

STATUS / VISION BUS

CLEAN BUS EURO PLATFORM PARIS RATP SITE VISIT

JEAN-MARC BOUCHERET

Sustainable Mobility Manager

Feb, 10th 2023

I V E C O • G R O U P

IVECO
BUS



ADVANCING
PUBLIC
TRANSPORT

AGENDA

- IVECO GROUP & IVECO BUS
- WHICH ENERGY, WHICH GROWTH
- WHICH ENERGY SWOT

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IVECO GROUP STRUCTURE

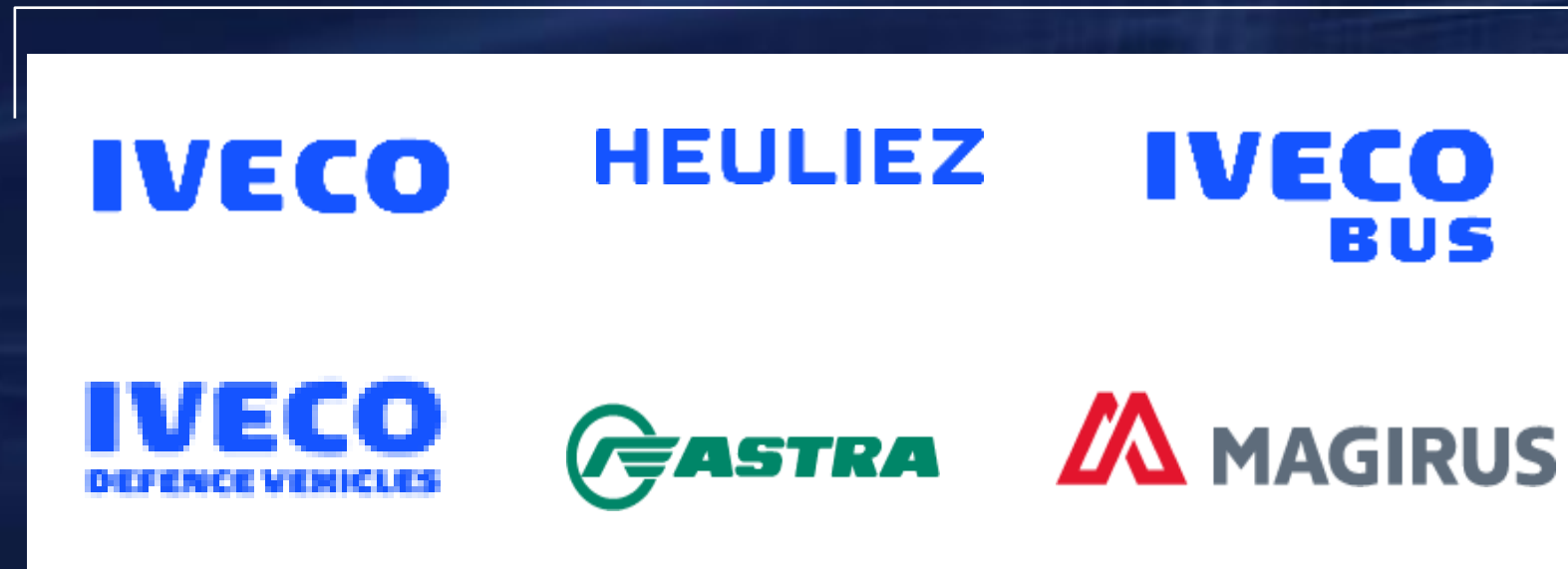
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Commercial & Specialty vehicles



Powertrain

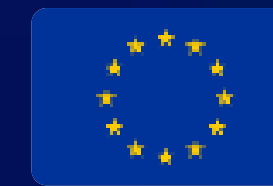


Financial services



IVECO BUS IN EUROPE 28*

TOTAL INDUSTRY VOLUME (TIV) Europe 2021



2
IN EUROPE



1
IN FRANCE, ITALY,
CZECH REPUBLIC

1
IN INTERCITY
IN EUROPE

1
IN CITYBUS
IN FRANCE

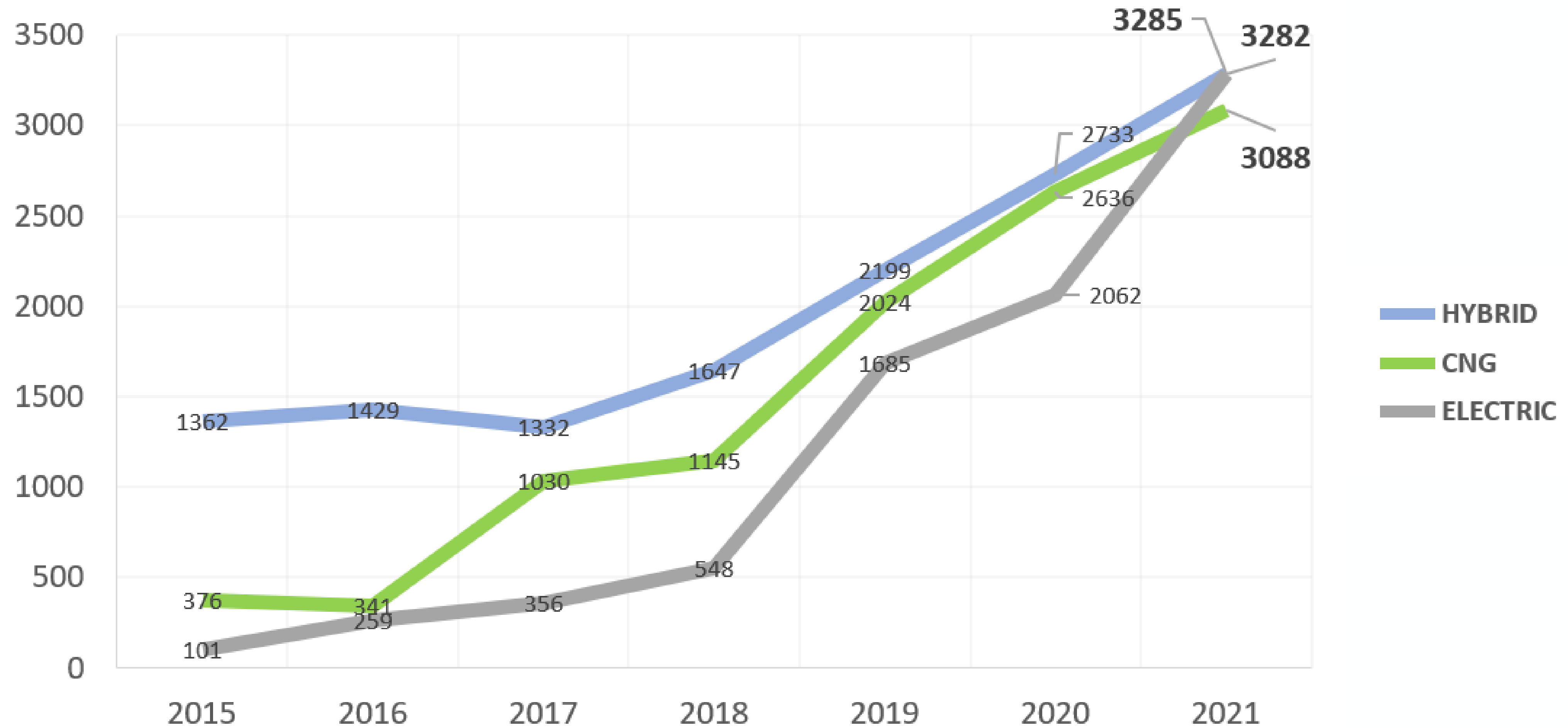
* Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom

