



Powering a climate-neutral economy

The Energy System Integration and Hydrogen Strategies

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Towards a climate-neutral economy

2020 targets

2030 framework
– Clean Energy
Package

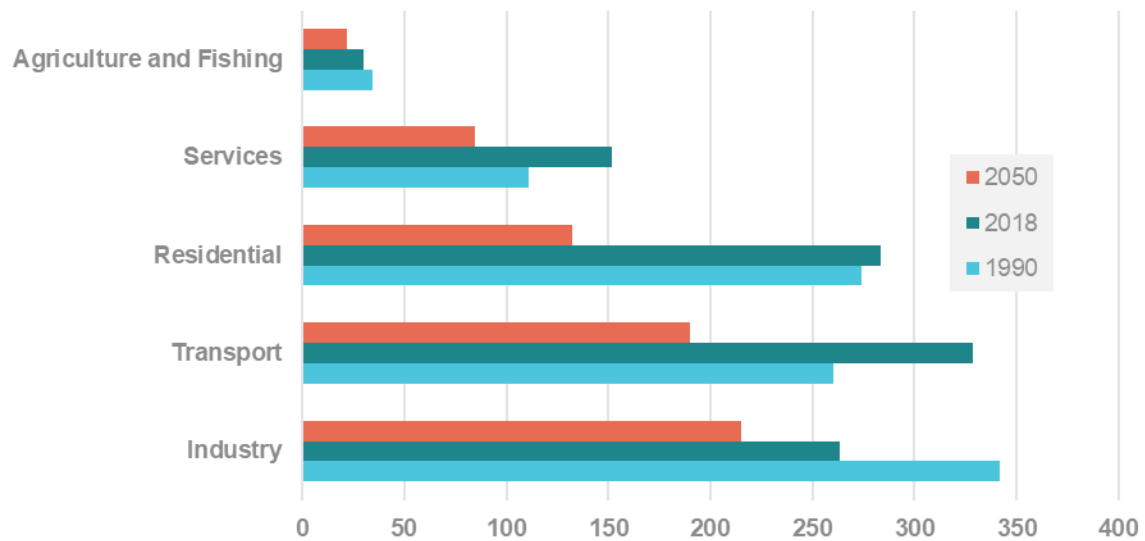
2050 Long Term
Decarbonisation
Strategy

The European
Green Deal

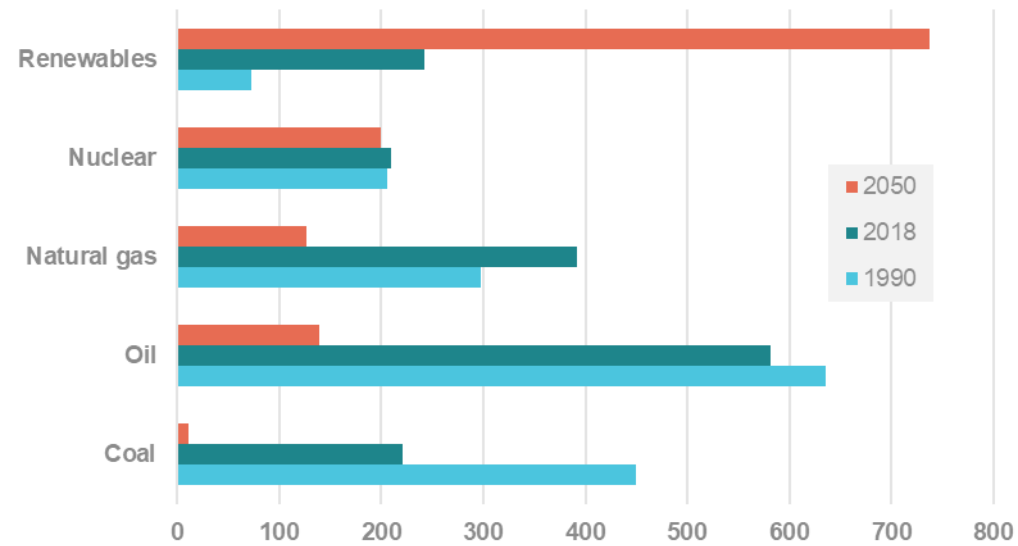
A changing energy landscape towards 2050

