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# AUSTRIAN POSITIONS FOR ADVANCED PROPULSION TECHNOLOGIES

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A3PS Position Paper R&D Demand 2024+

## A Introduction

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The present A3PS position paper "**R&D Challenges 2024+**" summarizes envisaged developments and trends, as well as priorities of the industrial and scientific A3PS members. It provides an overview on the R&D challenges in the coming years and the necessary R&D activities to strengthen Austria as a business location.

A3PS expert groups have updated and identified actions and measures towards a climate-neutral, sustainable, efficient and safe transport system via:

- 1) **Support of mobility and powertrain technologies & innovations** in Austria, taking a holistic view of the value creation process, based on the **LCA (Life Cycle Assessment)** method ("from cradle to grave") to meet the 2030 targets and to enable mission 2050 targets in full.
- 2) **Establishment of a legal framework**, norms, standards and a strategy for R&D activities, the rapid implementation of R&D results and for regular operation (street / off-road / rail).
- 3) **Fostering of core competencies** in the field of mobility and powertrain innovations in Austria with a strong focus on value creation in Austria.

The A3PS position papers should support the orientation of national R&D activities and technology policy impulses, as a supplement to those priorities set at European level.

A3PS considers primarily R&D topics in this position paper. A3PS is convinced that investing in and therefore funding research is the most effective way for the achievement of more sustainable, more efficient and cost-effective technologies.

### Goal:

To empower the Austrian industry & academia in R&D regarding a global perspective → keep Austria competitive

All R&D topics presented in the A3PS area comprise only CO<sub>2</sub>-neutral solutions, global oriented

As a "living document", the **position papers** are regularly checked for topicality and revised if necessary. The present position paper provides a **short-term outlook** for 2024-2026 (download at <https://www.a3ps.at/a3ps-position-papers>).

A more extensive list of research requirements including **mid-term** (2025-2030) and **long-term** (2030+) topics can be found in the **A3PS Roadmap** at <https://www.a3ps.at/a3ps-roadmaps>.

The position papers cover all advanced propulsion systems: battery electric powertrain technologies, fuel cell technologies and hybrid automotive powertrains with combustion engines using sustainable liquid or gaseous energy carriers. Life cycle assessment serves as method to find the best solution for different mobility applications depending on available energy carriers.

All sustainable technologies are essential to reach the ambitious climate goals. This includes sustainable energy carriers also for the existing fleet of vehicles. In contrast, narrowing down the technology options for a GHG-neutral road sector available delays the ramp-up of a carbon-neutral vehicle stock and leads to higher than necessary cumulated GHG emissions by 2050.<sup>1</sup>

## A.1 Circular Economy

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Circular economy must be considered in all technology sectors. This increases the research demand since, besides functional efficiency, additionally safety, security, durability, recyclability and second life must be considered. This is essential for the overall vehicle, components, batteries, bearing parts, etc.

A circular economy is "a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible".<sup>2</sup> Circular economy aims to tackle global challenges like climate change, biodiversity loss, waste, and pollution by emphasizing the design-based implementation of the three base principles of the model. The three principles required for the transformation to a circular economy are: eliminating waste and pollution, circulating products and materials, and the regeneration of nature. Circular economy is defined in contradistinction to the traditional linear economy.<sup>3</sup>

As climate change increasingly highlights the limits of the environmental devastation of a linear economy, many companies and consumers are moving towards implementing a global circular economy<sup>4</sup>, which is a systems solution framework tackling issues such as waste, pollution, and diminishing biodiverse ecosystems. The 9R's are a circular economic framework that examines how materials can be used and reused at their highest value while minimizing waste and environmental destruction. They are *Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle* and *Recover*.<sup>5</sup>

## A.2 A3PS – Austrian Association for Advanced Propulsion Systems

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A3PS and its members from industry and research institutions discussed, phrased and prioritized the contents of this position paper in early 2024. Founded in 2006 as an initiative of the Austrian Ministry of Technology, A3PS is the **strategic platform** of the Austrian technology policy, industry and research institutions and stimulates the development of advanced propulsion systems and energy carriers – to build up common competence and to accelerate market launches.

A3PS addresses all **advanced powertrain technologies** contributing to the improvement of energy efficiency and to the reduction of emissions and supporting the whole innovation cycle (research, development, deployment).

