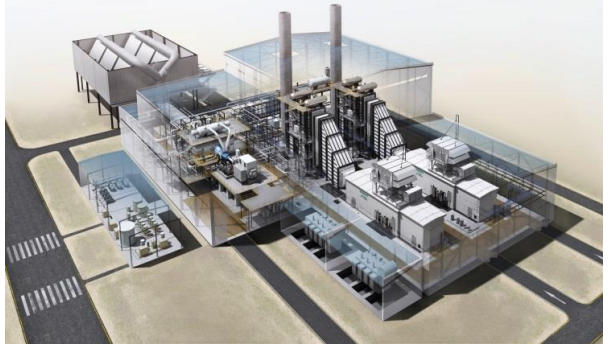
more than **7 million** equivalent operating hours of fleet experience

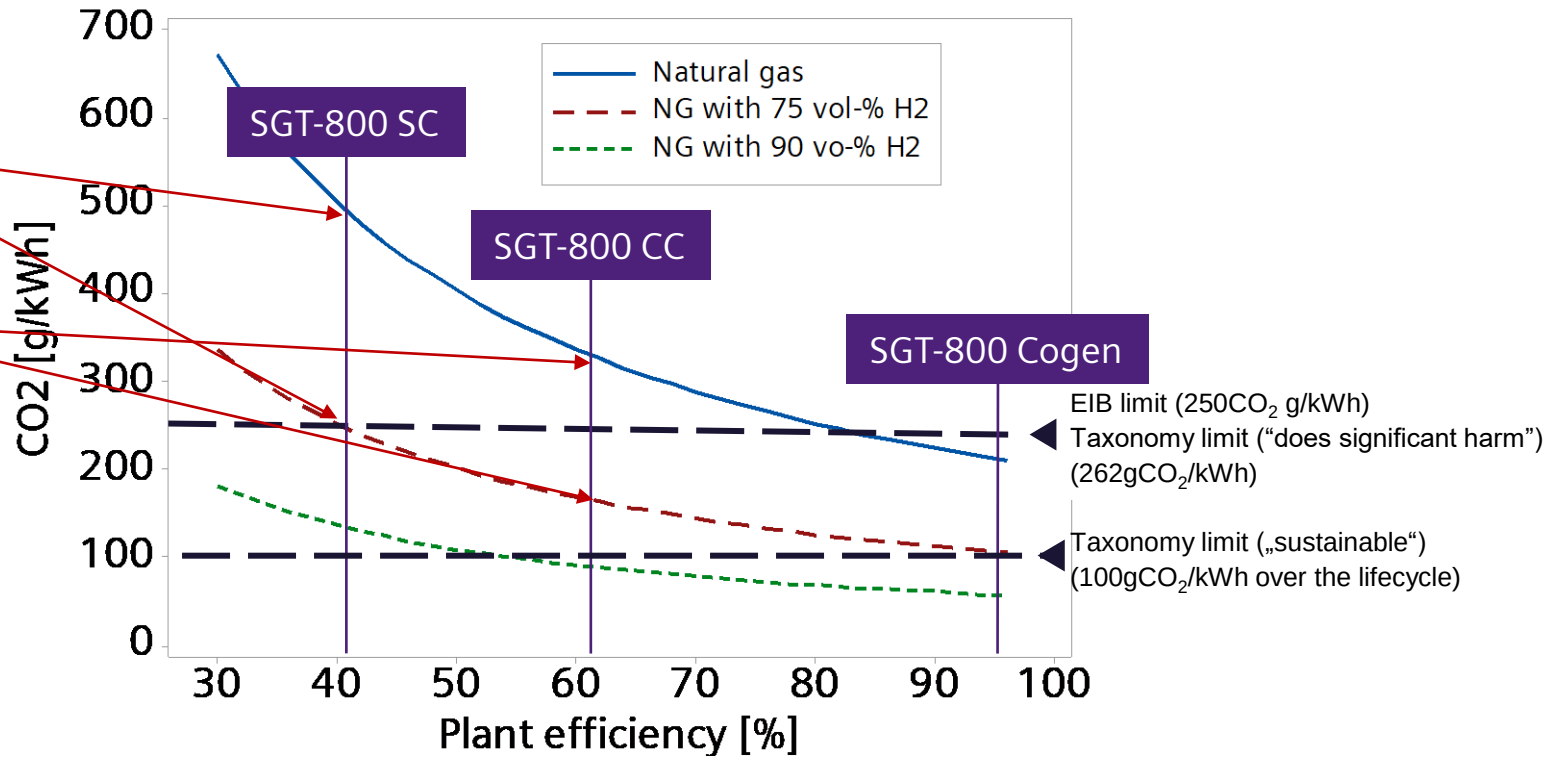
99.8% overall fleet reliability 2018

