

Long-term perspectives on the role of gas(es) in EU decarbonisation

EU-Russia Gas Advisory Council (GAC WS2)

7 December 2018

Jesse Scott, Deputy Secretary General

jesse.scott@eurogas.org

Eurogas statement

The gas sector agrees with the Commission that the Paris Agreement has transformed the energy landscape and that meeting deep decarbonisation climate targets requires a rethink of how we all use and consume energy.

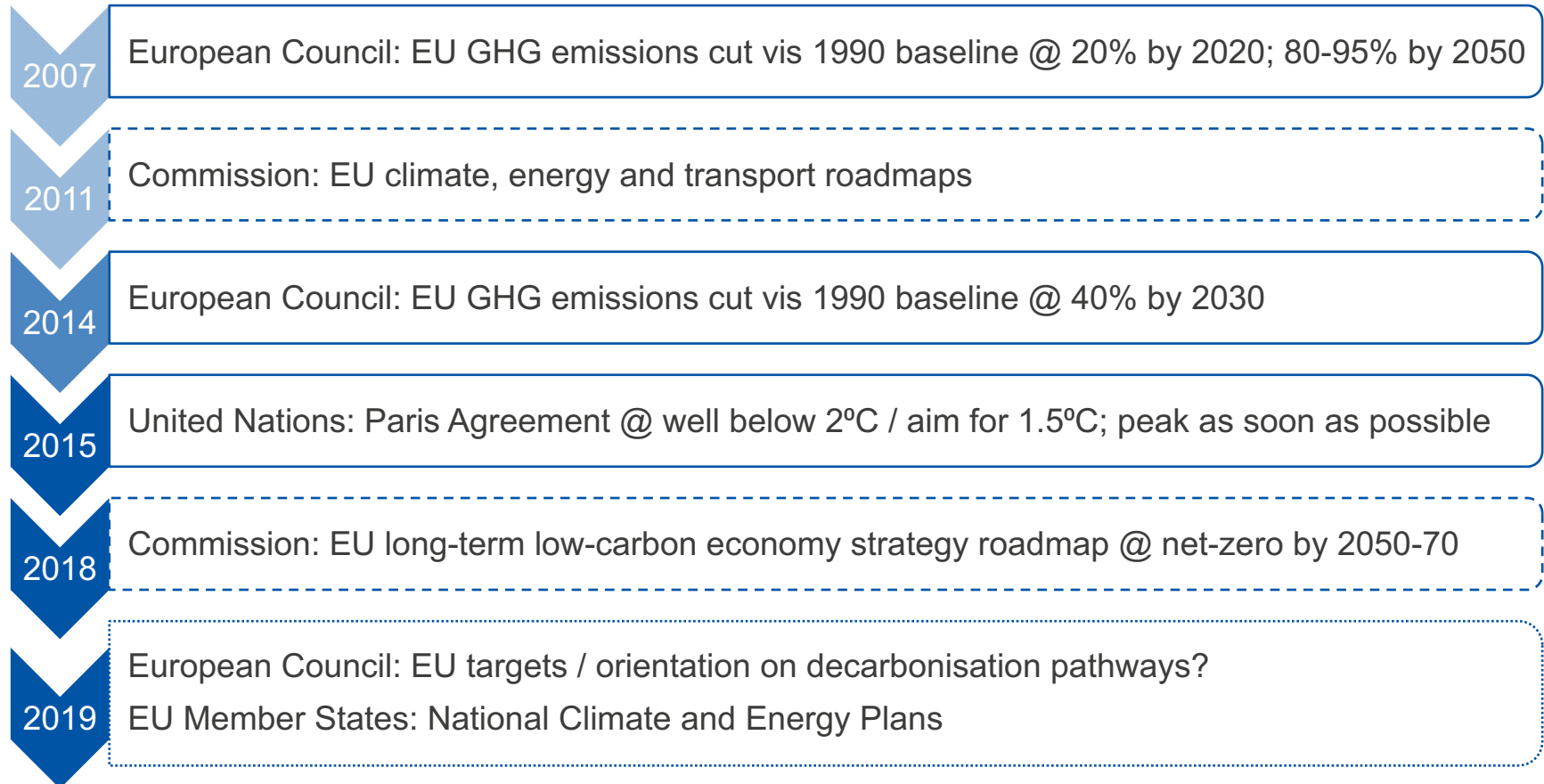
Limiting global temperature increase to well below 2° C above pre-industrial levels is the minimum aim: Eurogas also supports the Paris commitment to pursue efforts to limit the temperature increase to 1.5° C above pre-industrial levels.

