ELECTRICITY AND GAS COUPLING IN A DECARBONISED ECONOMY

KEY FINDINGS AND RECOMMENDATIONS

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cerre Centre on Regulation in Europe
Improving network and digital industries regulation

THE MOST COMPREHENSIVE RESEARCH ON SECTOR COUPLING

The European Union is committed to decarbonising its economy by 2050 and the energy system has a primary role to play. Although tremendous progress has been achieved in reducing GHG emissions by 23% relative to 1990 levels, a huge task lies ahead if we are to achieve the target of net zero emissions by 2050.

Future achievements must be delivered three times faster than what has been done to date - a challenge that can only be achieved with a joint effort in both electricity and gas system planning, integrating all energy end-use sectors and applications.

One of the greatest challenges for this jointly planned energy system (sector coupling) is to build out the flexibility and resilience needed to achieve net zero by 2050, while taking into account the current state of the energy system.

CERRE's report offers new, in-depth analysis of the complex dynamics and interactions between the electricity and gas sectors likely to emerge in the coming decades. It also introduces fundamental regulatory and policy recommendations to support this unprecedented decarbonisation task for EU and national policymakers.

READ OUR EXECUTIVE SUMMARY

READ OUR CONCLUSIONS

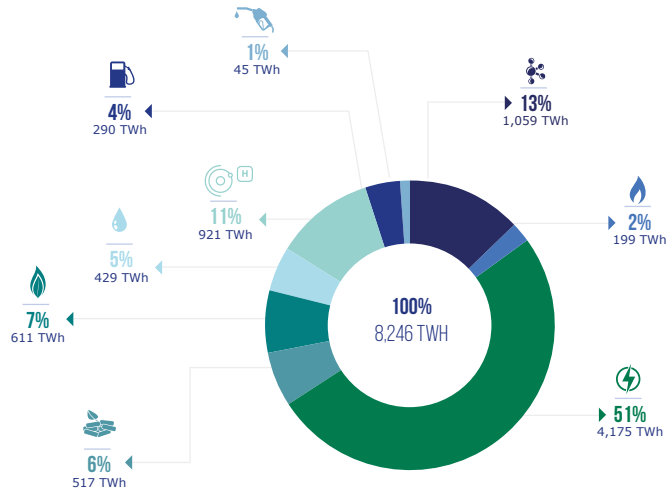
A STATE-OF-THE-ART MODEL TO ANALYSE 4 DIFFERENT PATHWAYS TO 2050

CERRE's unique research is based on a state-of-the-art energy system optimisation model. Using this model, the report analysed the EU's plans for a deep decarbonisation of the energy system in 2050, focusing on the flexibility of, and complementary trends between, various low-carbon energy vectors.

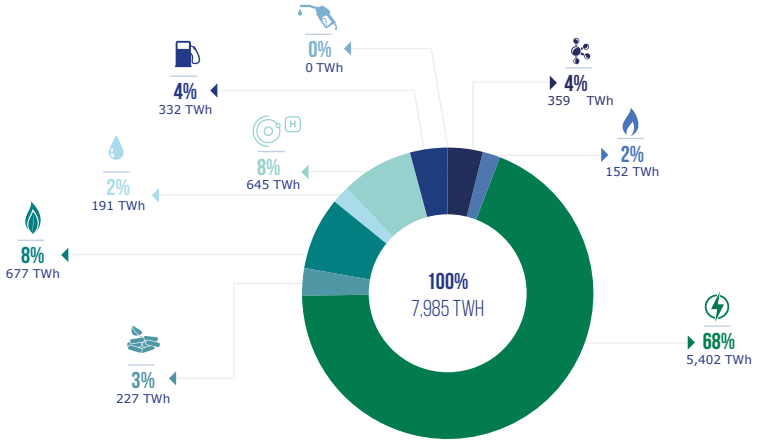
The report unveils four scenarios – a core scenario which strives to reach net zero (NZ) GHG emissions by 2050 (based on the EU's 1.5 TECH model) for the EU (+UK, Norway, Switzerland) and three variants: (i) a 90% GHG emissions reduction scenario, (ii) a NZ-e which favoured electrification, and (iii) a NZ-g which favoured gasification. Both NZ-e and NZ-g reach net zero and are extreme versions of the core NZ scenario. These scenarios and a detailed sensitivity analysis cover variations in network costs, system integration technologies and storage.

DISCOVER OUR METHODOLOGY, ANALYTICAL FRAMEWORK AND SCENARIOS (CHAPTER 6)

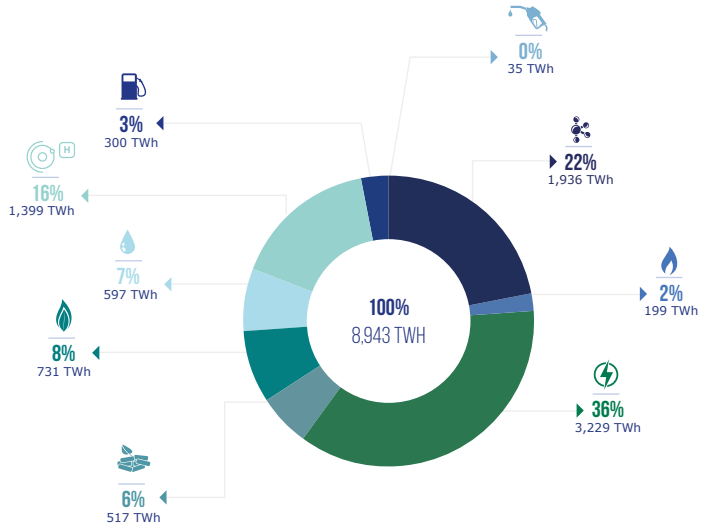
NET ZERO BASELINE SCENARIO



NET ZERO-E SCENARIO



NET ZERO-G SCENARIO



LEGEND

- Biomethane
- Natural gas
- Electricity
- Biomass
- E-gas
- E-liquids
- Hydrogen
- Diesel
- Gasoline

MORE THAN 40 RECOMMENDATIONS TO MAKE SECTOR COUPLING A REALITY

The report addresses a wide number of strategic regulatory recommendations derived from the modelling results. Critical areas such as the pricing of electricity, gas and carbon, the role of the electricity sector in supporting the net zero targets, and the (re)organisation of gas systems are all addressed in this discussion. The essential role of hydrogen, the massive investments needed to achieve deep electrification of the economy, and the potential of other technologies such as CCS, are also part of this must-read chapter.

READ OUR 40+ RECOMMENDATIONS

STARTING POINT = 4 SCENARIOS
- **NET ZERO REMODELLED (LTS, 2018)**
- **90% GHG REDUCTION REMODELLED (LTS, 2018)**
- **NZ-E (FAVOURING ELECTRIFICATION)**
- **NZ-G (FAVOURING GASIFICATION)**

GENERAL POLICY RECOMMENDATIONS

KEY RESULTS OF THE MODELLING

41 SPECIFIC RECOMMENDATIONS

- Pricing of electricity, gas and carbon (1-6)
- Key role of the electricity system in sector coupling (7-11)
- Organisation of the gas system (12-16)
- Sources of hydrogen and implications of fixed costs (17-18)
- Role of definitions (19-20)
- Initial uses of hydrogen (21-23)
- Financing sector coupling (24-25)
- EU and specific countries (26-29)
- Role of EU in near term (30-34)
- Next steps (35-41)

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