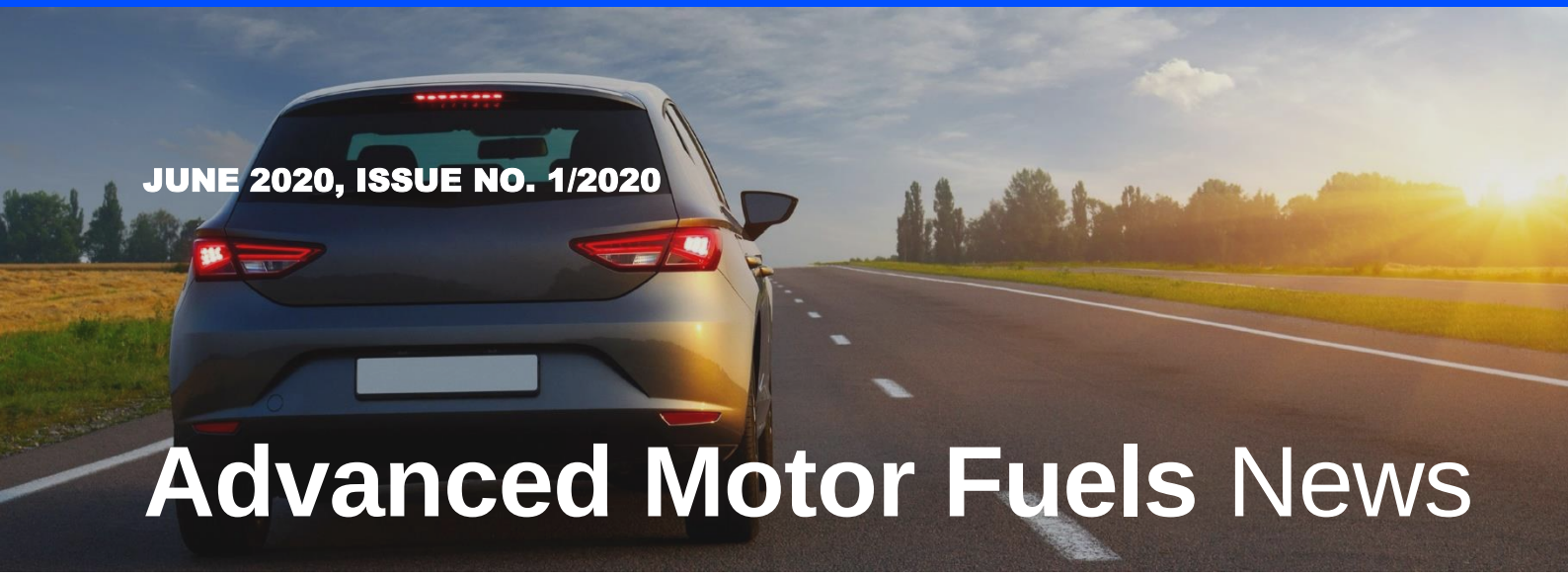
Technology Collaboration Programme
by IEA



JUNE 2020, ISSUE NO. 1/2020

Advanced Motor Fuels News

Remote Emission Sensing (RES) can be used to detect high-emitting / gross-polluting vehicles in real-world traffic. AMF has recently started up a project to evaluate and compare conventional RES, point sampling RES and plume chasing RES.

MORE

CONTENTS

ADVANCED MOTOR FUELS
IEA-AMF
Technology Collaboration Programme on
Advanced Motor Fuels

DEMONSTRATION / IMPLEMENTATION / MARKETS

Identification of Most Promising Fuels

A new machine-learning tool has significantly speeded up calculating the thermodynamics of chemical reactions, making it possible to identify the most promising fuels for lower emissions and greater engine efficiency in seconds.

Developed as part of the U.S. Department of Energy's (DOE's) Co-Optimization of Fuels & Engines (Co-Optima) initiative, A machine-Learning derived, Fast, Accurate Bond dissociation Enthalpy Tool (ALFABET) makes it possible for researchers to identify the most promising fuels for lower emissions and greater engine efficiency in seconds rather than days.

Bond dissociation enthalpy (BDE) is the energy required to break a chemical bond between atoms in organic compounds. Knowing the BDE of all the bonds in a molecule allows researchers to predict its chemical reactions in order to determine its suitability for certain uses, such as in polymers or fuels including biofuels. However, to calculate the BDEs using traditional quantum mechanics methods requires resource-intensive simulations.

ALFABET significantly decreases the amount of time, and therefore the computational costs, of calculating the energy required to break chemical bonds, and closely matches the accuracy of the traditional density-functional theory method. Built at the National Renewable Energy Laboratory, ALFABET is freely available via an interactive website.

Source: https://www.nrel.gov/

Link: https://bde.ml.nrel.gov/

Oil Refinery Conversion to Renewable

Global Clean Energy Holdings has purchased the Alon Bakersfield Refinery in California and will immediately retool it to produce renewable diesel from feedstocks such as the company's patented fallow land crop varieties of camelina. The refinery already has much of the equipment for renewable diesel production, though retooling is expected to take between 18 to 20 months to complete, with start-up expected in late 2021.

