



Lipid waste feedstock for sustainable fuels: A market review

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27/02/2023



BIO4A (Advanced Sustainable BIOfuels for Aviation) has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 789562.



SUSTAINABLE FUELS for AVIATION

The RED II and the Annex IX

BIOFUEL and WASTE FEEDSTOCK

Used Cooking Oils (UCOs)

Animal fats

MARKET REVIEW

Context & market size

Conclusion

Sustainable fuels for aviation

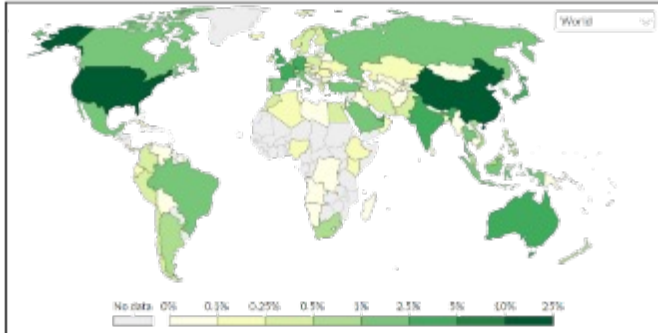
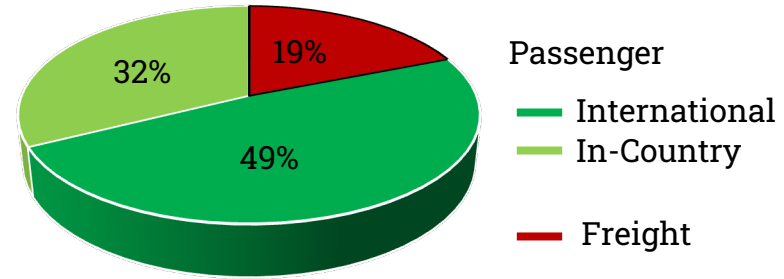


Image from ourworldindata.org



Data from the ICCT (2019)

SAF



CEF



International Sustainability and Carbon Certification



REDcert



Green Gold Label



Roundtable of Sustainable Biomaterials



Sustainable RESources



Council on Sustainable Biomass Production



Roundtable on Sustainable Palm Oil



Roundtable on Responsible Soy



Accredia (ITALY)

EU Feedstock Legislation

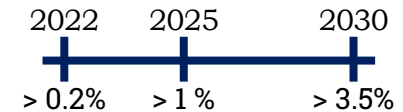


2018/2001/EC

➡ EU Renewable Energy Directive (RED II)

➡ Annex IX: Eligible Feedstock

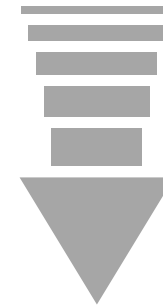
- **Part A**



- **Part B**

UCOs & AFs < 1.7%

Part A	Part B
<ul style="list-style-type: none">• Algae if cultivated on land in ponds or photobioreactors• Biomass fraction of mixed municipal waste• Biowaste from private households subject to separate collection• Biomass fraction of industrial waste not fit for use in the food or feed chain• Straw• Animal manure and sewage sludge• Palm oil mill effluent and empty palm fruit bunches• Crude glycerine• Bagasse• Grape marcs and wine lees• Nut shells• Husks• Cobs cleaned of kernels of corn• Biomass fraction of wastes and residues from forestry and forest-based industries• Other non-food cellulosic material• Other ligno-cellulosic material except saw logs and veneer logs	<ul style="list-style-type: none">• Used cooking oil• Some categories of animal fats



**Oncoming
RED III**

Biofuel and waste feedstock



"liquid or gaseous fuel for transport produced from biomass, i.e., agricultural, forestry or fishery products, wastes or residues of biodegradable nature from industries or municipalities"



1° Generation

- Rapeseed 
- Sunflower 
- Soybean 
- Palm 



2° Generation

- Used Cooking Oils
- Animal Fats



3° Generation

- Microalgae

2025



**Vegetable oil
for food use**



23.5
Kg/capita

**50 Mtons
WASTES**

Biofuel and waste feedstock

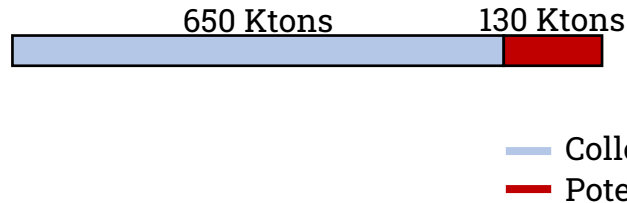
UCOs and AFs in Europe



UCOs are oils and fats that have been used for cooking or frying in the food processing industry, restaurants, fast-foods and at consumer level, in households

