

OIL



NATURAL  
GAS



ELECTRICITY



HYDROGEN



BIOMASS



WIND



SOLAR

# TotalEnergies

## Na cestě za energií

**Josef Paumer**  
Mobility and New Energies Manager



# 01

**TotalEnergies**

**Energy Outlook 2021**

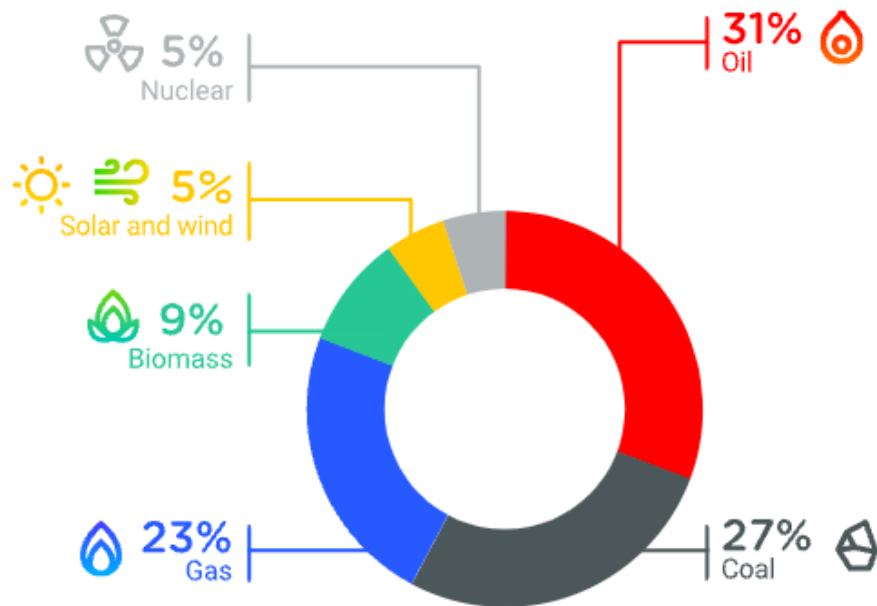


# World of energy today

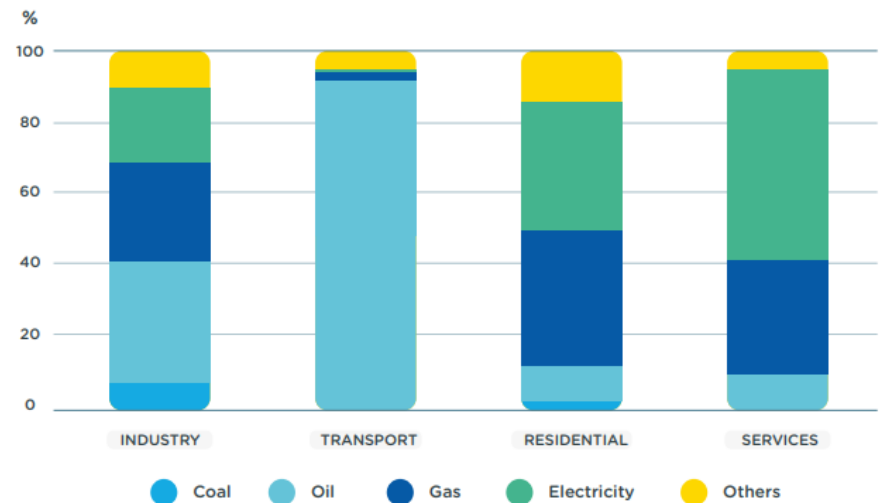
## Global energy mix

81% of energy consumed worldwide comes from fossil fuels

Global energy consumption by energy source\*



## Energy consumption by sector



# Meeting the energy needs of a growing population

World total energy demand in Momentum

PJ/d

2 000

1 000

1990 2000 2010 2020 2030 2040 2050

World  
(+0.5%)

Non-OECD  
(+1.1%)

OECD  
(-0.7%)

(CAGR\*  
2019/50)