Link: http://www.biodieselmagazine.com/articles/2517012/california-refinery-to-be-converted-to-produce-renewable-diesel

Japan: Renewable Hydrogen Production

The New Energy and Industrial Technology Development Organization (NEDO), Toshiba Energy Systems & Solutions Corporation (Toshiba ESS), Tohoku Electric Power Co., Inc., and Iwatani Corporation announced that the Fukushima Hydrogen Energy Research Field (FH2R), which had been under construction in Namie town, Fukushima Prefecture since 2018, has been completed with a

renewable energy-powered 10MW-class hydrogen production unit, the largest-class in the world, at the end of February.

FH2R can produce as much as 1,200 Nm3 of hydrogen per hour (rated power operation) using renewable energy. Renewable energy output is subject to large fluctuations, so FH2R will adjust to supply and demand in the power grid in order to maximize utilization of this energy while establishing low-cost, green hydrogen production technology. Hydrogen produced at FH2R will also be used to power stationary hydrogen fuel cell systems and to provide for the mobility devices, fuel cell cars and buses, and more.

Source: https://www.nedo.go.jp/english/news/AA5en_100422.html

Fuel Cell Truck Joint Venture

Daimler and Volvo have agreed to create an independent company to develop, produce, and sell fuel cell systems for heavy-duty vehicles in the second half of 2020s. Daimler will bring together all of its fuel cell activities into this agreement, including those of Mercedes-Benz Fuel Cell group which has been working on fuel cells for two decades.

Link: https://www.volvogroup.com/en-en/news/2020/apr/news-3640568.html

Bogota Electric Bus Deployment

The Columbian capital of Bogota ordered 379 electric buses from BYD, which are set to begin operation in September 2020. This is the largest electric bus order for Latin America, besting the 183 buses delivered to Chile in August 2019. Currently, Columbia has 64 electric buses operating in Medellin. Electric buses have also been delivered recently to Ecuador, Brazil, Peru, Panama, Uruguay and Argentina.

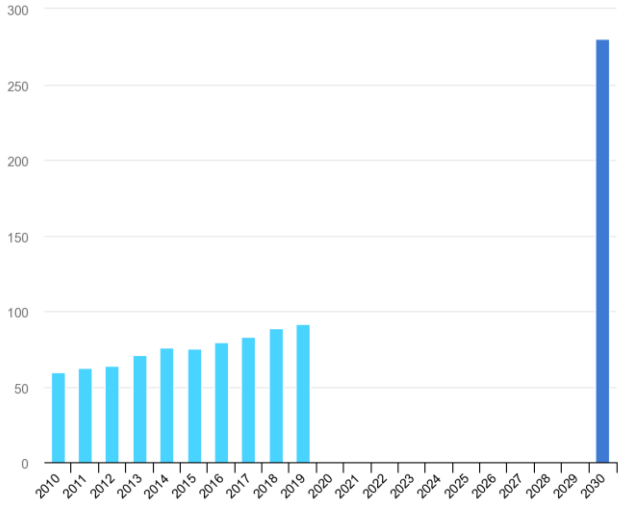
Link: https://en.byd.com/news-posts/byd-to-deliver-latin-americas-largest-electric-bus-fleet-379-buses/

POLICY / LEGISLATION / MANDATES / STANDARDS

Tracking Clean Energy Progress

The development of production technologies and the deployment of transport biofuels is still not on track as required for reaching the ambitious climate goals, as the IEA points out in its update of the Tracking Clean Energy Progress publication.

Transport biofuel production expanded 6% year-on-year in 2019, and 3% annual production growth is expected over the next five years. This falls short of the sustained 10% output growth per year needed until 2030 to align with the Sustainable Development Scenario SDS.



Stronger policy support and innovation to reduce costs are required to scale up both advanced biofuel consumption and the adoption of biofuels in aviation and marine transport, as envisaged in the SDS. As only sustainable biofuels have a place in the SDS, more widespread sustainability governance must complement higher biofuel output.

Source: www.iea.org

Link: https://www.iea.org/reports/tracking-transport-2020/transport-biofuels

Successful Alternative Fuel Deployment

At the 'Sustainable Transport Forum' on 3 December 2019 in Paris, a wide range of experts discussed the consequences of climate change and concrete solutions to reduce the environmental impact of road transport. Participants included experts on circular economy, health & environment, logistics, socio-economics of transport, environment, public transport, and supply chains.

One of the main conclusions was that all stakeholders must be involved to make deployment of sustainable mobility solutions a success. IEA AMF TCP Annex 21 'Deployment strategies for hybrid, electric and alternative fuel vehicles' drew a similar conclusion and recommended to "Work hard to bring aboard all relevant stakeholders - don't forget to include stakeholders (misleadingly) perceived to be unimportant".

The use of renewable energy is one important component of sustainable mobility. An example of the successful introduction of a renewable fuel in France is the bio-ethanol bus service shuttling between the city of La Rochelle and the island of Ré. The fuel used is ED95, a blend of 95 vol-% ethanol and 5 vol-% additives such as ignition improvers. Grape skins from local wine production are used as feedstock for the ethanol, so there is no competition with food production.

