

Retrofitting 1G biofuels – Status quo and BIOFIT activities

BIOFIT Final Policy Conference
Industry session: 1G biofuels
19.01.2022
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1G biofuels overview of the sector

Main source for GHG mitigation in transport sector are 1G biofuels as blending components into **diesel** and **gasoline**

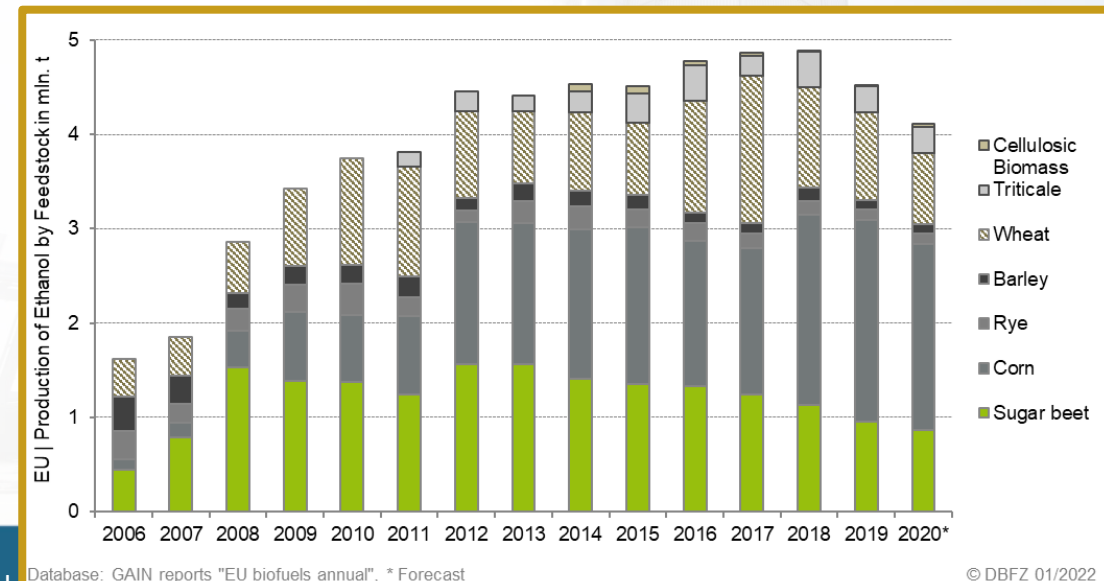
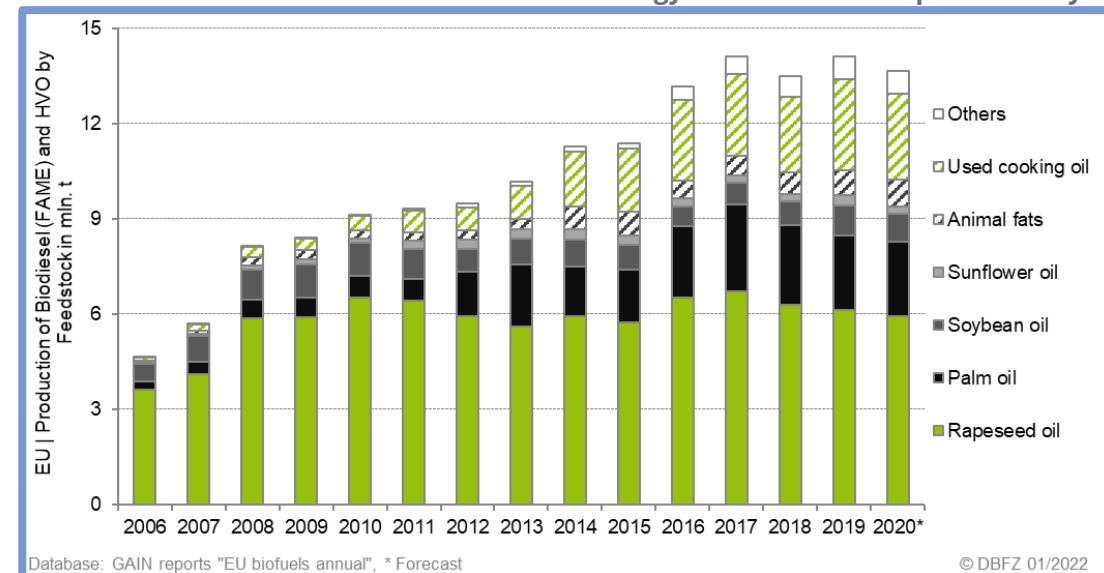
- **Biodiesel** (fatty acid methyl esters - FAME)
- **Hydrogenated vegetable oil** (HVO/HEFA)
- **Bioethanol**

