HyBalance workshop
Hydrogen day 1.008

Brussels 8h October 2019

Florie Gonsolin, Manager Climate Change and Energy
fgo@cefic.be

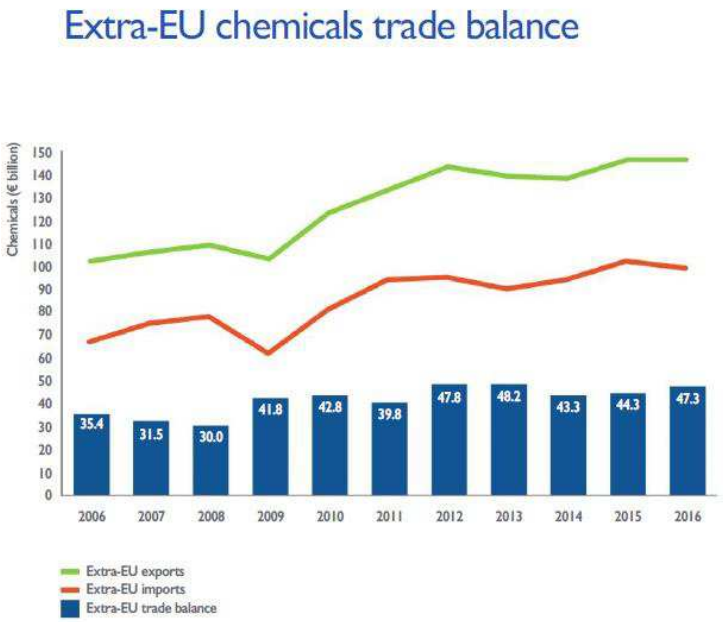
Responsible Care®
OUR COMMITMENT TO SUSTAINABILITY

Cefic: The voice of the chemical industry in Europe

Cefic represents large, medium and small chemical companies in Europe

Key industry figures:

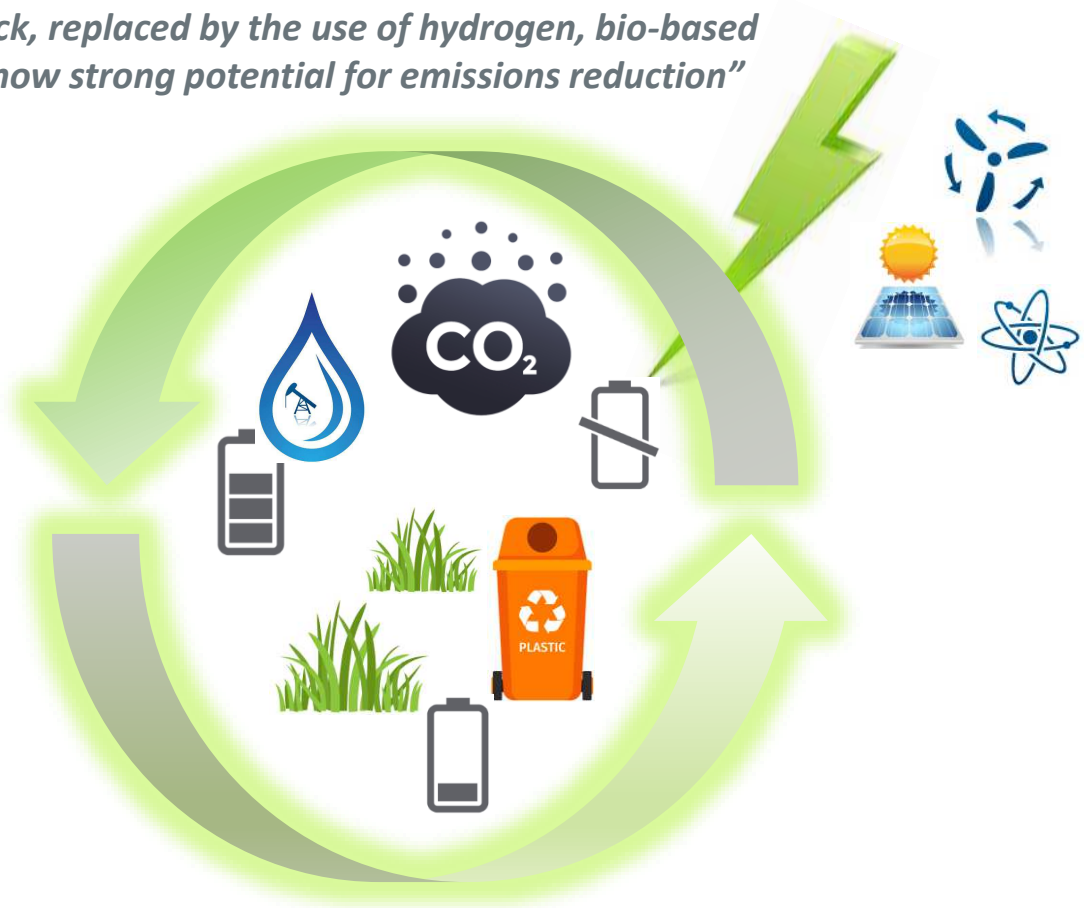
- **1.2 million** jobs
- **16%** of world chemicals production
- **96 %** of European chemical companies are **SMEs**
- **€ 542 billion** of **EU sales** in 2017
- EU chemical **trade surplus** of **€ 48,1** billion in 2017



www.cefic.org
www.twitter.com/Cefic

Redesigning chemical value chains from scratch

"Lower use of fossil-based feedstock, replaced by the use of hydrogen, bio-based material and recycled materials, show strong potential for emissions reduction"