The combined potentials of natural, renewable and decarbonised gas will help to achieve climate ambitions on time, and help to keep the energy transition cost low, making it socially acceptable for European citizens.

Key questions

- What role has natural gas played in EU decarbonisation since 1990 to today?
- Is the EU climate neutral 2050 target achievable without renewable and decarbonised gases?

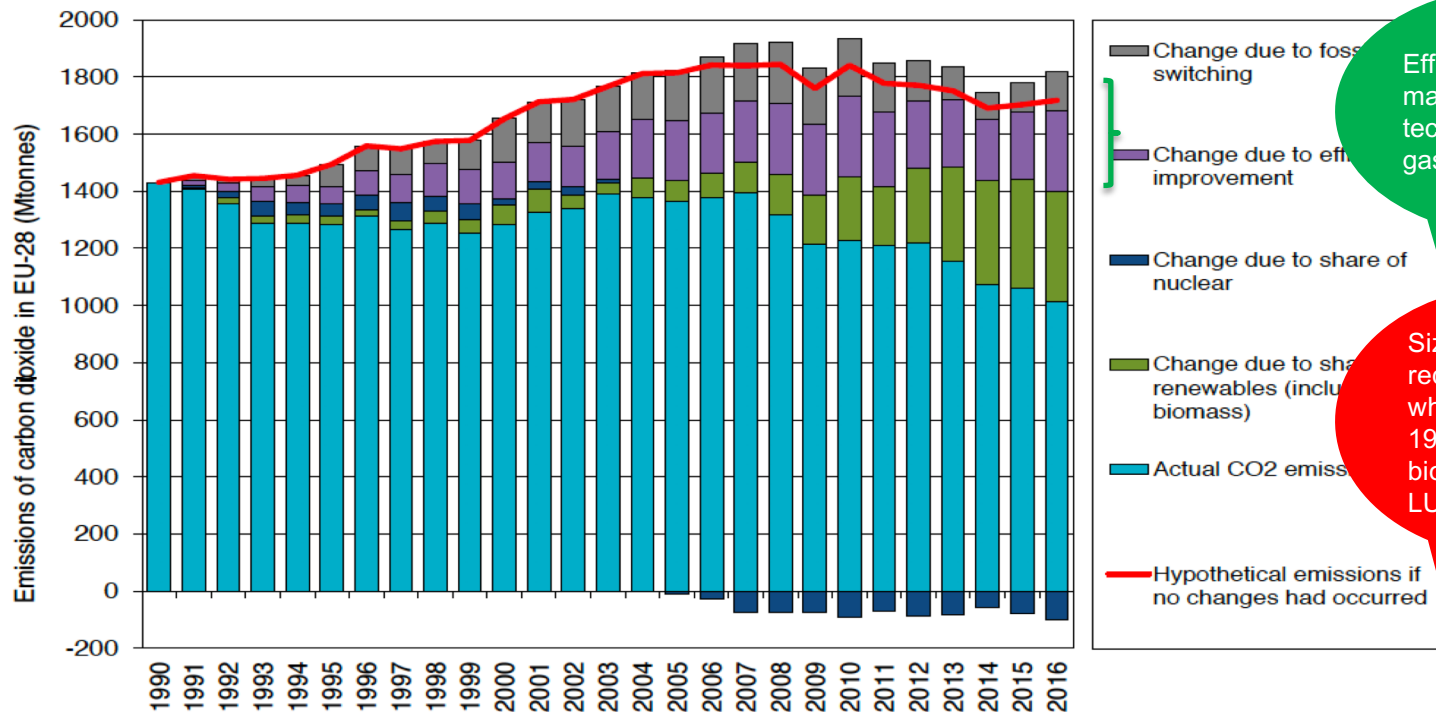
The long-term: EU climate targets for 1990-2050



