Turning Biomass into Watts: The Importance of Biomass in the 2030 Energy Mix of the CEE Region

Future role of biofuels in the transport sector

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Content

- Introduction
- Biofuel generations
- Biofuel production
- Fuel vs food
- Policy framework
- Conclusions

Introduction

Basic principle:

$$S = f(E, \eta(Tc), \eta(Tis))$$

Service:
km driven

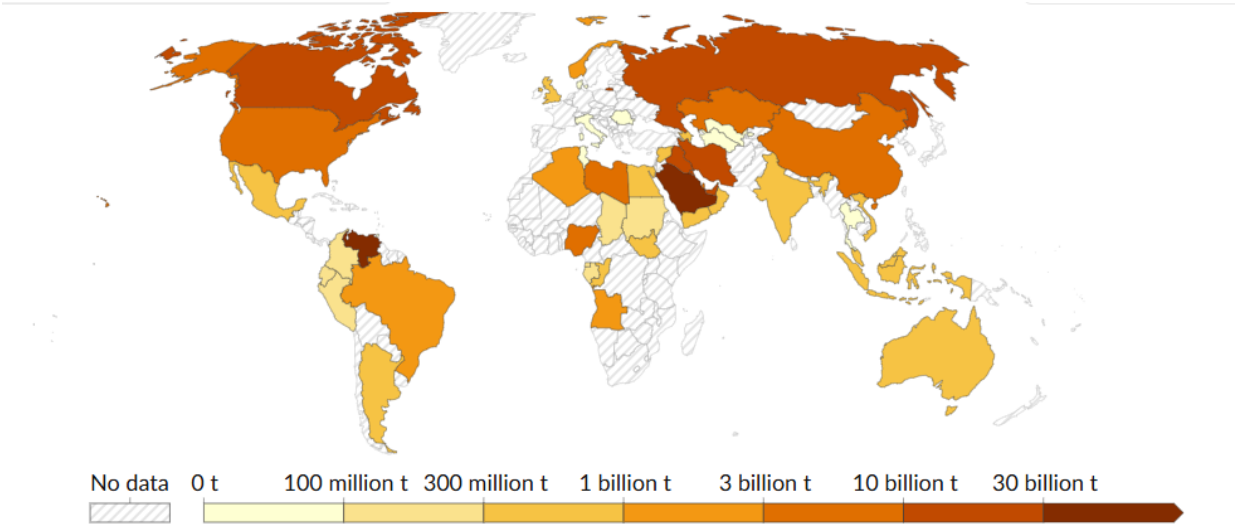
Fuel mix,
Fuel demand

Efficiency:
Liter/100 km

Infrastructur

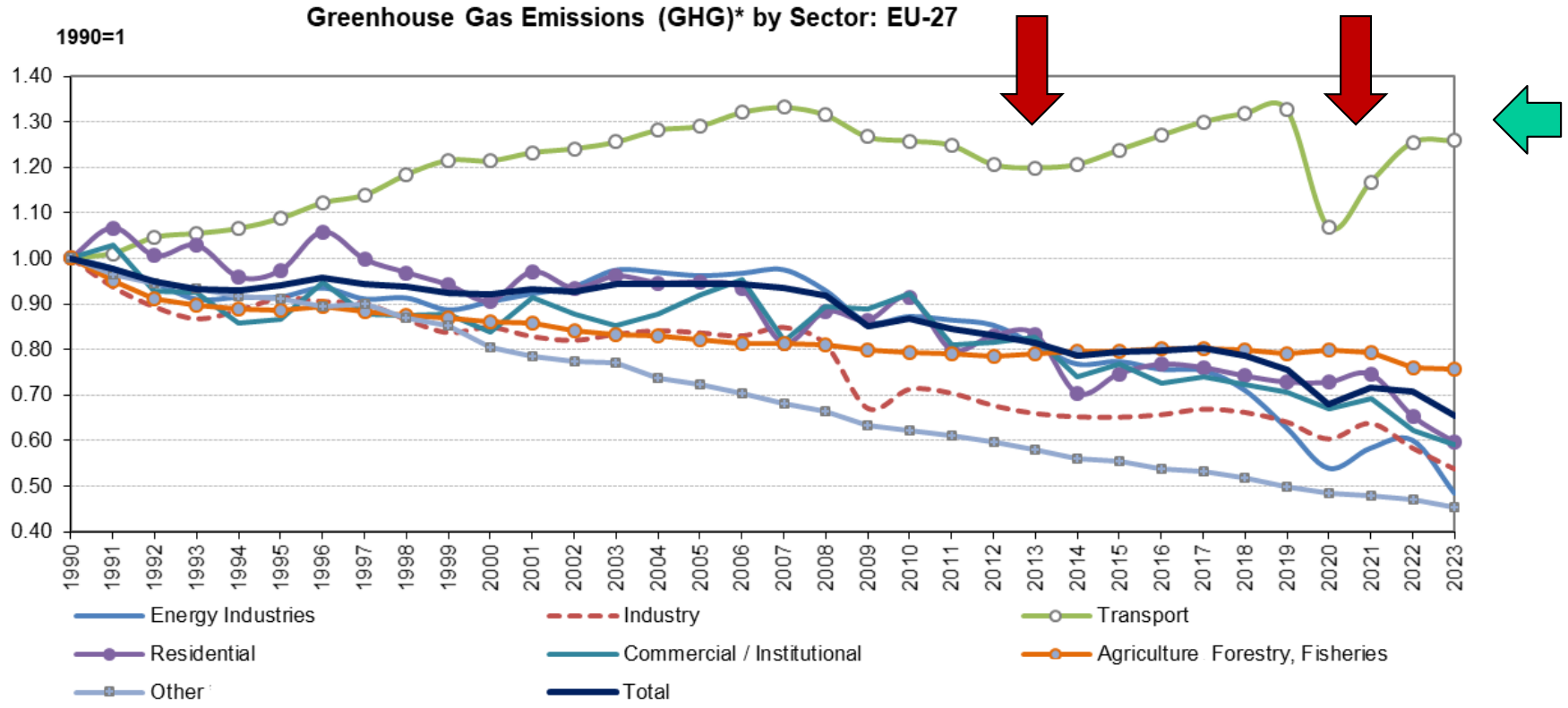
Transport sector

- oil products
- least-diversified
- energy import dependency



Oil reserves

GHG


Greenhouse Gas Emissions (GHG)* by Sector: EU-27
1990=1
1.40
1.30
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023
Energy Industries
Industry
Transport
Residential
Commercial / Institutional
Agriculture Forestry, Fisheries
Other
Total

Biofuels

- **Liquid or gaseous fuels for transport produced from biomass**

Biofuels

Mature biofuels
1st generation biofuels

Immature biofuels
2nd generation biofuels
(from lignocellulose)

Biofuels in labour stage
3rd generation biofuels
(from algae)

Long term possibility
4th generation biofuels
(from genetically manipulated feedstocks)

Biofuels

1st generation biofuels

Bioethanol is mostly produced from wheat, corn, sugar beet and sugar cane.