2020 → **2050**

Key conditions for a successful large-scale deployment of hydrogen

- Striking the **right balance between promotion and affordability**
- A solid and credible **certification framework**
- Ensuring **healthy competition** from the start
- Careful planning of **infrastructure**
- Strong **research and innovation support**

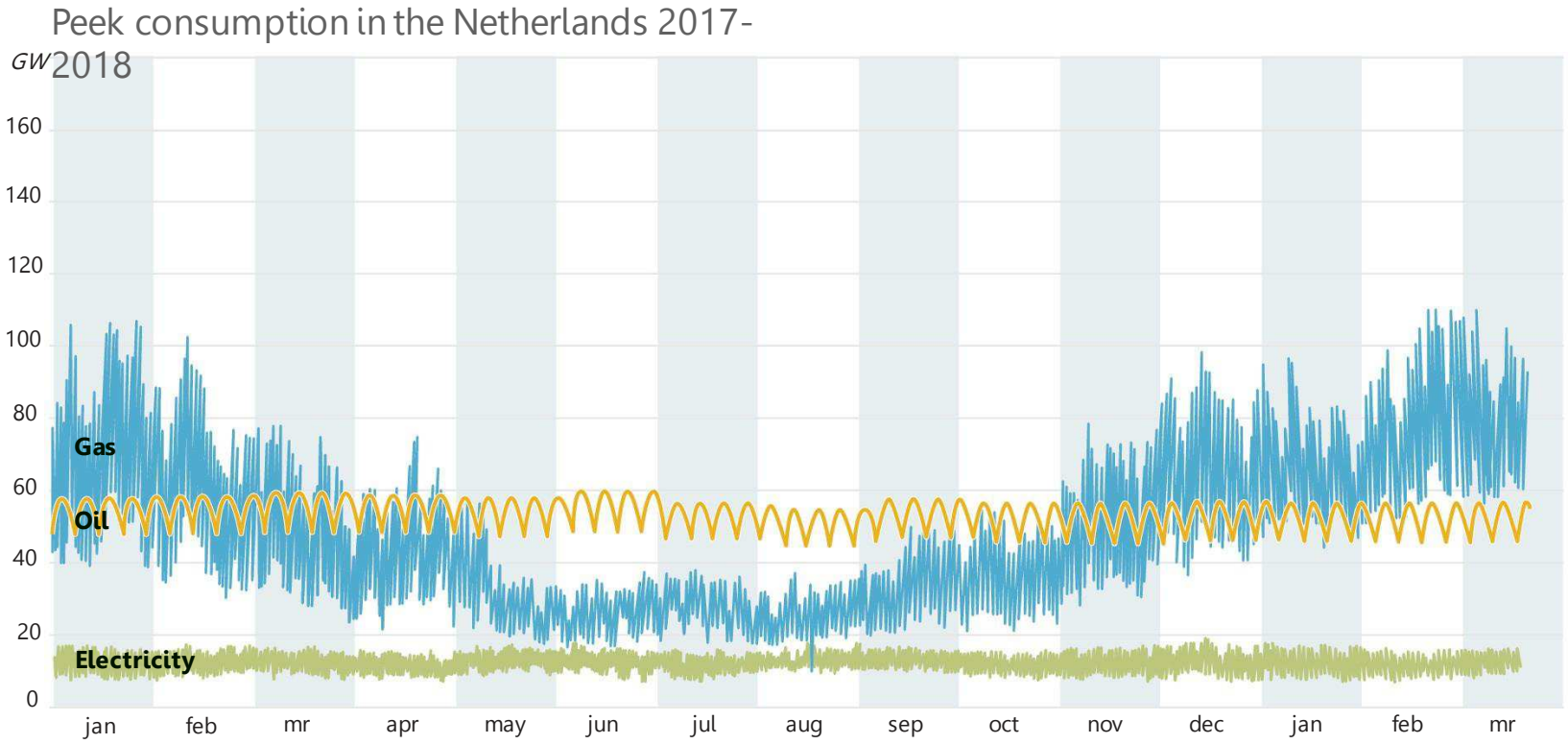
How could large-scale electrolyser plants help balancing the European power grids

