



# *Powering a climate-neutral economy: The role of hydrogen*

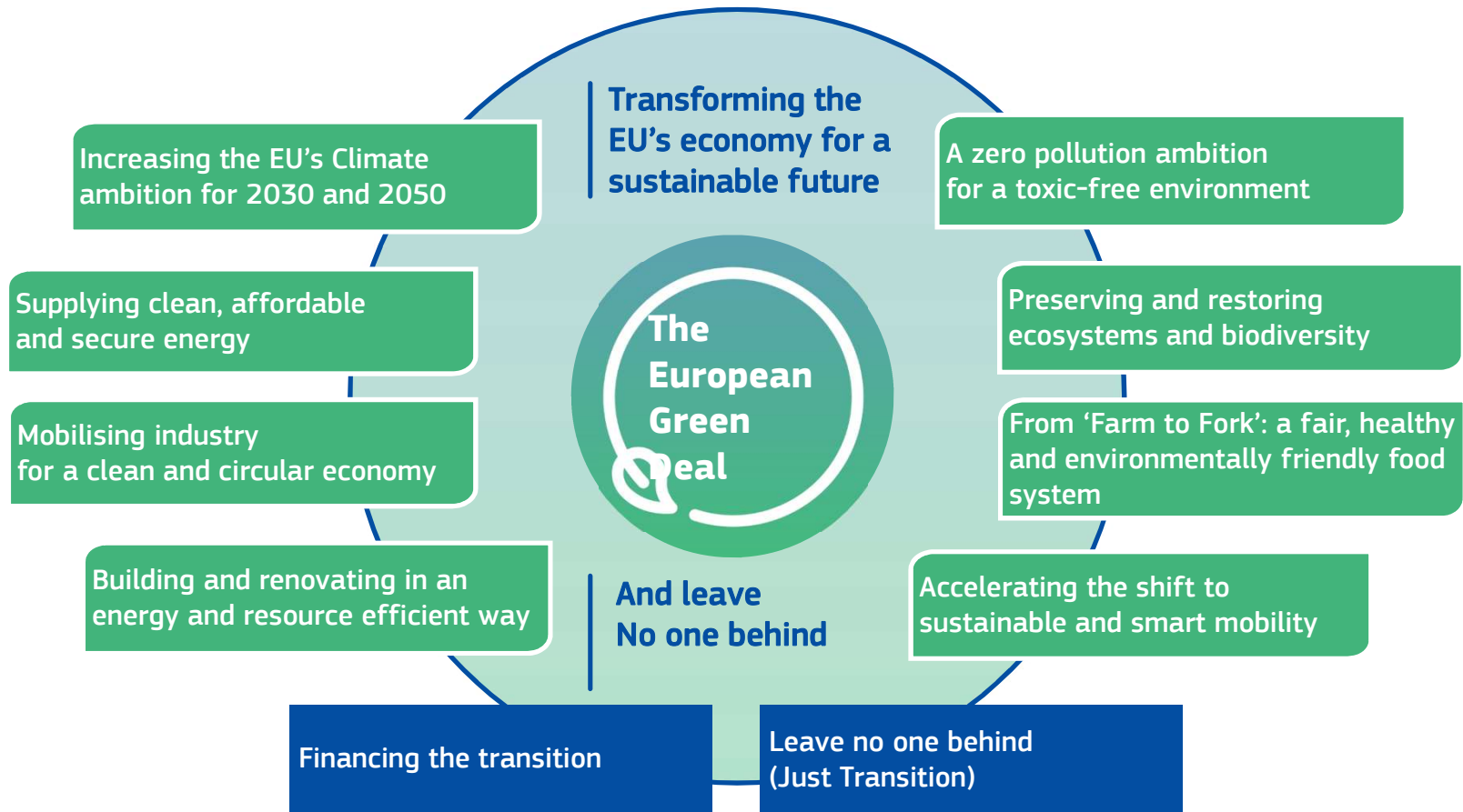
**Dr. Tudor Constantinescu**

**Principal Adviser**

**DG ENER – European Commission**

04 December 2020

# The European Green Deal

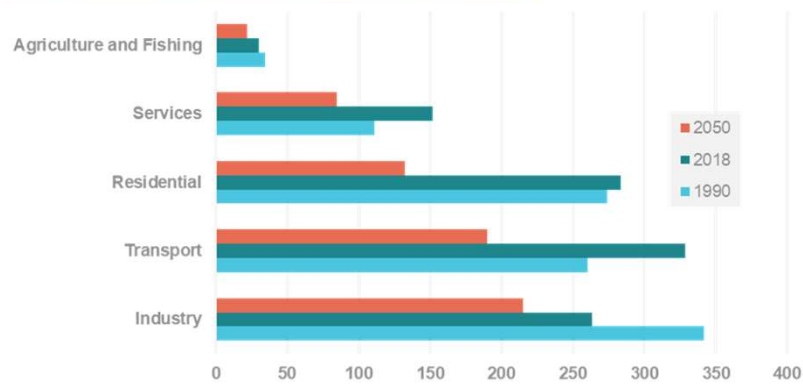


The EU as a global leader

A European Climate Pact