Stakeholders such as the Nouvelle-Aquitaine Region, bus operator Transdev Express Sud-Ouest La Rochelle, bus manufacturer Scania, and local distillery UCVA teamed up for the application of this fuel in daily practice.

Links: https://iea-amf.org/content/projects/map_projects/21

https://www.youtube.com/watch?v=6SpL-Te0NDQ

EU Refiners' Ambition to Climate Neutrality

FuelsEurope, a division of the European Petroleum Refiners Association, recently presented "Clean Fuels for All", describing how low-carbon liquid fuels could enable the transport sector to contribute to EU's climate neutrality objective by 2050. The pathway also shows that intermediate CO2 reductions of 100 million tonnes (Mt) are achievable by 2035.

John Cooper, Director General of FuelsEurope, commented, "With a clear societal and scientific case for far-reaching climate action, and taking into account the economic and social impacts of the coronavirus crisis, we respect that there will be no return to business as usual for the fuels industries. With the focus increasingly turning to recovery and new investments, we believe now is the time to start policy discussions with EU and national policymakers, and customer stakeholders to design the enabling policy framework for the deployment of these essential low-carbon fuels."

Low-carbon liquid fuels will play a critical role in the energy transition and in achieving carbon neutrality in all transport modes, as the global demand for competitive liquid fuels is expected to progressively increase. Alongside electrification and hydrogen technologies, low-carbon liquid fuels will remain essential even beyond 2050, bringing important benefits to the European economy and society.

Source: https://www.fuelseurope.eu/newsroom/press-releases/

Japan: New Fuel Efficiency Standards

On March 31, 2020, the Standards for Determining Businesses Manufacturing Energy Consumption Machines Concerning the Improvement of the Passenger Vehicle Performance in Terms of Fuel Consumption (Public Notice of the Ministry of Economy, Trade and Industry and the Ministry of

Land, Infrastructure, Transport and Tourism No. 2 of 2013) and a related ministerial ordinance was promulgated for enforcement. The ministerial order and notice stipulate new fuel efficiency standards for passenger vehicles for which FY2030 has been set as the target year. The new fuel efficiency standards require manufacturers to improve the fuel efficiency of their vehicles by 32.4% compared with the actual fuel efficiency in 2016. The scope of regulation will be expanded to cover electric vehicles and plug-in hybrid vehicles for the first time.

Source:
https://www.meti.go.jp/english/press/2020/0331_009.html

US Support for Biofuel Infrastructure

The U.S. Department of Agriculture announced $100 million in funding for competitive grants or sales incentives for activities designed to expand the sale and use of ethanol and biodiesel fuels. $86 million will be made available to fueling stations for activities related to higher blends of fuel ethanol greater than 10 percent. In addition, $14 million will be made available to fueling stations and fuel distribution facilities for activities related to higher blends of biodiesel greater than 5 percent.

Link: https://www.rd.usda.gov/hbiip

Chile`s Freight Sustainability Program

The Chilean Energy Sustainability Agency has developed the Giro Limpio national freight truck certification program to improve the efficiency, competitiveness, and sustainability of the goods movement supply chain. Giro Limpio provides tools and provides outreach promoting the adoption of fuel-saving strategies, such as detailing best practices, training drivers, and validating fuel-saving technologies. It also allows for the reduction of greenhouse gas emissions and other local pollutants that affect people's health. Currently, the Program has 8,000 trucks, about 3% of the Chilean truck fleet. In 2020, Giro Limpio has set the goal to reduce fuel consumption of the trucks associated with the program by 5%. Giro Limpio seeks to generate new alliances, both nationally and internationally, to build on programs throughout North, Central, and South America.

Link: https://www.girolimpio.cl/que-es-girolimpio/

Biofuels in Latin America

Biofuels deliver benefits for Latin America and are a key part of the region's clean energy transitions. Immediate action is needed to secure the future of biofuels in the region's clean energy transitions and maintain its wide-ranging benefits. Programmes that encourage the use of biofuels – and that provide a long-term vision of their place in the transport sector, such as RenovaBio in Brazil – are crucial to enable long-term investments in the sector. It is essential that such policy ambitions are not delayed or diluted as a result of low oil prices.

Link: https://www.iea.org/commentaries/biofuels-in-the-time-of-covid-19-staying-the-course-on-clean-transport-fuels-in-latin-america

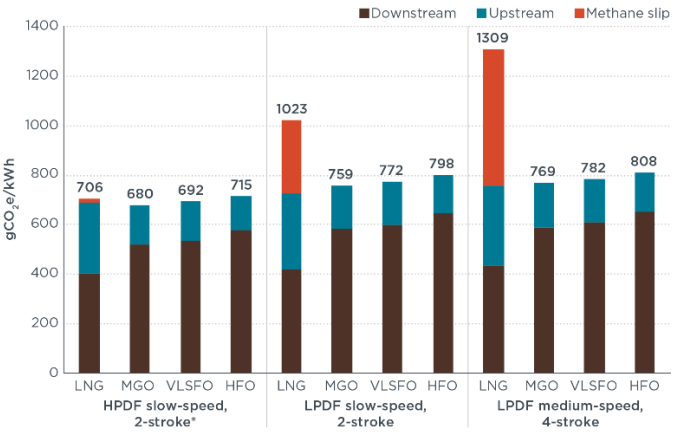
SPOTLIGHT SHIPPING AND AVIATION

LNG as a Marine Fuel

More and more ships, including container ships and cruise ships, are being built to run on liquefied natural gas (LNG), which emits approximately 25% less carbon dioxide (CO2) than conventional marine fuels in providing the same amount of propulsion power.

