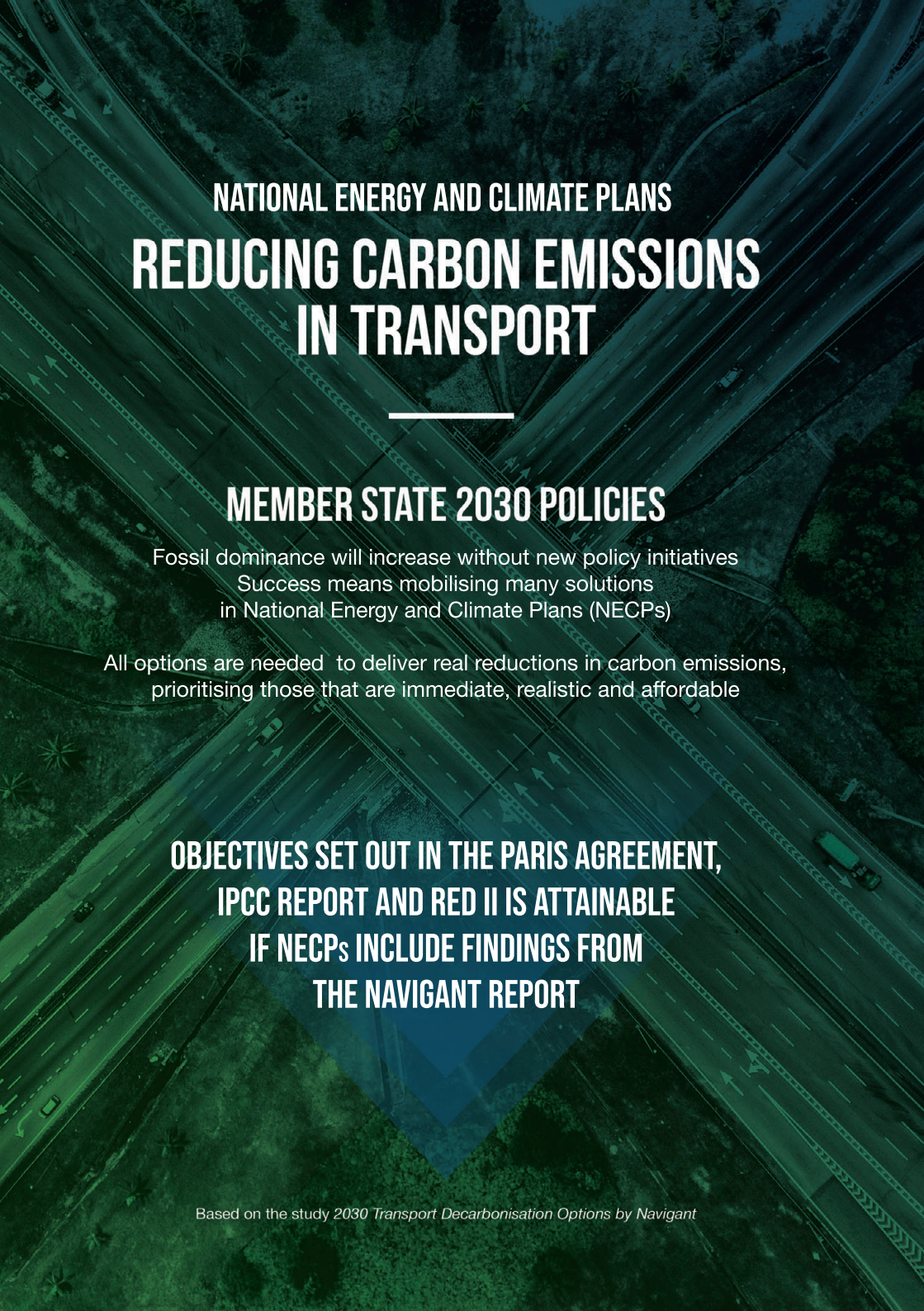


NATIONAL ENERGY AND CLIMATE PLANS

REDUCING CARBON EMISSIONS IN TRANSPORT

MEMBER STATE 2030 POLICIES

Fossil dominance will increase without new policy initiatives
Success means mobilising many solutions
in National Energy and Climate Plans (NECPs)