World energy demand per capita in 2019

MJ/d/capita

400

800

OECD

World

Non-OECD



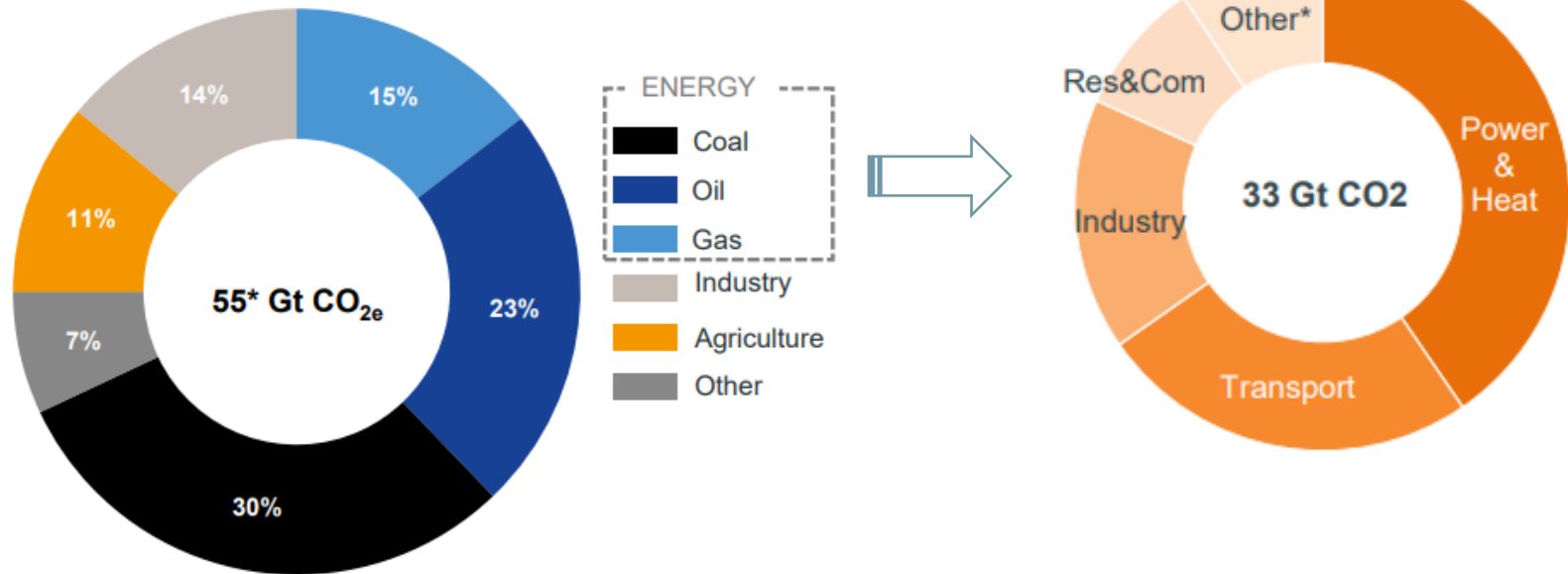
- World population will grow from 8bn today to 10bn people by 2050, driven by non-OECD countries: + 2bn
- Growing population and improving living standards will increase energy demand, again driven entirely by emerging countries

The challenge: reconciling growing energy demand with decarbonization and broader sustainable development goals

# How to curb emissions?

A collective engagement, from suppliers to consumers

Global GHG emissions in 2018 by sector in CO<sub>2</sub>eq



Energy usages contributes up to 68% of GHG emissions\*

Climate challenge requires action on all greenhouse gases and the decarbonization of energy



## Momentum scenario

### Key energy transition levers:

- Electrification and energy mix diversification in transport
- Increased penetration of clean H2
- Massive growth in power demand

# Energy Outlook 2021 – Momentum scenario

Based upon decarbonization strategies of **Net-Zero 2050 (NZ 2050) countries**, with China on-track to achieve carbon neutrality by 2060  
Announced targets & NDCs of other countries



## Momentum: market trends acceleration & NZ 2050 countries' commitments



GDP growth : +3.0%/yr  
Energy growth: +0.5%/yr

**Ban on new ICE\* sales** in NZ 2050 countries in 2035 spurring a **revolution** in transport:

- **Electrification** of light vehicles
- Increased adoption of **H2, H2-based fuels\*\* and bioenergies** in other transport segments

**Broad end-use electrification** with increasing demand for **renewable power (solar & wind)**

Large scale use of **natural gas** as a **transition fuel** especially in power & industry

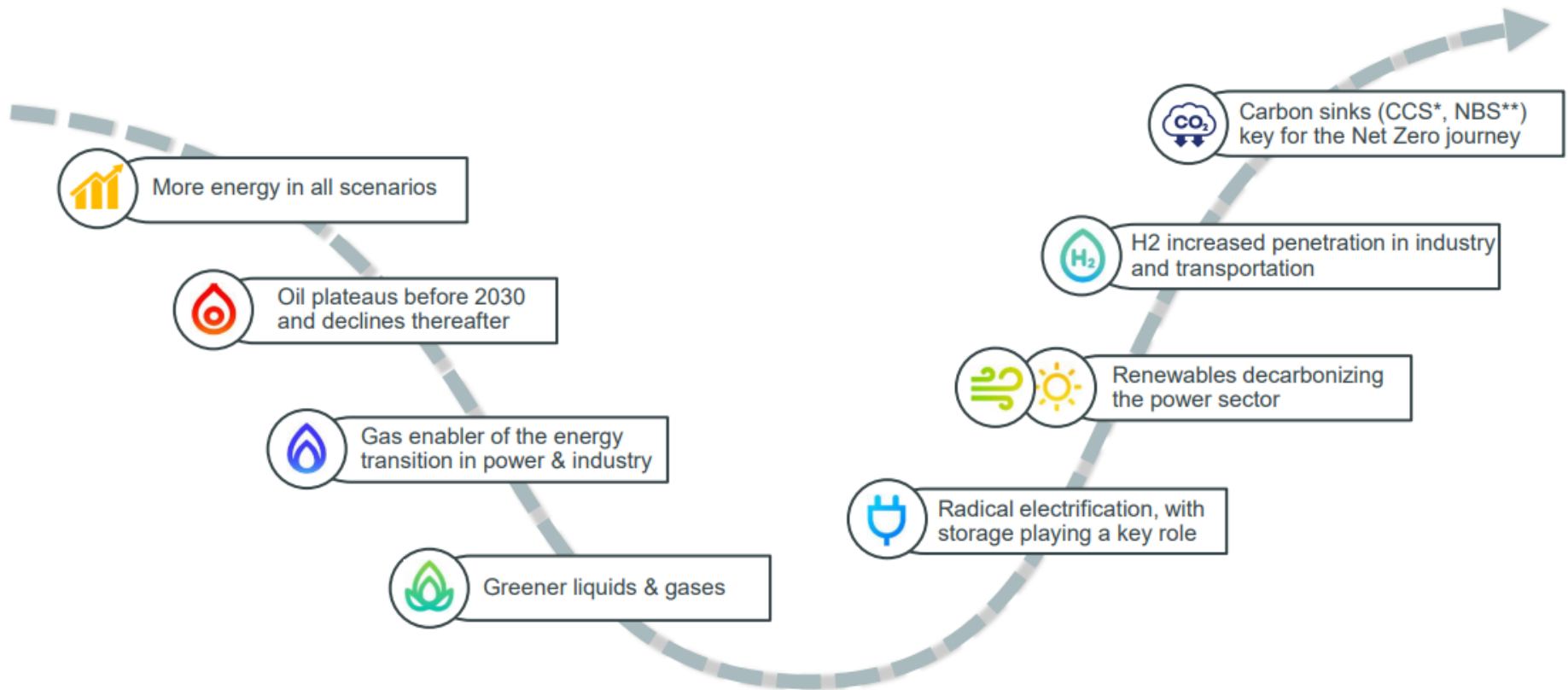
**Single-use plastic ban** in NZ 2050 countries & China from 2040 and increased plastics recycling