However, LNG is mostly methane, a potent greenhouse gas (GHG) that traps 86 times more heat in the atmosphere than the same amount of CO2 over a 20-year time period. To better understand the full climate impacts of using LNG as a marine fuel, this study compares the life-cycle GHG emissions from LNG, including upstream emissions from leakage during extraction, processing, and transport and downstream emissions from combustion and unburned methane, to those of heavy fuel oil, very low sulfur fuel oil, and marine gas oil (MGO).

The authors use a representative life-cycle emission factor as well as the 100-year and 20-year global warming potentials (GWPs) for methane included in the Intergovernmental Panel on Climate Change's Fifth Assessment Report. The 20-year GWP better reflects the need to reduce GHGs quickly, in order to meet the International Maritime Organization's (IMO) climate goals, and the results show that when combined with a trend toward higher leakage, there is no climate benefit from using LNG, regardless of the engine technology.



Life-cycle GHG emissions by engine and fuel type, 20-year GWP, higher methane scenario

Additionally, as illustrated in the figure, the most popular LNG marine engine—low-pressure dual fuel (LPDF), medium-speed, four-stroke—is also the leakiest. Using LNG, this technology emitted 70% to 82% more life-cycle GHGs than MGO. The IMO has signaled that it will regulate GHGs under its initial GHG strategy and continued investment in LNG infrastructure on ships and on shore risks making it

harder to transition to zero-emission vessels in the future. Investments should instead be focused on technologies that reduce total life-cycle GHG emissions, including energy-saving technologies, wind-assisted propulsion, zero-emission fuels, batteries, and fuel cells.

Source: ICCT

Link: https://theicct.org/publications/climate-impacts-LNG-marine-fuel-2020

Decarbonizing Shipping

Fuel cells and batteries are dominating the headlines, but internal combustion engines (ICE) will continue to dominate marine propulsion for decades. If demands for decarbonization in shipping are to be met, the question then becomes one of alternative fuels for ICEs: which fuels can be green enough, and available soon enough to satisfy stricter emissions regulations, and how will engine makers adapt to the new norm of fossil-free fuel?

Industry consulter DNV GL Maritime has recently published their view on this in an article.

Link: https://www.dnvgl.com/expert-story/maritime-impact/The-role-of-combustion-engines-in-decarbonization-seeking-fuel-solutions.html?utm_campaign=MA_20Q2_ART_Ind_234_Decarbonization%20and%20the%20role%20of%20combustion%20engines&utm_medium=email&utm_source=Eloqua

Push for Sustainable Aviation in the EU

Six countries asked the European Commission to define minimum requirements for sustainable aviation fuels sourced from renewable energy. Transport ministers from Germany, Finland, France, Luxembourg, the Netherlands and Spain called upon the Commission to quickly define a coherent framework to ensure the deployment of sustainable aviation fuels and to propose a European binding minimum share for sustainable aviation fuels from renewable sources for member states.

Link: https://www.permanentrepresentations.nl/documents/publications/2020/06/04/joint-statement-on-sustainable-aviation

SPOTLIGHT ELECTRIC VEHICLES

Canada's EV Fast Charge Network

Petro-Canada announced the completion of a network of DC chargers with locations from Nova Scotia to British Columbia, which will allow EV drivers to travel across the country. The network has more than 50 charging stations, which are located at least every 250 kilometers. The project was supported in part through $4.6 million in funding from the Government of Canada's Electric Vehicle and Alternative Fuel Infrastructure Deployment Initiative.

Link: https://www.globenewswire.com/news-release/2019/12/18/1961940/0/en/Petro-Canada-announces-completion-of-coast-to-coast-network-of-EV-fast-chargers.html

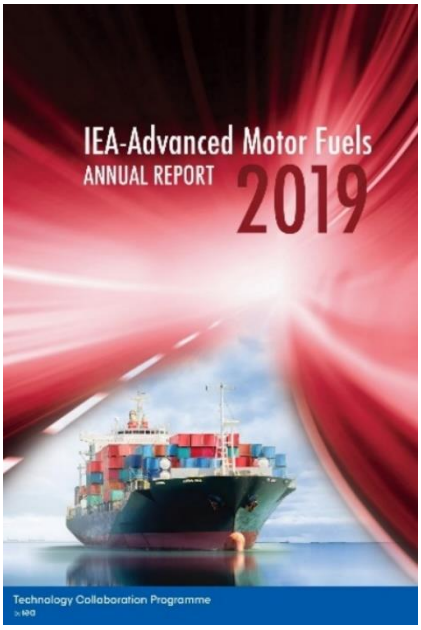
Shared EV Fleet in Mexico

DiDi plans to launch Latin America's first shared electric vehicle fleet in Mexico in 2020. The initiative will make more than 500 hybrid vehicles and 200 electric vehicles available on its app, through cooperation with local leasing partners and drivers. The company plans to provide data insights on the dynamic traffic patterns of Mexico City using its trip data.

