Climate assessment of innovative mitigation strategies towards operational improvements in aviation

Report - ClimOp's First Advisory Board Workshop

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Introduction

The first Advisory Board (AB) workshop was hosted by ClimOp (Climate Assessment of Innovative Mitigation Strategies towards Operational Improvements in Aviation) on the 2nd of July 2020, on an interactive webpage hosted by the ClimOP official website. The consortium organized a remote session due to the mobility limitation occurred after the spreading of the Sars-COVID-2.
The main objectives of the AB workshop were to collect feedback on the preliminary results produced in the first four months of project activities. These results have been described in two deliverables, which identify a first list of operational improvements (OIs) to mitigate the CO_2 and non-CO_2 emissions from aviation (D1.2 - Inventory of operational improvement options) and a set of Key Performance Indicators (KPIs) to assess the feasibility of the OIs from taking in account seven performance aspects: operational, environmental, economical, technical, safety, human performance and social acceptance (D1.1 - Definition of climate and performance metrics). These deliverables have been finalised and uploaded on the EC portal at the end of April 2020.
Deep Blue, as project coordinator and leader of the dissemination activities, took care of the organization of the workshop sessions, including the creation of a dedicated webpage. Representants of each member of the ClimOp consortium moderated and took notes during the workshop activities.

ClimOp: Greener operation to innovate the aviation sector

ClimOp is a research project, funded by the Horizon2020 programme, that partakes in the Aviation International Cooperation Flagship called "Safer and Greener Aviation in a Smaller World". The overall aim of the project is to present a series of operational improvements that can reduce the climate impact of the aviation sector, taking into account the stakeholders' perspective. The final goal of ClimOp is to provide recommendations to steer the decision and policymaking in the European Union (EU) Aviation sector. To reach this goal, ClimOp employs a six-step methodology that focuses on stakeholders' needs by using an iterative validation process. The overall goal of the methodology is to allow ClimOp generating a link between its outcomes and the related sectors of interest (see ClimOp website for further information).

Description of the AB workshop and main statements

Eight Advisory Board members participated in the workshop: H. Ureta (AENA), R. Vrugt (Dutch Ministry of Infrastructure and Water), J. Stuhlberger (Airbus), R. Emmerink (Royal Schipol Airport), I. Cavka (ACI Europe), E. Garcia (CANSO), V. Stoyanov (BULATSA) and R. Pouzolz (MTU Engine).