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<sup>1</sup> FVV (2022), "Future Fuels: FVV Fuel Study IVb: Transformation of European Mobility to the GHG-neutral Post-fossil Age", [https://www.researchgate.net/publication/366974074\\_FVV\\_Fuel\\_Study\\_IVb\\_-\\_Transformation\\_of\\_European\\_mobility\\_to\\_the\\_GHG-neutral\\_post-fossil\\_age\\_-\\_FVV\\_H1313\\_2022](https://www.researchgate.net/publication/366974074_FVV_Fuel_Study_IVb_-_Transformation_of_European_mobility_to_the_GHG-neutral_post-fossil_age_-_FVV_H1313_2022), retrieved 8 May 2024

<sup>2</sup> <https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits>, retrieved 8 May 2024

<sup>3</sup> <https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview>, retrieved 8 May 2024

<sup>4</sup> <https://medium.com/topangasupply/defining-circularity-is-sustainable-a-dirty-word-a47bb5ce5ef9>, retrieved 10 May 2024

<sup>5</sup> <https://www.topanga.io/post/how-the-9r-framework-can-change-our-economy>, retrieved 10 May 2024

A3PS members congregate in four thematic expert groups. These expert groups elaborate positions, trends, R&D demands and demands concerning the essential legal framework for prospective technologies as for this document.

A3PS's goal is to empower the Austrian industry and academia in R&D regarding a global perspective to keep Austria competitive. All R&D topics presented in the A3PS area – such as this position paper – comprise only CO<sub>2</sub>-neutral solutions, global oriented.

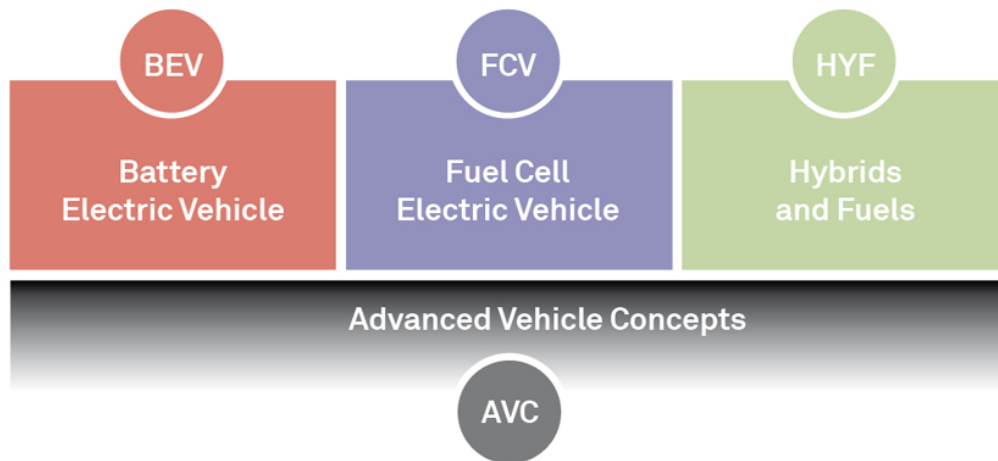


Fig. 1: 4 A3PS thematic expert groups

### BEV – Battery Electric Vehicle

Expert group BEV focuses on strong scientific and informative public relations work about **battery electric vehicles**. The group analyses strengths and weaknesses of battery electric vehicles and points out research and development needs.

### FCV – Fuel Cell Electric Vehicle

FCV expert group's focus is on hydrogen **fuel cell electric vehicles**. Besides, the group also deals with **hydrogen** production, infrastructure and storage, since sustainable production, price and availability of hydrogen play a key role for the success of fuel cell vehicles.

### HYF – Hybrids and Fuels

Expert group HYF concentrates on the identification of needs for research on efficient **hybrid** technology, **sustainable energy carriers** for vehicles as well as **internal combustion engines**. The strengths of Austrian institutions in this field are discussed and highlighted.

### AVC – Advanced Vehicle Concepts

Expert group AVC deals with **advanced and future vehicle concepts** comprising **new lightweight materials, innovative production technologies & digitalization of processes** and **digitalization & automation of vehicles and infrastructure**. The group links to the other three expert groups and focuses on a system perspective and integration. The wide range of different technologies in expert group AVC is addressed in two chapters within this position paper:

- Advanced Vehicle Concepts, including automatization, digitalization, connectivity – the vehicle as part of the “system of systems.”
- Innovative Materials and Vehicle Production Technologies