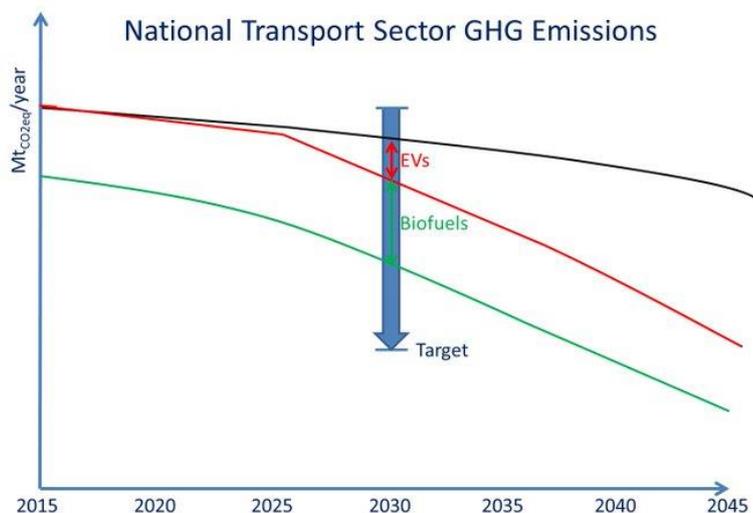


AMF Newsletter



Biofuels and electric vehicles are both needed to reach ambitious targets of decarbonising the transport sector, as has been shown for five countries individually by a joint AMF-IEA Bioenergy TCP project on the decarbonisation of transport. Project findings were presented at a workshop in Brussels in November.

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Renewable Gasoline in Seattle

Gevo has been awarded a four-year contract, with three two-year extensions, to supply at least 20,000 gallons per year of renewable isobutanol and 600,000 gallons per years of renewable isoctane to the City of Seattle. Gevo produces the biofuels from corn at its production facility in Luverne, Minnesota.

Source: <http://www.globenewswire.com/news-release/2019/11/04/1940667/0/en/Gevo-Wins-Bid-to-Supply-Renewable-Gasoline-to-the-City-of-Seattle.html>

Largest U.S. Electric Bus Order

The Los Angeles Department of Transportation has ordered 130 BYD battery-electric buses, which will arrive in mid-2021. The project will cost \$88 million, with \$67 million of that coming from Federal and State incentives. The project is the largest single order of battery-electric buses to date in the United States. The project is part of the city's sustainability goal to convert the entire bus fleet to zero-emission technologies by 2030.

Source: <https://en.byd.com/news-posts/byd-receives-largest-battery-electric-bus-order-in-u-s-history/>

Renewable Naptha for E85 Blends

Pearson Fuels will purchase renewable naphtha to blend in its E85 fuels sold in California. The naphtha is a co-product of World Energy's production of renewable diesel and sustainable aviation fuel from agricultural waste feedstocks. Replacing gasoline with renewable naphtha in the E85 will achieve a research octane number of over 100.

Source: <https://www.prnewswire.com/news-releases/pearson-fuels-partners-with-world-energy-to-deliver-an-advanced-e85-flex-fuel-300943097.html>

Reduction of NOx in stationary engines

Hana Tech, the Korea Automotive Technology Institute, and Inha University are jointly developing a landfill gas engine generator of 500kW. To reduce NOx emissions, water injectors were mounted in the intake port of each cylinder. For the testing, the amount, duration and timing of water injection were varied. The control system is built to control injection start and end based on the cam position signal of the engine, so that the injection can only be performed during the intake valve opening period. At the present, the measured NOx reduction was 60% at 200kW power.



Source: http://www.nonco2.re.kr/files/english/Phase2/CH4/CH4_5.jpg

California agencies don't buy ICE sedans

In order to reduce GHG emissions from the state fleet, California state agencies will be prohibited from purchasing sedans solely powered by an internal combustion engine, with exemptions for certain public safety vehicles. This is one of several steps California has taken to reduce GHG emissions and displace the consumption of petroleum product. The state fleet met its 20% petroleum reduction goal of three years earlier than the 2020 requirement.

Source: <https://www.dgs.ca.gov/Press-Releases/Page-Content/News-List-Folder/State-Announces-New-Purchasing-Policies-to-Reduce-Greenhouse-Gas-Emissions>

California's plans for Clean Transportation

California plans to spend 533 million USD, largely funded with cap-and-trade proceeds, on its comprehensive strategy for reducing air pollution and GHG emissions from the transportation sector. The funding includes \$238 million for the Clean Vehicle Rebate Project, which offers rebates for the purchase of zero-emission vehicles, including electric, plug-in hybrid electric, and fuel cell vehicles; and \$182 million for clean trucks, buses, and off-road freight equipment through its voucher and demonstration projects.