Decarbonisation → Deep decarbonisation

EEA analysis highlights the role of renewables in power

Figure 3.7 Estimated impact of different factors on the reduction in emissions of CO₂ from public electricity and heat production in the EU-28 between 1990 and 2016



Efficiency gain due mainly to CCGT technology—i.e. also gas-coal fuel switch

Size of green bar reduces by half when taking out 190 Gte for 'zero' biomass offset in LULUCF

Presentation of EU success in energy understates the role of natural gas (and biomass)

Getting to 2050: gas-for-coal substitution in power

- Coal/lignite today supply 58% of EU thermal power generation (864 TWh), with an average of 850 g CO₂/kWh output
- Substituting CCGT-based gas-fired power, at an average of 350 g CO₂/kWh output (at 58 % turbine efficiency) offers an opportunity envelope of 430 Gte of CO₂ reduction
- Not all of this can be done (Poland)—but there is still much more room for gas-for-coal substitution
- Gas has existing idled capacity and low impact on grids, allowing it to be more effective in early reduction of CO₂ emissions than other power solutions
- *Biomass-firing is an alternative that will give reported reductions rules, but... questions about accuracy of LULUCF offsets; concerns about the transport/life-cycle and second-order (land use change) effects of imported biomass*

Gas-for-coal substitution the quickest way to avoid lock-in of CO₂ in the atmosphere

Renewable power: wind and solar integration

2014 – electricity mix 21% RES



5% biomass



10% hydro



6% intermittent

2030 – electricity mix <55% RES
(65% in Germany, 100% in Austria)



5% biomass



10% hydro



35-40% intermittent

x6 increase in intermittent generation during 15 years

An energy future without gas?

All-renewable electrification

“Gaseous fuels”

But all-electric might not work out simple or cheap ... bulk seasonal storage, flexibility, infrastructure?

Is a multi-vector energy transition more affordable – or is it too complicated?

Electricity is becoming green: all-electric looks like the answer for the energy transition

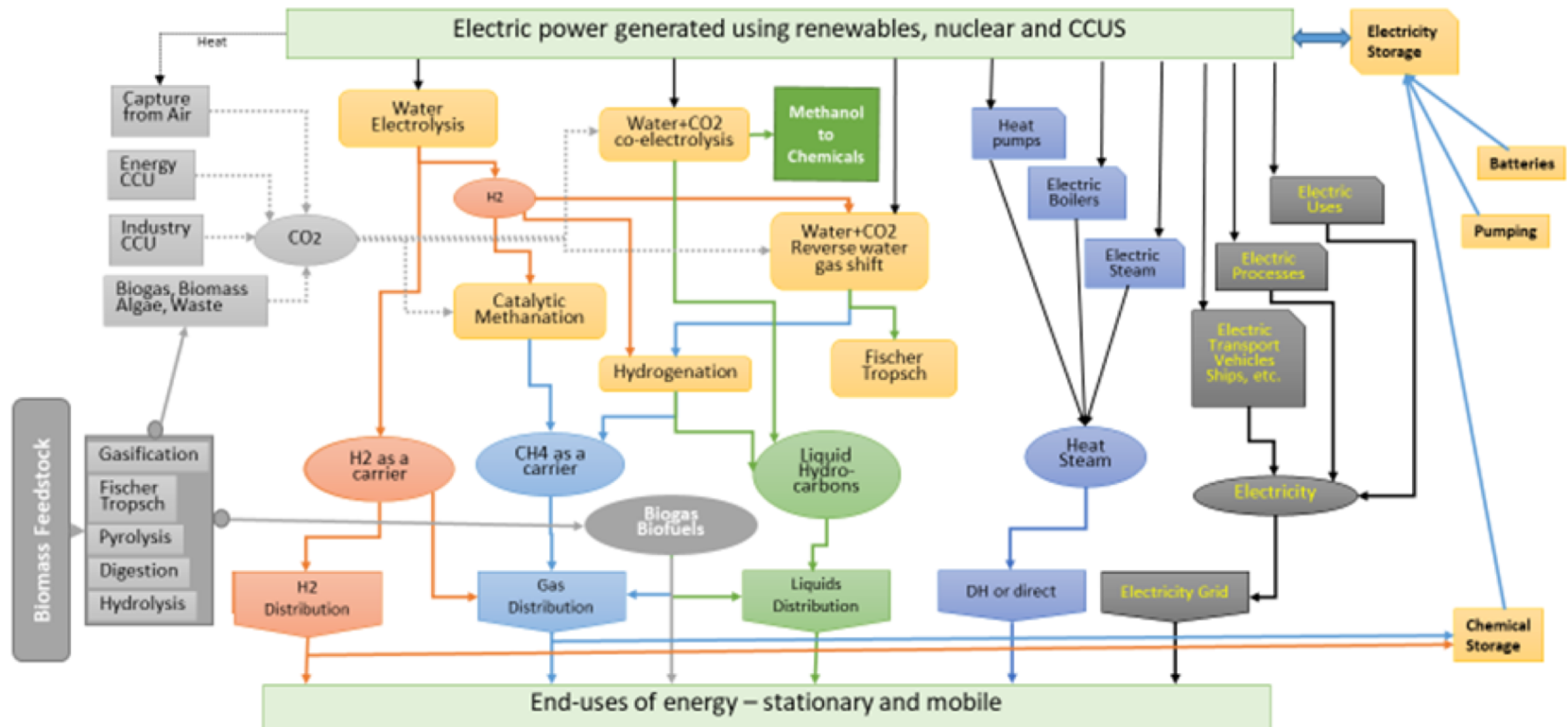
What are the possibilities for climate-compatible gas fuels and infrastructure?