Biodiesel is produced from different kinds of vegetable oil (e.g. rape seed, sunflower, and soybean).

Biofuels

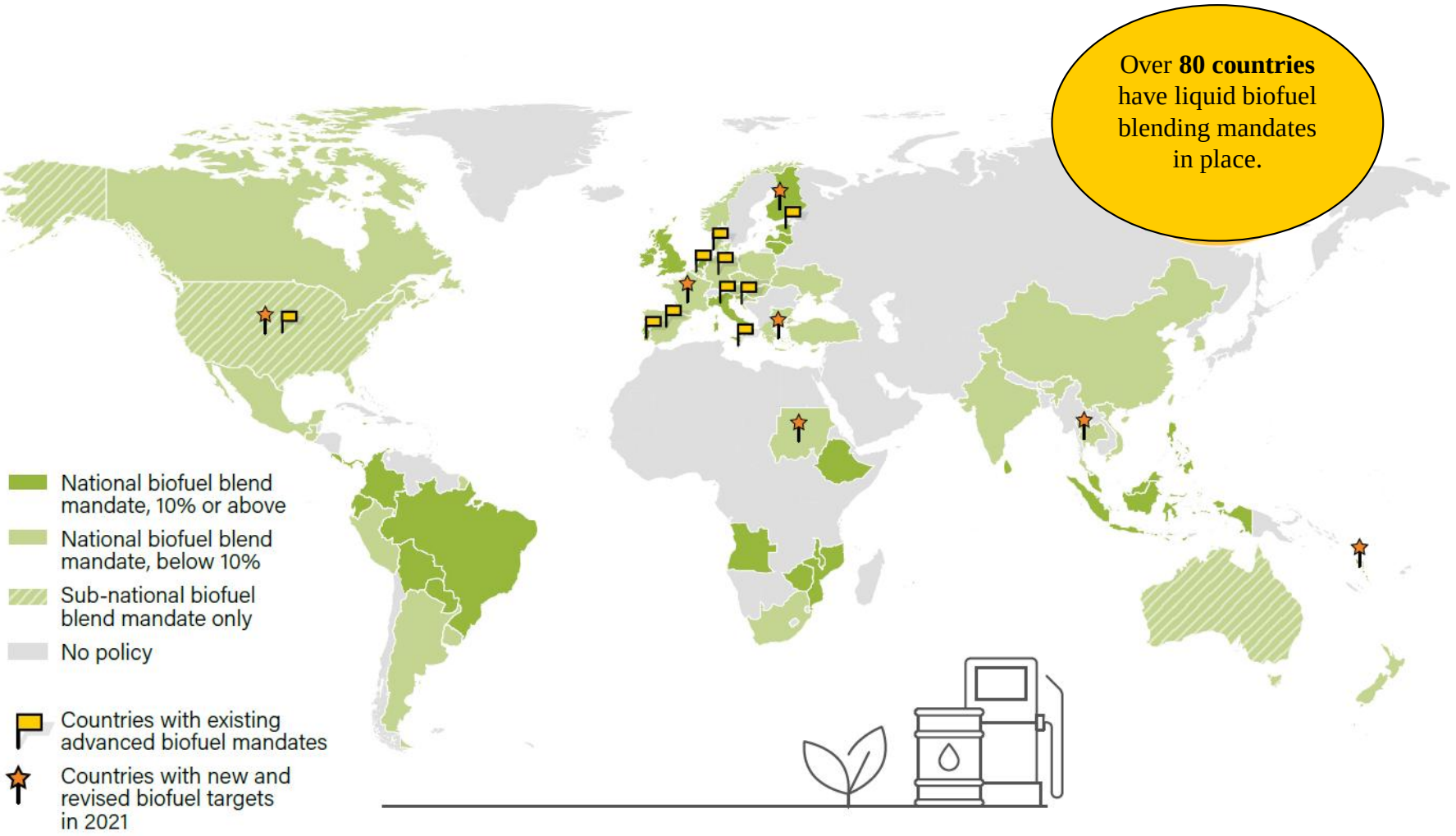
•**Bioethanol blends**:
Bioethanol can be easily blended with gasoline in various proportions, ranging from low-level blends (e.g., E10, containing 10% ethanol) to high-level blends (e.g., E85, containing up to 85% ethanol).

• **High bioethanol blends:**
These blends reach 85 % bioethanol content in gasoline. They require special engine modifications and have widely been used in flexible fuel vehicles (FFV).

• **Biodiesel:**

Biodiesel can be blended and used in many different concentrations. The most common are B5 (up to 5% biodiesel) and B20 (6% to 20% biodiesel). B100 (pure biodiesel) is typically used as a blendstock to produce lower percentage blends and is rarely used as a transportation fuel.