Source: https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/UtilitiesIndustries/Energy/EnergyPrograms/Infrastructure/DC/Item%203_CARB_FundingPlan_2019-2020_Clean%20Transport_Incentives.pdf

German Position paper on renewable fuels

11 companies and industry associations have signed a position paper on "Climate change mitigation with sustainable renewable fuels". The paper calls for making use of existing sustainable options to reduce greenhouse gases in transport, and for encouraging the development of new technologies.

A package of measures is needed to achieve the climate targets in the transport sector, including:

- A national target for renewables in transport beyond the targets of the revised Renewable Energies Directive (EU/2018/2001 - RED II)
- Roll-out of higher biofuel blends
- Allow the use of sustainable renewable fuels to be credited toward fleet CO2 limits
- Further development of electricity-based fuels, e.g. by exemption from highway tolls

Source: <http://news.bio-based.eu/position-paper-climate-change-mitigation-with-sustainable-renewable-fuels/>

SPOTLIGHT ASIA

India's biofuel promotion program

As to bring down import dependency of oil products by 2022, India aims to enhance domestic production, improve energy efficiency, promote energy conservation and encourage alternate fuels. The Ministry of Petroleum and Natural Gas has a four-pronged strategy and promotes ethanol, lignocellulosic ethanol, compressed bio-gas and biodiesel.

Lignocellulosic ethanol production

In February 2019, the "Pradhan Mantri JI-VAN Yojana" program was launched as a tool to create advanced ethanol production capacity in India and to attract investments in this new sector. The program provides financial support to integrated bioethanol projects using lignocellulosic biomass and other renewable feedstock. The JI-VAN Yojana will be supported with total financial outlay of approx. Rs. 20 billion for the period from 2018-19 to 2023-24 which will be utilized for supporting 12 commercial projects and 10 demonstration projects for second generation bioethanol projects.

Source: <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1566711>

Biogas production

India is inviting expressions of interest from potential entrepreneurs to set up compressed bio-gas (CBG) production plants and make CBG available in the market for use in automotive fuels. The plan is to roll out 5,000 CBG plants across India in a phased manner, with 250 plants by the year 2020, 3,000 plants by 2022 and 5,000 plants by 2023. These plants are expected to produce 15 million tonnes of CBG per year, which is about 40% of India's current annual CNG consumption of 44 million tonnes. The potential investment is estimated to be approx. Rs. 1.7 lakh crore.

Source: <https://pib.gov.in/newsite/PrintRelease.aspx?relid=183787>

Biodiesel production from used cooking oil

National oil marketing companies have expressed interest to procure biodiesel made from used cooking oil (UCO). Entrepreneurs setting up biodiesel plants will receive a remunerative price and assurance of complete off take of their production by the oil companies.

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=1581736>

E-mobility and GHG emissions

The introduction of electrified vehicles (xEVs) is expanding to reduce energy consumption and greenhousegas (GHG) emissions in the transport sector. This study examined scenarios for India, Indonesia and Thailand in which it simulated energy consumption reduction and GHG emissions quantitatively to investigate the effect on GHG emissions. In countries with high GHG emissions from power generation, such as India and Indonesia, the introduction of xEVs alone cannot reduce emissions levels. A combination of alternative fuel promotion and the introduction of xEVs is more effective for reducing energy consumption and GHG emissions in the transport sector.

Source: <http://www.eria.org/research/evaluation-of-co2-emissions-reduction-through-mobility-electrification/>

SPOTLIGHT ELECTRIC VEHICLES

Ford Developing 12,000 Charging Station Network

Ford will provide its EV customers two years of free access to 12,000 charging stations through its partnership with Greenlots and Electrify America. Ford will not be building these charging stations, rather will be connecting existing stations operated by different charging companies for its customers. After the two years, Ford EV owners will be able to pay for charging at these stations without having to subscribe separately to individual charging networks.

Source: <https://media.ford.com/content/fordmedia/fna/us/en/news/2019/10/17/ford-introduces-north-americas-largest-electric-vehicle-charging-network.html>

SPOTLIGHT SHIPPING

Clean Shipping Partnership

Wärtsilä and PSA Marine will collaborate in the development of clean energy technologies for shipping. Specific collaboration areas include the use of electric or hybrid technologies; the incorporation of next-generation smart vessel technologies; and the adoption of secured connectivity to facilitate ship-to-shore data exchange. PSA Marine will have two dual-fuel harbour tugs running on LNG by the end of the year.