Pieter van Aartsen, GIE Board Member

„HYDROGEN, KEY ENABLER OF WIND POWER & INDUSTRY LEADERSHIP IN EUROPE" WORKSHOP
8 OCTOBER


gie
Gas Infrastructure Europe
70 member companies
26 countries
1 observer
Gasum
GASSCO
SWEDEGAS
conexus
SSE Gas Storage
GAS STORAGE DENMARK
ENERGINET
Gas Networks Ireland
nationalgrid
Interconnector
nationalgrid (Gasin LNG)
SOUTH HOOK
Gate terminal
storengy
GRTgaz
NAM
gasunie
energystock
VNG Gasspeicher
ontras
Open Grid Europe The Gas Wheel
uniper
FLUXYS
FLUXYS
Dunkerque LNG
creos
innogy
CASCADE
innogy
NET4GAS
GAS STORAGE POLAND
GAZ system
FRANCGAZ
eustream
nafta
GRTgaz
astora
TA
rag
OMV
MMBF
MAGYAR FÖLDGÁZTÁROLÓ
DEPOGAZ
storengy
SWISSGAS
GAZPROM
GAS CONNECT AUSTRIA
FGSZ
TRANSGAZ
MAGISTRALA ENERGIEI
elengy
Adriatic LNG
Plinovodi
PSP
reganosa
TERĒGA
EDISON
plinacro
BULGARTRANSGAZ
BBG
OLT
REN Armazenagem
REN Atlântico
REN Gasodutos
enagas
snam
gastrade
DESFA
(+observer)

Infrastructure Challenge



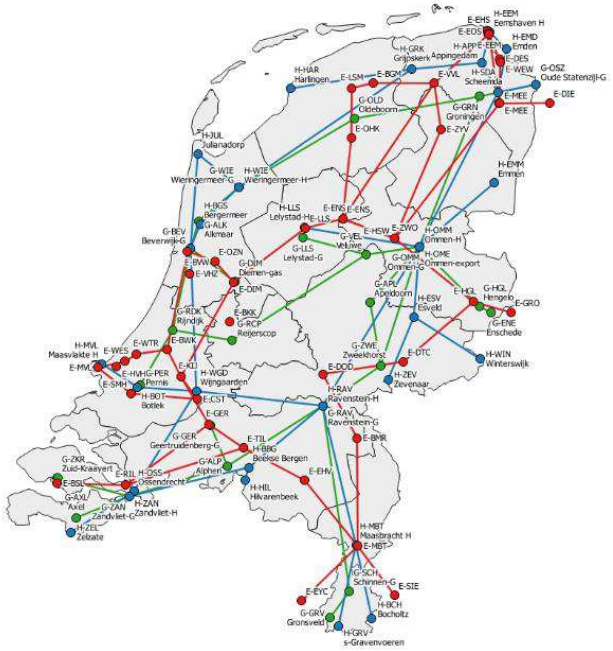
Infrastructure challenge

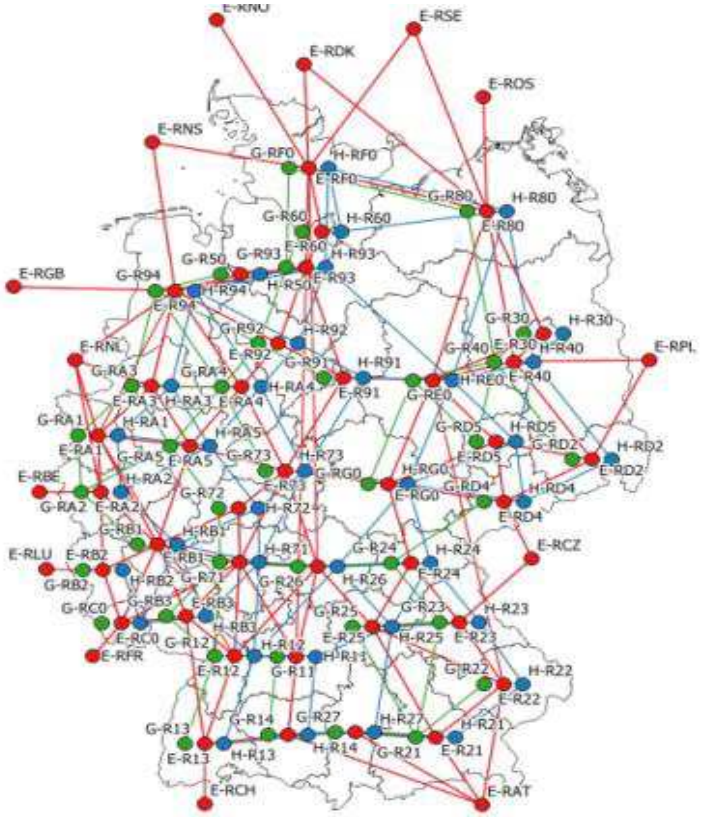
Sector coupling and energy transition

The transition to a sustainable energy supply requires a new approach to network planning.

