

Alliance for **Zero-Emission Aviation**



PREPARING EUROPE
FOR HYDROGEN
& ELECTRIC FLIGHT

General information session

Paris Air Show, 20 June 2023



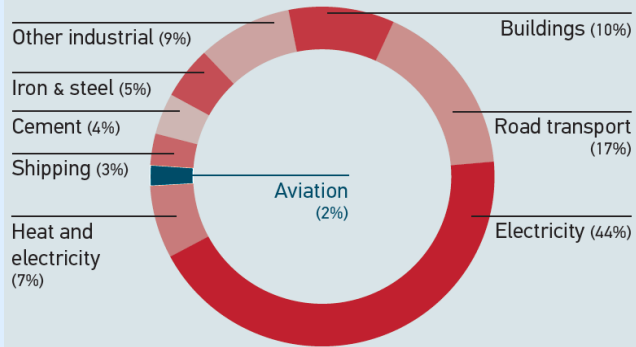
Why AZEA?

- ➔ **Support the EU aeronautics industry to deliver zero-emission aircraft for environmental and industrial benefits**
- ➔ **Recognise the contribution of electric/hydrogen to reach long-term decarbonisation objectives**
- ➔ **Prepare the aviation ecosystem for commercial exploitation of electric and hydrogen aircraft**

Support the EU aeronautics industry to deliver zero-emission aircraft for environmental and industrial benefits

Counting CO₂

Aviation makes up around 2% of global CO₂ emissions. Figures from 2014³.



NB: energy-related CO₂ emissions only. Does not include land use change emissions from agriculture or forestry which between them are around 25% of global greenhouse gas emissions.

Aviation
Must become sustainable



Entire aviation sector
Ambitious environmental objectives

Net zero CO₂ emissions by 2050 from all flights within and departing from the EU



Manufacturing industry
Energy shift towards electric and hydrogen propulsion
(within 10 years for short haul)

Hydrogen combustion
Fuel cells
Battery electric
Hybrid electric

Recognise the contribution of electric/hydrogen to reach long-term decarbonisation objectives

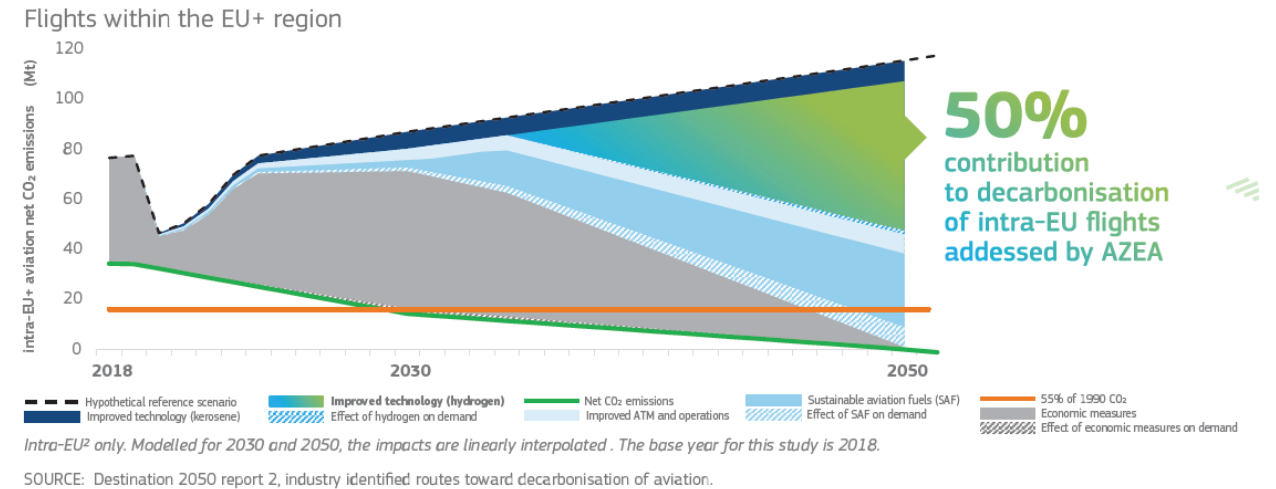
➔ While SAF and offsets will remain the solution for the decarbonisation of long-haul flights, electric and hydrogen aircraft may strongly contribute to