Source: <https://www.wartsila.com/media/news/15-11-2019-wartsila-and-psa-marine-collaborate-to-achieve-clean-energy-shipping-2575117>

Fuel Cell Vessel Constructed

Ulstein assembled its first complete hydrogen-fuelled vessel using a Nedstack Fuel Cell Technology system. The design is based on Ulstein's existing SX190 vessel platform and has a total installed power of 7.5 MW, of which 2 MW is generated by a PEM fuel cell power system, which are located in a separate, second engine room. Sea trials of a newly built vessel could happen as soon as 2022.

Source: <https://ulstein.com/news/2019/zero-emission-operations-in-offshore-construction-market>

SPOTLIGHT AVIATION

Ethanol to Renewable Jet Fuel Conversion

The U.S. Department of Energy has awarded \$1.4 million to Vertimass LLC to commercialize a catalyst technology that converts ethanol into renewable jet fuel. The technology is expected to allow an expansion of the U.S. biofuels market beyond the current constraints due to the ethanol "blend wall", which is due to the limit of ethanol that can be blended into gasoline.

Source: <https://biofuels-news.com/news/vertimass-awarded-up-to-1-4-billion-to-optimize-renewable-jet-fuel/>

AMF ExCo Meeting

AMF ExCo 58 was held 5-8 November, 2019, in Montreux, Switzerland. The meeting was held back to back with the Task Leaders Meeting of the Combustion TCP, and interactions between both TCPs included a joint workshop (see below for details).



New annex on “Advanced Maritime Fuels”

A new AMF annex was started to investigate the way forward for low carbon, sulphur-free marine engine fuels. Key questions include:

- Which engine concepts are available, and which should be developed?
- How can sufficient (diesel-like) reactivity be obtained with low-reactivity fuels?
- Are chemical ignition enhancers preferable over positive ignition?
- How does LNG stack up to other Sulphur-free marine fuels?

Denmark is leading this work, with Canada, Finland, Korea, Sweden, Switzerland and USA as further participants; the Methanol Institute will also be involved. More information will be provided on the AMF website soon.

Ideas for future AMF work

Several ideas for future AMF work were discussed during the meeting. Proposals on adequate testing of snowmobiles and recreational vehicles, an overview of remote sensing activities, and the value proposition of alcohol-based/derived fuels will be developed and discussed at the next ExCo meeting.

Completed annexes

The work within the following three AMF annexes has been completed:

- Annex 55: Real Driving Emissions and Fuel Consumption
- Annex 54: GDI Engines and Alcohol Fuels
- Annex 51: Methane Emission Control

Look out for the final annex reports and the key messages which will be published early 2020!

Next Meeting

The next AMF ExCo meeting will be held in Xi’an, China, in the week of 18 May, 2020. The program will start in Beijing with a workshop presenting recent AMF work. On 19 May the program will be continued with a half-day expert workshop on lessons learned from experiences with the market introduction of alternative motor fuels. Both workshops will be open to non-AMF members. Please contact the Secretary if you are interested in participating.

Joint AMF – Combustion TCP Workshop

The IEA Technology Collaboration Programmes Clean & Efficient Combustion and Advanced Motor Fuels jointly held a workshop on November 6, 2019, in Montreux, Switzerland. The joint workshop provided a unique platform to discuss challenges, opportunities and requirements of future combustion systems and appropriate fuels. Questions addressed included:

- What role will low emission ICEs play in the future transport system?
- How can the ICE complement the electrification trend?
- Which are the most promising ICE technologies and fuels?

More than 90 workshop participants, including internationally recognized experts from both TCPs as well as management and R&D representatives from industry, regulatory agencies and other key stakeholders, convened for a full day of plenary sessions and smaller breakout groups to discuss innovative combustion systems using advanced fuels for road transport, shipping, aviation, off road machinery and power generation.

Several areas of possible new collaborations between experts of both TCPs and industry were identified and will now be explored within the TCPs strategic planning processes.

Transport Decarbonisation Workshop

A joint IEA Bioenergy and AMF TCP project called “The Contribution of Advanced Renewable Transport Fuels to Transport Decarbonisation in 2030 and beyond” presented its findings at a workshop in Brussels, Belgium, on November 18, 2019.

The project investigated the evolution of national road vehicle fleets of 5 countries to 2050 and the possibility of this fleet to reduce GHG emissions through the use of biofuels, electrofuels and electricity in electric vehicles. The five countries analysed were Finland, Sweden, Germany, USA and Brazil. Country key strategies were described for all of these and for China and Japan.