Link: https://www.greencarcongress.com/2020/02/20200203-didi.html

IEA & IEA AMF NEWS

AMF Annual Report 2019



The AMF Annual Report provides information on the Advanced Motor Fuels Technology Collaboration Programme, on the status of advanced motor fuels in AMF member countries and worldwide, and on the work carried out by AMF in individual projects. In addition, the AMF Chairman provides an outlook on advanced motor fuels.

Link: https://iea-amf.org/content/publications/annual_reports

AMF ExCo Meeting

AMF ExCo 59 was held as an online meeting in May 2020. The meeting agenda had to be adapted to the online format and thus focused on those items that had to be discussed urgently and on taking decisions on new and existing annexes. The silver lining was that representatives of all AMF member countries and all annexes could participate in the meeting.

A new AMF ExCo Chair was elected: Jesper Schramm, the country delegate for Denmark and Professor in the Department of Mechanical Engineering at the Technical University of Denmark. Jesper is one of the longest-standing members within AMF and has been leading the Technology Subcommittee for several years. He is looking forward to chairing the ExCo. Jesper is taking over from Magnus Lindgren who he thanked for his work and leadership.

Three topics were discussed for possible new AMF work:

- Real world emissions from recreational vehicles
- Value proposition of alcohol fuels
- Remote emission sensing

The latter was started as new AMF annex.

New Annex: Remote Emission Sensing

The objective of the annex is to evaluate and propose how remote emission sensing (RES) can be used for policy purposes as well as for direct enforcement to detect high-emitting/gross-polluting vehicles in real-world traffic.

Activities include:

- Collection and consolidation of existing data
- Comparison and evaluation of the performance of the different RES technologies
- Evaluation and proposal on the use of RES to detect individual high-emitting vehicles for direct enforcement
- Evaluation and proposal on the use of RES for emission legislation and air pollution policy purposes
- Project coordination & management, synthesis, reporting and dissemination

The annex was started with Sweden as the Operating Agent and China, Denmark, Finland, Sweden and Switzerland as participants.

IEA Sustainable Recovery Plan

This new IEA publication provides suggestions for how governments can simultaneously boost economic growth, create millions of jobs and build more resilient and cleaner energy systems. It shows ways to integrate energy policies into government responses to the economic shock caused by the Covid-19 crisis, helping accelerate the deployment of modern, reliable and clean energy technologies and infrastructure.

“Governments have a once-in-a-lifetime opportunity to reboot their economies and bring a wave of new employment opportunities while accelerating the shift to a more resilient and cleaner energy future,” said Dr Fatih Birol, the IEA Executive Director. “Policy makers are having to make hugely consequential decisions in a very short space of time as they draw up stimulus packages. Our Sustainable Recovery Plan provides them with rigorous analysis and clear advice on how to tackle today’s major economic, energy and climate challenges at the same time. The plan is not intended to tell governments what they *must* do. It seeks to show them what they *can* do.”

Source: www.iea.org

Link: https://www.iea.org/reports/sustainable-recovery

AMF WORK KEY FINDINGS

GDI Engines and Alcohol Fuels

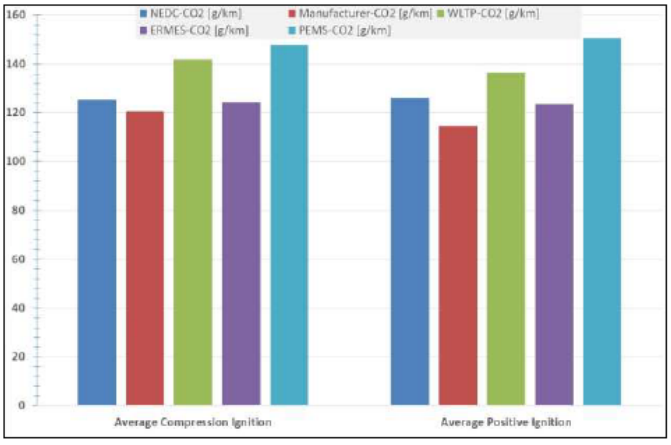
Ethanol is the most widely used biofuel around the globe. In addition to reducing greenhouse gas emissions, ethanol, generally has beneficial effects on both gaseous and particulate matter (PM) tailpipe emissions. Fuel-efficient gasoline direct injection (GDI) engines tend to have high PM emissions and genotoxicity compared to diesel engines, however, both the use of ethanol as a blending component and gasoline particulate filters can alleviate this issue. Annex 54 contributed to the understanding of particulate formation as well as mitigation.

Link: https://iea-amf.org/content/projects/map_projects/54

Real Driving Emissions and Fuel Consumption

To obtain reliable fuel consumption and emission data, test procedures have to reflect real driving behaviour. Such test procedures further helps ensure compliance of vehicles and identifying defeat devices. The world harmonized light vehicles test procedure (WLTP) could achieve this. Another useful method is on-board measurement through portable mesurment equipment (PEMS).