- ❖ decarbonise **intra-EU flights** after 2035
- ❖ remove **in-flight CO₂** emissions
- ❖ reduce **non-CO₂** emissions
- ❖ improve energy **efficiency**

➔ Commuters and regional aircraft (**30% of the market**), a growing market segment led by non-EU industry

➔ Green aircraft may unlock regional air mobility and create **new business models** for regional aerodromes

Hydrogen (whether used in combustion turbines or fuel cells) and battery electric propulsion **will completely eliminate** in-flight CO₂ emissions and significantly reduce other emissions.



General Aviation / Air Taxi



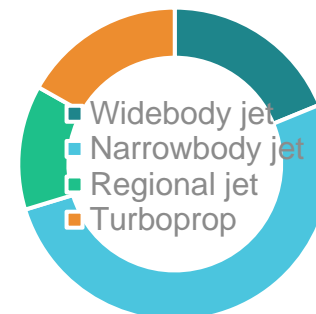
eVTOL



Small Commuter



Regional Aircraft



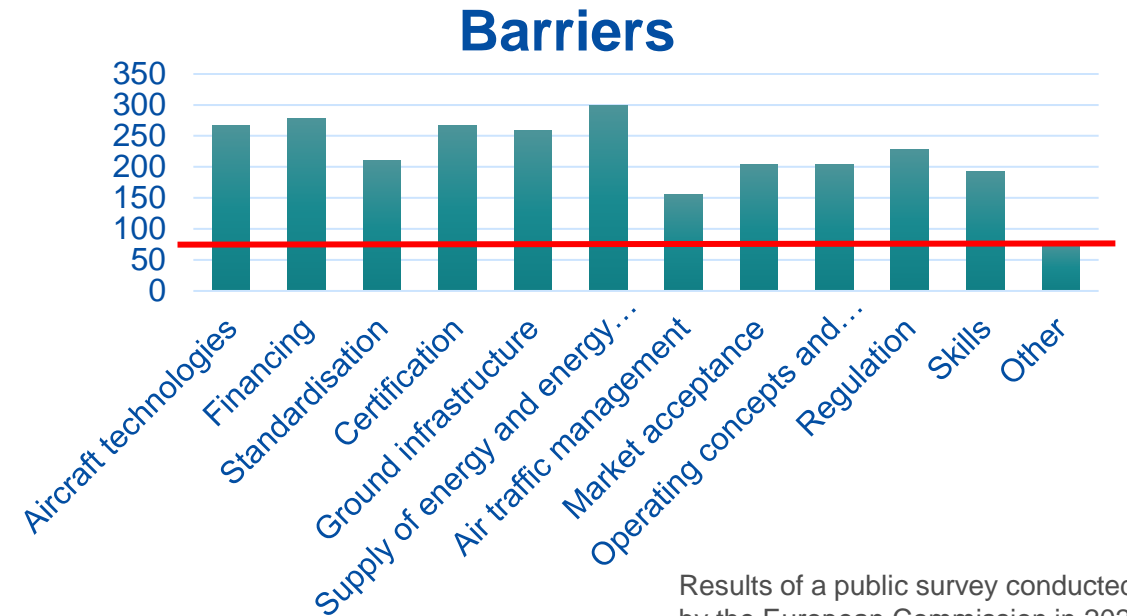
Prepare the aviation ecosystem for commercial exploitation of electric and hydrogen aircraft

➔ Existence of barriers in many different areas confirmed by a public consultation (9/2021)

- ❖ Supply of green energy (electricity and hydrogen)
- ❖ Development of necessary airport infrastructures and their financing
- ❖ Safety and security regulations
- ❖ Certification and standardisation
- ❖ Operating concepts, ATM
- ❖ Skills, etc.