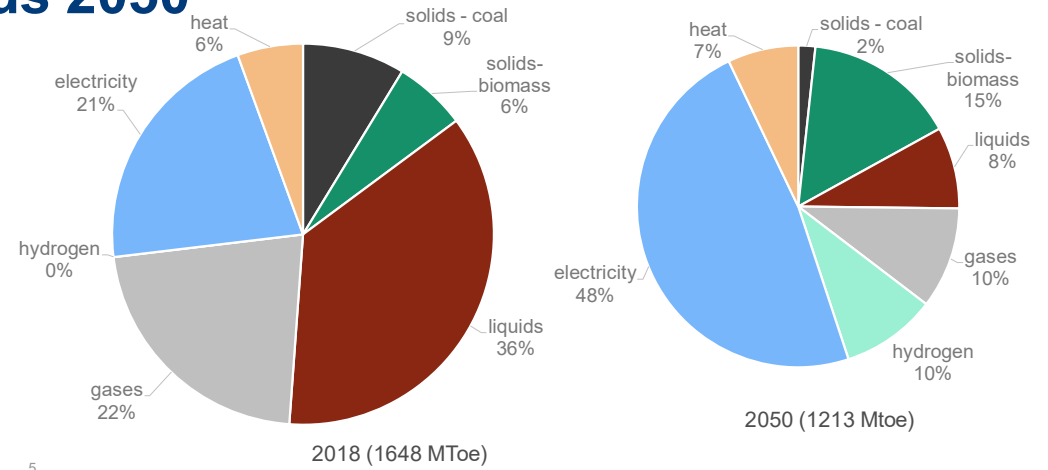


# A changing energy landscape towards 2050



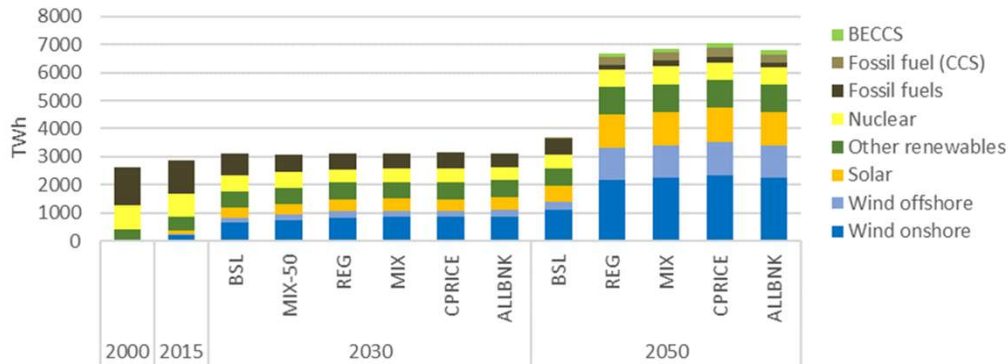
Source: Mtoe, based on EU28 Eurostat/LTS 1.5LIFE/TECH scenarios

## (1) Changing demand



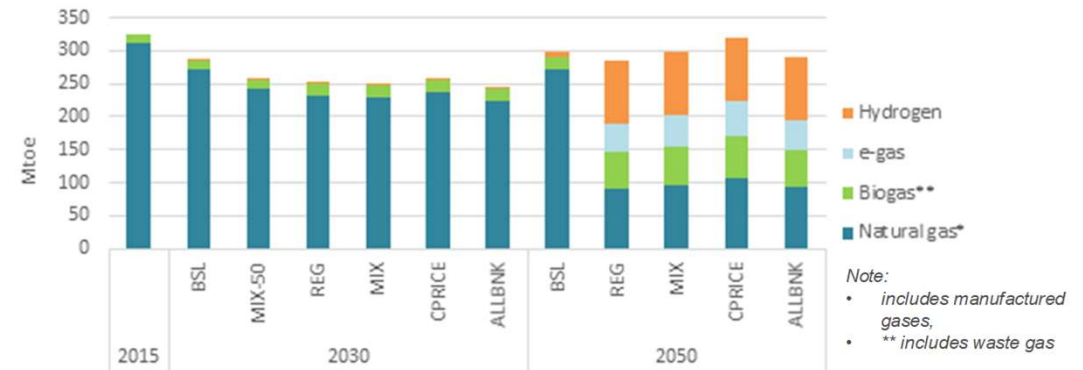
Source: Based on EU28 Eurostat/LTS 1.5LIFE/TECH scenarios