All options are needed to deliver real reductions in carbon emissions,
prioritising those that are immediate, realistic and affordable

OBJECTIVES SET OUT IN THE PARIS AGREEMENT, IPCC REPORT AND RED II IS ATTAINABLE IF NECPs INCLUDE FINDINGS FROM THE NAVIGANT REPORT

Based on the study *2030 Transport Decarbonisation Options by Navigant*

MITIGATING CARBON EMISSIONS FROM TRANSPORT IN MEMBER STATES IS AN URGENT PRIORITY

It is essential for EU Member States to deliver on their 2030 Integrated National Energy and Climate Plans (NECPs) obligations if the EU is to meet its commitments under the Paris Agreement. This will be challenging and potentially expensive for governments and taxpayers. It is therefore important that realistic and affordable solutions should form the bulk of each Member State's policies.

The transport sector is the only sector in the EU in which almost no climate progress has been made to date. Sadly, trends even anticipate growth in transport sector carbon emissions in the coming decade. Because of the lack of progress, sector emissions that used to account for less than one sixth of total greenhouse gas emissions in the EU are now about to exceed one quarter.

- CHALLENGING AND POTENTIALLY EXPENSIVE TARGETS FOR NECPs
- NAVIGANT STUDY PROVIDES IMMEDIATE, REALISTIC AND AFFORDABLE SOLUTIONS
- COMBINED BIOFUELS/ELECTROMOBILITY MAXIMISES CARBON REDUCTIONS COST EFFECTIVELY

A research study *2030 Transport Decarbonisation Options,* compiled by Navigant, shows how biofuel use combined with electromobility can maximise cost effectively the reduction in carbon emissions in nine Central and Eastern European Member States. The carbon abatement cost of these technologies is quantified. The research findings are relevant to other Member States and can therefore be applied, with modifications, to other countries.

The EU's 2030 Climate Package is ambitious on electricity, but largely ignores the transport and heating sectors, which together account for far more energy than the power sector. Navigant concludes that 2020 EU climate policy could succeed even while ignoring the heating and transport sectors, but that will not be possible for 2030. Far reaching deployment of both electrification and biofuels in the transport sector are needed to achieve significant carbon savings and ensure EU compliance with the Paris Agreement.

The structure of RED II disincentivizes Member States who use less than 6% conventional biofuels in 2020 from maximizing the use of conventional biofuels in 2030, a relatively cheap climate change mitigation option. Therefore, it makes climate and economic sense for Member States to ensure that they reach at least 6% conventional biofuels use in 2020. Member States that use less than 6% conventional biofuels in 2020 may thus face far higher costs of compliance in 2030 than Member States that attain that threshold.

ELECTRIFICATION AND BIOFUELS ARE BOTH ESSENTIAL

All options are needed in combination to achieve overall greenhouse gas emission savings. There is a widespread assumption that electric driving will provide early reductions in carbon emissions from transport. However, emission savings from electric driving are limited until 2030 because of the slow deployment of electric vehicles and because of the carbon intensity of electricity in many areas is relatively high. By 2030, only about 7% of the EU light duty vehicle fleet will be electric.

Navigant projects that by 2030 energy consumption in road transport in the nine countries studied will increase by 16%. Under existing EU plans emissions from road transport would increase by over 20% instead of decreasing. The absolute consumption of fossil fuels will grow further and liquid fuels as energy carriers in transport will be in use for decades.

Few scalable options for decarbonisation exist.

The urgency of the climate problem and the limited ambition level of existing policy frameworks at EU level call for acceleration of the deployment of renewable energy in transport at the Member State level. That means much higher utilisation of sustainable biofuels that directly displace fossil fuels within the existing internal combustion engine fleet.

Biofuels are the single most prevalent renewable energy source in transport today, however, only about 5% of energy in EU road transport today comes from biofuels. Sustainable crop-based biofuels can contribute to the decarbonisation of transport at scale with attractive carbon abatement costs.