**China's** emissions to peak in the mid 2020's, with **~60% decarbonization by 2050**

## Temperature rising by 2.2-2.4°C in 2100

# More energy & less emissions

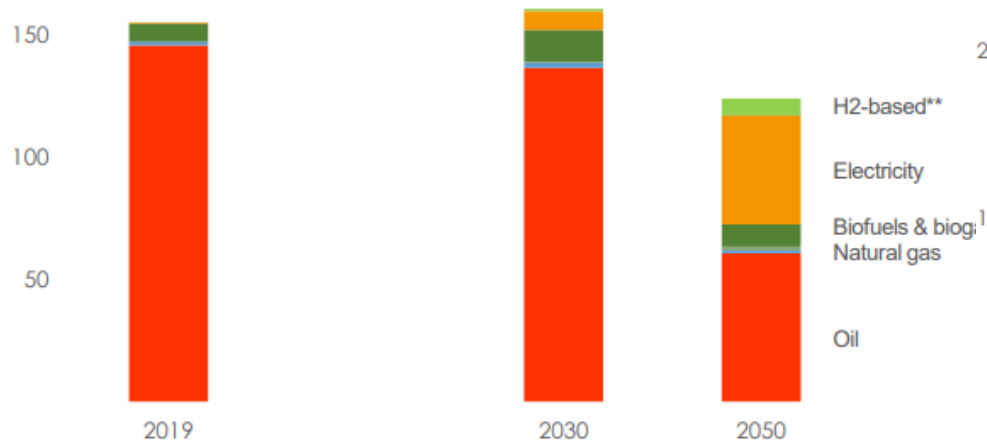
## Energy transition pathway





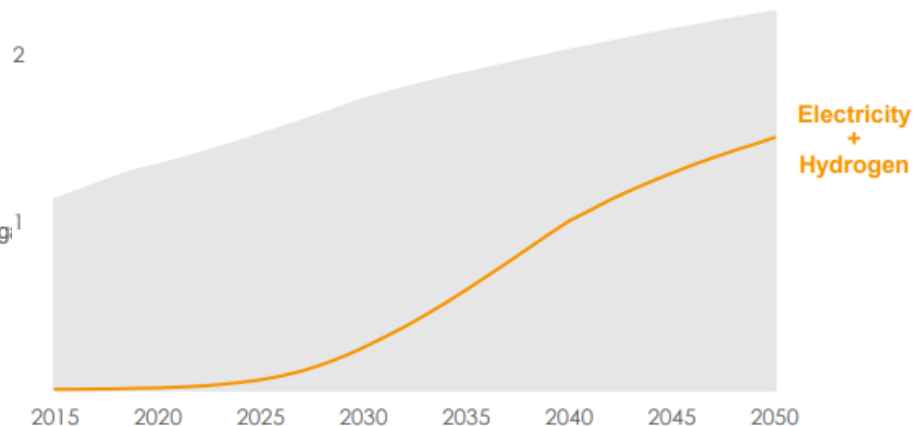
# Electrification in Light Vehicles

**Light Duty Vehicles\* final consumption (Momentum)**  
PJ/d



- LDV accounting for 47% of 2019 Transport CO2 emissions
- EV fleet accelerating after 2030, displacing oil
- Oil below 50% in 2050

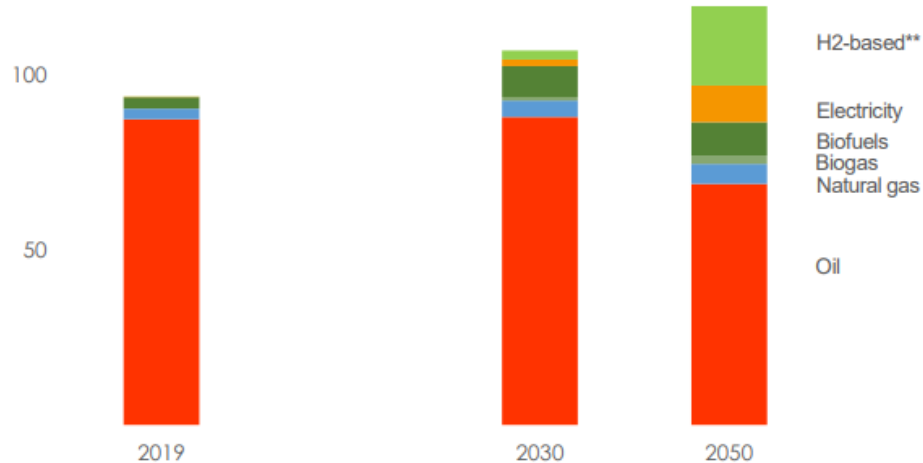
**Light Vehicles fleet (Momentum)**  
Billion