fuel can contain up to **50%** hydrogen (by volume), with DLE burner

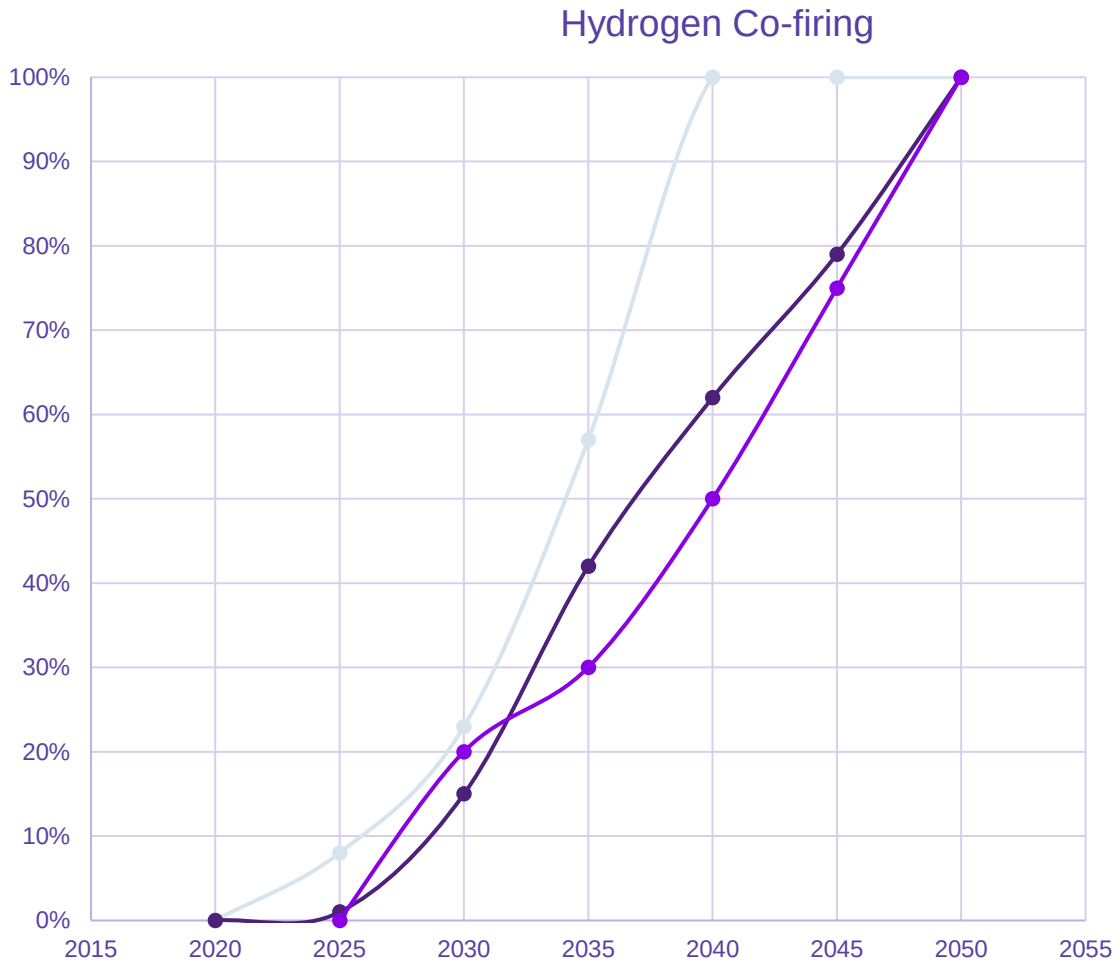
SGT-800 Single Cycle (62MW(e))
75 vol-% H_2 halves the carbon footprint