Renewable and decarbonised gas

- CO₂-neutral Green Hydrogen from Power-to-Gas (P2H₂) processes using renewable electricity
- CO₂-neutral Blue Hydrogen produced from natural gas in combination with pre-combustion carbon capture and storage/use (CCS/U)
- CO₂-neutral/negative Synthetic Methane produced from biogas or Power-to-Gas in combination with post-combustion CCS
- CO₂-neutral Biogas and Biomethane produced from municipal waste, agricultural residues and sewage

PRIMES: H₂, e-CH₄, biogas, waste gas

Alternative pathways, in the PRIMES model (i.e. H₂, e-gas, e-liquids, electrification)



June 11, 2018 - Athens

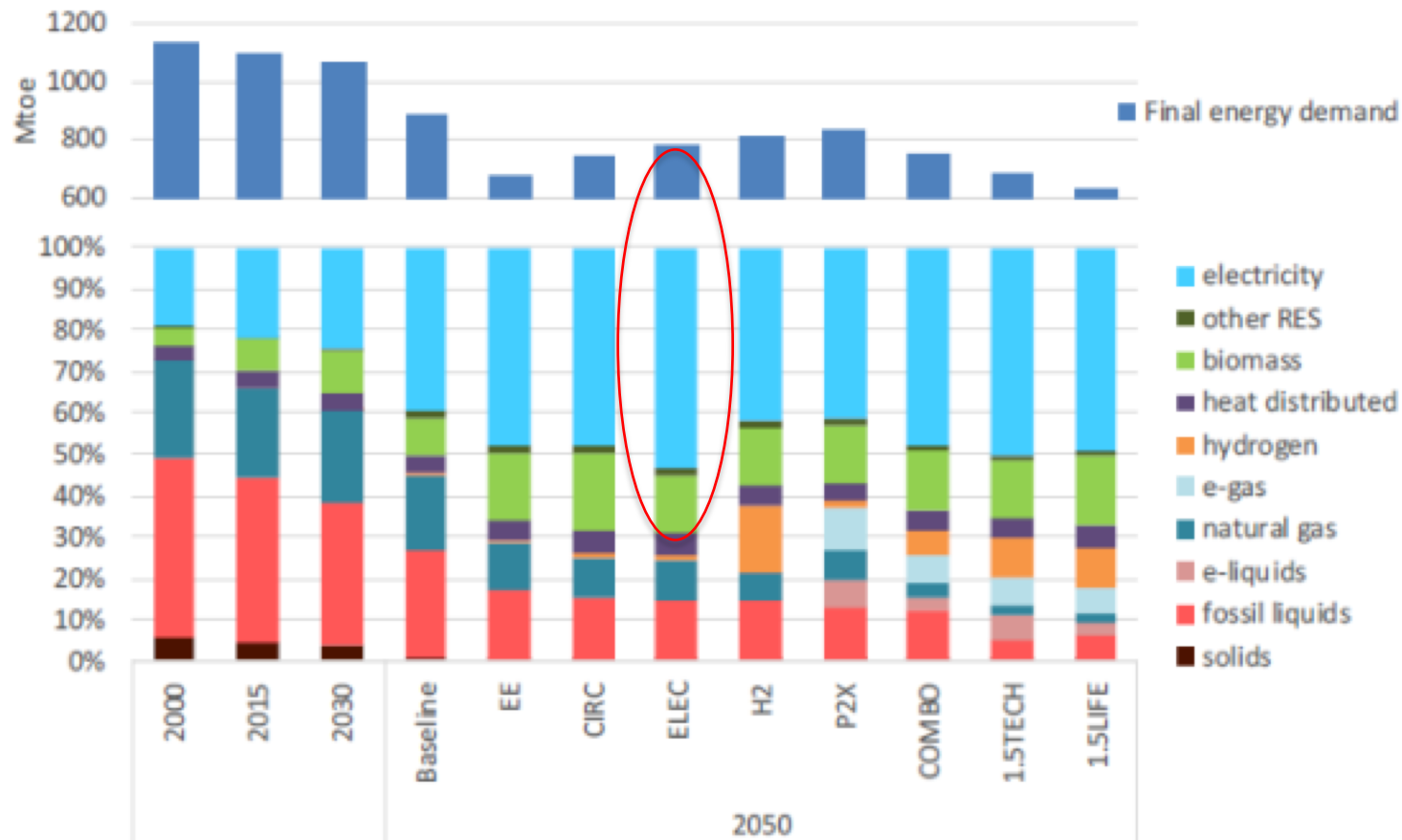
E²Modelling

Table 1: Overview of main scenario building blocks

Long Term Strategy Options								
	Electrification (ELEC)	Hydrogen (H2)	Power-to-X (P2X)	Energy Efficiency (EE)	Circular Economy (CIRC)	Combination (COMBO)	1.5°C Technical (1.5TECH)	1.5°C Sustainable Lifestyles (1.5LIFE)
Main Drivers	Electrification in all sectors	Hydrogen in industry, transport and buildings	E-fuels in industry, transport and buildings	Pursuing deep energy efficiency in all sectors	Increased resource and material efficiency	Cost-efficient combination of options from 2°C scenarios	Based on COMBO with more BECCS, CCS	Based on COMBO and CIRC with lifestyle changes
GHG target in 2050	-80% GHG (excluding sinks) ["well below 2°C" ambition]					-90% GHG (incl. sinks)	-100% GHG (incl. sinks) ["1.5°C" ambition]	