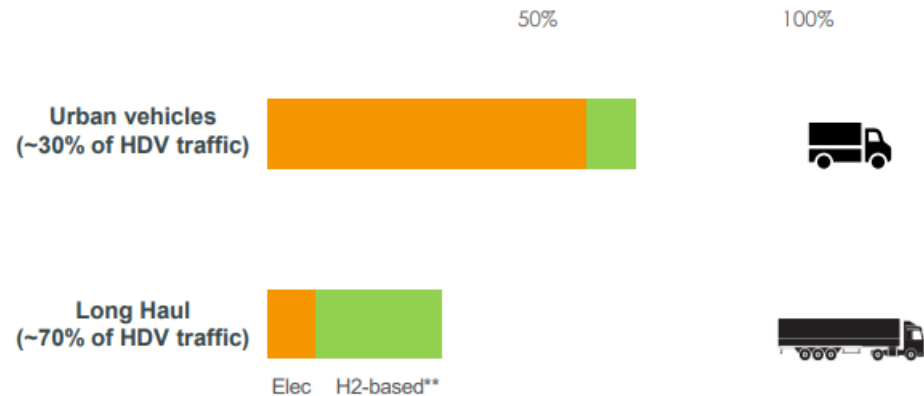
- Aggressive assumptions on EV penetration, with 2035 ICE sales ban in NZ 2050 countries
- In NZ 2050 countries, 100% of fleet converted to electricity or fuel-cells by 2050 (vs. ~90% in China)
- Such development will require massive new infrastructures (charging points and power network)

# Mix diversification in Heavy Duty Vehicles

Heavy Duty Vehicles\* final consumption (Momentum)  
PJ/d



HDV zero emissions share in traffic in 2050 (Momentum)



- HDV accounting for 28% of 2019 Transport CO2 emissions
- Fuel-cells, clean hydrogen-based fuels and bioenergies are key to decarbonize HDV, together with electricity

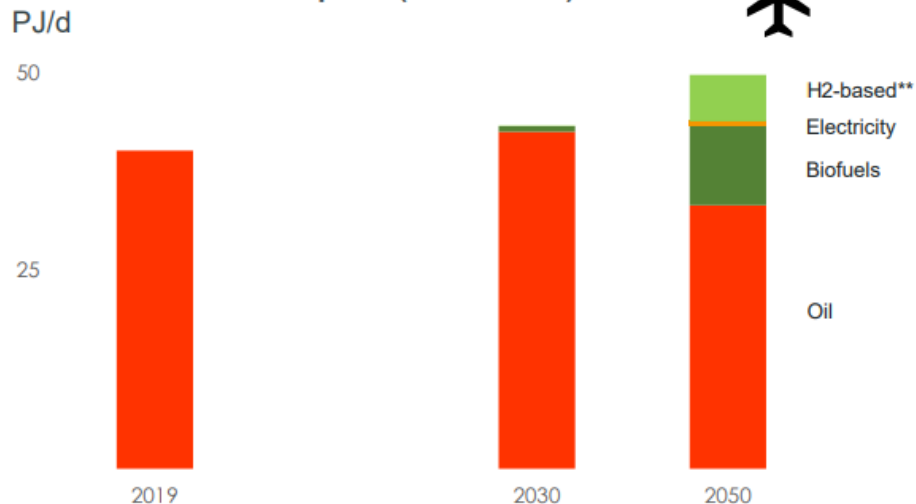
- Rapid increase of battery electric share for urban and some medium/long haul trucks
- Progressive penetration of fuel-cells and e-fuels in trucking after 2035 for long haul trips

\* HDV = Trucks + Buses + Coaches

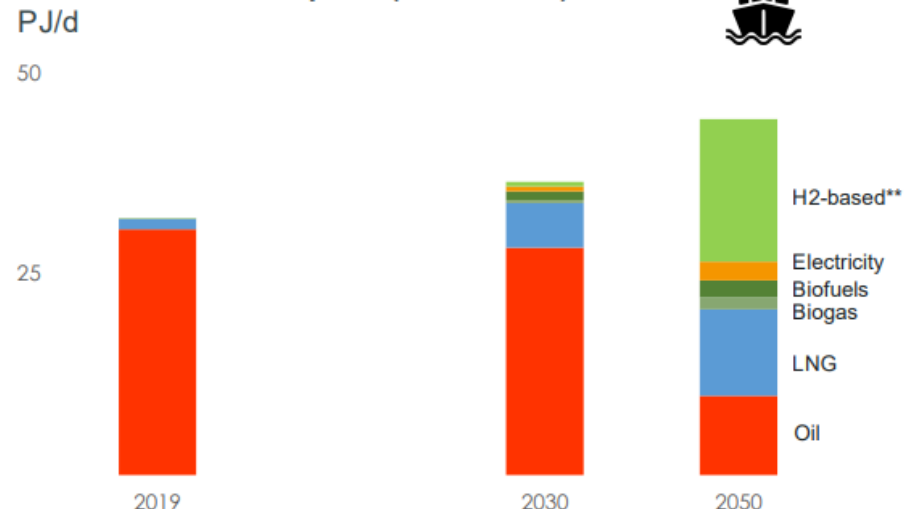
\*\* Includes H<sub>2</sub>, e-fuels (H<sub>2</sub> + CO<sub>2</sub>), methanol, ammonia...