Stable production in the last years,

- Slight fluctuations
- Increase in production of FAME and HVO/HEFA from UCO

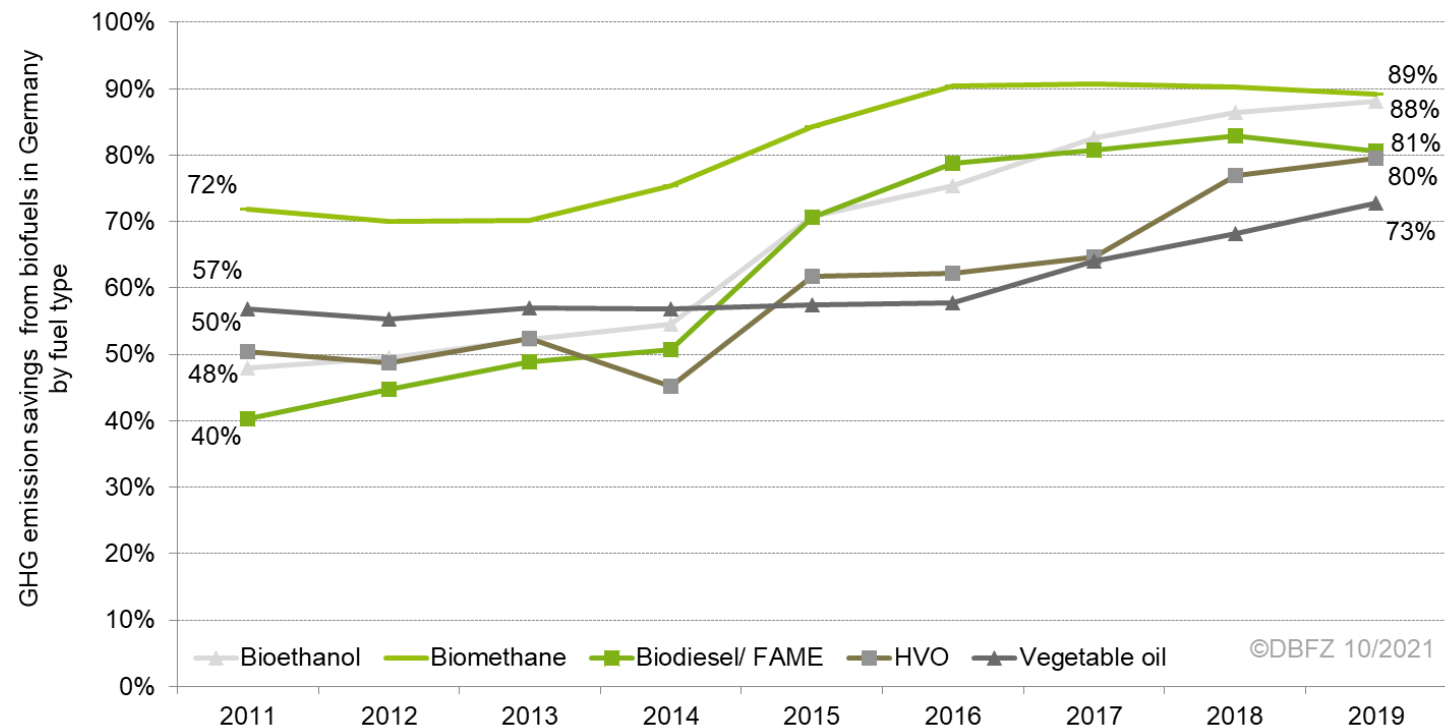
Main input: currently agricultural crops, with still rather small share of residues:

- UCO, animal fats for biodiesel and HVO
- Cellulosic biomass for bioethanol. Increase of production is ongoing e.g. by Clariant and AustroCell Hallein