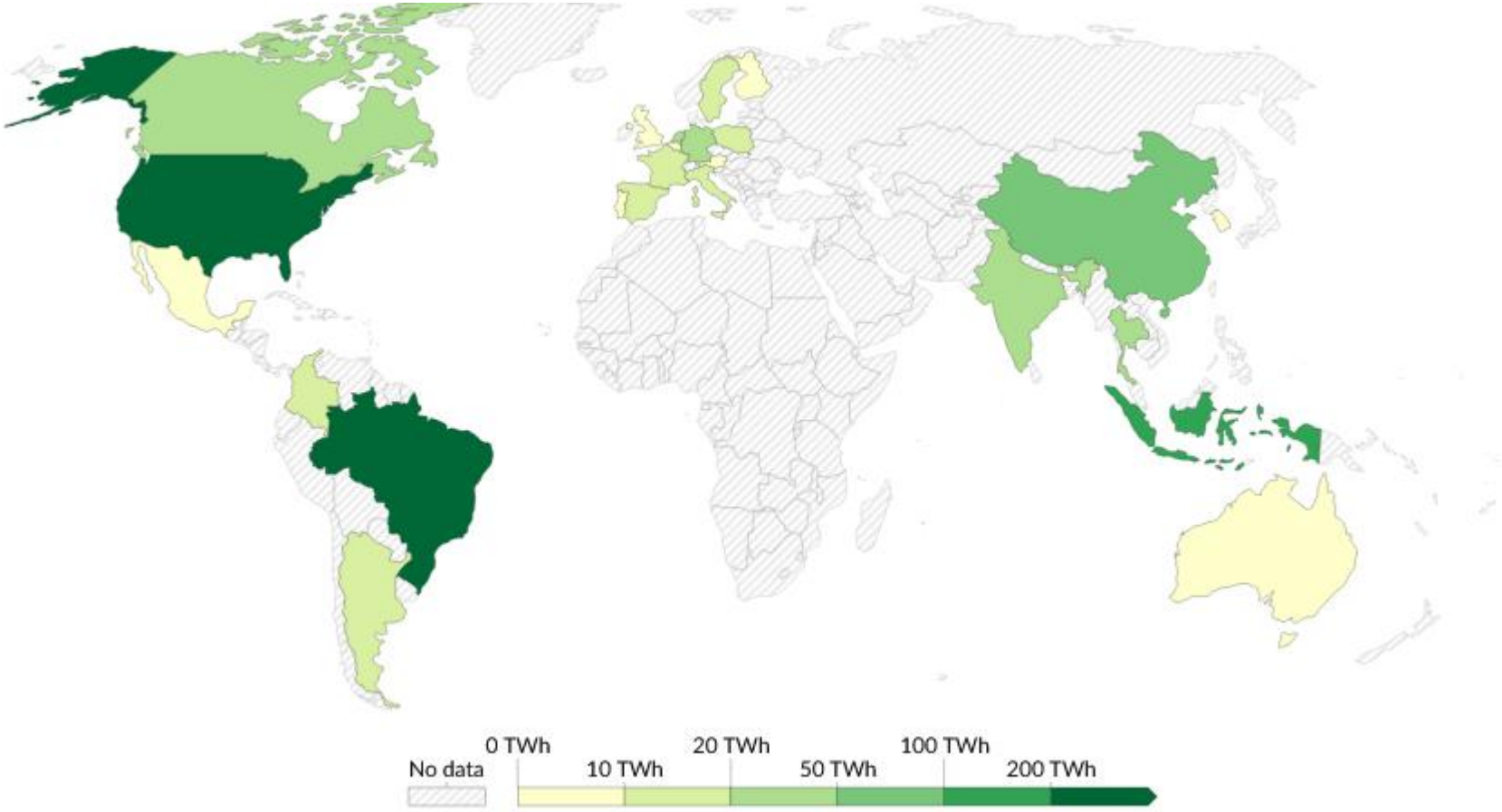
Biofuel Mandates and Targets



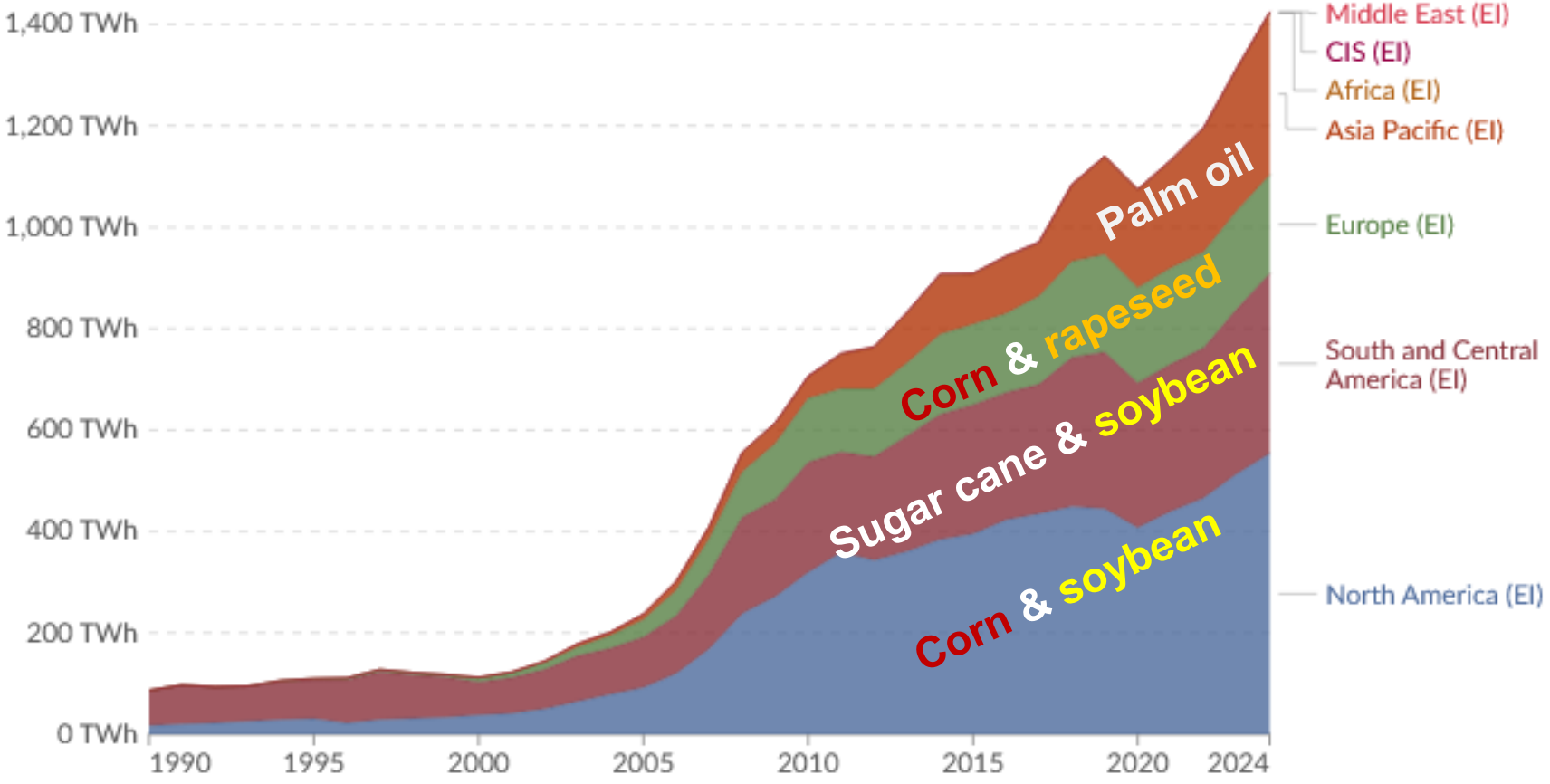
Biofuel energy production, AT

The role of biofuels in transport was relatively stable around 5% (by energy) in the past decade, with a general use of B7 as diesel fuel (containing up to 7% biodiesel by volume) and E5 as gasoline fuel (containing up to 5% bioethanol by volume).