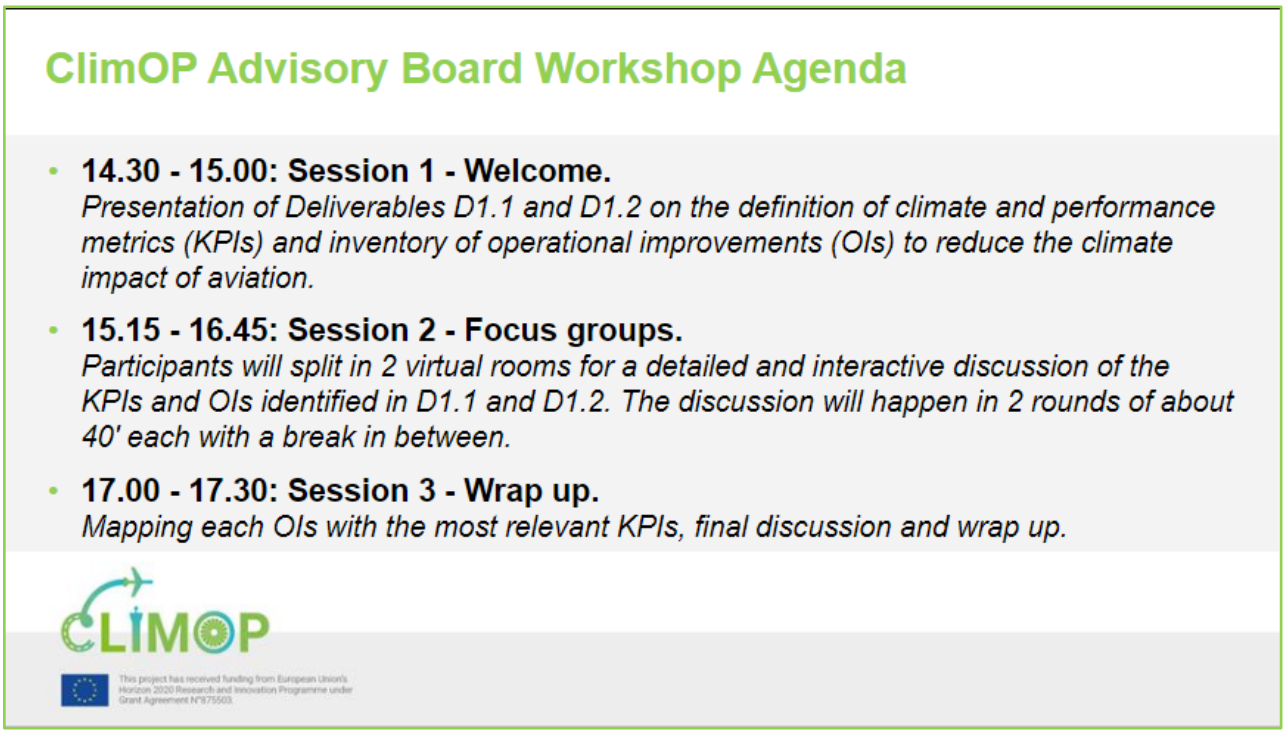


Figure 1. ClimOp first Advisory Board Workshop agenda

The objective of the first session was to give an overview of the deliverables D1.1. and D1.2. The preliminary set of KPIs was presented by V.S.V. Dhanisetty (TUD), coordinator of D1.1. The inventory of OIs was mainly presented from Elena Branchini (SEA), coordinator of D1.2, with the contribution of F. Linke (DLR), A. Tedeschi (Deep Blue), and K. Sutopo (NLR).

At the end of this session, the AB members were asked to evaluate the timescale and feasibility of a set of OIs by placing them on a timescale–feasibility plane. The set of OIs were divided into four sub-groups: the airline network operations, the climate optimised trajectories, the measures on the ground and the measures at regulatory level, as it is shown in Fig. 7 of deliverable D1.2. The purpose of this exercise was to compare the assessment done by the ClimOp consortium with the educated opinions of the AB.

Subsequently, in the second session, the AB members were split into two virtual breakout rooms. In each room, the participants were engaged in a focus-group conversation moderated by ClimOp partners. The role of the moderators was to ask the AB members a list of questions to assess whether the KPIs and OIs identified in D1.1 and D1.2:
- are “common knowledge” among the stakeholders,
- cover the whole spectrum of possibilities currently known or available in the aviation domain,
- are in line with how each stakeholder actually operates in their domain.

The focus groups were articulated in two rounds of about 40 minutes each, one about the selected KPIs and the following one upon the OIs. After the first round, two participants from each group were asked to switch room to stimulate a lively and interactive discussion.

In the third and last session, the participants were asked to respond to a survey focused on matching a list of KPIs with each of the 16 OIs presented during the workshop. Finally, this session summed up the input collected during the workshop.

Results

Section 1 – questions

During and after each presentation, short questions were asked to engage the participants and to collect their opinions on the subject of discussion. Five were the questions we proposed to the AB members, two on the selected KPIs and three on the list of operational improvements:

- Which are the 3 most impacted stakeholders by the challenge of climate mitigation?
    - Airlines 28%
    - Society 26%
    - Passengers 18%