## (2) Changing energy carriers



Source: 2015: Eurostat, 2030-2050: PRIMES model

## (3) Massive increase RES-E



Source: 2015: Eurostat, 2030-2050: PRIMES model

## (4) Renewable and low-carbon gases



## **A full value chain approach**

### **Building on the Green Deal and Recovery Plan objectives**

## **The Energy System Integration**

## **The Hydrogen Strategy**

- An investment agenda
- Boosting demand and scaling up production
- Develop hydrogen infrastructure and markets
- Research and innovation
- The international dimension

## **The Hydrogen Alliance**

# The Hydrogen Strategy – a roadmap to 2050

---

**2024**

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

# Hydrogen – an investment agenda

Next Generation EU, Invest EU, Cohesion Policy, CEF-E, CEF-T  
ETS Innovation Fund, Horizon Europe

Renewable electricity  
production

€220-340 BLN

Renewable  
hydrogen

€24-43  
BLN

Hydrogen  
transport,  
distribution,  
and storage

€65 BLN

Transport  
(HDV)  
€13 BLN

Steel  
€8 BLN

European Clean Hydrogen Alliance

# Hydrogen – fostering demand

---

**Renewable**, and in a transitional period low-carbon hydrogen, for:

- Replacing **existing hydrogen** production (70-100 MT of CO<sub>2</sub>eq/yr)
- Green **fertilisers** and green **steel**
- Local buses, commercial fleets, or specific parts of the rail network
- **Heavy duty** road vehicles
- In the longer term, **maritime and aviation**

Supporting end-consumers

- EU strategy on clean steel
- Sustainable and Smart Mobility Strategy

Creating markets

- Certification of renewable and low-carbon hydrogen
- Specific end-use sectors quotas of renewable hydrogen or its derivatives
- Hydrogen infrastructure access to all consumers
- Open and competitive hydrogen market with sold price signals

# Hydrogen – supply and infrastructure

---

**Scaling up renewable hydrogen**, and in a transitional period low-carbon hydrogen, through:

- Supporting producers through support mechanisms
- Develop a EU-wide hydrogen infrastructure

Producers

- Common low-carbon threshold for hydrogen production facilities
- Certification of renewable and low-carbon hydrogen
- Revision of the Emission Trading Scheme
- Carbon Contract for Differences
- Market-based support schemes for renewable hydrogen
- Liquid markets with commodity-based hydrogen trading

Infrastructure

- Network of refuelling stations through Alternative Fuels Infrastructure Directive
- Revision of the TEN-E and internal gas market legislation to ensure interoperability, common quality standards, and cross-border operational rules
- Revision of TYNDPs to ensure full integration of hydrogen infrastructure



# Hydrogen – Research and innovation

Maintain and strengthen EU's global leadership role through support:

- Establish Clean Hydrogen Partnership
- Targeted research and innovation in Horizon Europe
- ETS Innovation Fund
- Interregional Innovation Investment Instrument with pilot action on hydrogen technologies

Scale-up production

- Larger size, more efficient and cost-effective electrolyzers
- Mass manufacturing capability and new materials
- Break-through solutions like direct solar hydrogen

Infrastructure

- Distribute, store and dispense hydrogen at large volumes
- Repurposing of existing gas infrastructure
- Adaptation of LNG terminals

End-use applications

- New industrial processes
- Multi MW-fuel cells
- Hydrogen-derived synthetic fuels for the maritime and aviation sector

Cross-cutting areas

- Improved harmonized safety standards
- Reduced environmental impacts and sustainability
- Critical raw materials, re-use and recycling

# Hydrogen – the international dimension

Strengthening Europe's global leadership role and putting renewable hydrogen high on its strategic agenda:



# The Hydrogen Alliance

---

- Boosting demand and scaling up production
- Developing hydrogen infrastructure and markets
- Research and innovation
- The international dimension

## European Clean Hydrogen Alliance

Kick-starting the EU Hydrogen Industry to achieve the EU climate goals



# Thank you