Federal Office
for Agriculture and Food

# Evaluation and Progress Report 2019

Biomass Energy Sustainability Ordinance
Biofuel Sustainability Ordinance

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## Preface

Dear Reader,

This is the tenth annual Evaluation and Progress Report presented by the Federal Office of Agriculture and Food (BLE) as the competent authority.

Around 3.6 million tonnes of certified biofuels were placed on the market in Germany in 2019, representing a year-on-year growth of around three percent. The replacement of fossil fuels achieved by using these biofuels has saved emissions totalling 9.7 million tonnes of $CO_2$ equivalent. The average emission savings compared with fossil fuels totalled 82.6 percent—a high figure that has remained unchanged from last year.

The pandemic spread of the novel SARS-CoV-2 virus since the early months of 2020 presented a particular challenge to sustainability certification and to supervising authorities. Normally, inspections are carried out by certification bodies on site at each company concerned. These inspections form an important basis for certification decisions. Regulators were forced to adapt this approach, however, as a result of travel restrictions and quarantine regulations. In some cases, certifying bodies were allowed to issue certificates based on a document review, provided they complete on-premises checks at a later date.

The pandemic has also had an impact on the surveillance of certification activities conducted by the BLE. The BLE's assessors continue to closely monitor selected audits from certification bodies (chosen by means of a risk-based methodology) – either by a remote appraisal and written procedure or, where circumstances permit, in person during the on-site audit as before.

The General Customs Directorate also responded to the change in the situation by extending the deadline for submitting written correspondence and concluding quota trading contracts by two months until 15 June 2020.
Accordingly, the data required for this report were available later than usual. Despite these difficulties, I am pleased to say that we have managed to publish the report by the usual date.

Dr Hanns-Christoph Eiden
President of the Federal Office of Agriculture and Food

# 1. Introduction

## 1.1 General

On 5 June 2009, Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources (Renewable Energy Directive) was published in the Official Journal of the European Union. The Directive forms part of the EU climate and energy package adopted by the Council on 6 April 2009. This package consists of binding legislation intended to ensure that the EU meets its climate and energy targets by 2020[1].

The Directive is careful to point out that the control of European energy consumption and the increased **use of energy from renewable sources**, in addition to energy savings and increased energy efficiency, constitute important parts of the package of measures needed to reduce greenhouse gas emissions and to **comply with the Kyoto Protocol to the United Nations Framework Convention on Climate Change**, and with further Community and international greenhouse gas emission reduction commitments beyond 2012.

The overall aim of this Directive therefore includes goals such as increasing the share of energy from renewable sources within the EU[2], decreasing dependencies on fossil fuels and reducing greenhouse gas emissions.

At the national level, each Member State must therefore take measures and develop appropriate instruments for achieving the targets set or any more comprehensive national targets.

The use of energy from renewable sources in the **transport sector** is viewed as one of the most effective tools available to the Community for reducing its dependence on imported oil in the transport sector—a sector exposed to acute risks in terms of energy security—while influencing the fuel market for transport[3].

[1] The three most important targets in the package are: Reduction of greenhouse gas emissions by 20% (compared with 1990 levels), 20% of energy in the EU to be from renewable sources, improving energy efficiency by 20%.
[2] At least 10% of final energy consumption in transport by 2020, Art. 3(4) of Directive 2009/28/EC.
[3] Recitals of Directive 2009/28/EC of the European Parliament and of the Council.

The Renewable Energy Directive prescribes **sustainability criteria** for biofuels and bioliquids:

- The greenhouse gas emission savings achieved by the use of biofuels and bioliquids must be at least 50% (at least 60% in the case of new installations)[4],
- Biofuels and bioliquids must not be made from source materials obtained from land of high value in terms of its biodiversity,
- Biofuels and bioliquids must not be made from source materials obtained from land with a high carbon stock,
- Biofuels and bioliquids must not be made from source materials obtained from land that was peatland in January 2008, unless evidence is provided that the cultivation and harvesting of these source materials do not involve drainage of previously undrained soil.

According to Commission Communication 2010/C 160/02, the sustainability criteria for biofuels and bioliquids can be implemented as follows:

1. By national schemes
2. By using a voluntary scheme that the Commission has recognised for the purpose
3. By complying with the terms of a bilateral or multilateral agreement concluded by the European Union with third countries, which the Commission has recognised for this purpose

As of the reporting date of 31 December 2019, the European Commission had published implementation decisions to recognise a total of 14 voluntary schemes in the context of the Renewable Energy Directive. These voluntary schemes operate alongside the certification schemes recognised by the BLE (DE schemes) and national schemes operated by other Member States for the sustainable production of biomass, and a number have now been re-recognised after five years.

On 4 August 2010, the German government adopted the National Renewable Energy Action Plan. The German government subsequently published its energy policy for an environmentally friendly, reliable and affordable energy supply on 28 September 2010. Article 27(1) of the Renewable Energy Directive requires Member States to complete transposition into national law by 5 December 2010. In Germany, this was achieved by the publication of the Biomass Electricity Sustainability Ordinance (BioSt-NachV) of 23

[4] The methodology used for biofuel and bioliquid accounting is that given in Art. 19 no. 1(b) or (c) together with Annex V of Directive 2009/28/EC, which is equivalent to section 8(2) together with Annex 1 of the German Biofuel Sustainability Ordinance (Biokraft-NachV). Once the upstream chain has communicated its own emissions, the calculation is made by the certified biofuel manufacturers and entered into the sustainability certificate. The fossil reference value used to determine whether a biofuel is sustainable remains set at 83.8 g $CO_2$eq/MJ.

July 2009 and the Biofuel Sustainability Ordinance (Biokraft-NachV) of 30 September 2009 in the Federal Law Gazette. These two sustainability ordinances transpose the Renewable Energy Directive into German law, and constitute some of the measures from the German government's National Action Plan and energy policy.
In the ILUC Directive, (Directive (EU) 2015/1513 of the European Parliament and of the Council of 9 September 2015 amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources), European legislators introduced a ceiling of 7% for the proportion of biofuels produced from food crops (conventional biofuels) while reducing the time allowed for meeting the sustainability criterion of minimum emission savings of 50% and of 60% for new installations (these savings figures have been current since 1 January 2017)[5].

In Germany, the biofuel quota for energy was replaced by the Greenhouse Gas Mitigation Quota on 1 January 2015. Since then, all parties governed by this new legislation ('party under obligation') have been required to ensure that the greenhouse gas emissions of the fossil petrol and diesel fuels they place on the market plus the greenhouse gas emissions of the biofuels they place on the market are reduced by a defined percentage vis-à-vis the reference value calculated individually in each case[6]. The required reduction vis-à-vis the reference value has been 4% since 2017 and 6% from 2020.

As a measure accompanying the introduction of the Greenhouse Gas Mitigation Quota, the BLE regularly prepares evaluations for the Commission and the voluntary schemes as well as the national schemes. These evaluations provide the scheme in question with information about sustainability certificates with particularly low emission values, as entered into Nabisy by the scheme's participants. If the emission value stated on the certificate is at least 10% below the 'typical value' or a comparable value, it is described in the evaluation as a 'particularly low emission value'. The data provided by the BLE in this context should not be confused with the data used in this evaluation report. By providing these data, the BLE assists certification schemes in completing their own evaluations. The Commission receives a summary of the total number of relevant sustainability certificates in each of the schemes that the Commission recognises.

## 1.2 This report

As the competent authority, the BLE is required to submit an annual progress report to the federal government.

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[5] Art. 17(2) of Directive 2009/28/EC

[6] The reference value used for comparisons with reductions in greenhouse gases is calculated by multiplying the base value (since 2018: 94.1 g $CO_2$eq/MJ) with the energy quantity of fossil petrol and diesel fuels placed on the market by the party under obligation plus the energy quantity of the biofuel placed on the market by the party under obligation. The greenhouse gas emissions of fossil petrol and diesel fuels are calculated by multiplying the base value with the energy quantity of the fossil petrol and diesel fuels placed on the market by the respective party. The greenhouse gas emissions of biofuels are calculated by multiplying the greenhouse gas emissions stated in certificates acceptable according to section 14 of the Biofuel Sustainability Ordinance, in kilogram carbon dioxide equivalents per gigajoule, by the energy quantity of the biofuel placed on the market by the party under obligation.

This report provides information about the use of sustainable biomass in Germany during the 2019 calendar year. Details are provided about quantities of biofuels and bioliquids in a total of three sections. These are as follows:

- Biofuels recognised as counting towards the Greenhouse Gas Mitigation Quota (chapter 6)
- Bioliquids registered for electricity generation and supply according to the German Renewable Energy Sources Act (EEG) (chapter 7)
- Biofuels and bioliquids not destined for energy use in Germany (chapter 8)

The data used for the evaluation report are provided by the government's Sustainable Biomass System database (Nabisy). This database records all biofuel and bioliquid quantities relevant for the German market. The primary sources of these data are the certified manufacturers of biofuels, who enter all of the data required for the issuing of a sustainability certificate. Following this, the biofuel is generally traded a number of times, with all economic operators along the chain also being certified parties and requiring a Nabisy account in order to receive or transfer the certificate, which is then referred to as a 'partial sustainability certificate'. The process is similar to online banking.

### 1.3 Summary of important results and events in 2019

- An application for recognition as part of the German Greenhouse Gas Mitigation Quota was made for 123,619 TJ of **biofuels** [previous year: 120,066 TJ]. This equates to 3,632 kilotonnes (kt) of biofuels. Of these, just under 53% (64,903 TJ) were made from EU source materials [previous year: just under 67% (73,172 TJ)].

- The source materials for all types of biofuels were mainly wastes and residues (29.4% [previous year: 35.8%]), rapeseed (25.1% [previous year: 20.9%]), palm oil (17.5% [previous year: 15.7%]), maize (12.7% [previous year: 12.9%]) and wheat (7% [previous year: 7.2%]).

- At around 73% and 89,646 TJ, **biodiesel (FAME)** accounted for the largest share of biofuels [previous year: 72%, 86,663 TJ].

- The source materials most commonly used for biodiesel production were wastes and residues at 33,139 TJ (37% [previous year: 47.5%]), followed by rapeseed at 29,600 TJ (33% [previous year: 29%]).

- At around 25% and 30,808 TJ, **bioethanol** accounted for the second-largest share of biofuels [previous year: 26%, 30,785 TJ].

- The source materials most commonly used for bioethanol production were maize at 19,623 TJ (63.7% [previous year: 50.3%]) and wheat at 5,394 TJ (18% [previous year: 28%]).

- In 2019, the use of palm oil in biofuels rose compared with the previous year (+29%).

- The overall reduction in **greenhouse gas emissions** for all (pure) biofuels was 82.6% when compared with fossil fuels. This means that emissions totalling around 9.7 million tonnes of $CO_2$ equivalent were avoided by the use of biofuels instead of fossil fuels.

- A total of 32,925 TJ of electricity was generated from **bioliquids**. EEG-based remuneration was applied for to compensate for feeding this electricity into the grid. Of these bioliquids, 84% [previous year: 84.6%] were thick liquor from the pulp industry, 13% [previous year: 11.3%] consisted of vegetable oil.

- The overall reduction in **greenhouse gas emissions** for all (pure) bioliquids was 93% when compared with fossil fuels. This means that emissions totalling around 2.8 million tonnes of $CO_2$ equivalent were avoided by the use of bioliquids instead of fossil fuels [previous year: about 2.6m t].

- Some 77,220 TJ of the biofuels and bioliquids whose sustainability information had been registered in Nabisy were retired to accounts held by other states [previous year: approx. 73,735 TJ]. The corresponding sustainability certificates showed significantly higher emissions in comparison with the documents submitted in Germany.

- As of the reporting date of 31 December 2019, a total of 14 voluntary schemes had been recognised by the European Commission that were also recognised in Germany.

- The certification bodies recognised by the BLE (21 as of 31 December 2019) completed 2,845 certifications worldwide during the reporting year (previous year: 3,016) according to the terms of their recognition. Of these, 2,763 (previous year: 2,919) certifications were completed according to the requirements of the voluntary schemes and 82 (previous year: 97) according to the requirements of the two DE schemes. These certifications are subject to BLE surveillance.

## 1.4 Methodology

This Evaluation and Progress Report describes the existing processes and measures, and provides an analysis of the data available to the BLE. The Report also covers the circumstances that are relevant to implementation in Germany, such as the transposition of Directive 2009/28/EC in other Member States and the recognition of voluntary schemes by the European Commission.

The results of this analysis are presented, compared and explained from a number of perspectives.

The discussions that follow relate to the data as submitted by the economic operators to the BLE in its capacity as the competent authority according to sections 66 and 74 of Biokraft-NachV.

No conclusions can be drawn from the following sections as to the actual number of participants in individual voluntary schemes and/or national schemes of other Member States.

Data on the sustainability of biofuels and bioliquids supplied to the market must be entered into the government Sustainable Biomass System database Nabisy by economic operators where such data may be of relevance to the German market. If quantities are entered as a precautionary measure but ultimately not used for energy production in Germany, these data are retained within Nabisy without being allocated to Germany. The respective economic operator is responsible for the correct retirement posting of such data. The data entered are thus collected in an organised manner and documented systematically.

The information presented here is intended for use by policymakers and economic decision-makers as a basis for optimisation processes.

In addition, our analysis is also intended to assess the effectiveness of the measures taken—to the extent possible given the available data.

Where information is given on the number of Nabisy users or certifications, it should be noted that economic operators have been counted more than once in the event of these operators using separate certification schemes at the same time, and in the event of economic operators acting as both producer and supplier. No conclusions can therefore be drawn as to the number of companies participating in the measures.

Effectiveness is measured with reference to the following targets:

- The increase in the proportion of 'renewables' in Germany's energy supply within the fuels sector and in electricity generation from liquid biomass
- The reduction in greenhouse gas emissions resulting from the use of sustainable biomass
- The development of more efficient processes and source materials for producing energy from biomass

Changes in these indicators over the relevant calendar year are analysed with reference to BioSt-NachV and Biokraft-NachV.

More specifically, areas of analysis include

- the effectiveness of the sustainability ordinances in terms of the targets pursued by the federal government;

and

- the optimisation of the implementation of the requirements of the Renewable Energy Directive

among others.

Appropriate methods have been chosen for data collection, quantification and evaluation.

The sustainability certificates considered are those for which an application was made for recognition vis-à-vis the biofuel quota obligation in the respective quota year, as well as certificates registered for compensation under the EEG. The vast majority of these are partial sustainability certificates, which are the result of multiple aggregations and/or splits along the chain of stakeholders until the final end user. These certificates were identified by means of the where-used notices issued by the main customs offices and/or grid operators.

Data are considered and evaluated with regard to the type of fuel, its quantity, energy content, origin, the source materials used in its production and, ultimately, the resulting emissions. A tabular format has been chosen in cases where presentation graphics did not appear appropriate.

The primary focus is the state of play as of 31 December 2019 along with a statistical comparison of the implementation of the measure over time (per year) in relation to the initial values.

In this context, the monitoring measures put in place by the BLE and/or administrative processes are also analysed, evaluated and optimised.

Differences in totals in this report are due to rounding.

## 2. Responsibilities of the BLE

In Germany, the BLE is the competent authority for the implementation of the sustainability criteria from the Renewable Energy Directive within the legal framework created by the sustainability ordinances.

In the field of sustainable bioenergy, the BLE's responsibilities include:

- In the **biofuels sector—making data available** to the biofuels quota office and the main customs offices as required for recognising biofuels as contributors to the Greenhouse Gas Mitigation Quota
- In the **bioenergy sector—making data available** to grid operators as required for EEG compensation and the payment of the renewable source materials bonus for plant operators
- In the **emissions trading sector—making data available** to the Emissions Trading Authority
- **Management of data** on the sustainability of biofuels and/or bioliquids in the web-based **government Sustainable Biomass System database (Nabisy)** and issuing partial sustainability certificates in response to applications from economic operators
- Periodic **evaluation of sustainability ordinances** and **preparation** of the annual progress report for the federal government
- Periodic preparation of **reports on particularly low emissions** from sustainability certificates for voluntary schemes, national schemes and for submission to the European Commission
- **Recognition** and **surveillance activities for certification schemes** and **certification bodies** in accordance with the sustainability ordinances.

In accordance with section 74 of BioSt-NachV and section 66 of Biokraft-NachV, the BLE is required to complete the following periodic measures for the implementation of the sustainability ordinances:

- Conducting annual audits at the certification bodies' business premises ('office audits') and risk-based random appraisals of the certification bodies' auditing activities ('witness audits')
- Maintenance and enhancement of the BLE's website by providing information and documents in German and English
- Maintenance and further development of a consistent system for the recognition of certification schemes and bodies, and for the surveillance of compliance with statutory requirements
- Maintenance and further development of the government's Nabisy database for documenting the type and origin of biofuels and sustainability certificates. Documentation and verification of information about the sustainability of biofuel supplies, data exchange with databases in other Member States.
- Maintenance and enhancement of the information register pursuant to section 66 of BioSt-NachV and section 60 Biokraft-NachV
- Organisation of meetings of the Advisory Council on Sustainable Bioenergy
- Organisation of events with certification schemes, certification bodies and businesses, with the aim of exchanging knowledge and information
- Speaking at information events for influential stakeholders such as associations, certification schemes, certification bodies, representatives of the German states, and competent authorities of other Member States
- Attendance at various industry events and trade fairs
- Cooperation and coordination of implementation with the competent authorities of other Member States in REFUREC (Renewable Fuels Regulators Club), and as an observer in relevant working groups of CA-RES (Concerted Action – Renewable Energy Sources Directive)
- Training BLE Audit Service staff working as auditors in the area of sustainable biomass production
- Training Nabisy web application users

# 3. Certification schemes, voluntary schemes and national schemes of other Member States

The Renewable Energy Directive and its national transposition by means of the sustainability ordinances require compliance with their provisions regarding the sustainability of biomass, and the biofuels and bioliquids produced from this biomass, by all economic operators along the entire value chain. The DE schemes, together with the voluntary schemes recognised by the European Commission or national schemes of other Member States are tasked with guaranteeing and monitoring this compliance.

Certification schemes have organisational responsibility for ensuring compliance with the requirements of the Renewable Energy Directive (and of national legislation transposing this Directive) for the production and supply of biomass. Scheme documentation includes provisions offering a more detailed definition of the requirements and how compliance with these is to be proven, as well as the verification of such proof.

## 3.1 Certification schemes recognised by the BLE pursuant to section 33 nos. 1 and 2 of BioSt-NachV and/or Biokraft-NachV

As of 31 December 2019, the BLE had received the following number of applications for the recognition of certification schemes:

*Table 1: Applications for DE certification schemes*

| | |
|---|---|
| **Total applications received by 31/12/2019** | **4** |
| of which rejected | 1 |
| **of which recognised** | **3** |
| of which recognition withdrawn | 1 |
| **currently recognised by the BLE[7]** | **2** |

The BLE has approved DE schemes for the following countries within the scope of their applications[8]:

- All member states of the European Union,as well as
- Argentina, Australia, Belarus, Bolivia, Bosnia and Herzegovina, Brazil, Burkina Faso, Cambodia, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Ecuador, Egypt, El Salvador, Ethiopia, Georgia, Ghana, Guatemala, Hong Kong, India, Indonesia, Israel, Ivory Coast, Kazakhstan, Kenya, Laos, Madagascar, Malaysia, Mauritius, Mexico, Moldova, Mozambique, Nicaragua, Norway, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Republic of Korea, Russia, Serbia, Singapore, South Africa, Sudan, Switzerland, Tanzania, Thailand, Togo, Turkey, Uganda, Ukraine, United Arab Emirates, United

[7] ISCC System GmbH (Cologne) and REDcert GmbH (Bonn)
[8] This does not mean that all these countries allow the BLE to conduct on-site monitoring by means of a witness audit

States, Uruguay, Uzbekistan, Venezuela, and Vietnam.

### 3.2 Voluntary systems pursuant to section 32 no. 3 BioSt-NachV/Biokraft-NachV

Pursuant to Article 18(4), sub-para. 2, sent. 1 of Directive 2009/28/EC, the European Commission may decide that voluntary national or international schemes in which standards are set for the production of biomass products contain accurate data for the purposes of Article 17(2). Such data may be used to demonstrate that consignments of biofuel comply with the sustainability criteria set out in Article 17(3) to (5) of the Directive. The recognition of such voluntary schemes is valid for no more than five years.

Pursuant to section 41 of BioSt-NachV and/or Biokraft-NachV, such voluntary schemes are deemed recognised in Germany for as long as and to the extent that they are recognised by the European Commission. As of 31 December 2019, the European Commission had recognised or re-recognised the following 14 voluntary schemes:

*Table 2: Voluntary schemes (EU schemes) as of 31/12/2019*

| Voluntary schemes | Head office | Recognised on | Re-recognised on |
|---|---|---|---|
| 2BS Association | France | 10/08/2011 | 28/08/2016 |
| Bonsucro | United Kingdom | 10/08/2011 | 23/03/2017 |
| ISCC System GmbH | Germany | 10/08/2011 | 11/08/2016 |
| Round Table on Responsible Soy Association (RTRS) | Argentina | 10/08/2011 | 11/12/2017 |
| Roundtable on Sustainable Biomaterials (RSB) | Switzerland | 10/08/2011 | 11/08/2016 |
| REDcert GmbH | Germany | 15/08/2012 | 12/08/2017 |
| KZR INiG | Poland | 24/06/2014 | |
| Red Tractor Farm Assurance Combinable Crops & Sugar Beet Scheme | United Kingdom | 06/08/2012 | 15/12/2017 |
| Scottish Quality Farm Assured Combinable Crops Limited | United Kingdom | 13/08/2012 | 30/06/2015 |
| Trade Assurance Scheme for Combinable Crops | | 08/10/2014 | |
| Universal Feed Assurance Scheme | | 08/10/2014 | |
| Better Biomass | | 17/12/2018 | |
| U.S. Soybean Sustainability Assurance Protocol EU (SSAP EU) | | 18/02/2019 | |
| Roundtable on Sustainable Palm Oil RED | | 29/07/2019 | |

The list of currently recognised voluntary certification schemes is published on the European Commission website at:

https://ec.europa.eu/energy/en/topics/renewable-energy/biofuels/voluntary-schemes

### 3.3 National schemes of other member states

National schemes of other member states also have organisational responsibility for ensuring compliance with the requirements of the Renewable Energy Directive's sustainability criteria for the production and supply of biomass. These schemes set out the details of the requirements for proof of compliance with the criteria and how such proof is to be verified.

In 2019, data from the national schemes of Austria and Slovakia were available in Nabisy. Companies based within the territory of Austria are required to register sustainability data in the Austrian elNa database.

### 3.4 Economic operators

In the area of sustainable bioenergy, all economic operators along the entire value chain operate according to the specifications of a certification scheme, a voluntary scheme or a national scheme of other Member States, with the exception of users (plant operators and parties obliged to provide evidence). The latter must comply with other national provisions in order to receive compensation from the EEG and/or to have their product recognised as part of the biofuel quota.

Specifically, the following types of economic operators are distinguished:

#### Grower

Growers are agricultural businesses and establishments that grow and harvest biomass.

#### Primary distributor

Primary distributors are businesses and establishments (plants) that are the initial recipients of the biomass required for producing biofuels from those who grow and harvest the biomass, for the purpose of trading it further (e.g. agricultural trade).

#### Originator

Businesses or private homes where wastes and residues are generated.

#### Waste collectors

Waste collectors are businesses and establishments that initially collect the biomass required for producing biofuels, in the form of biogenic waste and residues from the businesses or private households where waste and residues are generated, for the purpose of trading this biomass onwards.

### Conversion operator

Two groups must be distinguished here:

a) Businesses and establishments that process biomass from sustainable cultivation, biogenic waste or residues and which supply the semi-finished products to a further stage of processing for the purpose of biofuel or bioliquid production (e.g. oil mills, biogas plants, fat processing plants or other plants whose processing output is of insufficient quality for the final use of the product).
b) Businesses and establishments that process liquid or gaseous biomass and upgrade this to the quality required for final use. (Such as oil mills, esterification plants, ethanol plants, hydrogenation plants, or biogas upgrading plants.)

Businesses along the production and supply chain that require certification from the certification schemes are known as **interfaces**. In this context, primary distributors and waste collectors are the primary interface; conversion operators that process biomass to the quality required for final use are the **final interface**.

### Suppliers and/or traders within the value chain

Suppliers are economic operators who act between the primary distributor and the conversion operators or between the final interfaces and the distributor of biofuels and/or the plant operator who feeds electricity generated from bioliquids into the grid. Where suppliers downstream of the final interface are not subject to customs monitoring, they must become participants in a DE certification scheme or a voluntary scheme that is recognised by the EU.

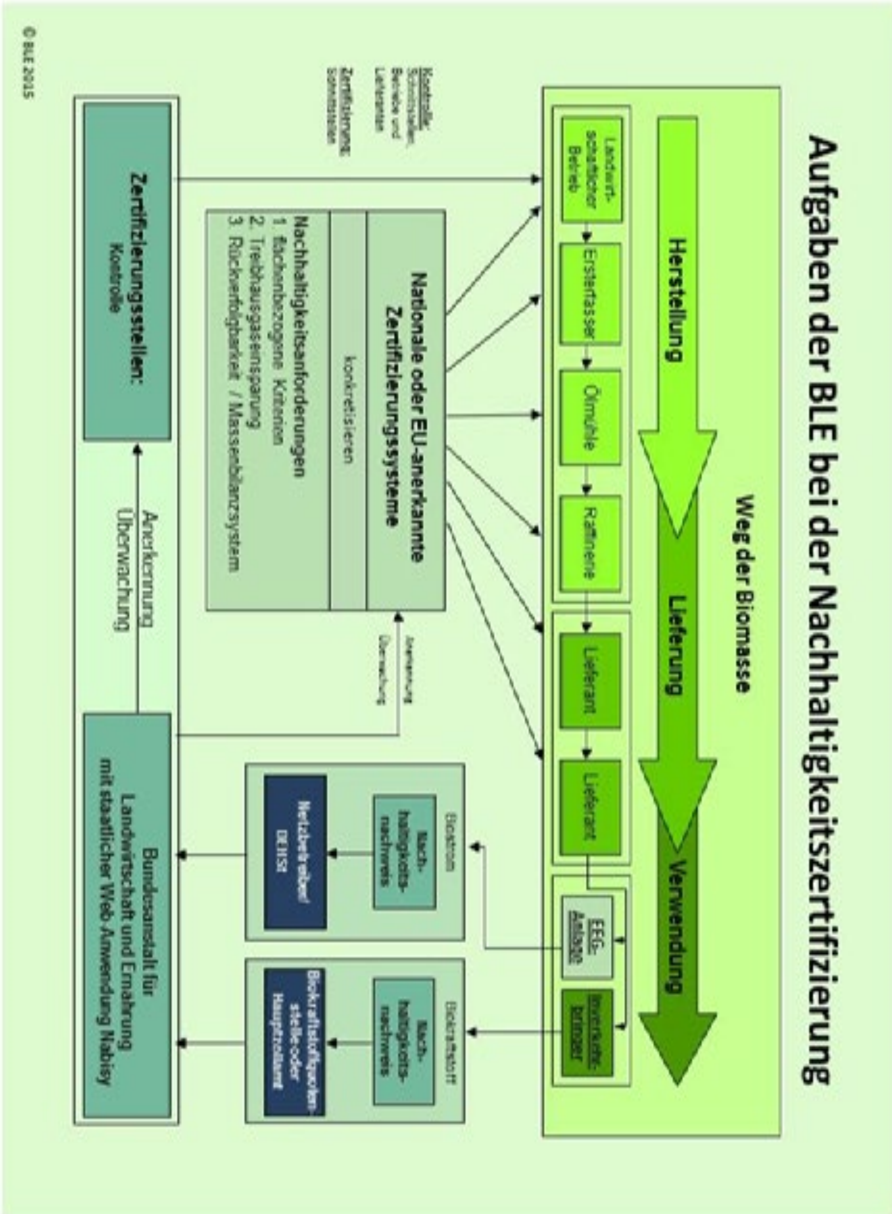
### Plant operator

Plant operators are economic operators that, irrespective of ownership, use plants to generate electricity from renewable energy sources and feed this electricity into the grid. The plant operators receive EEG-based compensation from the grid operator following submission of the relevant sustainability certificate.

### Parties obliged to provide evidence

Parties obliged to provide evidence are economic operators who, pursuant to section 37a of the German Federal Immission Control Act (Bundes-Immissionsschutzgesetz) are required to meet a certain minimum target for the reduction of greenhouse gas emissions on their sum total of taxed fuel in the course of a calendar year. To this end, these operators may place sustainable biofuels on the market.

*Figure 1*


Aufgaben der BLE bei der Nachhaltigkeitszertifizierung
Weg der Biomasse
Herstellung
Lieferung
Verwendung
Landwirtschaftlicher Betrieb
Ersterfasser
Ölmühle
Raffinerie
Lieferant
Lieferant
EEG-Anlage
Inverkehrbringer
Nationale oder EU-anerkannte Zertifizierungssysteme
konkretisieren
Nachhaltigkeitsanforderungen
1. flächenbezogene Kriterien
2. Treibhausgaseinsparung
3. Rückverfolgbarkeit / Massenbilanzsystem
Zertifizierungsstellen: Kontrolle
Anerkennung
Überwachung
Biostrom
Nachhaltigkeitsnachweis
Netzbetreiber/ DEHSt
Biokraftstoff
Nachhaltigkeitsnachweis
Biokraftstoffquotenstelle oder Hauptzollamt
Bundesanstalt für Landwirtschaft und Ernährung mit staatlicher Web-Anwendung Nabisy
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### 3.4.1 Scheme participants notified to the BLE

Alongside certification schemes recognised by the BLE, voluntary national or international schemes that set requirements for the production of biomass products are also deemed recognised by Germany under the sustainability ordinances without any further formalities, as long as and to the extent that they are recognised by the European Commission. The same applies to national schemes of other Member States.

Registration is mandatory for participants in BLE-recognised certification schemes (DE schemes). As regards voluntary and national schemes, participants are taken into account only if these were notified to the BLE because the biofuels or bioliquids produced or traded by these participants are or may become relevant to the German market, and they require a Nabisy account. The majority of participants now take part in an EU-recognised voluntary scheme.

As of 31 December 2019, **5,045 participants** (previous year: 4,884) along the value chain were registered with the BLE as producers or traders of biofuels or bioliquids.

The sum totals are derived from all participants notified to the BLE. In cases where a company acts in several roles simultaneously—e.g. as a producer of biofuel and as a supplier downstream of the final interface—or participates in more than one certification scheme, this company may be counted more than once.

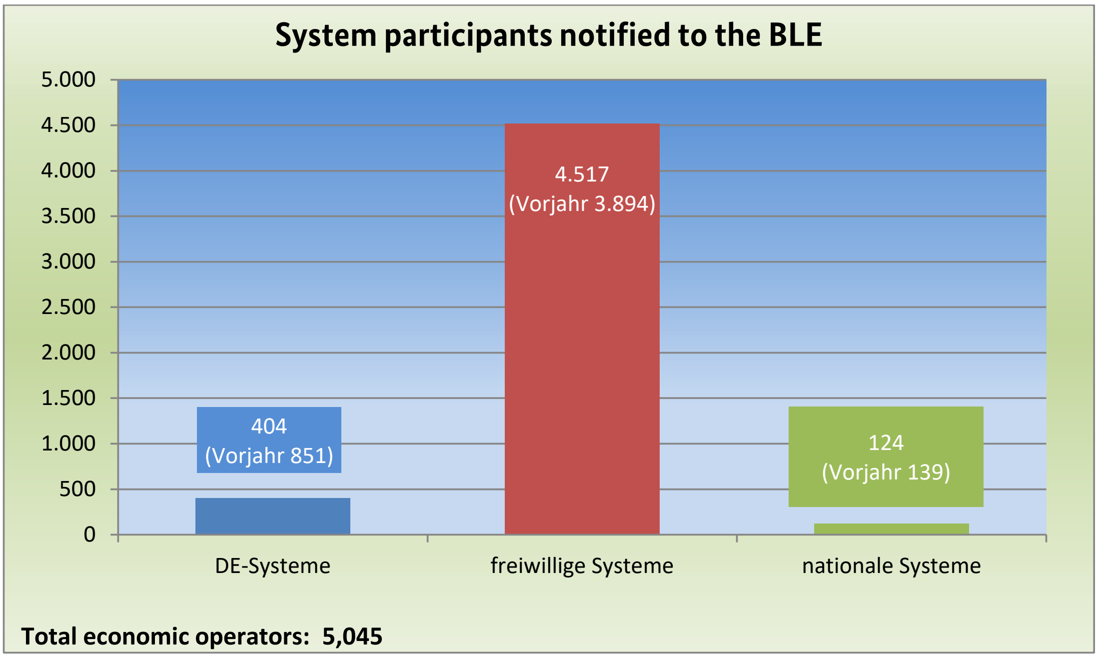



*Figure 2*

### 3.4.2 Suppliers subject to monitoring by German customs offices

Where suppliers downstream of the final interface are subject to customs monitoring pursuant to section 17(3) no. 2 of Biokraft-NachV, these suppliers are not required to be participants in a DE scheme or in a voluntary scheme recognised by the European Commission.To benefit from this exemption, a supplier's mass balance system must be subject to periodic audits by the main customs offices for reasons of tax monitoring pursuant to the German Energy Tax Act (Energiesteuergesetz) or the monitoring of biofuel quota obligations pursuant to the German Federal Immission Control Act. In such cases, these suppliers must use the Nabisy electronic database to document the receipt and transfer of the biofuels, stating the place, date and information included on the sustainability certificate.

