Commercializing Conventional and Advanced Liquid Biofuels from Biomass

Task 39
IEA Bioenergy

Inside This Issue

From the Task

By Jim McMillan, Jack Saddler and Susan van Dyk

This "end of 2015" issue of the Task 39 newsletter highlights biofuels developments of likely interest to Task 39 stakeholders, including some of Task 39's recent work.

Many of our IEA Bioenergy Task 39 (Liquid Biofuels) colleagues participated in IEA Bioenergy's "end-of-triennium" conference, held in Berlin, 27-29 October, 2015. One conference highlight was the Task 39 organized session, ***Progress in the development and use of advanced liquid biofuels***, featuring talks by Task 39 industrial participants,. The Task also held a well-attended, productive business meeting in association with the Berlin conference, with a primary focus on work planning for the coming triennium.

On-going work that will continue into the next triennium includes the Task 39-led multi-task update report on the *Current Status and Potential for Algal Biofuels Production*, which is being led by Les Edye, Australia's representative to Task 39. This report should be published in early 2016 following review by the IEA Bioenergy Executive Committee and final report revisions. Two other projects are also now initiated and progressing: 1) Advanced Biofuels for Advanced Engines; and 2) Comparison of Leading LCA Models used to assess greenhouse gas (GHG) emissions of conventional and advanced biofuels pathways. Both of these projects will continue into the next triennium (2016-2018), with progress being reported in future newsletters. Other work planned for the upcoming triennium includes an update to the drop-in biofuels technology report, potentially also including special reports on aviation and maritime biofuels.

Task 39 will hold its next business meeting in March in Rotterdam, the Netherlands in conjunction with the ECO-BIO 2016 Conference. We look forward to seeing you there.

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In other news, the recent UNFCCC COP21 held in Paris has dominated the headlines. The historical climate agreement signed there, by 195 countries, agrees to curb GHGs to keep global temperatures from rising more than 2°C above 1900 levels. You can read a summary of the agreement from the BBC here. One question our Task might ask is what this agreement means for biofuels, particularly since its text did not explicitly refer to biofuels. Transportation contributes 14% to global GHG emissions and significant reductions in emissions can be achieved by replacing fossil fuels with biofuels. The important role of biofuels to achieve needed emissions reductions was highlighted in a recent S&T2 Consultants report issued by the Global Renewable Fuels Alliance entitled, "GHG emission reductions from world biofuel production and use – 2015." Both the IEA and the IPCC recognize that biofuels can play a significant role in emission reductions, however only 36 countries included biofuels as part of their Intended Nationally Determined Contributions (INDCs). As noted in a statement by the European Renewable Ethanol Association ePURE, (ePURE.org), transport emissions account for 26% of total GHG emissions in Europe and "unless European policymakers take decisive and immediate action to decarbonise Europe's transport sector, there is little hope Europe will achieve the level of GHG reductions needed to meet the COP21 climate ambitions." (read more).

Although oil prices are once again at record lows, it is encouraging that biofuels continue to expand globally, as exemplified by DuPont recently opening the world's largest cellulosic ethanol facility and Spain increasing its biofuels blending to 8.5%. The last few months have also seen Brazil increase its mandate for biodiesel blending to 7% while opening the door for higher biodiesel blends to be used on a voluntary basis (See News section). Indonesia will also encourage the use of B20 from next year onwards. In Australia, the state of Queensland will introduce an ethanol (3%) and biodiesel (0.5%) mandate starting January 1, 2017.

Policy support for biofuels in the US continues. The EPA finally announced the volume requirements and associated percentage standards that apply under the RFS program in calendar years 2014, 2015, and 2016, for cellulosic biofuel, biomass-based diesel, advanced biofuel and total renewable fuel. EPA also finalized volume requirements for biomass-based diesel for 2017 at 2 billion gallons. (details here)

We welcome your feedback. Please direct your comments to Susan van Dyk

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The EPA announcement was received with mixed feelings (read here), but the general consensus is that biomass-based diesel came out as the biggest winner, while ethanol volumes were largely restricted by the blend wall (just 0.1% over 10%) and reduced from statutory RFS targets. Further policy support in the US came in the form of an extension of the biodiesel blender's tax credit (see news section).

One of us (Jack Saddler) was fortunate to recently be on sabbatical at IEA HQ in Paris and to be able to contribute to the work of the IEA's Renewable Energy Division (RED). IEA published two key reports in the last few months where members of RED contributed, specifically the IEA Medium-Term Renewable Energy Market Report (MTRMR) and the IEA World Energy Outlook 2015 (WEO). The MTRMR report's executive summary provides some insights on how biomass should be preferentially be used for biofuels (transport) and renewable heat. "Blending mandates are expected to support biofuels for transport demand and production, even with the lower oil price environment." The report forecasts that, overall, biofuels growth will likely stabilize, providing about 4 percent of road transport demand by 2020. Several factors are limiting further growth, including the ongoing US blend wall and the EU-28's recently introduced 7% contribution cap that conventional biofuels can make towards the EU's 10% renewable transport target for 2020. The MTRMR report notes that significant development of advanced biofuels is necessary for diversification and decarbonization of transport in the long term, particularly in sectors such as aviation. Also, policies that can mandate blending levels and provide capital incentives will be increasingly required, along with the development of secure local feedstock supply chains. The report estimates that any new advanced biofuels investments will require oil prices of around $100 per barrel to be attractive.

The World Energy Outlook (WEO) looked at all energy sectors, energy trends, the oil market, natural gas, unconventional gas, coal, power, renewables and energy efficiency, and also included a section discussing energy in India. Each sector is analyzed under three scenarios, including current and new policies, as well as the more aggressive 450 Scenario that achieves greater GHG reductions. It also examined the impact of low oil prices. (Read more here.)

In both the Current Policies and the New Policies scenarios, "the world moves further away from achieving its agreed 2 degree Celsius climate goal, but at differing speeds." The only scenario able to achieve required reduction in GHG emissions is the more aggressive 450 Scenario in which "the long-standing trend of increasing energy-related CO_2 emissions is quickly halted and emissions then decline by more than 2 percent per year (on average), to stand at around 19 gigatonnes (Gt) in 2040. Key policy and technology drivers that underpin this change in direction include stronger support for renewables deployment in the power sector, CCS (in power and industry), carbon pricing, more rapid reform of fossil-fuel subsidies, and broader adoption and stronger application of energy efficiency policies and low-carbon forms of transport."