BIOFUELS:

- **ARE AVAILABLE IN FORMS FUNGIBLE WITH THE CURRENT FUEL DISTRIBUTION SYSTEM AND DRIVETRAINS**
- **DO NOT REQUIRE MAJOR VEHICLE OR SYSTEM CHANGES**
- **CURRENTLY CONTRIBUTE MOST TO RENEWABLE ENERGY IN THE EU TRANSPORT SECTOR**

ELECTRIFICATION AND BIOFUELS ARE THE ONLY REALISTIC TECHNOLOGIES AVAILABLE FOR LARGE SCALE DECARBONISATION TO 2030

MAXIMISING CARBON SAVINGS IN TRANSPORT

Decarbonizing the transport sector is a challenging task given the forecasted trajectories. While the demand for mobility in the EU will continue to increase, the EU transport sector must reduce its greenhouse gas emissions by 30% by 2030. This would necessitate a sharp break with the trend of increasing emissions to date.

Starting with 2018 data, Navigant outlines three scenarios under which carbon emissions and savings in road transport could be impacted by biofuel use between now and 2030:

2030 BUSINESS AS USUAL SCENARIO

The BAU is based on the transport targets in RED II. This is the basis for Member States biofuel use in decarbonising transport. Under this scenario carbon emissions in road transport increase by over 20%.

2030 OPTIMAL SCENARIO

This scenario assumes Member States give stronger support to deploying biofuels to achieve higher levels of carbon savings. Under this scenario the result would be a lower level of increase than the BAU at 12%.

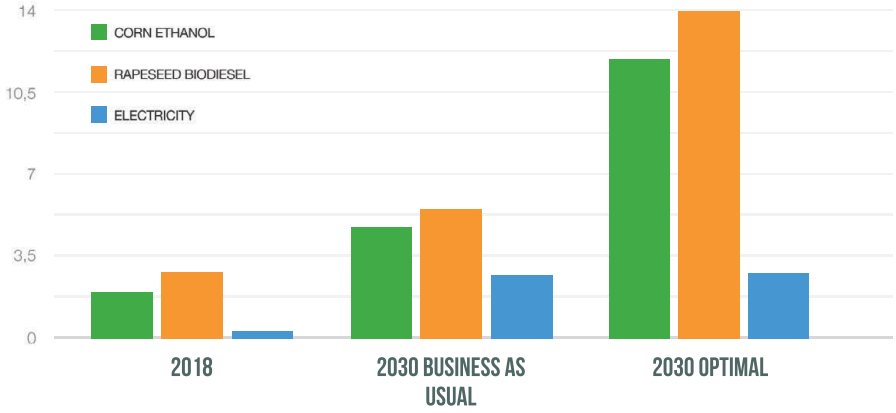
2030 AMBITIOUS SCENARIO

This is the only scenario that stabilises carbon emissions from road transport at 2018 levels and would require substantially higher amounts of biofuel (35.2%).

ROAD TRANSPORT CARBON EMISSIONS AFTER COMBINING ELECTROMOBILITY AND BIOFUEL 2030 SCENARIOS

	2018	2030 BUSINESS AS USUAL	2030 OPTIMAL
Share of biofuels of all types	6%	10,50%	19,20%
Total emissions from road transport	**187 Mtonne**	**225 Mtonne** +20%	**210 Mtonne** +12%

CARBON SAVINGS BY DEPLOYMENT OF THREE FORMS OF ALTERNATIVE ENERGY



SOLUTIONS FOR THE FUELS INDUSTRY AND GOVERNMENT

V4+ REGION 2030 OPTIONS

all calculations of GHG savings inclusive ILUC

		2030	
	2018	BUSINESS AS USUAL	OPTIMAL
Demand for transport payload-km		+18% more passenger kilometres +25% more tonne-kilometres	
Energy in transport (EJ)	2.02 EJ	2,25 EJ or +12% more energy consumption	
Share of biofuels of all types	6%	10,5%	19,2%
Emissions savings from crop based biodiesel	2,8	5,6	13,9
Emissions savings from crop based ethanol	1,9	4,8	11,9
Emissions savings from all other biofuels	0,4	4,2	6,8
Emissions savings from from electric driving	0,1	2,9	
Remaining emissions from fossil fuels	181	215	191
Total emissions from road transport	**187 Mtonne**	**225 Mtonne** +20%	**210 Mtonne** +12%

RED II discusses and assumes "typical" levels of carbon savings from biofuels. However, actual savings are significantly greater. In real world performance, biofuels reduce the carbon emissions of liquid fuels by around 65-70%, and the numbers are improving every year. The substantial carbon savings from electromobility, rapeseed biodiesel and corn ethanol are illustrated in the chart on previous page in both the BAU and Optimal scenarios.

