AMF TCP End of Term Report 2020-2025

Introduction

This End of Term Report from the Advanced Motor Fuels (AMF) TCP covers the period 2020-2025 and is part of the RfE process for a new term for the period 2025-2030[1].

Strategy/Vision

AMF TCP is helping the transport sector achieve sustainability and reduce the impacts of the sector on the environment. Established in 1984, AMF TCP has a strong international network that fosters collaborative research, development, and deployment of advanced motor fuels and provides unbiased information on clean, energy-efficient, and sustainable fuels and related engine and vehicle technologies.

The mission of AMF TCP is to advance the understanding and appreciation of the potential of advanced motor fuels towards transport sustainability. AMF TCP provides sound scientific information and technology assessments facilitating informed and science-based decisions regarding advanced motor fuels on all levels of decision-making.

AMF TCP considers fuels advanced if they have positive impact on GHG emissions as well as on air pollutant emissions, have been sustainably produced, are cost-efficient to produce and efficient to use in engines.

Summary of Activities

The work of AMF TCP is carried out through Tasks with clearly defined objectives, budgets and time frames, which can be kicked-off with at least three Contracting Parties participating and whose progress is presented at the semi-annual ExCo meetings. The AMF TCP work program is presented in detail in the RfE Questionnaire, along with key findings.

In the 5-year period from 2020 to 2025, 13 Tasks were active. Of these, five rolled into this period (2020-2025) from the previous 5-year term (2015-2020), and eight were initiated in this period (two of which have not yet been assigned a number). A brief description of these Tasks is given below; further information can be found on the AMF TCP website.

Task 28: Information Service & AMF Website (AMFI) – ongoing

This Task provides dissemination of AMF TCP results and publications and communication towards related experts and decision makers. Major outputs are the fuel info section that provides topical information on 13 different types of alternative motor fuels, the AMF TCP website, and a newsletter.

Task 56: Methanol as Motor Fuel – completed

With the support and participation of the Methanol Institute, this Task investigated the applicability of methanol as fuel in light-duty and heavy-duty road vehicles, as well as ships. The project concluded with a webinar hosted by the Methanol Institute.

Task 57: Heavy Duty Vehicle Evaluation – completed

This Task combined chassis dynamometer measurements, on-road measurements and simulations of heavy-duty trucks, with the aim to present a snapshot of the performance of contemporary vehicles as well as to present projections of performance up to the year 2030. The HEV TCP contributed to the results at the Tasks´ final webinar.

[1] This report was approved at ExCo67 (18-20 June 2024) and excludes TCP outputs between June 2024 and the end of the term (February 2025).

Task 58: The Role of Advanced Renewable Transport Fuels in the Decarbonisation of Transport in 2030 and beyond – completed

The purpose of this project was to draw the big picture of how advanced renewable transport fuels can contribute to the decarbonization of the transport sector, and to deliver this information to policy makers. It was conducted as joint project with the Bioenergy TCP and included a workshop with decision makers from industry and policy in Brussels, Belgium.

Task 59: Lessons Learned from Alternative Fuels Experience – completed

This Task assessed case studies of market introductions of alternative fuels to determine success factors and pitfalls, lessons, and recommendations for better action from the experiences of different countries in the last decades.

Task 60: The Progress of Advanced Marine Fuels – completed

This Task investigated the use of new forms of low-carbon fuels in the shipping sector. The project concluded with a conference "CLEAN Marine Conference - The Progress of Advanced Marine Fuels", which was organized jointly with the CLEAN Cluster Denmark and the Methanol Institute.

Task 61: Remote Emission Sensing – completed

This project successfully investigated 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. It concluded with a final webinar in June 2024.

Task 62: Wear in Engines using Alternative Fuels – ongoing

This Task deals with identifying, evaluating and counteracting foreseeable engine wear problems from the future use of alternative fuels. Close cooperation with the AMT TCP has been established.

Task 63: Sustainable Aviation Fuels – completed

This Task was AMF TCPs´ first Task dealing with the aviation sector. A new set of experts needs to be brought to the table as to allow AMF TCP to conduct meaningful R&D work on sustainable aviation fuels. The Task thus focused on identifying stakeholders and experts, assessing participants' national situation, and facilitating information exchange on the main challenges in taking up sustainable aviation fuels. Areas that need to be addressed in future work/tasks were identified.