Projections for world biofuels demand under the 450 Scenario call for 2.1 mb/d in 2020, rising to 9.4 mb/d in 2040. Under that scenario, by 2040 world oil demand drops to 74.1 mb/d. In 2013, the global biofuels share of total transport fuels is 3 percent. Under the different scenarios, current policies are projected to lead to biofuels rising to a 4 percent in 2025 and 5 percent in 2040. Under its New Policies Scenario the 2025 projections at 4 percent is the same, but the 2040 projection rises to 6 percent. Under the more aggressive 450 Scenario, the 2025 projection is 7 percent and the 2040 projection is 18 percent.

As readers of past issues know, the major feature of each Task newsletter is a more in-depth article on biofuels developments in one of Task 39's participating member countries. This Newsletter features an update on activities in Germany. We thank Franziska Müller-Langer and Nicolaus Dahmen for providing an informative report on biofuels developments in Germany.

As always, we appreciate your feedback. Please send us any ideas on how we might increase the value of these Task 39 newsletters. We hope to hear from you via email and get your feedback and suggestions.

Best wishes for the season and new year. *Jim, Jack and Susan*

Biofuels for transport in Germany

Franziska Müller-Langer (DBFZ), Nicolaus Dahmen (KIT)

Background and policy

Decarbonizing the transport sector is one of the European Union's (EU) priorities, as GHG emissions from transport in the EU increased by 36% between 1990 and 2007 (and by another 20% by 2012), while non-transport sector emissions decreased 15% over the same period. To reach the GHG targets of the EU's White Paper on Transport, which are to achieve a 20% reduction from 2008 levels by 2030 and a 60% reduction from 1990 levels by 2050, the European Commission is taking a comprehensive view on technology-neutral solutions for decarbonizing the transport sector, as well as addressing electricity and other renewable energy sources. For the same period, the final energy demand in transport is projected to be 349 Mtoe in 2030 and 361 Mtoe in 2050 (compared to 339 Mtoe in 2000) [1-3] (Figure 1).

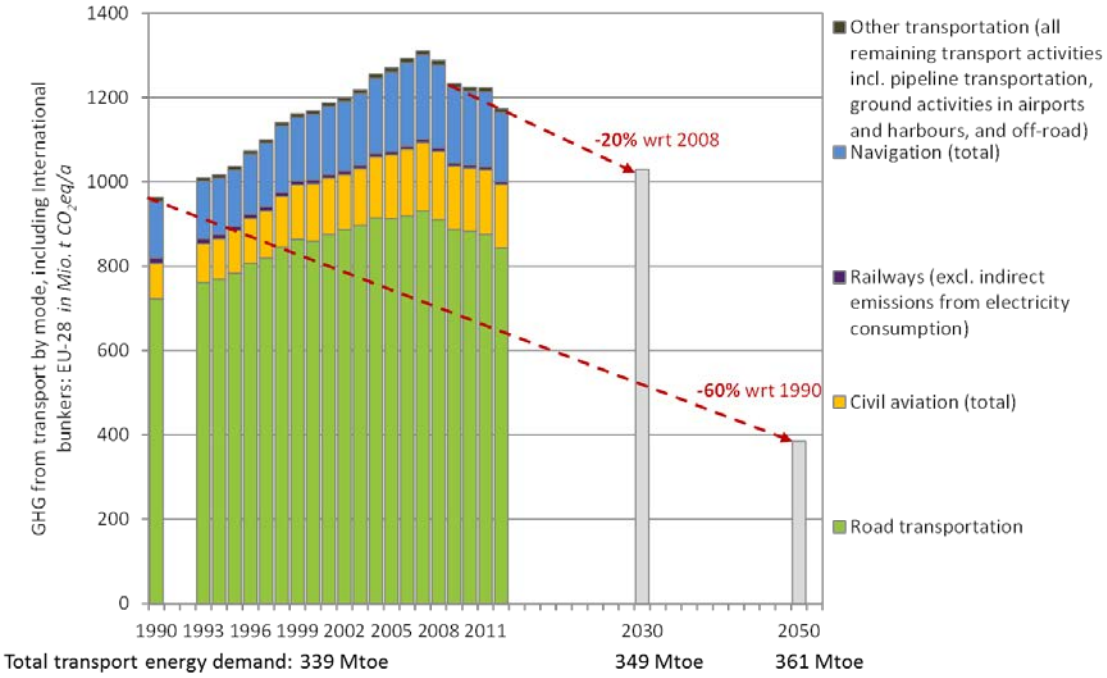


Figure 1. GHG from transport by mode and total transport energy demand EU-28 (DBFZ 2015 based on [3,4])

This article briefly introduces the regulative framework in the EU and in Germany before addressing current developments and perspectives of conventional and advanced biofuels.

Current regulative framework in the EU

The main instruments for decarbonizing the transport sector in the EU along the whole value chain (or well-to-wheel, WTW) are: (i) related to the fuel side (or well-to-tank, WTT) - a target of 10% sustainable renewables in transport and 6% greenhouse gas emission reduction from road fuel suppliers by 2020; as well as (ii) related to the vehicle side (or tank-to-wheel, TTW), CO_2 emission standards for cars and vans and legislation for a broad market introduction of clean and energy-efficient vehicles; or (iii) related to e.g. aviation (or tank-to-wake, TTW) - targets for biofuel volumes and low carbon fuels (Figure 2). However, in the current policies there are no direct links or harmonization between WTT and TTW emissions; the former

considers GHG emissions (i.e. including all CO_2 equivalents such as methane and nitrous oxide), whereas the latter considers just CO_2 emissions related to the fuel combustion in vehicles.