➔ Addressing them requires bringing together many different stakeholders, including beyond aviation, in a coordinated way

- ❖ Manufacturers, airlines and lessors, airports, energy providers and distributors, ANSP, regulators, SO, RO, NGOs, investors, Regions, MS, etc.



AZEA was launched in June 2022 as an open platform gathering private and public stakeholders..

.. to prepare the aviation ecosystem for the earliest possible entry into commercial service of hydrogen and electric aircraft

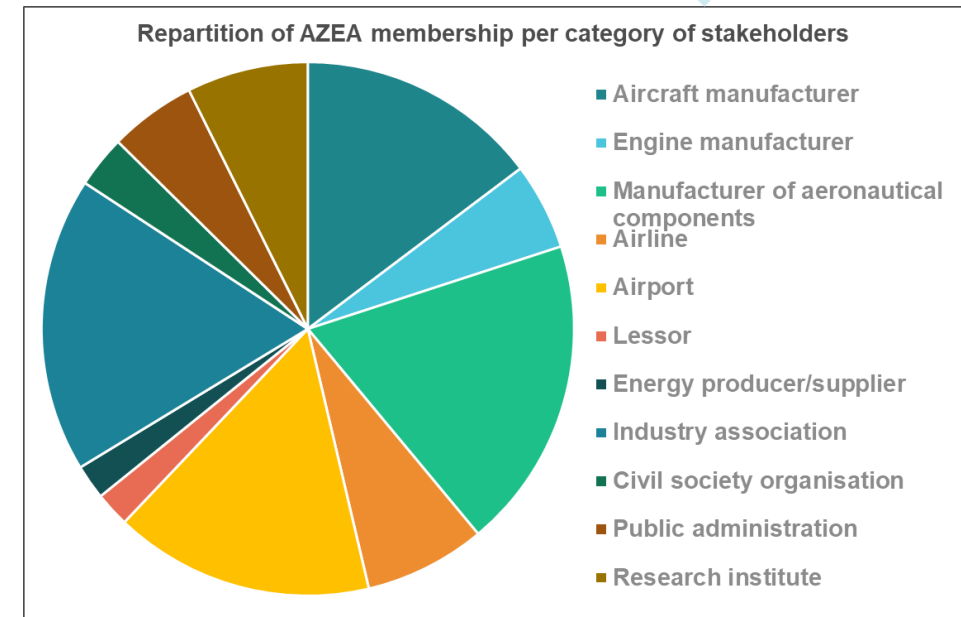
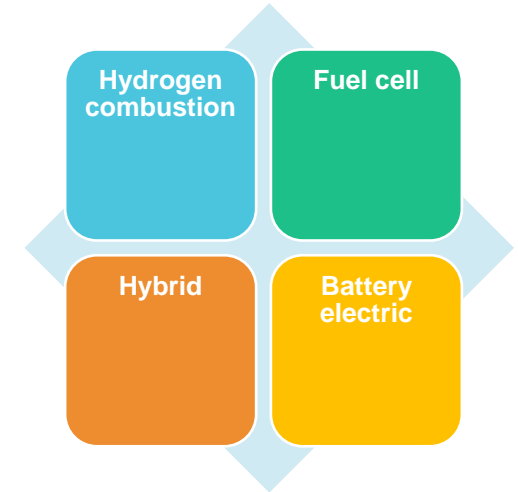
Turn prototypes into commercial successes