**Which energy
Which growth**

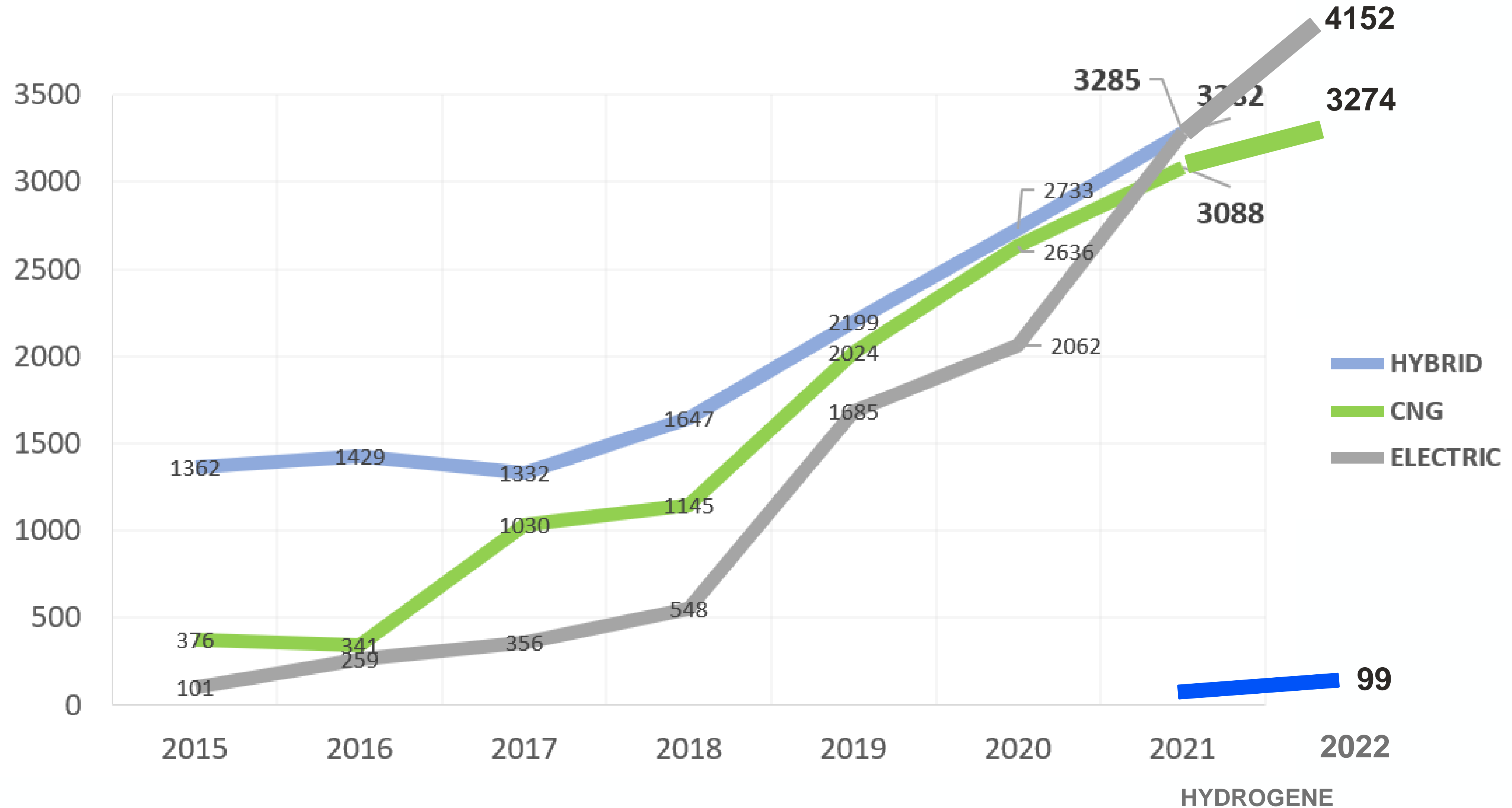
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Urban bus - Europe → 2021



Urban bus - Europe → 2022

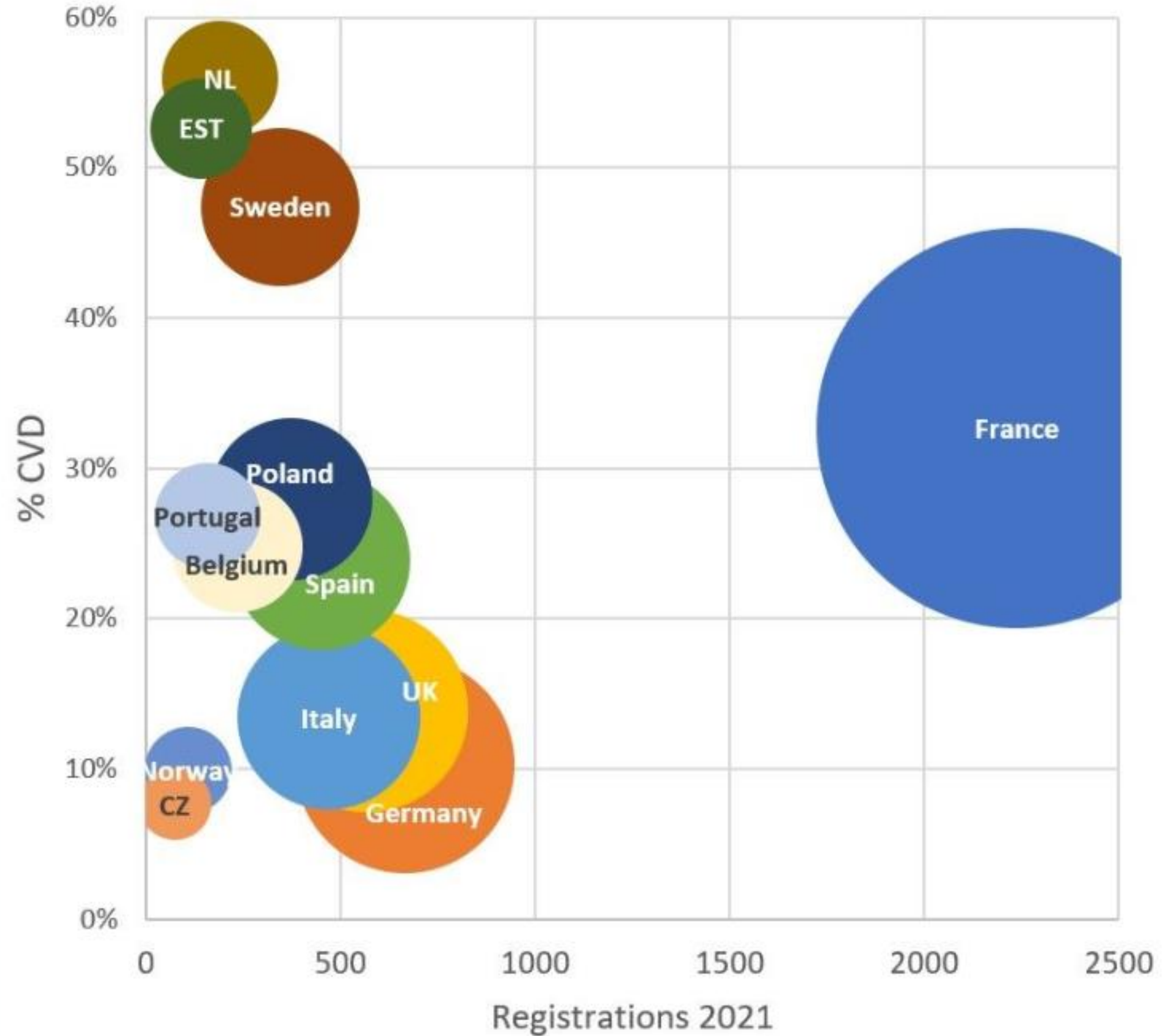


According to CVD

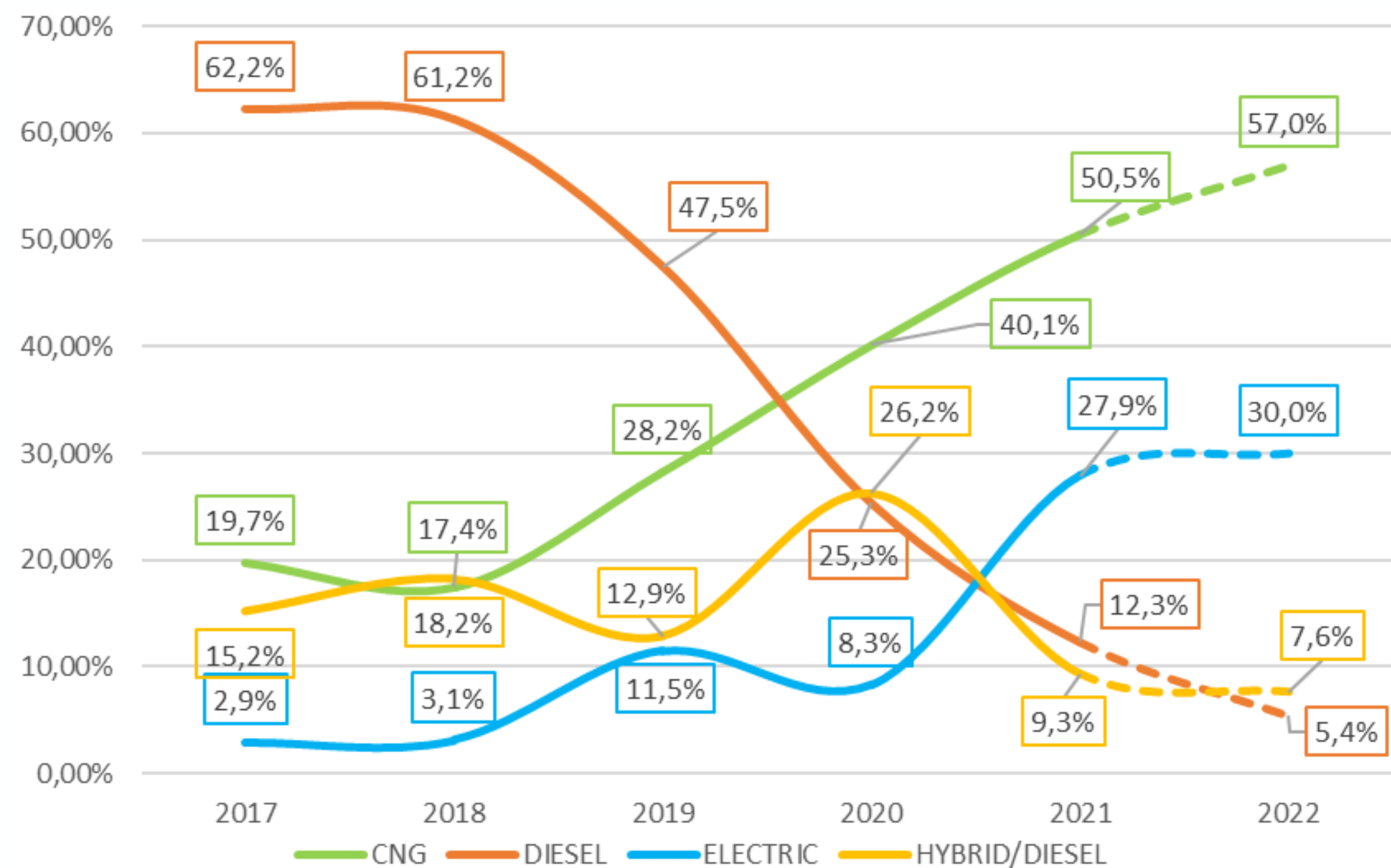
Clean Vehicle Directive :