Biofuel energy production, 2024

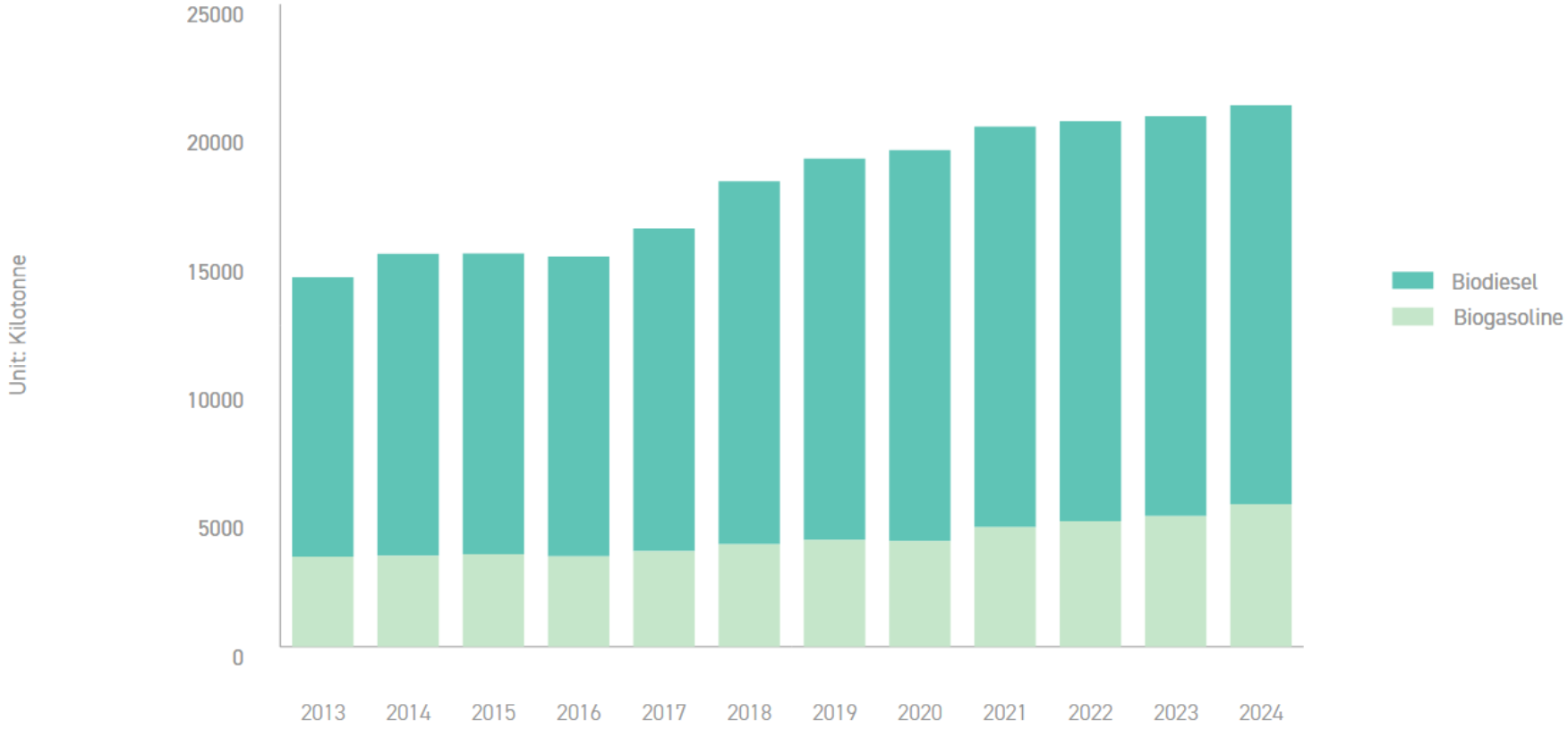


Biofuel production by region

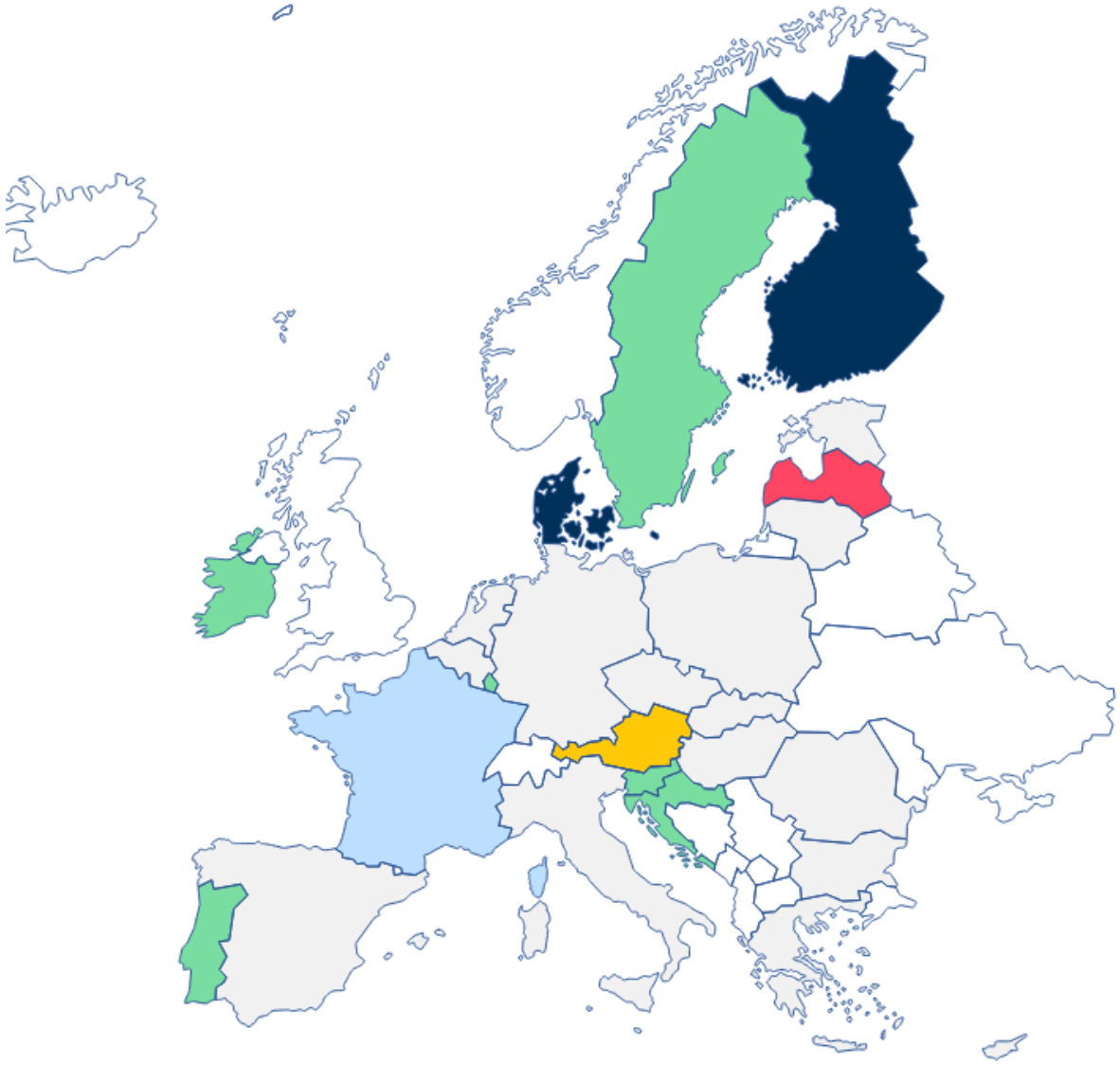


Our World in Data

Evolution of biofuel demand in the EU-27



Tax incentives for biofuels in transport in EU-27



No tax incentive:

Biofuels do not benefit from any tax advantages compared to fossil fuels.

