

RENEWABLE FUELS FOR EFFICIENT ICE: A WAY TO CO₂-NEUTRAL MOBILITY

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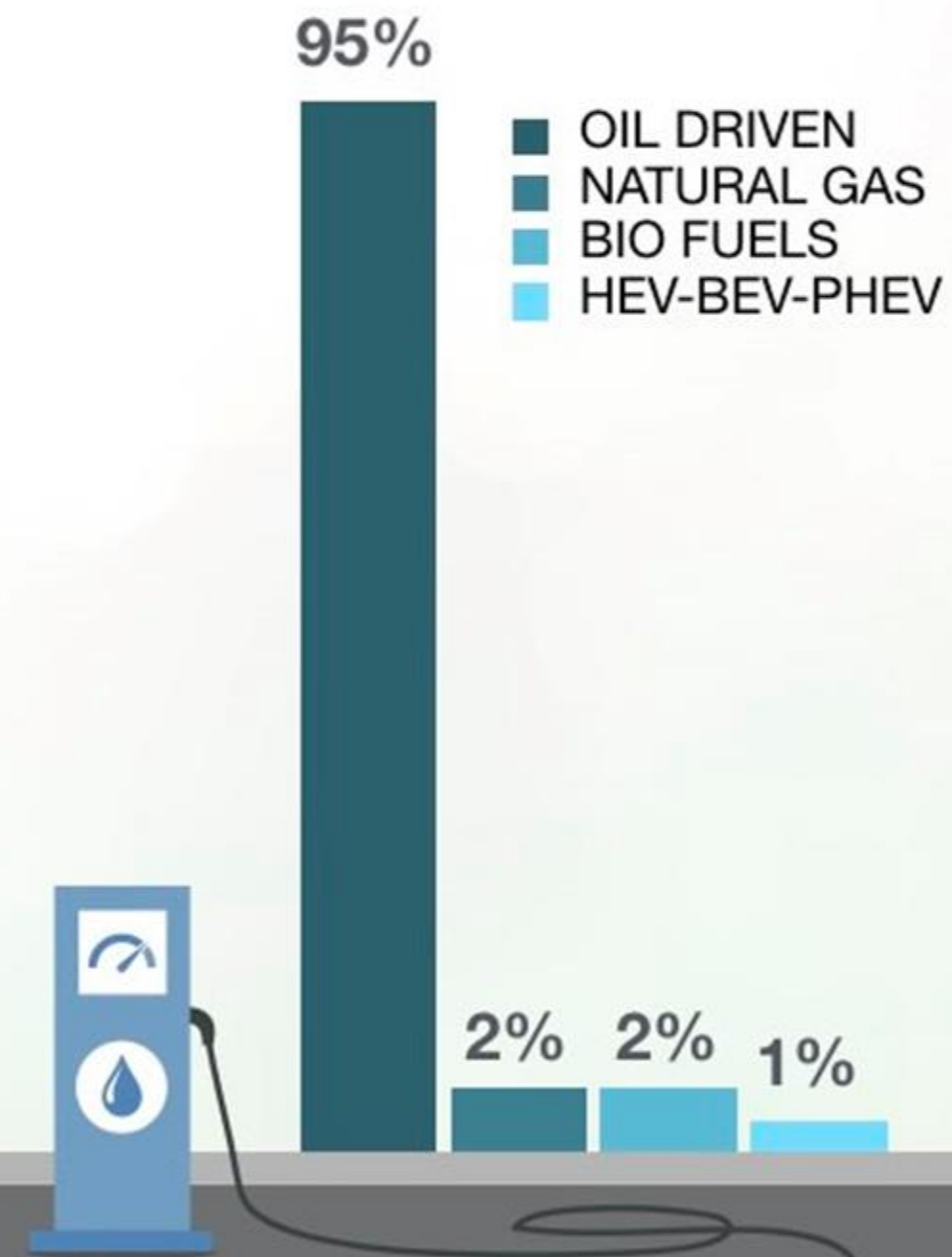
FCA ITALY - POWERTRAIN ENGINEERING
RESEARCH & TECHNOLOGY

GASOLINE & ALTERNATIVE FUELS ADVANCED ENGINEERING (CRF)