Changing consumption and production patterns

Final energy demand per sector

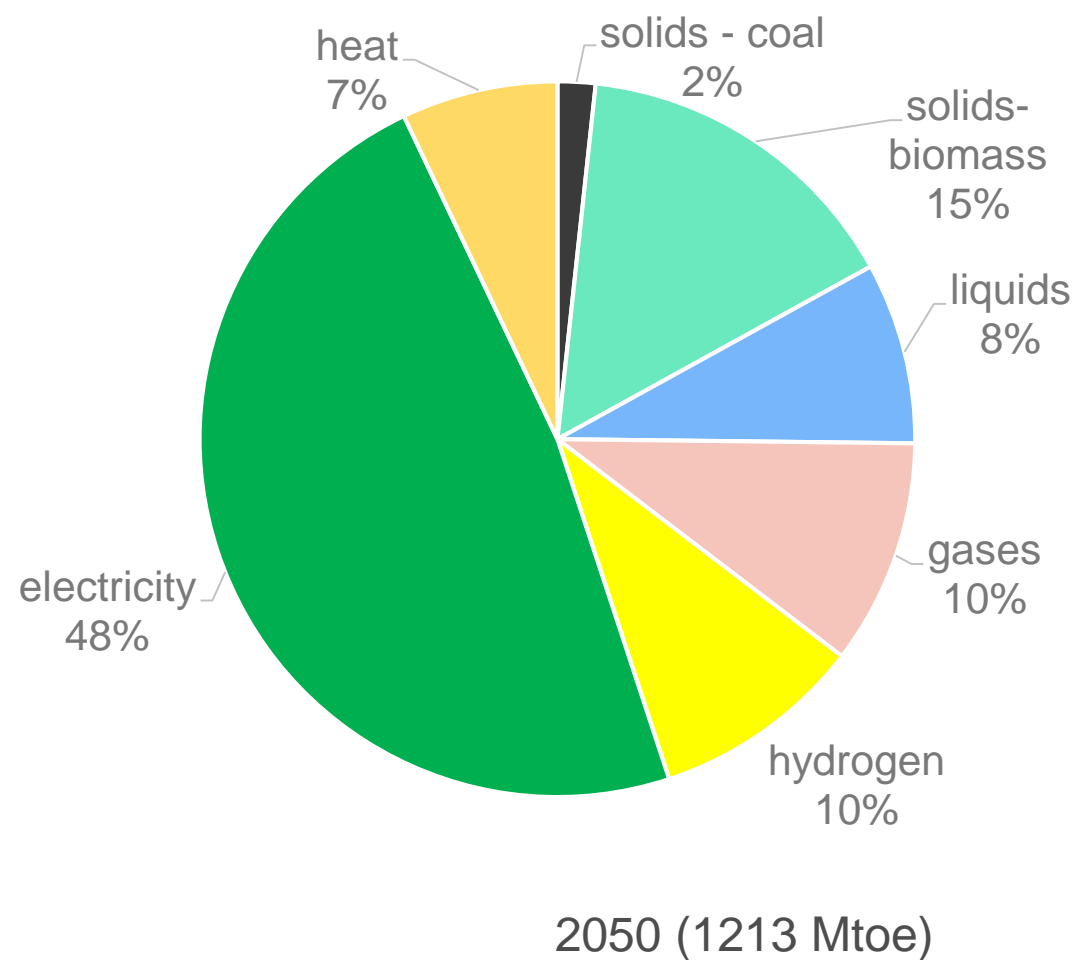
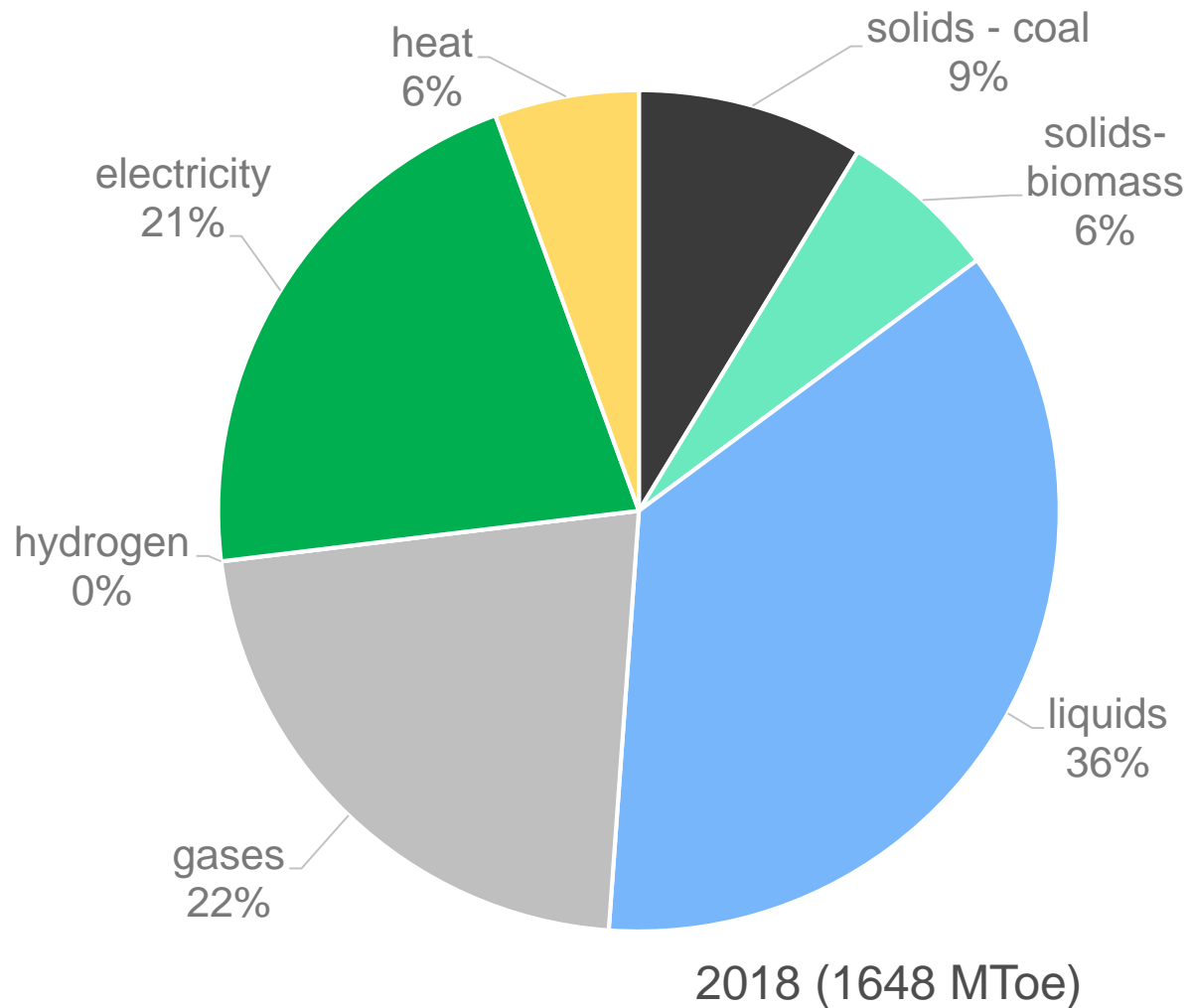