During the application process for access to Nabisy, the BLE obtains confirmation from the main customs office responsible for the supplier's place of business that the applicant is indeed subject to customs monitoring. Once this confirmation has been provided, the economic operator is granted a database account.

As of 31 December 2019, 173 suppliers subject to customs monitoring (previous year: 177) were registered in Nabisy.

### 3.4.3 Participants in national schemes from other Member States

Some of the participants registered in Nabisy participate in national schemes from other Member States. As of 31 December 2019, the BLE had been notified of a total of 124 (previous year: 139) participants in the national schemes from **Austria** and **Slovakia**. This relatively small number of notifications does not mean that the biofuels and/or bioliquids or source materials from other Member States are of only limited relevance to the German market (cf. chapter 6.1, Figure 12).Instead, it may be due to the fact that some Member States completed their transposition of Directive 2009/28/EC at a later date. For this reason, interested economic operators from other Member States had typically already joined the DE schemes or the voluntary schemes recognised by the European Commission by this later date.

## 4. Certification bodies

Certification bodies are independent natural or legal persons that issue certificates to economic operators along the value chain and monitor compliance with the requirements of the Renewable Energy Directive and of the national legislation enacted to transpose this Directive, as well as other requirements of the scheme used, in all businesses along the value chain. Certificates certify that the specific requirements of the Renewable Energy Directive are met for the production of sustainable biofuels and/or bioliquids. In Germany, the BLE is the competent authority for the recognition and surveillance of certification bodies in the context of sustainable biomass production. This applies irrespective of whether the certification bodies act under DE schemes or under voluntary schemes, since the BLE's surveillance duties relate to all certification bodies that have their registered place of business in Germany.

Pursuant to section 42 nos. 1 and 2, and section 43 together with section 56, of BioSt-NachV/Biokraft-NachV, BLE had received the following number of applications for recognition as a certification body by 31 December 2019:

*Table 3: Applications for recognition as a certification body*

| | |
|---|---|
| **Total applications (as of 31/12/2019)** | **51** |
| of which rejected | 6 |
| **of which permanently recognised** | **45** |
| of which recognition withdrawn or expired because of inactivity of the certification bodies | 24 |
| **Number of certification bodies permanently recognised as of 31/12/2019** | **21** |

During the application process, certification bodies initially receive provisional recognition, which allows them to commence their certification activities. Only once the certification body's business premises have undergone a successful office audit conducted by the BLE's Audit Service can this provisional recognition be replaced by a permanent one.

An up-to-date list of recognised certification bodies can be viewed at: https://www.ble.de/EN/Topics/Climate-Energy/Sustainable-Biomass-Production/sustainable-biomass-production_node.html

BLE auditors conduct on-site audits concurrently with the certification bodies' own certification audits—known as 'witness audits'—all over the world in countries that have given permission for the BLE to conduct these witness audits on their territory. These audits are intended to assess audits conducted under both the DE schemes and the voluntary schemes. In 2019, the BLE performed 106 (previous year: 123) witness audits of certification audits conducted by the certification bodies. Some 57 of these audits were carried out in Germany, while the remaining 49 audits took place around the world both in EU Member States and outside the EU.

*Table 4: Permanently recognised certification bodies*

| Recognised certification bodies | Permanently recognised on |
|---|---|
| SGS Germany GmbH, Germany | 23/08/2010 |
| DQS CFS GmbH, Germany | 23/08/2010 |
| TÜV SÜD GmbH, Germany | 23/08/2010 |
| GUT Certifizierungsgesellschaft mbH, Germany | 23/08/2010 |
| Global-Creative-Energy GmbH, Germany | 30/08/2010 |
| Control Union Certifications Germany GmbH | 30/08/2010 |
| Agrizert Zertifizierungs GmbH, Germany | 29/09/2010 |
| IFTA AG, Germany | 01/12/2010 |
| DEKRA Certification GmbH, Germany | 01/12/2010 |
| LACON GmbH, Germany | 15/12/2010 |
| ÖHMI Euro Cert GmbH, Germany | 20/12/2010 |
| QAL Umweltgutachter GmbH, Germany | 20/12/2010 |
| Agro Vet GmbH, Austria | 21/12/2010 |
| ASG cert GmbH, Germany | 14/03/2011 |
| TÜV Nord Cert GmbH, Germany | 23/09/2011 |
| proTerra GmbH, Germany | 27/09/2011 |
| ELUcert GmbH, Germany | 17/04/2013 |
| SC@PE international Ltd. | 05/06/2014 |
| DIN CERTCO Gesellschaft für Konformitäts-bewertung mbH | 04/02/2015 |
| SicZert Zertifizierungen GmbH | 26/03/2015 |
| Alko-Cert GmbH | 03/02/2017 |

## 4.1 International certifications according to DE scheme rules

In Germany, the transposition of Directive 2009/28/EC into national law requires the certification of certain economic operators along the value chain for the production of biofuels and bioliquids. These economic operators are termed **interfaces**, and include the primary distributors/waste collectors and all conversion operators. In addition, compliance assessments are made along the production and supply chain.

The certification bodies acting according to the requirements of the certification schemes recognised by the BLE (REDcert-DE and ISCC-DE) mainly carried out certifications in Germany and within the European Union.

A total of 82 certificates were issued in the reporting year according to DE scheme requirements (previous year: 97).

It can be assumed that the scheme participants certified here are mostly companies who operate exclusively within the German market. Accordingly, these companies do not necessarily require certification according to the requirements of a voluntary scheme. However, some overseas businesses were also awarded a certificate according to DE scheme requirements.

## 4.2 Certifications according to voluntary scheme requirements

The BLE is responsible for recognising and monitoring certification bodies who have their head office or a branch office in Germany and make certification decisions on these premises.

This is irrespective of the type of scheme used (DE or voluntary), whose scheme requirements the company to be certified has agreed to be bound by. All certificates are submitted to the BLE by the certification bodies. In the reporting year, **2,763** (previous year: 2,919) new and repeat certifications were reported for businesses certified under voluntary scheme requirements.

# 5. Nabisy government database and sustainability certificates

## 5.1 Sustainable Biomass System (Nabisy)

Pursuant to Commission Decision 2011/13/EU of 12 January 2011, economic operators are required to submit to Member States certain types of information concerning the sustainability of each consignment of biofuels or bioliquids where this could become relevant for the market concerned.

Such submissions are filled in electronically in Germany. For each consignment of biofuels or bioliquids, this information must be entered into the web-based **Nabisy** government database by the economic operators. Sustainability certificates and partial sustainability certificates hold the data required for fulfilling sustainability criteria entered into Nabisy and must be passed on along the supply chain.

In the reporting year, transactions were recorded on 2,075 (previous year: 2,317) accounts. These accounts were all accounts of businesses from the final interface onwards, as this is where the Nabisy system applies.

The adoption of the German ‘Act introducing tenders for electricity from renewable sources and further amending the law on renewable energy’ of 13 October 2016 (Federal Law Gazette I, p. 2258), has meant that the Biomass Electricity Sustainability Ordinance has applied to all EEG-subsidised bioliquids from 1 January 2017. Effective 1 January 2017, plant operators have needed to hold a sustainability certificate if they require use of **start-up, ignition, or auxiliary firing** for the operation of their plant and use liquid biomass for this purpose. Since October 2016, the BLE has set up accounts and access in response to applications from over 1,000 affected biogas plants.

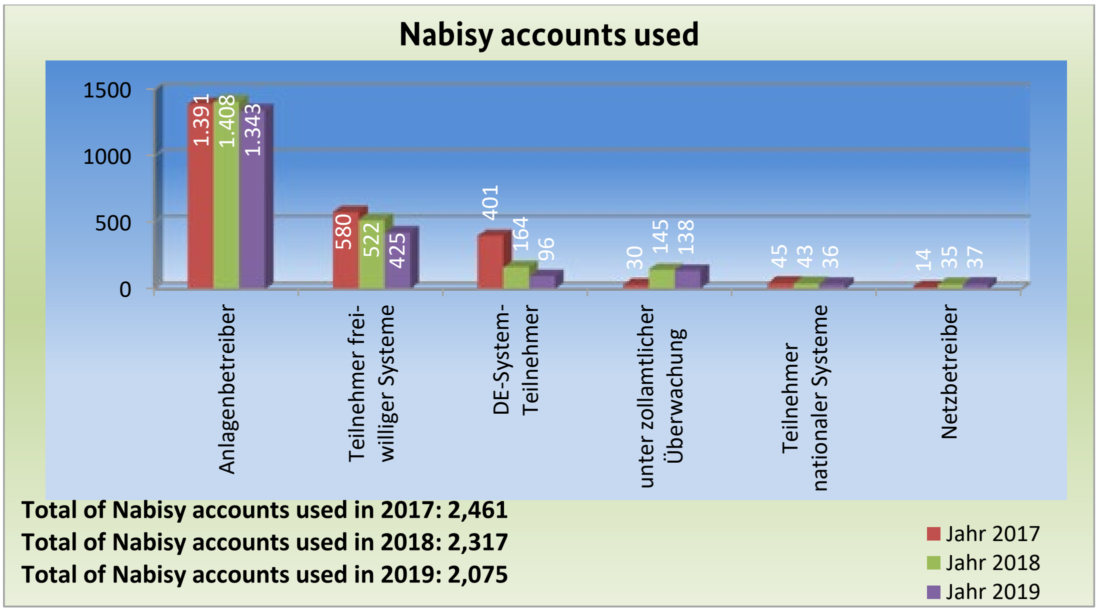



*Figure 3*

Depending on their function, economic operators who have a corresponding Nabisy account are able to create sustainability certificates (final interfaces), transfer or split sustainability certificates or partial sustainability certificates (suppliers, plant operators) and issue where-used notices (grid operators). Economic operators have the option of applying to the BLE for a number of account logins according to their requirements.

The figure below shows the number of users with access as of 31 December 2019.

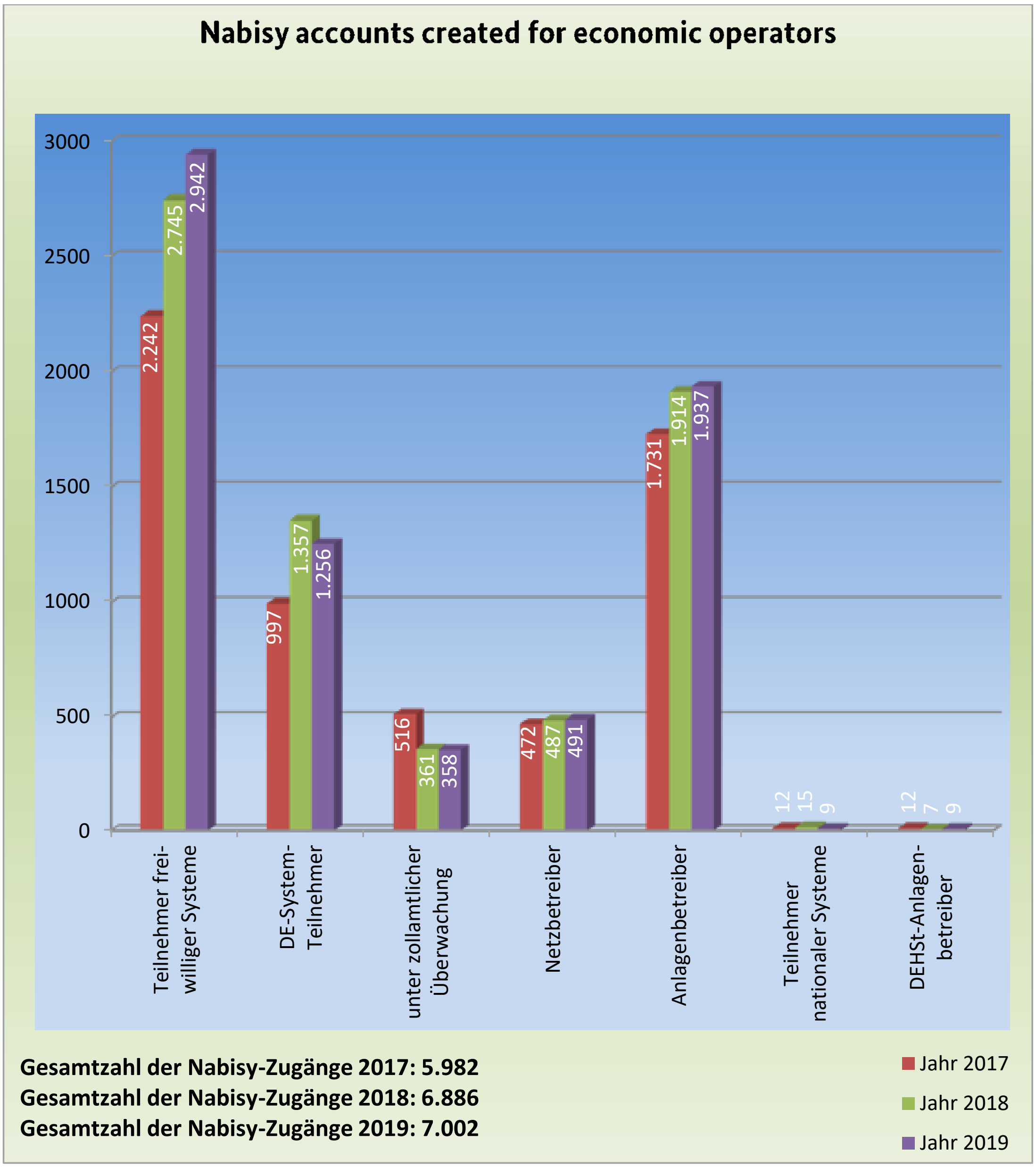



*Figure 4*

## 5.2 Certificates

Only the manufacturer of a consignment of biofuels or bioliquids can issue a **sustainability certificate**. This manufacturer is the so-called **'final interface'**. By issuing the certificate in Nabisy, the manufacturer confirms that the consignment is fit for use on the German market. If a decision is made at a later stage in the value chain, e.g. by a supplier, that the product is to be used outside Germany, the relevant certificate must be retired by the party concerned to the retirement account of the state where the product is to be used.

Presentation of a sustainability certificate or partial sustainability certificate to the customs authorities is a requirement for biofuels recognised as part of the distributor's greenhouse gas reduction obligation. Plant operators can claim compensation according to the German Renewable Energy Sources Act (EEG) and (where applicable) the NawaRo bonus for electricity produced from biomass and fed into the grid only if they present a sustainability certificate or partial sustainability certificate.

Sustainability certificates are issued by those certified economic operators (**issuers**) who upgrade liquid or gaseous biomass so that it is capable of meeting the quality requirements for its use as a biofuel or who manufacture bioliquids from the biomass used. In the sustainability ordinances, these economic operators are referred to as the 'final interface'. This terminology is not used by the voluntary schemes. For this reason, this report refers in more general terms to 'economic operators who issue sustainability certificates'.

A sustainability certificate identifies a certain quantity of biofuel or bioliquid as being sustainable. If biofuels and/or bioliquids are traded along the supply chain as far as a party obliged to provide evidence and/or plant operator, the quantities concerned are also passed on as necessary.

To represent these events, a sustainability certificate must therefore be split accordingly or transferred to a customer's supplier account. This results in the creation of **partial sustainability certificates**.

Accordingly, Nabisy processes both sustainability certificates ('basic certificates' that can be issued only by manufacturers) and partial sustainability certificates ('subsequent certificates' that are generated by an action on the part of a supplier: transfer and splitting).

In 2019, **21,736** sustainability certificates (previous year: 16,619) were configured in Nabisy by 258 manufacturers worldwide. In the case of 34 of these manufacturers, these were 'new plants' (initial commissioning after 5 October 2015), which are required to achieve minimum emission savings of 60% instead of 50%. The 258 manufacturers mentioned above operate one or several production facilities. These are: 119 esterification plants (FAME), 76 oil mills (refined oils), 37 bioethanol plants (bioethanol), 21 biogas upgrading plants (biomethane), 6 pulp mills (thick liquor) and 6 hydrogenation plants (hydrogenated oils).

*Table 5: Sustainability certificates issued*

| Manufacturer location | Number of manufacturers | Number of sustainability certificates issued |
|---|---|---|
| Germany | 100 | 12,479 |
| European Union | 68 | 7,766 |
| Third countries | 90 | 1,491 |
| **Total** | **258** | **21,736** |

Samples of a sustainability certificate (basic certificate) and a partial sustainability certificate (subsequent certificate) are shown below (samples are current as of early 2019).

# NACHHALTIGKEITSNACHWEIS

*für flüssige Biomasse nach §§ 15 ff. Biomassestrom-Nachhaltigkeitsverordnung (BioSt-NachV) oder für Biokraftstoffe nach §§ 15 ff. Biokraftstoff-Nachhaltigkeitsverordnung (Biokraft-NachV)*

**Nummer des Nachweises:** EU-BM-14-213-10000002-NNw-00000708

| Schnittstelle: | Empfänger: | Zertifizierungssystem: |
|---|---|---|
| EU-BM-14-SSt-00000002 | Lieferant/trader EU 3, Musterstadt, EU-BM-14-Lfr-10000003 | Nabisy Test Voluntary Scheme, null, EU-BM-14 |

**1. Allgemeine Angaben zur Biomasse / zum Biokraftstoff:**

Art: 100,00% FAME — Anbauland / Entstehungsland*: PL

Menge: 111,221 m³ — Energiegehalt (MJ): 3.670.293

Die flüssige Biomasse / der Biokraftstoff ist aus Abfall oder aus Reststoffen hergestellt worden und die Reststoffe oder Abfälle
- stammen nicht aus der Land-, Forst- oder Fischwirtschaft oder aus Aquakulturen. ☐ ja ☒ nein
- stammen aus der Land-, Forst- oder Fischwirtschaft oder aus Aquakulturen. ☐ ja

**2. Nachhaltiger Anbau der Biomasse bzw. nachhaltige Herstellung des Biokraftstoffs nach den §§ 4 – 7 BioSt-NachV / Biokraft-NachV:**

Die Biomasse erfüllt die Anforderungen nach den §§ 4 – 7 BioSt-NachV / Biokraft-NachV ☒ ja ☐ nein

**3. Treibhausgas-Minderung nach § 8 BioSt-NachV / Biokraft-NachV:**

$$E = e_{ec} + e_l^{**} + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee} \quad (g\ CO2eq/MJ)$$

$$E = 19{,}9 + \quad + 11{,}2 + 1{,}0 + 0{,}0 - \quad - \quad - \quad - \quad = 32{,}1$$

** $e_l$ beinhaltet den Bonus für die Umwandlung stark verschmutzter oder degradierter Flächen ☐ ja ☐ nein

THG-Minderung bei Verwendung

61,7% als Kraftstoff [83,8 (g CO2eq/MJ)] — 58,3% zur Wärmeerzeugung [77 (g CO2eq/MJ)]

64,7% zur Stromerzeugung [91 (g CO2eq/MJ)] — 62,2% Kraft-Wärme-Kopplung [85 (g CO2eq/MJ)]

Erfüllung der Minderung bei einem Einsatz in folgender Region (z. B. Deutschland, EU): Deutschland

Die Erstinbetriebnahme der Anlage zur Herstellung des Biokraft - oder Biobrennstoffs erfolgte nach dem 5. Oktober 2015 ☐ ja ☒ nein

**Lieferung auf Grund eines Massenbilanzsystems nach § 17 BioSt-NachV / Biokraft-NachV:**

☒ Die Lieferung ist in einem Massenbilanzsystem dokumentiert worden.
- ☐ Die Dokumentation erfolgt über die elektronische Datenbank der BLE
- ☒ Die Dokumentation erfolgte nach den Anforderungen des folgenden Zertifizierungssystems: REDcert GmbH
- ☐ Die Dokumentation erfolgt nach § 17 Abs. 3 Biokraft-NachV.

Der Nachhaltigkeitsnachweis wurde elektronisch erstellt und ist ohne Unterschrift gültig.

**Ort und Datum der Ausstellung:** Pritzwalk OT Falkenhagen, 11.04.2019

* **Hinweis:**

Dieser Nachweis wurde in der Web-Anwendung „Nabisy" erstellt. Er ist mit einer eindeutigen ID-Nummer versehen. Die Daten zur Nachhaltigkeit des Biokraft- oder Biobrennstoffs sind in der Nabisy-Datenbank gespeichert. Die Echtheit des Nachweises kann durch zuständigen Stellen in EU-Mitgliedsstaaten und Efta-Staaten überprüft werden.

Vordruck der Bundesanstalt für Landwirtschaft und Ernährung

*Figure 5*

Bundesanstalt für
Landwirtschaft und Ernährung

**Zusatzinformation zu** **EU-BM-14-213-10000002-NNw-00000708**

**Allgemeine Daten**

| | |
|---|---|
| Ausstellungsdatum | 11.04.2019 |
| Lieferdatum | 31.03.2019 |
| Empfänger | Lieferant/trader EU 3<br>Musterweg 3<br>10003 Musterstadt |

**Menge**

| | |
|---|---|
| Menge | 111,221 m³ |
| Energiegehalt | 3.670.293 MJ |

**Art der Biomasse**

| Code / Kürzel | Attribut Annex IX* | Anteil (%) | Anbauland | ILUC |
|---|---|---|---|---|
| 38260010-1 / Biodiesel_Raps | Conv | 100,00 | PL | 55,00 |

* Hinweis: Adv - Fortschrittlich, Conv - Konventionell, - - Weder Adv noch Conv

Nicht zugeordnete Anbauländer

**Zusatzinformationen zur THG Emission**

| | | | |
|---|---|---|---|
| Treibhausgas-Emissionen | 32,1 g CO2eq/MJ | inkl. mittl. Schätzwert ILUC | 87,1 g CO2eq/MJ |

*Figure 6*

# NACHHALTIGKEITS-TEILNACHWEIS

*für flüssige Biomasse nach §§ 15 ff. Biomassestrom-Nachhaltigkeitsverordnung (BioSt-NachV) oder für Biokraftstoffe nach §§ 15 ff. Biokraftstoff-Nachhaltigkeitsverordnung (Biokraft-NachV)*

**Nummer des Teilnachweises:** EU-BM-14-Lfr-10000007-999-12345678-NTNw-10007199

**Nummer des Basis-Nachweises:** EU-BM-14-213-10000002-NNw-00000708

03/19-Musterstadt

**Aussteller:** BLE

| Schnittstelle: | Empfänger: | Zertifizierungssystem: |
|---|---|---|
| EU-BM-14-SSt-00000002 | Lieferant/trader EU 7, Musterstadt, EU-BM-14-Lfr-10000007 | Nabisy Test Voluntary Scheme, null, EU-BM-14 |

**1. Allgemeine Angaben zur Biomasse / zum Biokraftstoff:**

Art: 100,00% FAME  Anbauland / Entstehungsland*: PL

Menge: 61,205 m³  Energiegehalt (MJ): 2.019.765

Die flüssige Biomasse / der Biokraftstoff ist aus Abfall oder aus Reststoffen hergestellt worden und die Reststoffe oder Abfälle
- stammen nicht aus der Land-, Forst- oder Fischwirtschaft oder aus Aquakulturen. ☐ ja ☒ nein
- stammen aus der Land-, Forst- oder Fischwirtschaft oder aus Aquakulturen. ☐ ja

**2. Nachhaltiger Anbau der Biomasse bzw. nachhaltige Herstellung des Biokraftstoffs nach den §§ 4 – 7 BioSt-NachV / Biokraft-NachV:**

Die Biomasse erfüllt die Anforderungen nach den §§ 4 – 7 BioSt-NachV / Biokraft-NachV ☒ ja ☐ nein

**3. Treibhausgas-Minderung nach § 8 BioSt-NachV / Biokraft-NachV:**

| E = | $e_{ec}$ | + | $e_l$** | + | $e_p$ | + | $e_{td}$ | + | $e_u$ | - | $e_{sca}$ | - | $e_{ccs}$ | - | $e_{ccr}$ | - | $e_{ee}$ | | (g CO2eq/MJ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E = | 19,9 | + | | + | 11,2 | + | 1,0 | + | 0,0 | - | | - | | - | | - | | = | 32,1 |

** $e_l$ beinhaltet den Bonus für die Umwandlung stark verschmutzter oder degradierter Flächen ☐ ja ☐ nein

THG-Minderung bei Verwendung

61,7% als Kraftstoff [83,8 (g CO2eq/MJ)]  58,3% zur Wärmeerzeugung [77 (g CO2eq/MJ)]

64,7% zur Stromerzeugung [91 (g CO2eq/MJ)]  62,2% Kraft-Wärme-Kopplung [85 (g CO2eq/MJ)]

Erfüllung der Minderung bei einem Einsatz in folgender Region (z. B. Deutschland, EU): Deutschland

Die Erstinbetriebnahme der Anlage zur Herstellung des Biokraft - oder Biobrennstoffs erfolgte nach dem 5. Oktober 2015 ☐ ja ☒ nein

**Lieferung auf Grund eines Massenbilanzsystems nach § 17 BioSt-NachV / Biokraft-NachV:**

☒ Die Lieferung ist in einem Massenbilanzsystem dokumentiert worden.
- ☒ Die Dokumentation erfolgt über die elektronischen Datenbank der BLE
- ☐ Die Dokumentation erfolgte nach den Anforderungen des folgenden Zertifizierungssystems:
- ☒ Die Dokumentation erfolgt nach § 17 Abs. 3 Biokraft-NachV.

Letzter Lieferant (Name, Adresse): Lieferant/trader EU 3, Musterstadt

Der Nachhaltigkeits-Teilnachweis wurde elektronisch erstellt und ist ohne Unterschrift gültig. **Ort und Datum der Ausstellung:** Bonn, 23.04.2019

*** Hinweis:**

Dieser Nachweis wurde in der Web-Anwendung „Nabisy" erstellt. Er ist mit einer eindeutigen ID-Nummer versehen. Die Daten zur Nachhaltigkeit des Biokraft- oder Biobrennstoffs sind in der Nabisy-Datenbank gespeichert. Die Echtheit des Nachweises kann durch zuständigen Stellen in EU-Mitgliedsstaaten und Efta-Staaten überprüft werden.

Vordruck der Bundesanstalt für Landwirtschaft und Ernährung

*Figure 7*

Bundesanstalt für
Landwirtschaft und Ernährung

**Zusatzinformation zu** EU-BM-14-Lfr-10000007-999-12345678-NTNw-10007199

**Allgemeine Daten**

| | |
|---|---|
| Ausstellungsdatum | 23.04.2019 |
| Lieferdatum | 31.03.2019 |
| Empfänger | Lieferant/trader EU 7<br>Musterweg 7<br>10007 Musterstadt |

**Menge**

| | |
|---|---|
| Menge | 61,205 m³ |
| Energiegehalt | 2.019.765 MJ |

**Art der Biomasse**

| Code / Kürzel | Attribut Annex IX* | Anteil (%) | Anbauland | ILUC |
|---|---|---|---|---|
| 38260010-1 / Biodiesel_Raps | Conv | 100,00 | PL | 55,00 |

* Hinweis: Adv - Fortschrittlich, Conv - Konventionell, - - Weder Adv noch Conv

Nicht zugeordnete Anbauländer

**Zusatzinformationen zur THG Emission**

Treibhausgas-Emissionen 32,1 g CO2eq/MJ inkl. mittl. Schätzwert ILUC 87,1 g CO2eq/MJ

*Figure 8*

## 6. Biofuels

The figures that follow illustrate the quantities of energy (in TJ) from biofuels placed on the market in Germany that were the subject of applications for recognition in terms of the 2019 Greenhouse Gas Mitigation Quota.

The data are based on the certificates in Nabisy that the German Federal Revenue Administration had annotated with notes on use.

Please note that the information given concerns only the quantities applied for and their energy content. No conclusions can be drawn on the basis of the available data as to whether all quantities and energy contents presented here are in fact recognised as part of the quota obligation.

An increase in the total quantity of biofuels was again recorded in the 2019 reporting year, rising 3% compared with the previous year. The proportion of wastes and residues fell by 19.5% and their share is now only 28% of the overall quantity.

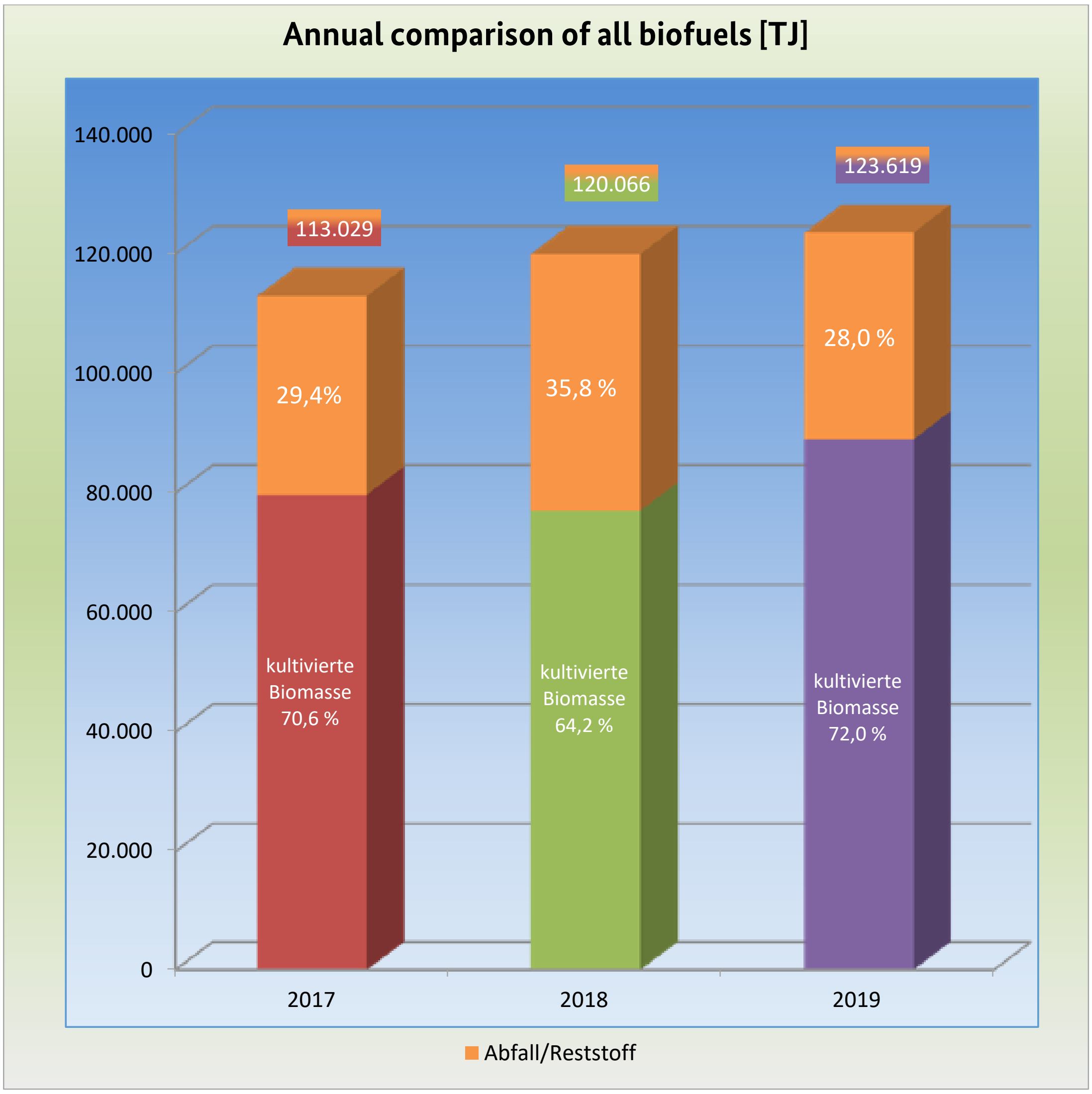



*Figure 9*

## 6.1 Origin of source materials

Biofuels whose source materials originated in Europe reported a further decline although these make up the largest proportion worldwide by a large margin.