Concentrate on disruptive a/c configurations

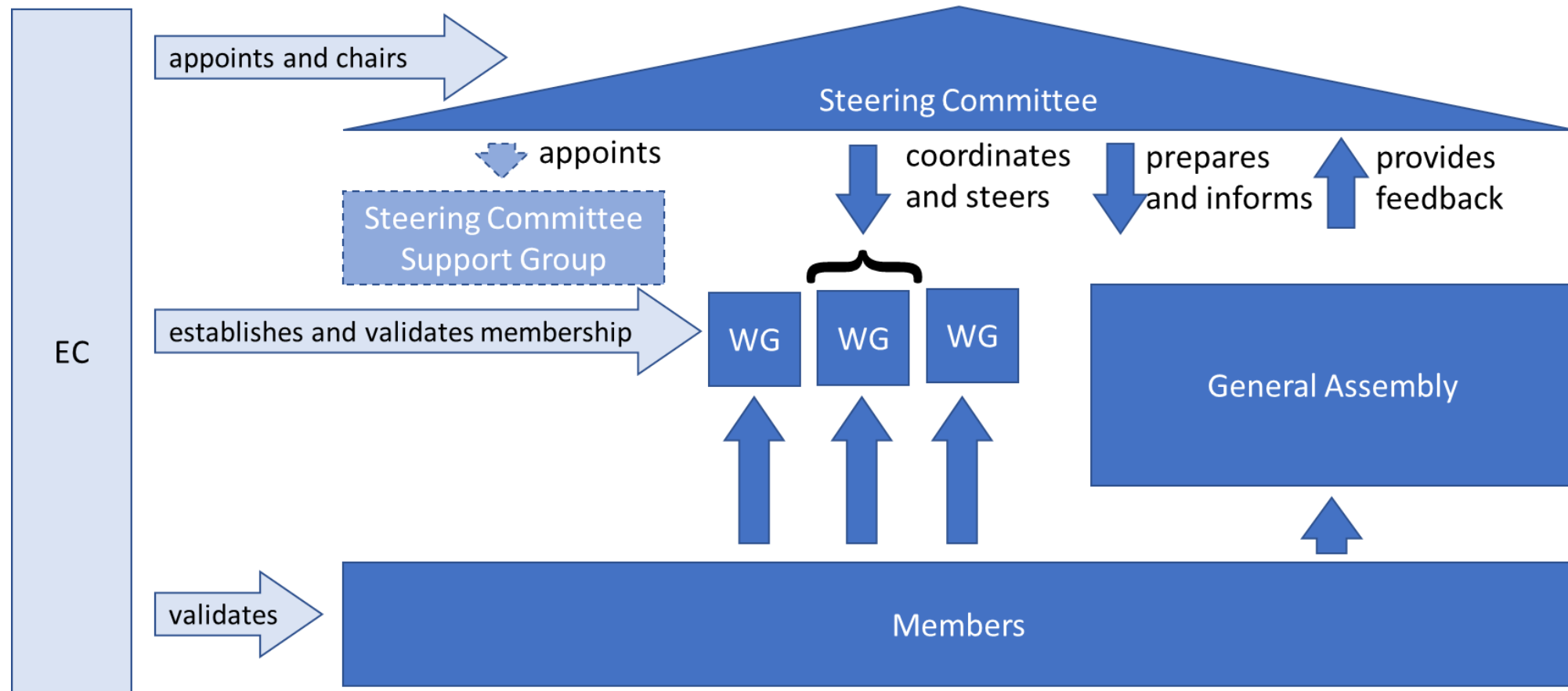
Facilitate cooperation between actors that need to be involved

AZEA has an open membership

- ➔ Open to all actors willing to work together to prepare the **market** for commercial operations of electric and hydrogen aircraft
- ➔ Limited number of eligibility criteria (as per [ToR](#)):
 - 1) Be a legal entity
 - 2) Commit to the objectives of the Alliance by signing the [Declaration](#)
 - 3) Have **activities relevant to the objectives of the Alliance**
 - Provide a description of your (potential) involvement in operations of electric and hydrogen aircraft
 - 4) Abide by the rules set in the [Terms of Reference](#)
 - 5) No conflict of interests with the objectives of the Alliance



AZEA Governance (1)





AZEA Governance (2)



➔ General Assembly, to ensure engagement of all members

- ❖ Meets twice a year
- ❖ No decision power
- ❖ Facilitate the engagement and maintain the dialogue with all AZEA Members
- ❖ Provide feedback and inputs to the Steering Committee and WGs on progress and on-going work