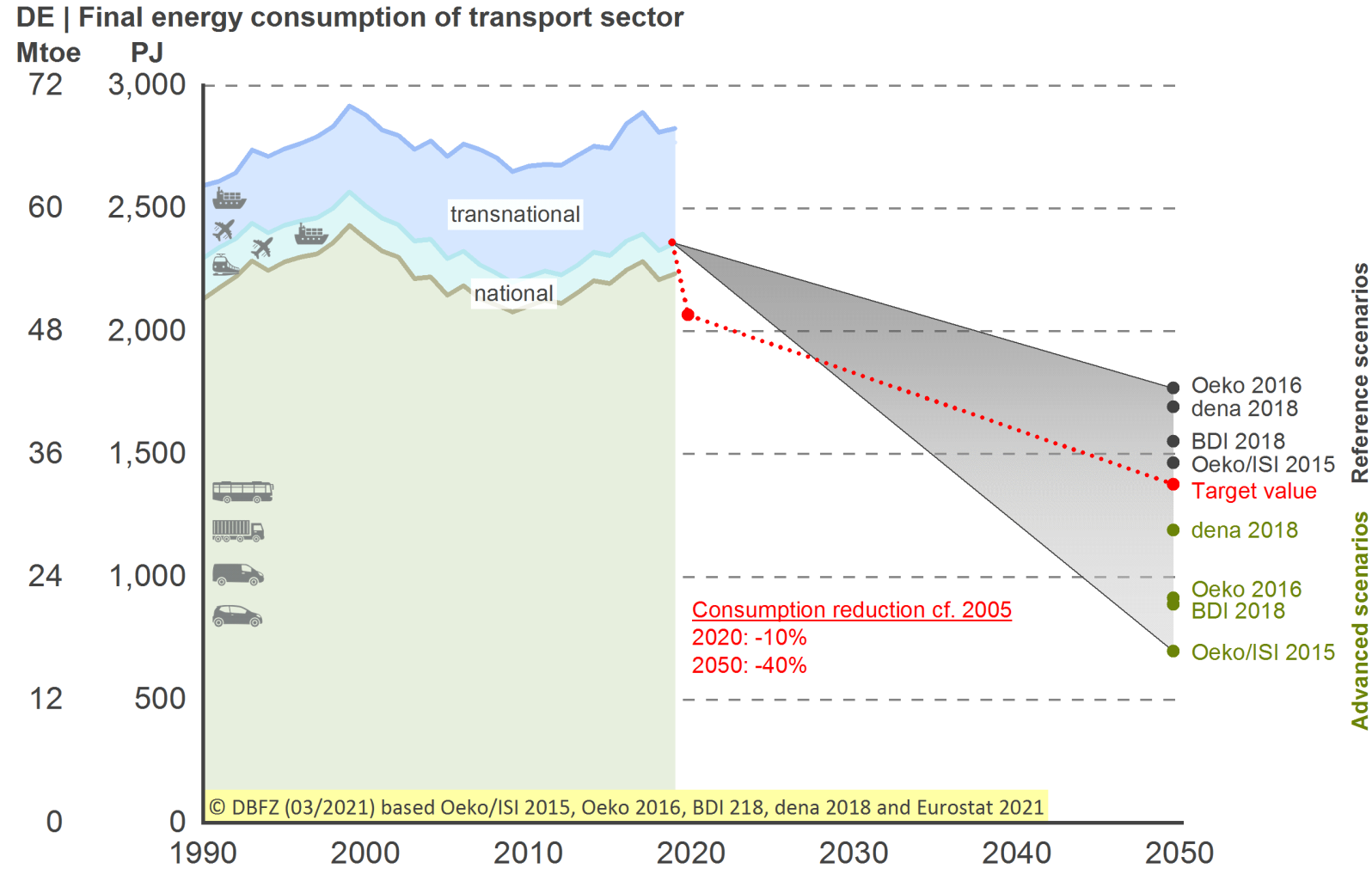
Improvement of GHG emission savings from 1G biofuels



Average value for GHG emission savings from biofuels utilized in Germany by fuel type between 2011 and 2019 (No specificity from feedstock utilized). ©DBFZ based on BLE (2014,2015, 2017, 2018 and 2020)