Of the tested vehicles, 94% showed a higher fuel consumption and emission of CO2 when tested in the certification cycle (NEDC) compared with the manufacturer declared values.Compared with normal use (PEMS) the deviation to the declared values was even higher. If the test procedure better represent real driving behaviour (WLTP) the difference was



significantly lower as can be seen in the figure below.

Average CO2 emission in g/km for cars with compression ignition and positive ignition engines

Link: https://iea-amf.org/content/projects/map_projects/55

Methane Emission Control

The use of methane in transport is predicted to increase, especially in liquid form in heavy-duty road transport and in the marine sector. Methane reduces, e.g., particulate emissions, and holds a promise to reduce CO2 emission up to 20…25 %. However, almost all methane fuelled engines have methane slip

that could nullify the CO2 benefit. AMF Annex 51 shows that technologies exist to mitigate this problem.

The most important mechanisms behind unburned methane emissions from natural gas engines have been identified. These include: misfire/bulk quenching, wall quenching, crevice volumes, post oxidation and valve timing/overlap. Particularly low-pressure dual fuel engines are associated with high values of methane emissions. Mixing of hydrogen into natural gas has shown emission and operation advantages. Different oxidation catalyst concepts have shown to be promising for exhaust after treatment. Finally, engine exhaust is found to be the major source of methane slip from NG vehicles.

Link: https://iea-amf.org/content/projects/map_projects/51

PUBLICATIONS

IEA Bioenergy Annual Report 2019

This IEA Bioenergy Annual Report includes a report from the Executive Committee and a detailed progress report on each of the Tasks. Also included is key information such as Task participation, Contracting Parties, budget tables and substantial contact information plus lists of reports and papers produced by the Technology Collaboration Programme.

Source: IEA Bioenergy

https://www.ieabioenergy.com/publications/new-publication-iea-bioenergy-annual-report-2019/

Advanced Biofuels Cost Reduction

Decarbonising transport will require a range of bio-based transport fuels, and especially advanced low carbon fuels which are suitable for long-haul transport applications including aviation. A number of appropriate technologies to produce such fuels are being developed and commercialised. However so far, their production has only reached a limited scale.

The costs of these advanced biofuels are currently higher than those of the fossil fuels which they can displace and of more conventional biofuels such as ethanol from sugar or corn, or biodiesel. This report considers what scope there is to reduce the production costs of a range of advanced biofuels, and to identify under what conditions they could become affordable.

Source: ACEA - Association des Constructeurs Européens d'Automobiles

https://www.ieabioenergy.com/publications/new-publication-advanced-biofuels-potential-for-cost-reduction/

Why Bio-Methanol Webinar

The "Why Bio-methanol?" webinar was organized by the Methanol Institute in partnership with Södra and NextChem. Circular processes have been identified as instrumental in extending value chains by increasing the utility of what would normally be considered waste or byproducts. Bio-methanol is a clean and sustainable fuel that can be produced from a variety of feedstocks such as municipal solid waste (MSW), agricultural waste, and forestry residues. The production of bio-methanol offers a solution for the diversification of waste management by diverting waste from landfills and incinerators into the production of a higher-valued clean petrochemical that can also be used as a fuel. The webinar shared the experience of 2 companies that produce bio-methanol in their own regulatory and commercial landscapes in Sweden and Italy.

The "Why Bio-methanol?" webinar is the first in a series of webinars organized by MI which is aimed at promoting the continued exchange of information related to the methanol industry. More information on the next webinar will be shared in the coming weeks.

Link: https://www.methanol.org/methanol-industry-conferences/

Methanol: A Future-Proof Fuel

Future Fuel Strategies has prepared a primer report for the MI titled, "Methanol: A Future-Proof Fuel," offering a status report and overview of methanol and its current uses in vehicle transportation fuels and its role in future fuels as well. Increasingly, methanol is being used around the world in several innovative applications to meet growing demand for energy, particularly in transport. The primer presents methanol's fuel quality benefits, addresses concerns about the use of methanol, the history of methanol blending in fuels, and its future potential as a renewable fuel capable of significantly reducing CO2 emissions.

Link: https://www.methanol.org/automotive-fuel/

Japan: IEEJ Outlook 2020

The IEEJ (The Institute of Energy Economics, Japan) Outlook 2020 considers how to best make up for the disadvantages of renewable energy, LNG and other energy sources while utilizing their advantages. The outlook provides quantitative long-term estimates for energy supply and demand, and related areas reflecting improvements in analytical approaches, as did the earlier ones.

Source: https://eneken.ieej.or.jp/data/8650.pdf

Co-Optima FY19 Year in Review

Top scientists, engineers, and analysts with the U.S. Department of Energy's Co-Optimization of Fuels & Engines (Co-Optima) initiative are examining how simultaneous improvements to fuels and engines can improve efficiency and reduce emissions and costs of the entire on-road fleet, including light-duty (LD), medium-duty (MD), and heavy-duty (HD) internal combustion vehicles that are likely to make up the majority of the U.S. automotive market for decades to come.