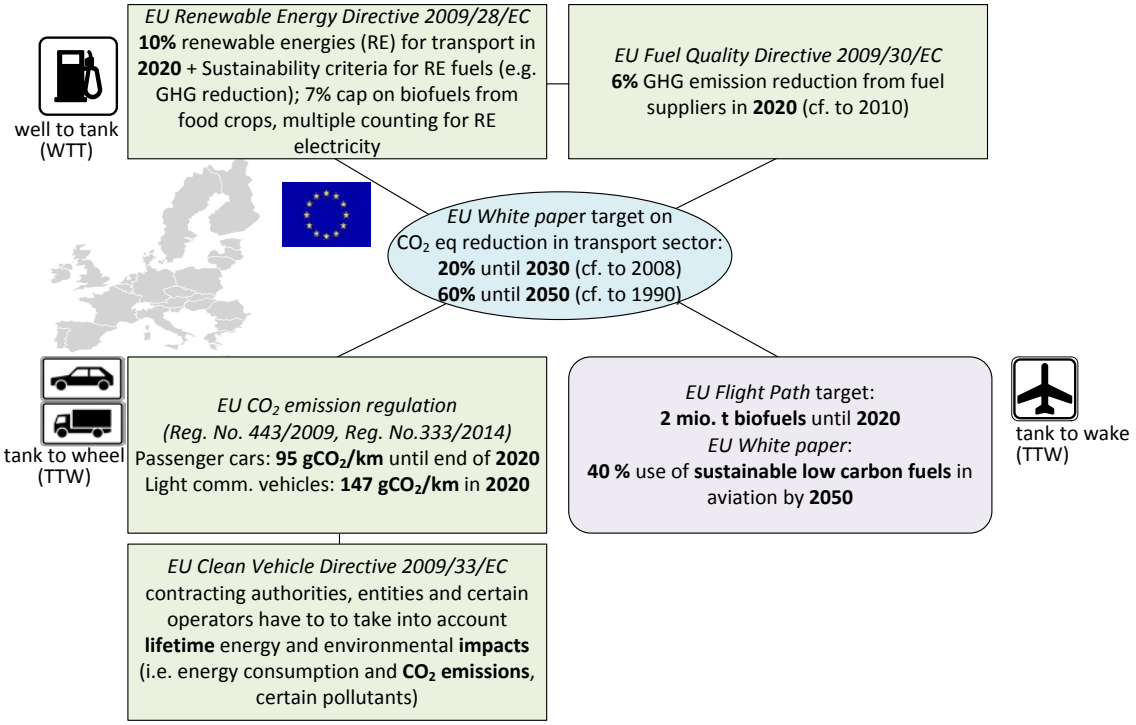


Figure 2. Instruments for decarbonizing the transport sector in the EU (©DBFZ 2015, [5-1012])

Moreover, under the Directive on the deployment of alternative fuels infrastructure (AFID, 2014/94/EU) member states are required to develop national policy frameworks for the market development of alternative fuels (mainly electricity, CNG, LNG and hydrogen) with regard to infrastructure requirements [11]. In addition, the Energy Taxation Directive (ETD, 2003/96/EC) is binding and sets minimal taxation rates for energy carriers. In 2011, the European Commission proposed adjusting the ETD from a volume-based tax to a CO_2 and energy-based tax on energy carriers, but this has not been adopted yet. [12]

For the WTT-related part, the Renewable Energy Directive (RED) and Fuel Quality Directvie (FQD) have been implemented at the EU Member State (MS) level. Up to now member states have differed significantly in setting policy instruments and measures. Most of them have shifted away from financial instruments towards quota systems for fuel suppliers.

For the time frame post-2020, only general, not sectoral related, binding targets until 2030 are set which are: (i) about 40% GHG emission reduction compared to 1990; (ii) 27% share of renewable energies related to energy consumption at EU level; and (iii) 27% improvement in energy efficiency [13].

How the EU will proceed is the big question, especially since an overall strategy for decarbonizing road transport is to be established in the first half of 2016. The European Commission (EC) recently set out a strategy for heavy-duty vehicles (HDVs) over the coming years, and in 2016-2017 it will develop or adopt a new renewable energy directive that includes a biomass and biofuel sustainability policy. In 2017, an action plan on second and third generation biofuels and other sustainable fuels will be published [12-16].

Current regulatory framework in Germany

In Germany the European directives and regulations are implemented adequately by §37 BImSchG (Federal Emission Protection Act), including BiokraftNachV (related to RED) and §36 BImSchV (related to FQD) and the EnergieStG (related to ETD). In 2014, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety published a draft of the twelfth law amending the BImSchG, which includes a change in the GHG reduction targets (3.5% from 2015 / 4% from 2017/ 6% from 2020). In addition, it contains numerous enabling provisions, which will simplify the implementation of future European law into national law.

Germany is the first and probably only European member state to have shifted from energetic related quotas to GHG related quotas starting in January 2015, making the FQD the leading policy instrument instead of the RED. This means that fossil fuel supplier companies will be obligated to sell the respective biofuel or renewable fuel with its fossil counterpart petrol or diesel (which is usually done through blending), in order to produce a fuel mix which achieves a 3.5%/4%/6% GHG mitigation (compared to fossil gasoline and diesel mix) for the entire fuel sector from 2015/2017/2020 onwards. After 2020, the GHG mitigation target remains at the level of 6%. Biofuels are currently the only way to fulfill the target, other instruments will follow. Because only actual emission savings count towards the quota (double counting is not allowed, GHG emissions of biofuels to be calculated on life cycle basis according to GHG methodology in RED/FQD), the exact increase in a biofuels use depends on its specific GHG intensity: the higher the specific GHG mitigation potential the lower the required renewable fuel consumption to fulfill the quota.

This quota system will continue post-2020. Biofuels that are counted within the quota are fully taxed (for diesel fuels similar to fossil diesel which is about 47 EURct/l, for gasoline fuels 65 EURct/l). This is also the case for E85 and advanced biofuels from 2016 onwards.