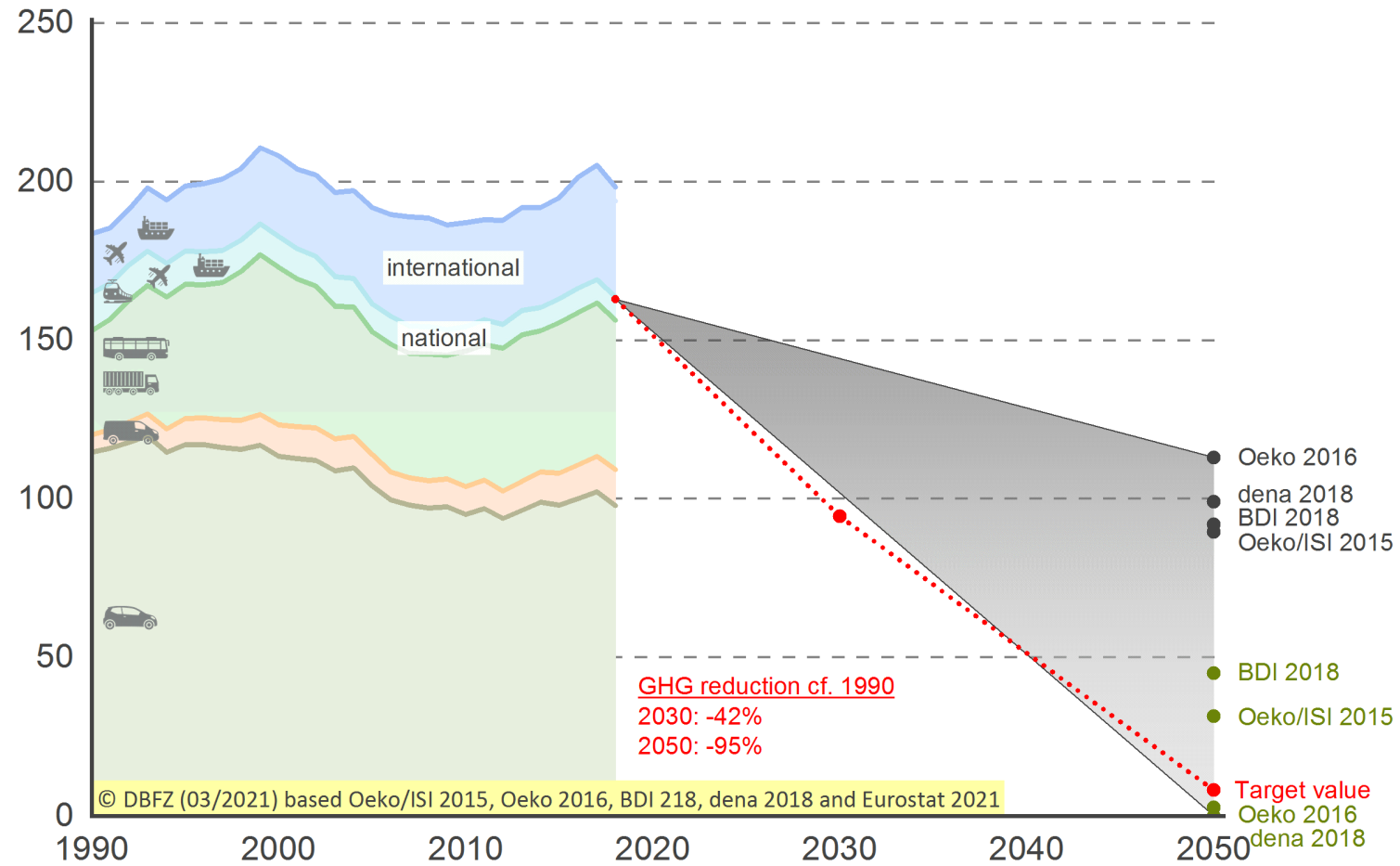
Gap between trends and targets





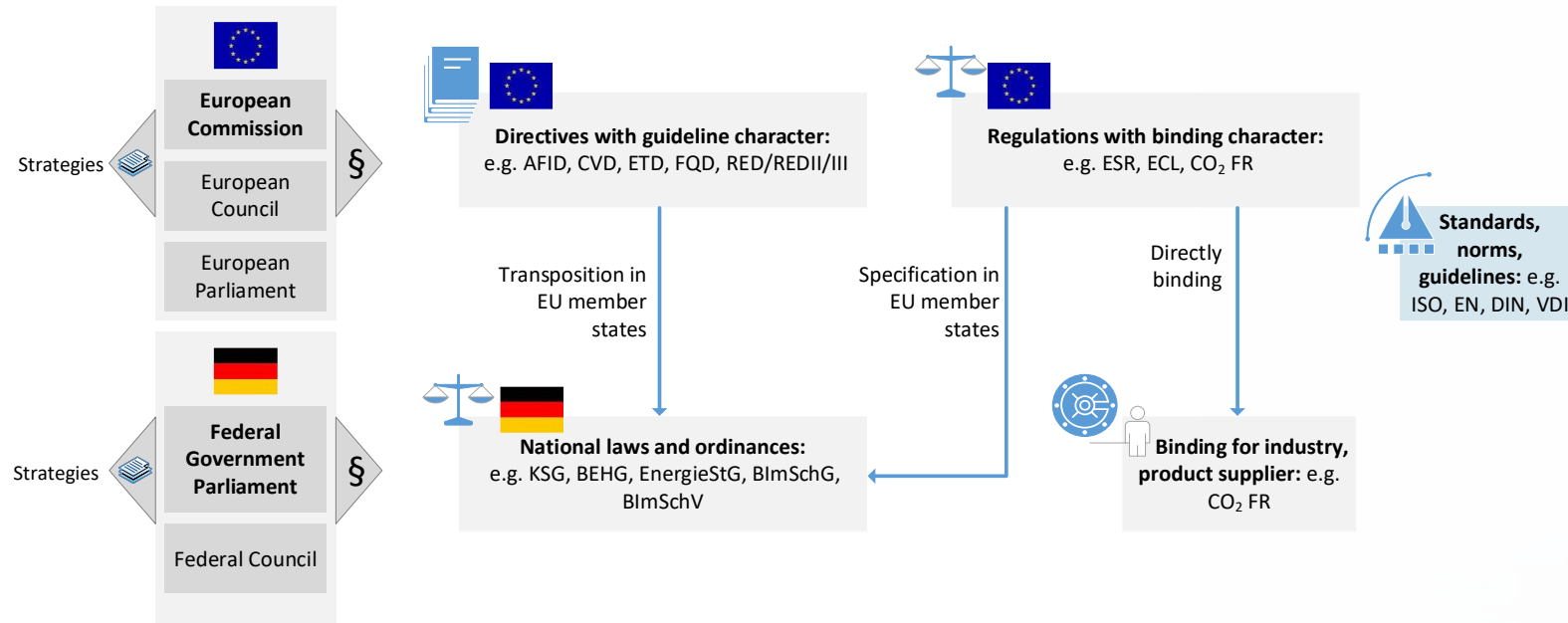
Gap between trends and targets

DE | GHG emissions in million metric tonnes CO₂ equivalents



Advanced scenarios Reference scenarios

Highly regulated sector



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Targets and quota e.g. for

- Advanced biofuels (0.2% in 2022, 1% in 2025, 3.5% in 2030, REDII)
- Aviation (ICAO target of 50% GHG emission reduction until 2050)