Major Common Assumptions	<div><div><ul style="list-style-type: none">Higher energy efficiency post 2030Deployment of sustainable, advanced biofuelsModerate circular economy measuresDigitilisation</div><div><ul style="list-style-type: none">Market coordination for infrastructure deploymentBECCS present only post-2050 in 2°C scenariosSignificant learning by doing for low carbon technologiesSignificant improvements in the efficiency of the transport system.</div></div>							
Power sector	Power is nearly decarbonised by 2050. Strong penetration of RES facilitated by system optimization (demand-side response, storage, interconnections, role of prosumers). Nuclear still plays a role in the power sector and CCS deployment faces limitations.							
Industry	Electrification of processes	Use of H2 in targeted applications	Use of e-gas in targeted applications	Reducing energy demand via Energy Efficiency	Higher recycling rates, material substitution, circular measures	Combination of most Cost-efficient options from “well below 2°C” scenarios with targeted application (excluding CIRC)	COMBO but stronger	CIRC+COMBO but stronger
Buildings	Increased deployment of heat pumps	Deployment of H2 for heating	Deployment of e-gas for heating	Increased renovation rates and depth	Sustainable buildings			CIRC+COMBO but stronger
Transport sector	Faster electrification for all transport modes	H2 deployment for HDVs and some for LDVs	E-fuels deployment for all modes	Increased modal shift	Mobility as a service			<div><ul style="list-style-type: none">CIRC+COMBO but strongerAlternatives to air travel</div>
Other Drivers		H2 in gas distribution grid	E-gas in gas distribution grid				Limited enhancement natural sink	<div><ul style="list-style-type: none">Dietary changesEnhancement natural sink</div>