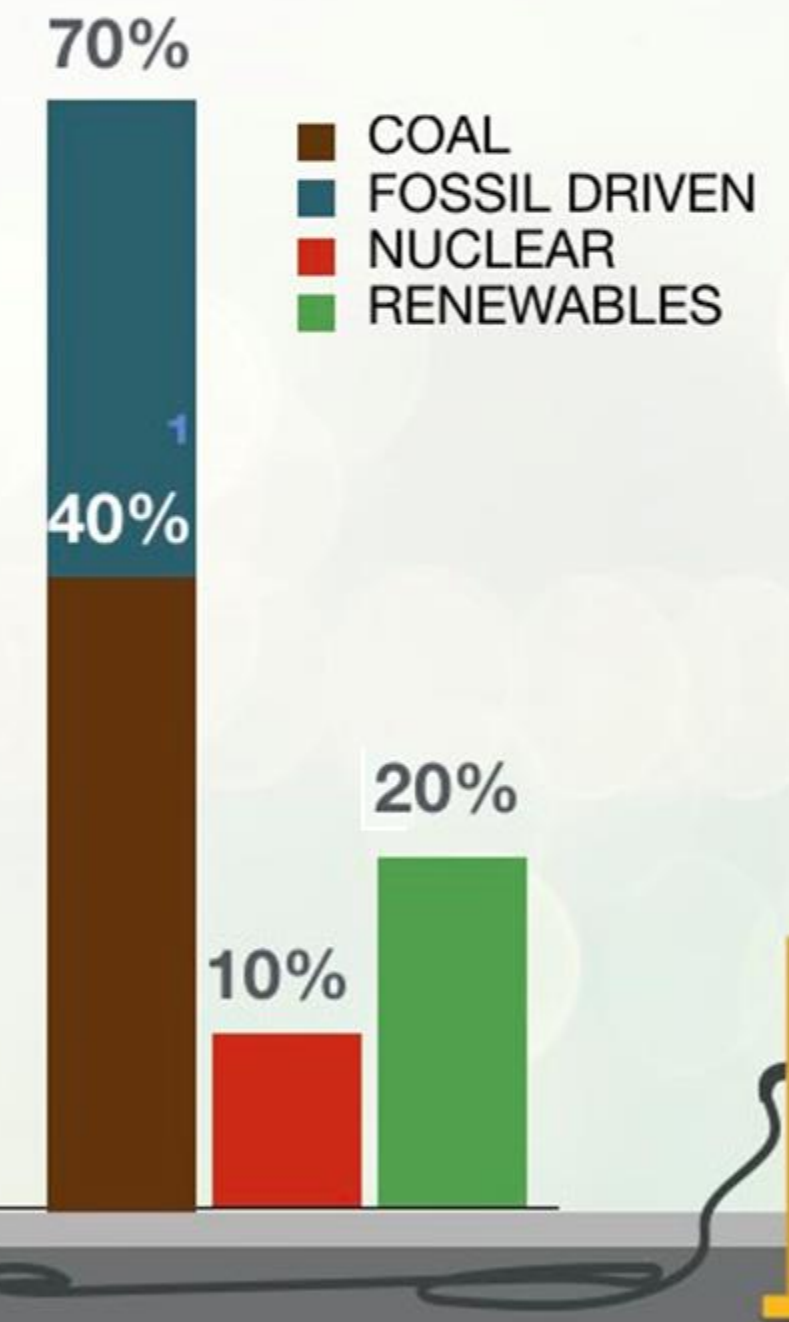
Current fuels and energy mix

A deeply rooted oil-based system is asked to move towards new energy carriers

CURRENT GLOBAL TRANSPORTATION MATRIX



CURRENT GLOBAL ELECTRICITY PRODUCTION ENERGY MIX



No «silver bullet» solution

ENVIRONMENTAL
SUSTAINABILITY

ENERGY
SECURITY

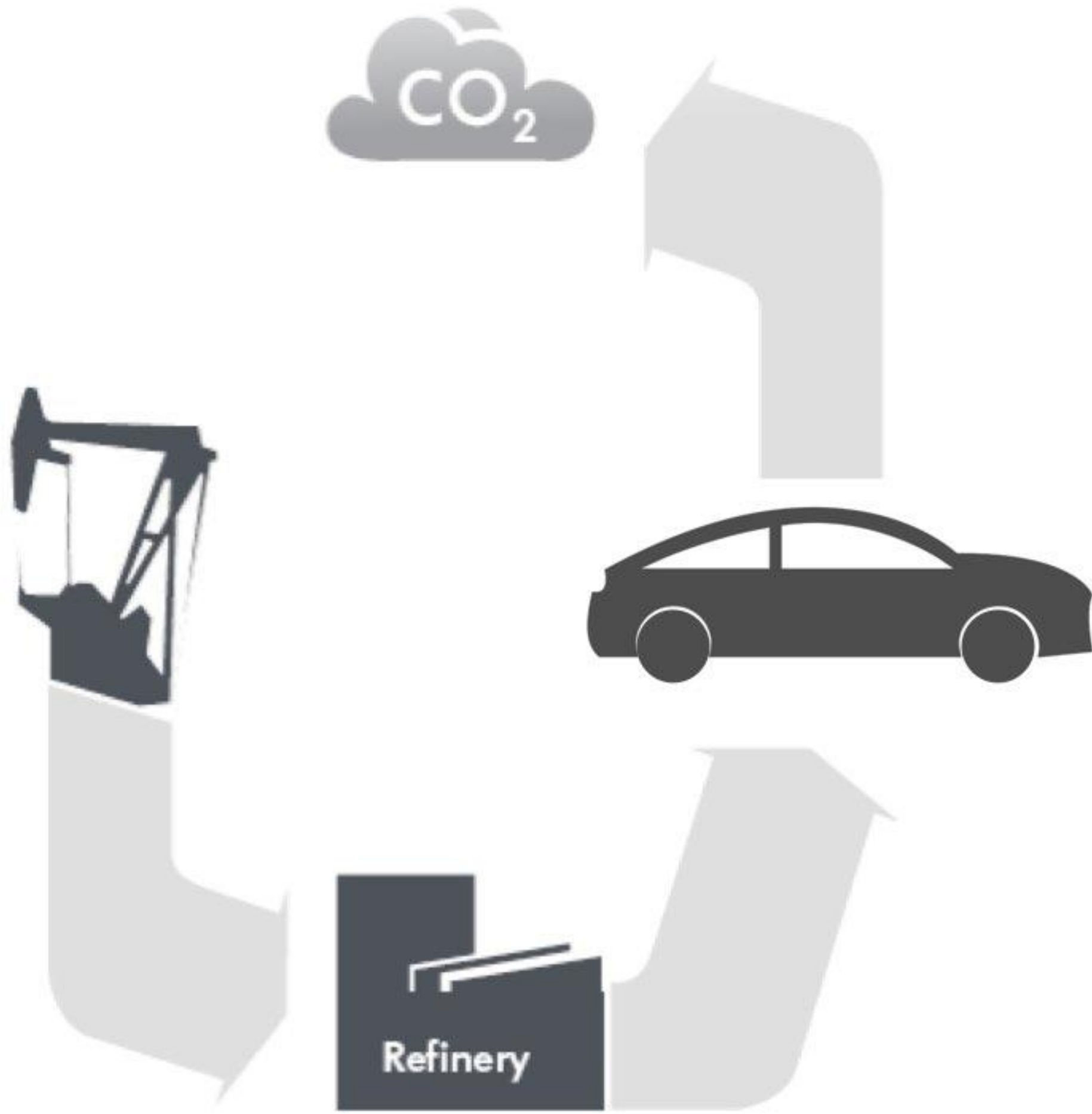
PRIMARY ENERGY
SOURCES COST
& AVAILABILITY