Taxation based on the energy/CO_2 content:

Biofuels are taxed according to their energy content (calorific value) and their average CO_2 emissions.

No excise duty/exempted from certain taxes (components):

Biofuels are not subject to excise duties or are exempt from certain taxes. E.g. Exemption from carbon tax.

Lower tax for low biofuels blends:

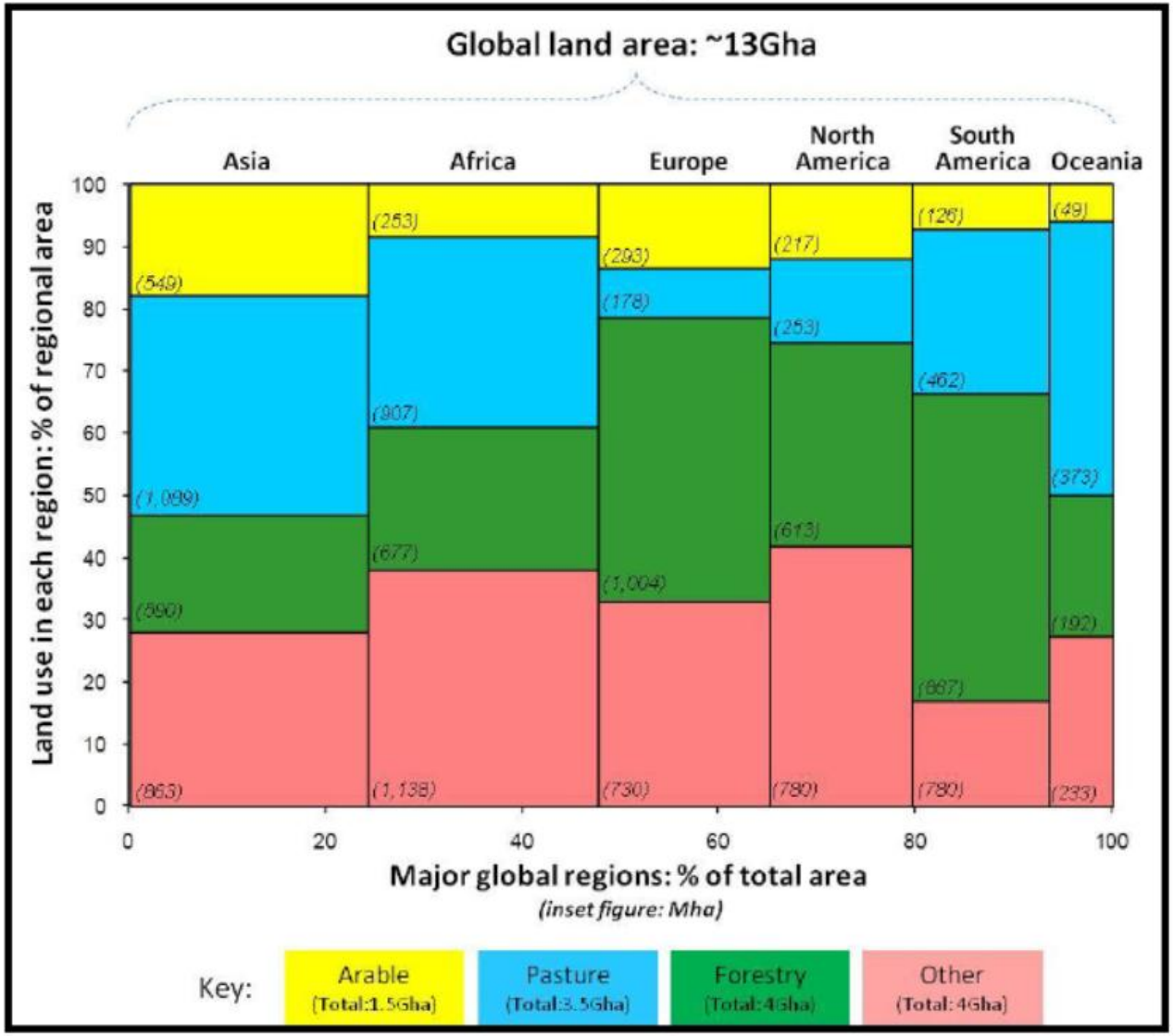
Lower taxation rates are applied to biofuel blends with a percentage of fossil fuel content above 70%.

Lower tax for high biofuels blends:

Lower taxation rates are applied to biofuel blends with a percentage of fossil fuel content below 70%.

Lower tax for high and low biofuels blends

World land use



Source: (Slade *et al.*, 2011; based on FAO database).

New challenges / risks

+ Reduction of GHG emissions

+ Energy security

+ Rural development

- Food and fuel competition

- Sustainability….risk of increase in GHG emissions – LUC

- Risks of degradation of land, forests, water resources and ecosystems - associated with use of freshwater, fertilizers and pesticides