The analysis shows that currently most investigated countries are not on track to reach their GHG emission reduction targets in the transport sector. The evolution of national transport sector GHG emissions largely varies, from rising to relatively stable to decreasing; but even the decreasing ones are not in line with their ambitious targets. It is therefore imperative to make use of all available options, including striving for a transport efficient society and for efficient vehicles, and using renewable energy carriers in all forms.

Workshop presentations are available online. The final project report will be published mid-2020.

Link: <https://iea-amf.org/content/news/TD-WS>



PUBLICATIONS

World Energy Outlook 2019

This IEA flagship publication explains the impact of today's decisions on tomorrow's energy systems, and describes a pathway that enables the world to meet climate, energy access and air quality goals while maintaining a strong focus on the reliability and affordability of energy for a growing global population. While it is necessary to peak GHG emissions as soon as possible and reduce them rapidly to net zero by 2070, global energy demand in the Stated Policies Scenario rises by 1% per year to 2040. It appears that the momentum behind clean energy technologies is not enough to offset the effects of an expanding global economy and growing population.

Link: <https://www.iea.org/reports/world-energy-outlook-2019>

Advanced biofuels: What holds them back?

This study from the International Renewable Energy Agency (IRENA) analyses current barriers to investment in advanced biofuels. Based primarily on a survey of industry executives and decision makers, the study aims to capture the perspective of project developers aiming to nurture the market and scale up actual usage in competition with fossil fuels.

Link: <https://irena.org/publications/2019/Nov/Advanced-biofuels-What-holds-them-back>

Sustainability in the U.S. Biofuel Industry

Argonne National Laboratory has led a study on the energy and water sustainability of the US biofuel industry. For the study, a survey of commercial-scale dry-mill facilities spread throughout the country, including facilities producing fuels from both starch and cellulosic materials, was undertaken. The survey covered a range of topics, including plant capacity, feedstock, production volume, and water usage and wastewater management as well as fuel and electricity consumption.

Link: <https://water.es.anl.gov/documents/EW%20survey%20report%20final%20ANL.pdf>

Concawe literature review on biofuels potentials

"A look into the maximum potential availability and demand for low-carbon feedstocks/fuels in Europe (2020–2050)" is a literature review undertaken by Concawe. The study covers the following scope:

- Potential biomass availability for the 2020, 2030 and 2050 time horizons
- Potential demand for the 2020, 2030 and 2050 time horizons
- Technologies conversion routes and technology readiness level (TRL)
- Potential production costs for the 2020, 2030 and 2050 time horizons
- Challenges: barriers and potential enabling conditions.

Link: <https://www.concawe.eu/wp-content/uploads/Feedstocks-1.pdf>

Transport fuels in the EU in 2017

This annual report of the European Environment Agency provides a summary of the information on the quality and the GHG emission reduction of fuels in the European Union in 2017, as reported by the EU member states, Iceland and Norway.

Link: https://www.eea.europa.eu/publications/quality-and-greenhouse-gas-intensities-1/at_download/file

Air quality in Europe — 2019 report

This report presents an updated overview and analysis of air quality in Europe from 2000 to 2017. It reviews the progress made towards meeting the air quality standards established in the two EU Ambient Air Quality Directives and towards the World Health Organization (WHO) air quality guidelines (AQGs). It also presents the latest findings and estimates of population and ecosystem exposure to the air pollutants with the greatest impacts.

Link: https://www.eea.europa.eu/publications/air-quality-in-europe-2019/at_download/file

The POTEnCIA central scenario

This report describes the evolution of the EU energy system until the year 2050 under the assumption that no further policies and measures are introduced beyond the end of 2017. The results show that both the energy and the carbon intensity of the European economy remain on a declining path in the 'Central' scenario set-up, but will miss mid-century targets.

The Central scenario was developed with the JRC's energy model POTEnCIA and serves as reference point to which policy scenarios can be compared. It is the result of a transparent and iterative interactive exercise between the JRC, other Commission services and Member States' national experts within the POTEnCIA modelling framework.

Link: <https://op.europa.eu/en/publication-detail/-/publication/a3c2af84-facf-11e9-8c1f-01aa75ed71a1/language-en/format-PDF>

Solutions to decarbonise shipping

This report from the International Renewable Energy Agency (IRENA) explores the impact of maritime shipping on CO₂ emissions, the structure of the shipping sector, and key areas that need to be addressed to reduce the sector's carbon footprint.