DEDICATED
FUEL SUPPLY
INFRASTRUCTURES

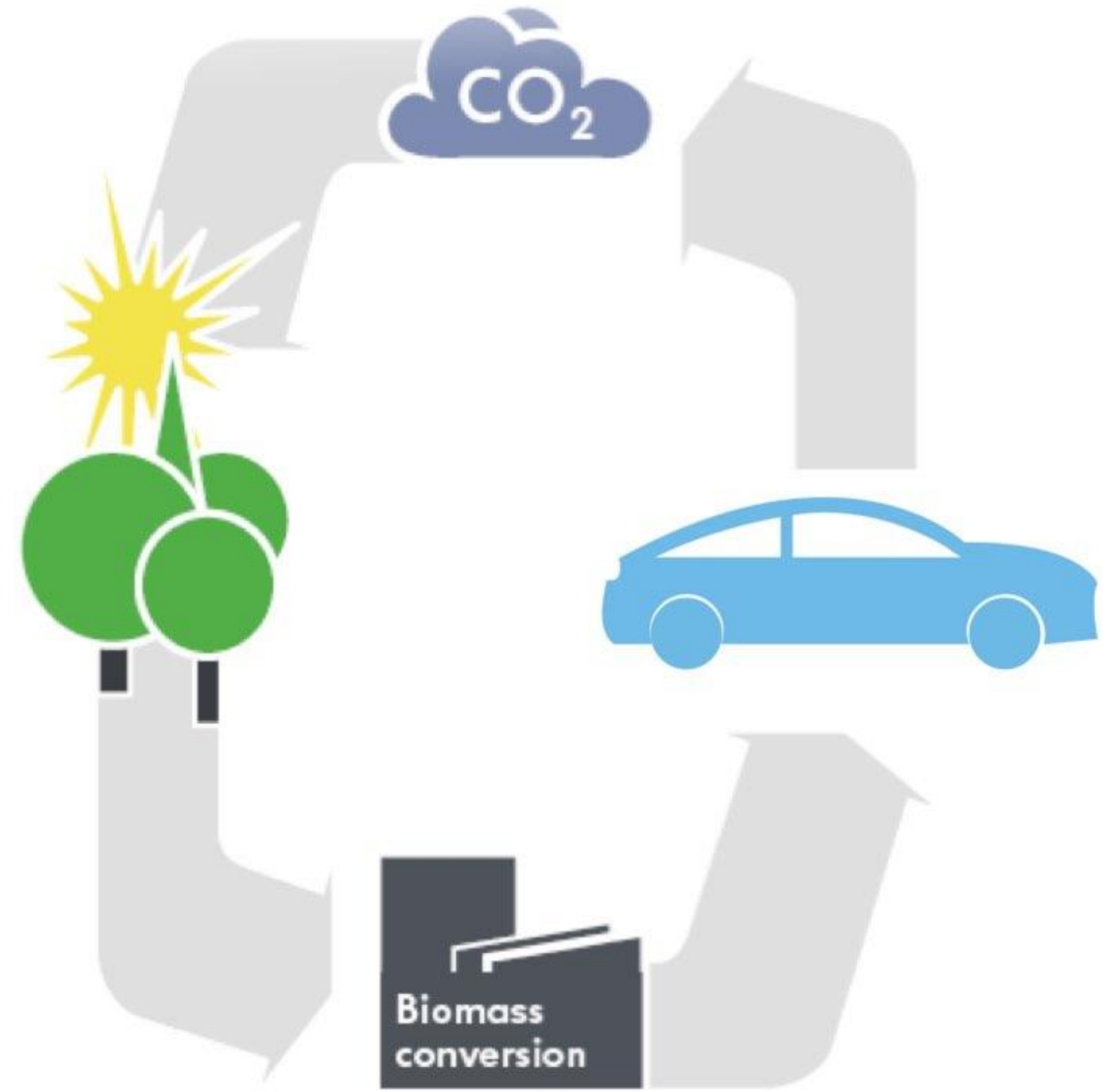
CUSTOMER & LOCAL
NEEDS / VEHICLE
MISSION PROFILE

From “carbon” to “carbon-free”

Fossil fuel
Open CO₂ cycle



Carbon neutral fuel
Closed CO₂ cycle



Towards carbon neutral fuels: Renewable fuels

A renewable fuel must be suitable for internal combustion engine and simultaneously fully produced by renewable feedstock/source (e.g. waste, sun, wind, biomass, etc.)