# Multiple decarbonization paths in Aviation & Marine

**Aviation final consumption (Momentum)**



**Marine final consumption (Momentum)**



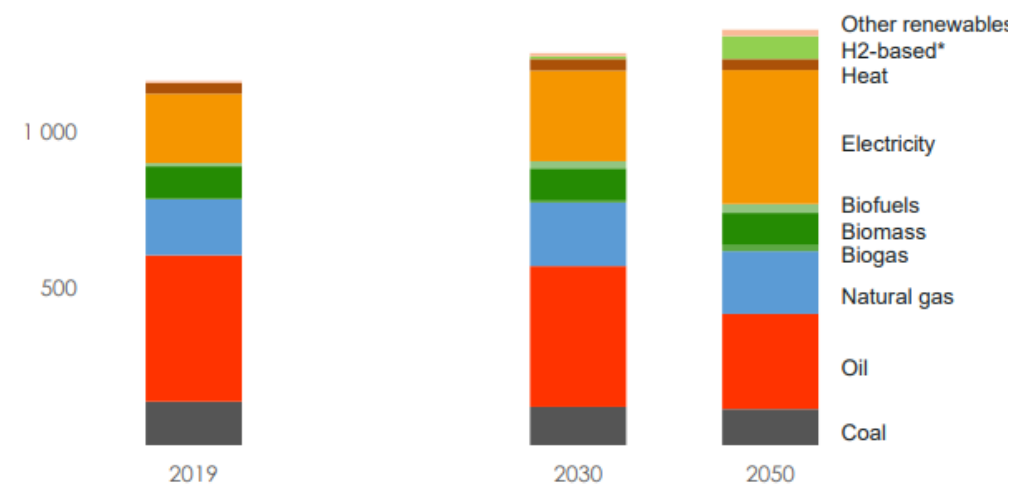
- Aviation accounting for 13% of 2019 Transport CO<sub>2</sub> emissions
- To be decarbonized, aviation needs large scale low-carbon liquids (Sustainable Aviation Fuels\*), as electricity will remain marginal

- Marine accounting for 10% of 2019 Transport CO<sub>2</sub> emissions
- LNG, moving to bio-LNG, part of the transition pathway together with clean H<sub>2</sub>-based fuels (methanol, ammonia,...)

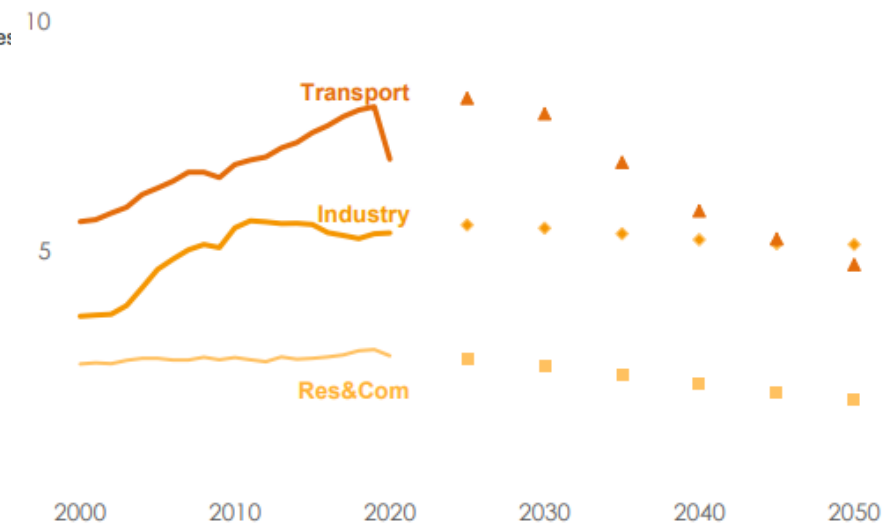
# Momentum: World Total Final Consumption

Electricity becomes the #1 source of end-user energy in the early 2040s

Total final consumption  
PJ/d



CO2 emissions by sector  
Gt



- Steady growth of end-use energy demand by 2050 (0.4% p.a.) with a strong change of the energy mix
- Fossil fuels share down from 2/3 to less than half

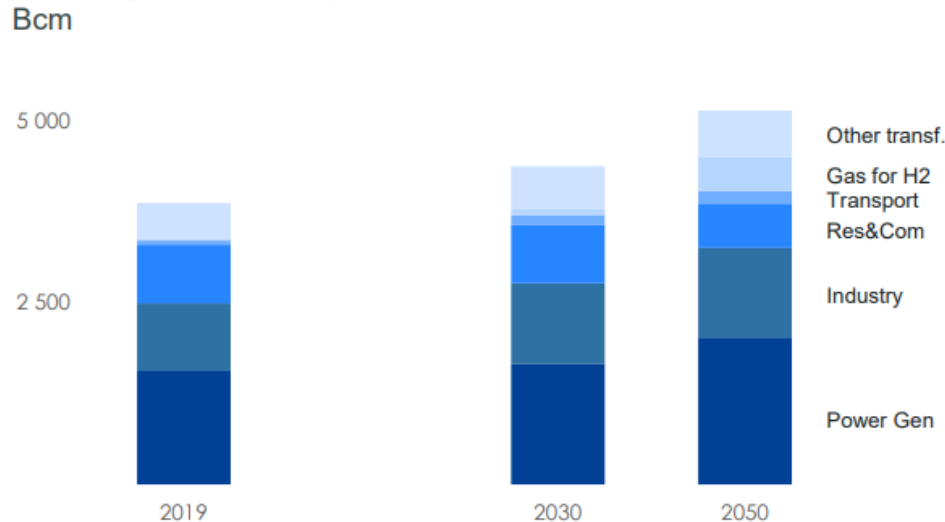
- Transport, n°1 end-user emitting sector today, accounts for the bulk of CO2 abatements by 2050

\* Includes H2, e-fuels (H2 + CO2), methanol, ammonia...