Biofuels manufactured from Asian source materials increased by 15% to 28%, which is the second-largest proportion worldwide.

Proportions for Australia, Central America and South America all rose significantly while still remaining at a relatively low level.

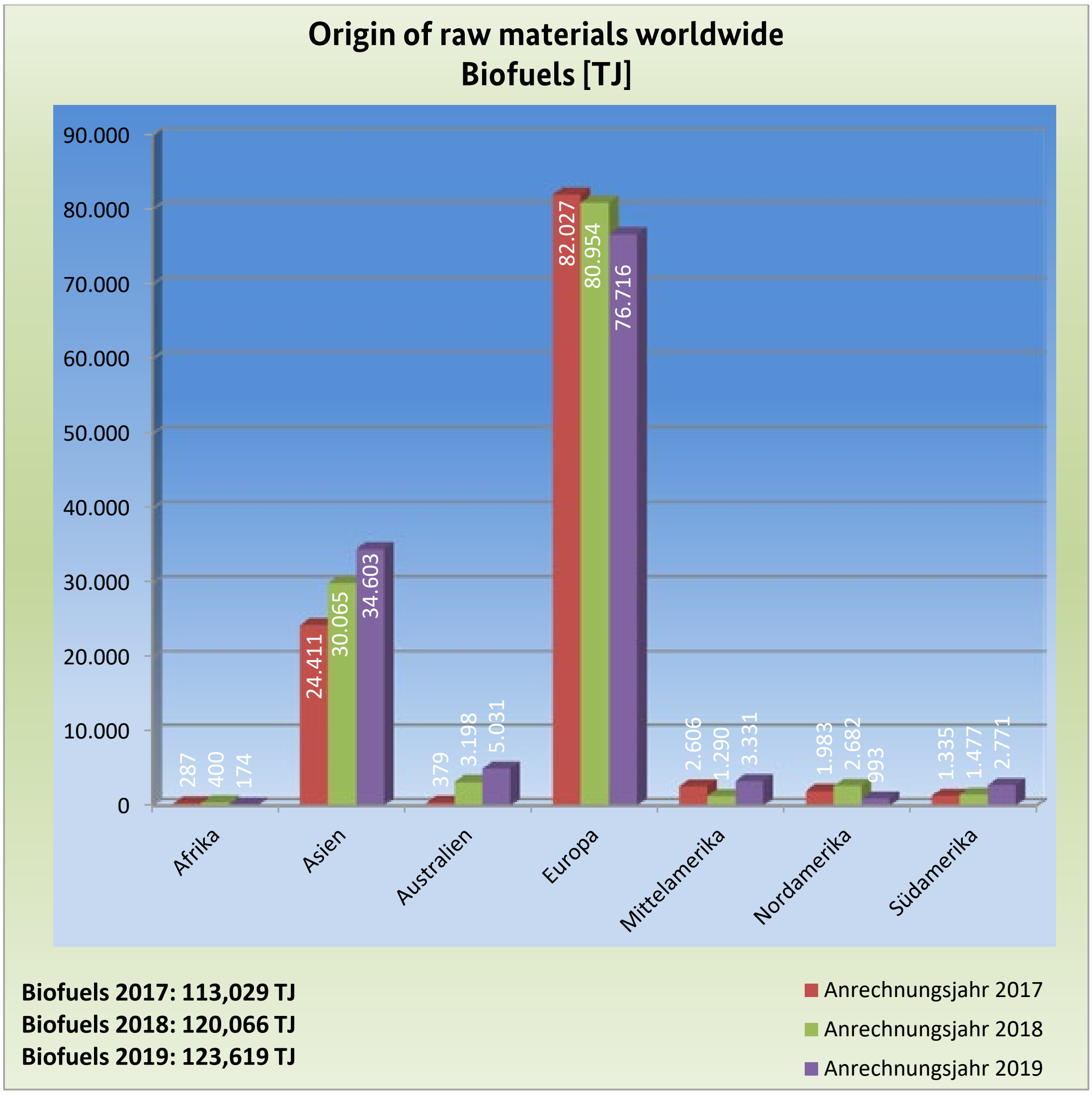



*Figure 10*

The proportion of source materials originating from Germany decreased once again, by almost 10%.

The proportion from third countries in Europe rose again (+51%).

Quantities from other Member States of the European Union posted a decline of 12%.

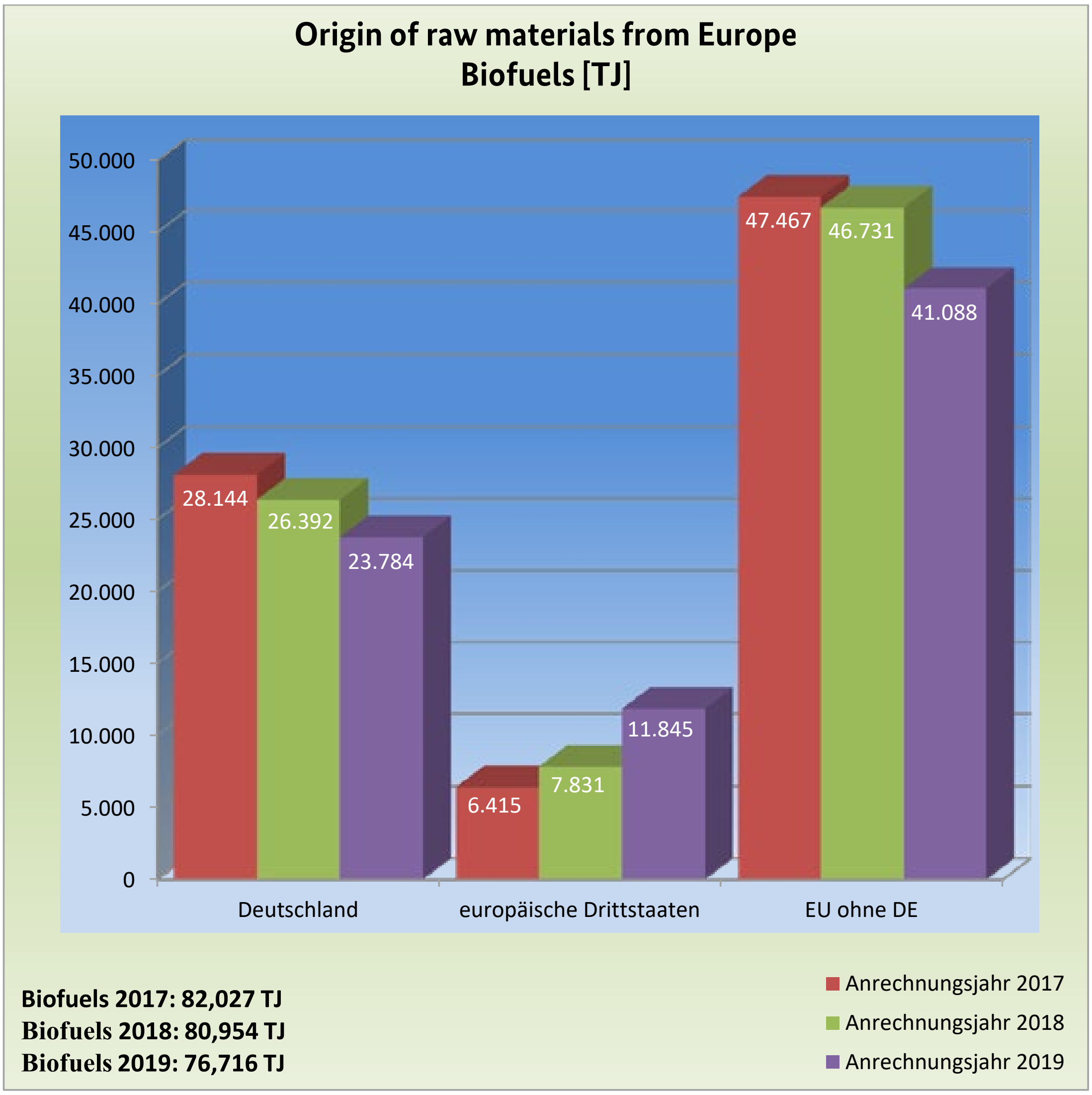



*Figure 11*

In the reporting year, a decrease in source materials from the European Union used in biofuel production was again reported (−11%). More than one third of these biofuels were produced from source materials that had been cultivated or generated in Germany.

Some 14% of biofuels originated from Hungary and 13% from Poland. The proportion for all of the other nations shown in the pie chart remained under 5% in each case. The quantities from the 16 countries each providing less than 1,000 TJ amounted to just under 6% of the total.

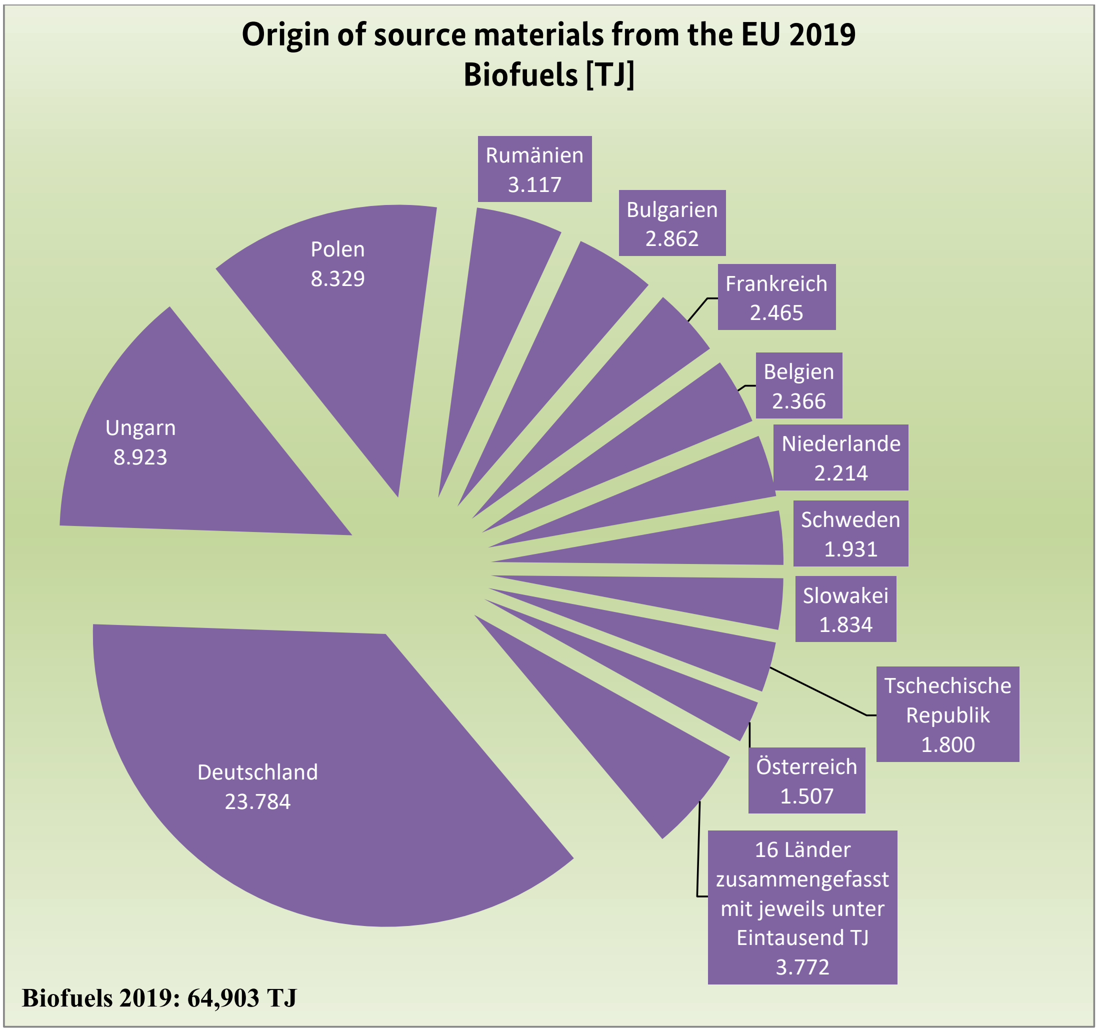



*Figure 12*

The proportions [in TJ] of the 16 aggregated countries were split as follows:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Denmark | 949 | Spain | 581 | Greece | 486 | Croatia | 467 |
| Lithuania | 329 | Latvia | 290 | Italy | 172 | United Kingdom | 163 |
| Finland | 119 | Estonia | 94 | Slovenia | 34 | Portugal | 33 |
| Cyprus | 32 | Luxembourg | 13 | Ireland | 10 | Malta | 0.3 |

The proportion of biofuels whose source materials originated in third countries in Europe increased once again year-on-year (+51%). This was a result of the increased quantity from Ukraine.

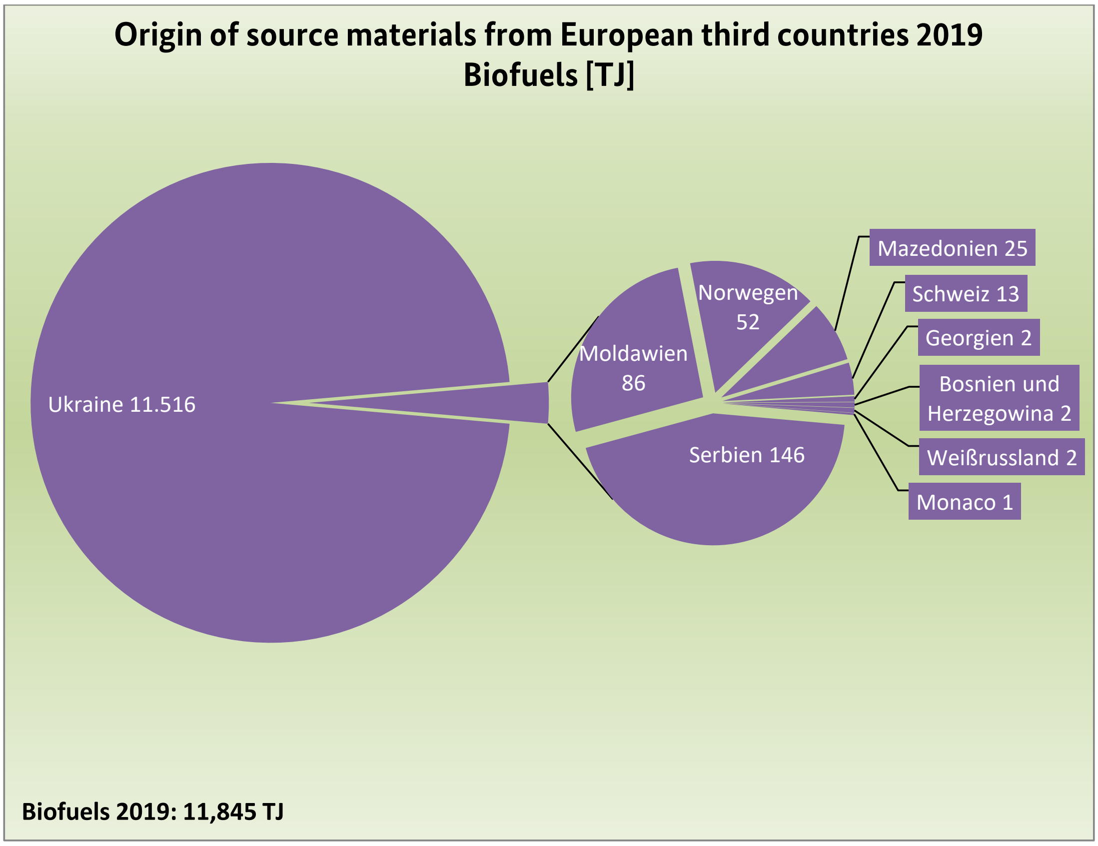



*Figure 13*

### 6.2 Source materials by origin and type

In the reporting year, biofuels whose source materials originated in **Africa** were produced exclusively from wastes and residues. The quantity of biofuels from this source material fell by 56%, however.

Some 67% of these wastes and residues originated in South Africa, with 18% generated in Ghana. The remaining quantity originated in Mediterranean coastal states on the African continent.

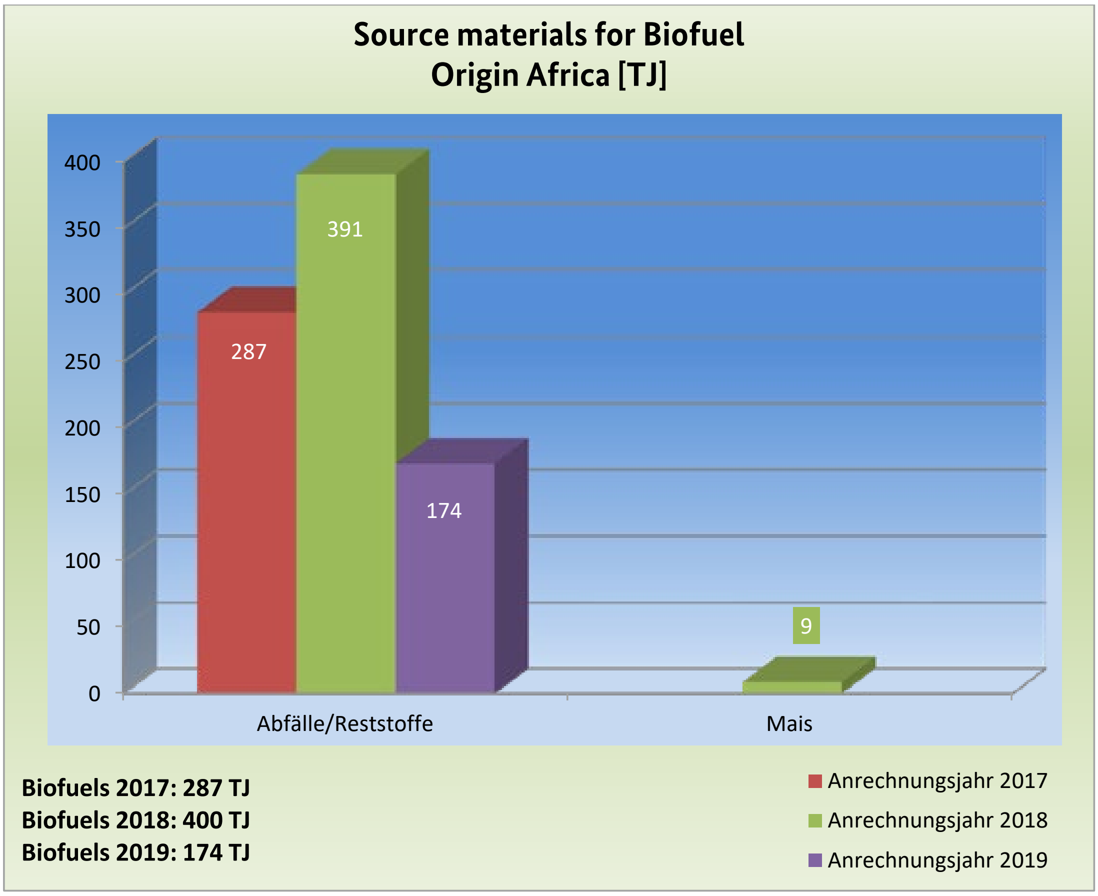



*Figure 14*

In the reporting year, the quantity of biofuels produced from source materials originating in **Asia** increased by 15%. This can generally be ascribed to the increase in palm oil (+20%).

The palm oil utilised was sourced from in Indonesia (93%), Malaysia (5%) and India (2%).

Wastes and residues were generated by a total of 27 Asian countries. The largest quantities originated in China (72%) and Indonesia (10%).

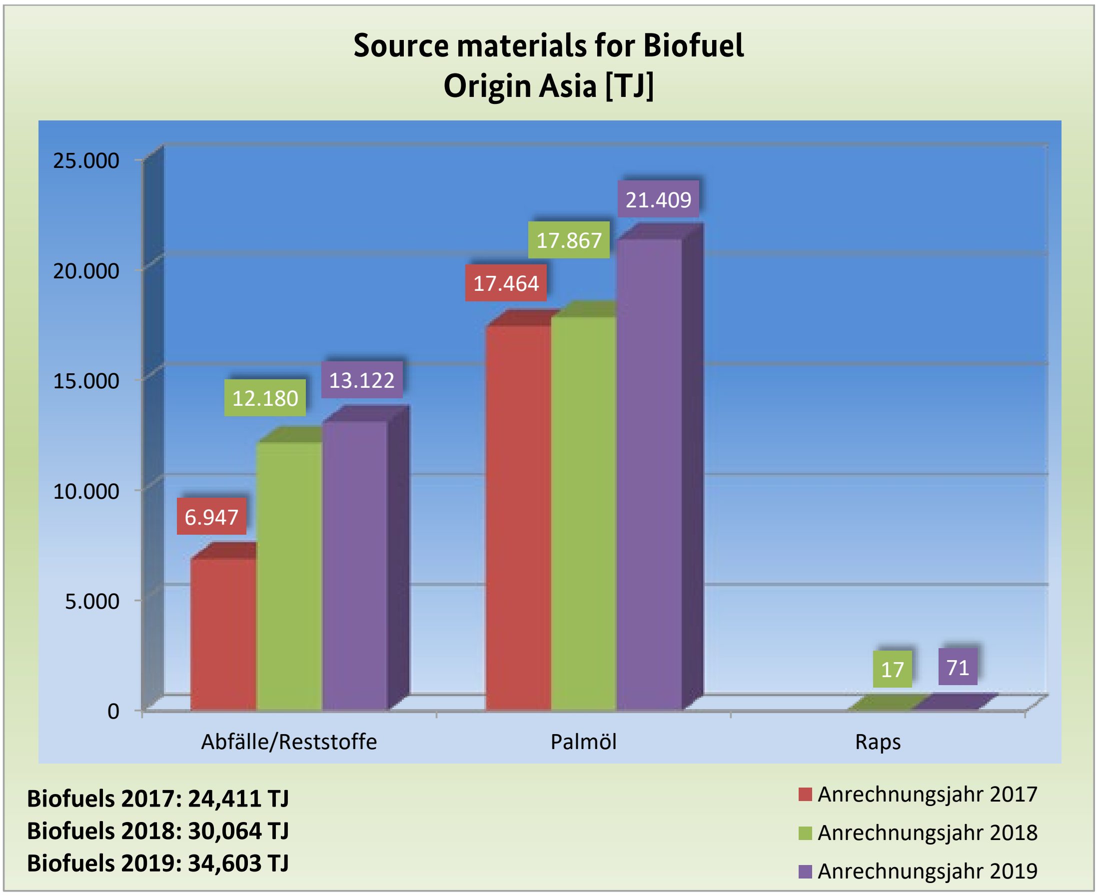



*Figure 15*

Biofuels whose source materials originated in **Australia** were largely produced from rapeseed.

A considerable increase was again reported for the proportion produced from rapeseed (+62%).

The wastes and residues generated in Australia for the production of biofuels fell by 79%, and their importance therefore continued its previous decline.

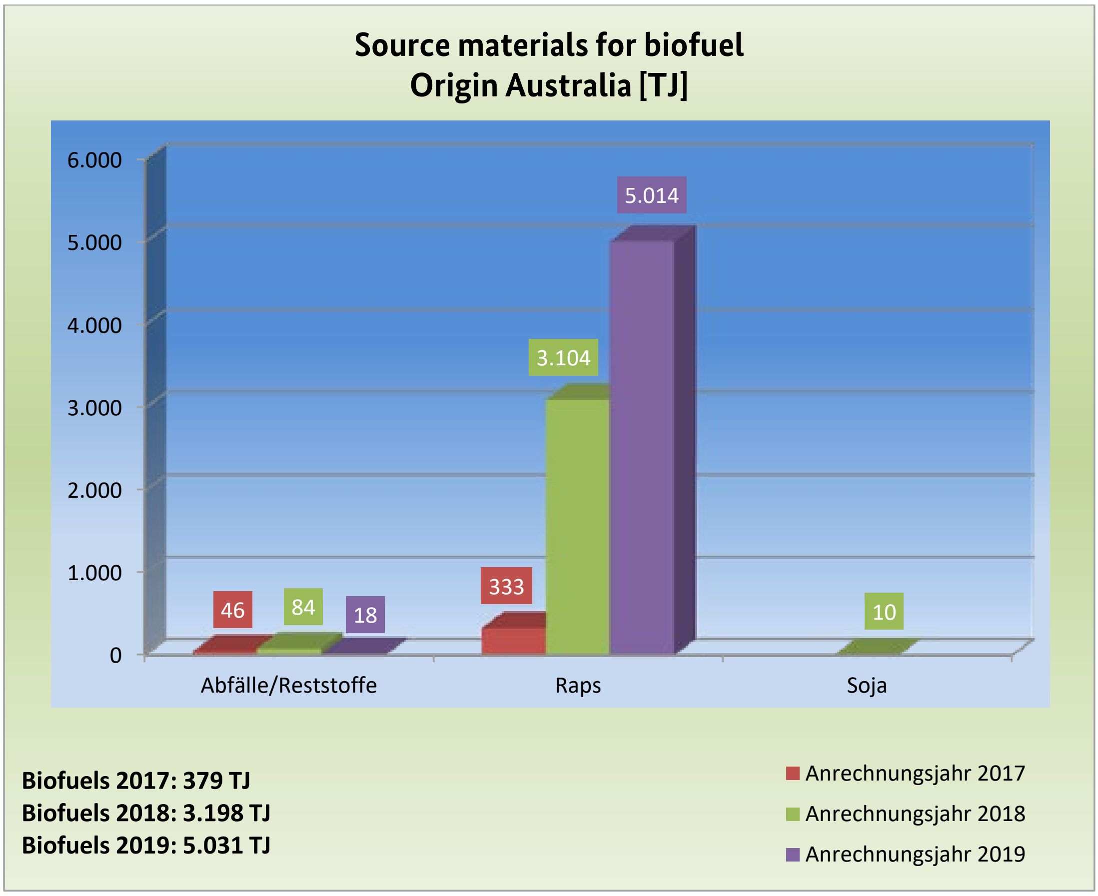



*Figure 16*

Rapeseed was the most important source material originating in **Europe** during the reporting year. While wastes and residues had occupied the top spot in Europe in the previous year, this important crop plant reclaimed its crown in the reporting year. While this resulted mostly from a decline in the wastes and residues utilised (−27%), rapeseed was itself able to post an increase (+12%).

The third-placed source material was maize, with a share of 26%, followed by wheat (7%).

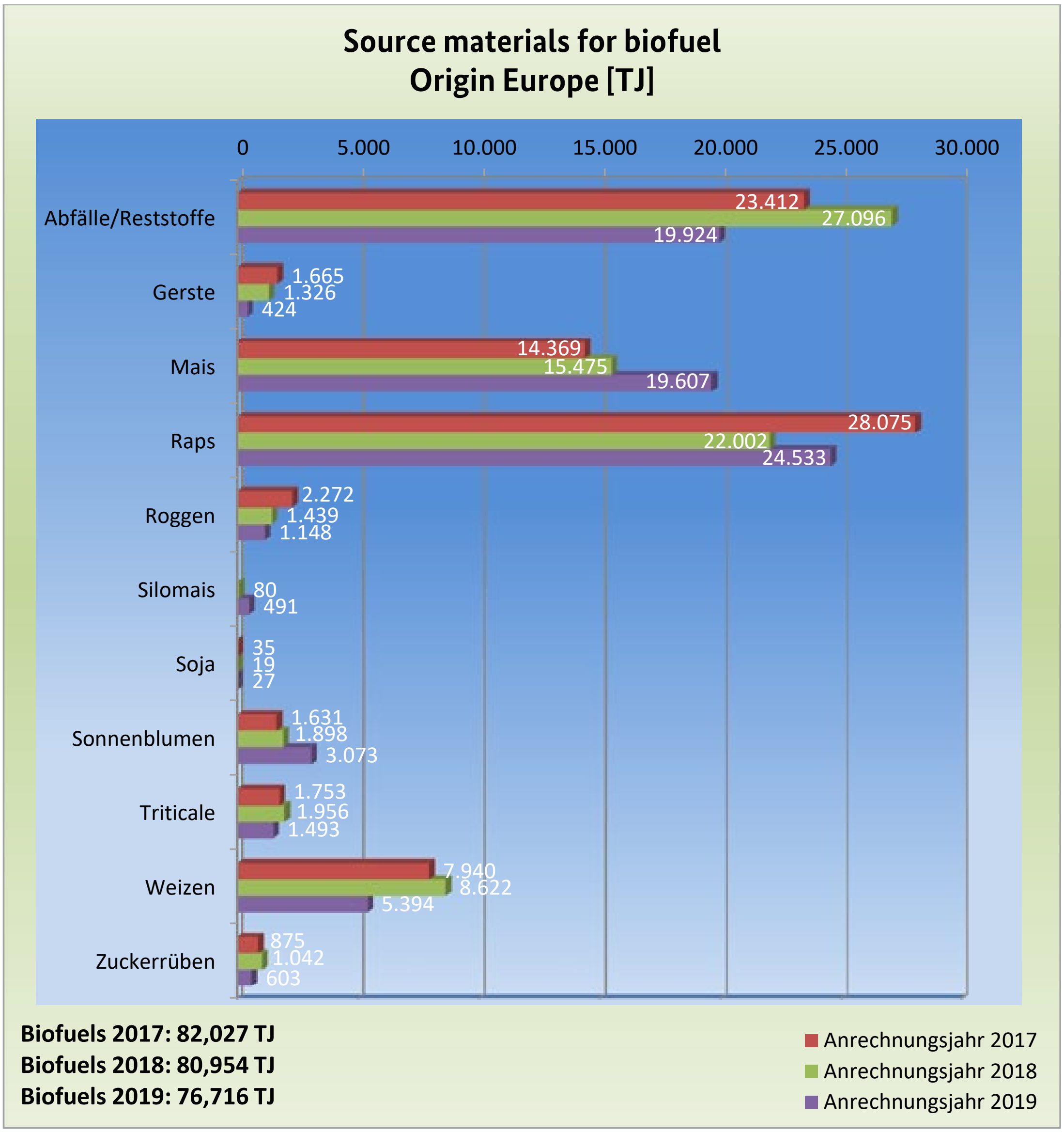



*Figure 17*

The quantity of biofuels whose source materials originated in **Germany** decreased again during the reporting year by 10% (previous year: 6.2%). The quantity of biofuels produced from German rapeseed increased by 13%. The proportion of wastes and residues decreased by 25%.

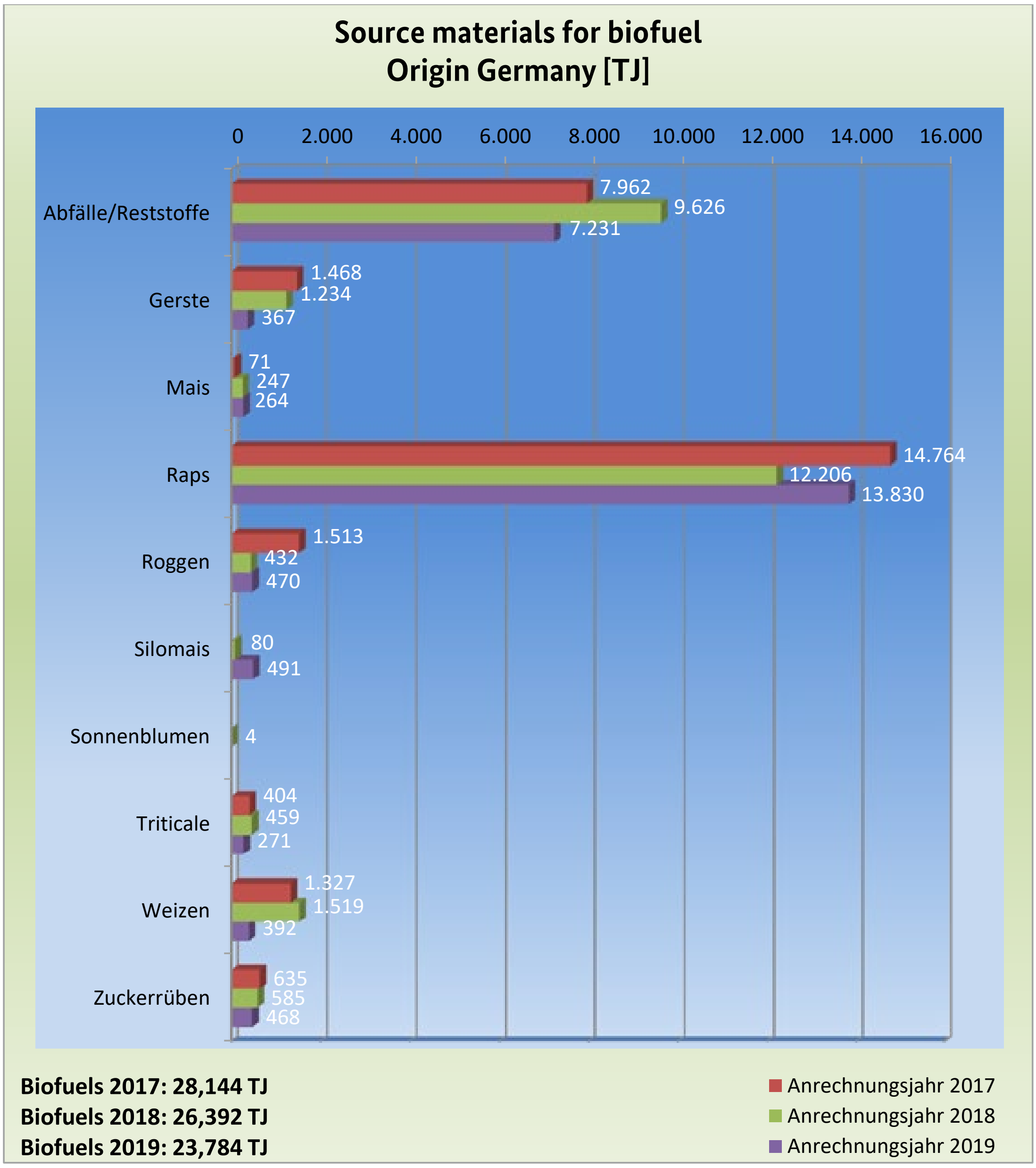



*Figure 18*

As in previous years, the proportion of biofuels produced from palm oil in **Central America** was subject to considerable fluctuations. This proportion virtually tripled in the reporting year. Some 89% of the palm oil was cultivated in Honduras, with the remainder (11%) originating in Guatemala.