BIO-FUEL

**1ST GENERATION
2ND GENERATION
3RD GENERATION**

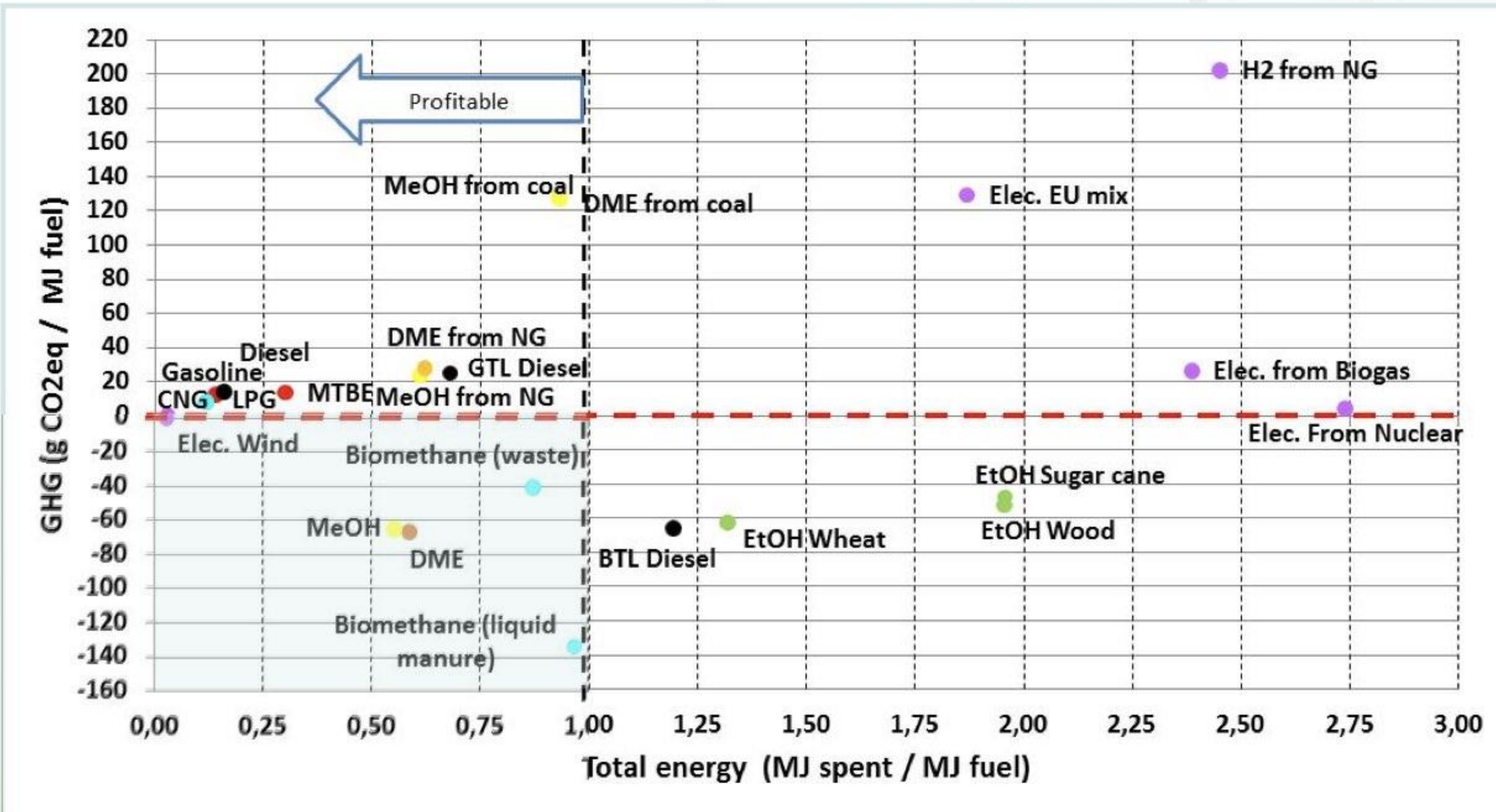
E-FUEL

SYNTHETIC-FUEL



Renewable & profitable fuels to enable circular economy

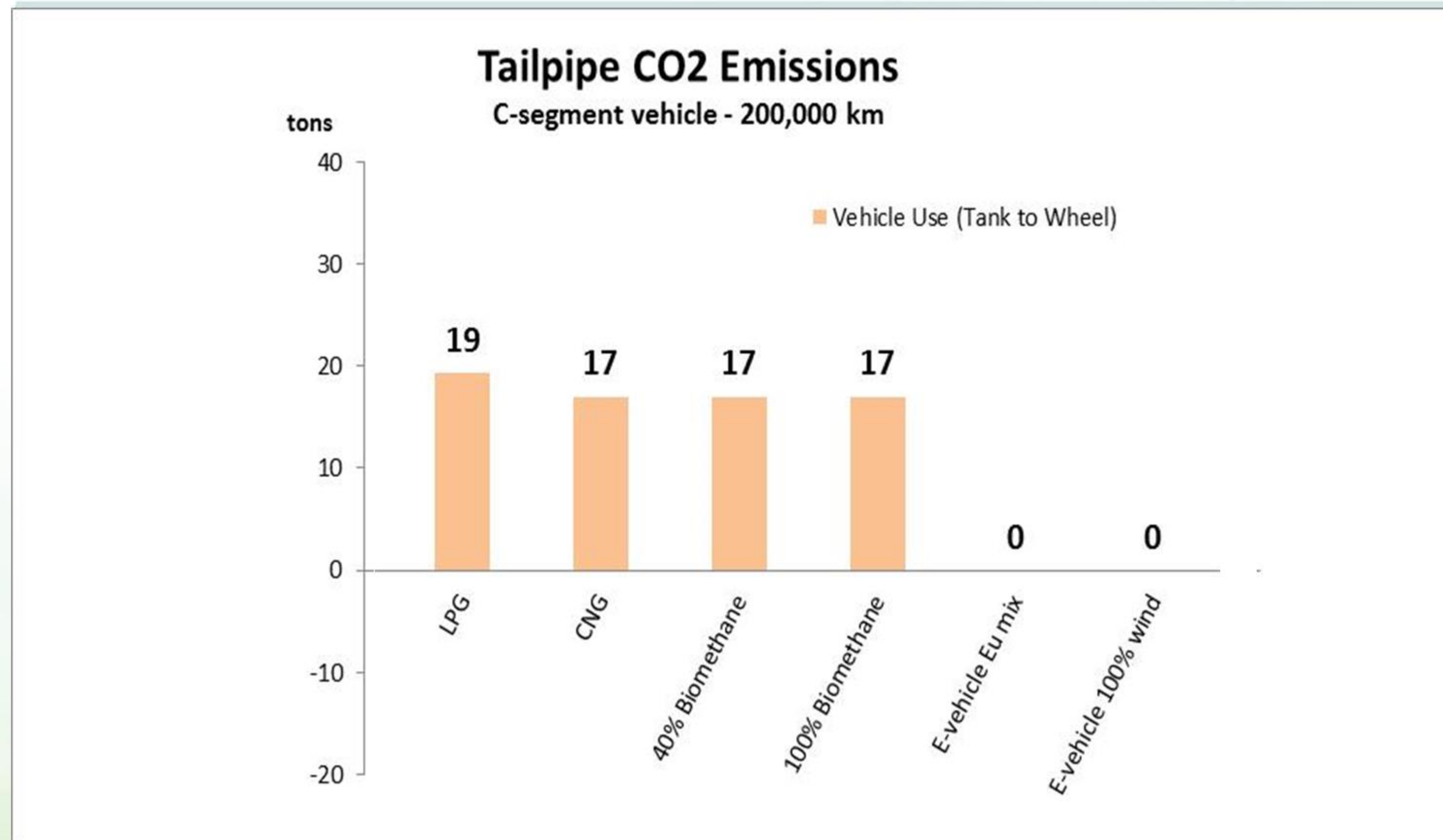