Task 64: E-fuels and End-use Perspectives – ongoing

The focus of this project is an informative exchange on the production and application of different e-fuels as well as the corresponding regulatory framework and standards. For this purpose, a series of workshops was conducted. The Task collaborated with the Bioenergy TCP.

Task 65: Powertrain Options for Non-Road Mobile Machinery – ongoing

This Task explores energy and powertrain options and their feasibility for NRMM applications in different use cases, including snowmobiles and generator sets for e.g. agriculture.

Exhaust After-Treatment Systems – new Task

This Task was started up as a joint Task with the Sustainable Combustion TCP in June 2024. It will conduct regular information exchange on the impact of the use of advanced motor fuels on exhaust conditions, sensors and catalysts, and ambient air emissions.

Recent Progress in SAF Research – new Task

This Task was started up in June 2024. It will conduct regular information exchange through quarterly online seminars on research related to the production of SAF, the application of SAF, and related policy.

In addition, AMF TCP investigated the use of ammonia in combustion engines and published a special report on this topic. This is an important contribution to understanding potential applications of ammonia, among other options, as potential fuel for large ship engines.

AMF TCP also produced five Annual Reports, which provide 3 pages of description for each of the Tasks and 5 pages on the status of advanced motor fuels in each of the participating countries. In earlier years the report served as the main outreach tool and 200-300 copies were printed and distributed at conferences. However, in the meanwhile, and in particular after the pandemic, people are reluctant to pick up heavy reports. Thus, it was decided to stop printing the full report and to start distributing double-sided one-pagers with a QR-code linking to the digital report instead. In addition, the country reports are extracted from the main document and made available on the AMF TCP website as separate files, constituting one of the most-visited parts of the website.

In the course of looking back at 40 years of collaboration in the AMF TCP, a jubilee brochure was produced which highlights successful projects, added value and impact created by AMF TCP, and outlines the future direction of AMF TCP.

Collaboration

AMF TCP has contributed towards IEA publications through reviewing several GEVO and Energy Technology Perspectives reports, providing articles for the "Today in the Lab – Tomorrow in Energy?" initiative, participating in EUWP meetings, Transport Contact Group meetings and TCP Universal Meetings as well as in the Energy Innovation Forum in 2024, and through providing data on heavy-duty vehicles and on ferries for the IEA GREET+ project.

As mentioned in the above summary of activities, AMF TCP has actively collaborated, and continues to do so, with several other TCPs, namely AMT, Bioenergy, HEV, Hydrogen and Sustainable Combustion. AMF TCPs´ ExCo66 in October 2023 was conducted in conjunction with a business meeting of IEA Bioenergy Task 39 and included a full-day workshop on the topic of "Renewable Fuels - Ten times more renewable fuels".

Currently, AMF TCP is trying to initiate cross-TCP collaborative work on a White Paper on Sustainable Fuels in Combustion Engines, as a means of reaching out to decision makers and pointing out the continued need for the application of fuels in combustion engines and related R&D work.

Other organisations that AMF TCP interacts with are the Methanol Institute, the International Transport Forum (ITF) and the International Council on Clean Transportation (ICCT).

Governance

To manage AMF TCP's functioning and work program, the Executive Committee (ExCo) meets twice a year, with Contracting Parties hosting in turn. Members discuss the progress made in active Tasks, share results, and explore and start new Tasks. Participation in these meetings is high; on average, 87% of the contracting parties are present at the ExCo meetings, along with 85% of the Task Manager of active Tasks.

Due to the pandemic, AMF TCP was forced to conduct all of the ExCo Meetings in 2020 and 2021 online, which actually had a positive effect on the average number of participants. In order to maintain this positive trend and also contribute to climate protection due to lower travel emissions, the ExCo decided to conduct one virtual and one physical meeting per year from 2022 onwards. Physical meetings usually include a study tour and/or a workshop, as to allow for deeper understanding as well as more informal information exchange.

The AMF TCP leadership team consists of one Chair and two or three Vice-Chairs (ideally spread over different geographic regions) who are elected for a period of two years with the possibility of continuation through further two-year periods. Two Sub-committees have been established for Technology & Strategy, and Outreach & Membership, respectively, and a Financial Officer oversees the finances that are operated by the American Society of Engineering Education.

The AMF TCP Executive Committee has designated a Secretary to assist the Executive Committee in carrying out its responsibilities. Between 2020 and 2024, there were two male Chairs (Magnus Lindgren – Sweden; and Jesper Schramm - Denmark); 4 males and 6 females served as Vice-Chairs, Sub-committee Heads, Financial Officer or Secretary.