➔ Steering Committee, to pilot AZEA

- ❖ Limited to organizations not subject to control by non EU country
- ❖ Role:
 - Guide the Alliance towards its objectives (AZEA decision making body)
 - Provide strategic advice to ensure maximum impact of the Alliance
- ❖ Tasks:
 - Define AZEA's work programme, monitor the progress and adopt corrective actions
 - Ensure coordination between WGs and integrate their contributions
 - Validate AZEA deliverables
 - Report to the General Assemblies

AZEA core tasks

Analyse

- ❖ Identify all **barriers and gaps** (including policy and regulatory needs)
- ❖ Define **requirements** for the entry-into-service of electric and hydrogen aircraft (energy, infrastructure, etc.)
- ❖ Identify the **actions** required to overcome barriers
- ❖ Identify **investments** needs

Connect

- ❖ Promote **investment** projects and connect them to financing partners
- ❖ Foster **partnerships** and maximize **synergies** across the ecosystem and beyond
- ❖ Create the necessary **momentum** amongst stakeholders
- ❖ **Outreach** and International partnerships



ANALYSIS (ad hoc Working Groups)

ACTION PLAN for the introduction of electric and hydrogen aircraft (update and monitoring)

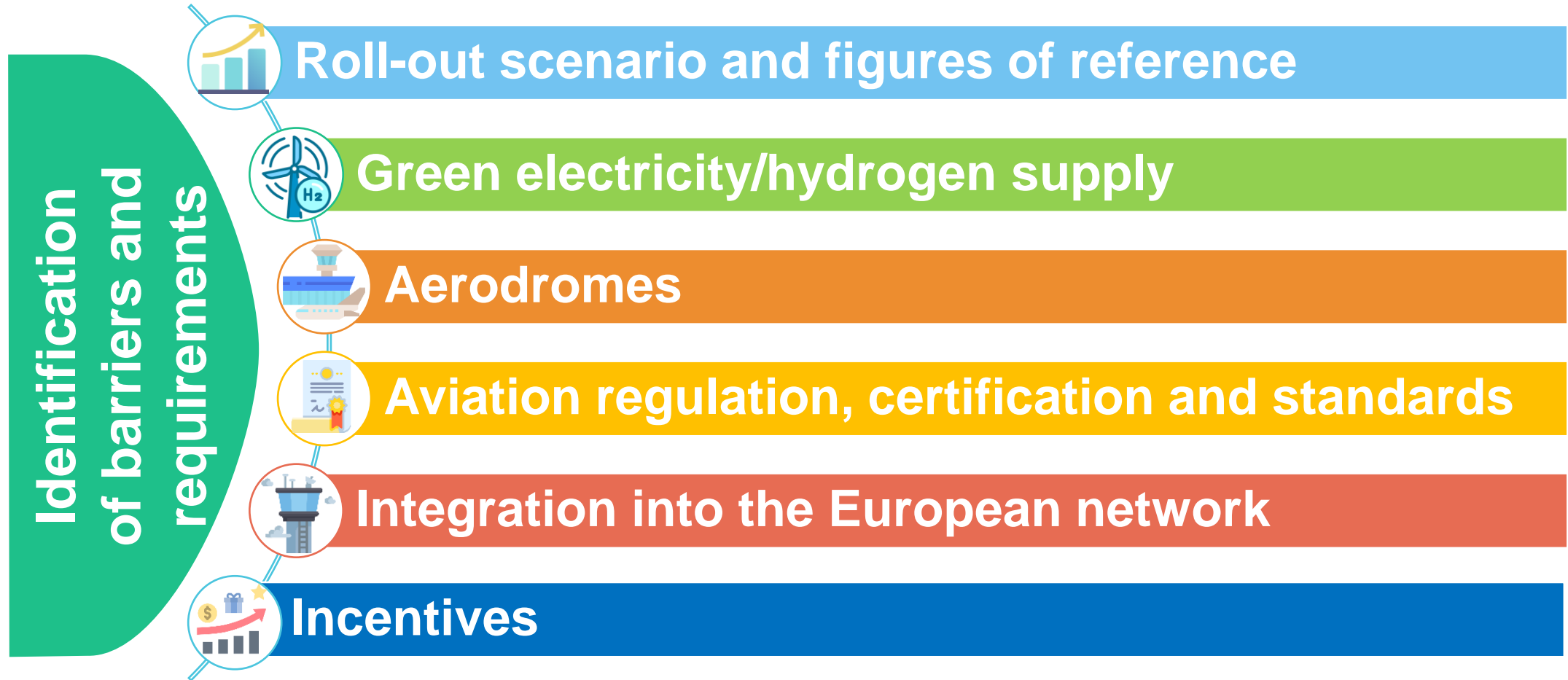
Support **INVESTMENTS** projects and foster **PARTNERSHIPS**