Well to Tank analysis - JRC data



Area of carbon neutral fuel

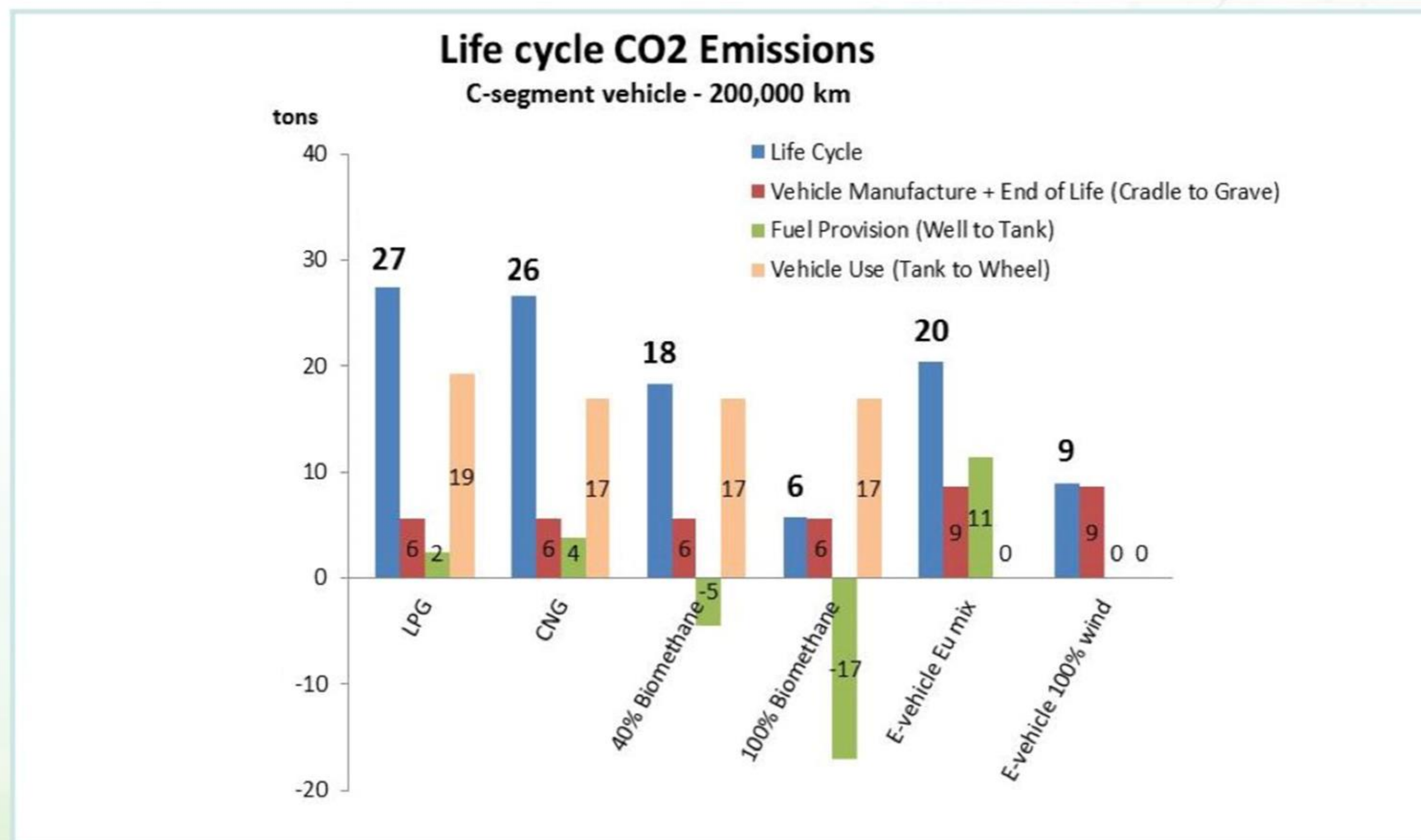
CO₂ tailpipe emissions

EU promotes a no-technology neutral approach just to demonstrate its strong motivation