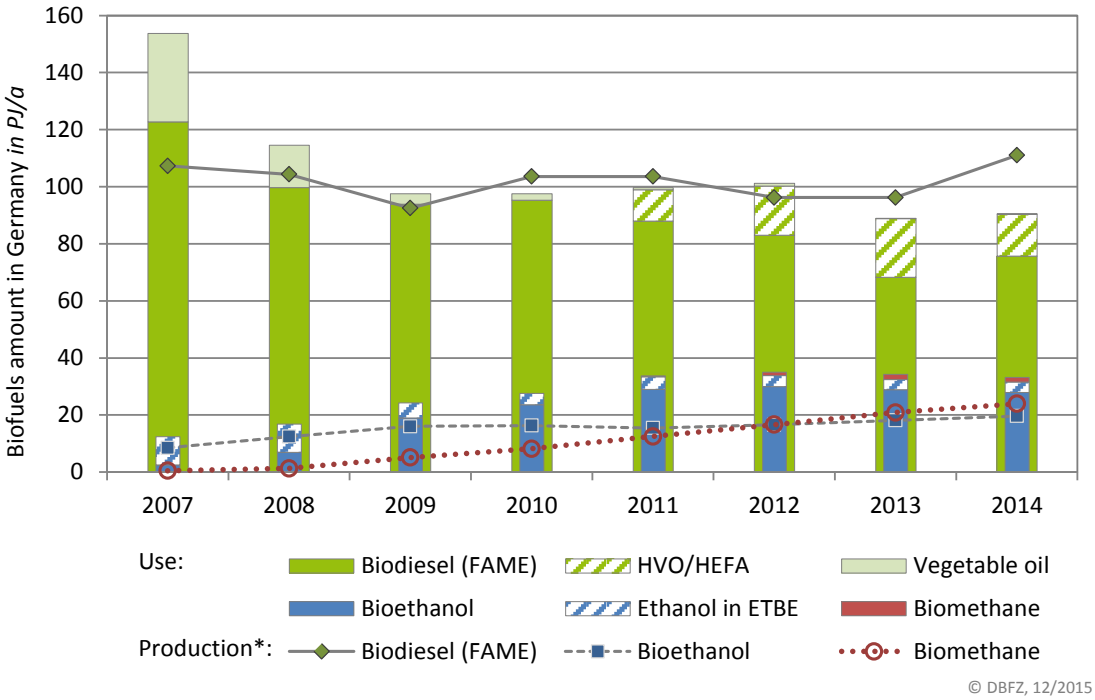
The quota target has to be achieved by companies placing fossil fuels on the market over the calendar year (i.e. possible variation throughout the year and in different regions). Additional GHG quota shares above the annual target may be transferred to the following year's target. Moreover, obligated entities can delegate their quota requirements to a third party through bilateral contracts. In case of non-fulfillment of obligations, penalties of about 47 EURct/kg CO_2 equivalent are binding. [17]

Developments and perspectives until 2020 and post-2020 in Germany

Currently the market is mainly based on conventional fuels which will still be dominant at least until 2020. For advanced biofuels there are many R&D&D activities. Both developments and perspectives will be discussed in the following section with a focus on biofuel production.

Conventional biofuels

The development of capacities, production and use of conventional biofuels such as biodiesel (FAME), bioethanol, HVO/HEFA and biomethane is shown in Figure 3. There are no production capacities for HVO/HEFA. Biomethane is produced in significant capacities but for different markets; just a share of roughly 7 % is used for transport applications.



*HVO/HEFA : no production capacities in Germany; Vegetable oils and biomethane (via biogas): pduction also for other sectors (e.g. food, material use, energetic use e.g. for CHP or heat)

Figure 3. Development of conventional biofuels in Germany (©DBFZ 2015 based on [18-24])

In 2014, about 5.0% or 125 PJ/a of the transport fuels used were biofuels (2013 about 124 PJ/a or 5.5%) of which about 65 PJ/a was biodiesel (FAME, mainly based on rape oil and used cooking oil, UCO, due to the existing double counting for residue based biofuels) and 15 PJ/a was HVO/HEFA with (mainly based on palm oil). About 32 PJ/a was used as ethanol (mainly based on wheat starch and beet sugar) and about 2 PJ/a was biomethane from biogas (mainly based on residues). (Figure 4)

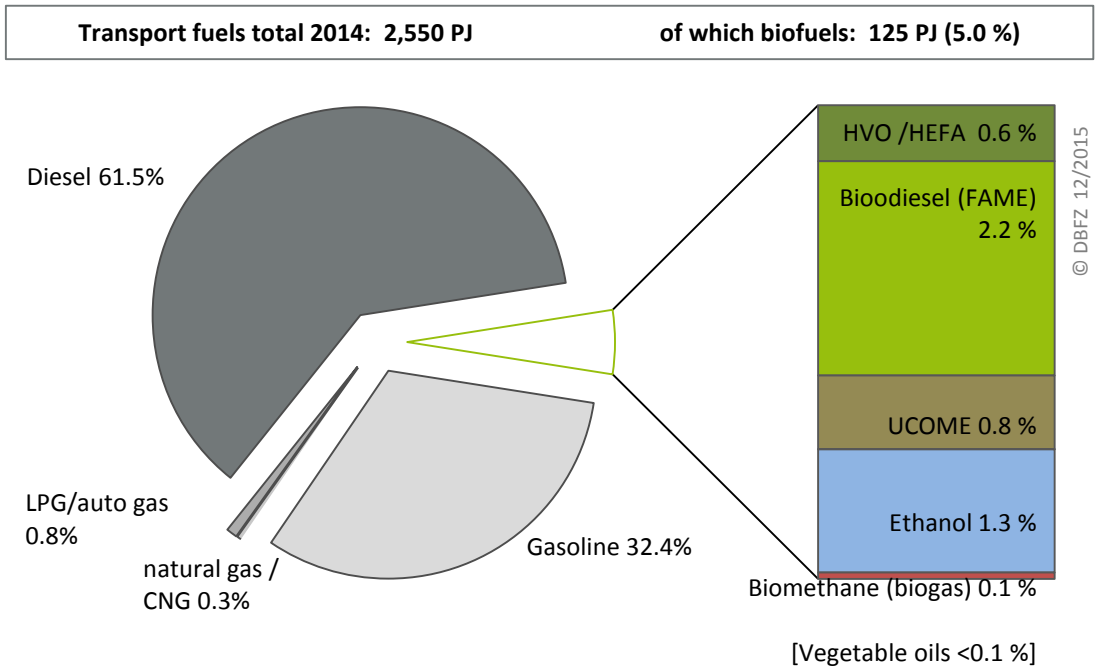
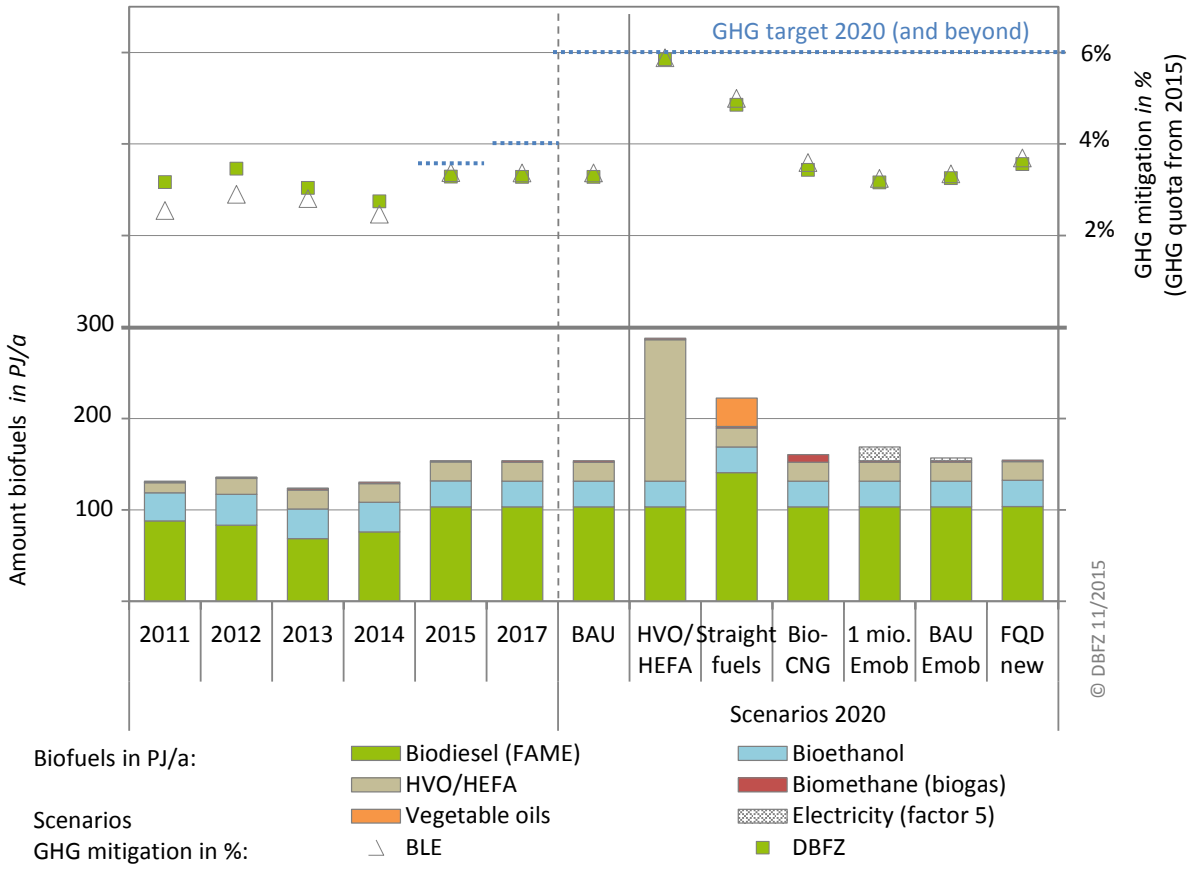