EC long-term climate neutral strategic vision

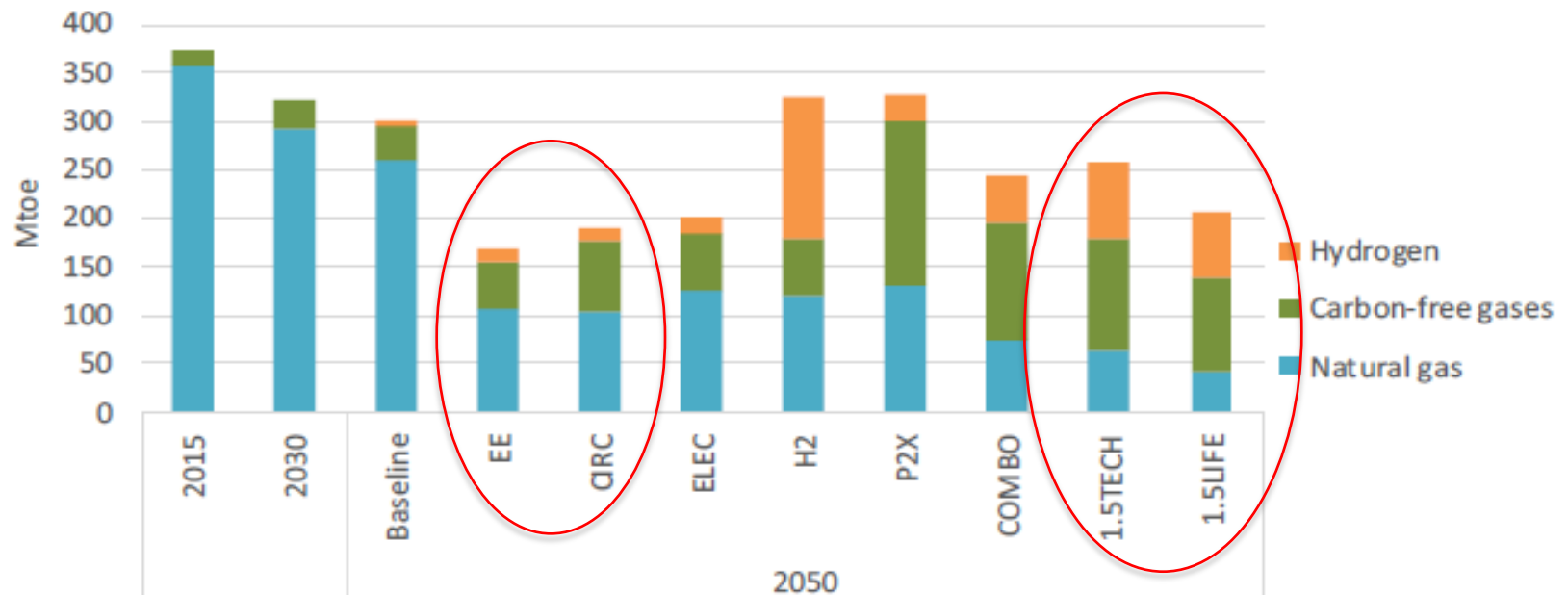
Figure 20: Share of energy carriers in final energy consumption



Source: Eurostat (2000, 2015), PRIMES.