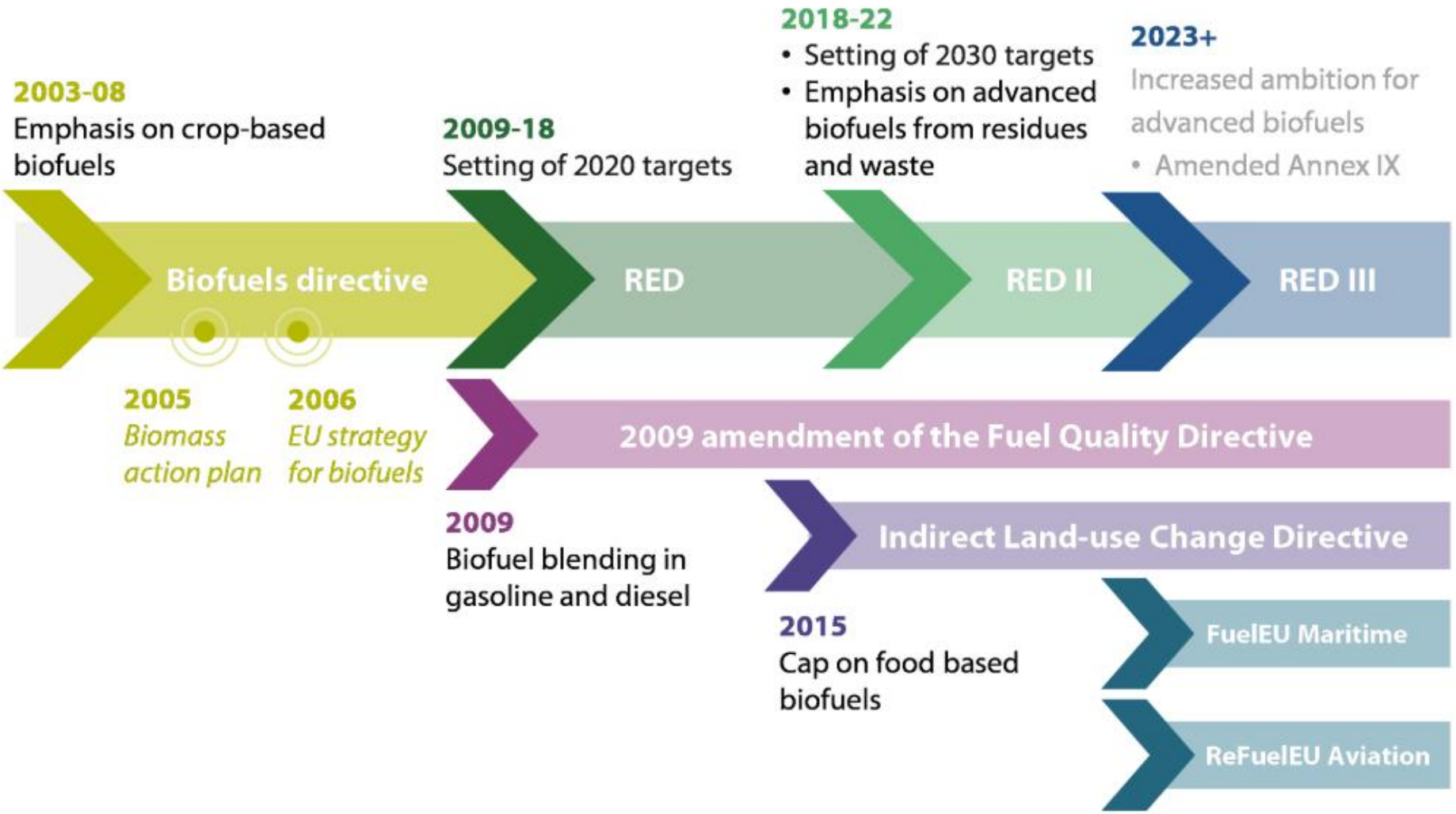
- Economic viability…oil price (2. gen biofuels)

August 2005

December 2007

April 2008

Policy framework



Source: ECA.