Caps for conventional biofuels

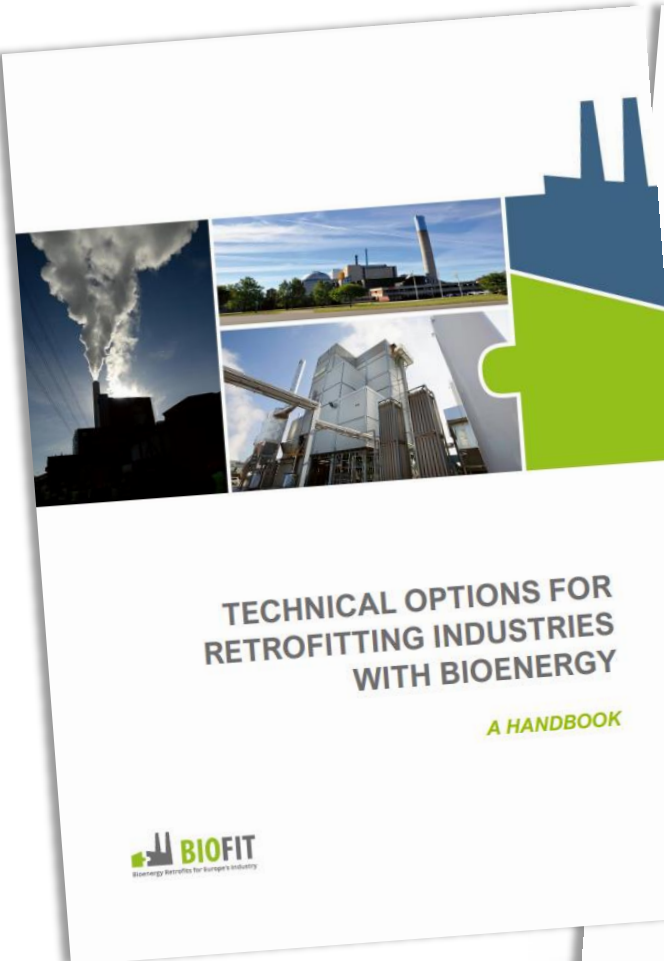
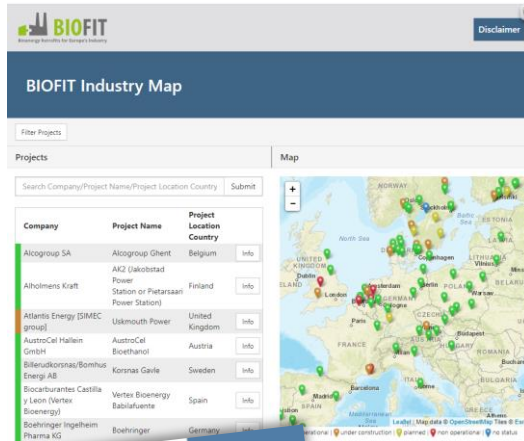
Sustainability criteria

Drivers for retrofitting for biofuels

Drivers (in no specific order):

- Feedstock change to residues / 2G (REDII, Annex IX) (benefits on market: e.g. double counting)
- Lowering GHG emissions as a market benefit
- Production of biofuels for different applications, e.g. marine and aviation sector
- Upgrading of by-products for additional income
- Flexibilisation of feedstock
- Quality improvement of biofuels
- Exploring synergies with renewable electricity generation and CO₂ utilization