- BEV
- FCEV
- Gas / Biogas

Top EU M.S. Bus & Coach registrations 2021 - % CVD

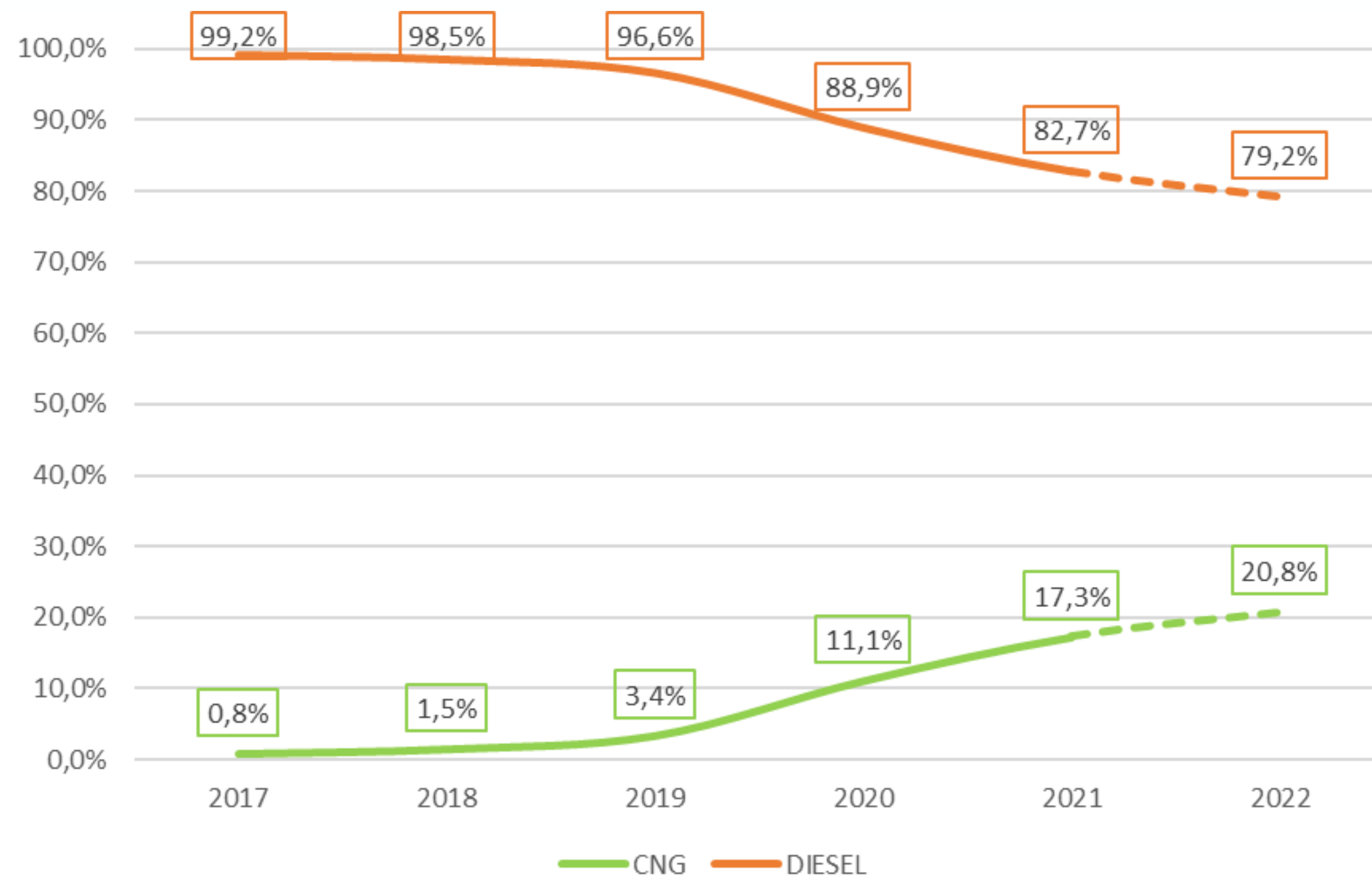


France – Urban bus



— CNG
— ELECTRIC

Intercity coach



— DIESEL
— CNG
— HYBRID/DIESEL

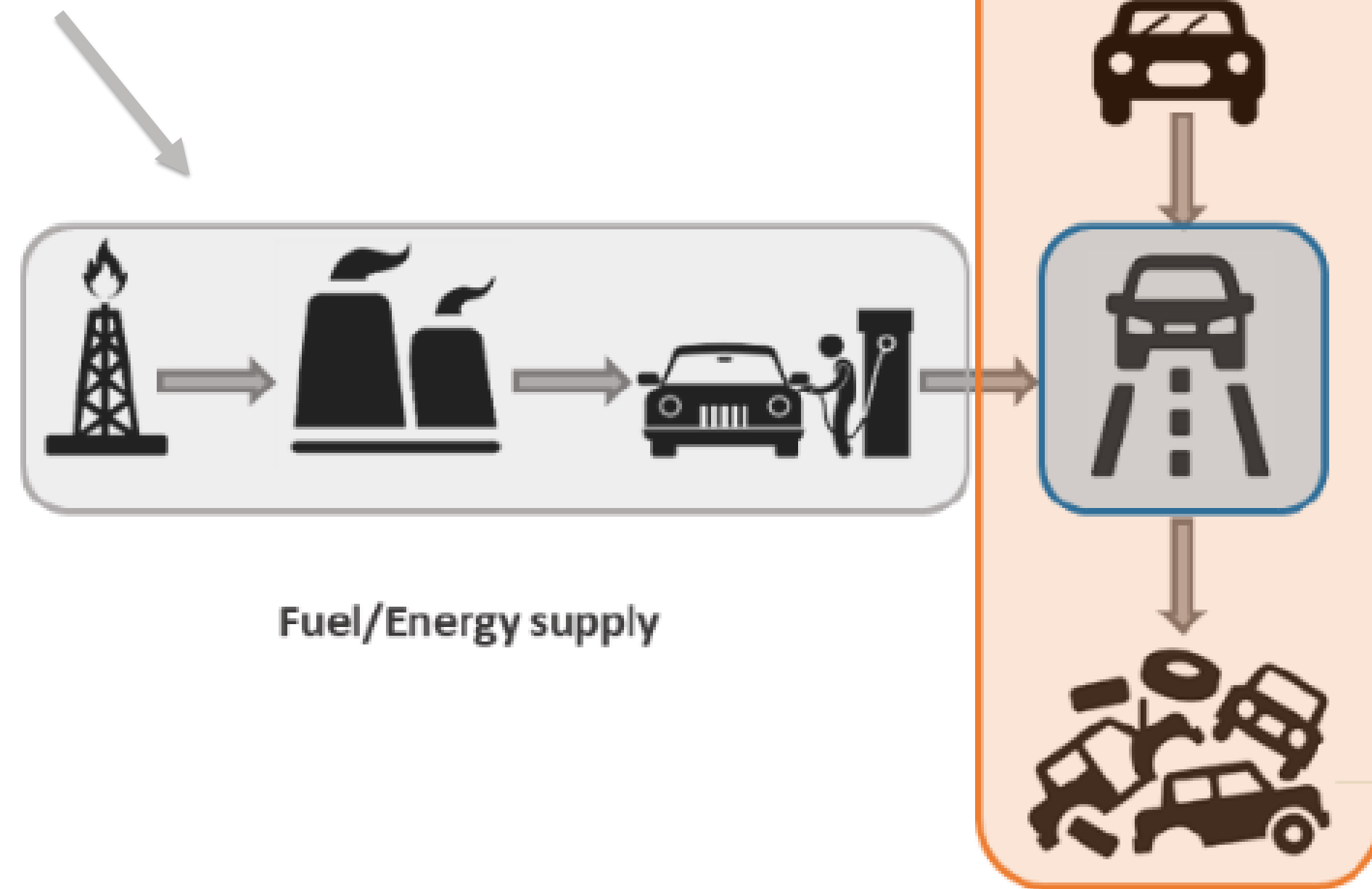
How to assess CO2 emissions

2)

Well-to-Wheel

Stakeholder studies

- JEC WTW report v.5
- Base Carbone ADEME ®



3)

Life Cycle Analysis

- Voluntary
- Methodology ISO 14040/44
- Non harmonised criteria

1)

Tail-pipe

Consumption → CO2

- SORT + Emission factor
- VECTO (CO2 Directive)