Recommend

Establish and follow up of an **Action Plan** :

- ❖ Based on a **roll-out scenario** for zero-emission aircraft
- ❖ Defining **priorities** and **milestones**
- ❖ Providing clear objectives and **actionable recommendations** to **support all investments** required **and address barriers identified** (legislation, standardisation, operations, skills, etc.)
- ❖ Serving as a **reference** to support the coordinated actions required by the different actors involved

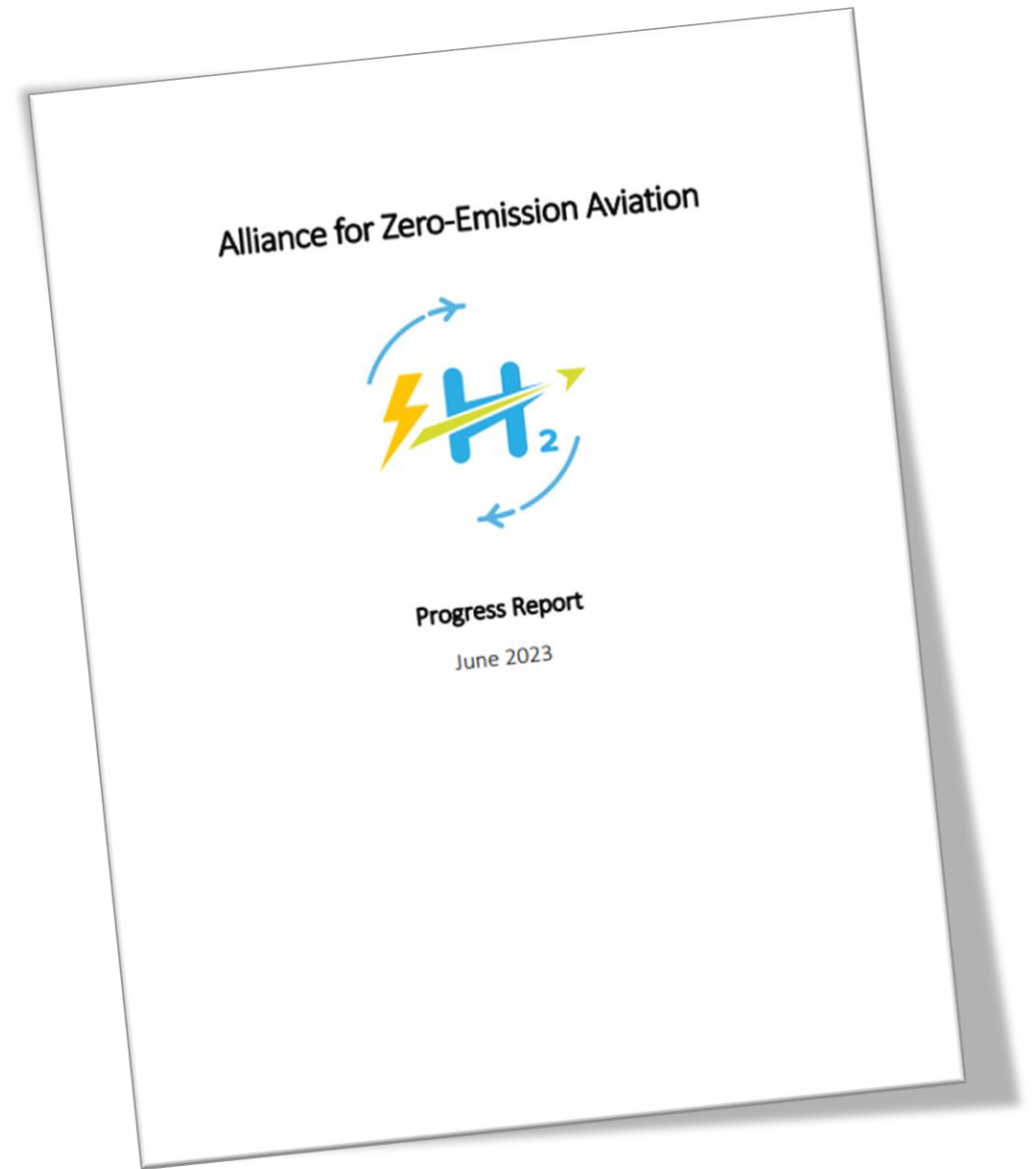
Six Working Groups to support the analysis phase