We have to analyse the **integrated energy system**, described in scenarios.

Determine the consequences for the gas and electricity networks by means of an **integrated infrastructure model**.

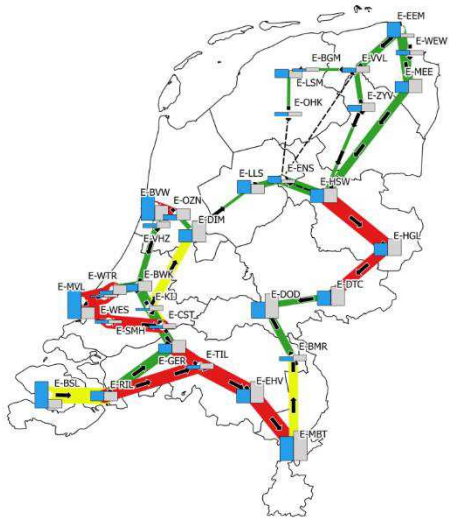




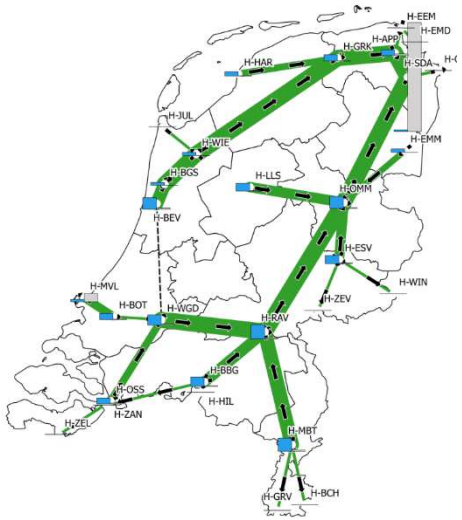
Combined grid model

Location of P2G installations matters

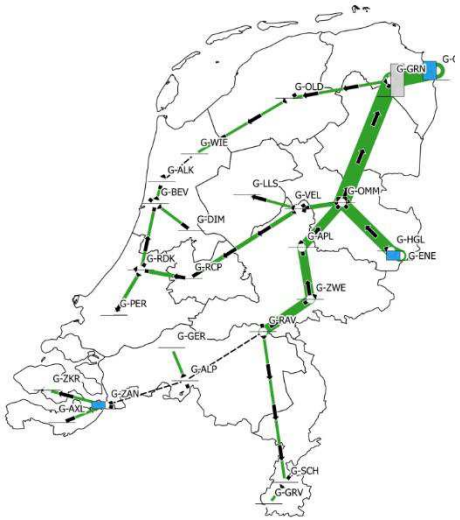
P2G located near demand



Electricity



Hydrogen



Methane

Local scenario: PV + onshore wind

Juni 2050, 12:00

Supply

Demand

Loading
---None---
Normal
High
Overloaded

Eurelectric, the European power sector association

- Represents the power sector in over **32 European countries**
- Speaking for more than **3,500 companies in power generation, distribution and supply**
- Promote the **role of electricity in addressing the challenges of sustainable development.**
- Gathers more than **1000 industry experts** providing high-quality input with up-to-date information
- **Permanent Secretariat** based in Brussels

By 2045 we envision a carbon neutral power sector that makes a significant contribution to decarbonization of the EU economy