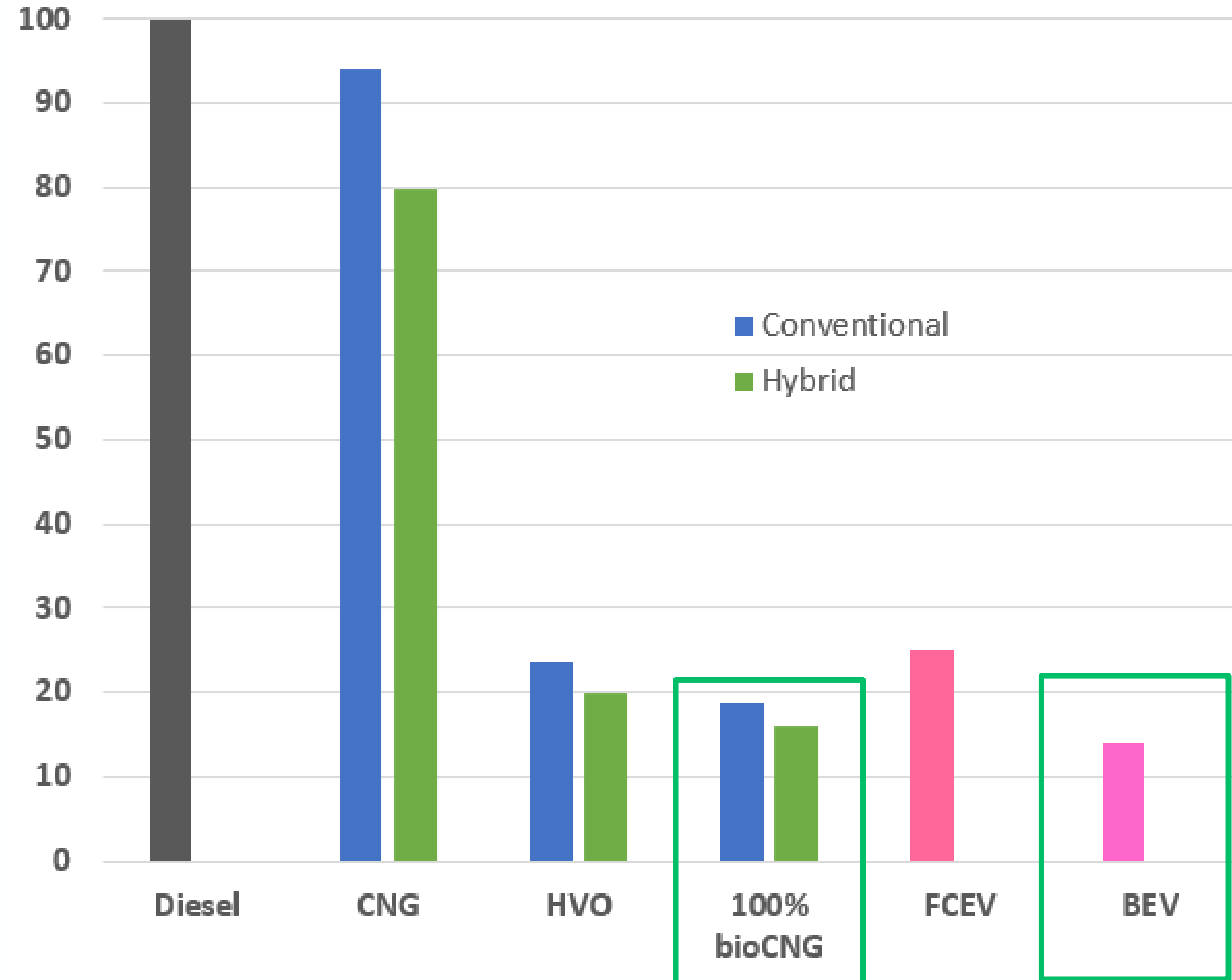
Directive CO2 vehicles

- Revision in 2022-23
- Status renewables tbd

Well to Wheel

Source :

- IVECO Internal data
- Base Carbone ® ADEME
- CATP <https://www.agir-transport.org/parution-de-la-mise-a-jour-de-letude-comparative-des-differentes-motorisations-des-autobus-par-la-catp/>

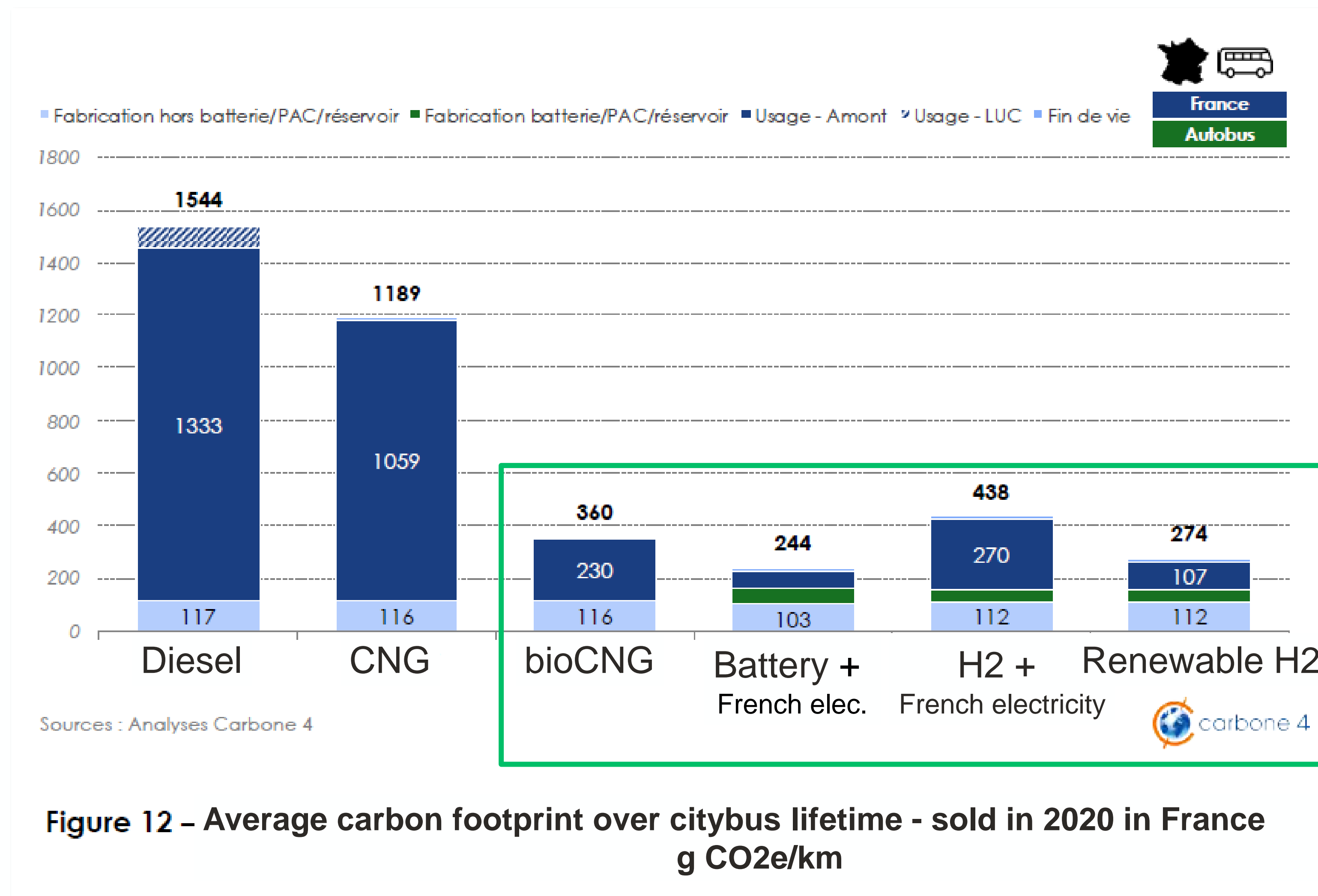


Life Cycle Analysis : What should be done

- Citybus



October 2020



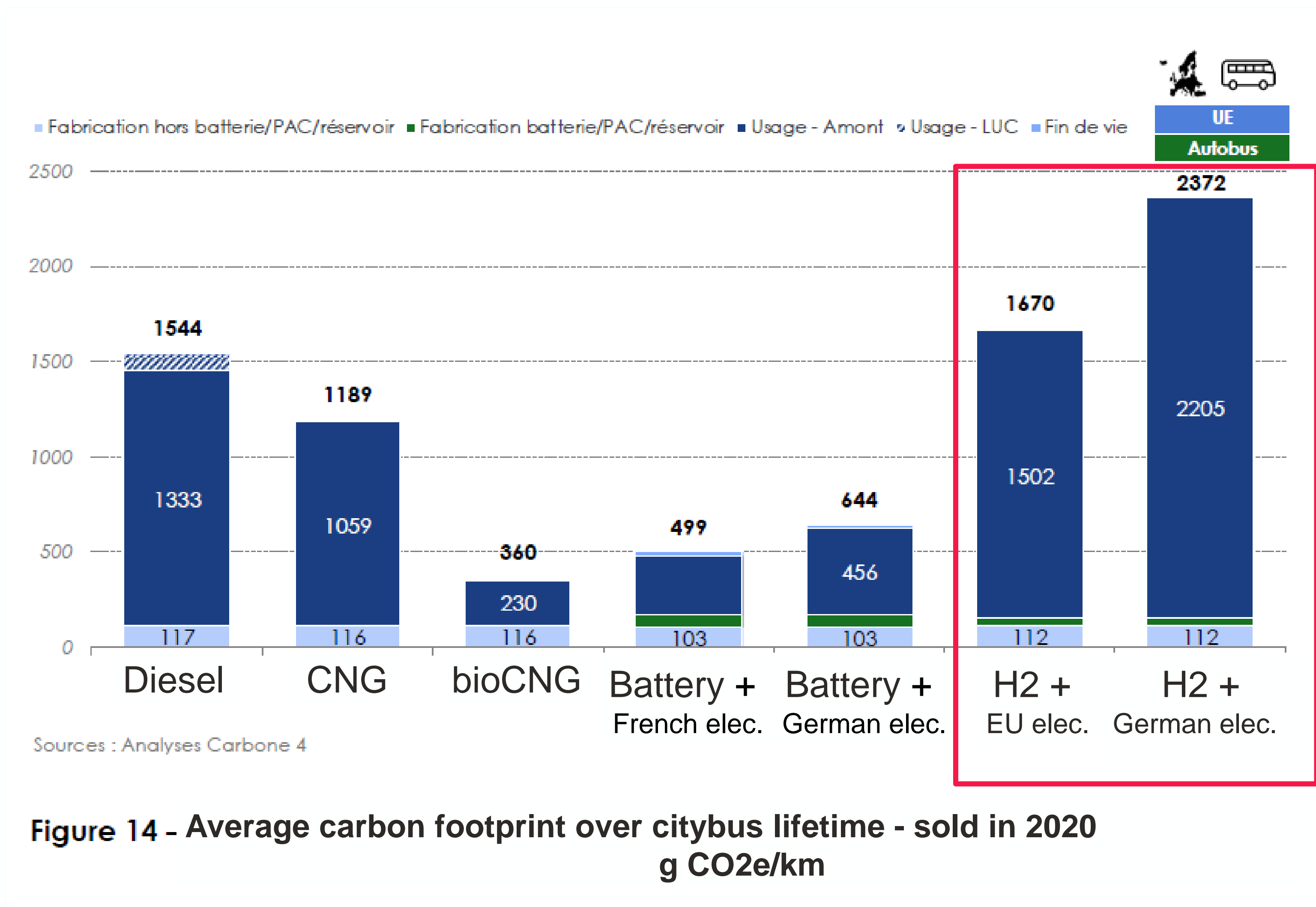
**Figure 12 – Average carbon footprint over citybus lifetime - sold in 2020 in France
g CO2e/km**