EU policy

EU - the first climate-neutral continent by 2050

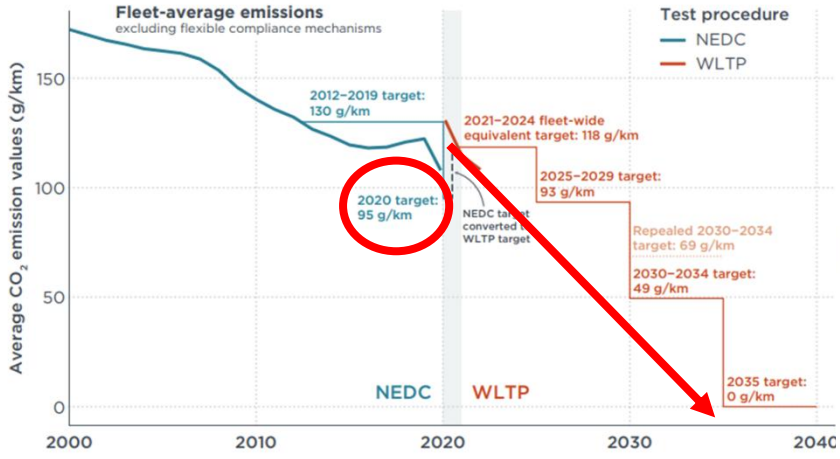
European Green Deal

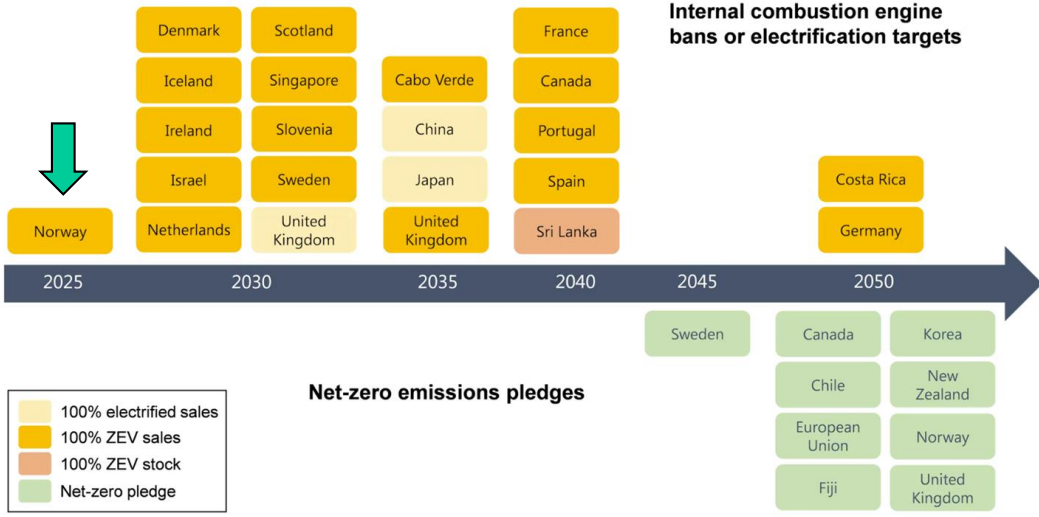
Sustainable and Smart Mobility Strategy

at least 30 million zero-emission cars will be in operation on European roads

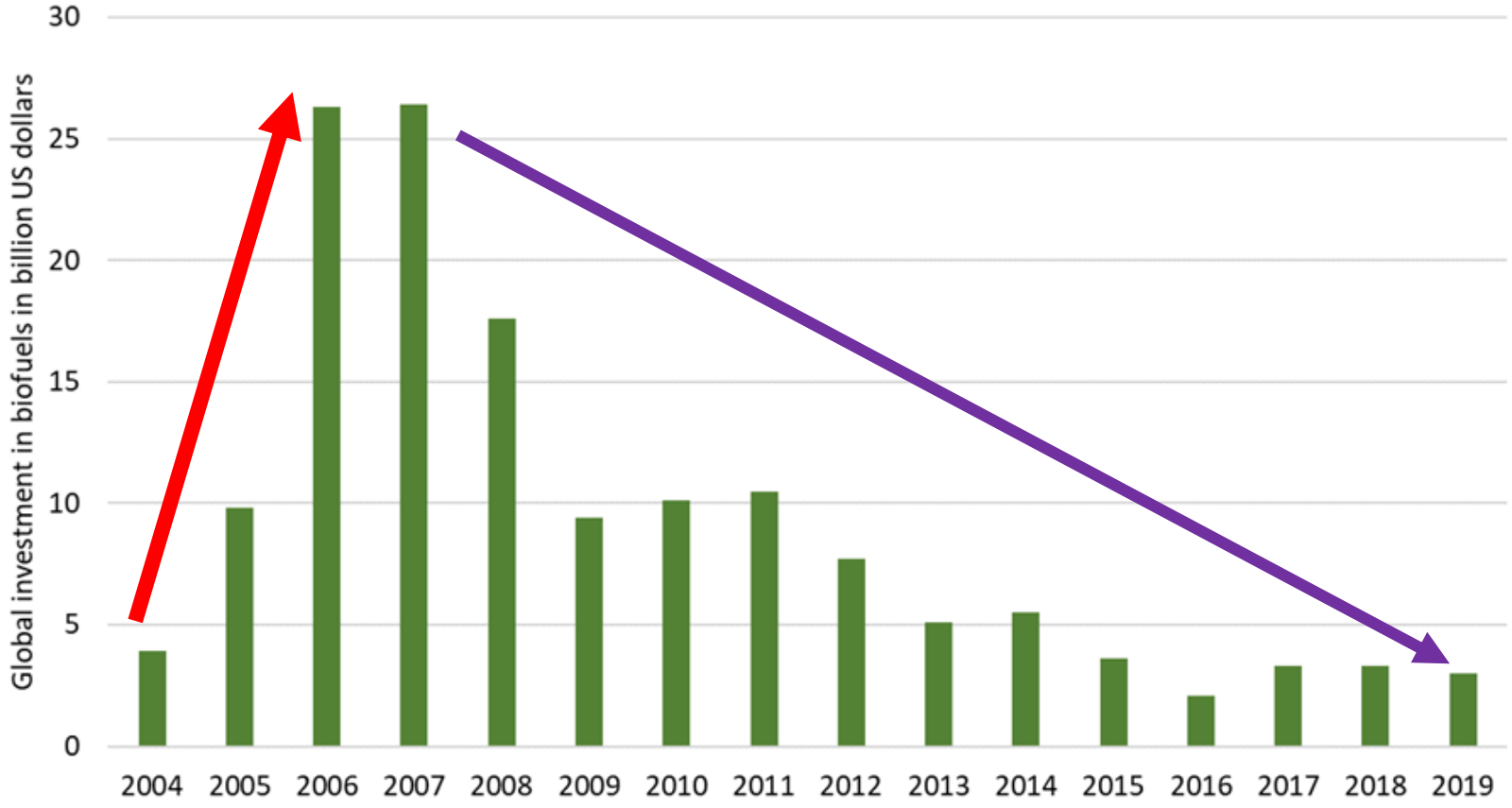
nearly all cars, vans, buses as well as new heavy-duty vehicles will be zero-emission.

2009 2010 2015 2020 2025 2030 2050





Global investment in biofuels



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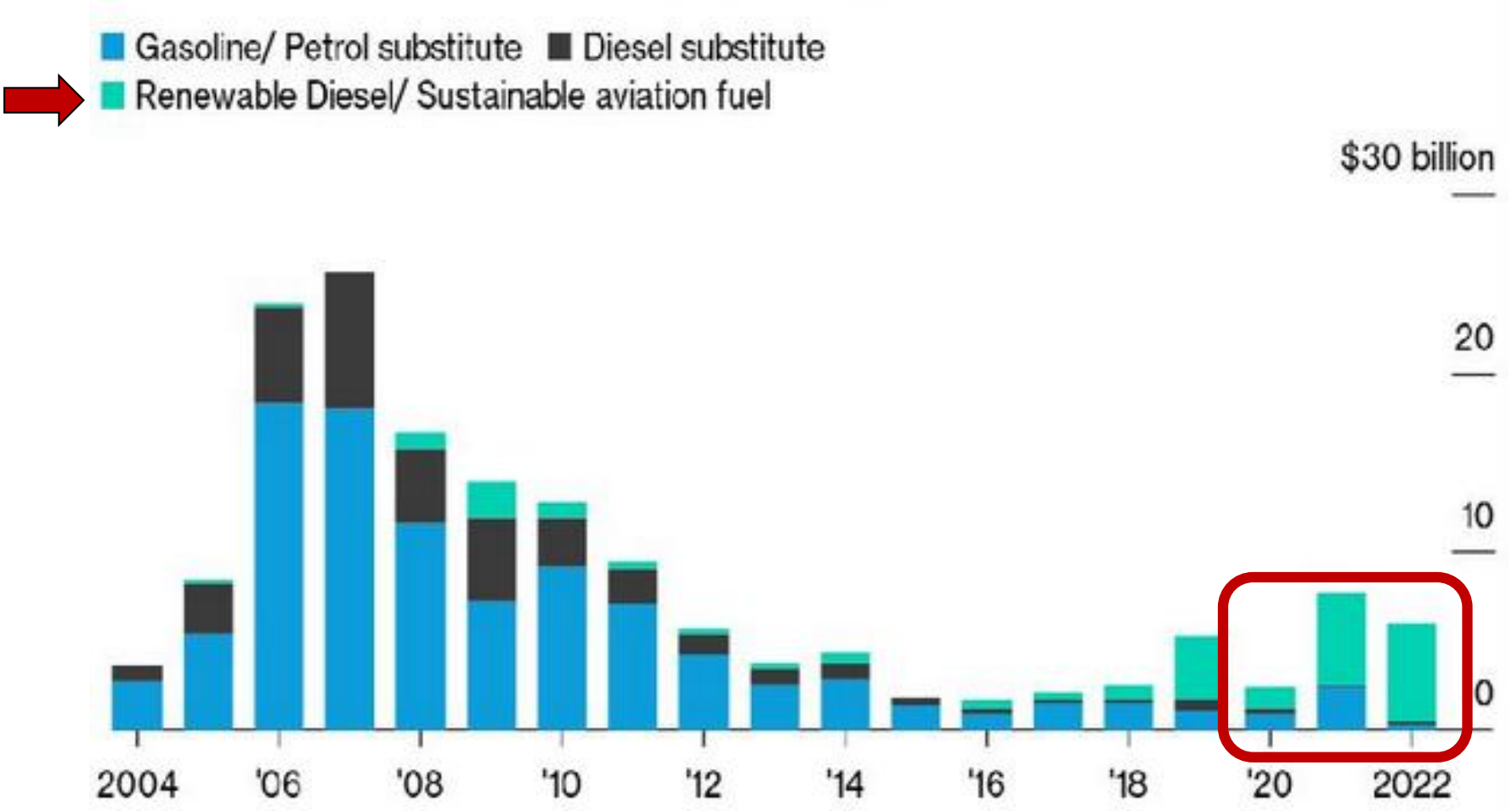
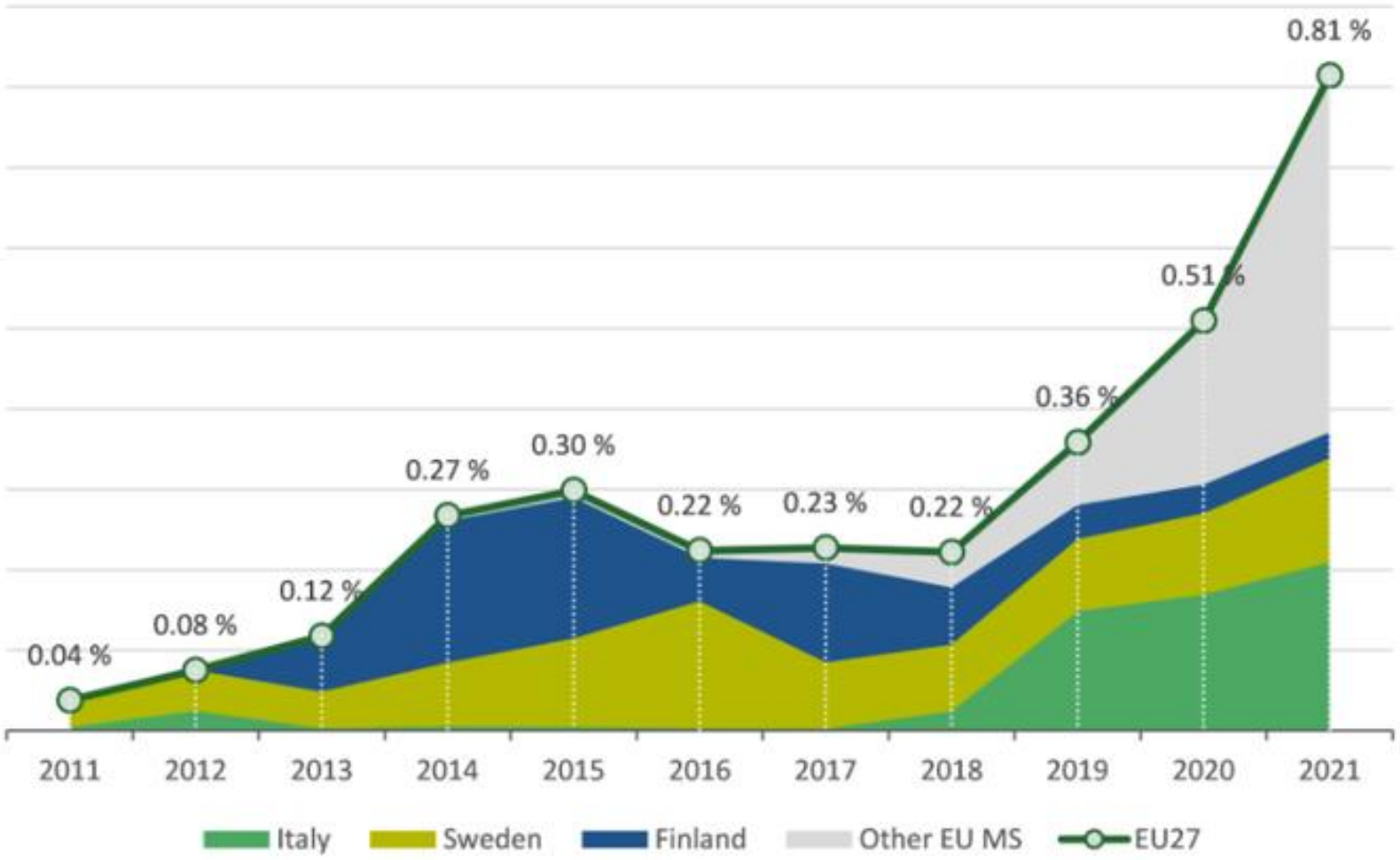