# Momentum: World Oil & Natural Gas

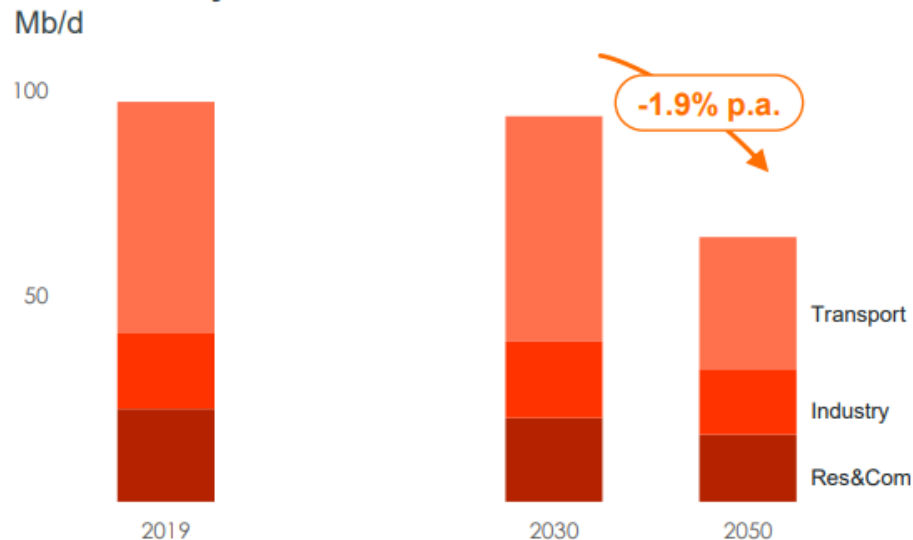
Natural gas key for energy transition, while oil starts decreasing after 2030

Natural gas demand by sector



- Natural gas is a key transition fuel, growing by  $\sim +1\%/yr$  to 2050
- Natural gas to displace coal in Power and Industry
- Power generation accounts for  $>1/3$  of gas demand growth, as does gas for blue H2 production

Oil demand by sector



- Acceleration of transport revolution drives oil decrease after 2030
- NZ 2050 countries regulations and SUP ban further reduce demand
- Decrease in demand post-2030 lower than the natural decline of producing oil fields



# 02

**TotalEnergies, a  
multi-energy company**

**Our Ambition &  
4 Levers to Get Net  
Zero by 2050**

More energy,  
less emissions,  
always more sustainable

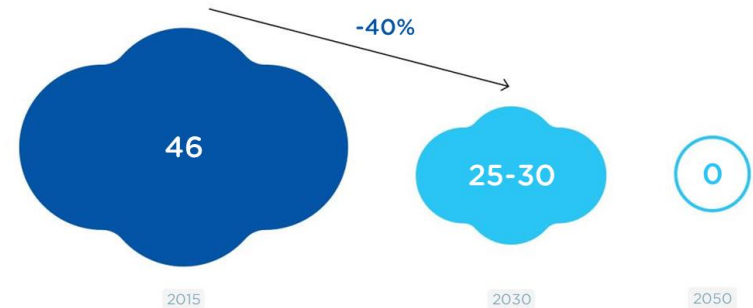


# Our ambition towards future

- To get to net zero emissions across our global operations by 2050
- Transform TotalEnergies into a broad energy company and a major player in the energy transition
- By moving to new energies, encourage our customers to change their consumption habits, prefer energy efficiency and turn to low-carbon solutions first

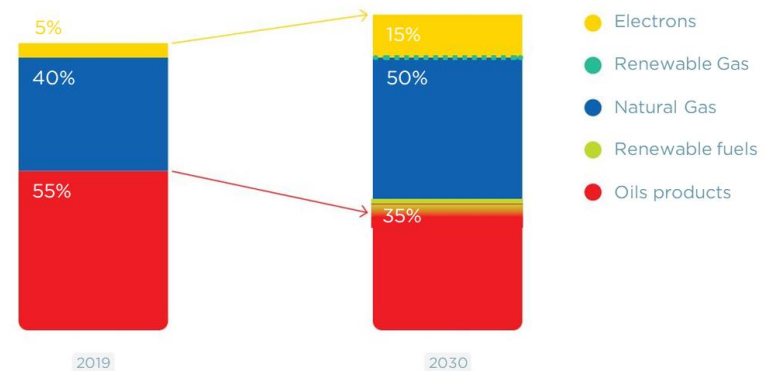
## OUR AMBITION TO REACH CARBON NEUTRALITY

Reduce our direct emissions to Net Zero by 2050  
(in MtCO<sub>2</sub>e)



## OUR TRANSFORMATION INTO A BROAD ENERGY COMPANY

Energy sold to our customers  
(% in sales)





# 1

## Electricity

Being a Key Player Across  
the Value Chain

Electricity is the energy of the 21st century. In the coming decades, electricity demand will grow faster than overall energy demand. Because we want to respond responsibly, we are investing massively in solar and wind power in order to become one of the global top five producers of renewable energy by 2030. We are developing a portfolio of operations across the electricity value chain to ensure that electricity accounts for 40% of our sales mix by 2050.