Life Cycle Analysis : What should not be done

- Citybus



October 2020

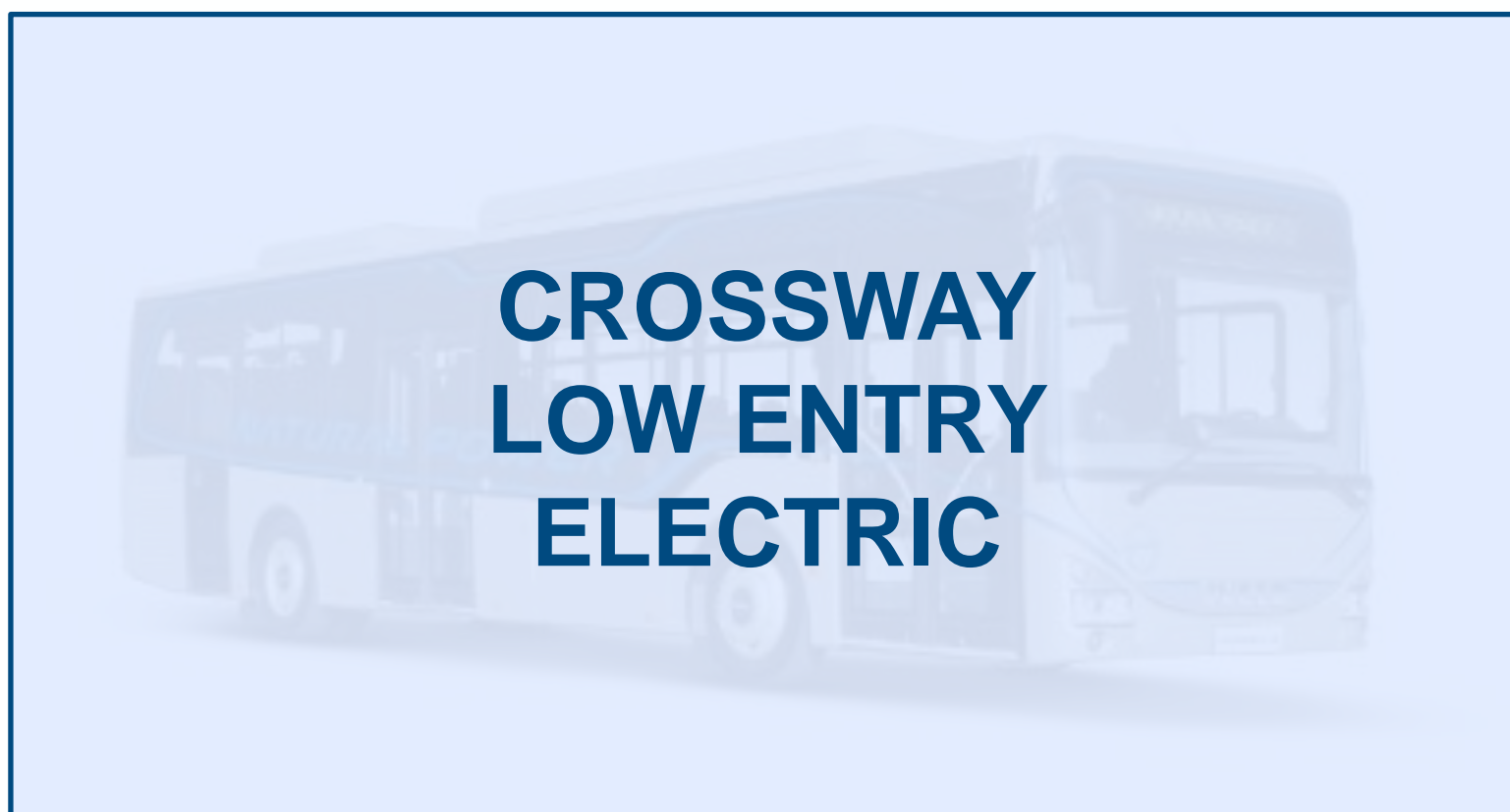


Portfolio Compliant CVD

As of today

Zero-Emission

Electric BEV



Low-Emission

Gas



Liquid Alternative Fuels



Portfolio Compliant CVD

New

Zero-Emission

Electric BEV



Nouveau

**CROSSWAY
LOW ENTRY
ELECTRIC**

Low-Emission

Gas



CROSSWAY



Liquid Alternative Fuels



CROSSWAY



EWAY

IVECO BUS



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EWAY = 'Heuliez Electric'

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EWAY : target excellence



- ✓ Exclusive bus manufacturing, over 40 y
- ✓ Unique test track for emobility, over 20y

- ✓ Zero-Waste landfill
- ✓ Zero industrial water
- ✓ Returnable carriers / suppliers
- ✓ Stainless steel body / KTL chassis

- ✓ Over 1,600 units sold
- ✓ Over 600 units in operation
- ✓ Over 33 M km travelled

- ✓ N# 1 France
- ✓ N# 1 Paris Region / RATP
- ✓ N# 4 EU – H1 2022

- ✓ Interoperability proven (ASSURED)
- ✓ Range 9 – 10 – 12 – 18 m
- ✓ Plug – Pantograph - Inverted

- ✓ New FPT batteries, in-house Iveco Group



EWAY : from 'small to large'

Small : 9,5 x 2,33 m

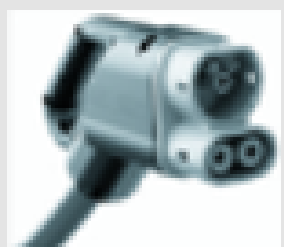

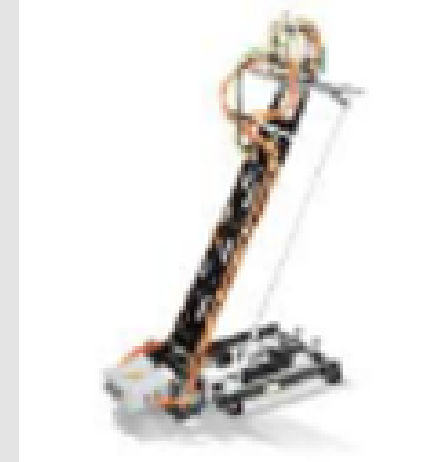
Large : 18 x 2,55 m



EWAY : from 9,5 to 18 m ebuses

BATTERIES FPT	GX 137 Elec 9,5m	GX 137 Elec 10,7m	GX 337 Elec 12m	GX 437 Elec 18m
5 packs – 346 kW/h	✓	✓	✓	
6 packs – 416 kW/h		✓	✓	
7 packs – 485 kW/h			✓	✓
8 packs – 554 kW/h				✓
9 packs – 624 kW/h				✓

EWAY : approving connecting to chargers

		ABB	heliox	EKO SMART ENERGY SYSTEMS ENERGETYKA	ies
	Charge au depot	✓	✓	✓	✓
	Norme	DIN 70121 ISO 15118 -1			
	Interopérabilité	✓	✓	✓	
	Pantographe descendant Charge intermédiaire	✓	✓	✓	
	Norme	DIN 70121 ISO 15118 -2			
	<u>Interoperabilité</u>	✓			
	Pantographe ascendant Charge intermédiaire	✓	✓	✓	
	Norme	DIN 70121 ISO 15118 -2			
	<u>Interoperabilité</u>	DIN			