There are solutions for the fuels industry and government to stimulate increasing volumes of alternative fuels. For instance, high impacts could be achieved by making E10 the standard fuel in all EU countries, deploying E85 in 5% of the car fleet, deploying ED95 in buses, and biodiesel in blends from 30-100% in both light and heavy vehicles. Support policies can help to drive the carbon performance of biofuels by combining mandates with strict sustainability requirements or market benefits for higher greenhouse gas savings.

- BAU TARGETS INCREASE EMISSION LEVELS BY 20%
- OPTIMAL BIOFUEL/ELECTRIC TARGETS SHARPLY LOWER BAU EMISSION LEVELS
- EFFORT SHARING REGULATION (ESR) PERMITS HIGHER BIOFUEL USE TO ACHIEVE MS ESR TARGETS

COST OF CARBON ABATEMENT TO MEMBER STATES OF BIOFUELS AND ELECTRIC DRIVING

Government subsidies for electric car sales and for the development of charging infrastructure reduce the cost of electric vehicles for consumers. In addition, consumers benefit from lower tax rates on electricity than liquid fuel. From a government perspective, this results in a loss of tax revenue to exchequers.

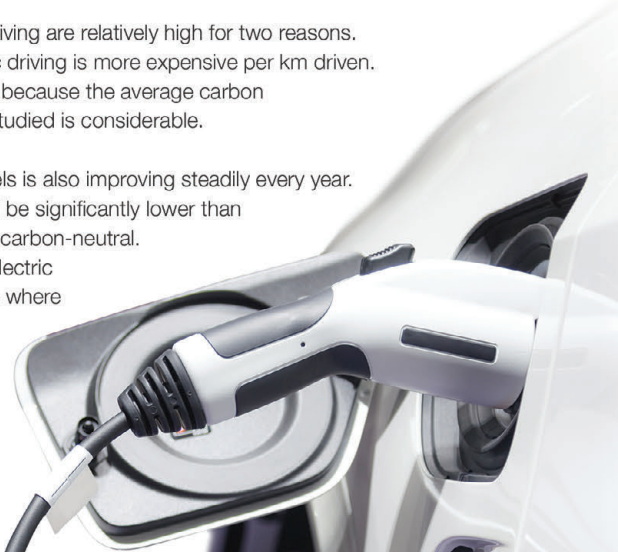
Navigant points out that, when the full costs are accounted for, electric driving has the highest costs to society. The research notes that carbon abatement costs for electric driving will decrease as the cost of producing electric vehicles reduces and the installation expense of charging infrastructure declines towards 2030.

Currently, the average carbon abatement cost of electric driving in the Study Region approaches €800/tonne CO2 equivalent, while the cost of conventional biofuels (inclusive of iLUC) is less than €200/tonne. Using the estimates for commodity prices that have been provided to Member States for their NECP development, the carbon abatement cost of electric vehicles is expected to fall below €200/tonne by 2030 and the cost of conventional biofuels to around €20/tonne.

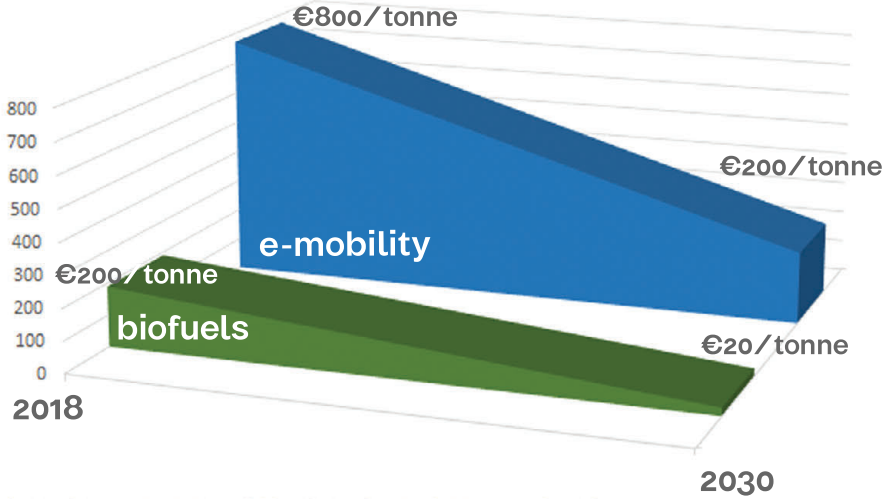
The carbon abatement costs of electric driving are relatively high for two reasons. Navigant and Roland Berger show electric driving is more expensive per km driven. In addition, the carbon savings are limited because the average carbon intensity of the grid electricity in the area studied is considerable.