to solve global GHG moving the issue into another arena.



Life cycle - CO₂ equivalent emissions

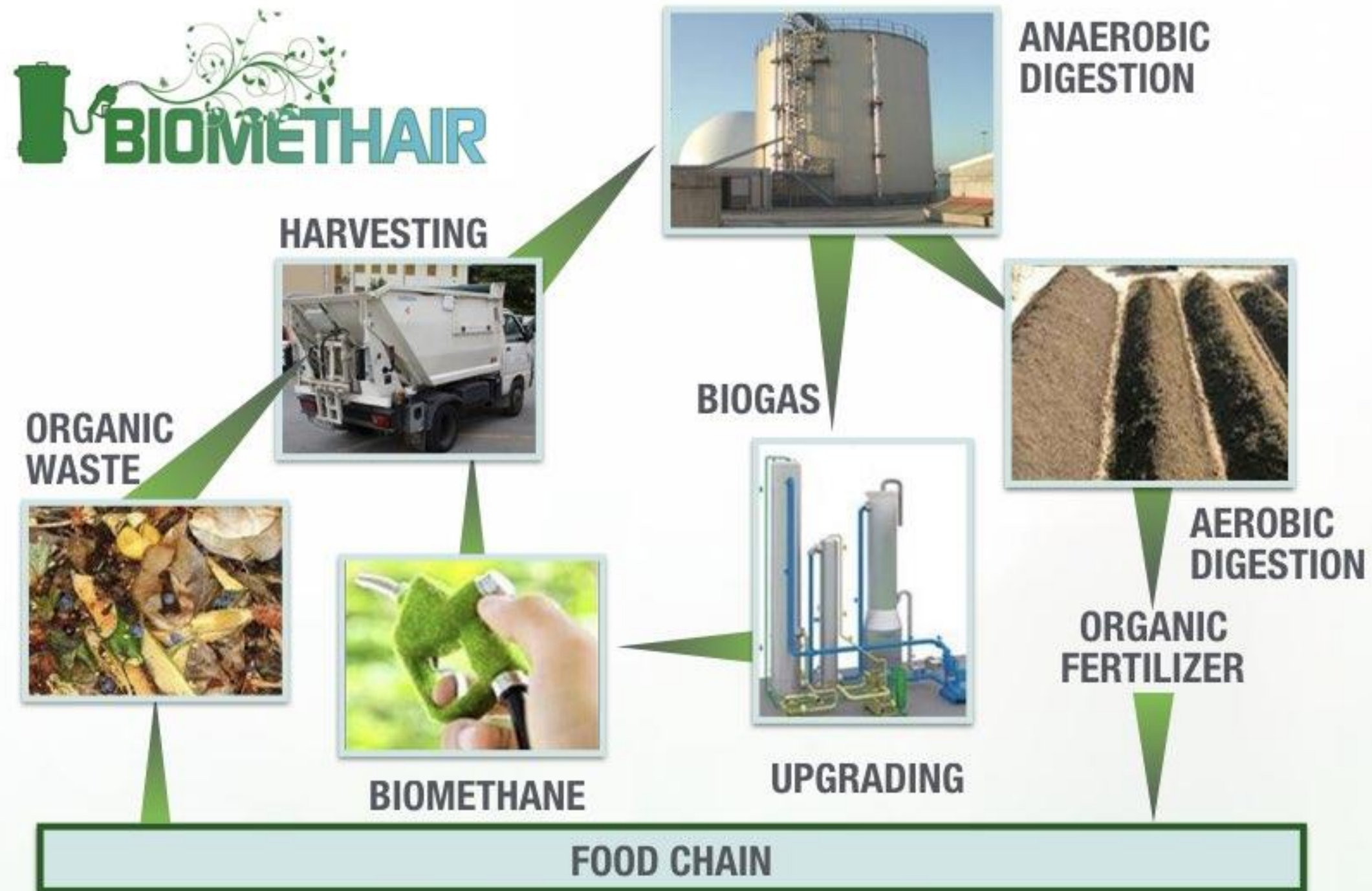
To achieve real CO₂ neutral solutions a life cycle comparison is mandatory