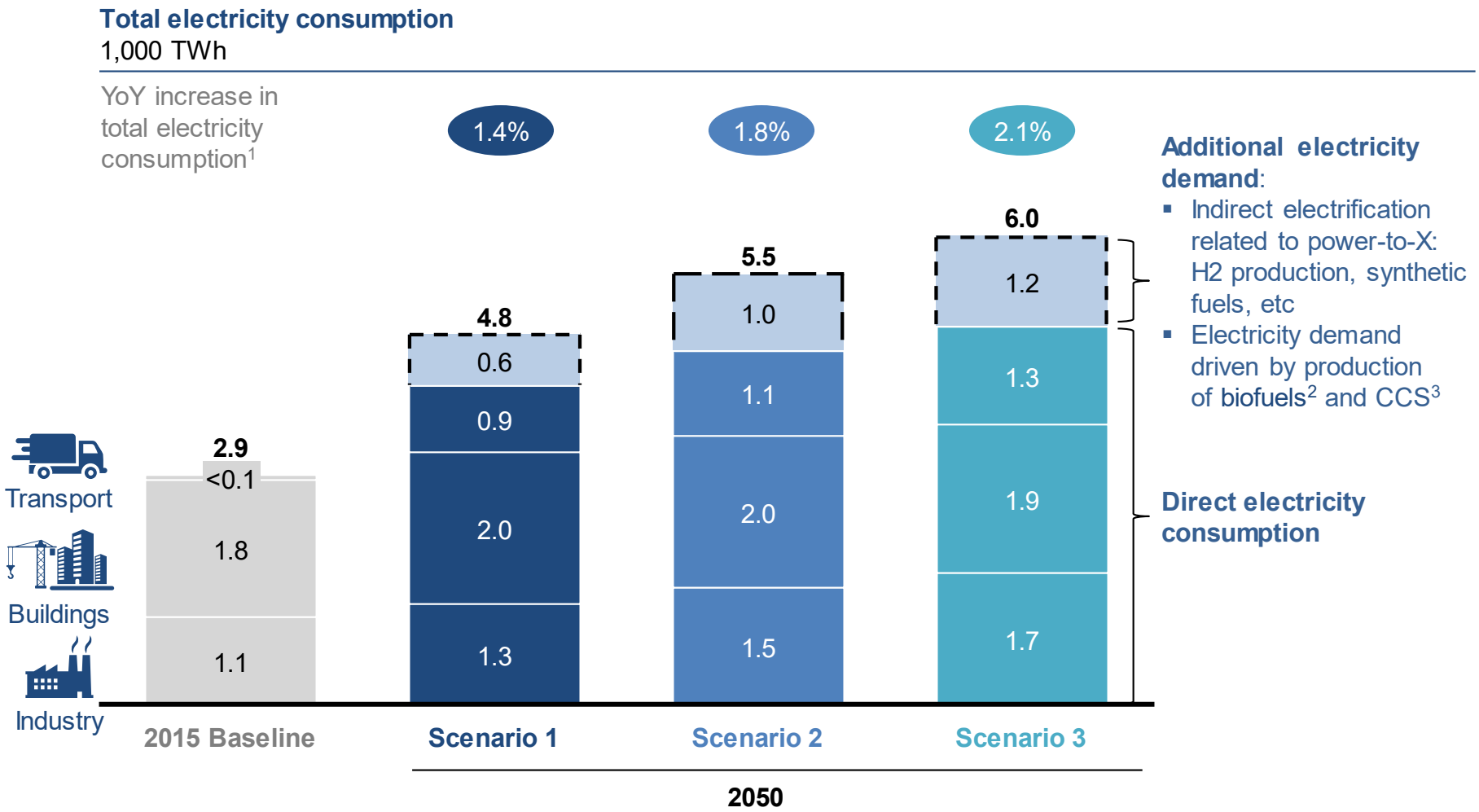
High penetration of renewables and transmission build will be the main driving force of the European energy transition. Renewables will represent >80% of electricity supply driven by large untapped potential and rapidly declining cost

System reliability and flexibility needs provided by multiple sources in the power sector and from other industrial sectors. These include hydro, nuclear power and gas, and emerging sources deployed at scale such as demand side response, battery storage, hydrogen electrolysis and power-to-X

Changing role of fossil generation. Fossil electricity supply will be gradually phased out and represent only ~5% of total supply by 2045. However, gas will still represent ~15% of total installed capacity to contribute to system reliability, especially in regions that don't have access to hydro or nuclear

Decreasing costs of carbon neutral technologies and innovation to abate the last tons of CO2 emissions (e.g. CCS, negative emissions) coming from the marginal use of the remaining thermal capacity such as negative emissions and CCS technologies

Hydrogen and other power-to-X fuels will significantly increase electricity demand



1 Includes both direct and indirect electrification (power-to-X) as well as electricity demand driven by production of CCS and biofuels
2 Biofuels require feedstock as well as additional energy (either in form of thermal energy or power) for their production – see glossary
3 Total CO2 abated through CCS: <200 Mt Co2; CCS may require technology improvement as well as increasing acceptability, e.g, for underground storage