Consumption per energy supply source



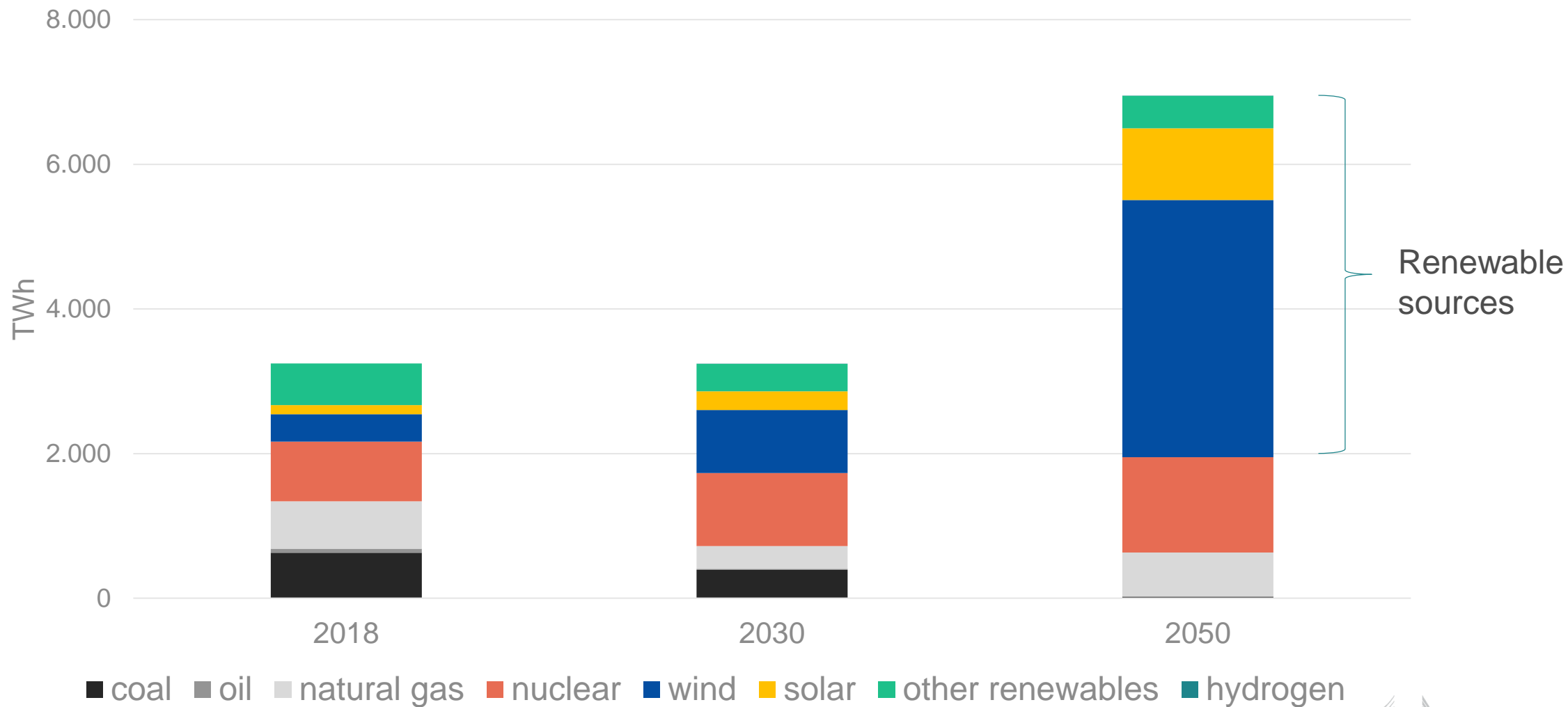
Source: Mtoe, based on EU28 Eurostat/LTS 1.5LIFE/TECH scenarios