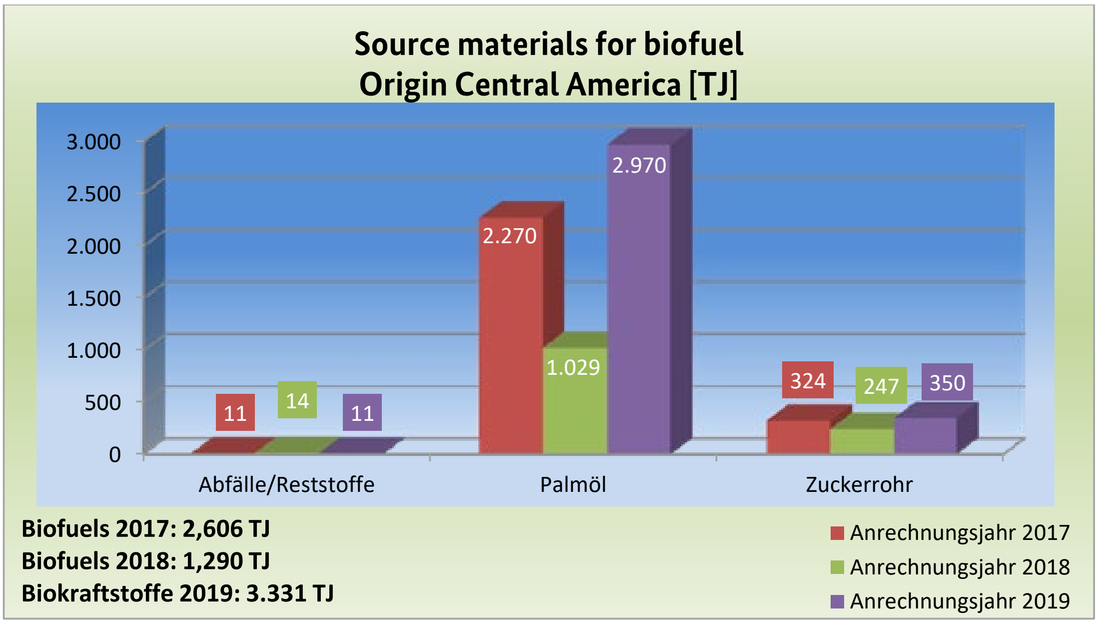



*Figure 19*

Biofuels produced from source materials originating in **North America** consisted almost entirely of wastes and residues in the reporting year, and fell sharply by 63%.

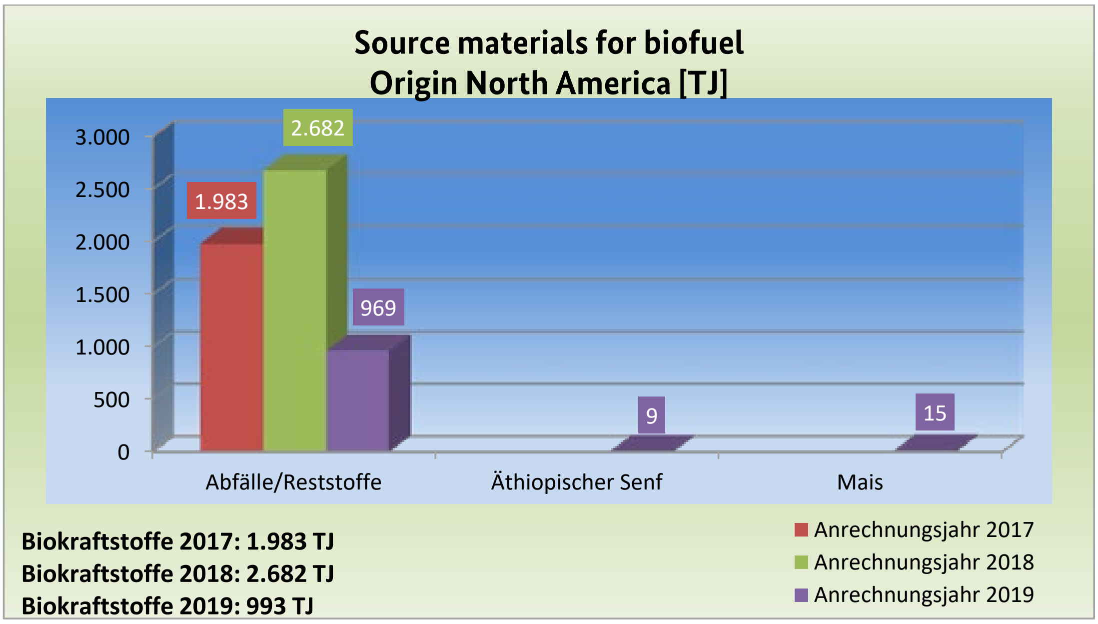



*Figure 20*

The quantity of biofuels made from source materials originating in **South America** increased by 88% in the reporting year.

This rise was heavily dependent on the increase in the quantities of soy utilised (84%), originating mostly in Brazil and Argentina, and the proportion of sugar cane, which was cultivated exclusively in the South American Republic of Peru (+329%).

Last year's newcomer crop, Ethiopian mustard—also known as Abyssinian mustard (*Brassica carinata*)—continued to be used only in small quantities, despite a percentage gain of 71%.

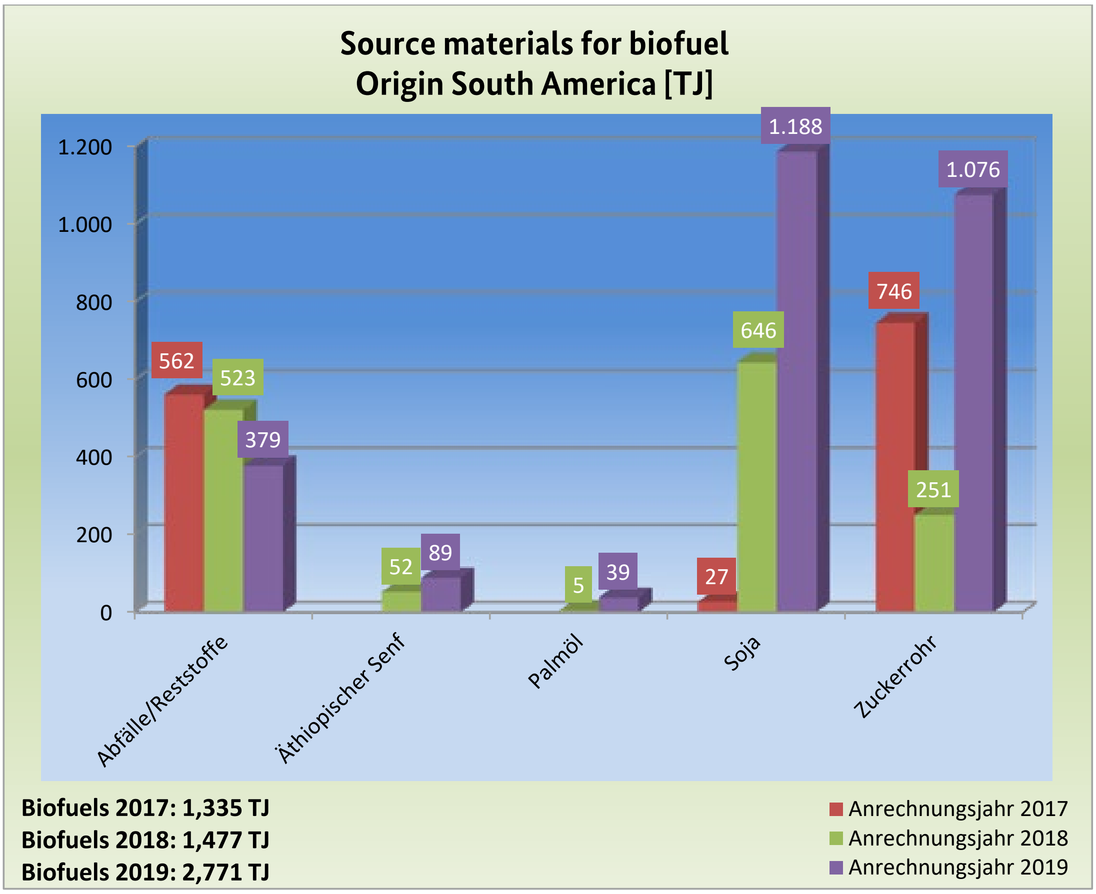



*Figure 21*

*Figure 22*

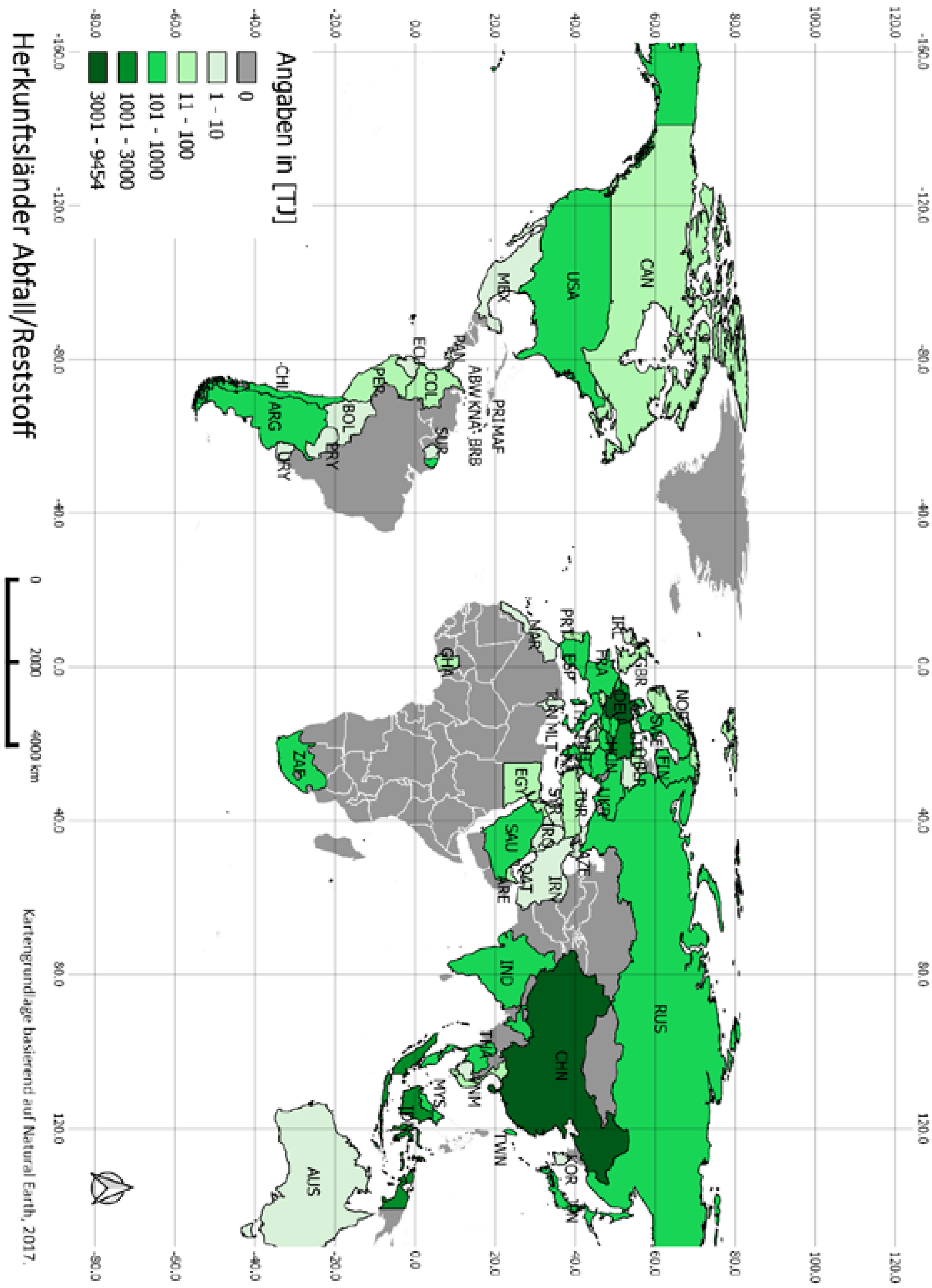
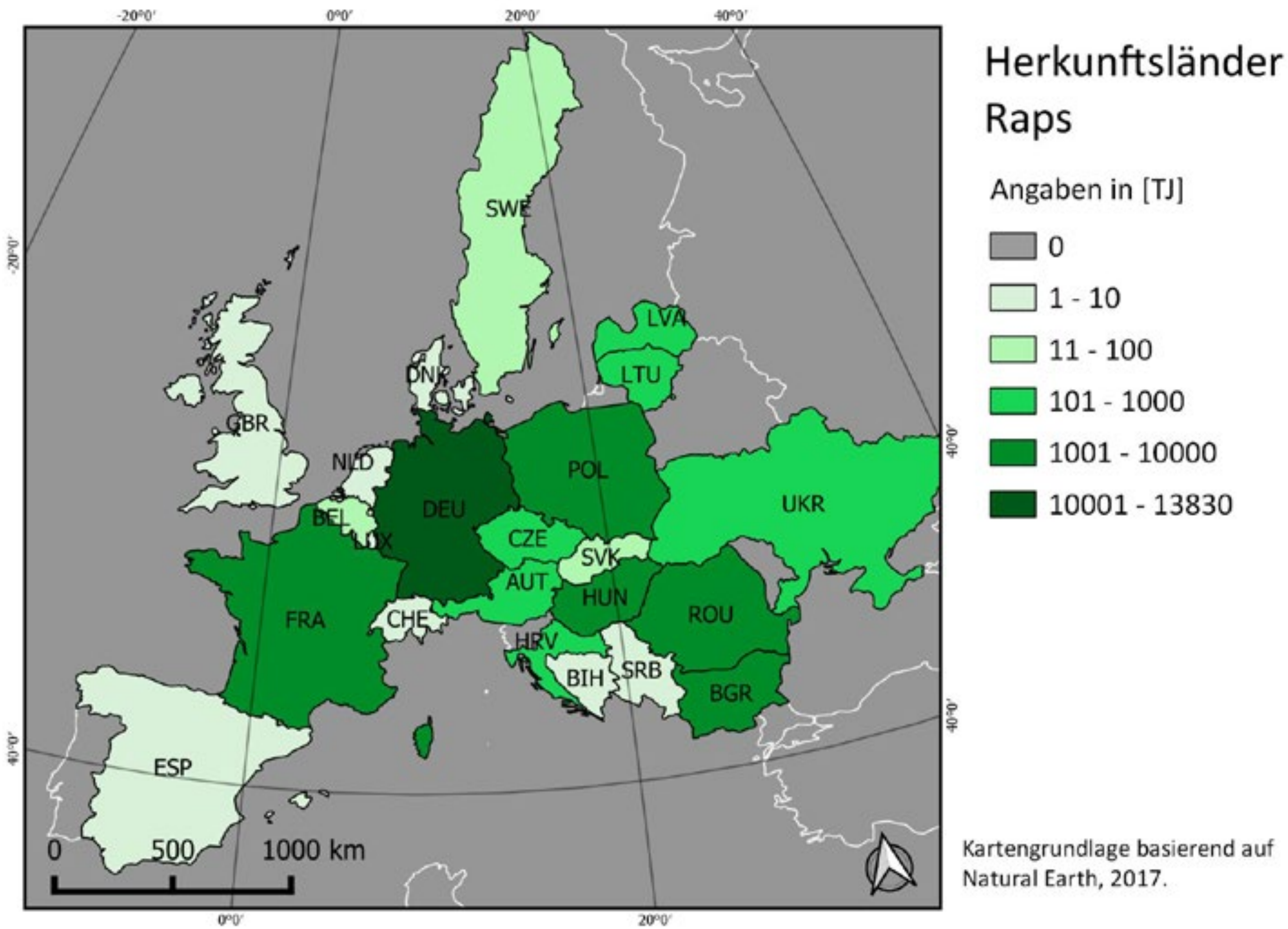

Herkunftsländer Abfall/Reststoff
Angaben in [TJ]
0
1 - 10
11 - 100
101 - 1000
1001 - 3000
3001 - 9454
0 2000 4000 km
Kartengrundlage basierend auf Natural Earth, 2017.

*Figure 23*




Kartengrundlage basierend auf Natural Earth, 2017.

*Figure24*

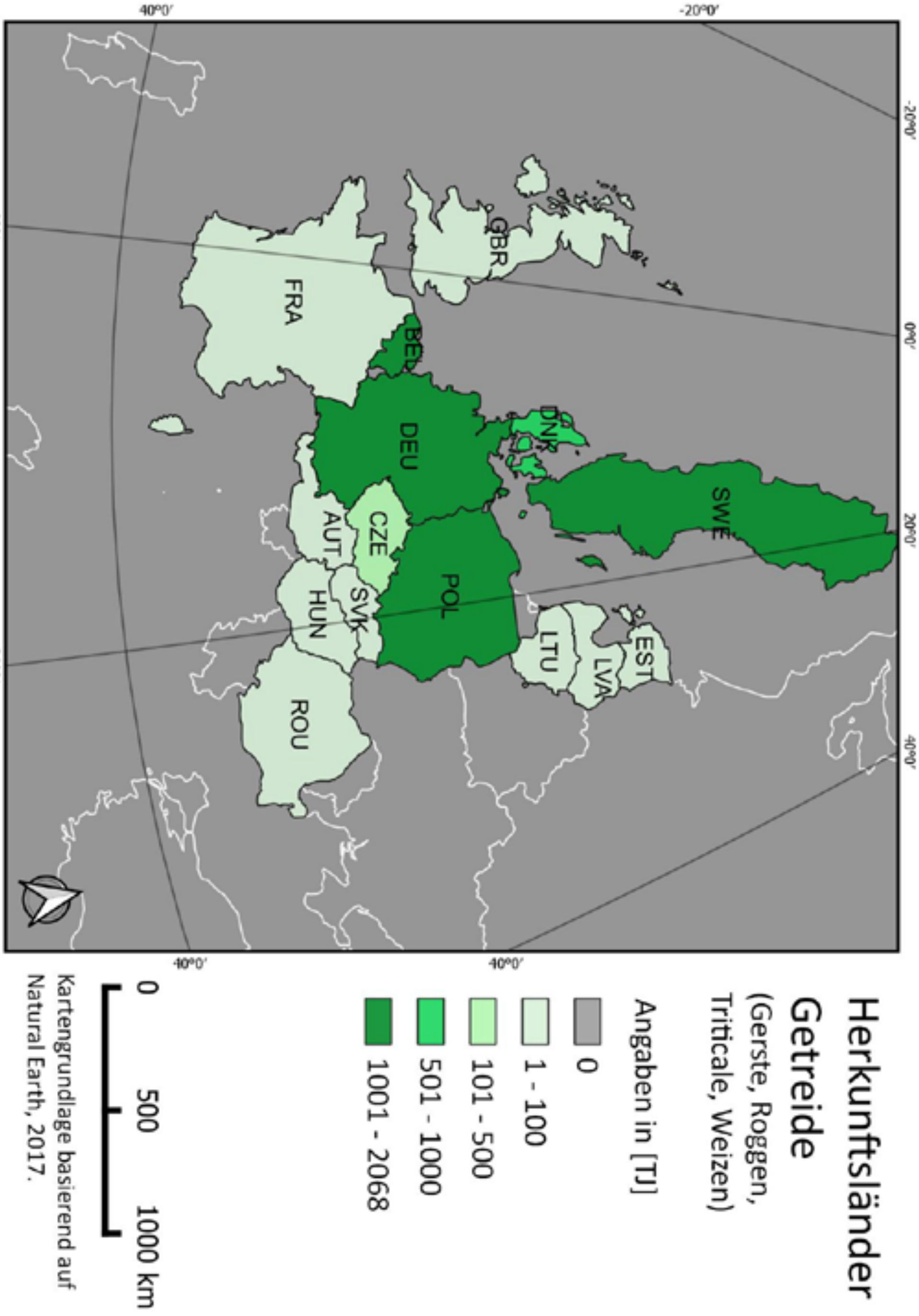
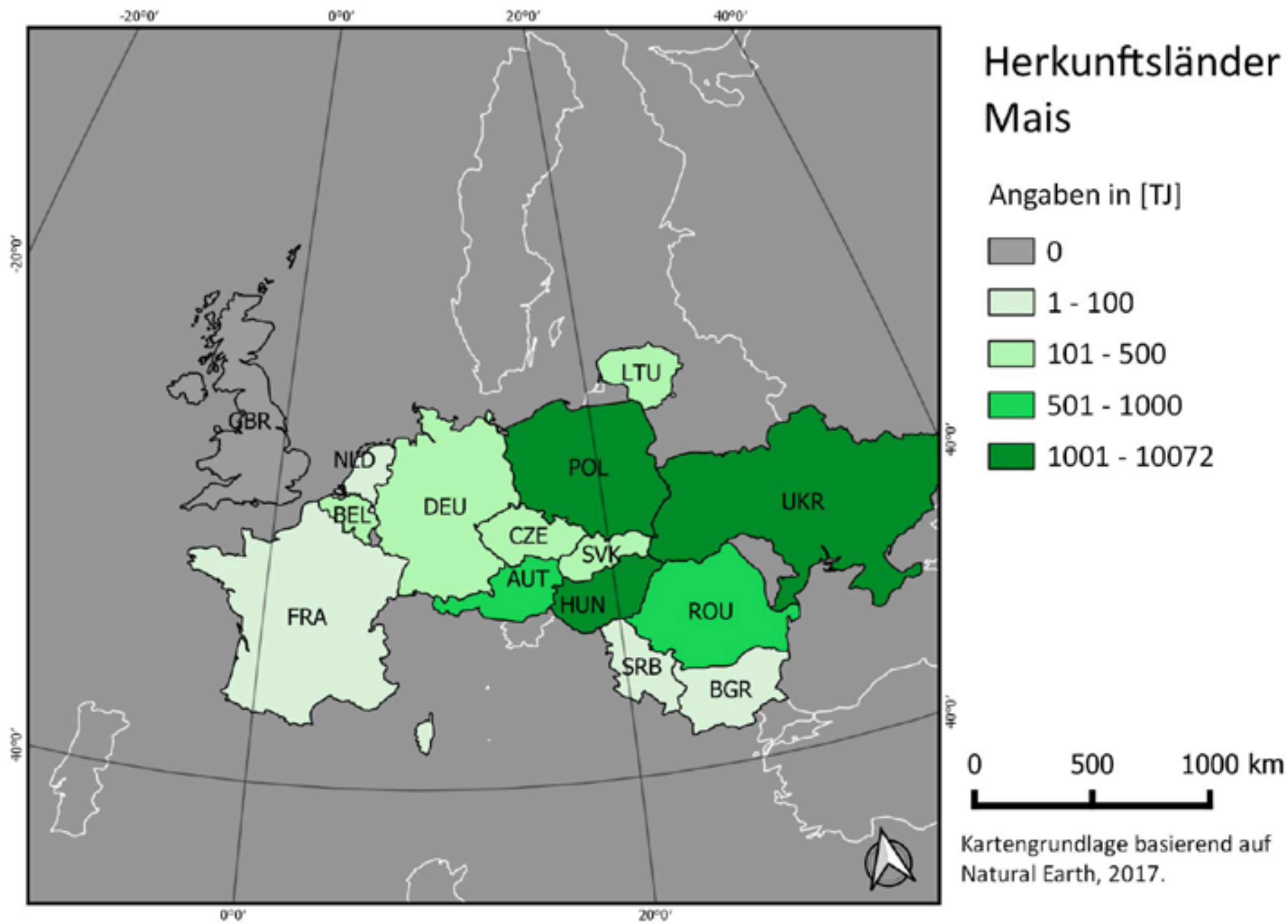

Herkunftsländer Getreide
(Gerste, Roggen, Triticale, Weizen)
Angaben in [TJ]
0
1 - 100
101 - 500
501 - 1000
1001 - 2068
0
500
1000 km
Kartengrundlage basierend auf Natural Earth, 2017.
GBR
FRA
BEL
DEU
DNK
SWE
CZE
AUT
POL
SVK
HUN
ROU
LTU
LVA
EST

*Figure25*



Herkunftsländer
Mais
Angaben in [TJ]
0
1 - 100
101 - 500
501 - 1000
1001 - 10072
GBR
NLD
BEL
FRA
DEU
CZE
AUT
HUN
SVK
POL
LTU
UKR
ROU
SRB
BGR
0 500 1000 km
Kartengrundlage basierend auf
Natural Earth, 2017.

### 6.3 Types of biofuels

In terms of quantities, FAME (biodiesel) remains the most important type of biofuel. Biodiesel's share rose year-on-year by 3% while the proportion for bioethanol remained virtually constant. Proportions for other biofuel types also remained largely unchanged from the previous year.

In the reporting year, a small quantity of co-processing HVO (CO-HVO) was submitted for quota recognition for the first time.

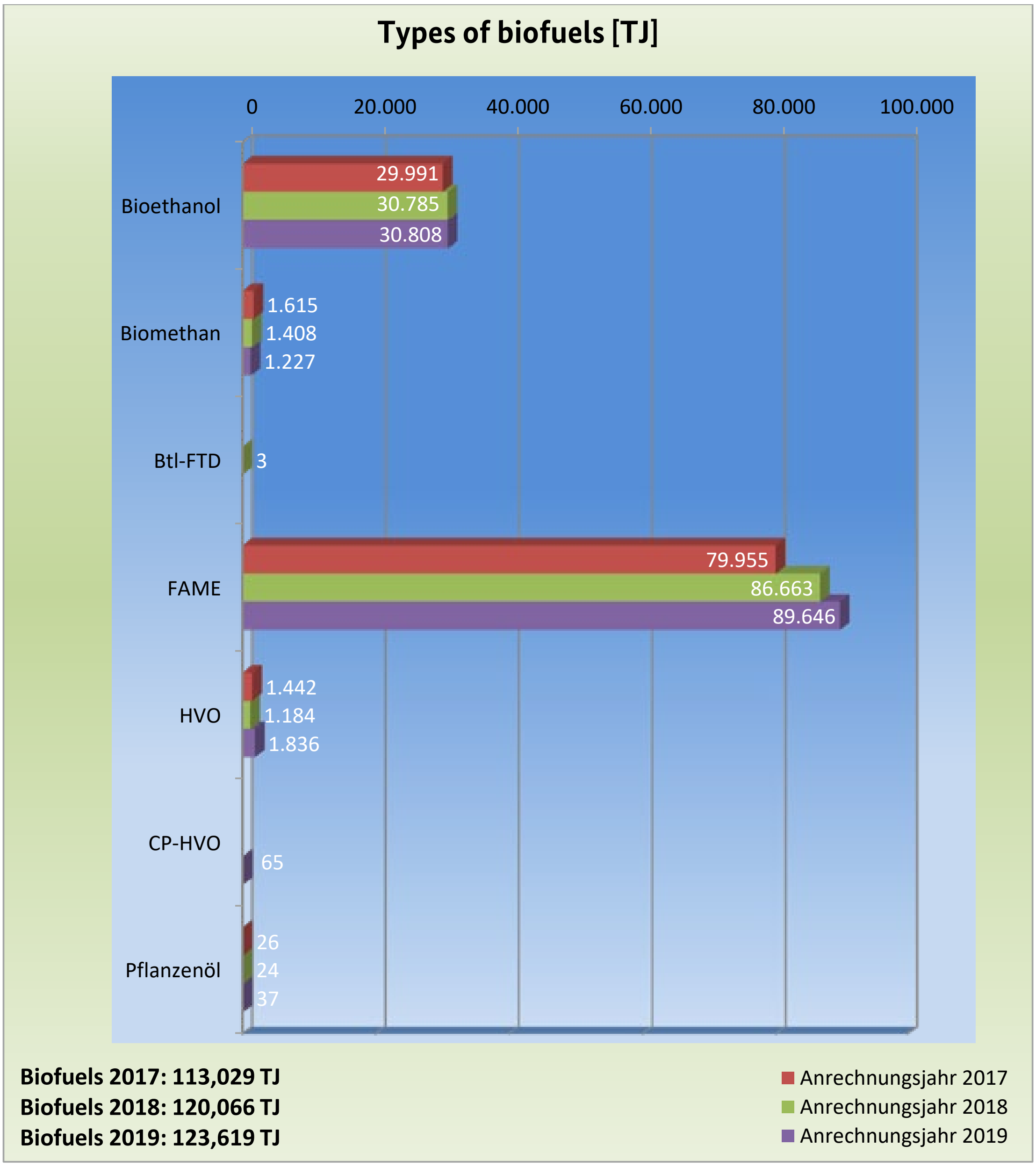



*Figure 26*

The following figure shows the percentages for biofuel types in 2019.

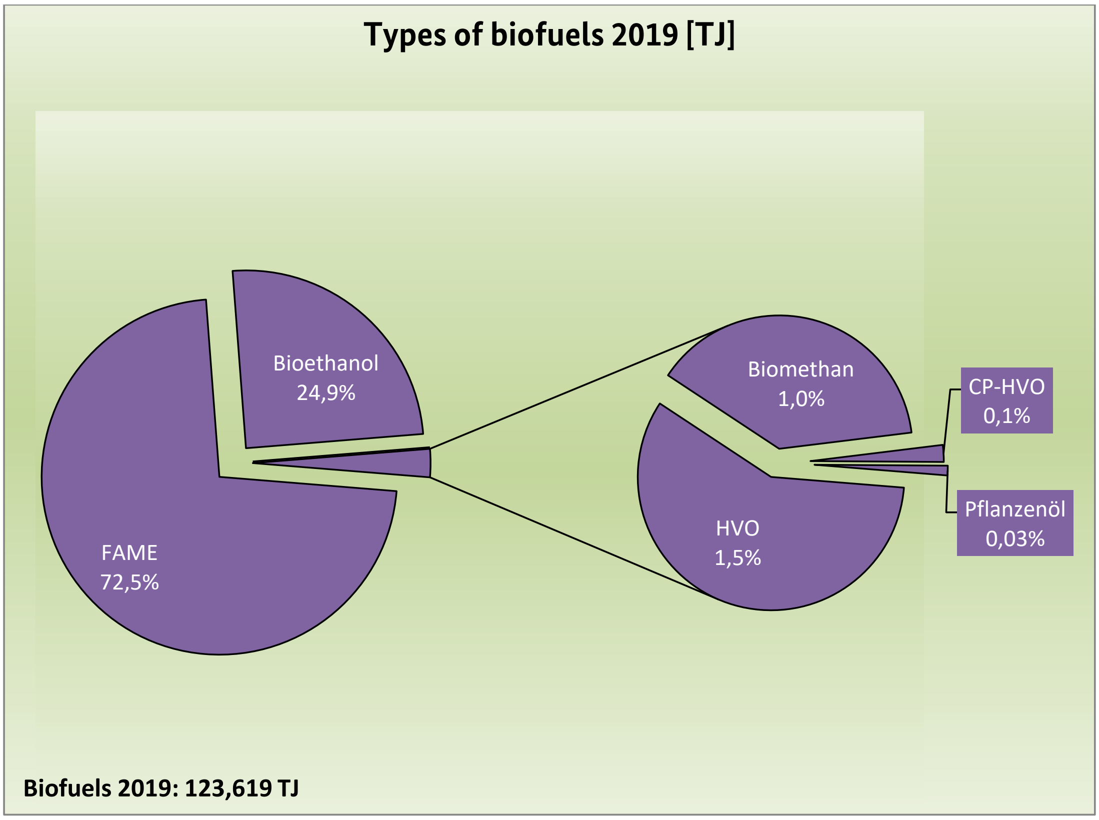



*Figure 27*

The quantity of **bioethanol** utilised in the reporting year remained largely unchanged. Maize remained the most important source product for the production of bioethanol, and its share again rose significantly in the reporting year (+27%).In contrast, the proportion for the second-placed source material, wheat, decreased by 37%. Proportions for other types of cereal crops changed as follows: triticale −24%, rye −20% and barley −68%. The proportion for sugar beet decreased again by 42% while the share for sugar cane rose by 187% in the reporting year. The overall quantity of these sugar-rich plants remained constant due to the alternating, annual increase and decrease in quantities of sugar cane and sugar beet. The proportion of biofuels made from wastes and residues was increased once again by 67%.