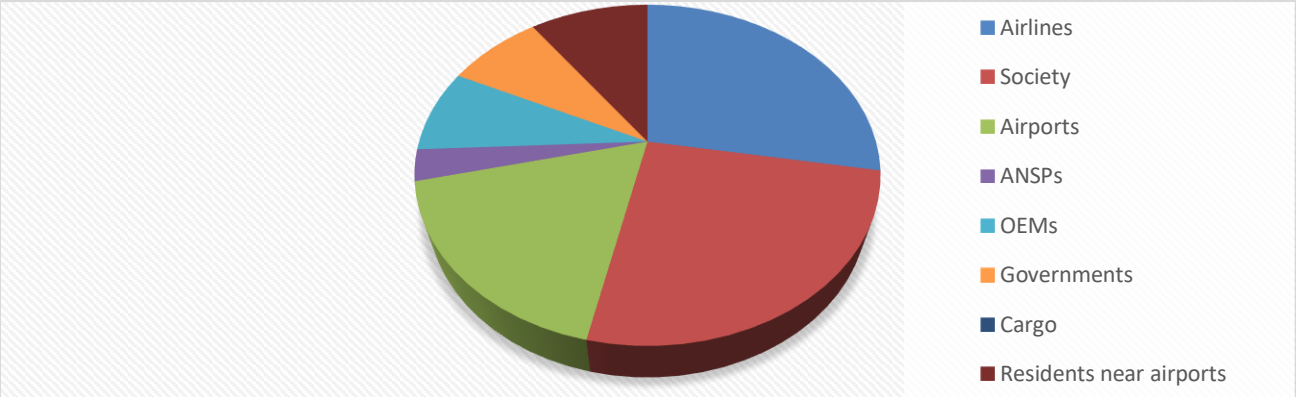


Figure 2. Results of Question 1 on what are, in the participants' opinion, the most impacted stakeholders by the challenge of climate mitigation.

- Which of these KPIs is the most relevant for you?
  - Environmental 31%
  - Operational 23%
  - Safety 17%

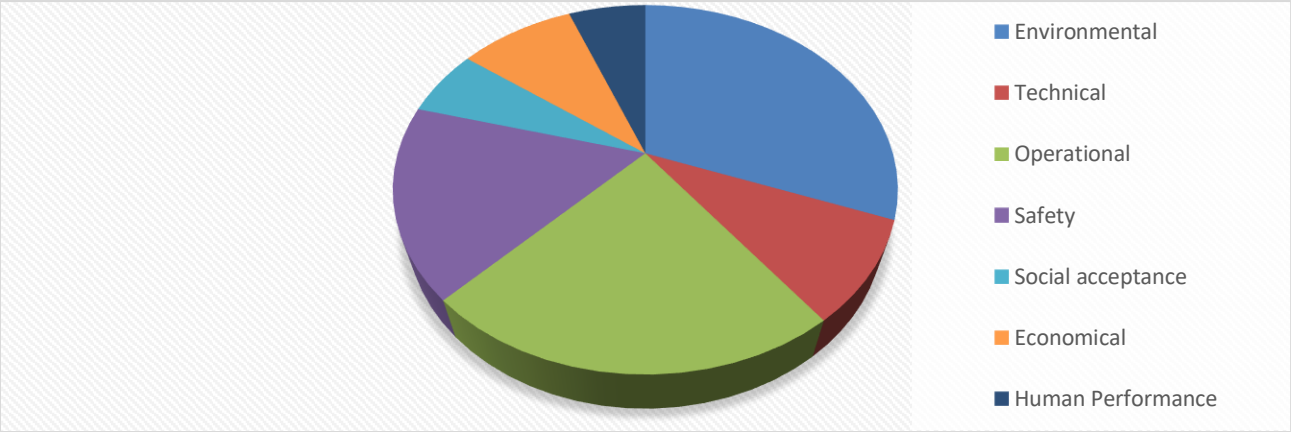


Figure 3. Results of question 2 on the KPAs that are considered most relevant by the participants.