Yearly capability to produce biomethane in Italy is 8.5 billion cubic meter able to refuel 1/3 of total Italian vehicle fleet

The Circular Economy approach: two real examples

Italian Funding Project "Biomethair" coordinated by Fiat Research Center



Production capability =
200k ton/year feeding 400.000 Fiat Panda
with a yearly mileage of 15km - Yearly CO₂ saving
= 500 kton vs fossil CNG

BioMetaNow project between FCA and Milan urban company devoted to clean waste water



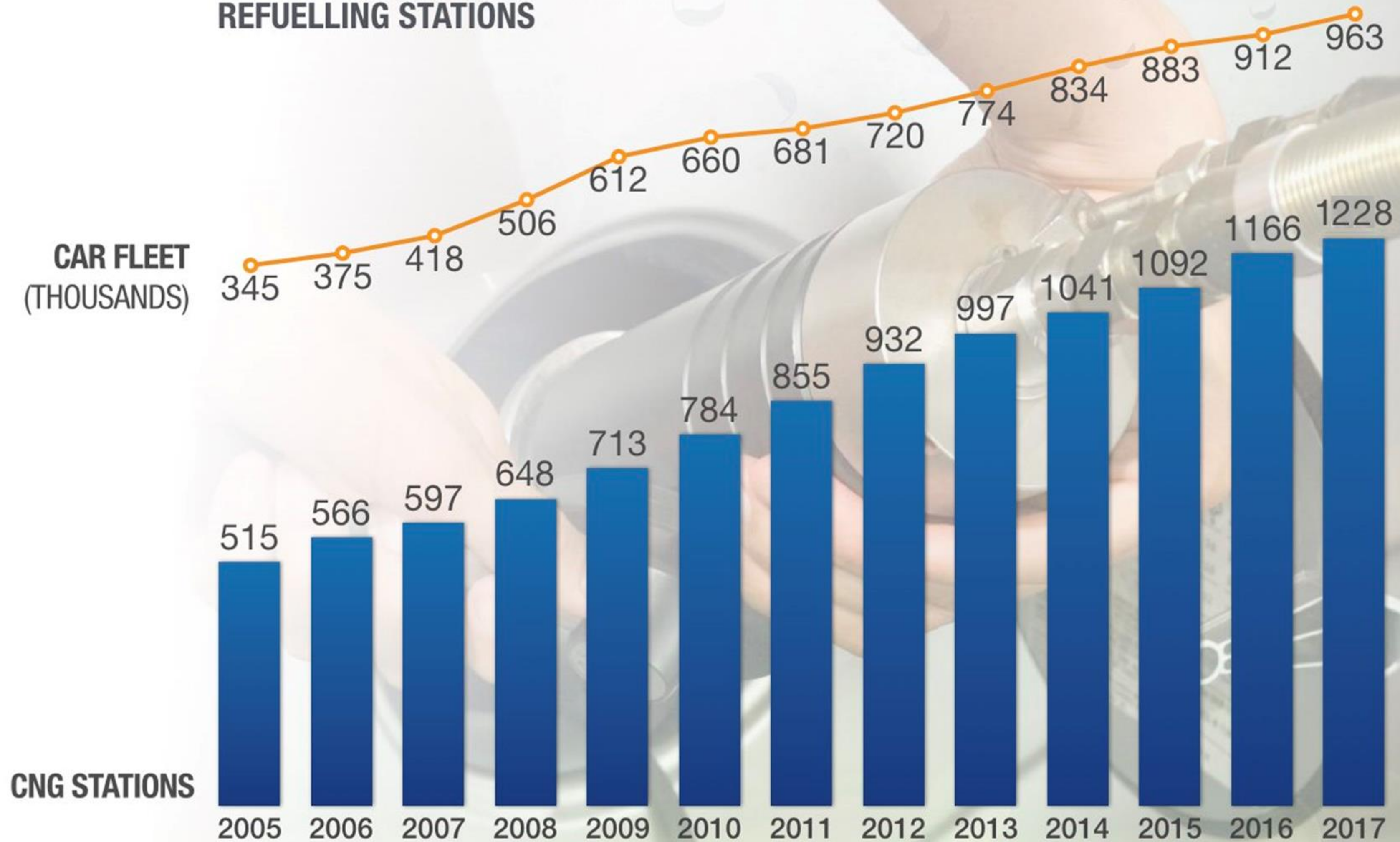
**Pure biomethane is produced by
the recycling of waste water**
(included liquid manure)