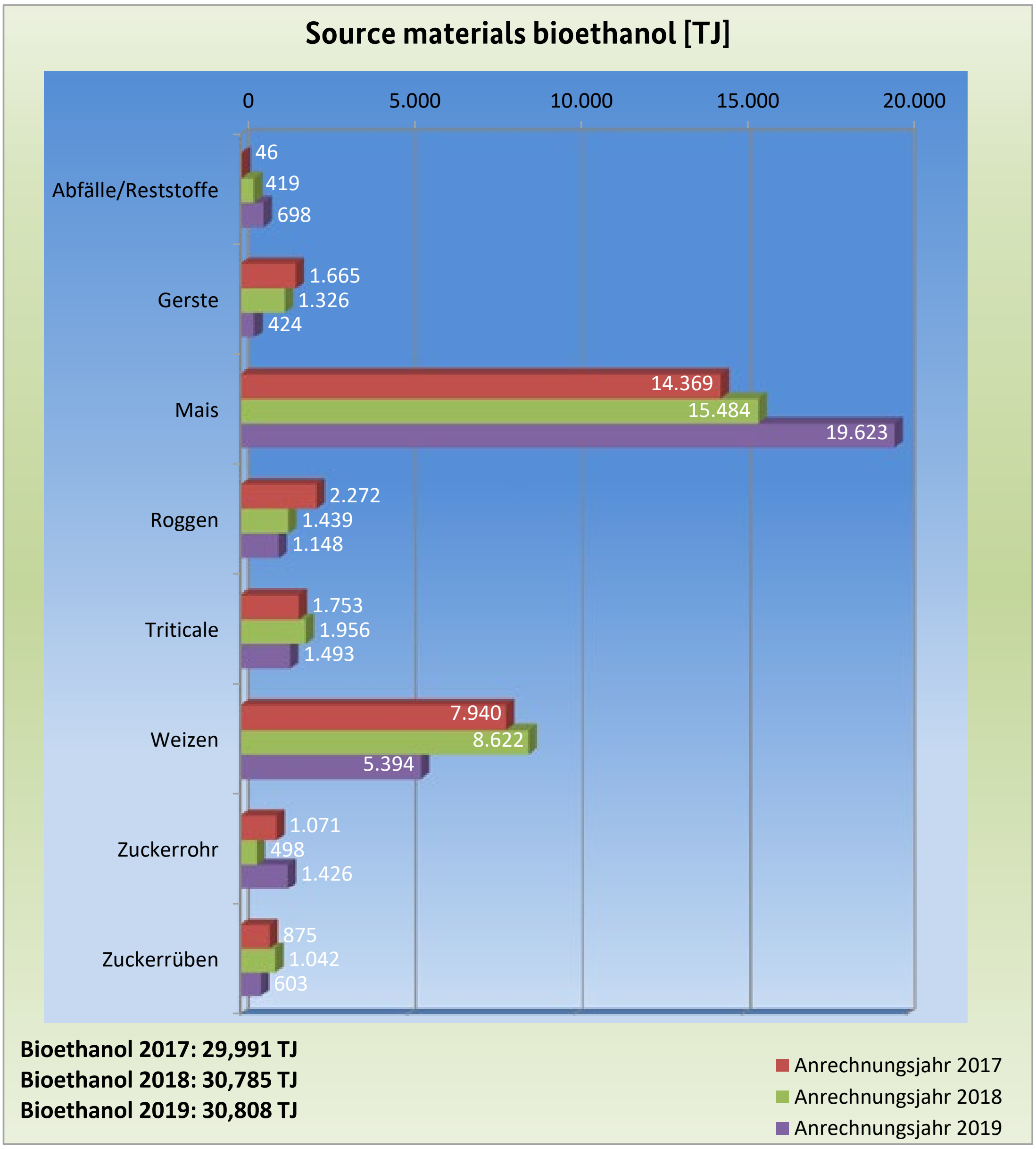



*Figure 28*

In the reporting year, the most important source materials for the production of **bioethanol** in Germany were rye and sugar beet (both 19%). A significantly downward trend was seen in the case of biofuels made from barley (−70%) and wheat (−74%).

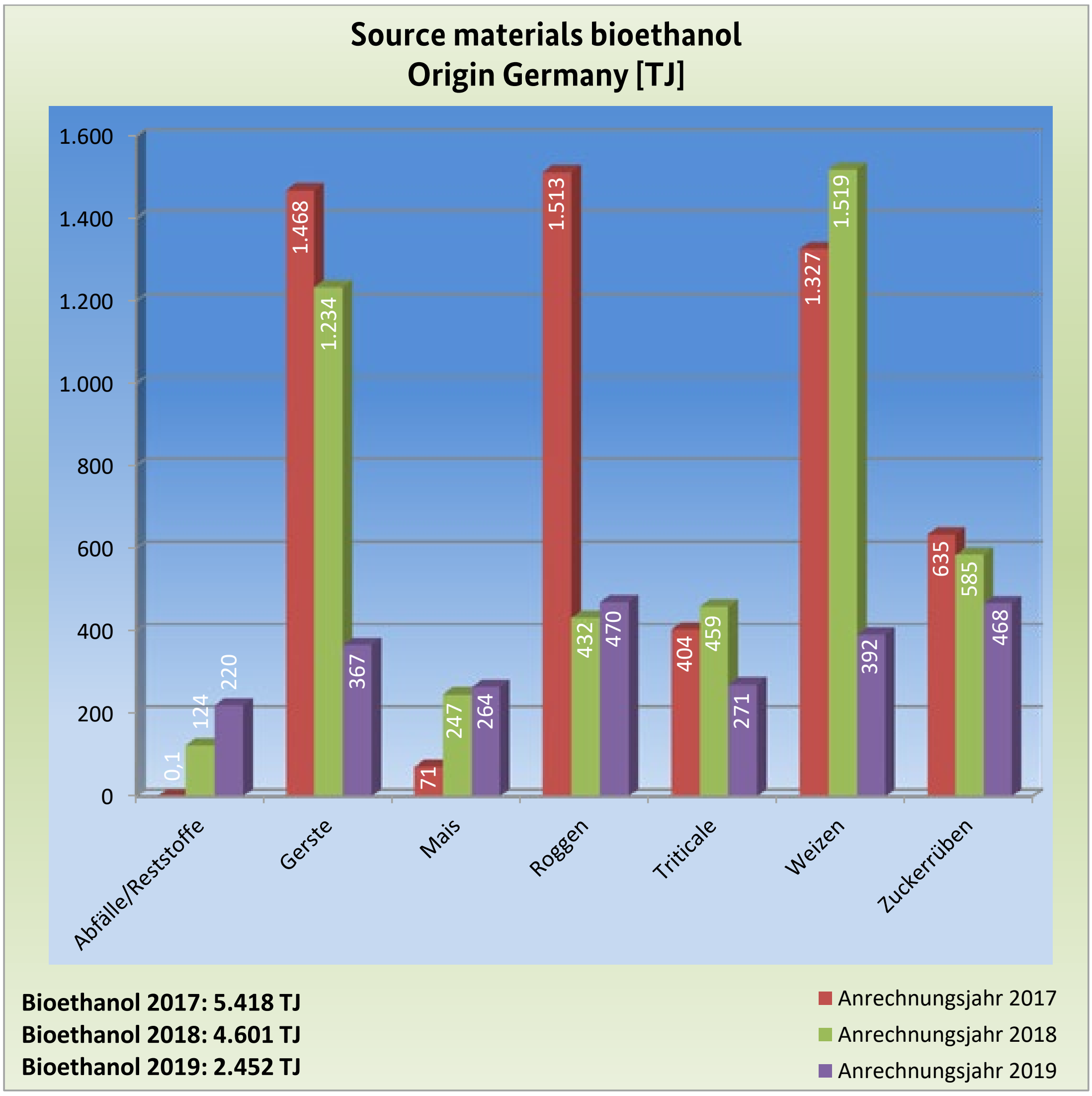



*Figure 29*

Although the proportion of **FAME (biodiesel)** made from wastes and residues had increased substantially in the previous year (+31%), this fell by a comparable amount (−20%) in the reporting year. The proportion made from rapeseed rose by 18% and this crop remained the second-placed source material. The proportion of FAME made from palm oil also rose by 27%.

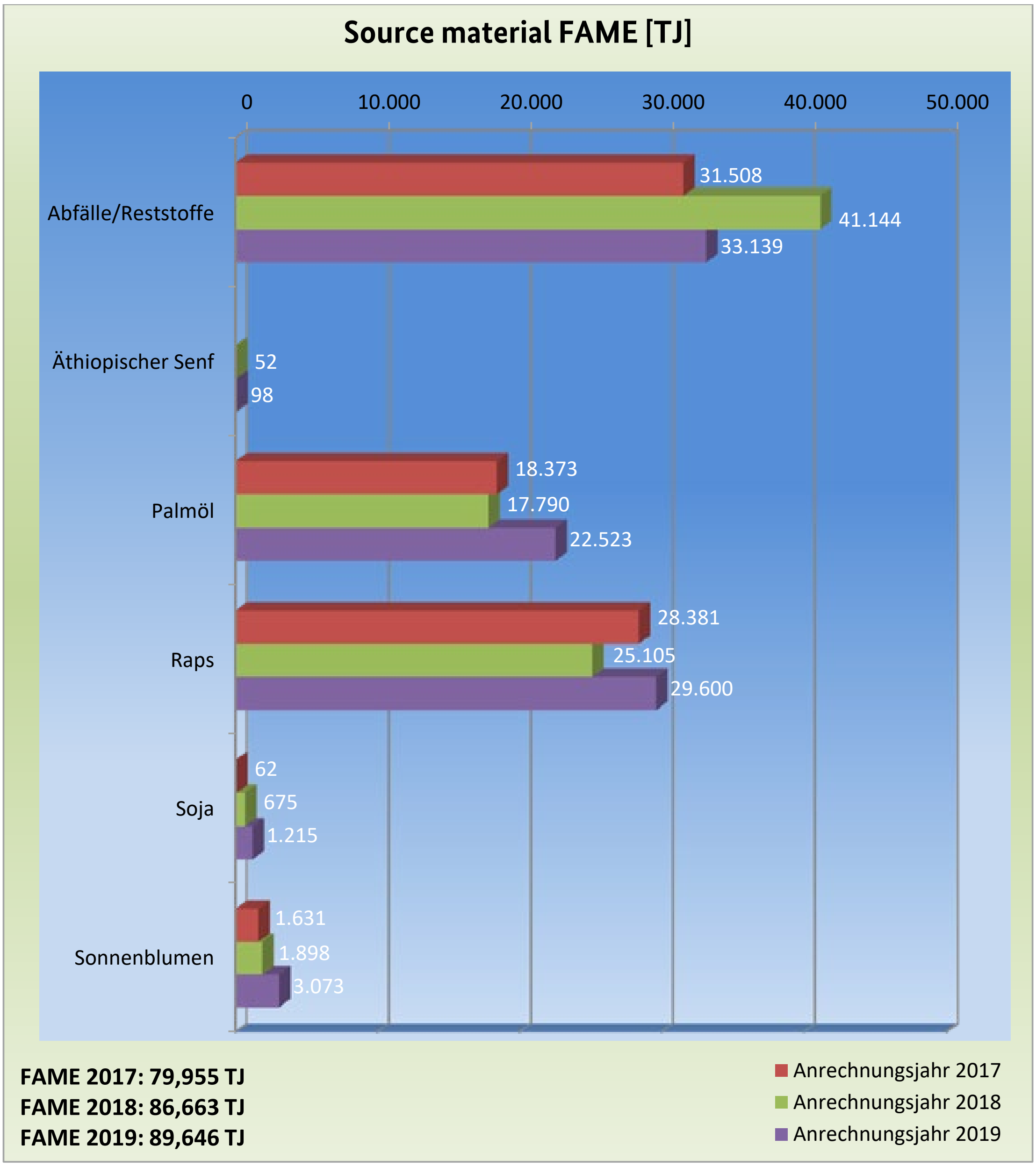



*Figure 30*

The most important source material originating in **Germany** for the production of **biodiesel** was rapeseed (69%). The remaining volume of biodiesel was produced from wastes and residues (31%).

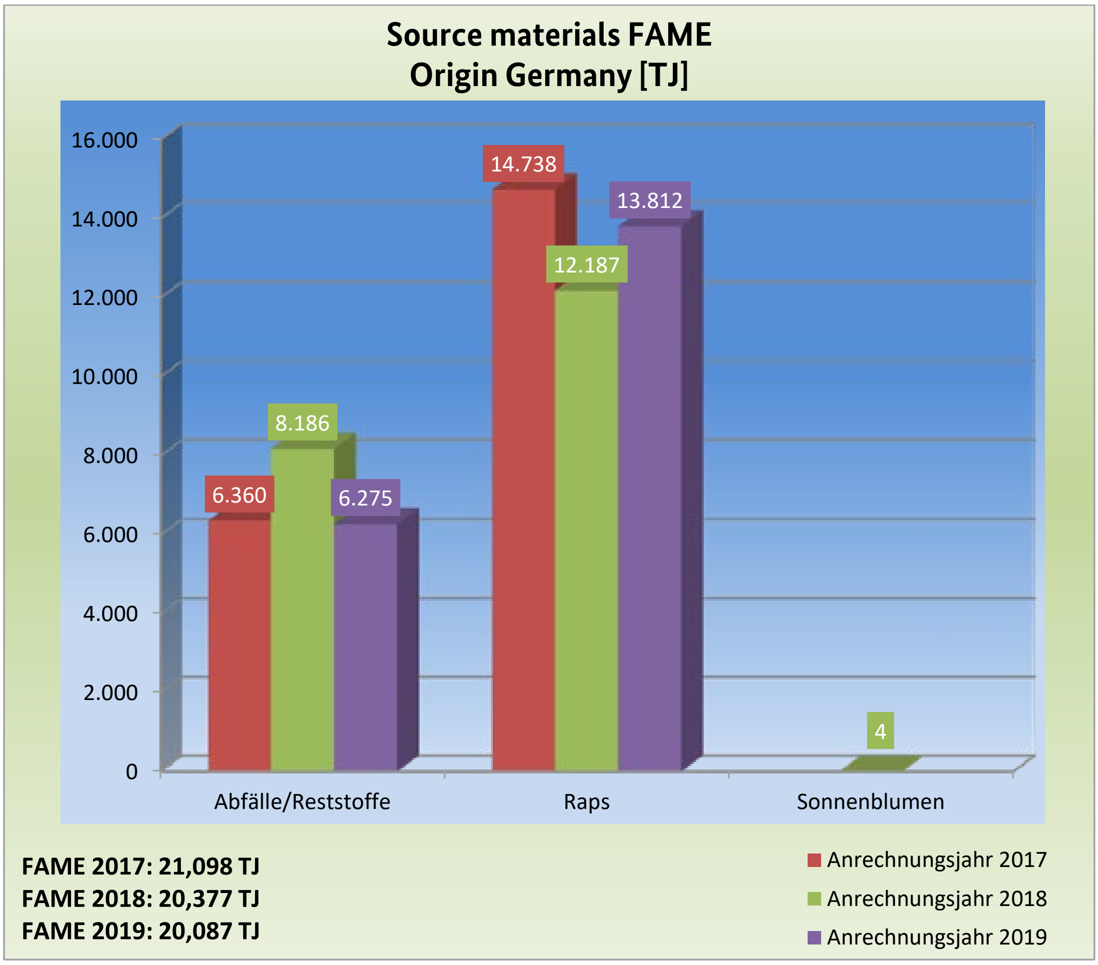



*Figure 31*

In the reporting year, the quantity of **hydrogenated vegetable oil (HVO)** recognised for the Greenhouse Gas Mitigation Quota rose by 61%. The proportion for palm oil rose by 64%. A small quantity of co-processing HVO from palm oil was also registered for the quota.

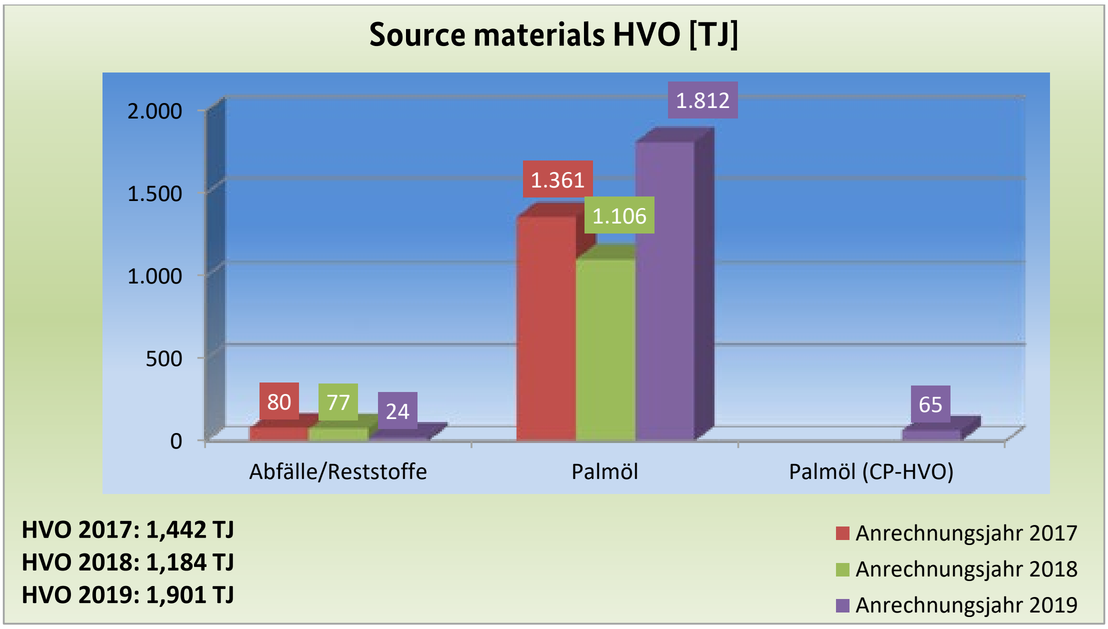



*Figure 32*

The quantity of **biomethane** recognised for meeting the German Greenhouse Gas Mitigation Quota fell again year-on-year by around 13%. While the proportion from wastes and residues dropped sharply by 45%, the proportion from silage maize more than tripled.

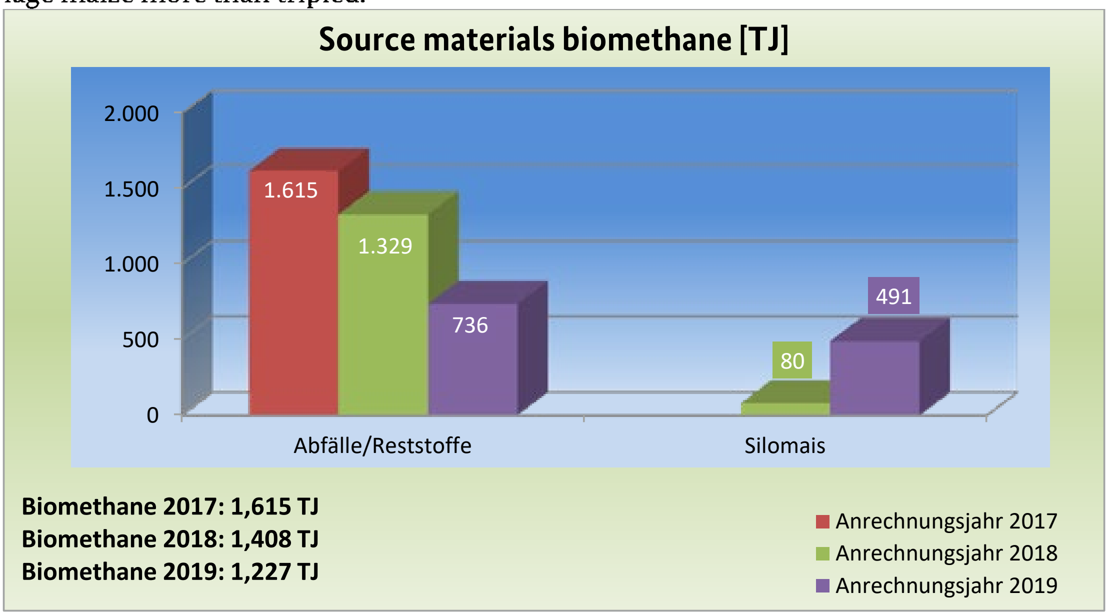



*Figure 33*

**Vegetable oils** as a biofuel continued to be of limited importance in the reporting year, with their share of the overall quantity being just 0.03% in 2019.

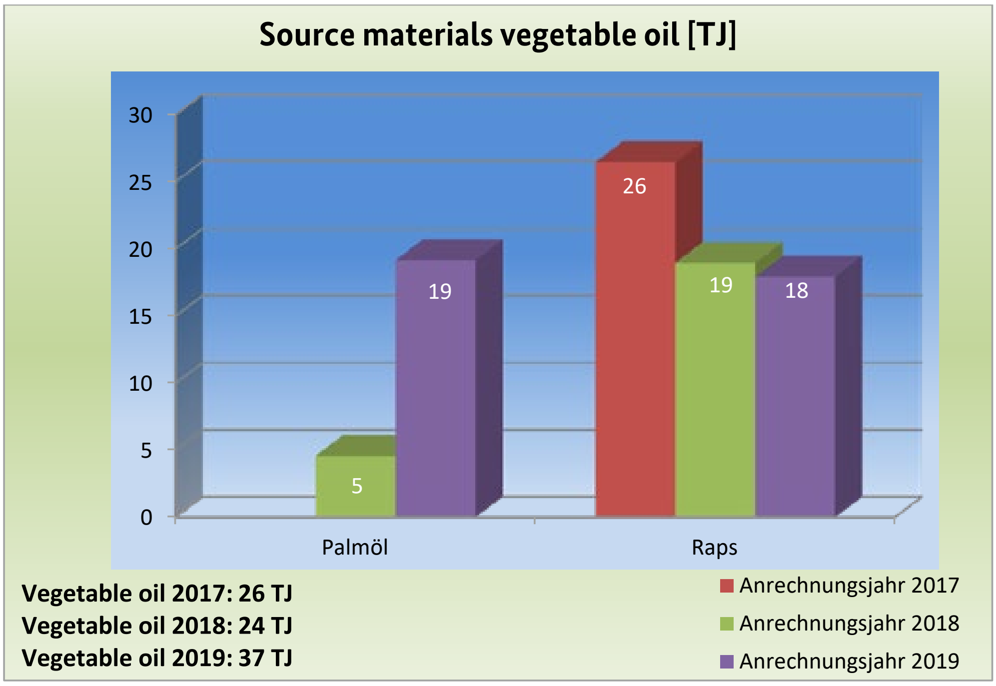



*Figure 34*

## 6.4 Greenhouse gas emissions and savings

One of the aims of the Renewable Energy Directive is the **reduction of greenhouse gas emissions**. Pursuant to sections 18 of BioSt-NachV/Biokraft-NachV, data regarding emissions must be stated as $CO_2$ equivalent on sustainability certificates for the product.

The total emissions resulting from the production process of the final product must be accounted for when calculating emissions. These emissions are the greenhouse gas emissions named in the Renewable Energy Directive, i.e. carbon dioxide ($CO_2$), nitrous oxide ($N_2O$) and methane ($CH_4$), expressed as $CO_2$ equivalent per energy unit. Emissions are calculated according to the prescribed method[9] by the certified economic operators who participate in the value chain.

The following figures show the emissions for the biofuels for which an application was lodged for recognition in terms of the biofuel quota.

In calculating emission savings, the emissions resulting from the biofuel's entire production process are compared with the **individual reference values for fossil fuels** according to the 38th Federal Immission Control Act (BImSchV), which have been in force since the 2018 reporting year[10]:

*Table 6: Fossil fuel reference values*

| Type of fuel | Fossil fuel reference value until 2017 [g $CO_2$eq/MJ] | Fossil fuel reference value from 2018 [g $CO_2$eq/MJ] |
|---|---|---|
| Bioethanol | 83.8 | 93.3 |
| Biomethane | 83.8 | 94.1 |
| Btl-FTD | 83.8 | 95.1 |
| FAME | 83.8 | 95.1 |
| HVO | 83.8 | 95.1 |
| Vegetable oil | 83.8 | 95.1 |

[9] Cf. footnote 4 on page 8.

[10] Please note that a change was made to the reference value for determining emission savings in the 2018 reporting year. Until the 2017 quota year, a uniform reference value for fossil fuels (83.8) had been used when calculating the emission savings for all types of biofuels. This reference value applied uniformly to all further calculations, namely to the question of whether a biofuel is indeed sustainable, to the question of the quota applied to an individual party under obligation and, finally, to the question of whether or not a party under obligation had met their quota. With effect from the 2018 quota year, the 38th Implementation Ordinance for the Federal Immission Control Act (38th BImSchV) provides a new base value (94.1) as well as new individual reference values (93.3 and 95.1).

The emission savings presented here are based on a comparison of **pure biofuels** to **pure fossil fuels**. Since the 2018 quota year, evidence of a saving of 50% compared with a fossil fuel needed to be provided for a biofuel to be considered sustainable. A calculation of the total savings in the case of blended fuels in Germany would be based on the total emissions resulting from biogenic and fossil fuels.

The figure below illustrates the volume of emissions that would have resulted if fossil fuels had been used exclusively, instead of the given quantity of biofuel. **Accordingly: the use of biofuels has resulted in savings of 9.7 million tonnes of $CO_2$ equivalent.**

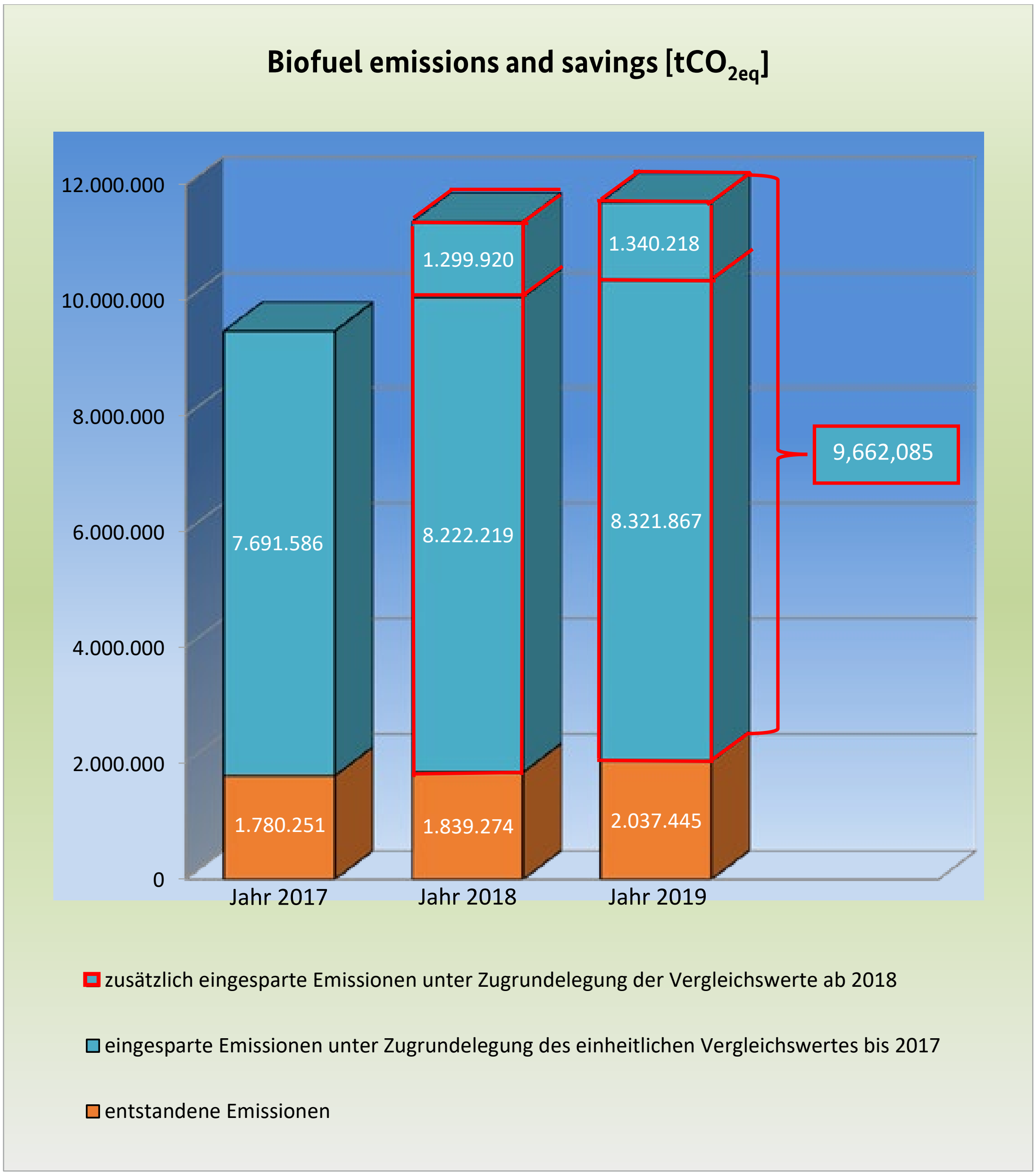



*Figure 35*

In the reporting year, the biofuels placed on the market emitted an average of 16.48 $tCO_2eq$ per terajoule, representing an increase from previous years.

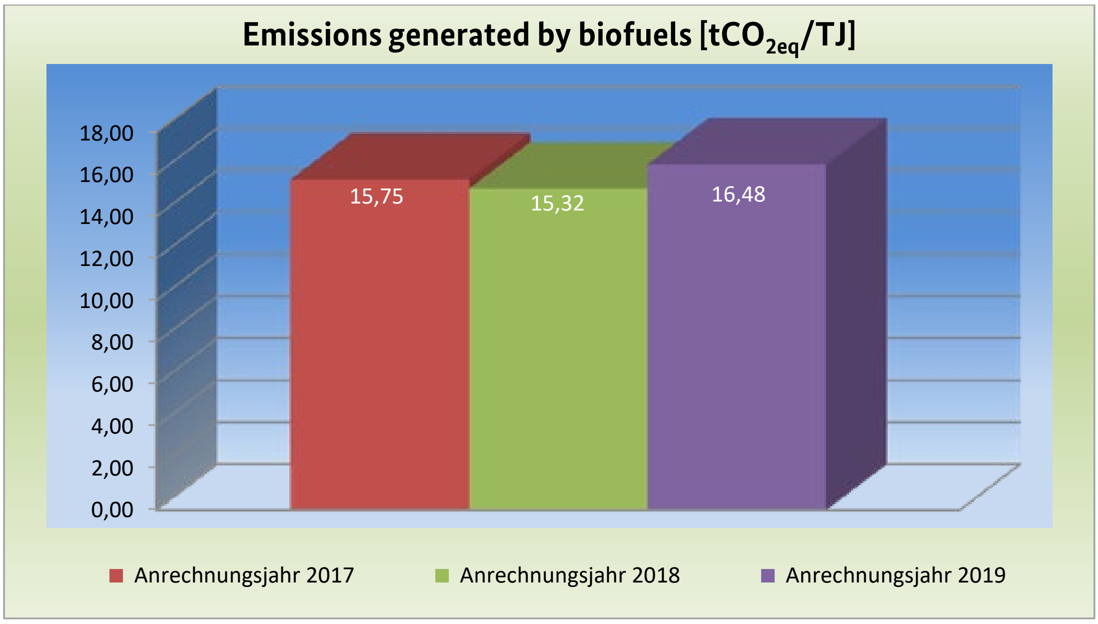



*Figure 36*

This has a direct effect on average total emission savings compared with fossil fuels, which decreased by around 1.2 percentage points.