- Which of the following operational improvements “in flight” do you find more promising to reduce the impact of the aviation industry on climate (choose up to three options)?
  - Avoiding climate sensitive areas 19%
  - Optimal hub-and-spoke & point-to-point network 17%
  - Climate-optimised approach procedures 17%

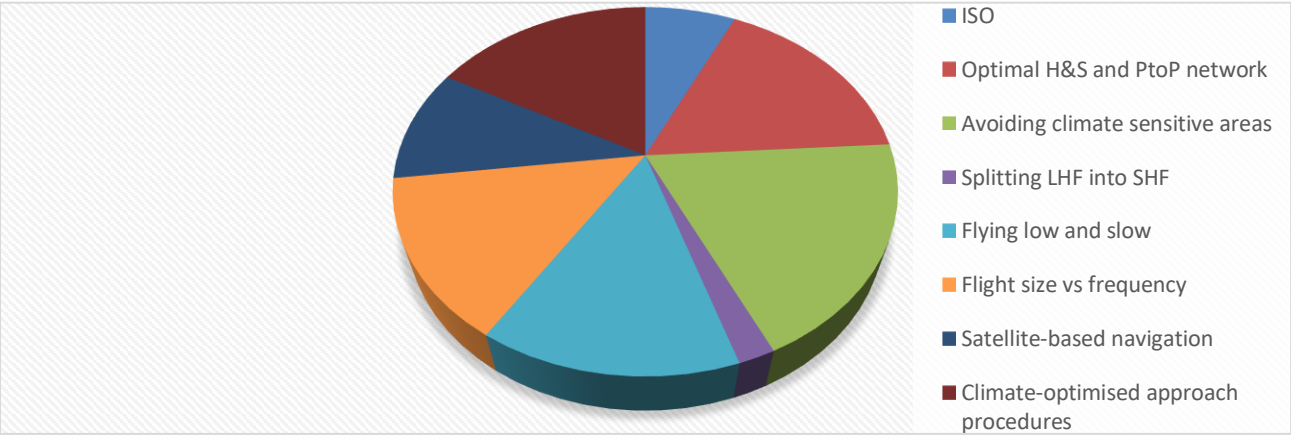


Figure 4. Same as Fig. 1 for the question about the most promising OIs "in flight".

- Which of the following improvements of ground operations do you thin have a larger impact on climate (choose up to three options)?
    - Efficient taxiing 29%
    - Electrification of ground equipment for airport operations 26%
    - Renewable energy production at the airport 24%

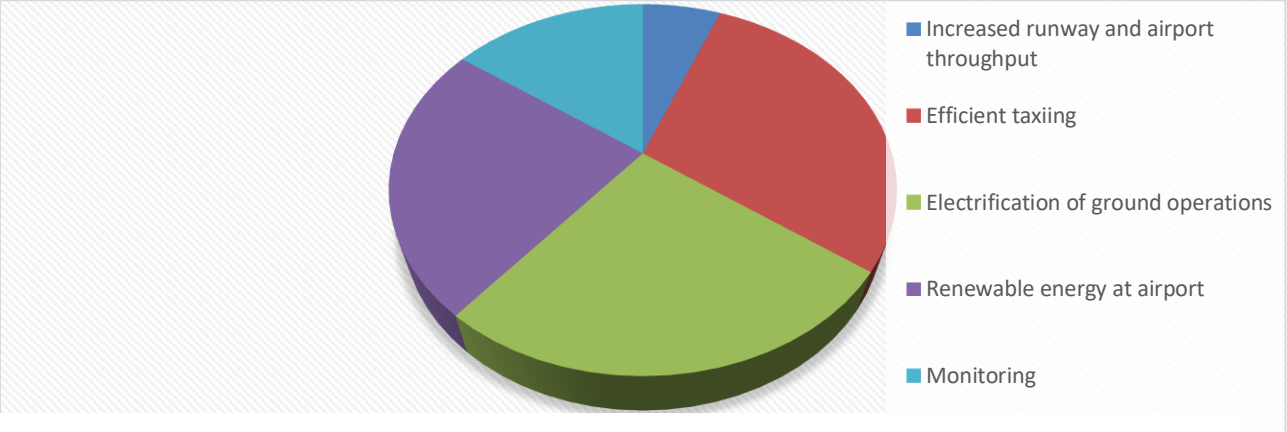


Figure 5. Same as Fig. 1 for the question of what OIs on ground have the largest impact on climate in the participants' view.