# Electrons - Beyeing a Key Player Across the Value Chain

## Developing Our Renewable Electricity Production Capacity

### Renewable Energies (gross capacity in Gigawatt)



\*100 GW is almost twice the installed capacity of the French nuclear fleet (60 GW)

AMONG THE WORLD'S TOP 5  
IN RENEWABLE ENERGIES BY 2030

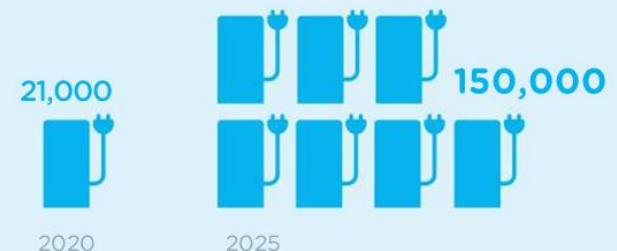
## From Production to Marketing

12 MILLIONS CUSTOMERS IN  
EUROPE BY 2025

### Gas & Power customers (in Millions)










### EV Charge Points



# Electrons - Buying a Key Player Across the Value Chain

## TotalEnergies and Electric Mobility

TotalEnergies charge points  
in large cities and urban areas

		Charge points
2019	 Metropolitan Region Amsterdam	20,000
2020	 London	1,700
	 Paris	2,300
2021	 Amsterdam	2,000
	 Antwerp	3,000
	 Singapore	1,500
	 Hubei	> 11,000





# 2

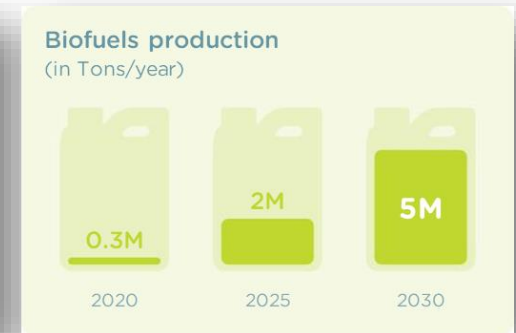
## Gas

### Leveraging Natural Gas to Drive the Energy Transition

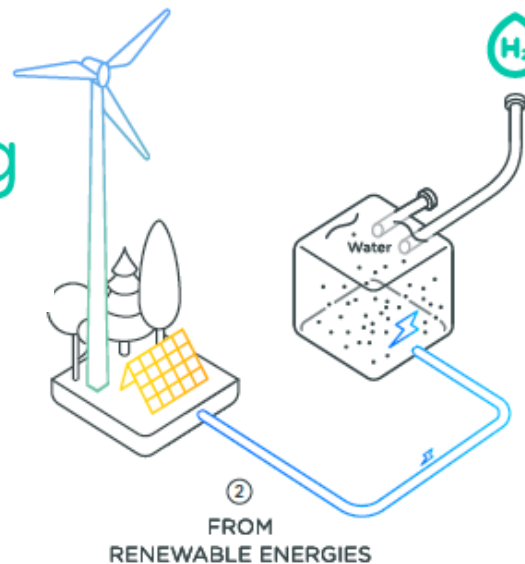
TotalEnergies is the world's second-largest global LNG player, and natural gas is a front-line component of our offering. Natural gas is the least greenhouse-gas-emitting fossil energy and a key partner to inherently intermittent renewable energies. It's also the best solution for decarbonizing maritime and road transportation, which emit considerable amounts of CO<sub>2</sub>. For gas to fully play its role in the energy transition, we are constantly working to reduce methane emissions – from our own facilities on through to the end customer – and investing in renewable gas.

# Gas – Leveraging Natural Gas to Drive the Energy Transition

## Accelerating in Renewable Gas



## Hydrogen, a Promising Energy Carrier



### Green hydrogen

Green hydrogen is produced via water electrolysis using renewable energies. Green hydrogen has the most attractive potential for the future.

### GREEN HYDROGEN'S FOUR AREAS OF APPLICATION

- It can be injected into natural gas networks, thereby helping to decarbonize them.
- It offsets the intermittent nature of renewable energies by offering a storage solution.
- It promotes the development of electric mobility when combined with a fuel cell.
- It helps decarbonize industrial processes.



# 3

## Liquids

### Satisfying Global Demand and Decarbonizing Petroleum Products

Getting to a net zero society will require deep changes in the global energy mix. While oil consumption will stabilize and then decline, the world will still need hydrocarbons in the coming decades to meet rising energy demand. That's why we are continuing to develop new oil projects that are balanced in terms of cost and carbon intensity. At the same time, we are further reducing emissions related to the production and use of oil by avoiding the release of greenhouse gases into the atmosphere, making our facilities more energy efficient and developing renewable fuels such as renewable diesel and sustainable aviation fuel.



# Liquids – Satisfying Global Demand and Decarbonizing Petroleum Products

Selective  
and Sustainable  
Oil Production



We are continuing develop new oil projects, but strictly balanced in terms of cost and carbon intensity

Avoiding and  
Reducing Emissions  
at Our Industrial Sites



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100%

Renewable energies will cover 100% of our electricity needs in Europe by 2025, helping us keep nearly 2 million tons of CO<sub>2</sub> per year out of the atmosphere.

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Developing Our Offering  
of Renewable Fuels



A new generation of synthetic fuels known as e-fuels are in the experimental R&D stage. Made using low-carbon electricity and CO<sub>2</sub> captured from the atmosphere or biomass, they are carbon neutral and will be able to be blended with fossil-based fuels in unlimited proportions.