SGT-800 Combined Cycle
75 vol-% H_2 halves the carbon footprint





Ramp-up scenarios for carbon-neutral gases leading to zero emissions in 2050



„Optimistic Scenario"*

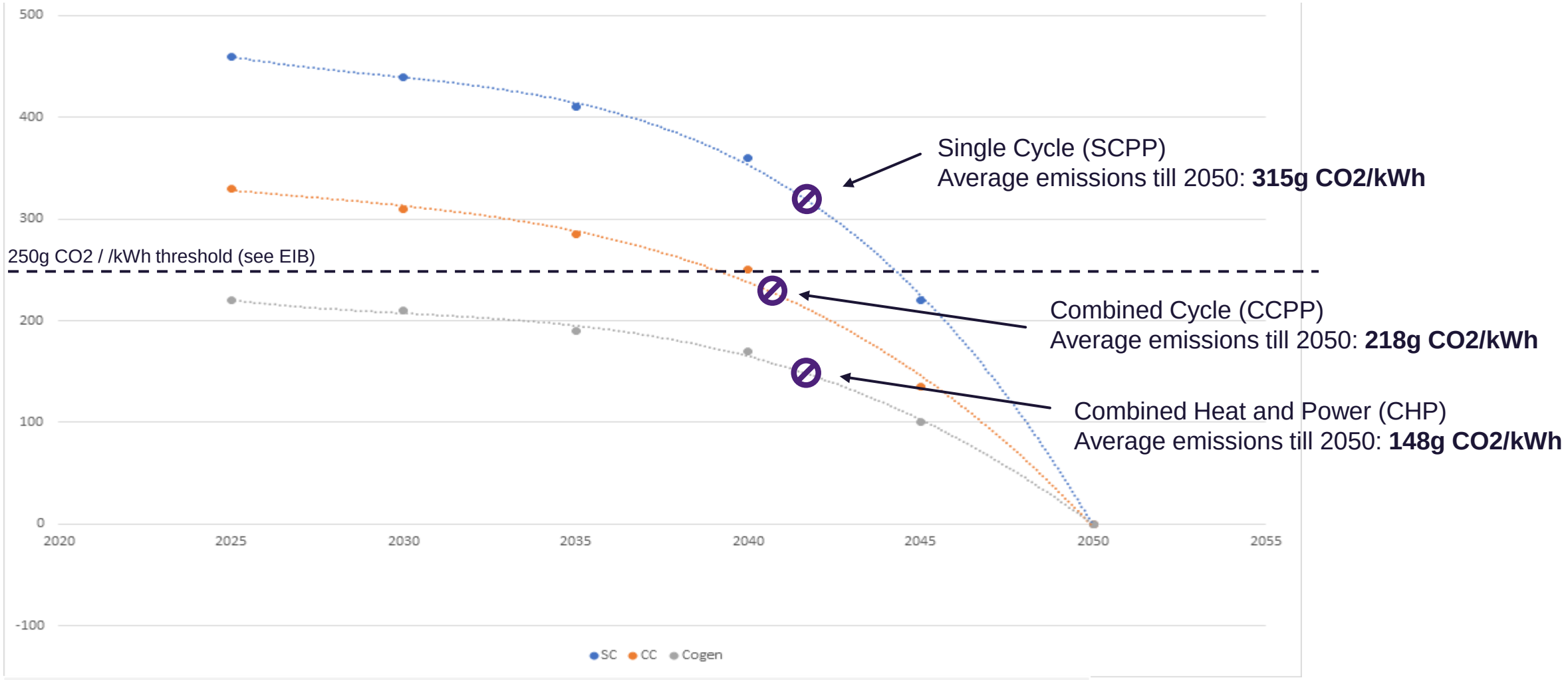
Decades	%-blending	%-climate-neutral gases
2020-2030 average	10 %	40 % biogas/-methane 50 % blue hydrogen 10 % green hydrogen
2030-2040 average	60 %	10 % biogas/-methane 50 % blue hydrogen 40 % green hydrogen
2040-2050 average	100 %	0 % biogas/-methane 30 % blue hydrogen 70 % green hydrogen