Figure 4. Biofuels use in Germany in 2014 (©DBFZ 2015 based on [21,22,25,26])

Figure 5 summarizes biofuels developments through 2014 as well as future scenarios needed to fulfill the 2020 GHG targets that are likely under the current frame conditions. There are biofuel pathways available on the market that can achieve an average of about 60 to 65% GHG mitigation which exceeds the EU RED requirement. For 2020, it is likely that the GHG target of 6% will only be reached by using much more imported HVO/HEFA blended to diesel fuels. The effect of e.g. replacing all CNG by biomethane or reaching the German electro mobility target of 1 million plug-in or plug-in hybrid vehicles in 2020 will not have a significant impact on the GHG quota.



Assumptions: 2015, 2017 and BAU (Business as usual) 2020: max. blending and constant amount on biomethane, HVO/HEFA and total simular to 2013; Scenarios: HVO/HEFA: 10% blend of HVO/HEFA; straight fuel: biodiesel (FAME) and vegetable oils similar to 2007(stright fuels and blend); Bio-CNG: 100% biomethane (similar to total CNG 2013); Emob (100% renewable): 1 mio. E-PKW (30% plug in, 70% plug in hybrides), BAU: 8.000 new E-PKW per year; FQD new: base value 2010 at 94,1 g CO2/MJ, here default values; GHG mitigation: DBFZ - experience values, BLE = real values 2011-2015

Figure 5. Biofuel use within the quota, development and scenarios for 2020 (©DBFZ 2015 based on [21-23] and authors' own calculations)

Advanced biofuels

In Germany there are recognizable projects on advanced transport biofuels at different technology readiness levels (TRL) or fuel readiness levels (FRL). There were and are different funding programs for R&D&D with different emphases (e.g. use of diversified raw materials, decentralized-centralized concepts along value chains, promoting of Germany's role as technology developer, integration of renewable fuels based on biomass and electricity into the energy transition).

Table 1 summarizes the most important characteristics of ongoing research at pilot and demo level.

Table 1. Overview of Germany's ongoing transport biofuels research at pilot and demonstration levels (partial)