- What kind of action at regulatory level do you think would have acceptance by stakeholders?
    - Environmental scoring 36%

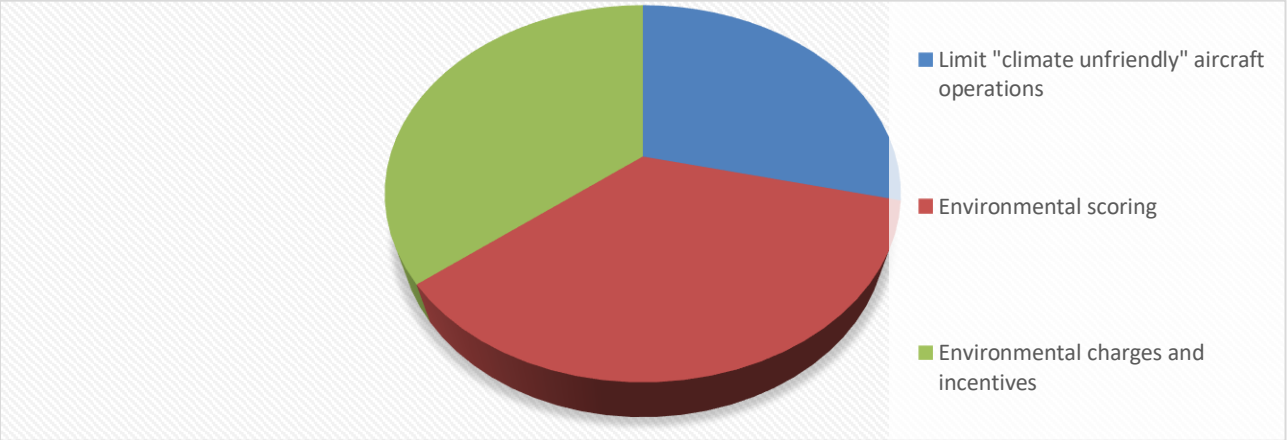


Figure 6. Same as Fig. 1 for the question about the stakeholders' acceptance of regulatory measures.

Focus group (KPIs)

During the first part of focus groups, ClimOp presented a set of question to collect the opinion of the AB members on the KPIs selected to evaluate the impact of the list of OIs. The eight AB members were split into two rooms, the Room1 and the Room2. Both rooms followed the same order of questions and the moderators solicited each participant to express its opinion in turn. During the first session, the KPIs were presented clustered in seven key performance areas (KPAs), identified as the most relevant within the project: environmental, technical, operational, safety, economical, human performance and social acceptance. The first five groups of metrics assess the quantitative impact of the OIs, while the last two evaluate the qualitative impact of the OIs. After a brief introduction, the moderators started the focus groups presenting the set of questions:

- Have all KPAs been covered? Are the proposed KPAs clear?

To this demand, some participants from both rooms affirmed that there were “interactions between KPIs of various areas”. MTU Engine said she did not see safety as a metrics but as a “constraint”, while the representant of ACI Europe said that all KPIs were clear in covering the most significant aspect of OIs performance. Schiphol Amsterdam Airport suggested to list the KPIs in relation to the stakeholders they impact.

- Are the definition and scope of the climate and performance metrics clear? Why? How can them be improved?

To this question, the attendants of Room 2 affirmed that the proposed metrics did not “need further improvements". So, the moderator continues with the following question.

- Do you think all relevant stakeholders have been identified? If not, which ones are missing?