EC long-term climate neutral strategic vision

Figure 33: Consumption of gaseous fuels



Note: "carbon-free" gases refer to e-gas, biogas and waste-gas.

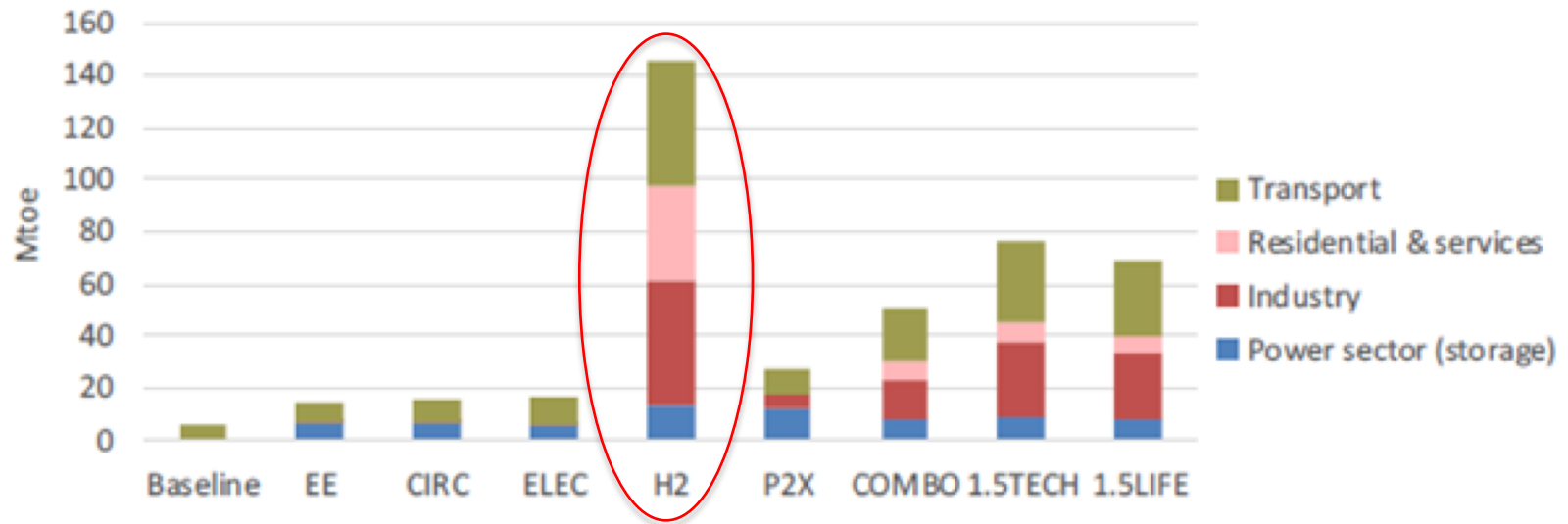
Source: Eurostat (2015), PRIMES.

https://ec.europa.eu/clima/policies/strategies/2050_en

"Decarbonisation analyses show a large uncertainty on the role of gas in the long term."

EC long-term climate neutral strategic vision

Figure 32: Consumption of hydrogen by sector in 2050



Note: "Residential & services" also includes agriculture.

Source: PRIMES.

https://ec.europa.eu/clima/policies/strategies/2050_en

Decisions about which pathway forward are critical for the prospects for hydrogen development

EC conclusions

- In the long term, **unabated emissions from natural gas become increasingly incompatible with climate targets.** Depending on the sector, natural gas can be replaced by carbon-neutral forms of gas (biogas, e-gas) or possibly by hydrogen, which can substitute some traditional uses of gas (e.g. in buildings heating) but which cannot be used in all industrial applications.
- Under the Renewable Energy Directive formula, **e-fuels and hydrogen—when produced with renewable electricity—are also counted as renewables**

Eurogas (preliminary) policy proposals

- An EU target for renewable and decarbonised gases
- A European blueprint for gas fuels Guarantees of Origin (GOs)
- EC to study the market potential for different forms of r-gas and d-gas, and develop the EU framework for r/d-gas support schemes
- Encourage the development of carbon capture and storage value chains