How to enhance a wider use of renewables? - Infrastructure (Italian case)

DISTRIBUTION OF CNG REFUELLING STATIONS BY REGION



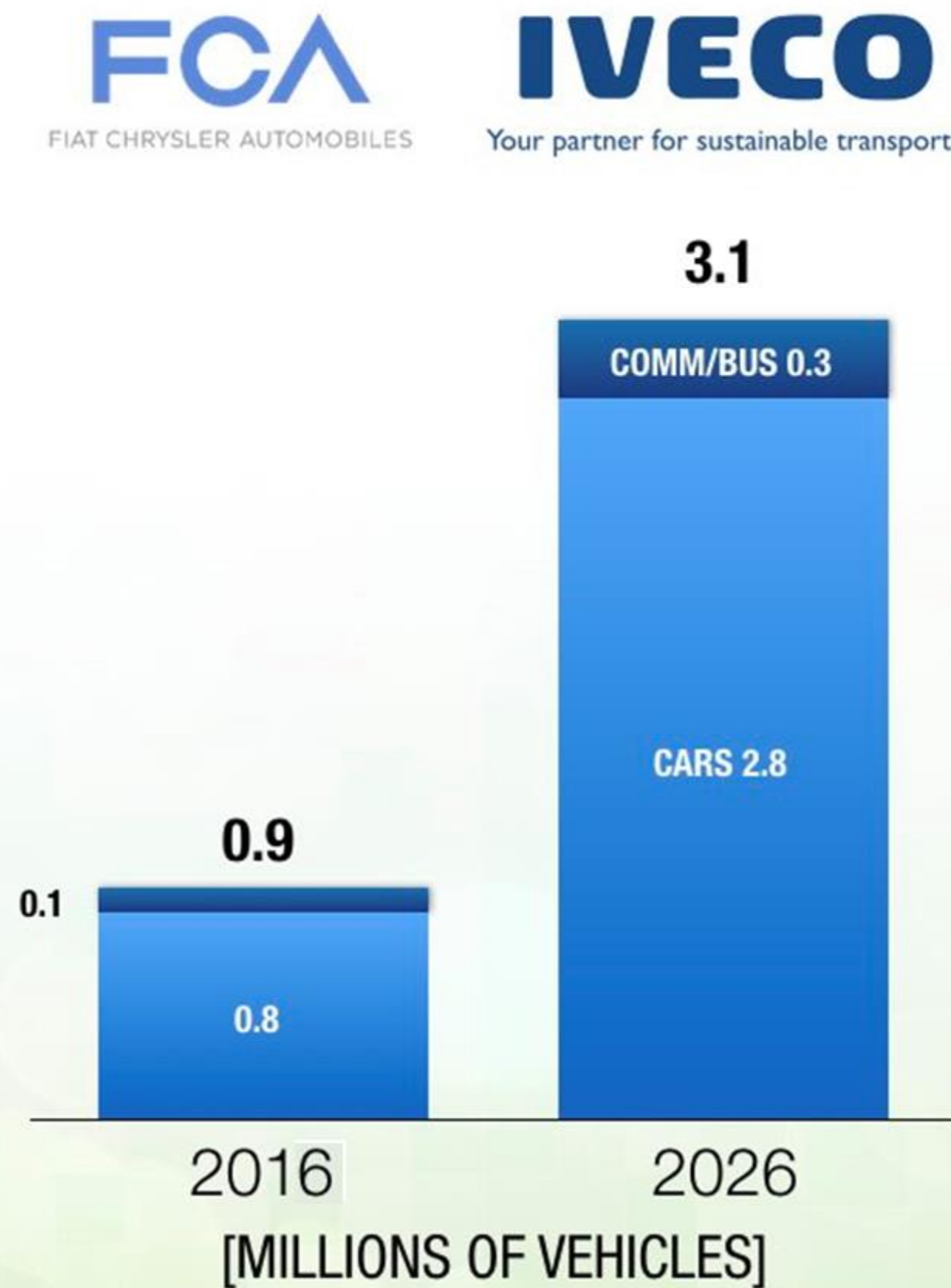
GROWTH IN CNG VEHICLES AND REFUELLING STATIONS



How to enhance a wider use of renewables? - Cooperation (Italian case)

Snam, FCA, and IVECO cooperate to optimize the development of the Italian CNG market

GROWTH IN CNG VEHICLES



FACTORS ENABLING DEVELOPMENT

- Offering a wide range of CNG vehicles
- Adaptation of the refuelling stations network, in terms of number and functionalities for light CNG vehicles, commercial vehicles and buses
- Territorial network development planning to balance regional coverage
- Expansion of the refuelling network to support increased use of CNG vehicles
- Support for the investments needed to develop the CNG refuelling stations network
- Promotion of CNG for public transport, crucial to reducing pollution in urban areas in Italy

GROWTH OF DISTRIBUTION NETWORK



Again: ICE or xEV?

Parallel pathways are needed for environment decarbonization:

- Electric vehicles, due to their CO₂-free tank to wheel emissions
- Carbon Neutral Fuels as enabler of closed loop CO₂ cycle (circular economy)

TODAY

Internal Combustion Engines

Fossil fuels

Carbon neutral fuels

Electrification

Conventional electricity

Renewable electricity

GREEN MOBILITY



CIRCULAR ECONOMY