Type of biofuel / conversion route	Process characteristics	TRL/FRL; Capacities	Stakeholder in research and industry in Germany	Funding programs (examples)
Biomass treatment to intermediate products				
Pyrolysis	Flash pyrolysis of different biomasses, slurry production	bioliq® demo plant, 2 MW pyrolysis, TRL 5	KIT	BMEL/FNR, federal funding
Direct liquefaction	Low pressure liquefaction by fluid cracking (e.g. of vegetable oils) and reactive distillation	TRL 4	Hochschule für Angewandte Wissenschaften Hamburg	BMEL/FNR, federal funding
Hydrothermal processes	Organosolv process	Fraunhofer CBP pilot plant in Leuna, operational since 2013, TRL 4-5 lignocellulose pre-treatment: 1 t wood/week	Fraunhofer CBP	Eranet, BMEL/FNR, BMBF/PTJ, federal funding
	Hydrothermal carbonisation	Several demo plants, TRL 6-7	AVA-CO2, ARTEC Biotechnologie, GRENOL, SunCoal, TerraNova, DBFZ, KIT/Uni Hohenheim, TU Braunschweig, ATB Potsdam	BMUB/BMWi, BMBF/PTJ
	Hydrothermal liquefaction	Lab / technical plants, TRL 3	DBFZ, KIT, Uni Hohenheim, TI	Eranet, BMBF/PTJ, BMEL/FNR
	Hydrothermal liquefaction & gasification	Pilot plant Verena, TRL 5-6	KIT	EU FP6, BMBF/PTJ
Biofuels for end use				
Bioethanol (fermentation)	cellulosic ethanol from agricultural residues like wheat and maize straw	Demo plant sunliquid® in Straubing, operational since 2014, TRL 7, FRL 6 1,000 t/a (from 4,500 t/a straw)	Clariant	BMBF/PTJ, EU Horizon2020
	Bioethanol & Chem. | wood; lignocellulose pre-treatment (organosolv method), fermentation, enzyme production, organosolv lignin, sugars (for ethanol and various platform chemicals)	Fraunhofer CBP Pilot plant in Leuna, fermentation + enzyme production: 10 to 10.000 l, TRL 5, FRL 5	With link to biofuels, e.g. Fraunhofer (FhG) CBP, DBFZ, Thyssen, Linde Engineering	BMBF/PTJ, 2012-2017
Isobutene (fermentation)	Fermentation	Demonstration plant (TRL 6) under construction (start operation summer 2016)	Global Bioenergies	BMBF/PTJ
Isobutene oligomers	Oligomerisation and hydrogenation	Miniplant TRL 4	Fraunhofer CBP / Global BioEnergies	-
HVO/HEFA	Hydrotreating processes, different feedstocks	Technical units, TRL 2-3	TU Bergakademie Freiberg (TU BAF)	
	HEFA out of micro algae	Pilot project, 2014 (AUFWIND project)	FZJ (Coord.), Nova-green, Phytolutions, HS Lausitz, OMV, RWTH Aachen, TU Munich, FhG, VERBIO, VT Schwedt, Airbus, DBFZ	BMEL/FNR, 2013-2016
BTL | Methanol / DME /gasoline	Entrained flow gasification, hot gas cleaning, synthesis	5 MW gasification 40-80 bar (TRL 6-7), 2 MW gasoline synthesis (TRL 7)	KIT, CAC, Air Liquide	EU FP6 & FP7, BMEL/FNR, federal funding
BTL | Fischer-Tropsch	Micro-structured reactor module	2-50 bpd container plant, TRL 5	KIT/INERATEC	

Type of biofuel / conversion route	Process characteristics	TRL/FRL; Capacities	Stakeholder in research and industry in Germany	Funding programs (examples)
BTL | Fischer-Tropsch	Fluid bed gasifier, ABSART gas cleaning (40 bar), FT- and SNG synthesis	Modular process development units	CUTEC	EU FP6, federal funding
XTL | Methanol, gasoline	HP-POX gasifier (100 bar for liquid and gaseous fuels), synthesis	5 MW (gasifier), 2 MW (synthesis) TRL 6-7,	TUBA Freiberg, Air Liquide, CAC	
HTL | Hydrothermal liquid biofuels	2-stage hydrothermal liquefaction, refining	Technical plant, TRL 4	DBFZ, TU Dresden, Uni Leipzig, amtech	BMBF/PTJ
Biomethane via biogas (fermentation)	straw fermentation, fertilizer production; (additional: Bioethanol plants (grain, sugar beet) and biogas	Commercial plant, 16,5 MW (136 GWh/a) from 40 kt/a straw, TRL 8, FRL 8 (260 kt/a bioethanol + 480 GWh biomethane)	VERBIO AG	EU NER300
Biomethane via SNG	Gasification, gas conditioning, methanation	Plant units at technical labs	KIT/EBI, Uni Erlangen, DBFZ, ZSW, CUTEC	BMUB/BMWi | Energetic biomass use, federal funding
Biohydrogen	AER process (dual fluid bed with active bed material)	Process development unit	ZSW	EU, federal funding
Different fuels	Tailor-made fuels from biomass (TMBF) Biomass fractionation / pretreatment; enzymatic + catalytic biomass processing; process optimization; synthesis and conversion of biomass-based streams to platform molecules and fuels;	Lab units	RWTH Aachen, Fraunhofer IME, Max-Planck-Institut	DFG, 2009-2017

In addition, so called PTX (power to gaseous, PTG, or power to liquid, PTL, fuels,and chemicals) is gaining an increasing interest, especially in the context of the German energy transition and increasing shares of renewable electricity. PTL is seen as carbon neutral and a clean fuel by different OEMs. There are two ongoing projects on PTL in Germany:

- PTL demo plant (160 l/day) of Sunfire in Dresden, co-financed by BMBF
- Planned PTL demo plant in Lünen using the CO_2 exhaust gas of the lignite power plant of Steag Lünen, together with Mitsubishi Hitachi Power Systems Europe (MHPSE), Carbon Recycling International (CRI), co-financed by EC Horizone2020
- PTX integrated into the Helmholtz EnergyLab2.0, a platform combining different energy conversion and storage technologies with overall process control and simulation on site of KIT with KIT, DLR and FZJ as partners. All relevant issues identified by IEA such as microreaction and other reaction technologies, power to gas, renewable carbon from biomass, development of catalysts and catalytic processes from lab to pilot are considered.

Notably, PTX for a flexible use of renewable energies is part of a huge BMBF funding program "Kopernikus – project for the energy transition" (2016-2025). In this context, there are several potential opportunities to favorably combine synergies of biomass conversion and PTX approaches (e.g. using CO_2 from bioenergy plants or delivering hydrogen for synthesis or fuel refining).

The 6% target for the German GHG quota continues after 2020. However, the EU's regulatory framework is binding until 2030 (-40% GHG, 27% renewable energies) but not sector-related. Especially with regard to increasing capacities or building up markets for advanced biofuels, it is very difficult to create likely scenarios as the biofuel and renewable energy market sectors are constantly undergoing changes depending on global and regional policy (e.g. targets post-2020, market interventions such as, e.g. subsidies

and support schemes) as well as fluctuating market conditions (e.g. development of prices for raw materials, auxiliaries and mineral oil).

Moreover, there is also the challenge of societal acceptance, which leads invariably to further market variability. However, there is ever increasing attention being given to biorefinery concepts, which are promoted to maximize biomass-to-products ratio, as biorefineries are multiproduct facilities (e.g. biofuels, bulk chemicals, feed and food, energy). Through the diversification of biomass based products, such plants may be less susceptible to market shifts.