Changing energy carriers



Source: Based on EU28 Eurostat/LTS 1.5LIFE/TECH scenarios

Power system is most rapid to decarbonise



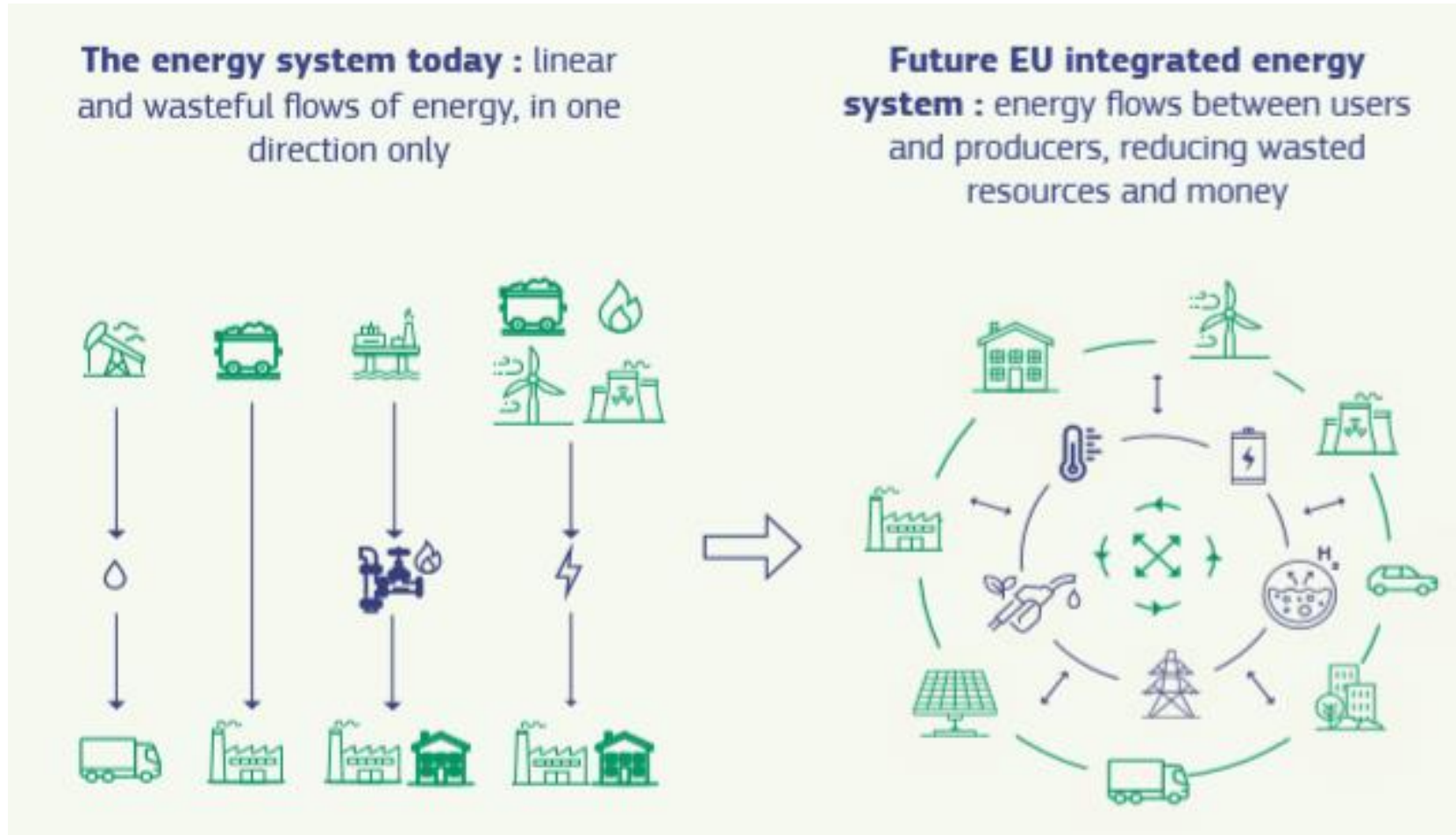
Source: Based on EU28 Eurostat/LTS 1.5LIFE/TECH scenarios

The rationale behind the Energy System Integration and Hydrogen Strategies

Why a Strategy for Energy System Integration? Why now?



What is energy system integration?



Energy System Integration (ESI) is the integrated planning and operation of the energy system 'as a whole', across multiple carriers, infrastructures and consumption sectors

Laying the foundation for a climate-neutral energy system

Energy System Integration Strategy

A more **circular and energy efficient** energy system

1

A **deep electrification** of consumption, based on **renewable electricity**

2

The use of **renewable and low carbon fuels (incl. hydrogen)** in hard-to-abate sectors