„Conservative Scenario"*

Decades	%-blending	%-climate-neutral gases
2020-2030 average	5 %	30 % biogas/-methane 70 % blue hydrogen 0 % green hydrogen
2030-2040 average	40 %	20 % biogas/-methane 50 % blue hydrogen 30 % green hydrogen
2040-2050 average	80 %	0 % biogas/-methane 40 % blue hydrogen 60 % green hydrogen

EnBW, FfE Study on the application of the EU Taxonomy and review of the requirements in the energy sector with a focus on gas

Average emissions on average over the asset life-time based on the conservative ramp-up scenario



Hydrogen and biogas accounted with zero emissions

Results for an optimistic and a conservative gas mix scenario (CO_2e/kWh share per decade) – blue hydrogen sensitivity analysis

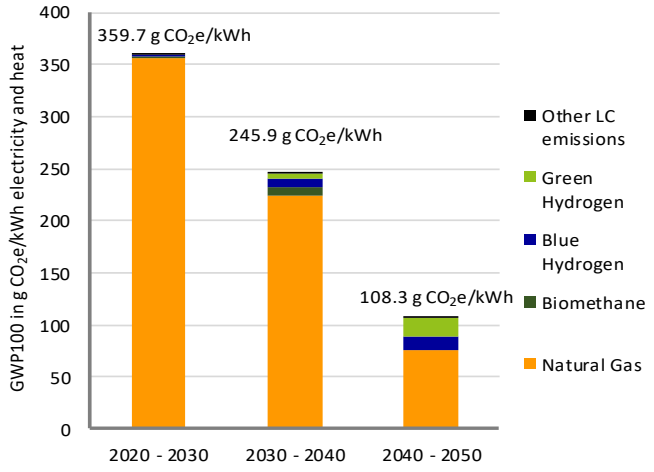
Blue H_2 30 g CO_2e/kWh

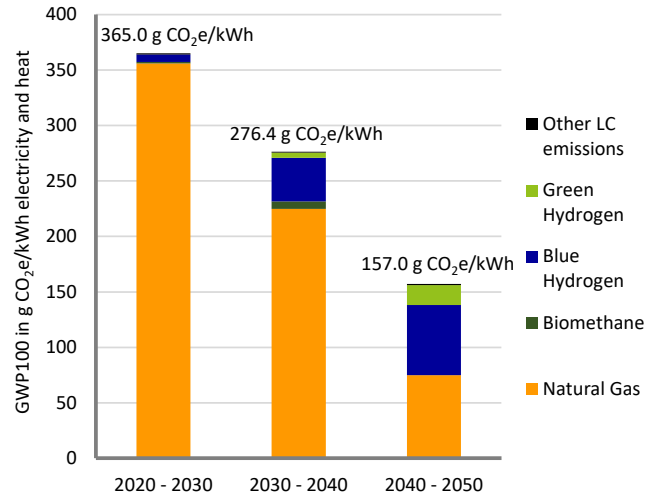
… a corridor between 160 – 216 g CO_2e/kWh can be achieved