Strategies and initiatives linked to biofuels

In Germany, biofuels are considered as an important renewable alternative for decarbonizing the transport sector and are part of different ongoing strategies and initiatives:

- Federal governments Mobility and fuels strategy under the under the lead responsibility of the Federal Ministry of Transport and Digital Infrastructure (cf. http://www.bmvi.de/SharedDocs/EN/Artikel/G/G-MKS/mfs-context.html?nn=86868)
- Biorefineries Roadmap as part of the German Federal Government action plans for the material and energetic utilisation of renewable raw materials (cf. https://www.bmbf.de/pub/BMBF_Roadmap-Bioraffinerien_en_bf.pdf)
- National Policy Strategy on Bioeconomy, Renewable Resources and biotechnological processes as a basis for food, industry and energy, BMEL 2013 (cf. http://www.bmel.de/SharedDocs/Downloads/EN/Publications/NatPolicyStrategyBioeconomy.pdf?__blob=publicationFile)
- ProcessNet initiative of Dechema and VDI-GVC: Sustainable Production, Energy and Resources (SuPER) Expert group on alternative fuels

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In the News

Reports and Research

October 14 – In France, a joint report by the French Académie des Technologies and Académie de l'Air et de l'Espace finds aviation biofuels are still a long way from being commercial, with the main barriers continuing to be production at scale that is economically competitive with fossil-based A1 jet fuel. The report concludes that in the near future vegetable oil-based hydrotreated esters and fatty acids (HEFA) are likely to be the only technological option that is also economically viable. (Read more)

October – IEA released its Medium-Term Renewable Energy Market Report, which includes insights on biofuels for transport and renewable heat (Read more). (Executive summary)

November – The International Energy Agency published its World Energy Outlook 2015. Under the New Policies Scenario it estimates that biofuels will only account for about 5% of transport fuel consumption by 2040 with blending mandates still in place by then. Despite remaining a relatively minor part of the energy mix, the projected total volume of biofuels is three times higher than what is consumed now, at an estimated 4 million barrels of oil equivalent biofuels per day, up from 1.5 million boe currently (Read more). The Executive Summary can be accessed from the IEA website.

November 20 – A report by California-based Life Cycle Associates found that in the United States the RFS has reduced GHG emissions by 355 million metric tons (Read more). (Report here)

November 26 – The Global Renewable Fuel Alliance published a S&T2 Consultants report entitled, "GHG emission reductions from world biofuel production and use – 2015." The report can be accessed here.

Policy and Regulatory Developments

October 14 – In Brazil, the National Council on Energy Policy (CNPE) issued a ruling opening the door for voluntary biodiesel blending of up to 20% for captive fleets and in public pumps, going as high as 30% in railroad transport, agricultural and industrial uses, which is significantly higher than the current 7% blending mandate. The ruling also allows experimentation with B100. (Read more)

October – China set to reverse policy on limiting production of corn-based ethanol amid record corn stocks. (Read more)

October – Government of India makes changes to indirect tax rates – inputs for biodiesel production. (Read more)

November – Boeing and Neste are working together to achieve ASTM certification of Neste's high freezepoint renewable aviation fuel which has been tested by Boeing in 15% blends. This is a different product than the HEFA jet biofuel product, which is already ASTM certified for blending at 50%. (Read more)

November 4 – Indonesia set to implement B20 next year. (Read more)

November 23 – The US EPA approved a pathway for barley-to-ethanol as a D5 advanced biofuel, as the proposed facility would be able to achieve over 50% reduction in GHG. (Read more)

November – Brazilian Senate Committee approves an increase in biodiesel blending to 7%. (Read more)

November 30 – The US EPA announced the Renewable Fuel Standard volumes for 2015-2016. (Read more) (and here)

December – In Australia, Queensland passed a bill mandating a 3% ethanol blend and 0.5% biodiesel blend beginning January 1, 2017. (Read more)

December 9 – Oregon joins California and British Columbia in introducing a comprehensive low carbon fuels policy for transportation. (Read more)

December – In Spain, the government approved an increase in biofuels blending to 8.5% for 2020. It seeks to implement a second-generation biofuel sub-target in 2017 to support the 7% cap on first generation biofuels. (Read more)

December – India announced it will put policies in place for production of flex-fuel vehicles. (Read more)

December 16 – Gevo's alcohol-to-jet process close to ASTM certification. (Read more)

December 17 – The US congress passed the biodiesel blenders tax credit that includes a two-year retroactive extension of the $1 per gallon biodiesel and renewable diesel tax credit. (Read more)

Sustainability

October – Malaysia and Indonesia decided to create the Council of Palm Oil Producing Countries (CPOPC) to better facilitate production and trade of palm oil in their countries. Part of the work to be undertaken by the council is to streamline the two countries' sustainable palm oil initiatives. Environmental sustainability, value addition for palm and palm oil products along with R&D will be key aspects of the regional cooperation as well as initiatives to work with smallholder farmers. (Read more)

December – ePURE released a new pamphlet looking at sustainable production of ethanol. (Read more)

December 14 – Bioethanol and petrol blends lowered CO_2 emissions from road traffic in Germany by around 1.2 million tonnes in the first three quarters of 2015, according to a new German study. (Read more).

Industry News

September 13 – Global Bioenergies and Aireg partner to advance jet fuel production from isobutene. (Read more)

September 15 – Vertimass LLC chose Technip to provide pilot testing, scale-up, and initial plant design for their novel technology for converting alcohol to renewable gasoline, diesel, and jet fuel blend stocks that are compatible with the current transportation fuel infrastructure. (Read more)

September 16 – Oberon Fuels, Ford Motor Company, and FVV have partnered on a 3-year, €3.5M project to research, analyze and test the potential of dimethyl ether (DME(fuel in passenger cars and heavy-duty truck engines. (Read more)

September 16 – Brazil's government projects that ethanol production will increase from 29 billion litres in 2014 to 44 billion litres in 10 years. (Read more)

September 16 – Abu Dhabi biojet fuel project using halophytes set to begin test stage. (Read more)

September 22 – Exports of ethanol to China continued in August, although volumes were lower than in July. Imports were from Pakistan and the US, amongst others (Read more). However, Forbes projects these export volumes will remain small. (Read more)

September 23 – Boeing and NDRC announced a new initiative to turn agricultural waste in China into sustainable aviation biofuel. Boeing will partner with NDRC to turn items from farms, such as corn cobs and wheat stalks, into sustainable jet fuel as a way to reduce aviation's carbon emissions. (Read more)