TRANSPORT & ENVIRONMENT

WORKSHOP

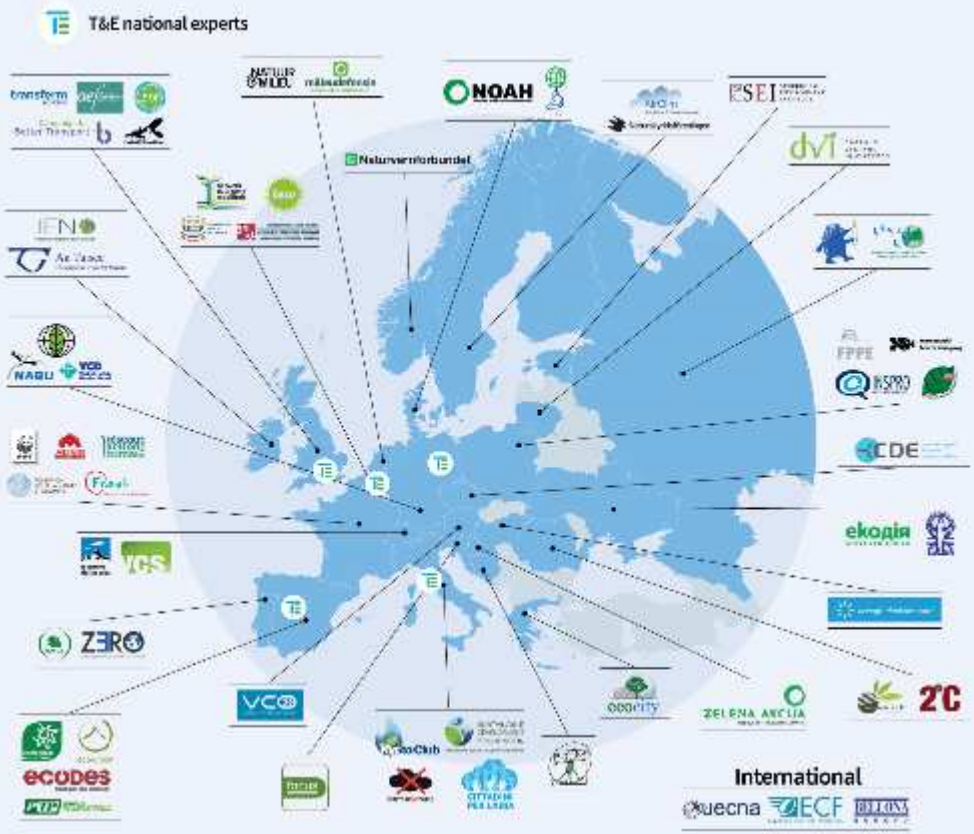
Hydrogen day 1.008

8 OCTOBER, 2019
BRUSSELS

CARLOS CALVO AMBEL

(carlos@transportenvironment.org / @transenv)