Map, factsheets, handbook



Content

Acknowledgements

The BIOFIT project

1 Introduction

2 The retrofitting process

2.1 Involved stakeholders

2.2 The roles of citizens and consumers

2.3 Motivation for retrofitting

3 Bioenergy sourcing for industries

3.1 Biomass potential

3.2 Biomass commodities

3.3 Logistics and value chains

3.4 Sustainability and certification policies

4 Overview of biomass conversion pathways

5 Retrofitting first generation biofuel plants

5.1 Overview of the sector

5.2 Cellulosic ethanol add-on to first generation bioethanol

5.3 Alcohols for aviation

5.4 Multi-feedstock biodiesel add-on

5.5 Glycerol reforming to methanol

5.6 Biomethane as substitute for natural gas

5.7 Electrofuels

5.8 Concluding remarks

Retrofitting fossil refineries

1 Overview of the sector

6.2 Carbon reduction in fossil refineries

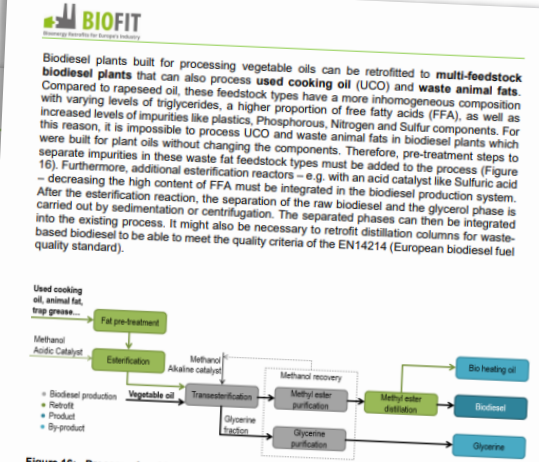
6.3 HVO integration

6.4 Pyrolysis oil integration into refineries

6.5 Concluding remarks

Retrofitting fossil fired power and CHP plants

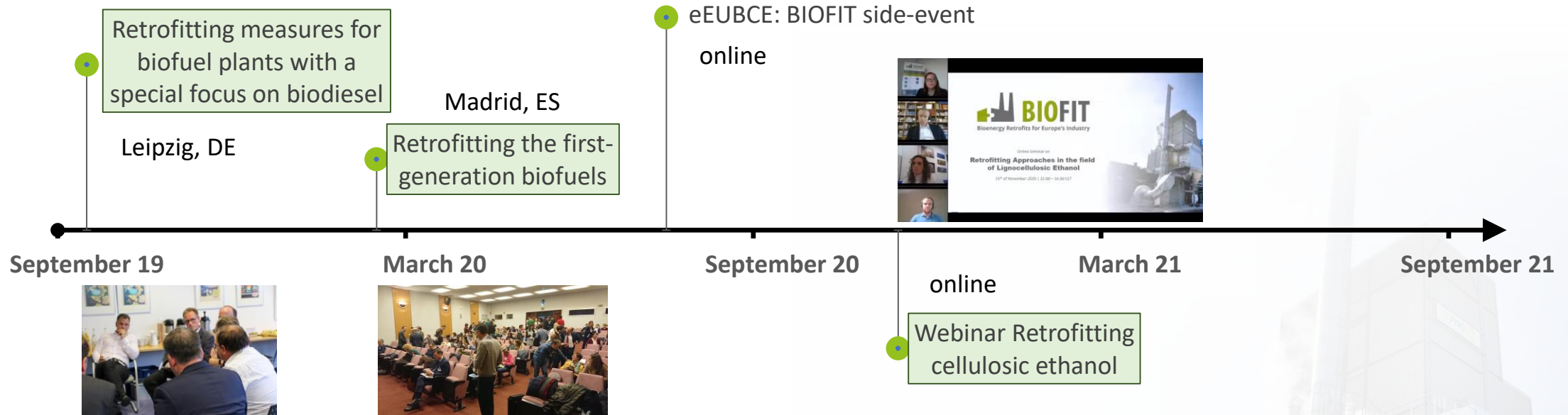
7.1 Overview of the sector



Another specific problem with UCOs and waste animal fats from the rendering process is **polymer contamination**. The reason for this is found in the case of UCO in the process of collection. UCO is usually collected in polyethylene or polypropylene containers. Parts of these polymers dissolve in the UCOs and cannot be removed by filtration. In the case of animal fat, rendering process.

The result of these plastic contaminations is deposits on heat exchangers and column bottoms, as well as an increased content of polymers in the biodiesel or the glycerol phase. By various additional process engineering methods, such as the use of a hydrogel with subsequent filtration, the use of porous membranes or the addition of bleaching earth and activated carbon, the polymer concentration in the UCO and waste animal fat can be reduced. (Braune, 2016)

Industry fora and surveys



- Surveys on drivers and barriers and public acceptance
- Policy recommendations → Results presented and discussed in Policy Breakfast tomorrow



Retrofit of the first-generation ethanol production facility of Biocarburantes de Castilla y Leon to produce advanced ethanol



Benefits, challenges and opportunities of integrating ATJ technology on to an existing 1G bioethanol plant

- Case study description
- Supply chain assessment
- Market assessment
- Techno-economic assessment
- Sustainability assessment
- Risks

Case study teams





Agenda of the session

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- 11:15 - 12:30 Industry session: 1G Biofuels Retrofitting 1G Biofuels – *Status quo and BIOFIT activities* –
Arne Gröngröft (DBFZ)
- 1G Bioethanol: Challenges and opportunities –
Antonio José Vallespir (CEO, VERTEX)
- Retrofitting a bioethanol facility for the co-production of advanced fuels using industrial residues –
Ana Isabel Susmozas Torres (CIEMAT), Juan María (Vertex)
- The Alcohol-To-Jet process: A Retrofit for 1G ethanol plants –
Andrew Hull (Swedish Biofuels)
- Technical options and policy recommendations for retrofitting in the 1G biofuels sector –
Stephanie Hauschild (DBFZ)
-
- 12:30 - 13:00 Discussion and Q&A: Biofuels –
Moderated by Raquel Iglesias Esteban (CIEMAT)