# Liquids – Satisfying Global Demand and Decarbonizing Petroleum Products

HVO

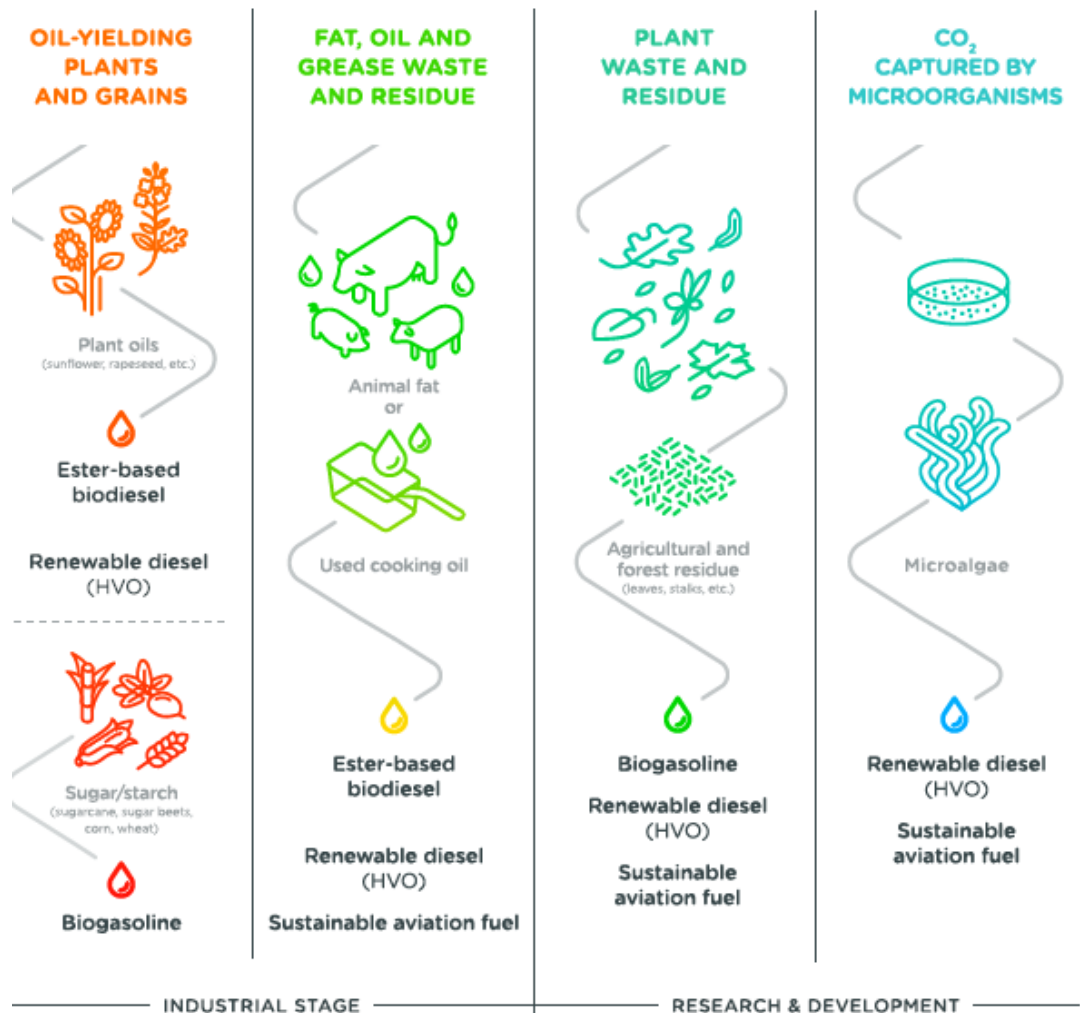
SUSTAINABLE  
AVIATION FUEL

HVO (2)

BIOGASOLINE

HVO (3)

SUSTAINABLE  
AVIATION FUEL





# 4

## Carbon Storage

### Investing in Carbon Sinks

In addition to our initiatives to reduce our greenhouse gas emissions and the carbon intensity of the products we sell, sequestering carbon is a critical driver for getting to net zero by 2050. This means carbon sinks have a crucial role to play. For more than 10 years, we have been forging partnerships to accelerate carbon capture and storage research and projects. We are also investing in natural carbon sinks such as forests and regenerative agriculture.



# Carbon Storage – Investing in Carbon Sinks

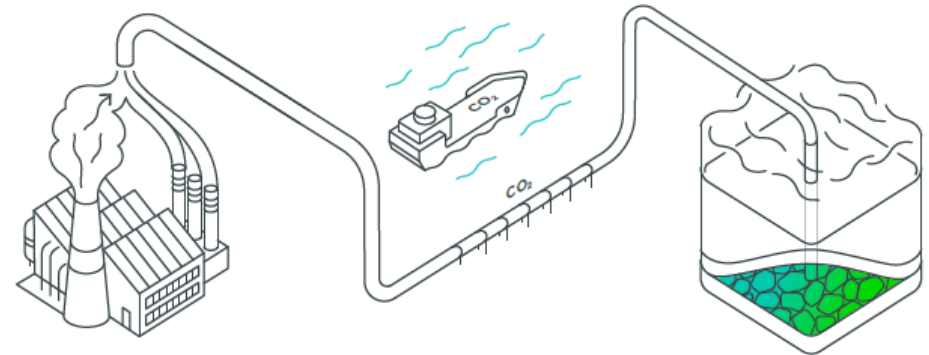
## Creating a Carbon Capture and Storage Value Chain

To get to net zero by 2050, we are co-developing large-scale sustainable carbon capture and storage (CCS) solutions.

**\$100M**

Annual amount devoted to CCS R&D and industrial pilot projects by TotalEnergies

## The Three Steps of Carbon Capture and Storage



1

**CAPTURE**

CO<sub>2</sub> is captured directly from stack emissions at industrial sites where it is separated from other flue gas components.

2

**TRANSPORTATION**

Once it has been compressed or liquefied, the CO<sub>2</sub> is transported by pipeline or ship to the place of storage.

3

**STORAGE**

The CO<sub>2</sub> is injected into impermeable rock formations more than 1,000 meters below the surface for permanent storage. These formations include salt aquifers and depleted oil and gas reservoirs.



**TotalEnergies**

**Děkuji**