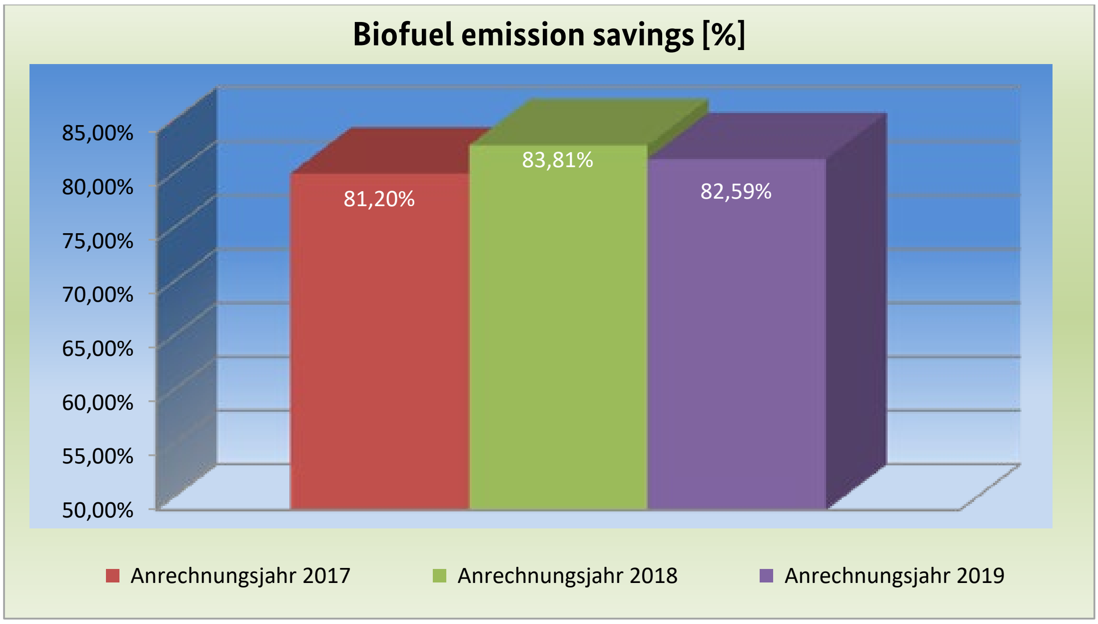



*Figure 37*

Among the different types of biofuels, vegetable oils had the highest average emissions in the reporting year, at 25.90 $tCO_2eq$ per terajoule. The best figure was achieved by biomethane, at 10.12 $tCO_2eq$ pre terajoule.

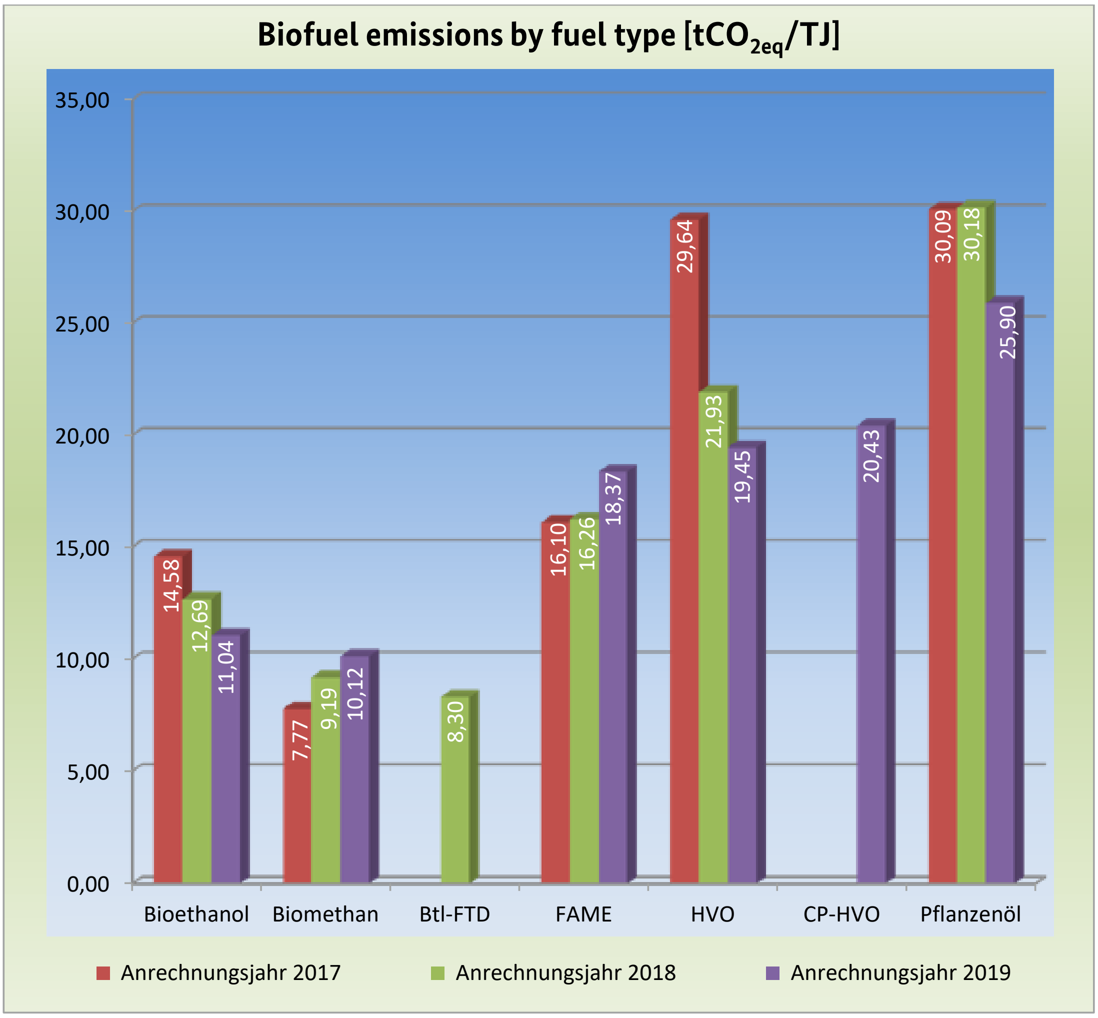



*Figure 38*

Co-processing HVO achieved a slightly lower value for savings achieved than HVO.

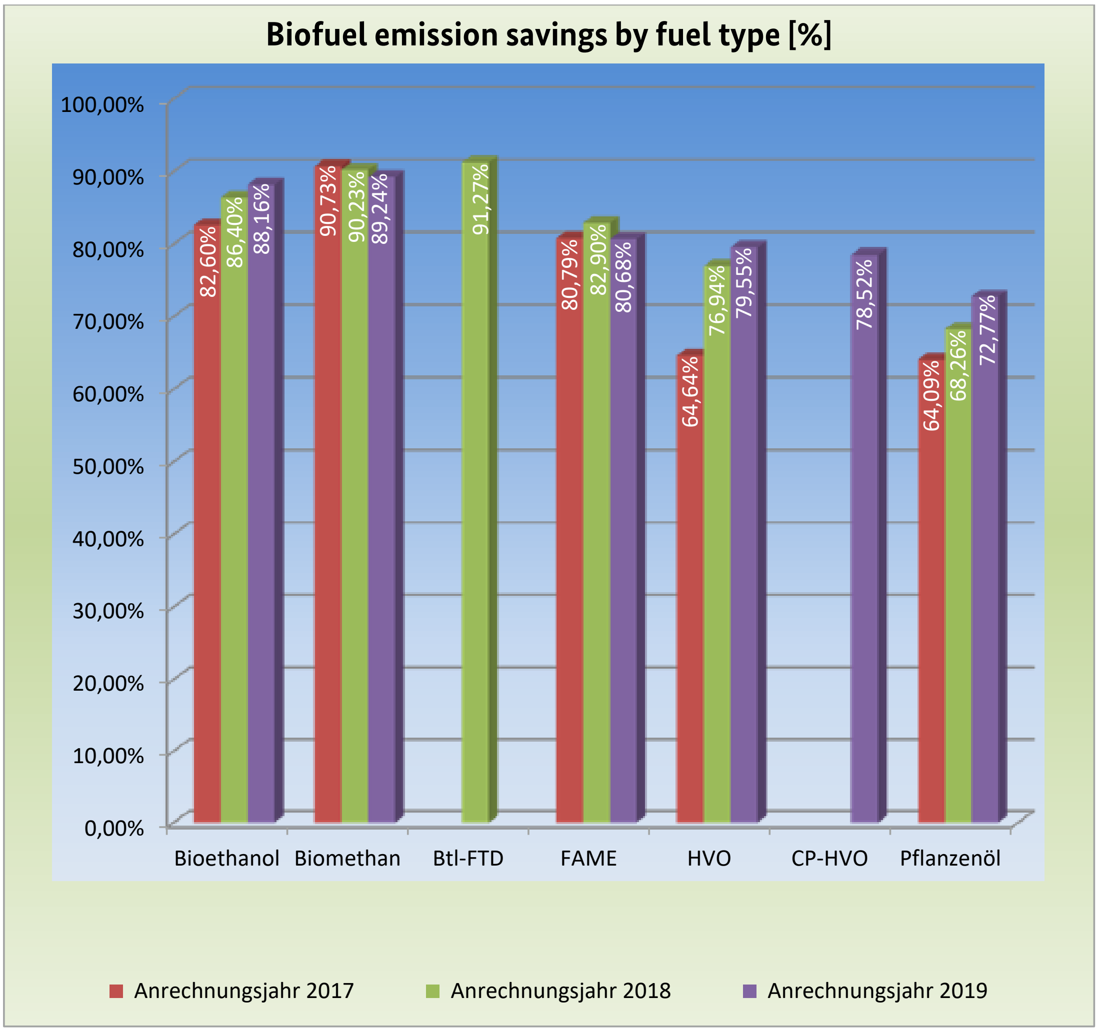



*Figure 39*

In the reporting year, bioethanol from wastes and residues was able to achieve the highest average emission savings. Quantities produced from maize and sugar cane took second and third place in these rankings.

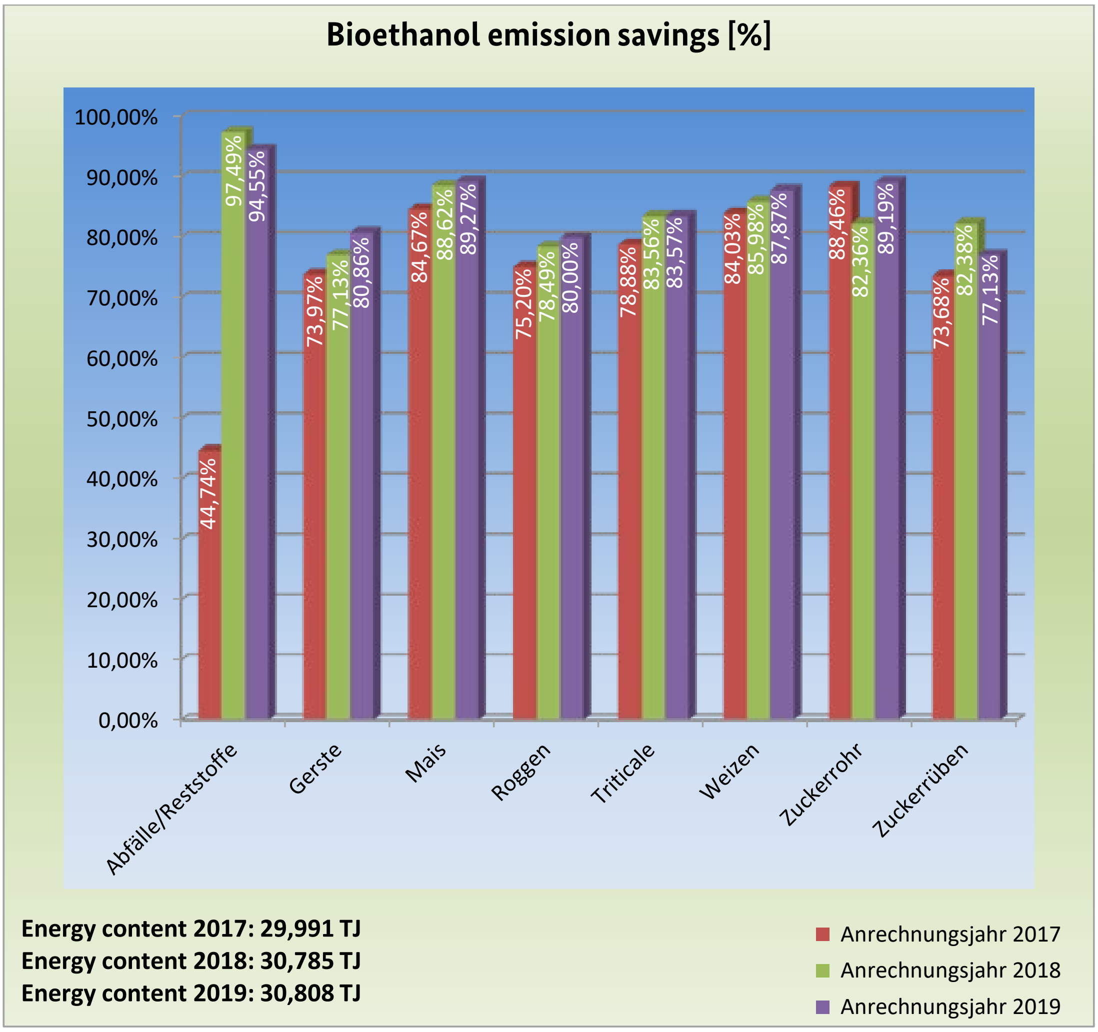



*Figure 40*

Compared with all other source products, biodiesel/FAME made from Ethiopian mustard achieved the highest emission savings in the reporting year by a wide margin. As with all other data used in this report, these data have also been taken unchanged from the government Sustainable Biomass System (Nabisy) database. Remarkably low emission values are the subject of regular reports to the competent certification scheme and the European Commission.

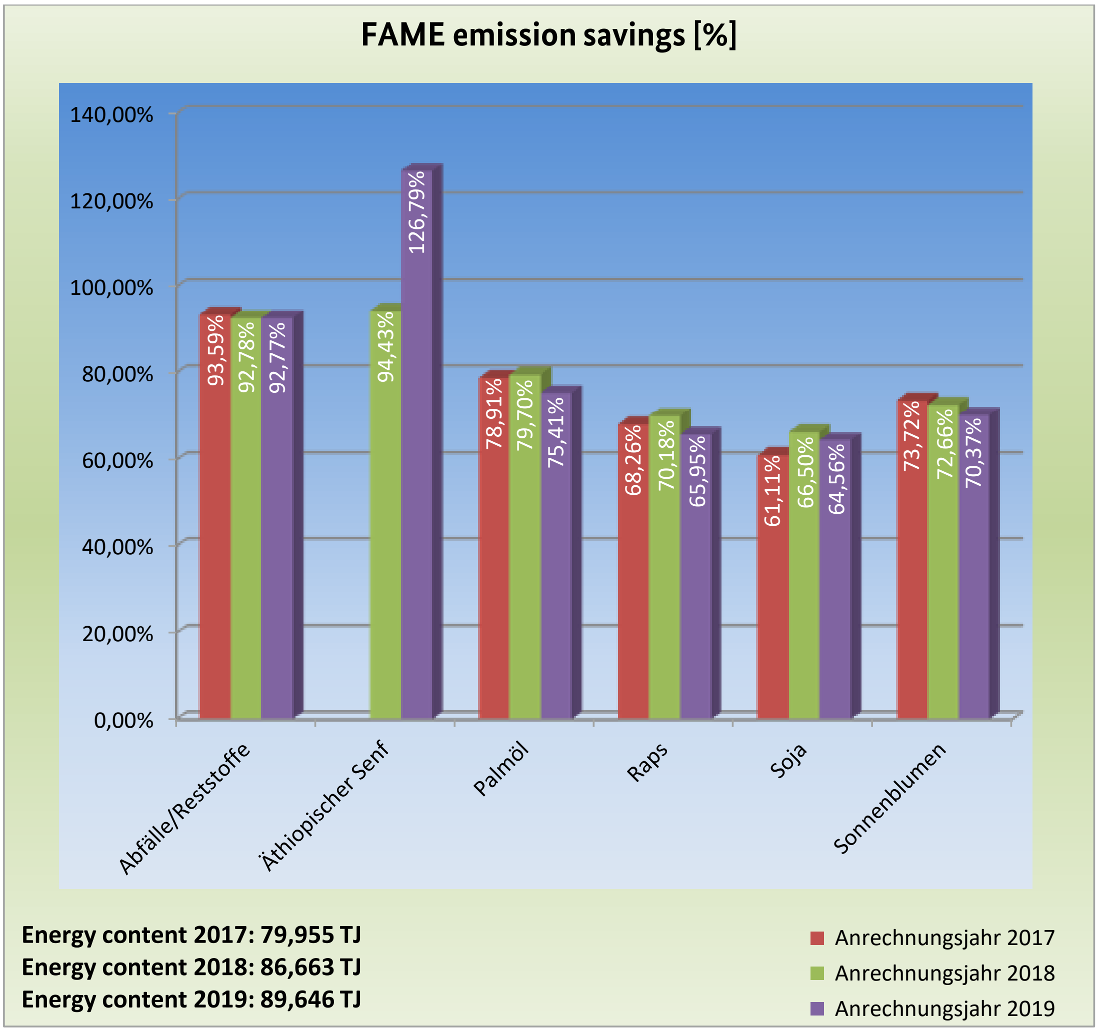



*Figure 41*

### 6.5 Emission savings of individual biofuel types per level of greenhouse gas mitigation

This section contains **tabular representations of the emission savings** for selected fuel types, source materials and cultivation regions. Figures are shown as an energy percentage within GHG mitigation levels.

*Table 7: Emission savings for bioethanol by source material and GHG mitigation level – percentage share*

| GHG savings compared with reference values from 2018 [%] | Wastes/ residues | | Barley | | Maize | | Rye | | Triticale | | Wheat | | Sugar cane | | Sugar beet | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2018 419 TJ | 2019 698 TJ | 2018 1,326 TJ | 2019 424 TJ | 2018 15,484 TJ | 2019 19,623 TJ | 2018 1,439 TJ | 2019 1,148 TJ | 2018 1,956 TJ | 2019 1,493 TJ | 2018 8,622 TJ | 2019 5,394 TJ | 2018 498 TJ | 2019 1,426 TJ | 2018 1,042 TJ | 2019 603 TJ | 2018 30,785 TJ | 2019 30,808 TJ |
| 50–55 | | | | | | | | | | | | | | | | | | |
| >55–60 | | | | | 0.01 | 0.10 | 4.49 | 0.24 | 0.11 | | 0.02 | 0.05 | | | 1.80 | 1.29 | 0.29 | 0.10 |
| >60–65 | | | | | 0.30 | 0.25 | | | | | | 0.002 | | | 0.29 | 11.28 | 0.16 | 0.38 |
| >65–70 | | | | | 0.96 | 0.64 | 0.61 | 2.44 | 0.09 | | 1.31 | 0.19 | | | 9.03 | 23.35 | 1.19 | 0.99 |
| >70–75 | | | 18.19 | 4.90 | 21.15 | 9.59 | 10.27 | 12.98 | 13.14 | 4.07 | 16.30 | 6.01 | 10.64 | | 15.53 | 22.10 | 18.00 | 8.34 |
| >75–80 | | | 74.89 | 81.56 | 5.14 | 8.29 | 30.24 | 28.15 | 10.02 | 15.67 | 32.29 | 43.30 | 13.51 | 1.13 | | 0.03 | 17.12 | 15.84 |
| >80–85 | 2.04 | 21.38 | | | 8.93 | 13.16 | 54.39 | 50.73 | 66.96 | 55.25 | 0.63 | 0.57 | 63.24 | 23.46 | 34.41 | 9.10 | 13.68 | 14.80 |
| >85–90 | | | | | 3.48 | 11.45 | | 5.46 | 0.64 | 22.04 | 8.39 | 4.16 | | 22.91 | 21.71 | 32.86 | 4.88 | 11.00 |
| >90–95 | 27.64 | 11.08 | | | 6.72 | 13.21 | | | | | 0.10 | | 12.61 | 45.15 | 17.24 | | 4.57 | 10.76 |
| >95–100 | 70.32 | 63.21 | 3.38 | 2.60 | 53.31 | 41.95 | | | 6.77 | 0.26 | 38.19 | 19.08 | | 7.35 | | | 39.04 | 31.88 |
| >100–105 | | 4.33 | 3.54 | 10.12 | | 1.37 | | | 2.27 | 1.97 | 2.78 | 25.40 | | | | | 1.08 | 5.65 |
| >105 | | | | 0.82 | | | | | | 0.75 | | 1.23 | | | | | | 0.26 |
| Total | One hundred percent | | | | | | | | | | | | | | | | | |

*Table 8: Emission savings for bioethanol by source material, origin and GHG mitigation level – percentage share*

| GHG savings compared with reference values from 2018 [%] | Maize | | | | | | | | Wheat | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Germany | | EU | | Third countries | | Total bioethanol from maize | | Germany | | EU | | Total bioethanol from wheat | |
| | Year 2018 247 TJ | Year 2019 264 TJ | Year 2018 7,996 TJ | Year 2019 9,211 TJ | Year 2018 7,240 TJ | Year 2019 10,147 TJ | Year 2018 15,484 TJ | Year 2019 19,623 TJ | Year 2018 1,519 TJ | Year 2019 392 TJ | Year 2018 7,103 TJ | Year 2019 5,002 TJ | Year 2018 8,622 TJ | Year 2019 5,394 TJ |
| 50–55 | | | | | | | | | | | | | | |
| >55–60 | | | 0.02 | 0.04 | | 0.15 | 0.01 | 0.10 | | 0.51 | 0.03 | 0.01 | 0.02 | 0.05 |
| >60–65 | | | 0.59 | 0.42 | | 0.09 | 0.30 | 0.25 | | | | 0.002 | | 0.00 |
| >65–70 | | | 0.74 | 0.47 | 1.23 | 0.81 | 0.96 | 0.64 | 5.50 | 2.60 | 0.41 | | 1.31 | 0.19 |
| >70–75 | 28.67 | 9.05 | 40.07 | 19.81 | | 0.32 | 21.15 | 9.59 | 56.48 | 45.03 | 7.71 | 2.95 | 16.30 | 6.01 |
| >75–80 | 44.19 | 1.31 | 8.59 | 17.60 | | 0.01 | 5.14 | 8.29 | 35.92 | 51.87 | 31.51 | 42.63 | 32.29 | 43.30 |
| >80–85 | 20.05 | 41.66 | 16.28 | 26.75 | 0.43 | 0.08 | 8.93 | 13.16 | | | 0.76 | 0.62 | 0.63 | 0.57 |
| >85–90 | 0.47 | 47.91 | 6.46 | 22.91 | 0.30 | 0.09 | 3.48 | 11.45 | | | 10.18 | 4.49 | 8.39 | 4.16 |
| >90–95 | | | 2.02 | 6.22 | 12.13 | 19.90 | 6.72 | 13.21 | | | 0.12 | | 0.10 | |
| >95–100 | 6.62 | 0.07 | 25.23 | 2.85 | 85.91 | 78.55 | 53.31 | 41.95 | 2.10 | | 45.90 | 20.57 | 38.19 | 19.08 |
| >100–105 | | | | 2.92 | | | | 1.37 | | | 3.38 | 27.39 | 2.78 | 25.40 |
| >105 | | | | | | | | | | | | 1.33 | | 1.23 |
| Total | One hundred percent | | | | | | | | | | | | | |

*Table 9: Emission savings for FAME by source material and GHG mitigation level – percentage share*

| GHG savings compared with reference values from 2018 [%] | Wastes/residues | | Ethiopian mustard | | Palm oil | | Rapeseed | | Soy | | Sunflower | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year 2018<br>41,144 TJ | Year 2019<br>33,139 TJ | Year 2018<br>52 TJ | Year 2019<br>98 TJ | Year 2018<br>17,790 TJ | Year 2019<br>22,523 TJ | Year 2018<br>25,105 TJ | Year 2019<br>29,600 TJ | Year 2018<br>675 TJ | Year 2019<br>1,215 TJ | Year 2018<br>1,898 TJ | Year 2019<br>3,073 TJ | Year 2018<br>86,663 TJ | Year 2019<br>89,646 TJ |
| **50–55** | | | | | | | | | | | | | | |
| **>55–60** | | | | | 0.01 | 0.01 | 1.52 | 0.55 | 6.06 | 3.47 | | | 0.49 | 0.23 |
| **>60–65** | | | | | 0.15 | 0.03 | 4.07 | 4.03 | 56.11 | 14.41 | | | 1.65 | 1.54 |
| **>65–70** | 0.0002 | 0.01 | | | 2.17 | 3.19 | 34.41 | 37.51 | 10.55 | 55.87 | 8.76 | 3.91 | 10.69 | 14.08 |
| **>70–75** | | | | | 0.63 | 12.63 | 53.05 | 55.13 | 0.29 | 10.03 | 84.76 | 67.47 | 17.36 | 23.82 |
| **>75–80** | 0.002 | | | | 46.38 | 45.29 | 6.91 | 2.78 | 26.99 | 16.13 | 6.49 | 27.14 | 11.87 | 13.44 |
| **>80–85** | 0.14 | 0.40 | | | 45.86 | 37.69 | 0.04 | | | 0.10 | | 1.49 | 9.49 | 9.67 |
| **>85–90** | 8.83 | 9.45 | | | 4.30 | 1.17 | 0.01 | | | | | | 5.08 | 3.79 |
| **>90–95** | 73.02 | 70.87 | 100.00 | 12.30 | 0.51 | | 0.002 | | | | | | 34.83 | 26.21 |
| **>95–100** | 18.01 | 19.28 | | | | | 0.0003 | | | | | | 8.55 | 7.13 |
| **>100–105** | | | | | | | | | | | | | | |
| **>105** | | | | 87.70 | | | | | | | | | | 0.10 |
| **Total** | One hundred percent | | | | | | | | | | | | | |

*Table 10: Emission savings for FAME by source material, origin and GHG mitigation level – percentage share*

| GHG savings compared with reference values from 2018 [%] | Wastes/residues | | | | | | | | Rapeseed | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Germany | | EU | | Third countries | | Total FAME from wastes/residues | | Germany | | EU | | Third countries | | Total FAME from rapeseed | |
| | Year 2018<br>8,186 TJ | Year 2019<br>6,275 TJ | Year 2018<br>16,884 TJ | Year 2019<br>11,669 TJ | Year 2018<br>16,074 TJ | Year 2019<br>15,195 TJ | Year 2018<br>41,144 TJ | Year 2019<br>33,139 TJ | Year 2018<br>12,187 TJ | Year 2019<br>13,812 TJ | Year 2018<br>9,586 TJ | Year 2019<br>10,171 TJ | Year 2018<br>3,332 TJ | Year 2019<br>5,617 TJ | Year 2018<br>25,105 TJ | Year 2019<br>29,600 TJ |
| 50–55 | | | | | | | | | | | | | | | | |
| >55–60 | | | | | | | | | 1.66 | 0.07 | 0.85 | 0.07 | 2.93 | 2.59 | 1.52 | 0.55 |
| >60–65 | | | | | | | | | 4.79 | 0.76 | 3.95 | 8.88 | 1.79 | 3.31 | 4.07 | 4.03 |
| >65–70 | | | 0.001 | 0.02 | | | 0.0002 | 0.01 | 44.98 | 47.48 | 27.43 | 36.88 | 15.78 | 14.16 | 34.41 | 37.51 |
| >70–75 | | | | | | | | | 48.28 | 51.33 | 59.27 | 51.33 | 52.62 | 71.37 | 53.05 | 55.13 |
| >75–80 | | | 0.01 | | | | 0.002 | | 0.20 | 0.37 | 8.49 | 2.85 | 26.88 | 8.58 | 6.91 | 2.78 |
| >80–85 | 0.03 | | 0.002 | 0.01 | 0.33 | 0.86 | 0.14 | 0.40 | 0.07 | | 0.002 | | | | 0.04 | |
| >85–90 | 4.88 | 2.43 | 17.32 | 22.20 | 1.92 | 2.55 | 8.83 | 9.45 | 0.01 | | 0.004 | | | | 0.01 | |
| >90–95 | 86.47 | 95.58 | 76.37 | 77.38 | 62.65 | 55.67 | 73.02 | 70.87 | | | 0.01 | | | | 0.002 | |
| >95–100 | 8.63 | 2.00 | 6.30 | 0.39 | 35.10 | 40.93 | 18.01 | 19.28 | | | 0.001 | | | | 0.0003 | |
| >100–105 | | | | | | | | | | | | | | | | |
| >105 | | | | | | | | | | | | | | | | |
| Total | One hundred percent | | | | | | | | | | | | | | | |

*Table 11: Emission savings for vegetable oil by source material and GHG mitigation level – percentage share*

| GHG savings compared with reference values from 2018 [%] | Palm oil | | Rapeseed | |
|---|---|---|---|---|
| | Year 2018<br>5 TJ | Year 2019<br>19 TJ | Year 2018<br>19 TJ | Year 2019<br>18 TJ |
| 50–55 | | | | |
| >55–60 | | | | |
| >60–65 | 100.00 | 14.32 | 28.29 | 20.67 |
| >65–70 | | 14.24 | 20.01 | 10.13 |
| >70–75 | | 9.46 | 51.69 | 69.19 |
| >75–80 | | 47.69 | | |
| >80–85 | | 4.83 | | |
| >85–90 | | 9.47 | | |
| >90–95 | | | | |
| >95–100 | | | | 0.01 |
| >100–105 | | | | |
| >105 | | | | |
| Total | One hundred percent | | | |

*Table 12: Emission savings for biomethane by source material and GHG mitigation level – percentage share*

| GHG savings compared with reference values from 2018 [%] | Wastes/residues | | Silage maize | |
|---|---|---|---|---|
| | Year 2018<br>1,329 TJ | Year 2019<br>736 TJ | Year 2018<br>80 TJ | Year 2019<br>491 TJ |
| 50–55 | | | | |
| >55–60 | | | | |
| >60–65 | | | | |
| >65–70 | | | | |
| >70–75 | | | | |
| >75–80 | 14.68 | 15.53 | 100.00 | 0.92 |
| >80–85 | 10.03 | 15.25 | | |
| >85–90 | 2.06 | 4.65 | | 99.08 |
| >90–95 | 22.83 | 20.46 | | |
| >95–100 | 49.46 | 44.11 | | |
| >100–105 | | | | |
| >105 | 0.94 | | | |
| Total | One hundred percent | | | |

*Table 13: Emission savings for wastes and residues by type and GHG reduction level – percentage share*

| GHG savings compared with reference values from 2018 [%] | ‘Advanced’, pursuant to 38th BImSchV, Annex 1[11] | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number 3 | | Number 4 | | Number 7 | | Number 9 | | Number 11 | | Number 16 | | Used cooking oils | | Other | | Total wastes and residues | |
| | Year 2018 191 TJ | Year 2019 106 TJ | Year 2018 53 TJ | Year 2019 476 TJ | Year 2018 51 TJ | Year 2019 1 TJ | Year 2018 0.3 TJ | Year 2019 36 TJ | Year 2018 1 TJ | Year 2019 0.3 TJ | Year 2018 53 TJ | Year 2019 129 TJ | Year 2018 35,192 TJ | Year 2019 27,206 TJ | Year 2018 7,429 TJ | Year 2019 6,644 TJ | Year 2018 42,971 TJ | Year 2019 34,598 TJ |
| 50–55 | | | | | | | | | | | | | | | | | | |
| >55–60 | | | | | | | | | | | | | | | | | | |
| >60–65 | | | | | | | | | | | | | | | | | | |
| >65–70 | | | | | | | | | | | | | | | | 0.03 | | 0.01 |
| >70–75 | | | | | | | | | | | | | | | | | | |
| >75–80 | 100.00 | 100.00 | 1.00 | 0.06 | | | | | 25.90 | 100.00 | | | 0.04 | | 0.05 | 0.12 | 0.49 | 0.33 |
| >80–85 | | | 4.53 | | | 100.00 | | | 74.10 | | 100.00 | 100.00 | | 0.01 | 1.90 | 3.95 | 0.46 | 1.14 |
| >85–90 | | | 0.16 | | 23.70 | | | | | | | | 9.55 | 10.72 | 4.02 | 3.76 | 8.54 | 9.15 |
| >90–95 | | | 94.31 | 31.67 | 76.30 | | 100.00 | 100.00 | | | | | 70.70 | 66.31 | 74.59 | 82.87 | 71.01 | 68.60 |
| >95–100 | | | | 68.27 | | | | | | | | | 19.70 | 22.96 | 19.28 | 8.81 | 19.47 | 20.68 |
| >100–105 | | | | | | | | | | | | | | | | 0.45 | | 0.09 |
| >105 | | | | | | | | | | | | | | | 0.17 | | 0.03 | |
| Total | One hundred percent | | | | | | | | | | | | | | | | | |

[11] See page 101, Table 31

## 7. Bioliquids

The total quantity of bioliquids registered for electricity generation and feed-in according to the EEG rose by 8% in the reporting year.