The AMF TCP Common Fund is cost-shared (a membership fee of 10,250 EUR per country applies), while Tasks can be task-shared, cost-shared, or a combination of both.

Technological developments and recent trends and their implications for the AMF TCP work program and strategy are discussed at every ExCo meeting. New Tasks can be initiated either top-down or bottom-up and it takes three contracting parties to start up a Task. Technology gaps and barriers to deployment are continuously being identified and discussed during ExCo meetings, especially in the Strategy & Technology Sub-committee. Whenever feasible, gaps and barriers identified are addressed through a Task.

As one of the first TCPs, AMF TCP followed IEA Secretariat´s request to adapt the text of the AMF Implementing Agreement to the new Framework and adopted the new legal text in May 2021. Other notable decisions were to establish collaboration with the International Transport Forum (ITF), and to stop printing and distributing hardcopies of the Annual Report.

Membership

As of May 2024, AMF TCP has 16 Contracting Parties from 14 countries: Austria, Brazil, Canada, China, Denmark, Finland, Germany, India, Japan (3 distinct Contracting Parties), Korea, Spain, Sweden, Switzerland and USA. The Executive Committee of AMF TCP allows to appoint a Member and an Alternate Member from each of the 16 Contracting Parties. Currently, 77% of these Members and Alternate Members are male, while 23% are female.

AMF TCP members as of 2023 represent a population of 3.8 billion people (48% of world population). AMF TCP is especially proud of having attracted several non-OECD members including Brazil, China and India. All of these have large populations and their economies experience rapid growth in transport activity and transport fuel demand. Changes of membership included the joining of Brazil in late 2022, and the withdrawals of Chile and Israel, both because of shifts in strategic direction of the participating institutions. Chile was a member from 2015 to 2021 and Israel from 2013 to 2020.

Key Outcomes

In the Strategic Work Plan 2020-2024, AMF TCP has identified 3 key areas of R&D, namely fuels, vehicles and system analysis. AMF TCP Tasks have contributed to all of these, created a significant body of relevant work, and hereby contributed to the implementation of IEA´s mission in the areas of secure and sustainable energy.

In particular, AMF TCP has expanded its network to more countries (Brazil), organisations (ITF) and sectors (aviation); contributed to R&D in the sector of advanced motor fuels and their application in engines and turbines; strengthened its collaboration with other TCPs; involved industry in several activities of AMF TCP Tasks; and assessed the optimum allocation of different fuels e.g. in heavy-duty trucks, ships and planes.

Lessons Learned/Conclusion

The term 2020 to 2024 was a time of radical changes. The pandemic made international travel impossible and forced AMF TCP to learn how to successfully conduct online meetings. As a result, even after the pandemic, one ExCo meeting per year will be held online and one in person.

Reducing GHG emissions has recently become a main driver for the development of a sustainable, efficient transport sector, while also pollutant emission standards continue to be tightened. The sector is shifting toward electric vehicles and toward low-carbon fuels for internal combustion engines. Consequently, the use of liquid fuels in the road transport sector is expected to decrease. The prospective ban of internal combustion engines for passenger cars in the EU from 2035 onwards has caused insecurity in the automotive sector and brought R&D on fuels in combustion engines almost to a halt.

However, combustion engines are desirable when high power and autonomous mobility are required, such as long-haul and heavy-duty applications in all transport sectors (road, aviation, shipping). AMF TCP is thus shifting focus from passenger cars to trucks, non-road heavy machinery, ships and planes, and expanding its network of experts accordingly.

Despite the challenging framing conditions, AMF TCP is concluding a successful working period. It has conducted R&D work on the performance evaluation of a range of fuels, including fuels for the shipping sector, aviation fuels, ammonia and electrofuels; assessed real driving emissions as well as the efficiency of heavy-duty vehicles; and compared different energy carriers for heavy-duty vehicles and planes. All Tasks conducted dissemination webinars and provided final reports and key recommendations to decision makers in 2-page documents.

AMF TCP members have found that AMF TCP efforts are relevant to their countries and are looking forward to continuing in the next working period. Some key statements that were made in the 2023 survey to members are reflected below.

Formation of a truly international network of experts

Good spirit within the AMF group

Engagement of multiple countries, including non-OECD countries

Sharing information and best practices, pooling resources, leveraging

Setting up timely research tasks

Ability to generate unbiased data on various motor fuels

Making AMF results visible

Creating data and information that goes into decision making