EWAY : approving connecting to chargers

Pantographe ABB



GRONINGEN



TRONDHEIM



RATP
Chargeurs ABB,
Ekoenergetika
et Komeca power



TISSEO TOULOUSE
Chargeurs Mobility avec
chargeurs Omexon



KEOLIS PAYS D'AIX
Chargeurs Komeca Power



Luxembourg - Vandivinit



IDFM - VELIZY
Chargeurs: IES



TRANSDEV LA ROCHELLE
Chargeurs: ABB Terra 54

URBANWAY CNG HYBRID

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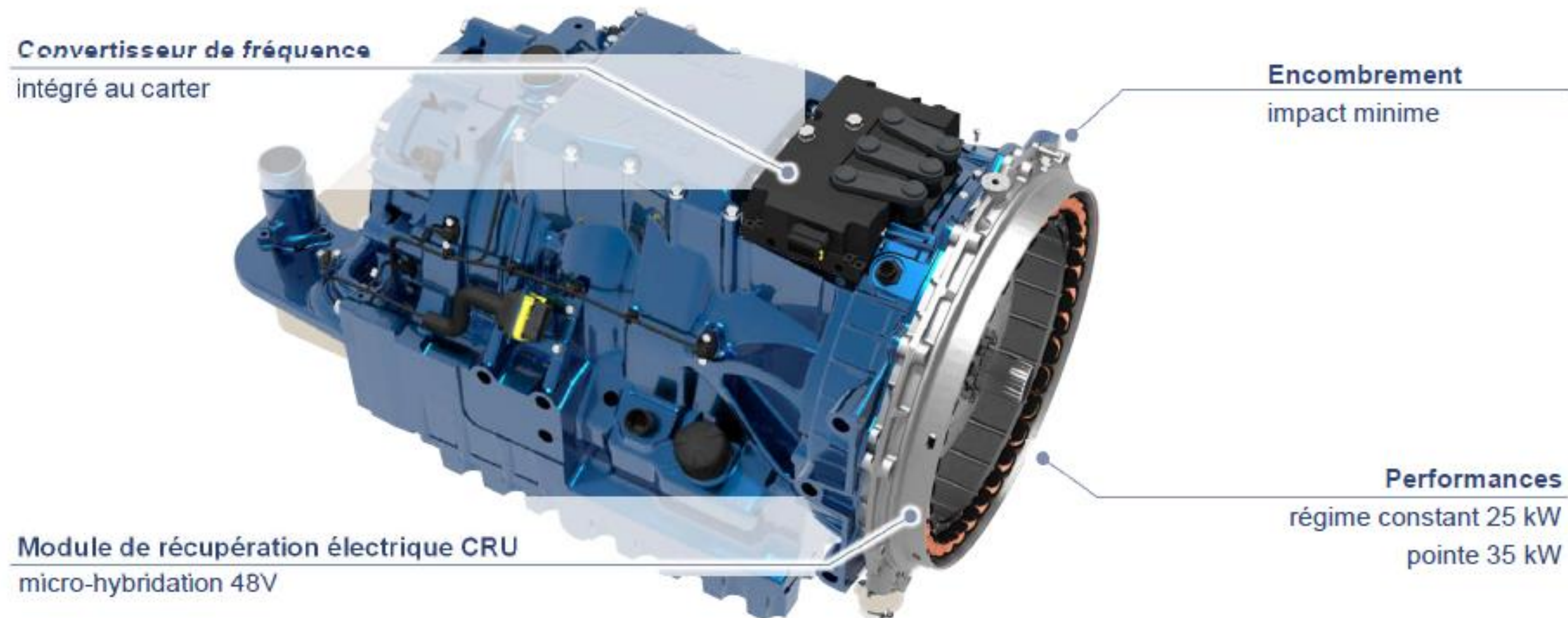
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New : URBANWAY HYBRID



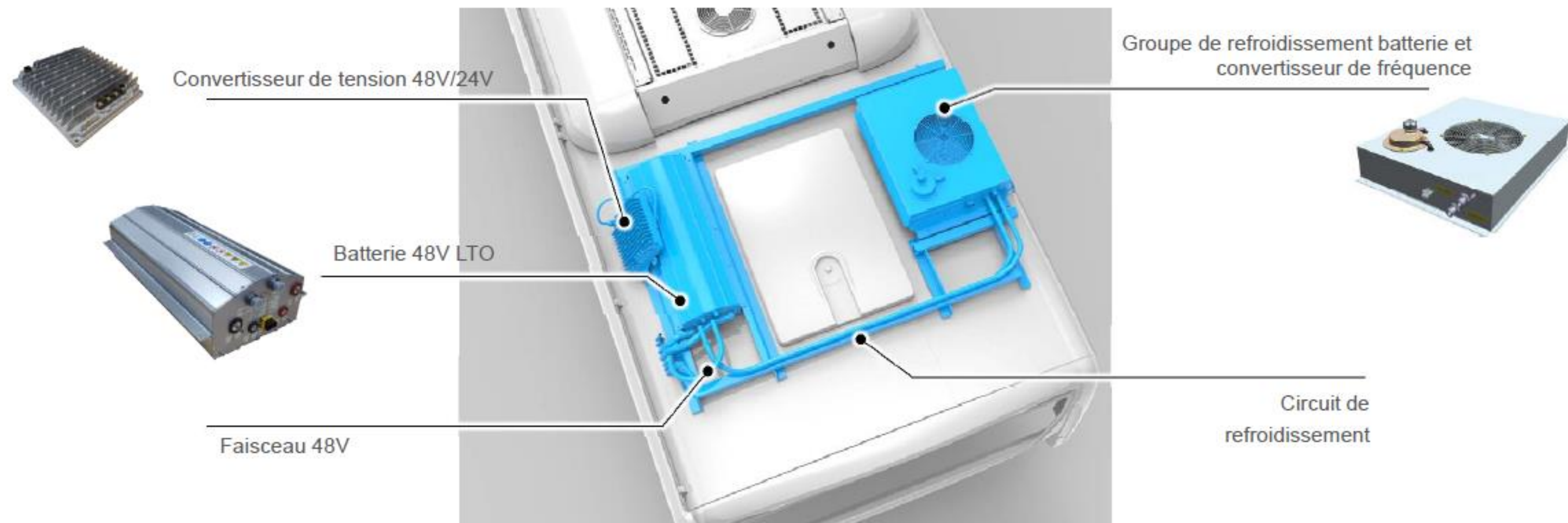
New : URBANWAY HYBRID

- Version hybrid 48 V
 - Different from High Voltage systems
 - Without electric habilitation
- Automatic gearbox Voith NXT
 - Stop & Start
 - Batteries LTO
 - Integrated generator



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- Engine Diesel Step E
- Compatible fuel XTL, like HVO
- Performance
 - -15% fuel consumption
 - -48 to -96% CO2



- Engine CNG Step E
- Compatible BioGas
- Performance
 - -19% fuel consumption vs Diesel
 - -35% avec 20% biométhane
 - -84% CO2 with 100% biomethane

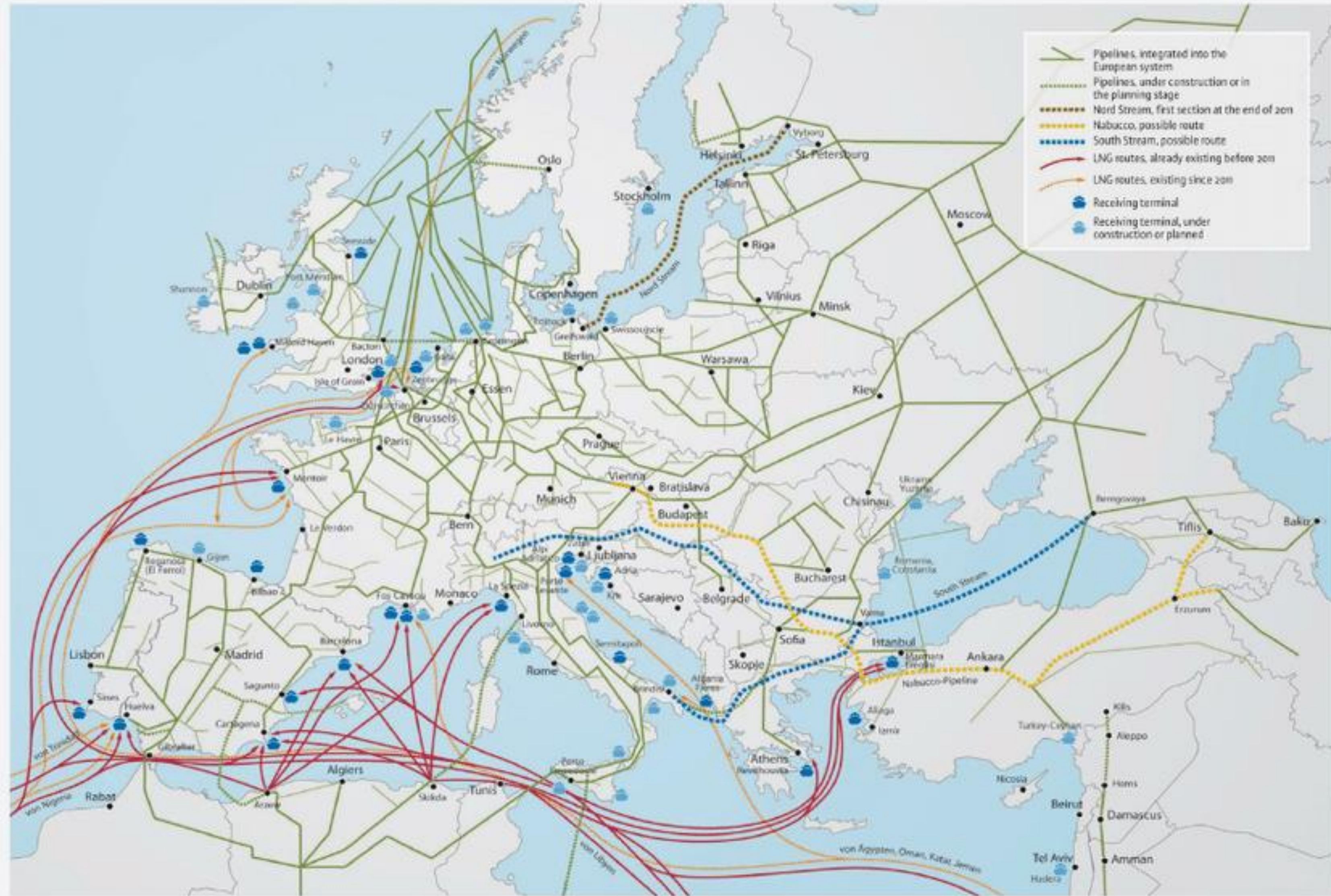
Which energy SWOT

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Natural Gas Transport Assets