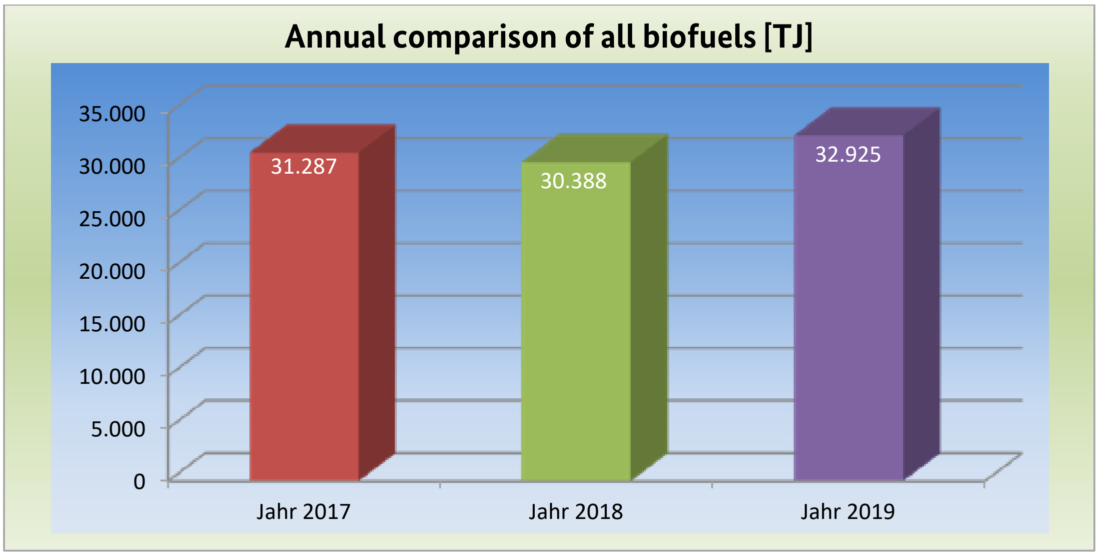



*Figure 42*

### 7.1 Types of bioliquids

The increase in the overall quantity can be ascribed to the gains achieved by bioliquids from the pulp industry (+7%) and from vegetable oils (+24%). The quantity of biodiesel (FAME) used for electricity generation decreased by 15%.

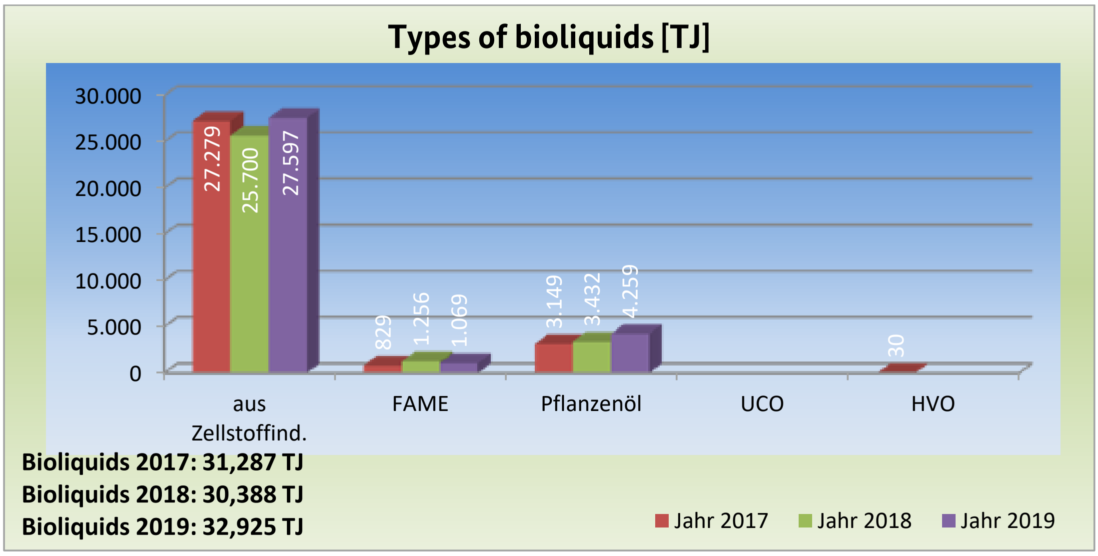



*Figure 43*

## 7.2 Source materials and origin of vegetable oils used as bioliquids

The quantity of vegetable oil produced from palm oil rose in the reporting year (+21%), as did the proportion for rapeseed (+39%). The comparatively small proportion produced from shea nuts remained at a level similar to the previous year.

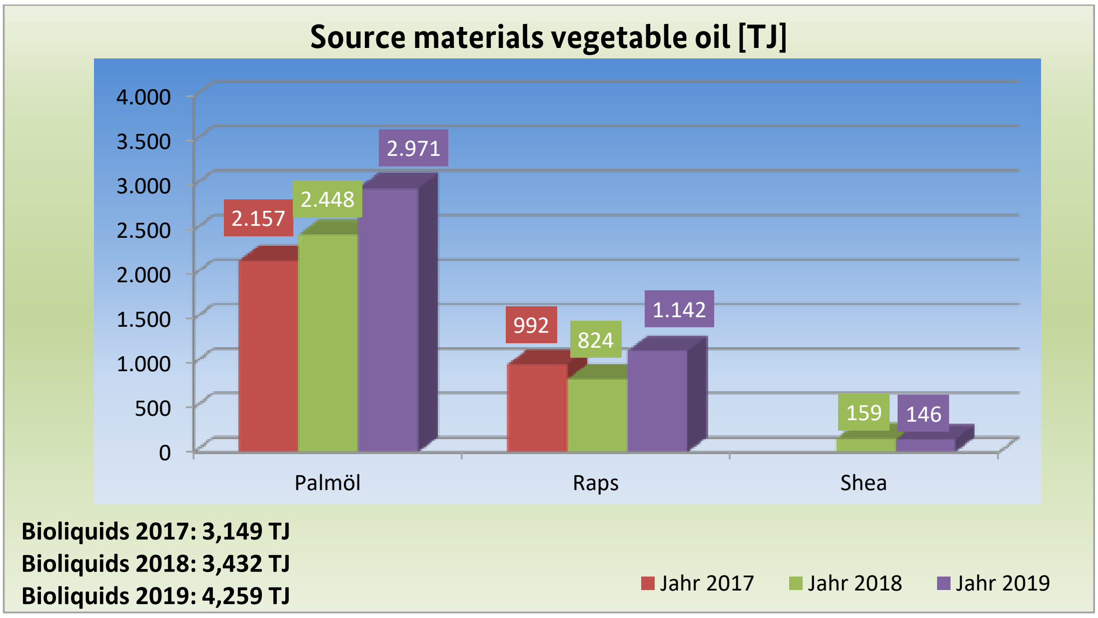



*Figure 44*

The overall volume of vegetable oils from palm oil rose in the reporting year by 21%. Especially large increases were recorded from the countries of origin of Honduras (+213%) and Indonesia (+200%). Guatemala supplied a proportion of the palm oil used in production for the first time.

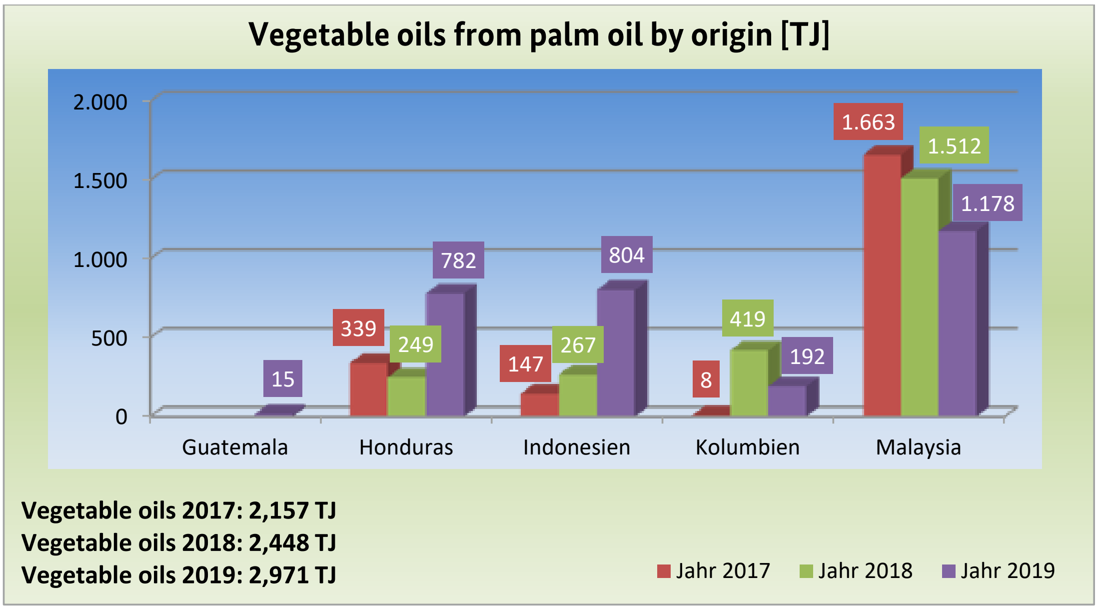



*Figure 45*

## 7.3 Greenhouse gas emissions and savings

In calculating emission savings, the total emissions resulting from the production of the bioliquid[12] were compared with the reference value of **91 g $CO_2$eq/MJ** applicable to fossil fuels used for generating electricity.

Due to the high proportion of very low-emission thick liquor from the pulp industry, overall savings in the bioliquids segment have traditionally been very high.

The emission savings presented here are based on the comparison of **pure bioliquids** to **pure fossil fuels**.

**A saving of approx. 2.8 million tonnes of $CO_2$ equivalent was achieved by the use of bioliquids for electricity generation.** This results from the fact that more than 2.8 million tonnes of $CO_2$ equivalent would have been emitted (based on the reference value of 91 g $CO_2$eq/MJ) if fossil fuels had been used exclusively for electricity generation instead of these bioliquids.

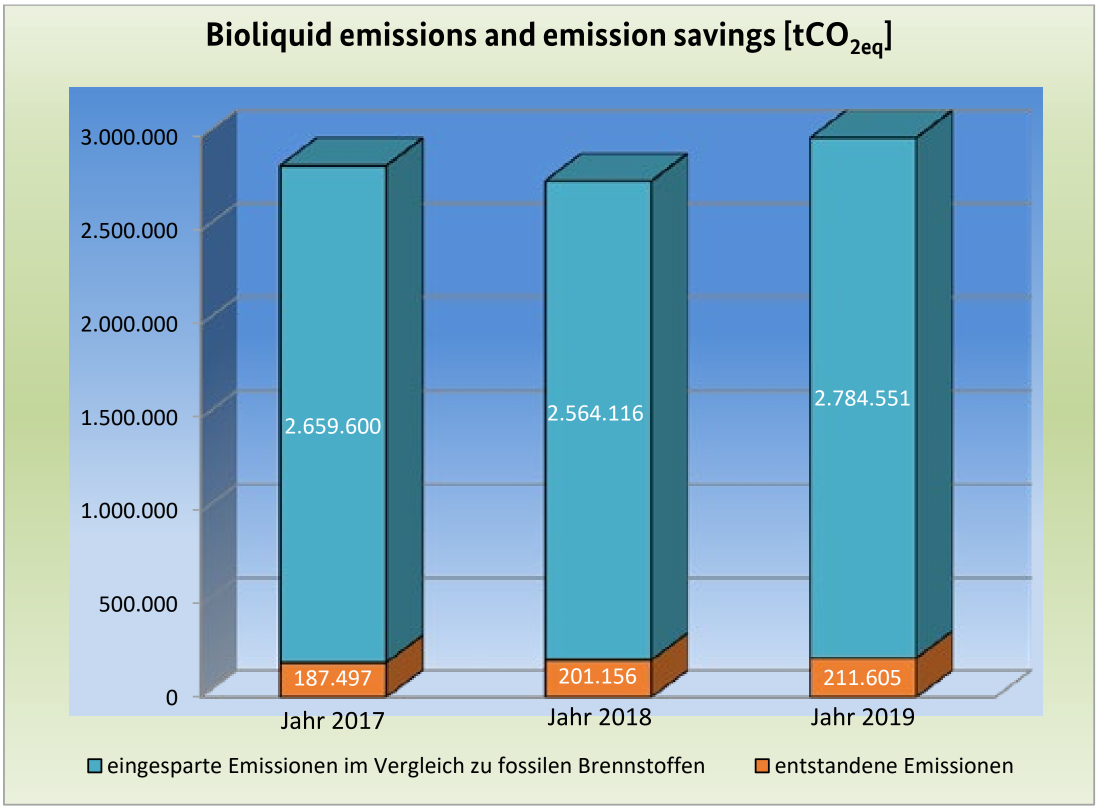



*Figure 46*

[12] Emissions are calculated by applying the same methodology as used for biofuels—cf. footnote 4.

The average volume of $CO_2eq$ generated declined year-on-year by 3%.

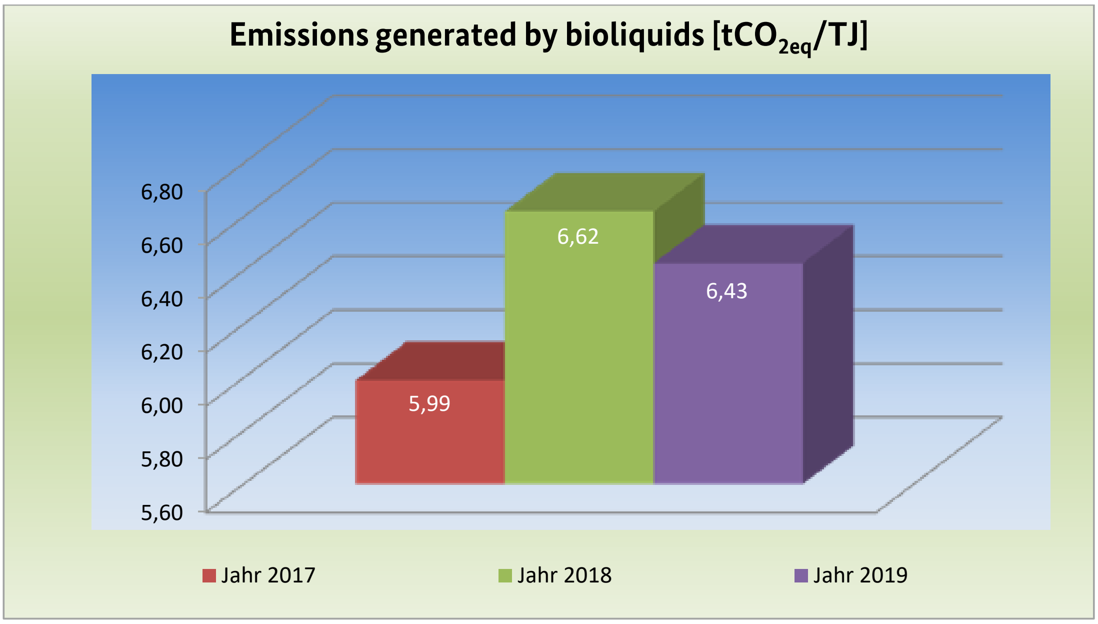



*Figure 47*

The emission savings of the quantities used for electricity generation rose by 0.21 percentage points.

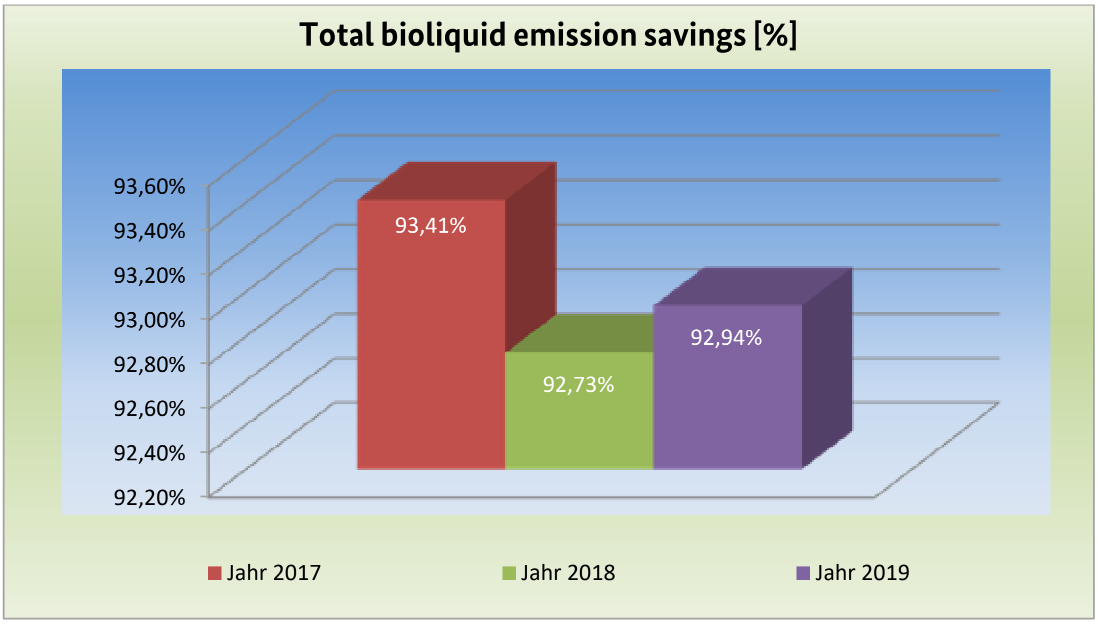



*Figure 48*

In a year-on-year comparison, vegetable oils used as bioliquids achieved a considerably better figure (−7%). Average emissions generated also decreased (−8%) in the case of bioliquids from the pulp industry.

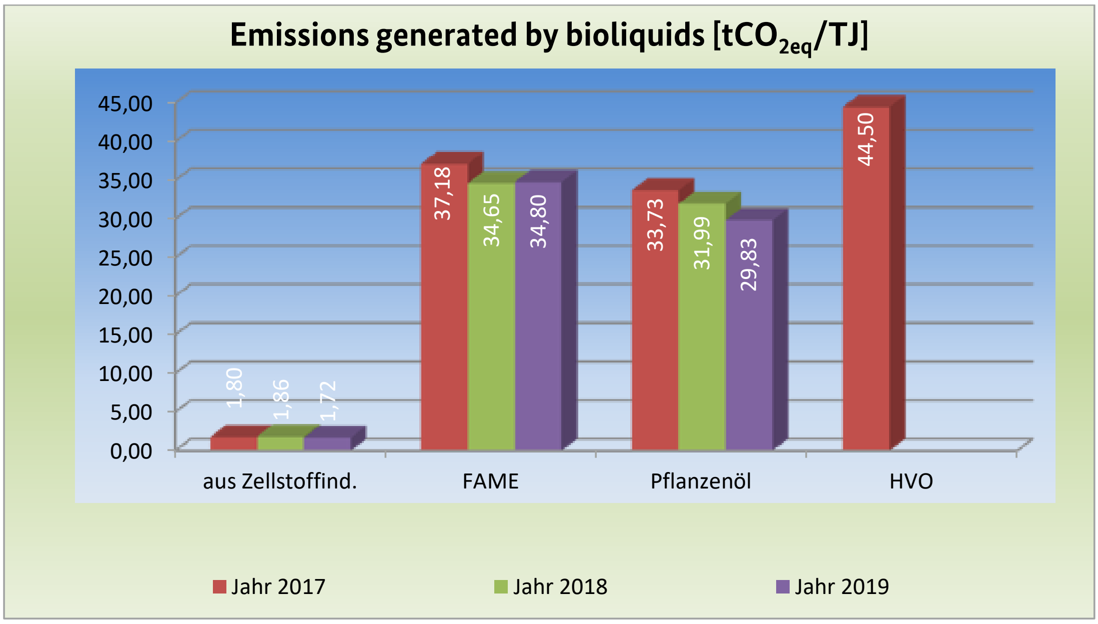



*Figure 49*

As in the previous year, bioliquids from the pulp industry achieved the best figure for savings. The figure was again over 98% in the reporting year.

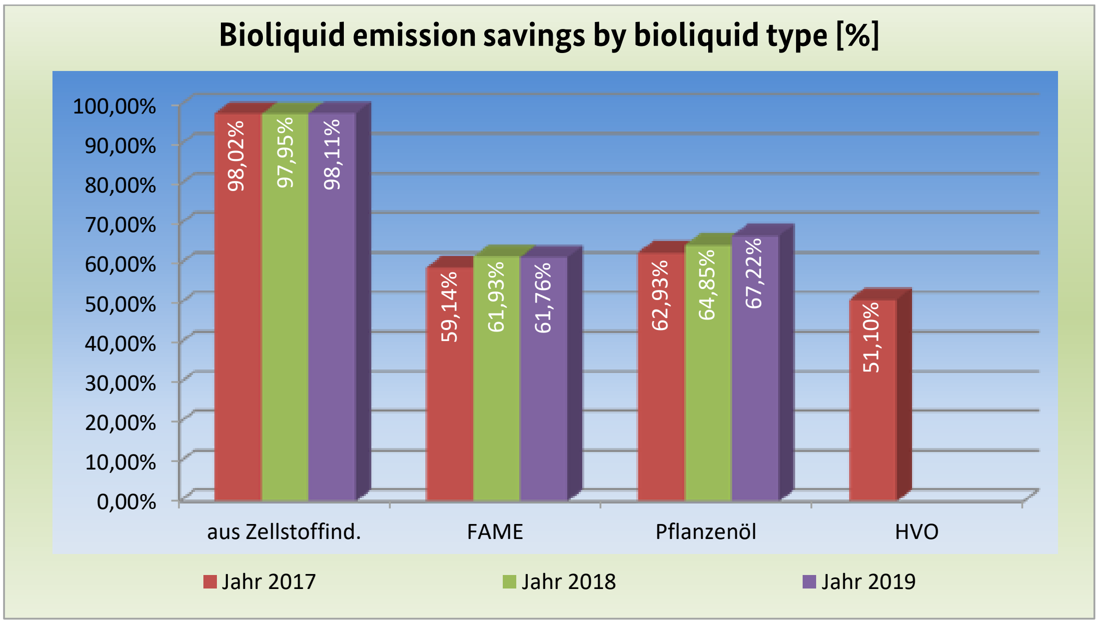



*Figure 50*

## 8. Retirement accounts

Retirement accounts for a number of purposes have been set up in Nabisy to allow economic operators to comply with mass-balancing regulations. These accounts are:

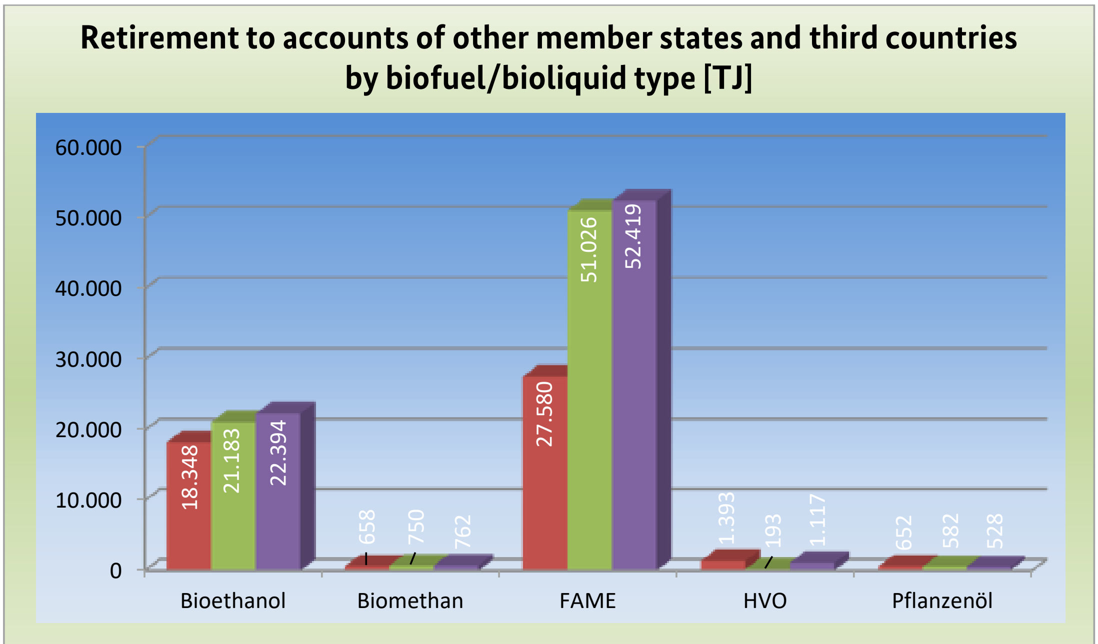
– **Country accounts**, in cases where goods leave Germany and the recipient is not registered with Nabisy

– **Retirement accounts for other purposes**, e.g. for use in the case of further conversion or other technical purposes

– **Shortfall on the reporting day**, in cases where there is no physical sustainable good corresponding to the certificates in existence at the end of a mass-balancing period

### 8.1 Retirement to accounts of other Member States and third countries

Biofuels and bioliquids that are registered in the Nabisy database and exported to other countries must be retired to the account of the relevant country in Nabisy by the economic operators. In the reporting year, this method was used to transfer **77,220 TJ** (previous year: 73,735 TJ) of biofuels and bioliquids to the accounts of EU Member States and non-EU countries




**Total amount retired 2017: 48,631 TJ**
**Total amount retired 2018: 73,735 TJ**
**Total amount retired 2019: 77,220 TJ**

*Figure 51*

The following figure shows only those country accounts to which no less than 1,000 TJ were retired in at least one reference year. Table 14 on page 90 shows a complete list of the amounts retired.

The largest amounts of retired biofuels and bioliquids were transferred to the accounts of Austria (26%), the Netherlands (18%) and France (13%).

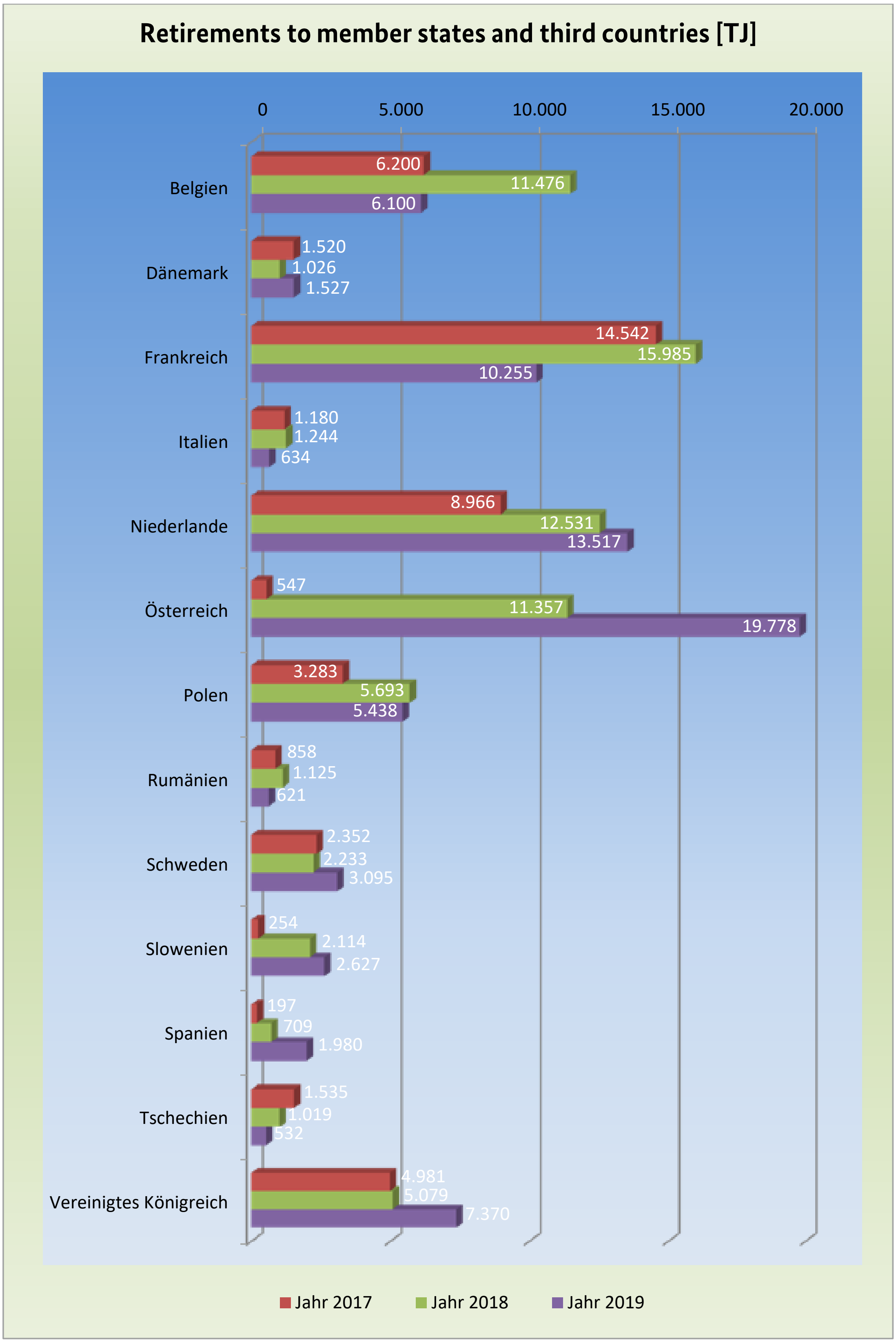

Retirements to member states and third countries [TJ]
0
5.000
10.000
15.000
20.000
Belgien
6.200
11.476
6.100
Dänemark
1.520
1.026
1.527
Frankreich
14.542
15.985
10.255
Italien
1.180
1.244
634
Niederlande
8.966
12.531
13.517
Österreich
547
11.357
19.778
Polen
3.283
5.693
5.438
Rumänien
858
1.125
621
Schweden
2.352
2.233
3.095
Slowenien
254
2.114
2.627
Spanien
197
709
1.980
Tschechien
1.535
1.019
532
Vereinigtes Königreich
4.981
5.079
7.370
Jahr 2017
Jahr 2018
Jahr 2019

*Figure 52*

*Table 14: Retirement of biofuels and bioliquids [in TJ] to Member States and third countries in 2019*

| Retirement account | Wastes/ residues | Barley | Maize | Palm oil | Rape-seed | Rye | Soy | Sun-flower | Triticale | Wheat | Sugar cane | Sugar beet | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Belgium | 172 | | 625 | 487 | 2,989 | | 932 | 93 | | 422 | 101 | 279 | **6,100** |
| Bulgaria | | | 96 | | 49 | | | | | 22 | | | **166** |
| Denmark | 304 | | 491 | | | | | | | 43 | 10 | 680 | **1,527** |
| Finland | | | 51 | | | | | | | 8 | | 158 | **218** |
| France | 223 | 158 | 2,392 | 379 | 3,590 | 19 | 2,366 | | 37 | 726 | 117 | 248 | **10,255** |
| Greece | | | 78 | | 50 | | | | | | | | **128** |
| Ireland | 76 | | 1 | | | | | | | | | | **77** |
| Italy | 41 | | 95 | | 498 | 0.02 | | | | | | | **634** |
| Croatia | 75 | | 12 | | 798 | | 91 | | 0.01 | 2 | | | **978** |
| Lithuania | | | | | 14 | | | | | 10 | | | **25** |
| Luxembourg | 124 | 5 | 122 | 82 | 418 | 3 | 38 | 11 | 4 | 43 | 6 | 8 | **864** |
| Netherlands | 7,391 | 96 | 2,942 | 11 | 160 | 22 | 77 | | 13 | 1,777 | 274 | 754 | **13,517** |
| Norway | | | 158 | | 119 | | | | | 75 | 10 | 45 | **409** |
| Austria | 535 | 2 | 980 | 917 | 14,403 | 89 | 2,624 | 71 | 10 | 107 | 4 | 36 | **19,778** |
| Poland | | 7 | 128 | 0.3 | 4,703 | 156 | 274 | 10 | 21 | 63 | | 74 | **5,438** |
| Romania | | | 544 | | 65 | | | | | 12 | | | **621** |
| Sweden | 1,115 | | 1,013 | 19 | 158 | | 152 | | | 122 | | 515 | **3,095** |
| Switzerland | | | 38 | 354 | 71 | | | | 5 | | | | **467** |
| Slovakia | 26 | | 2 | | 3 | 3 | | | | 3 | | 0.5 | **37** |
| Slovenia | 778 | | 136 | 4 | 1,333 | | 201 | 25 | 39 | 111 | | 0.1 | **2,627** |
| Spain | | | 69 | 44 | 1,130 | | 696 | | | 5 | | 36 | **1,980** |
| Czech Republic | 47 | | 61 | 34 | 293 | 47 | 0.01 | | 20 | 25 | | 6 | **532** |
| Hungary | 85 | | 5 | | 287 | | | | 0 | 2 | | | **379** |
| United Kingdom | 4,835 | 81 | 679 | | | | | | | 205 | 471 | 1,099 | **7,370** |
| **Total** | **15,827** | **349** | **10,717** | **2,330** | **31,130** | **339** | **7,452** | **210** | **149** | **3,784** | **993** | **3,940** | **77,220** |

## 8.2 Emission savings for retirements to country accounts

As in previous years, a lower reduction of emissions was recorded for the quantities retired to country accounts than for quantities recognised for the German Greenhouse Gas Mitigation Quota. The reference values used for calculating the emission savings of the retired quantities were the fossil fuel reference values applicable to the biofuel sector since 2018 (bioethanol: 93.3 g $CO_2$eq/MJ; biomethane: 94.1 g $CO_2$eq/MJ; FAME, HVO, vegetable oil: 93.3 g $CO_2$eq/MJ).