This report highlights the most significant Co-Optima R&D accomplishments from FY 2019, with details on findings that straddle LD, MD, and HD technologies:

- Multimode ignition strategies to boost fuel economy
- Fuel metrics to more accurately predict performance
- Ducted fuel injection for virtually sootless diesel combustion
- Renewable feedstocks to produce commercially viable diesel blends.

Link: https://www.energy.gov/eere/bioenergy/co-optima-fy19-year-review-report

First Phase of Co-Optima Initiative

The U.S. Department of Energy has released a capstone report summarizing findings from the first phase of the Co-Optima initiative, which focused primarily on the use of sustainable biofuels in a light-duty turbocharged spark-ignited engine. This research identified the fuel properties and engine parameters that mitigate knock and emissions, while maximizing boosted SI efficiency and performance. The researchers identified six fuel properties that had the most impact on engine efficiency and emissions: research octane number, octane sensitivity, heat of vaporization, flame speed, particulate matter index, and catalyst light-off-temperature. They found after screening a large number fuel blendstocks for the desired properties, they found six that fewest significant practical barriers to adoption which include alcohols and an olefin (alkene): di-isobutylene, ethanol, a fusel alcohol blend, isobutanol, n-propanol, and isopropanol. In a separate analysis of economic benefits and environmental performance of 24 biomass blendstocks, it was found that the top performing blendstocks all have the potential to reduce life-cycle greenhouse gas emissions by at least 60% compared to petroleum-based fuels. At a 30% blend level, this equates to an 18% reduction in emissions for the finished fuel.

Link: https://www.energy.gov/eere/bioenergy/articles/answers-three-vital-questions-how-fuels-can-improve-efficiency-emissions-and

Economics of Advanced Biofuels

U.S. Department of Energy researchers analysed the how bioproducts can make biofuels cost-competive with petroleum-based fuels. The researchers gathered information on a group of well-studied bioproducts that plants can already effectively produce. They then simulated what it would take to extract these bioproducts from plant material in the context of an ethanol biorefinery. They present a range of bioproduct selling prices and accumulation rates needed to reach a target $2.50/gal minimum biofuel selling price. The analysis suggests that, although no single bioproduct will be sufficiently high-volume and high-value to improve the economics of all biofuel production at the enterprise level, bioenergy crops can be engineered to produce a variety of high-value products in planta at concentrations well beyond the minimum needed to be cost-effective and have a significant impact on the commercial viability of cellulosic biorefineries.

Link: https://www.pnas.org/content/117/15/8639

Lignocellulose Pretreatment

Lignocellulosic biomass has been recognized as promising feedstock. In the present review, advances in lignocellulose pretreatment technologies for biofuels production are reviewed and critically discussed. Moreover, the challenges faced and future research needs are addressed especially in optimization of operating parameters and assessment of total cost of biofuel production from lignocellulose biomass at large scale by using different pretreatment methods.

Source:

https://www.biofueljournal.com/article_103970.html

Biodiesel in Pioneering Diesel Fuels

In this project the University of Applied Sciences Coburg has investigated future regenerative fuels with regard to their miscibility and ageing behaviour in order to be able to make better predictions about the miscibility of fuels. Based on solubility parameters and a developed algorithm, the miscibility of RME, OME as an option of a renewable synthetic fuel and HVO was derived theoretically and verified experimentally.

Link: https://www.ufop.de/index.php/download_file/8650/

Life-Cycle Analysis of Agave Ethanol

Researchers conducted the first comprehensive life cycle assessment and economic analysis on ethanol produced from agave. The study shows that ethanol yields from agave are comparable to Brazilian sugarcane and higher than US corn ethanol. Agave was found to outperform current first generation biofuel crops in water-related impacts and greenhouse gas emissions. The measured by land occupied per unit ethanol output is similar to sugarcane but nearly double that of corn; however, agave can be grown on arid land that is not suitable for food crops. Currently, ethanol production from agave would require government support to be economically viable.

Link: https://www.sciencedirect.com/science/article/pii/S0959652620313305

Renewable Energy in Europe

The European energy system is undergoing rapid changes to set the EU economy on a low-carbon and resource-efficient path. Renewable energy is instrumental to this transformation. EU efforts to double the share of renewable energy in its consumption have paid off, having reduced significantly the amount of fossil fuels used and their associated greenhouse gas emissions. Concerning air pollutant emissions however, the outcomes were not always positive: in countries where biomass burning has increased considerably since 2005, emissions of certain air pollutants have also increased. This briefing presents an estimate of the impact of renewable

energy consumption on fossil fuel use, greenhouse gas emissions (GHG) and air pollution since 2005.

Source: European Environment Agency (EEA) - Publications
https://www.eea.europa.eu/publications/renewable-energy-in-europe-key

Towards Net-zero Emissions in the EU

This report presents a comparison of 8 scenarios achieving more than 50% reduction of greenhouse gas emissions by 2030 compared to 1990, and 16 scenarios aiming at climate neutrality by 2050, similar with the ambitions of the "European Green Deal". It summarises insights into similar and diverging elements of the scenarios on how the EU energy system may change by 2030 and by 2050, compared to today. The wealth of information, stemming from how different organisations see the EU energy system to evolve within their own scenario context, can provide useful input to EU climate and energy strategies.