The carbon savings performance of biofuels is also improving steadily every year. By 2030 GHG savings from biofuels could be significantly lower than today's emission and could even become carbon-neutral. Even today, biofuels perform better than electric driving in many cases, particularly in areas where electricity has still not been decarbonised.

This cost varies for individual countries.



CARBON ABATEMENT COST OF BIOFUELS AND ELECTRIC DRIVING IN EURO/TONNE CO_2 AVOIDED



CARBON ABATEMENT COST OF BIOFUELS AND ELECTRIC DRIVING IN EURO/TONNE CO_2 AVOIDED

	2018	2030
Corn ethanol	€155	€25
Rapeseed biodiesel	€187	€6
Electric driving	€772	€228

From 2020 onwards, additional corn and rapeseed can be produced without negative impacts from (direct or indirect) land use change. This has two benefits: the cost of carbon abatement decreases and the overall emission reduction potential increases. It is within the scope of governments to craft an appropriate framework for this, and within the scope of the agricultural sector of the region studied to deliver this.

Under the Effort Sharing Regulation (ESR), Member States have annual emissions allocations (AEAs) on sectors outside of the EU Emissions Trading System (ETS). They are free to bank and borrow AEA's and to trade allowances with each other. A potential revenue benefit for lower GDP-performing Member States is that they could take advantage of lower emissions targets placed on them and sell AEA's to other Member States who need them.

CROP-BASED BIOFUELS ARE SUSTAINABLE

Stakeholders have frequently expressed concerns about the sustainability of crop-based biofuels. However, crop based biofuels are not automatically good or bad. They contribute to decarbonisation when the greenhouse gas emissions from the production supply chain and emissions from indirect land use change are limited. The impact of crop-based biofuels on food commodity prices has been limited, certainly in comparison to other factors. Biofuels can help to attract investments in agriculture, drive innovations, and spur regional economies. Good performance of crop-based biofuels is possible when demand is accompanied by strict sustainability requirements.

iLUC

Currently, the most complex topic related to the sustainability of biofuels is Indirect Land Use Change, or iLUC. The EU cap on crop-based biofuels is informed by concerns over iLUC. Simply put, iLUC is the rippling effect that an increasing demand for biofuels feedstock can have in global agriculture, and which could lead to land expansion and deforestation elsewhere, with the subsequent effect of carbon emissions. Navigant finds that biofuels can be sustainable and can carry low-iLUC risk, even when crop-based. Any far-reaching increases of biofuels deployment should be achieved while limiting iLUC risks, optimising greenhouse gas emission reduction and avoiding biodiversity impacts.

CONTRIBUTION TO EMPLOYMENT AND RURAL DEVELOPMENT

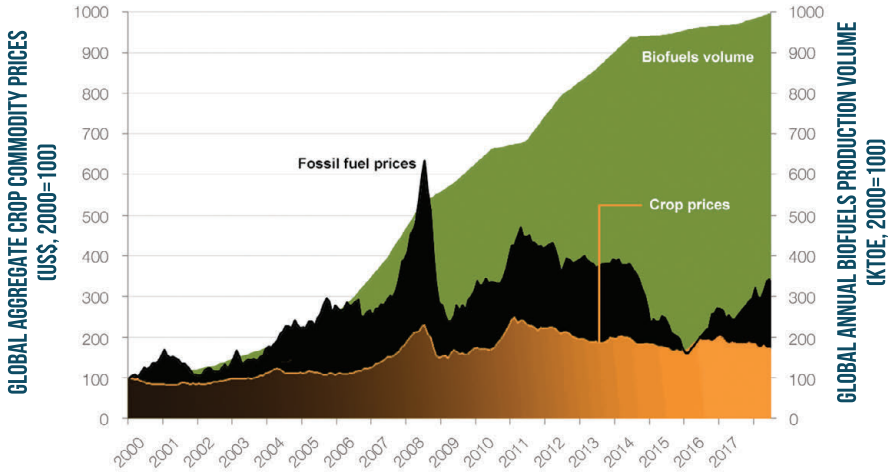
The expansion of the biofuel industry in Europe since 2000 has contributed to generating new jobs and income, especially in rural areas. The vast majority of these jobs are not on farms but in the industrial and service sectors. The EU framework on rural development policy aims to address a wide range of economic, environmental and social challenges typical for rural areas. Several of these rural challenges can be addressed by the production of biofuels feedstock, the industrial production of biofuels and the related logistics.