*Figure 53*

### 8.3 Retirements to other accounts

As well as the method of retirement to country accounts, the Nabisy electronic database also provides other retirement options for documented quantities that will not be (or have not been) used for the production of energy in Germany. The following figure shows recent changes for three of these other accounts.

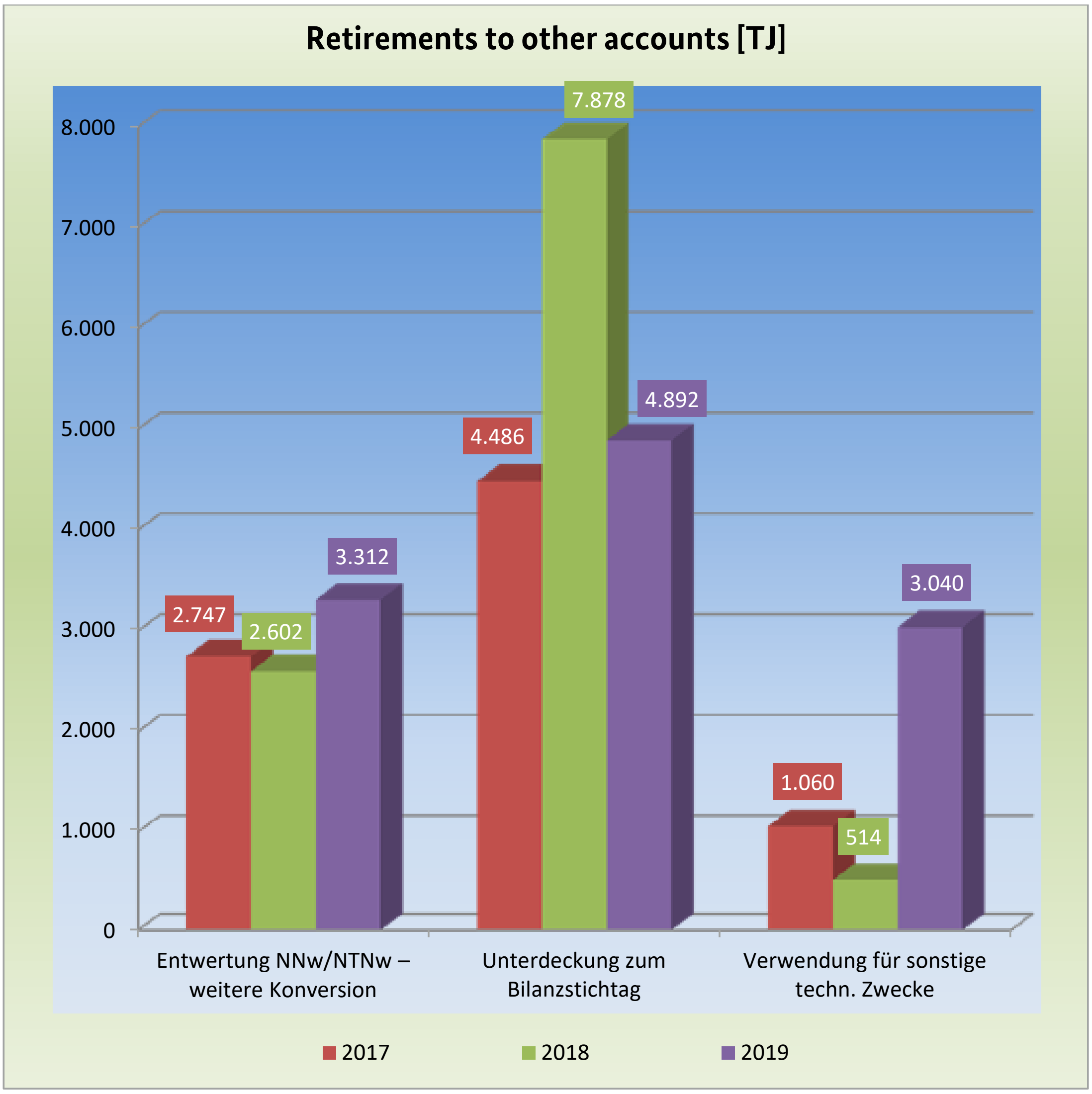



*Figure 54*

## 9. Outlook

While the 2019 reporting year was focused in particular on efforts to respond to key questions regarding the future implementation of the revised Renewable Energy Directive for the period 2021–2030 (Directive 2018/2001, also 'RED II'), 2020 has been overshadowed by the impact of the pandemic on all areas of our lives –both private and professional— and this is likely to continue for the foreseeable future.
Sustainability certification has been particularly affected by these unusual times. Not least because a key element of this work is the on-site audit, whereby a qualified auditor visits the premises of the company seeking to obtain certification to establish whether this organisation is capable of complying with the contractual specifications of its regulator (= scheme) to the fullest extent. Auditors complete this process by filling out the schemes' checklists. The insights gained from the audit are then evaluated by multiple instances within the certification body and the body then makes a decision as to whether to issue a certificate for a future period of time. Essentially, the body therefore extrapolates —and thereby guarantees— a previously established level of trust in the future.

This specific and material body of certification knowledge is now difficult—or de facto impossible—to obtain in many parts of the world. In many cases, travel restrictions, quarantine regulations for inbound and outbound travellers plus distancing laws have meant that the on-site checks that were part of day-to-day business for auditors 'pre-Covid' must now be substituted by other sources of knowledge.
Yet conventional product inspections based on sampling cannot be used in this certification segment: neither the source material nor the final product can be inspected to ascertain any sustainability properties.

The certification schemes recognised by the EU Commission (voluntary schemes) have responded appropriately and effectively to the impacts of the pandemic. During periods where travel restrictions are in force, these schemes exceptionally permit their contractually affiliated certification bodies and scheme participants to grant certificates on the basis of remote or desk audits (i.e. without first completing any on-site inspections), if these checks will be completed at a later point in time.
This exemption is a response to the de facto impossibility of auditor travel for the purposes of conducting on-site checks. To date, however, this exemption rule has been applied only to re-certification, i.e. to the issuing of a follow-on certificate for a company that has already been certified within the applicable scope for this scheme and whose certificate therefore (merely) needs renewing.
In light of current developments relating to the pandemic—infection rates were again rising fast worldwide as this report went to press in November 2020—and the future expansion of sustainability certification to other sectors, it seems unavoidable that additional efforts will have to be made above and beyond the existing exemptions to scheme rules, so as to identify alternative sources of knowledge for use by certification bodies for initial certifications as well. These sources must of course permit a prediction of future circumstances as robust as that provided by on-site audits, with their comprehensive site tour and all other steps. Unless these efforts are made, shutdowns may occur or entire business models may cease to exist.

# 10. Background data

*Table 15: Biofuels in TJ – source materials*[1]

| Fuel type/ Quota year / Source material | Bioethanol Figure 28, p. 54 | | | Biomethane Figure 33, p. 58 | | | Btl-FTD | | | FAME Figure 30, p. 56 | | | HVO Figure 32, p. 58 | | | CP-HVO Figure 32, p. 58 | | | Vegetable oil Figure 34, p. 59 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 |
| **Wastes/residues** | 46 | 419 | 698 | 1,615 | 1,329 | 736 | | 3 | | 31,508 | 41,144 | 33,139 | 80 | 77 | 24 | | | | | | |
| **Ethiopian mustard** | | | | | | | | | | | 52 | 98 | | | | | | | | | |
| **Barley** | 1,665 | 1,326 | 424 | | | | | | | | | | | | | | | | | | |
| **Maize** | 14,369 | 15,484 | 19,623 | | | | | | | | | | | | | | | | | | |
| **Palm oil** | | | | | | | | | | 18,373 | 17,790 | 22,523 | 1,361 | 1,106 | 1,812 | | | 65 | | 5 | 19 |
| **Rapeseed** | | | | | | | | | | 28,381 | 25,105 | 29,600 | | | | | | | 26 | 19 | 18 |
| **Rye** | 2,272 | 1,439 | 1,148 | | | | | | | | | | | | | | | | | | |
| **Silage maize** | | | | | 80 | 491 | | | | | | | | | | | | | | | |
| **Soy** | | | | | | | | | | 62 | 675 | 1,215 | | | | | | | | | |
| **Sunflower** | | | | | | | | | | 1,631 | 1,898 | 3,073 | | | | | | | | | |
| **Triticale** | 1,753 | 1,956 | 1,493 | | | | | | | | | | | | | | | | | | |
| **Wheat** | 7,940 | 8,622 | 5,394 | | | | | | | | | | | | | | | | | | |
| **Sugar cane** | 1,071 | 498 | 1,426 | | | | | | | | | | | | | | | | | | |
| **Sugar beet** | 875 | 1,042 | 603 | | | | | | | | | | | | | | | | | | |
| **Total** Figure 26, p. 52 | **29,991** | **30,785** | **30,808** | **1,615** | **1,408** | **1,227** | | **3** | | **79,955** | **86,663** | **89,646** | **1,442** | **1,184** | **1,836** | | | **65** | **26** | **24** | **37** |

[1] Differences in totals are due to rounding

*Table 16: Biofuels in kt - source materials* [1,2]

| Fuel type/ Quota year / Source material | Bioethanol | | | Biomethane | | | Btl-FTD | | | FAME | | | HVO | | | CP-HVO | | | Vegetable oil | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** |
| **Wastes/residues** | 2 | 16 | 26 | 32 | 27 | 15 | | 0.1 | | 843 | 1,101 | 887 | 2 | 2 | 1 | | | | | | |
| **Ethiopian mustard** | | | | | | | | | | | 1 | 3 | | | | | | | | | |
| **Barley** | 63 | 50 | 16 | | | | | | | | | | | | | | | | | | |
| **Maize** | 543 | 585 | 741 | | | | | | | | | | | | | | | | | | |
| **Palm oil** | | | | | | | | | | 492 | 476 | 603 | 31 | 25 | 42 | | | 1 | | 0.1 | 1 |
| **Rapeseed** | | | | | | | | | | 759 | 672 | 792 | | | | | | | 1 | 1 | 0.5 |
| **Rye** | 86 | 54 | 43 | | | | | | | | | | | | | | | | | | |
| **Silage maize** | | | | | 2 | 10 | | | | | | | | | | | | | | | |
| **Soy** | | | | | | | | | | 2 | 18 | 32 | | | | | | | | | |
| **Sunflower** | | | | | | | | | | 44 | 51 | 82 | | | | | | | | | |
| **Triticale** | 66 | 74 | 56 | | | | | | | | | | | | | | | | | | |
| **Wheat** | 300 | 326 | 204 | | | | | | | | | | | | | | | | | | |
| **Sugar cane** | 40 | 19 | 54 | | | | | | | | | | | | | | | | | | |
| **Sugar beet** | 33 | 39 | 23 | | | | | | | | | | | | | | | | | | |
| **Total** | **1,133** | **1,163** | **1,164** | **32** | **28** | **25** | | **0.1** | | **2,140** | **2,319** | **2,399** | **33** | **27** | **42** | | | **1** | **1** | **1** | **1** |

[1] Differences in totals are due to rounding
[2] Conversion to tonnage is based on the quantity indications from certificates.

*Table 17: Biofuels in TJ – source materials and their origin*[1]

| Region/ Quota year / Source material | Africa Figure 14, p. 41 | | | Asia Figure 15, p. 42 | | | Australia Figure 16, p. 43 | | | Europe Figure 17, p. 44 | | | Central America Figure 19, p. 46 | | | North America Figure 20, p. 46 | | | South America Figure 21, p. 47 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** | **2017** | **2018** | **2019** |
| Wastes/residues | 287 | 391 | 174 | 6,947 | 12,180 | 13,122 | 46 | 84 | 18 | 23,412 | 27,096 | 19,924 | 11 | 14 | 11 | 1,983 | 2,682 | 969 | 562 | 523 | 379 |
| Ethiopian mustard | | | | | | | | | | | | | | | | | | 9 | | 52 | 89 |
| Barley | | | | | | | | | | 1,665 | 1,326 | 424 | | | | | | | | | |
| Maize | | 9 | | | | | | | | 14,369 | 15,475 | 19,607 | | | | | | 15 | | | |
| Palm oil | | | | 17,464 | 17,867 | 21,409 | | | | | | | 2,270 | 1,029 | 2,970 | | | | | 5 | 39 |
| Rapeseed | | | | | 17 | 71 | 333 | 3,104 | 5,014 | 28,075 | 22,002 | 24,533 | | | | | | | | | |
| Rye | | | | | | | | | | 2,272 | 1,439 | 1,148 | | | | | | | | | |
| Silage maize | | | | | | | | | | | 80 | 491 | | | | | | | | | |
| Soy | | | | | | | | 10 | | 35 | 19 | 27 | | | | | | | 27 | 646 | 1,188 |
| Sunflower | | | | | | | | | | 1,631 | 1,898 | 3,073 | | | | | | | | | |
| Triticale | | | | | | | | | | 1,753 | 1,956 | 1,493 | | | | | | | | | |
| Wheat | | | | | | | | | | 7,940 | 8,622 | 5,394 | | | | | | | | | |
| Sugar cane | | | | | | | | | | | | | 324 | 247 | 350 | | | | 746 | 251 | 1,076 |
| Sugar beet | | | | | | | | | | 875 | 1,042 | 603 | | | | | | | | | |
| **Total** Figure 10, p. 37 | **287** | **400** | **174** | **24,411** | **30,065** | **34,603** | **379** | **3,19 8** | **5,031** | **82,027** | **80,954** | **76,716** | **2,60 6** | **1,290** | **3,331** | **1,983** | **2,682** | **993** | **1,335** | **1,477** | **2,771** |

[1] Differences in totals are due to rounding

*Table 18: Biofuels in kt – source materials and their origin*[1,2]

| Region/ Quota / year / Source material | Africa | | | Asia | | | Australia | | | Europe | | | Central America | | | North America | | | South America | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 |
| **Wastes/residues** | 8 | 10 | 5 | 186 | 326 | 351 | 1 | 2 | 0.5 | 616 | 721 | 536 | 0.3 | 0.4 | | 53 | 72 | 26 | 15 | 14 | 10 |
| **Ethiopian mustard** | | | | | | | | | | | | | | | | | | 0.2 | | 1 | 2 |
| **Barley** | | | | | | | | | | 63 | 50 | 16 | | | | | | | | | |
| **Maize** | | 0.3 | | | | | | | | 543 | 585 | 741 | | | 79 | | | 1 | | | |
| **Palm oil** | | | | 462 | 474 | 566 | | | | | | | 61 | 28 | | | | | | 0.1 | 1 |
| **Rapeseed** | | | | | 1 | 2 | 9 | 83 | 134 | 751 | 589 | 656 | | | | | | | | | |
| **Rye** | | | | | | | | | | 86 | 54 | 43 | | | | | | | | | |
| **Silage maize** | | | | | | | | | | | 2 | 10 | | | | | | | | | |
| **Soy** | | | | | | | | 0.3 | | 1 | 1 | 1 | | | | | | | 1 | 17 | 32 |
| **Sunflower** | | | | | | | | | | 44 | 51 | 82 | | | | | | | | | |
| **Triticale** | | | | | | | | | | 66 | 74 | 56 | | | | | | | | | |
| **Wheat** | | | | | | | | | | 300 | 326 | 204 | | | 13 | | | | | | |
| **Sugar cane** | | | | | | | | | | | | | 12 | 9 | | | | | 28 | 9 | 41 |
| **Sugar beet** | | | | | | | | | | 33 | 39 | 23 | | | 93 | | | | | | |
| **Total** | **8** | **11** | **5** | **648** | **800** | **919** | **10** | **86** | **135** | **2,503** | **2,490** | **2,368** | **73** | **37** | **124** | **53** | **72** | **27** | **44** | **42** | **86** |

[1] Differences in totals are due to rounding
[2] Conversion to tonnage is based on the quantity indications from certificates.

*Table 19: Total biofuels per source material*[1]

| Source material | 2017 [TJ] | 2018 [TJ] | 2019 [TJ] | 2017 [kt] | 2018 [kt] | 2019 [kt] |
|---|---|---|---|---|---|---|
| Wastes/residues | 33,249 | 42,971 | 34,598 | 879 | 1,145 | 928 |
| Ethiopian mustard | | 52 | 98 | | 1 | 3 |
| Barley | 1,665 | 1,326 | 424 | 63 | 50 | 16 |
| Maize | 14,369 | 15,484 | 19,623 | 543 | 585 | 741 |
| Palm oil | 19,734 | 18,901 | 24,418 | 523 | 502 | 646 |
| Rapeseed | 28,408 | 25,124 | 29,618 | 760 | 672 | 793 |
| Rye | 2,272 | 1,439 | 1,148 | 86 | 54 | 43 |
| Silage maize | | 80 | 491 | | 2 | 10 |
| Soy | 62 | 675 | 1,215 | 2 | 18 | 32 |
| Sunflower | 1,631 | 1,898 | 3,073 | 44 | 51 | 82 |
| Triticale | 1,753 | 1,956 | 1,493 | 66 | 74 | 56 |
| Wheat | 7,940 | 8,622 | 5,394 | 300 | 326 | 204 |
| Sugar cane | 1,071 | 498 | 1,426 | 40 | 19 | 54 |
| Sugar beet | 875 | 1,042 | 603 | 33 | 39 | 23 |
| **Total** | **113,029** | **120,066** | **123,619** | **3,339** | **3,538** | **3,632** |

[1] Differences in totals are due to rounding

*Table 20: Biofuels whose source materials originate in Germany [TJ]*[1]

| Fuel type/ Quota year / Source material | Bioethanol Figure 29, p. 55 | | | Biomethane | | | FAME Figure 31, p. 57 | | | Vegetable oil | | | Total Figure 18, p. 45 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 | 2017 | 2018 | 2019 |
| **Wastes/residues** | 0.1 | 124 | 220 | 1,602 | 1,316 | 736 | 6,360 | 8,186 | 6,275 | | | | 7,962 | 9,626 | 7,231 |
| **Barley** | 1,468 | 1,234 | 367 | | | | | | | | | | 1,468 | 1,234 | 367 |
| **Maize** | 71 | 247 | 264 | | | | | | | | | | 71 | 247 | 264 |
| **Rapeseed** | | | | | | | 14,738 | 12,187 | 13,812 | 26 | 19 | 18 | 14,764 | 12,206 | 13,830 |
| **Rye** | 1,513 | 432 | 470 | | | | | | | | | | 1,513 | 432 | 470 |
| **Silage maize** | | | | | 80 | 491 | | | | | | | | 80 | 491 |
| **Sunflower** | | | | | | | | 4 | | | | | | 4 | |
| **Triticale** | 404 | 459 | 271 | | | | | | | | | | 404 | 459 | 271 |
| **Wheat** | 1,327 | 1,519 | 392 | | | | | | | | | | 1,327 | 1,519 | 392 |
| **Sugar beet** | 635 | 585 | 468 | | | | | | | | | | 635 | 585 | 468 |
| Total | **5,418** | **4,601** | **2,452** | **1,602** | **1,396** | **1,227** | **21,098** | **20,377** | **20,087** | **26** | **19** | **18** | **28,144** | **26,392** | **23,784** |

[1] Differences in totals are due to rounding

*Table 21: Biofuels from wastes and residues [TJ]*[1]

| **'Advanced biofuels' pursuant to 38th BImSchV, Annex 1 no.** | **2017** | **2018** | **2019** |
|---|---|---|---|
| 3 (organic waste) | 86 | 191 | 106 |
| 4 (share of biomass in industrial waste) | 58 | 53 | 476 |
| 5 (straw) | 0.2 | | |
| 6 (animal manure and sewage sludge) | 3 | | |
| 7 (palm oil mill effluent and empty palm fruit bunches) | 80 | 51 | 1 |
| 8 (tall oil pitch) | 3 | | |
| 9 (crude glycerine) | | 0.3 | **36** |
| 11 (grape marc and wine lees) | 6 | 1 | 0.3 |
| 16 (other non-food materials containing cellulose) | | 53 | **129** |
| ***Subtotal for advanced biofuels*** | **237** | **350** | **748** |
| **Non-advanced biofuels from wastes and residues** | **33,012** | **42,621** | **33,849** |
| Used cooking oils | 27,045 | 35,192 | 27,206 |
| Other | 5,967 | 7,429 | 6,644 |
| **Total wastes and residues** | **33,249** | **42,971** | **34,598** |

[1] Differences in totals are due to rounding

*Table 22: Emissions and emission savings of biofuels*[1]

| Biofuel type | Emissions 2017 [t $CO_2$eq/TJ] | Emissions 2018 [t $CO_2$eq/TJ] | Emissions 2019 [t $CO_2$eq/TJ] | Savings 2017 [%] | Savings 2018 [%] | Savings 2019 [%] |
|---|---|---|---|---|---|---|
| | Figure 38, p. 64 and Figure 36, p. 63 | | | Figure 39, p. 65 and Figure 37, p. 63 | | |
| **Bioethanol** | 14.58 | 12.69 | 11.04 | 82.60 | 86.40 | 88,16 |
| **Biomethane** | 7.77 | 9.19 | 10.12 | 90.73 | 90.23 | 89,24 |
| **Btl-FTD** | | 8.30 | | | 91.27 | |
| **FAME** | 16.10 | 16.26 | 18.37 | 80.79 | 82.90 | 80,68 |
| **HVO** | 29.64 | 21.93 | 19.45 | 64.64 | 76.94 | 79,55 |
| **CP-HVO** | | | 20.43 | | | 78.52 |
| **Vegetable oil** | 30.09 | 30.18 | 25.90 | 64.09 | 68.26 | 72,77 |
| **Weighted average of all biofuels** | **15.75** | **15.32** | **16.48** | **81.20** | **83.81** | **82.59** |

[1] Saving compared with fossil fuel reference value (cf. Table 6, page 61)

## *Table 23: Types of bioliquids [TJ][1]*

Figure 43, p. 75

| Type of bioliquid | 2017 | 2018 | 2019 |
|---|---|---|---|
| From pulp industry | 27,279 | 25,700 | 27,597 |
| FAME | 829 | 1,256 | 1,069 |
| HVO | 30 | | |
| Vegetable oil | 3,149 | 3,432 | 4,259 |
| **Total** Figure 42, p. 75 | **31,287** | **30,388** | **32,925** |

## *Table 24: Bioliquid vegetable oil – source materials [TJ][1]*

Figure 44, p. 76

| Source material | 2017 | 2018 | 2019 |
|---|---|---|---|
| Palm oil | 2,157 | 2,448 | 2,971 |
| Rapeseed | 992 | 824 | 1,142 |
| Shea | | 159 | 146 |
| Total | **3,149** | **3,432** | **4,259** |

## *Table 25: Bioliquid vegetable oils from palm oil – origin [TJ][1]*

Figure 45, p. 76

| Origin | 2017 | 2018 | 2019 |
|---|---|---|---|
| Guatemala | | | 15 |
| Honduras | 339 | 249 | 782 |
| Indonesia | 147 | 267 | 804 |
| Colombia | 8 | 419 | 192 |
| Malaysia | 1,663 | 1,512 | 1,178 |
| Total | **2,157** | **2,448** | **2,971** |

[1] Differences in totals are due to rounding

*Table 26: Emissions and emission savings of bioliquids*[1]

| Type of bioliquid | Emissions 2017 [t $CO_2$eq/TJ] | Emissions 2018 [t $CO_2$eq/TJ] | Emissions 2019 [t $CO_2$eq/TJ] | Savings 2017 [%] | Savings 2018 [%] | Savings 2019 [%] |
|---|---|---|---|---|---|---|
| | Figure 49, p. 79 and Figure 47, p. 78 | | | Figure 50, p. 79 and Figure 48, p. 78 | | |
| From pulp industry | 1.8 | 1.86 | 1.72 | 98.02 | 97.95 | 98.11 |
| FAME | 37.18 | 34.65 | 34.80 | 59.14 | 61.93 | 61.76 |
| HVO | 44.5 | | | 51.1 | | |
| Vegetable oil | 33.73 | 31.99 | 29.83 | 62.93 | 64.85 | 67.22 |
| **Weighted average of all bioliquids** | **5.99** | **6.62** | **6.43** | **93.41** | **92.73** | **92.94** |

[1] Savings compared with fossil fuel reference value of 91 g $CO_2$eq/MJ.

## 11. Conversion tables, abbreviations and definitions

*Table 27: Conversion of energy units*

| Energy unit | Megajoule [MJ] | Kilowatt hour [kWh] | Terajoule [TJ] | Petajoule [PJ] |
|---|---|---|---|---|
| **1 Megajoule [MJ]** | 1 | 0.28 | 0.000001 | 0.000000001 |
| **1 Kilowatt hour [kWh]** | 3.60 | 1 | 0.0000036 | 0.0000000036 |
| **1 Terajoule [TJ]** | 1,000,000 | 280,000 | 1 | 0.001 |
| **1 Petajoule [PJ]** | 1,000,000,000 | 280,000,000 | 1,000 | 1 |

*Table 28: Densities*

| Biofuel type/ bioliquid type | Tonnes per cubic metre [$t/m^3$] | Megajoules per kilogram [MJ/kg] |
|---|---|---|
| Bioliquid from pulp industry | 1.32 | 7,000 |
| Bioethanol | 0.79 | 27,000 |
| Biomethane | 0.00072 | 50,000 |
| Biomethanol | 0.80 | 20,000 |
| CP-HVO | 0.78 | 44,000 |
| FAME | 0.883 | 37,000 |
| HVO | 0.78 | 44,000 |
| Vegetable oil | 0.92 | 37,000 |
| UCO | 0.92 | 37,000 |

*Table 29: Abbreviations*

| Abbreviations | Meaning |
|---|---|
| 36th BImSchV | 36th Ordinance Implementing the Bundes-Immissionsschutzgesetz (Federal Immission Control Act)<br>(Legislation used to implement the biofuel quota regulations in Germany) |
| 38th BImSchV | 38th Ordinance Implementing the Bundes-Immissionsschutzgesetz (Federal Immission Control Act)<br>Legislation setting out additional provisions for greenhouse gas mitigation in relation to fuels |
| CHP | Combined heat and power (co-generation) plant |
| Biokraft-NachV | Biofuels Sustainability Ordinance (Biokraftstoff-Nachhaltigkeitsverordnung) |
| BioSt-NachV | Biomass Electricity Sustainability Ordinance (Biomassestrom-Nachhaltigkeitsverordnung) |
| Btl-FTD | Biomass to liquid Fischer-Tropsch diesel |
| CP-HVO | Co-processing hydro-treated vegetable oil (hydrogenated vegetable oil) |
| DE scheme | Certification scheme recognised by the BLE pursuant to section 33 nos. 1 and 2 of BioSt-NachV/Biokraft-NachV |
| EEG | Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz) |
| EU scheme | A voluntary scheme pursuant to section 32 no. 3 BioSt-NachV/Biokraft-NachV |
| FAME | Fatty acid methyl ester ('biodiesel') |
| HVO | Hydrotreated Vegetable Oil (hydrogenated vegetable oil) |
| Directive 2009/28/EC (Renewable Energy Directive) | DIRECTIVE 2009/28/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC |
| GHG | Greenhouse gas |
| UCO | Used cooking oil |

*Table 30: Definitions*

| Term | Meaning |
|---|---|
| Bioliquid from pulp industry | Bioliquids from the pulp industry are energy- and lignin-rich by-products generated by the manufacture of cellulose in the paper industry. |
| Bioethanol | Bioethanol (ethyl alcohol) is obtained from renewable raw materials by distillation following alcoholic fermentation or by comparable biochemical methods. |
| Biomethane | Biomethane is produced by purifying the 'biogas' created by the fermentation of biomass. |
| Biomethanol | Like BtL fuel, methanol can be produced from a wide range of biomass types by means of synthesis gas. In addition, methanol can also be produced from the conversion of crude glycerine. |
| Blending | As used in this document, the addition of biofuels to fossil fuels (e.g. a maximum of 7% for diesel). |
| CP-HVO | HVO produced by common hydrotreatment with mineral-based oils as part of a refinery process |
| FAME | Fatty acid methyl ester (FAME), also known as biodiesel, is produced by the transesterification of fats and oils with methanol. |
| Fischer-Tropsch diesel ('BtL fuel') | A synthetic hydrocarbon (mixture) manufactured from biomass |
| HVO | Hydrotreated vegetable oils are vegetable oils converted to hydrocarbon chains in a hydrogenation plant by means of a chemical reaction using hydrogen. |
| Vegetable oil | Vegetable oil fuel can be obtained from rapeseed and other oil plants; unlike biodiesel, this fuel requires no chemical conversion. |
| UCO | UCO stands for used cooking oil. These oils can be used as a pure fuel or as a component of FAME. |

*Table 31: 'Advanced biofuels' as defined in*

| 38th BImSchV | Directive 2009/28/EC |
|---|---|
| **Annex 1 to section 2(6) no. 1 of the 38th BImSchV Raw materials for the production of biofuels according to section 2(6) no. 1** | **ANNEX IX, Part A Feedstocks and fuels, the contribution of which towards the target referred to in the first subparagraph of Article 3(4) shall be considered to be twice their energy content:** |
| 1. Algae cultivated on land in ponds or photobioreactors. | (a) Algae if cultivated on land in ponds or photo-bio-reactors. |
| 2. Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under point (a) of Article 11(2) of Directive 2008/98/EC. | (b) Biomass fraction of mixed municipal waste, but not separated household waste subject to recycling targets under point (a) of Article 11(2) of Directive 2008/98/EC. |
| 3. Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection as defined in Article 3(11) of that Directive. | (c) Bio-waste as defined in Article 3(4) of Directive 2008/98/EC from private households subject to separate collection as defined in Article 3(11) of that Directive. |
| 4. Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale as well as the agro-food, fish and aquaculture industry; but not the feedstocks listed in part B of Annex IX of Directive 2009/28/EC. | (d) Biomass fraction of industrial waste not fit for use in the food or feed chain, including material from retail and wholesale and the agro-food and fish and aquaculture industry, and excluding feedstocks listed in part B of this Annex. |
| 5. Straw. | (e) Straw. |
| 6. Animal manure and sewage sludge. | (f) Animal manure and sewage sludge. |
| 7. Palm oil mill effluent and empty palm fruit bunches. | (g) Palm oil mill effluent and empty palm fruit bunches. |
| 8. Tall oil pitch. | (h) Tall oil pitch. |
| 9. Crude glycerine. | (i) Crude glycerine. |
| 10. Bagasse. | (j) Bagasse. |
| 11. Grape marc and wine lees. | (k) Grape marc and wine lees. |
| 12. Nut shells. | (l) Nut shells. |
| 13. Husks. | (m) Husks. |
| 14. Cobs cleaned of kernels of corn. | (n) Cobs cleaned of kernels of corn. |
| 15. Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, pre-commercial thinnings, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil. | (o) Biomass fraction of wastes and residues from forestry and forest-based industries, i.e. bark, branches, pre-commercial thinnings, leaves, needles, tree tops, saw dust, cutter shavings, black liquor, brown liquor, fibre sludge, lignin and tall oil. |
| 16. Other non-food cellulosic material. | (p) Other non-food cellulosic material as defined in point (s) of the second paragraph of Article 2. |

| **Annex 1, continued** | **ANNEX IX, Part A, continued** |
|---|---|

| | |
|---|---|
| 17. Other ligno-cellulosic material except saw logs and veneer logs. | (q) Other ligno-cellulosic material as defined in point (r) of the second paragraph of Article 2 except saw logs and veneer logs. |
| | (r) Renewable liquid and gaseous transport fuels of non-biological origin. |
| | (s) Carbon capture and utilisation for transport purposes, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2. |
| | (t) Bacteria, if the energy source is renewable in accordance with point (a) of the second paragraph of Article 2. |