Natural gas pipelines and LNG terminals in Europe



Source: BfW, Eurogas
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Future Gas Transport Assets

Injecting biomethane

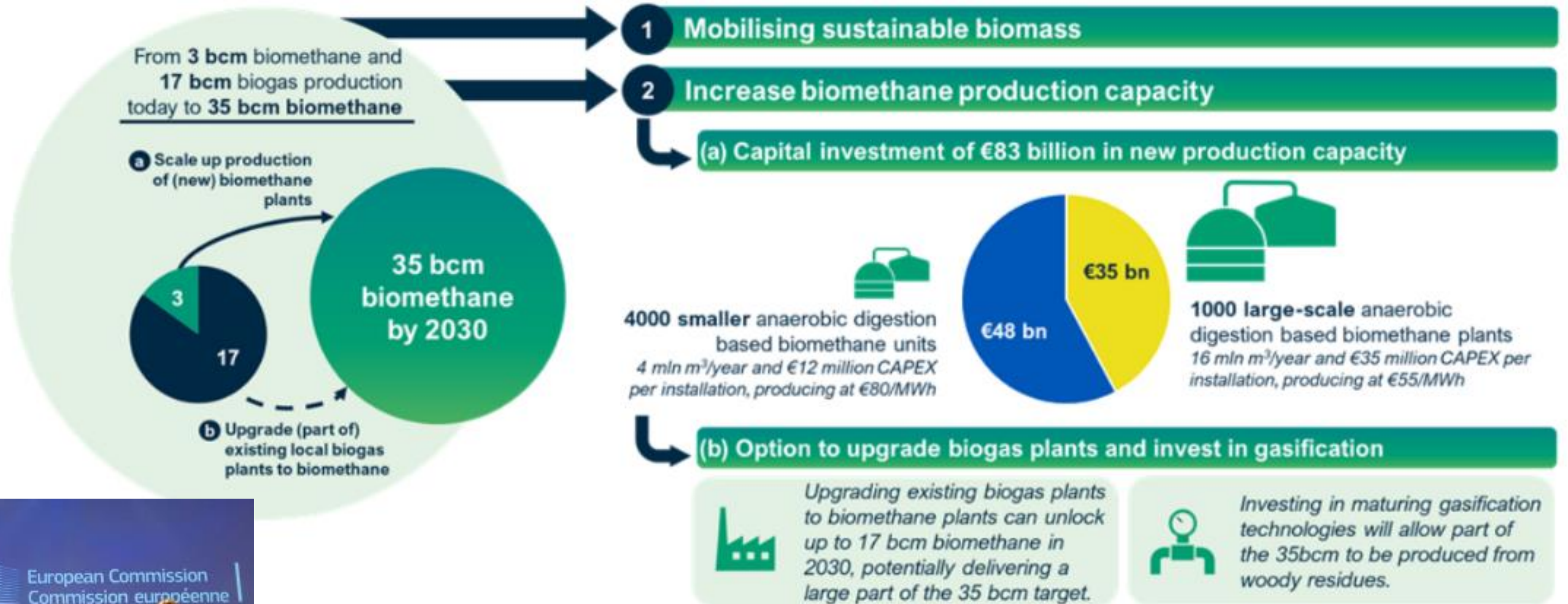
H2 pipes



RePower EU : REPowerEU: affordable, secure and sustainable energy for Europe

18,05,2022

What it takes to produce 35 bcm biomethane by 2030



Enough biomethane production in EU to meet REPowerEU 2030 target



Jonathan Spencer Jones
26 July 2022

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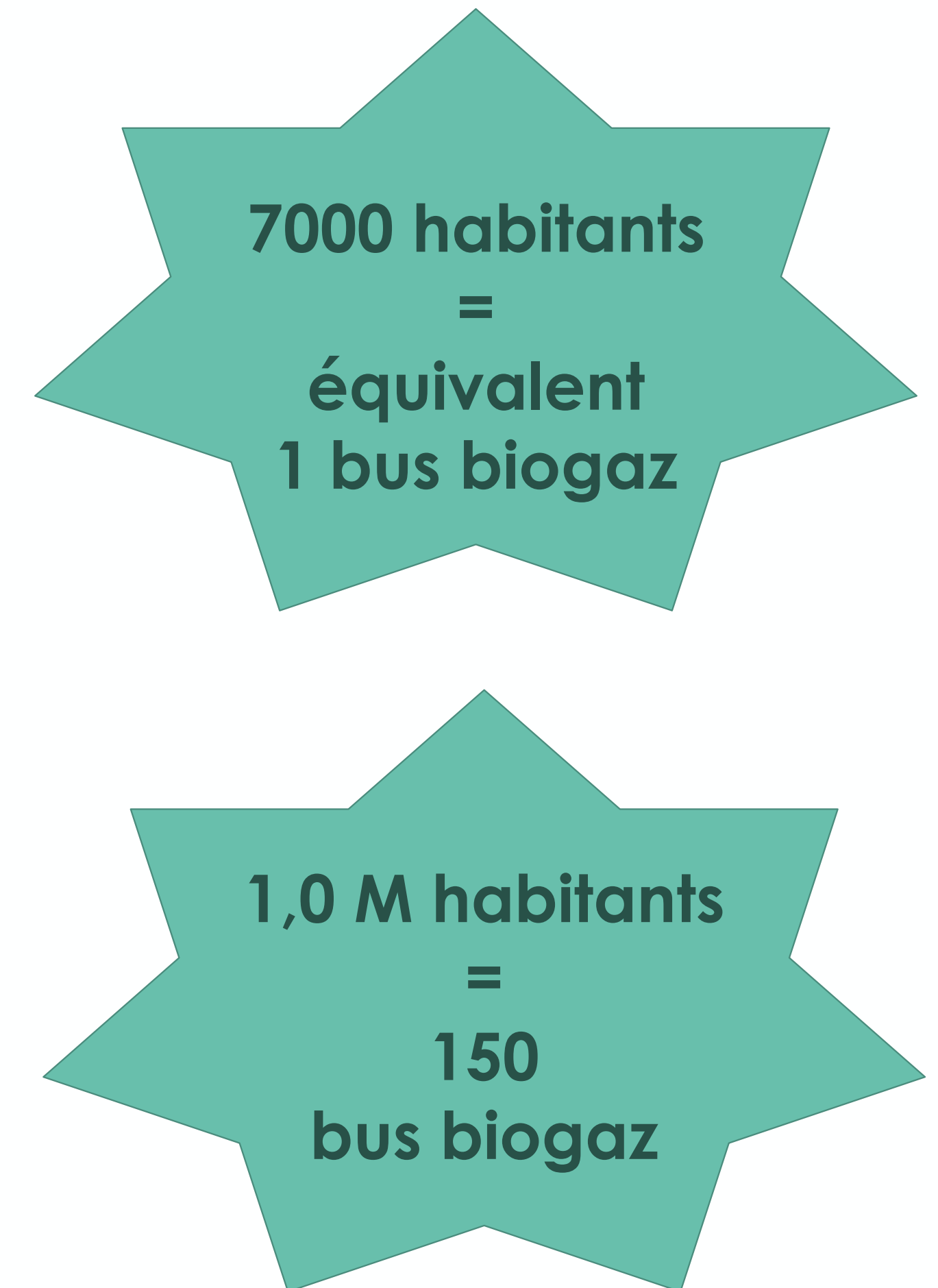
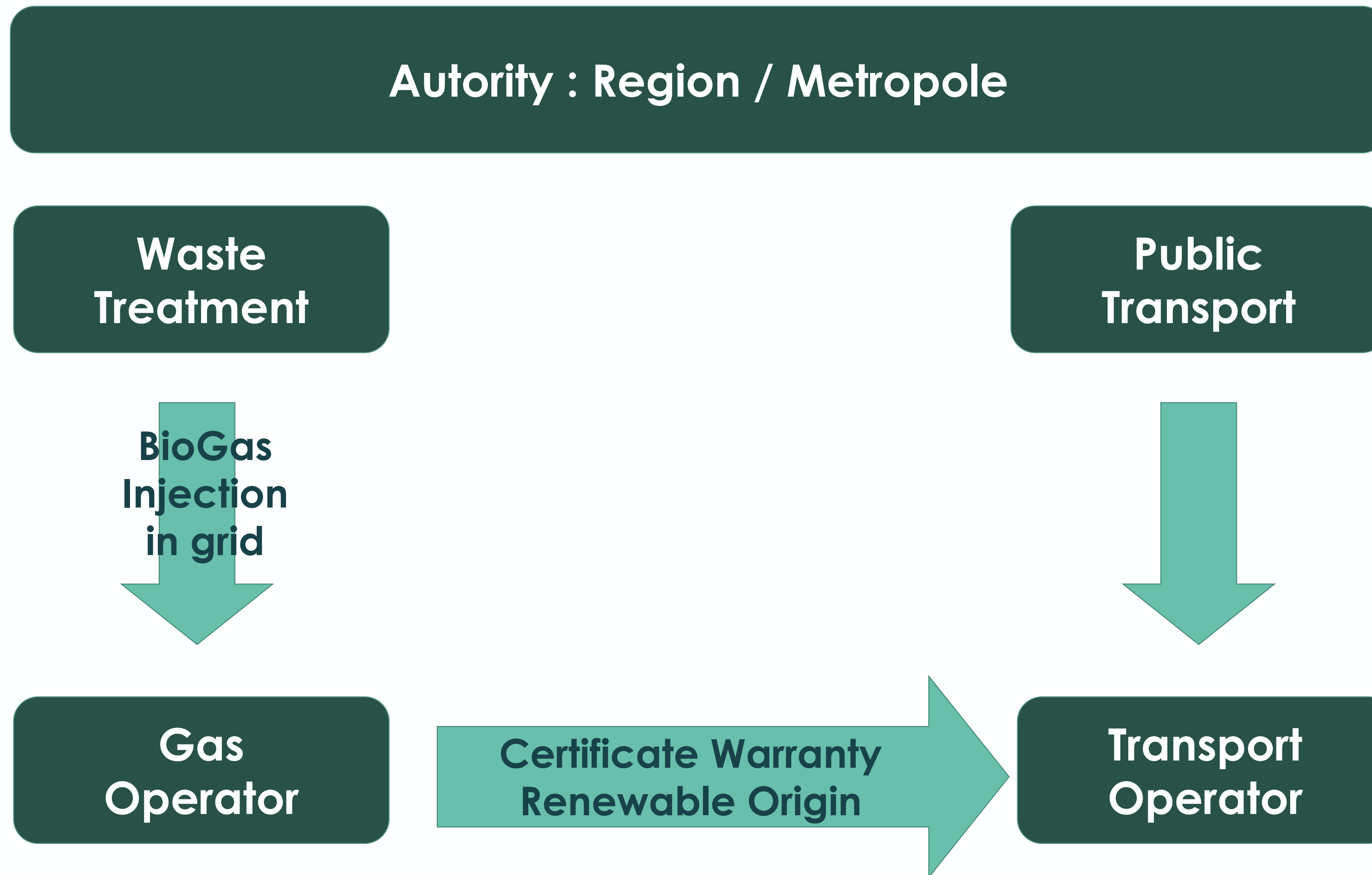
(Image: 123RF.com)