https://about.bnef.com/blog/global-drop-in-fuels-market-to-see-a-flood-of-new-entrants/

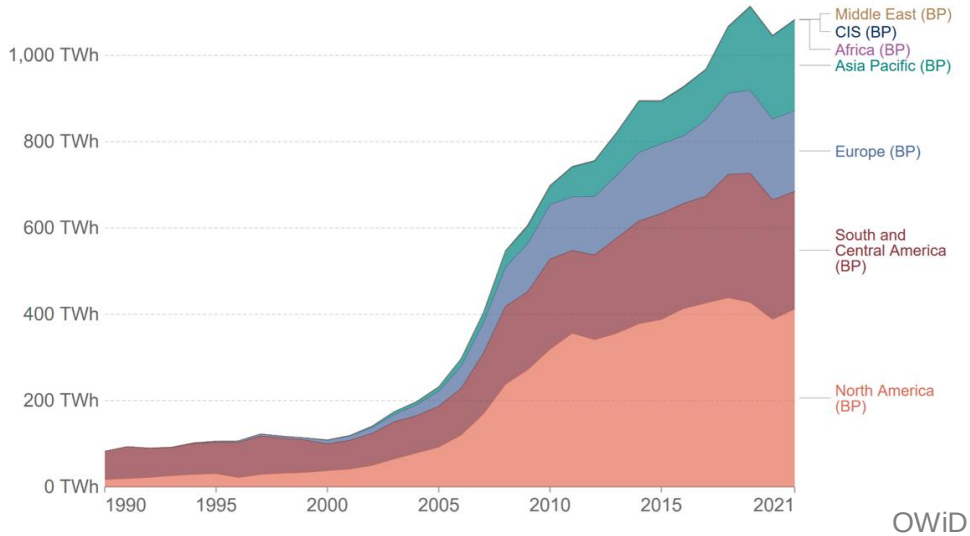
Production of advanced biofuels



COVID 19

- ✓ 11 March 2020 – global pandemic
  - ✓ partial or total lockdowns….
- ✓ Impact on mobility

11.6% drop in global BF production



The Russia-Ukraine war

- ✓ …disrupted the chance of global economic recovery from the COVID-19 pandemic
- ✓ both Russia and Ukraine play key roles in the energy, food and fertilizers markets

- ✓ Russia
  - ✓ the world's largest exporter of wheat
  - ✓ the second largest exporter of sunflower oil
  - ✓ the largest exporter of fertilizers

- ✓ Ukraine
  - ✓ the largest exporter of sunflower oil
  - ✓ the fourth largest exporter of corn
  - ✓ the fifth largest exporter of wheat

The Russia-Ukraine war

- ✓ …increase in feedstock and energy costs…biofuels prices
- ✓ …vegetable oil export losses from Ukraine and weather-related supply disruptions (drought in Latin America)….

Food vs fuel

- ✓ **…** about 10% of all grain …biofuel production.. could be used to reduce food insecurity in many parts of the world
- ✓ calls …to change biofuel production mandates in favour of food production

Conclusions

- Perspectives for biofuels:
  - Optimistic estimates – biofuels contribute ca. one-third of global fuel supply in 2050
    - 2nd generation and 3rd generation –commercially available by 2030
- Oil price…lower oil prices…lower investment for biofuels
- Incentives…shift toward advanced and waste-based fuels
- Biofuel – dependent on markets created by government policy…policy certainty, R&D, international cooperation
- Biofuels…in aviation, shipping and heavy goods vehicles

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