Source: Publications Office of the EU:

Link: https://op.europa.eu/en/publication-detail/-/publication/94aab140-8378-11ea-bf12-01aa75ed71a1/language-en/format-PDF

Trans-European Gas Infrastructure

The aim of this study is to obtain a better understanding of the potential of biomethane and hydrogen to contribute to the decarbonisation of the EU energy system, the impacts this will have on the gas infrastructure and the extent to which gas network operators and regulators are prepared to cope with these impacts. This study builds on the findings from the previous gas infrastructure 2050 study, while significantly advancing the provision of quantitative data to the analysis. The three explorative scenarios and assumptions regarding the use of electricity, methane and hydrogen serve to analyse this impact on the gas infrastructure, rather than aiming to forecast the most probable deployment pathway of biomethane and hydrogen in the EU or any Member State.

Source: Publications Office of the EU:

Link: https://op.europa.eu/en/publication-detail/-/publication/10e93b15-8b56-11ea-812f-01aa75ed71a1/language-en/format-PDF

Advanced Alternative Fuel Volumes in the Netherlands

This working paper estimates the volumes of advanced, non-food-based fuels that could contribute to the Netherlands' RED II obligation in 2030, focusing on the country's domestic resources. A cost and availability-constrained assessment is utilized to evaluate the advanced alternative fuel potential for the Netherlands through 2030 across three different incentive levels for alternative fuels.

Source: icct - the International Council on Clean Transportation

Link: https://theicct.org/publications/alternative-fuel-netherlands-May2020

India: Zero Emission Bus Deployment

The G20 Transport Task Group webinar, **The Ins and Outs of Zero Emission Bus Deployment: Lessons from India**, took place on Thursday, March 26, 2020.

The webinar included two presentations:

- Zero Emission Electric Bus Transitions in Bangalore, India by Ravi Gadepalli from UITP-India and
- Route-Level Modeling to Support Zero Emission Bus Deployment in Bangalore by Tim Dallmann from the International Council on Clean Transportation.

The UITP presentation provided an overview of policies in India supporting electric bus transitions, specifics on the steps Bangalore Metropolitan Transport Corporation (BMTC) has taken to implement electric buses in its fleet, and an overview of methods developed to estimate future fleet size in support of long-term planning.

The ICCT presentation introduced how bus route-level modeling can help address questions related to electric bus deployment, such as:

- How does the estimated range of battery-electric buses compare to the daily utilization of diesel buses currently in service?
- How do route and operational characteristics affect bus energy consumption and the range of electric buses?
- From a cost and operational perspective, which routes make the most sense to electrify first?

A recording of the webinar is available online:

Link: https://www.gotostage.com/channel/transport-task-group?utm_source=G20+Transport+Task+Group&utm_campaign=1a84a2bed9-zero-emission-buses-India-Mar-2020-follow-up&utm_medium=email&utm_term=0_f8461f0afc-1a84a2bed9-337674245&mc_cid=1a84a2bed9&mc_eid=15ad54317d

EVENTS

Advanced Bioeconomy Leadership Conference
8-10 July 2020, Washington, D.C., USA
http://biofuelsdigest.com/ablc/

Electric & Hybrid Vehicle Technology Expo
15-17 September 2020, Novi, Michigan, USA
https://www.evtechexpo.com/

Future of Biofuels 2020
22-23 September 2020, Copenhagen, Denmark
https://fortesmedia.com/future-of-biofuels-2020,4,en,2,1,5.html

US Biogas 2020
5-6 October 2020, San Diego, California, USA
https://events.newenergyupdate.com/biogas/

2020 JSAE Congress
21-23 October 2020, Kitakyushu, Japan
https://www.jsae.or.jp/2020aki/english/index.html

Eco-Mobility 2020
19-20 November 2020, Vienna, Austria
https://www.a3ps.at/konferenz/eco-mobility-2020

Biofuture Summit II and BBEST2020
30 November – 2 December, São Paulo, Brazil
http://bbest-biofuture.org/v2/

RNG 2020 Conference
8-11 December 2020, Dana Point, California, USA
http://www.rngcoalition.com/rng-conference/

Fuels of the Future 2021
18-19 January 2021, Berlin, Germany
https://www.fuels-of-the-future.com/

National Biodiesel Conference & Expo
18-21 January 2021, Ft. Worth, Texas, USA
https://www.biodieselconference.org/

Transportation Research Board 100th Annual Meeting
24-28 January 2021, Washington, D.C., USA
http://www.trb.org/AnnualMeeting/AnnualMeeting.aspx

SAE Hybrid and Electric Vehicle Technologies Symposium
16-18 February 2021, Pasadena, California, USA
https://www.sae.org/attend/

Renewable Fuels Association National Ethanol Conference
15-17 February 2021, San Diego, California, USA
http://www.nationalethanolconference.com/

The Work Truck Show & GreenTruck Summit
9-12 March 2021, Indianapolis, Indiana, USA
http://www.worktruckshow.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, Shinichi GOTO, AIST, and Andy BURNHAM, ANL. It is edited by Dina Bacovsky, BEST – Bioenergy and Sustainable Solutions. The Newsletter is available online at: *www.iea-amf.org*.

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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.