BASE POLICY ON 2019 REALITIES - NOT 2009 THEORIES

	2009 THEORY ✗	2019 REALITY ✓
FOOD PRICES	Theorized high impact on food prices - untrue	If anything have kept food prices low
ILUC	Theorized ILUC high impacts - untrue	Very small when measured
GHG SAVINGS	Theorized moderate GHG savings - untrue	Actually high GHG savings
COSTS	High costs	Low costs.

FOSSIL FUEL COSTS DRIVE FOOD PRICES

There is no correlation to biofuels volumes produced



Source: World Bank prices, compiled by Ecofys

IMPACTS ON FOOD SECURITY

Concerns about the impact of biofuels on food security often refer to global spikes in food prices in 2007-2008 and 2010-2011. However, closer examination demonstrates that the link between biofuels volumes and food prices is weak: While biofuels volumes continued to increase after 2008, the price of food actually drops, and when the development of biofuels slows down in 2010-2011, there is actually a new spike in food prices. In fact, food price developments and spikes are directly related to oil prices and extreme weather events, in combination with systemic issues such as reduced reserves, speculation and hoarding. Growing demand for biofuels over the past decade is not linked to food price movements, up or down. Indeed, the things that biofuels are made from have increased in price less over the past decade than any other type of commodity.

ANIMAL FEED CO-PRODUCTS

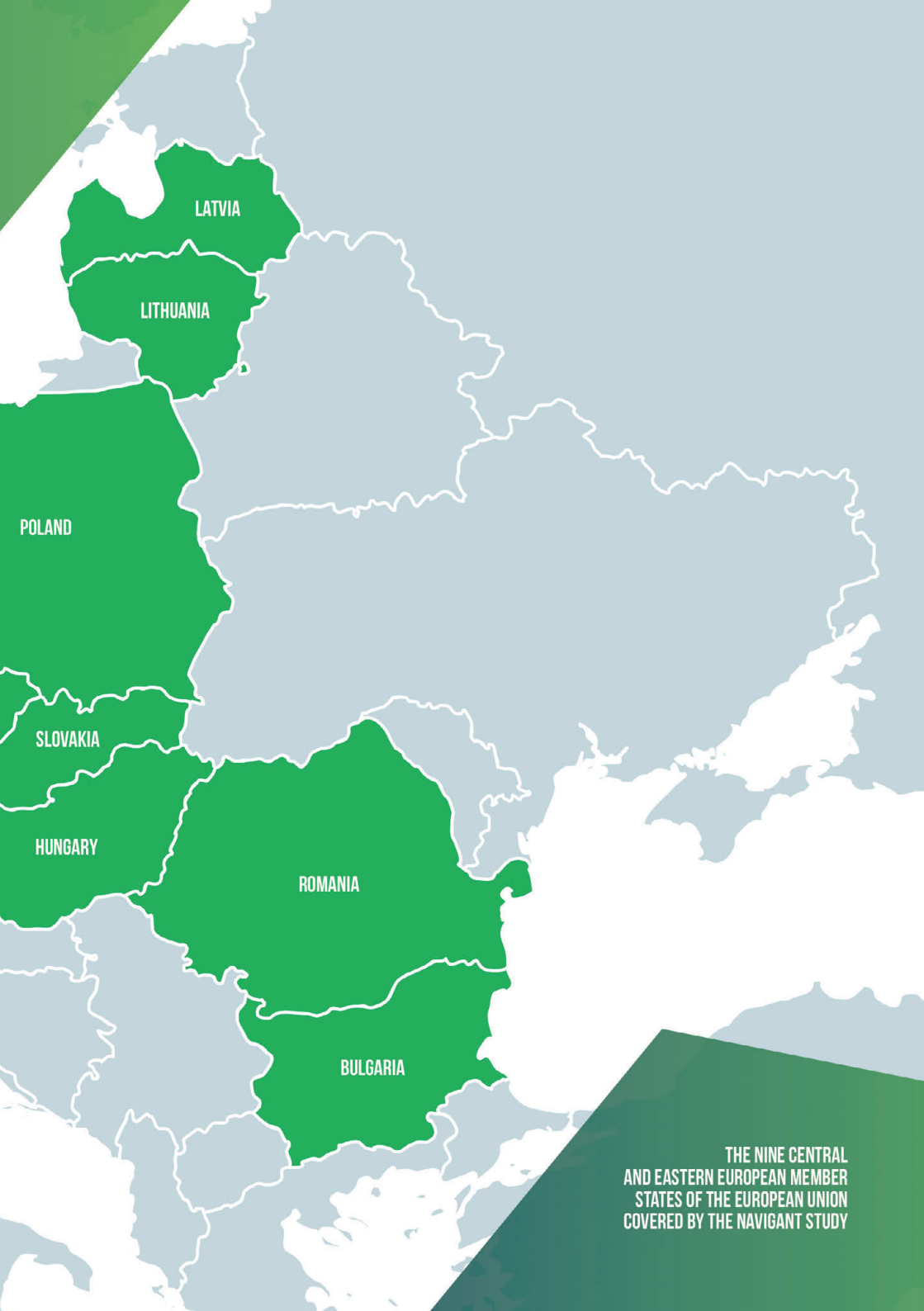
In crop based biofuel processing, roughly half of the final product by weight is biofuel and half is a high protein animal meal. Simplified, biofuels are just the extraction and isolation of starch from grains and fats from oilseeds. The remaining materials are a highly valued animal feed rich in protein that help reduce Europe's feed protein deficiency currently supplied by imports.

POTENTIAL FOR THE FURTHER DEVELOPMENT OF BIOFUELS:

Navigant finds that there is a large potential to increase the production of both biofuels and biofuels feedstock in the countries covered, especially through increasing the yields and redeveloping abandoned agricultural land. Studies show that these countries have a significant biomass potential that is underutilised and suggest that biofuels production could have further socio-economic benefits for this region.

The further development of biofuels is an interesting option for the Navigant Study Region, with multiple advantages, including:

- Spurring economic development and employment in rural regions.
- Investments in, and modernisation of, the agro-industrial sector.
- Increasing energy security and reducing dependency.
- Compliance with EU renewable energy and climate policies.
- Overcompliance could generate additional country income when allocations are sold to other Member States.



THE NINE CENTRAL AND EASTERN EUROPEAN MEMBER STATES OF THE EUROPEAN UNION COVERED BY THE NAVIGANT STUDY

2000 – 2010

SUPPORTIVE POLICIES

More than €10 billion invested in biofuels. Oil lost 5% of its market and biofuels created 30,000 sustainable rural jobs.

2010 – 2020

RESTRICTIVE BIOFUELS POLICIES (THE LOST DECADE)

Minimal investment in low carbon transport options – most investment during this time went to failed, but fashionable, projects.

EU farmers and rural communities lost. The climate lost. Jobs were not created: oil was not displaced.

The EU lost its momentum and leadership in transport decarbonisation.

2020 – 2030 THE DECADE LEADING TO 2030 IS BEING DECIDED NOW

DOZENS OF COUNTRIES ACROSS THE GLOBE HAVE LEAPFROGGED PAST THE EU IN THE RACE TO GET OIL OUT OF TRANSPORT

This brochure is based on the research study entitled "2030 Transport Decarbonisation Options" compiled by Navigant for Farm Europe.

The full report is available at:
https://platformduurzamebiobrandstoffen.nl/wp-content/uploads/2019/02/2019_Ecofys_Navigant_2030-Transport-decarbonisation-options.pdf