60 ORGANISATIONS IN 25 COUNTRIES

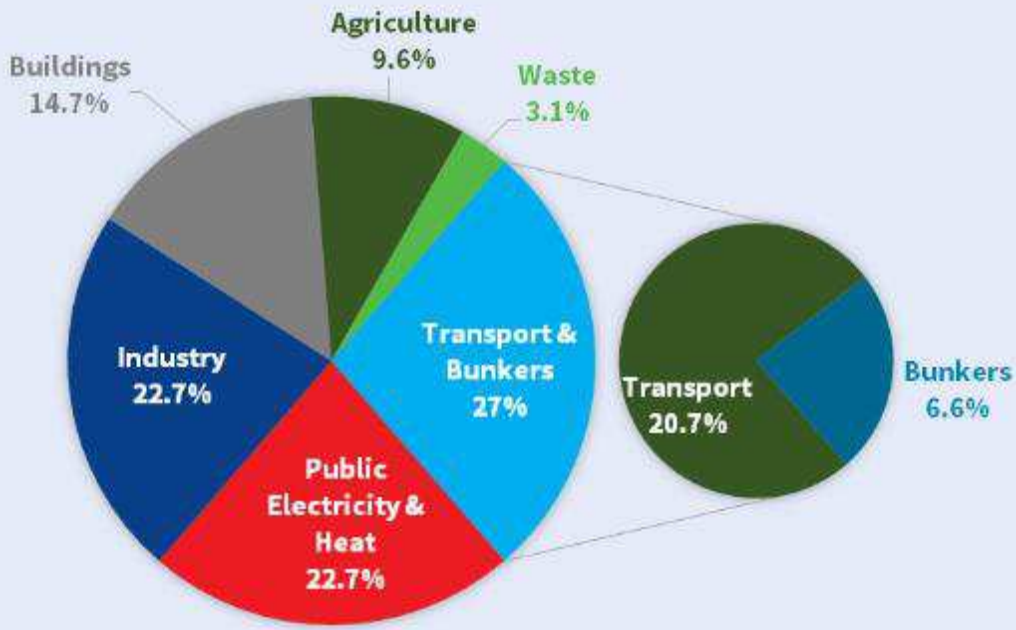


MOST MODES

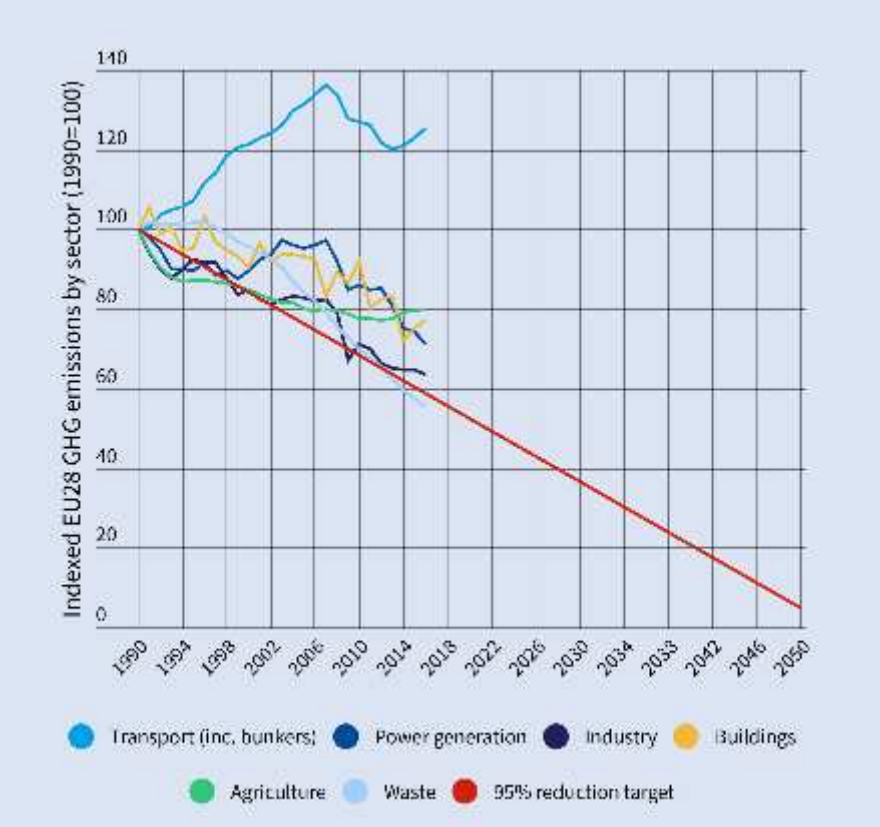
WELL-TO-TANK

ALL ENERGY SOURCES

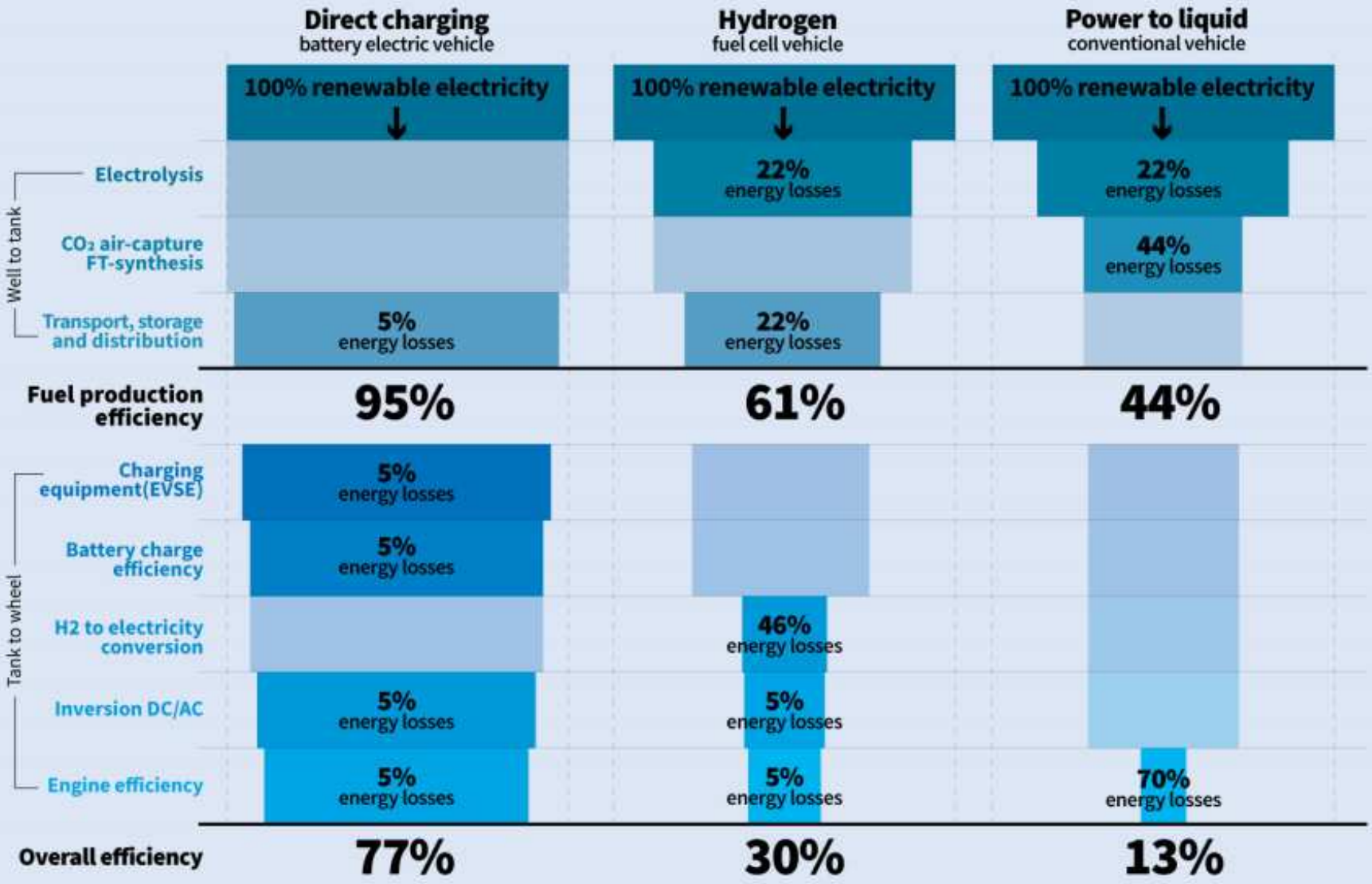
LARGEST CLIMATE PROBLEM…



…AND GETTING WORSE



CURRENT VISION ON H2 (I)