Animal Fats (AFs) are fats from slaughtered animals that are rendered into a variety of products (internal organs, bones, heads, hides and skins)

PROFESSIONAL SECTOR



DOMESTIC SECTOR

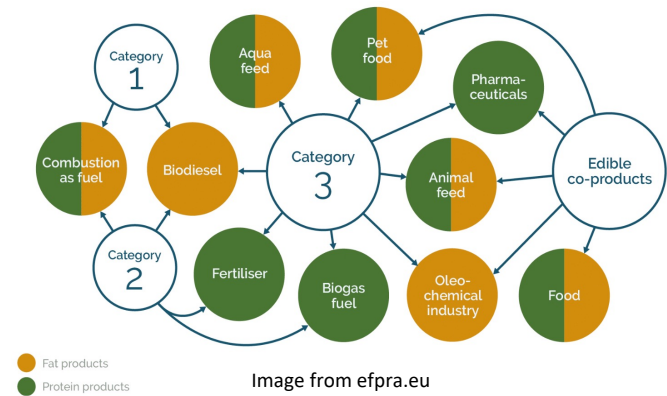
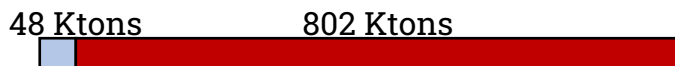


Image from efpra.eu

Both “High Risk” and “Low Risk” for BIOFUEL

Cat.1 + Cat.2 = 522 Ktons for BIOFUEL

BIOFUEL = largest market for all 3 categories



VEGETABLE OILS and ANIMAL FATS PRODUCTION and CONSUMPTION

- ➡ Global Production (2021): 240.0 Million tons (+1.0%)
- ➡ Global Production (2022): 245.5 Million tons (+2.3%) - expected
- ➡ Global Consumption (2021): 240.9 Million tons (+0.7%)
- ➡ Global Consumption (2022): 243.3 Million tons (+1.1%) - expected
- ➡ CRUDE PALM OIL: **30%** of global vegetable oil production and consumption
- ➡ LIPID-BASED BIOFUELS: **18%** of global consumption (vegetable oils and animal fats)

Data from REA (2021) and Oil World (2021)

COVID-19 IMPACT

- ➡ Consumption pattern shifted from ordering to self-cooking
- ➡ Shifted demand and supply (e.g. dropped demand of palm oil in Indonesia and Malaysia)
- ➡ Significant gap between demand and supply (e.g. palm oil import of India and Europe)
- ➡ Reduced supply (shutdown of the foodservice industry) and wastes recycling drop
- ➡ 2020 global market: -12.5% compared to y-on-y growth during 2017-2019

Data from market experts websites

Market Review

UCOs and AFs market size



UCOs global market

YEAR		MARKET SIZE (USD Billion)		CAGR (%)
Reference	Forecast	Reference	Forecast	
2021	2028	6.0	10.1	7.8
2019	2026	6.0	8.9	5.0
2020	2028	6.5	9.6	5.1
2021	2027	5.7	8.5	6.6
2021	2027	6.7	9.5	6.1

REGION

Europe

APPLICATION

Biodiesel

- Oleochemical
- Animal feed
- Others

SOURCE

Commercial (food-industry & Horeca)

AFs global market

MARKET VOLUME (Million metric tons)		CAGR (%)	MARKET SIZE (USD Billion)		CAGR (%)
Reference (2020)	Forecast (2027)		Reference (2021)	Forecast (2027)	
27.1	NA	2.8	237	285 - 360	3.8 - 8.0

REGION

Asia Pacific (LARD)

North America (TALLOW)

Germany in EU (LARD)

APPLICATION

Biodiesel (61%)

- Animal feed (20%), Oleochemical (7%), Food (7%), Pet-food (5%)