- ❖ WG management and support to be provided by the chairs and their 2 vice - chairs
- ❖ Commission services invited as observers in all WGs

First progress report

- Published at the occasion of the 2nd General Assembly of AZEA (19 June 2023 at Paris Air Show)
- Provides an overview of initial key findings of the six Working Groups



Initial key findings of Working Group 1: Roll-out scenario and figures of reference

*Robust and validated entry-into-service timelines and market penetration targets for hydrogen and electric aircraft are **essential** for the Alliance's planning.*

*Predictions regarding the entry-into-service of these aircraft vary, but all concur that **market entry will be well before 2030.***

*Market penetration of new propulsion technologies is **easier to forecast for existing market segments** than it is for new business cases, including in regional aviation.*

Initial key findings of Working Group 2: Green electricity/hydrogen supply

*There is currently **no regulatory framework** for the direct use of hydrogen and electric propulsion in aircraft.*

*Aviation needs are **not addressed** in most on the national hydrogen strategies.*

Initial key findings of Working Group 3: Aerodromes

Technology is not identified as a critical risk for airports. However, under the risk analysis classification, regulations, standardisation, permitting, skills, and energy/fuel availability were identified as critical.

Regarding a design of a sustainable hydrogen supply chain network for airports, there is no one-size-fits-all solution, not even for the quantitative aspects.

Traffic figures and mix are the key driver. The energy ecosystem, the community and the available space at and around the airport may be the main aspects to evaluate.



Initial key findings of Working Group 4: Aviation regulation, certification and standards

The adaptation of the regulatory framework across domains for zero emission aircraft has already started.

Work is more advanced when it comes to electric aircraft than hydrogen propulsion.

The certification rules provide flexibility to certify new technology.

Organisations can now de-risk their zero emission projects by using EASA's [pre-application services](#).



Initial key findings of Working Group 5: Integration into the European network

*Hydrogen and electric aircraft represent one of the most profound changes to the aviation ecosystem for years. **Change is needed** to evolve from how we work today to fully support these new aircraft types and propulsion methods so that these operations are able to fully achieve their objectives.*

*The **AZEA Concept of Operations** will serve as the vehicle for identifying those areas which will require further activities when maturity allows, and can be synchronised with the arrival on the market of new aircraft.*

***Adaptation of existing operational and environmental performance indicators** should be promoted in order to measure the different capabilities of aircraft using electric and hydrogen power sources for propulsion.*

*It is vital to assess and communicate information on the **potential non-CO2 emissions** that may be expected from AZEA aircraft, with appropriate analyses or assessments.*

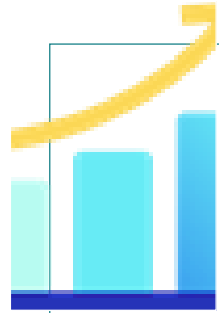
Initial key findings of Working Group 6: Incentives

Numerous barriers for the deployment of ZE aircraft have been identified across the aviation value chain. Some of these barriers are of technical nature, but many are linked to economic or regulatory aspects.