3

Hydrogen Strategy

A full value chain approach to upscale hydrogen

+
Clean Hydrogen Alliance

Making it happen – an action plan for Energy System Integration

Pillar	Actions oriented towards	Main tools involved (*)
A more circular and energy efficient energy system	<ul style="list-style-type: none"> • Better apply EEF principle & PEF • Build a more circular system 	RED, EED, TEN-E
A deep electrification of consumption, based on renewable electricity	<ul style="list-style-type: none"> • Increased supply RES-E • Faster electrification end-use sectors • Roll out EV infrastructure & new loads integration 	RED, IED, AFID, TEN-E, TEN-T, CO2 emissions for cars, EU funding, offshore RES, Renovation wave, NC Flexibility
RES & low carbon fuels for hard-to-abate sectors (incl. hydrogen)	<ul style="list-style-type: none"> • Promoting RES fuels from biomass • Promoting RES hydrogen • Enabling CCUS incl. for synthetic fuels 	RED, Aviation/Maritime initiatives, EU funding + Hydrogen Strategy Follow-up
Energy markets fit for decarbonisation & distributed resources	<ul style="list-style-type: none"> • Creating a level playing field across carriers • Review gas regulatory framework • Improve customer information 	ETD, ETS, State Aid, gas legislation, guidance on non price components
A more integrated energy infrastructure	<ul style="list-style-type: none"> • More integrated planning at gas, electricity, heat and hydrogen • Better governance 	TEN-E, TEN-T, RED, EED, TYNDP
A digitalised energy system & supportive innovation framework	<ul style="list-style-type: none"> • Ensure digitalisation support energy system integration • Research and innovation as a key enabler 	Energy Digitalisation Action Plan, NC cybersecurity, impact oriented research outlook

(*) *Non-exhaustive list*

Hydrogen – What and Why?

Hydrogen:

- Feedstock, fuel, energy carrier / storage, many applications
- Does not emit CO₂, no air pollution
- Essential to reach our climate ambition (hard-to-abate sectors)
- Europe is highly competitive in clean hydrogen technologies manufacturing

Which hydrogen:

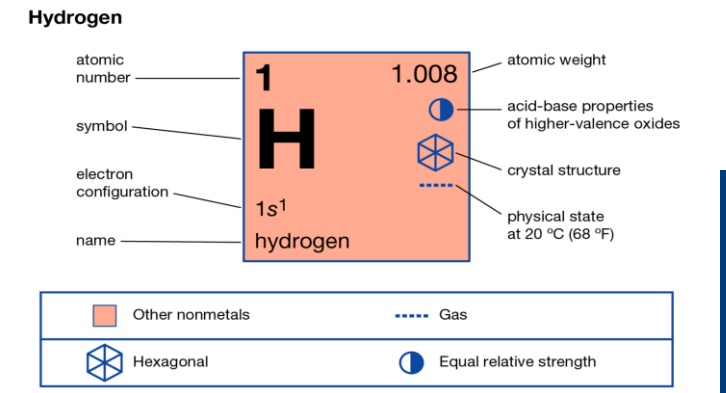
Currently: **fossil-based hydrogen**

Our vision: **Renewable (clean)**, and in a transitional period **low-carbon hydrogen** (fossil-based hydrogen with carbon capture and electricity based) for:

- Replacing existing hydrogen production
- **Industry** (fertilisers and green steel) and transport
(Local buses, parts of rail, heavy duty road vehicles; in the longer term: maritime and aviation)

Issues:

- **Cost-competitiveness**
- **Technological maturity (cost-effective electrolyzers)**
- **Renewable energy & scale**



The Hydrogen Strategy – a roadmap to 2050

2024

- 6 **GW** of renewable hydrogen electrolyzers
- Replace **existing hydrogen production**
- Regulation for liquid hydrogen markets
- Start planning of hydrogen infrastructure

2030

- **40 GW** of renewable hydrogen electrolyzers
- New applications in **steel and transport**
- Hydrogen for electricity balancing purposes
- Creation of “Hydrogen Valleys”
- Cross-border logistical infrastructure

2050

- Scale-up to **all hard-to-decarbonise sectors**
- Expansion of hydrogen-derived **synthetic fuels**
- EU-wide infrastructure network
- An open international market with € as benchmark

Thank you for your attention!