TRANSPORT & ENVIRONMENT @transenv @transenv transportenvironment.org

Source: WTT (LBST, IEA, World bank), TTW, (IEA, DOE, Transport & Environment calculations)
Note: values displayed here are on the higher side (optimistic) of the ranges found in the bibliography

CURRENT VISION ON H2 (II)

- Hydrogen will play a role in decarbonising the European economy
- H2 model availability
- Only Green hydrogen is acceptable
- Additional electricity demand
- Price
- Aviation and shipping

Air Liquide

H_2 Energy

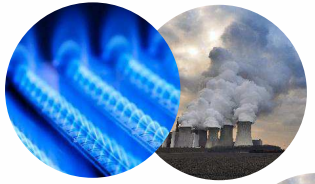
At the heart of the energy transition

AL technology portfolio
to provide decarbonized solutions for mobility and industry

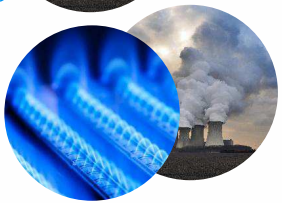
Biomethane

Electrolysis
low carbon electricity

Natural Gas + Carbon Capture & Storage (CCUS)

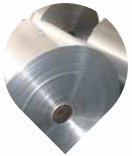


By product from industrial processes (Chlor alkali, Steel…)



H2 supply Air Liquide H2 supply chain

Industrial usages of H_2



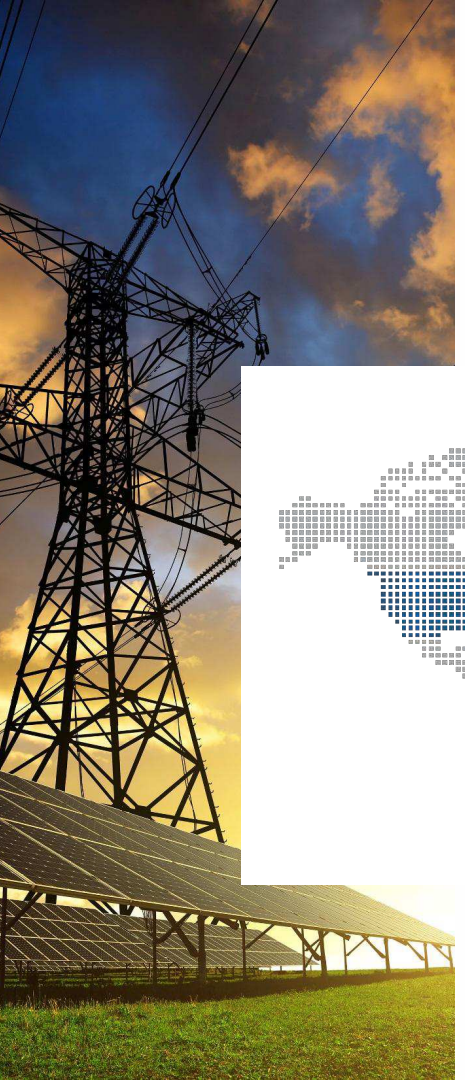
Mobility usages of H_2

Unified methodological frame for certificate of origin

CertifHy

Air Liquide creative oxygen

Air Liquide already started to invest in Hydrogen Energy



Mobility for Professionals
US+EUROPE
8 HRS

Mobility for Consumers
US North-East
12 HRS
+ Supply chain

Mobility for Consumers
California
4 HRS

Mobility for Consumers
Japan
9 HRS + 25% of 80 HRS by 2021

Mobility for Consumers
Dubai
1 HRS

Mobility for Consumers
Korea
1 HRS

Power to Gas
Denmark
4 HRS
+ 1 Electrolyzer

Mobility for Consumers
Germany
11 HRS

Mobility for Consumers
Paris, Brussels and Rotterdam
6 HRS

KEY HIGHLIGHTS

Share in STEP (Hype) and HysetCo (France)

Minority share in Hydrogenics (18.6%)

30 tpd LH2 plant West Coast US

20 MW PEM Electrolyzer Eastern Canada

More than 120 Hydrogen recharging stations (HRS) installed by Air Liquide in the world in which 58 directly invested and operated by Air Liquide