Policies, regulations and incentives can have a positive contribution to the development and deployment of ZE aircraft, by improving their competitiveness and providing market certainty.

A number of such policies, regulations and incentives have been identified. In the next phase of work, WG6 will assess how those instruments can be adapted to support ZE aviation.

Next steps for AZEA



Establish targets for the entry-into-service of hydrogen and electric aircraft



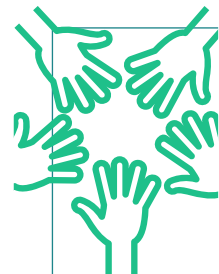
Establish a roadmap based on a common view shared by stakeholders



Following the analyses, set the right level of prioritisation in order to achieve the Alliance's objectives



Raise awareness in the aviation ecosystem and promote the Alliance and its goals towards national and regional authorities



Where possible, coordinate with partners working on similar activities in other regions to reflect the international dimension

AZEA WALK

“ROAD TO ZERO EMISSION AVIATION”

The Alliance for Zero-Emission Aviation builds upon a diverse membership of stakeholders spanning across Europe and beyond. The AZEA walk at Paris Air Show was set up under the theme “road to zero emission aviation” showcasing the contribution of AZEA Members, some of which are present here, towards this common goal. Following this walk, you will discover their various innovations and initiatives supporting electric- and hydrogen powered aviation.

Paris Air Show
19-25 June 2023

Hall 2B,
E140

DG DEFIS stand

Starting point of the AZEA walk.
Info session on Tuesday,
20 June at 12:00.



Hall 2

Hall 2A,
B276

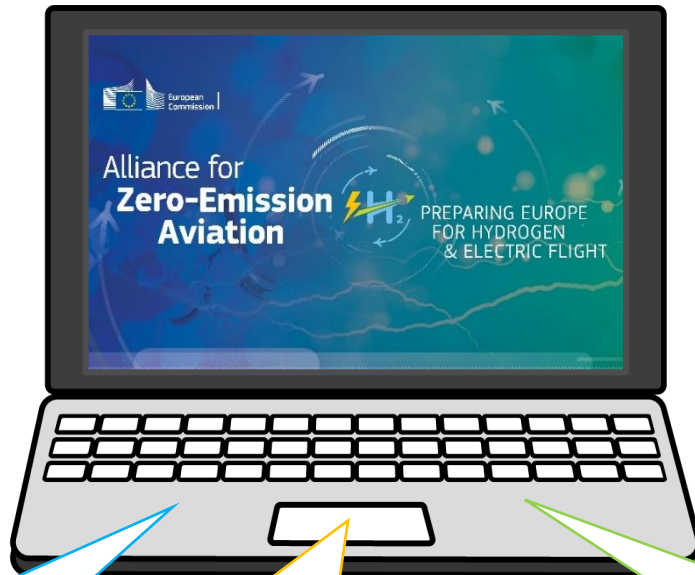
Clean Aviation JU (Joint Undertaking)

Display of cutting-edge aircraft technology
achieve sustainable aviation

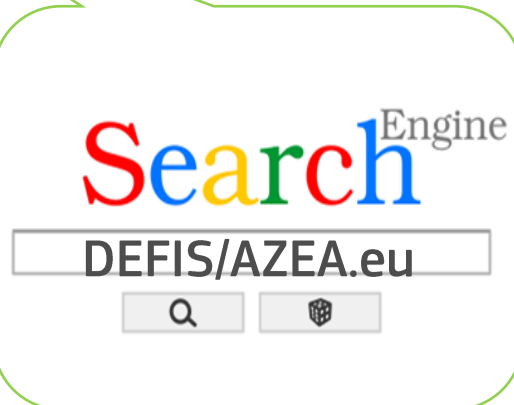
Scan the QR code to walk AZEA’s
“Road to Zero-Emission Aviation”
at Paris Air Show



For more information



https://defence-industry-space.ec.europa.eu/eu-aeronautics-industry/alliance-zero-emission-aviation_en



DEFIS-
AZEA@ec.europa.eu



Thank you



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