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A new study from the Gas for Climate consortium estimates that in the EU-27 up to 41 billion m³ (bcm) of biomethane could be available by 2030, exceeding REPowerEU's 35bcm target.

The study, which updates earlier estimates with the EU's ambition to accelerate biomethane production and take advantage of advancements in technology, further finds that up to 151bcm could be available by 2050 – close to the current 155bcm natural gas imports from Russia.

Path to circular economy, and resilience



Path to circular economy

In Nantes, 1 bus out of 2 could run on green gas

03/03/2022

By 2024, public stake holders have to propose recycling solutions for food wastes. Nantes Metropole intends to speed up investments in methanisation plants.



1/3 of Grenoble buses run on bio-CNG.



The waste water treatment plant of Aquapole is injecting biomethane in the GRDF gas grid. Operational since 2016, it produces 225 Nm³/h biomethane, equivalent to 80 buses.

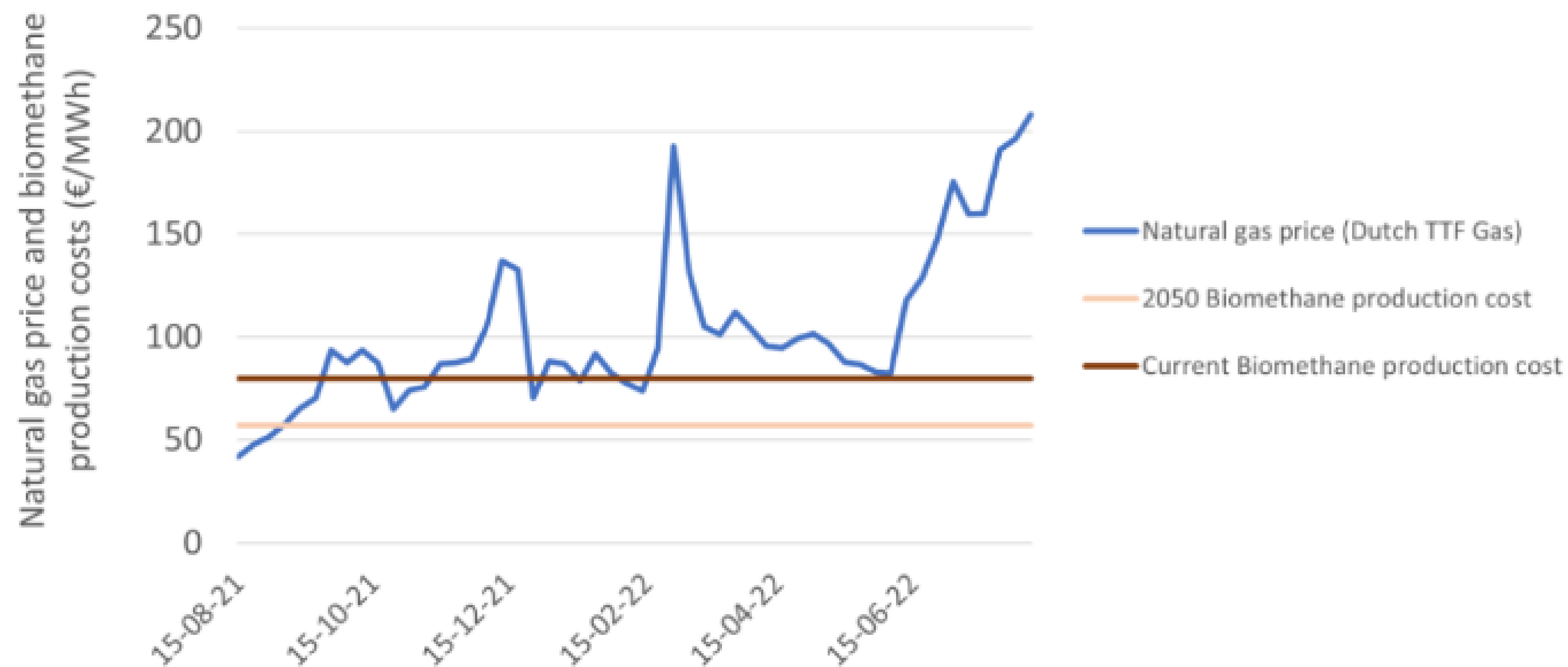


Source : Gas Mobilité, Grenoble Métropole

Energy price – impact on TCO - 2022

Fossile vs. Biomethane

Bioemthane production costs in comparison with natural gas price



SWOT POWERTRAINS

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STRENGTH

Existing EV product base
EU willingness for EV
Funded projects :
~7 B€ Recovery Resilience Fund
EIB loans

WEAKNESS

Raw material dependence / imported
Ability to convert urban depots
Availability of high power electricity supply

OPPORTUNITY

New : Service, Digital, Pay per use
Battery regulation to provide
environmental guidelines

THREAT

Unhomogenous rythm adoption : East / South EU
Capex intensive / Debts public services

SWOT Hydrogene

STRENGTH

Already existing EV product base
EU willingness for EV & H2
Energy stakeholders willingness
Fast FCEV refuelling vs. BEV recharging

WEAKNESS

Energy efficiency
TCO not aligned to BEV level
Lack of infrastructure : Green H2 production + distribution
Limitation of H2 storage in urban area by law

OPPORTUNITY

Funded projects to boost readiness :
Recovery Fund
IPCEI (July & September 2022),
AFIF (12,09,2022)
H2 EU Bank (14,09,2022)

THREAT

Green H2 assigned preferably or economically to industry
Fuel cost dependence on electricity price
Competition with BEV : performance & TCO
FC durability

SWOT Gas / Biogas

STRENGTH

IVECO leader in technology & market
Well perceived : no risk technology
Methanisation is continuous production
(not intermittent like wind or solar)

WEAKNESS

Fuel price increase due to undue connection to fossile
Biofuel recognized in CVD, but not in CO2 regulation
Inhomogeneous adoption of CNG across EU

OPPORTUNITY

Fit for 55 : Switch from fossile to biogas
Huge feedstock for methanisation plant
Need of circular economy & resilience
Readiness Euro VII (tbc)

THREAT

Biogas assigned preferably to heating & industry
Massive share of EV solutions with competitive TCO

SWOT Liquid renewables

STRENGTH

Biofuels recognized in CVD
WTW CO2 : -60 to -80% savings

WEAKNESS

Biofuels not recognized in CO2 Regulation (only TTW)
Limited fuel offer
Cost : feedstock + process + distribution
B100 impact of fuel consumption, oil, durability

OPPORTUNITY

Taxe regime evolution for renewable fuels
Contribution to Fit for 55
Circular economy : feedstock available

THREAT

ICE investments Euro VII
Feedstock availability (imports)
HVO assigned to aviation (SAF)

The logo features the text "IVECO • GROUP" in white, uppercase letters. A blue wireframe globe is positioned behind the text, centered between "IVECO" and "GROUP". The globe is composed of a grid of lines and dots, giving it a digital or network-like appearance. The background is a dark blue gradient.

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Thank you for attention

jeanmarc.boucheret@ivecogroup.com