Link: <https://irena.org/publications/2019/Sep/Navigating-the-way-to-a-renewable-future>

Maersk and Lloyds Register shipping study

A study by Maersk and Lloyds Register confirms that the best opportunities for decarbonizing shipping lie in finding new sustainable energy sources. Based on market projections, the best positioned fuels for research and development into net zero fuels for shipping are alcohol, biomethane, and ammonia.

Link to press release: <https://www.maersk.com/news/articles/2019/10/24/alcohol-biomethane-and-ammonia-are-the-best-positioned-fuels-to-reach-zero-net-emissions>

Ethanol for Lean Spark-Ignition

Researchers analysed the potential use of alternative fuels, such as ethanol and natural gas, in lean burn spark-ignited engines. Lean operation can improve efficiency by reducing throttling

losses and allowing the engine to be designed for a higher compression ratio. The study used a single-cylinder engine and varied both the fuel-air equivalence ratio and compression ratio to examine the performance and emissions of the fuels. It was found that higher compression ratios resulted in higher engine efficiency and improved lean burn capability for all fuels studied. However, hydrocarbon emissions increased due to higher crevice flows and retarded combustion phasing to avoid knock where needed. Ethanol offered the second highest engine efficiency, behind E10, at any given ϕ and compression ratio of the four fuels studied.

Link: <https://www.sciencedirect.com/science/article/pii/S0360544219322157>

EVENTS

Transportation Research Board 99th Annual Meeting, 12–16 January 2020, Washington, D.C., USA

Conference website: <http://www.trb.org/AnnualMeeting/AnnualMeeting.aspx>

Fuels of the Future 2020, 20-21 January 2020, Berlin, Germany

Conference website: <https://www.fuels-of-the-future.com/>

National Biodiesel Conference & Expo, 20-23 January 2020, Tampa, Florida, USA

Conference website: <https://www.biodieselconference.org/>

SAE Hybrid and Electric Vehicle Technologies Symposium, 28-30 January 2020, Pasadena, California, USA

Conference website: <https://www.sae.org/attend/>

Renewable Fuels Association National Ethanol Conference, 10-12 February 2020, Houston, Texas, USA

Conference website: <http://www.nationalethanolconference.com/>

Lignofuels 2020, 26-27 February 2020, Helsinki, Finland

Conference website: <https://www.wplgroup.com/aci/event/lignocellulosic-fuel-conference-europe/>

The Work Truck Show & GreenTruck Summit, 3-6 March 2020, Indianapolis, Indiana, USA

Conference website: <http://www.worktruckshow.com/>

SAE World Congress Experience, 21-23 April 2020, Detroit, Michigan, USA

Conference website: <https://www.sae.org/attend/wcx/>

10th European Algae Industry Summit, 29-30 April 2020, Reykjavik, Iceland

Conference website: <https://www.wplgroup.com/aci/event/european-algae-industry-summit/>

Advanced Clean Technology (ACT) Expo, 11-14 May 2020, Long Beach, California, USA

Conference website: <https://www.actexpo.com/>

AMAA 2020 Conference "Intelligent System Solutions for Auto Mobility & Beyond", 26-27 May 2020, Berlin, Germany

Conference website: www.amaa.de

32nd International AVL Conference "Engine & Environment", 28-29 May, 2020, Graz, Austria

Conference website: <https://www.avl.com/web/guest/-/32nd-international-avl-conference-engine-environment>

Oleofuels 2020, 24-25 June 2020, Marseille, France

Conference website: <https://www.wplgroup.com/aci/event/oleofuels/>

Electric & Hybrid Vehicle Technology Expo, 15-17 September 2020, Novi, Michigan, USA

Conference website: <https://evtechexpo.com/>

IMPRINT

The **Advanced Motor Fuels Technology Collaboration Programme** (AMF TCP) is one of the International Energy Agency's (IEA) transportation related Technology Collaboration Programmes. These are multilateral technology initiatives that encourage technology-related activities that support energy security, economic growth and environmental protection.

AMF provides an international platform for co-operation to promote cleaner and more energy efficient fuels and vehicle technologies. This newsletter contains news articles on research, development and demonstration of advanced motor fuels, information about related policies, links to AMF projects, and an overview over publications and events.

The newsletter is prepared based on contributions from Werner TOBER and Robert ROSENITSCH, TU Vienna, and Shinichi GOTO, AIST. It is edited by Dina Bacovsky, BEST - Bioenergy and Sustainable Technologies. The Newsletter is available online at: www.iea-amf.org

AMF welcomes interested parties to make contact and to become members of the AMF family. If you wish to get in touch please contact the AMF Secretary, the AMF ExCo Chair or your national AMF Delegate, see contact information below.

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