September 23 – US-based Algenol signed a memorandum of understanding (MOU) with China's Fujian Zhongyuan New Energy Company (ZYNE) to develop projects throughout Southern China, utilising carbon emissions to create renewable fuels. Algenol's patented Direct to Ethanol technology process utilises industrial CO_2 emissions directly from power plants as a feedstock for proprietary algae to produce the four most important renewable transportation fuels (ethanol, gas, diesel and jet). (Read more)

September 24 – Inventure Renewables, Inc. announced construction of a commercial scale plant for Wilmar (China) Oleochemicals Co., Ltd. The commercial scale plant will convert a waste vegetable oil byproduct into intermediate materials, which can be further processed into higher value food, feed and industrial products, including biodiesel. (Read more)

September 24 – Gevo will increase isobutanol production at their Luverne plant to 750,000 to 1 million gallons in 2016. This will decrease variable cost of production by 50% to $3-$3.50/gallon with an expected selling price of $3.50-$4.50/gallon. (Read more)

September 24 – Finnish wood-based UPM BioVerno diesel has been found to significantly reduce harmful tailpipe emissions. Shown to function just like conventional diesel in all diesel engines, it generates up to 80% less GHGs during its lifecycle compared to conventional fossil diesel fuels. (Read more)

September 29 – Aemetis begins harvesting biomass sorghum in California as a feedstock for low carbon advanced biofuels. (Read more)

October 8 – Sustainable marine biofuels programme launched Boskalis, and Wärtsilä announced their joint collaboration with GoodFuels Marine. The consortium will pioneer the development of sustainable "drop in" marine biofuels for the shipping industry. (Read more)

October 14 – SGBio, a joint venture between the Solvay Group and GranBio, has acquired assets from Cobalt, including their bank of microorganisms and intellectual property related to patents, trademarks, processes, operating procedures and know how. (Read more)

October 19 – In the Philippines, the Japan International Cooperation Agency will set up a used cooking oil to biodiesel program in Davao City, the only project of its type to be approved in the country by the donor agency (Read more)

October 21 – Company SG Preston will use UOP technology in 5 renewable diesel and biojet facilities in the US. SG Preston will deploy its biofuels strategy initially at these five plants (South Point and Van Wert, Ohio, Logansport, Indiana, and two additional sites in Michigan, US and Ontario, Canada. The company will utilize waste fats, oils and greases as well as distiller's corn oil obtained from ethanol plants, targeting 1.2 billion gallons of combined annual production. (Read more)

October 28 – USDA announces $210 million to expand biofuels infrastructure. (Read more)

October 29 – In India, Beta Renewables, Novozymes and CVC India Infrastructure Pvt. signed an MOU to develop a biorefinery in Punjab that will use wheat and paddy straw as feedstock. (Read more)

November 1 – DuPont opens the world's largest cellulosic ethanol plant in Nevada, Iowa. (Read more)

November 9 – In India, Praj Industries Limited (Praj) and biofuels company Gevo, Inc. signed licensing and joint development agreements for Gevo's Isobutanol technology. (Read more)

November – Ensyn received regulatory approval from the US EPA for the product RFGasoline. RFGasoline, a drop-in gasoline transportation fuel, is created by processing Ensyn's renewable crude (RFO), a liquid cellulosic feedstock for refiners, with customary petroleum feedstocks in conventional petroleum refineries (RFO Coprocessing). Ensyn is developing and commercializing RFO Coprocessing in a strategic alliance with Honeywell UOP. Ensyn received approval for RFDiesel in August. (Read more)

November 20 – Total S.A. announced plans to transform its oil refinery in La Mède, France, to manufacture 500,000 tons (approximately 170 MMgy) of hydrotreated vegetable oil (HVO), also known as renewable diesel. (Read more)

November 27 – British Airways and Solena parted ways as Solena failed to get funding to construct their MSW-to-biojet facility. (Read more)

December 3 – Abengoa closes cellulosic ethanol plant in Hugoton, corn-based ethanol plant in Colwich and also plans to shut its headquarters in the US. (Read more)

December 10 – Volvo Trucks North America approved the use of renewable diesel in all their engines. Volvo is the first OEM to endorse renewable diesel. (Read more)

December 10 – USDA approves $70 million loan guarantee for building a 20 million gallon per year cellulosic biofuel facility in Georgia (Read more)

December 14 – The US Navy to launch its Great Green Fleet six years after it was first announced with a carrier operating on a mixture of biofuels and fossil fuels. (Read more)

December 16 – In the US, Pacific Ethanol begins production of cellulosic ethanol from corn kernel fibre. (Read more)

December 17 – The Port of Seattle, Alaska Airlines and Boeing are partnering with the aim to power all flights by all airlines at Seattle Tacoma International Airport with sustainable aviation biofuel. A Biofuel Infrastructure Feasibility Study will be carried out. (Read more)

December 17 – San Francisco announced on 11 December that they have ended the use of petroleum diesel in the city's fleet and replaced it with Neste's NEXBTL renewable diesel. (Read more)

December 17 – The US EIA announced ethanol production reached a record of 1 million barrels per day. (Read more)

Upcoming Meetings & Conferences

Fuels of the Future – 13th International Biofuel Conference
2016, January 18-19, Berlin, Germany
Lignofuels
2016, January 20-21, Munich, Germany
ECO-BIO 2016
2016, March 6-9, Rotterdam, Netherlands
American Chemical Society Spring 2016 251st National meeting
2016, March 13-17, San Diego, California, USA
Symposium on Biotechnology for Fuels and Chemicals
2016, April 25-28, Baltimore, Maryland, USA
BIO International Convention
2016, June 6-9, San Francisco, California
Oleofuels 2016
2016, June 21-22, Liverpool, UK
6th International Conference on Algal Biomass, Biofuels and Bioproducts
2016, June 26-29, Paradise Point, San Diego
American Institute of Chemical Engineers – 2016 Annual Meeting
2016, November 13-18, San Francisco, California, USA.
ICBB 2016: 18th International Conference on Biofuels and Bioenergy
2016, December 29-30, Paris, France

For more events visit www.task39.org

IEA Bioenergy Task 39 Meetings

The following is an abbreviated tentative schedule of Task 39 events and meetings planned over the next 9 months. Please contact us for more detailed information:

- 2016 March 9-10 Rotterdam: Formal Task 39 business meeting and presentations at the ECO-BIO Conference (March 6-9).