Market Review

Conclusion



EU Import Prices 2022		EU Export Prices 2022	
➤	Animal Fats	➤	Sunflower
	+30%		+1.5%
➤	Palm oil	➤	Rapeseed
	+30%		+0.6%
➤	Soybean oil		
	+20%		
➤	Sunflower		
	+4%		
➤	Rapeseed		
	+3%		

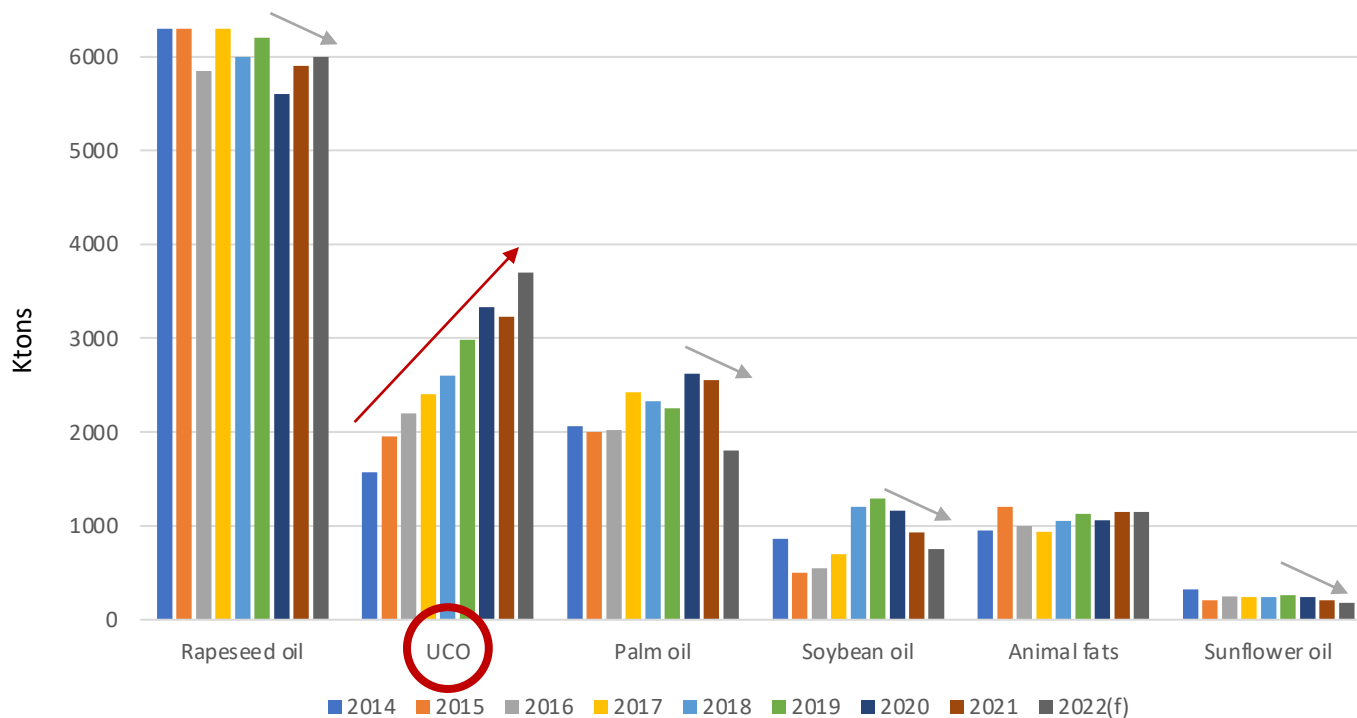
Data from FAOStat Database

Market Review

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Feedstock Use for Biodiesel + Renewable Diesel



Expected jet fuel demand	Unit	2018	2019	2020	2021	2022(f)
EU-27 Biodiesel + Renewable diesel CONSUMPTION	Million liters	16'495	16'712	17'090	17'611	17'610
EU-27 Biodiesel + Renewable diesel PRODUCTION	Million liters	15'200	16'260	15'784	15'590	15'460

Market Review

Conclusion



Expected JET FUEL demand	Unit	2017	2020	2025	2030
FUEL DEMAND	Mtoe/yr	53.9	54.9	56.6	58.3
Theoretical Biofuel demand to reach GHG neutrality vs 2020	Mtoe/yr		0.5 (calc)	1.0 (calc)	1.5 (calc)





THANKS FOR THE ATTENTION

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