Blue H_2 130 g CO_2e/kWh

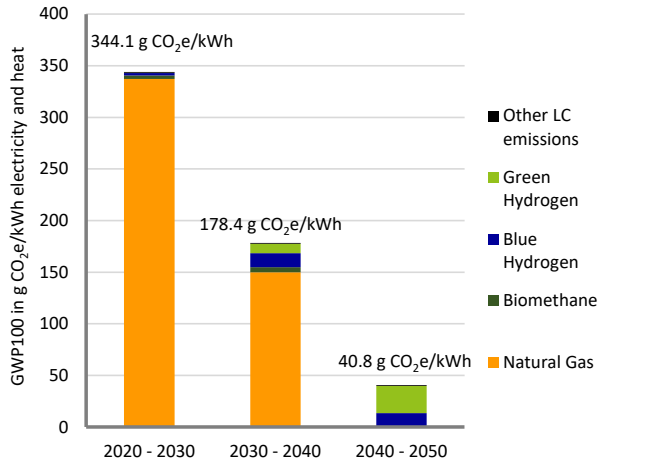
… a corridor between 195 – 247 g CO2e/kWh can be achieved

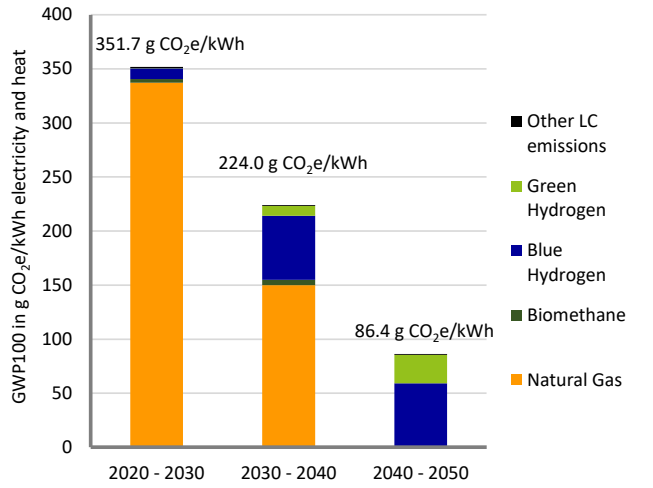
Conservative Scenario





Optimistic Scenario





Explanation

- **By 2030, mainly natural gas in the system;** in the short-term blue hydrogen available faster than green hydrogen; establishment of RE infrastructure for production of green H_2; development supported by EU and national hydrogen strategies
- **Decades 2030 to 2040 transition to a hydrogen economy**, ramp-up availability of H_2 with simultaneous decline in gas consumption in the power sector due to increasing renewable energies
- **In the optimistic scenario, 2040 overall power plant portfolio are climate-neutral** (i.e. for gas power plants through conversion to H_2, biogas, CCS etc.)

Why more realistic thresholds matter.

More realistic thresholds provide incentives to access green financing with contractual arrangements to lower emissions

Accelerating the transition

Competitive disadvantage for European manufacturing sites in international projects

Access to export credits and financing for international competitiveness

Gas-fired power stations enable the transition from lignite to renewables and can be used as a leverage to demand a faster coal phase out.

Eligibility for EU Recovery Fund and the Just Transition Fund

The explicit inclusion of transitional activities in the regulation is being ignored by the draft delegated act

Screening criteria don’t differentiate between the two

Gas-fired power generation might be excluded from capacity mechanisms

Review of EU State Aid Guidelines for Energy

Our proposal for a taxonomy that manages the transition to accelerate decarbonisation

1. Screening criteria should clearly distinguish sustainable activities and transitional activities as mandated by the taxonomy regulation

2. Thresholds for gas-fired power generations should be considered over the life-time of the asset, capped at 40 years, but reaching close to zero gCO2e/kWh by 2050

3. The threshold for gas-fired power generation as a *transitional activity* should be increased to at least 250gCO2/kWh on average over the life-time of the asset (aligned with point 2)

4. The threshold for gas-fired power generation to be considered as *doing no significant harm* should be based on best available technologies and aligned with the EU Electricity Regulation: 350gCO2/kWh or 700kg CO2/kW

5. Gas network extension in the context of a coal-to-gas shift should be eligible if they are hydrogen-ready