The following question examined if any relevant stakeholders were missing from the group of 9 presented during the first session (Society, airlines, air navigation service providers (ANSPs), airports, original equipment manufacturers (OEMs), governments, passengers, cargo forwarders, and residents near airports). Again, both rooms agreed on the presence of overlaps between society, passengers and residents near airports but moderators immediately explained that each stakeholder was considered in relation to specific KPIs, for example, passengers were considered for the ticket prices, residents for the noise and all three for the climate impact of the aviation. In Room1, ACI Europe asked if ClimOp considered fuel suppliers as a relevant stakeholder and the moderator reply that they were included in the airports' group of stakeholders. Later, Schiphol Amsterdam Airport suggested to “relate the most relevant stakeholders” to the KPIs. In Room 2, MTU and BULATSA advised to consider the scientific community, the military and regulators such as ICAO as relevant stakeholders and the moderators accepted the advice and continue with the next question.

- Do you think our KPIs are able to capture the relevant process[es] in your field of expertise? Can they quantify performance and progress? Do you think our metrics are relevant?

To this question, ACI Europe replied that the proposed metrics were appropriated but doubted the possibility to obtain ultrafine data. MTU Engine said that a baseline was needed to compare KPIs, while Airbus proposed to consider KPIs meaningful across different sectors. Due to the lack of time, some questions remained unaddressed to maintain the synchronisation between the rooms.

Focus group (OIs)

The second focus group session adopted the same format of the first but two participants from each group were asked to switch room to stimulate the discussion. After a short break, the focus group started with a brief introduction on the operational improvements to refresh the AB members before the new set of questions:

- Is any of these OIs relevant to you? How?

To this question, BULATSA acknowledged airports and taxiing movements as relevant, while AENA Eivissa replied that the most relevant OIs for them is the supply of energy at airports. MTU Engine argued that a more effective design optimization, ISO and flying low and slow were relevant OIs, and added that long-vs-short flight could produce changes in the aviation business model.

- Which OIs do you find more challenging? Why?

AENA replied that he didn't see how charging OIs could have contributed to reduce the climate impact of aviation, since "other sector causes more pollution". MTU agreed with his point and added that regulations need time to be implemented. BULATSA, from its side, affirmed that ATMs "can't bring effect to save 50% fuel" usage but better trajectories could just have a 2-3% of effects.

- Can you identify other general ongoing improvements that we have not treated yet? Can you provide some examples?

To this, MTU suggested that "specific operational procedures would enable detailed investigations" and AENA affirmed that solar panel could solve to their lack of energy supply.

- Do you have a feeling for which of the proposed OIs has the strongest impact on climate?

The AB member from BULATSA replied that leaving airlines the autonomy to decide their routs could mitigate the climate impact of aviation. AENA agreed with the previous statement saying that free routing, renewable electricity production and biofuel could reduce aviation emissions. On her side, MTU stated that "everything that limits flying" such as "fly less, climate restricted zone" could limit the climate impact of aviation. Airbus suggested to take into consideration cost-effective operational improvements.

- Is there any OIs that you consider impossible to introduce in your sector of expertise? Why?

AENA started saying that solar panels are not allowed to be implemented due to EASA policy restriction, while MTU and BULATSA stated there weren't OIs impossible to implement.

When both rooms completed the second round of questions, participants were asked to fill a survey to match the OIs with the KPIs.

Timescale-feasibility map

The AB members were given the opportunity to modify the diagram shown in Fig.

Figure a (which reproduces Fig. 7 of deliverable D1.2). This figure represents the timescale and feasibility of a set of OIs on a two-dimensional plane. The purpose of the exercise was not to exactly identify when and how easily an OI can be implemented but rather to qualitatively place each OI with respect to each other. Consequently, quantitative scales on the time and feasibility axes are not explicitly indicated. However, it is understood that the higher an OI is on the feasibility axis, the seamlessly it can be introduced in everyday operations. Also, moving an OI towards the right means that the timescale for its implementation increases from “readily available” to “years” or even “decades”. The OIs are classified into four sub-groups: the airline network operations (blue), the climate optimised trajectories (purple), the measures on the ground (green), and the measures at regulatory level (orange).

Three participants participated in this exercise by revising the diagram in Fig.

Figure a. Their inputs are shown in Figs.

Figure b–d. In two cases (Figs.

Figure b and

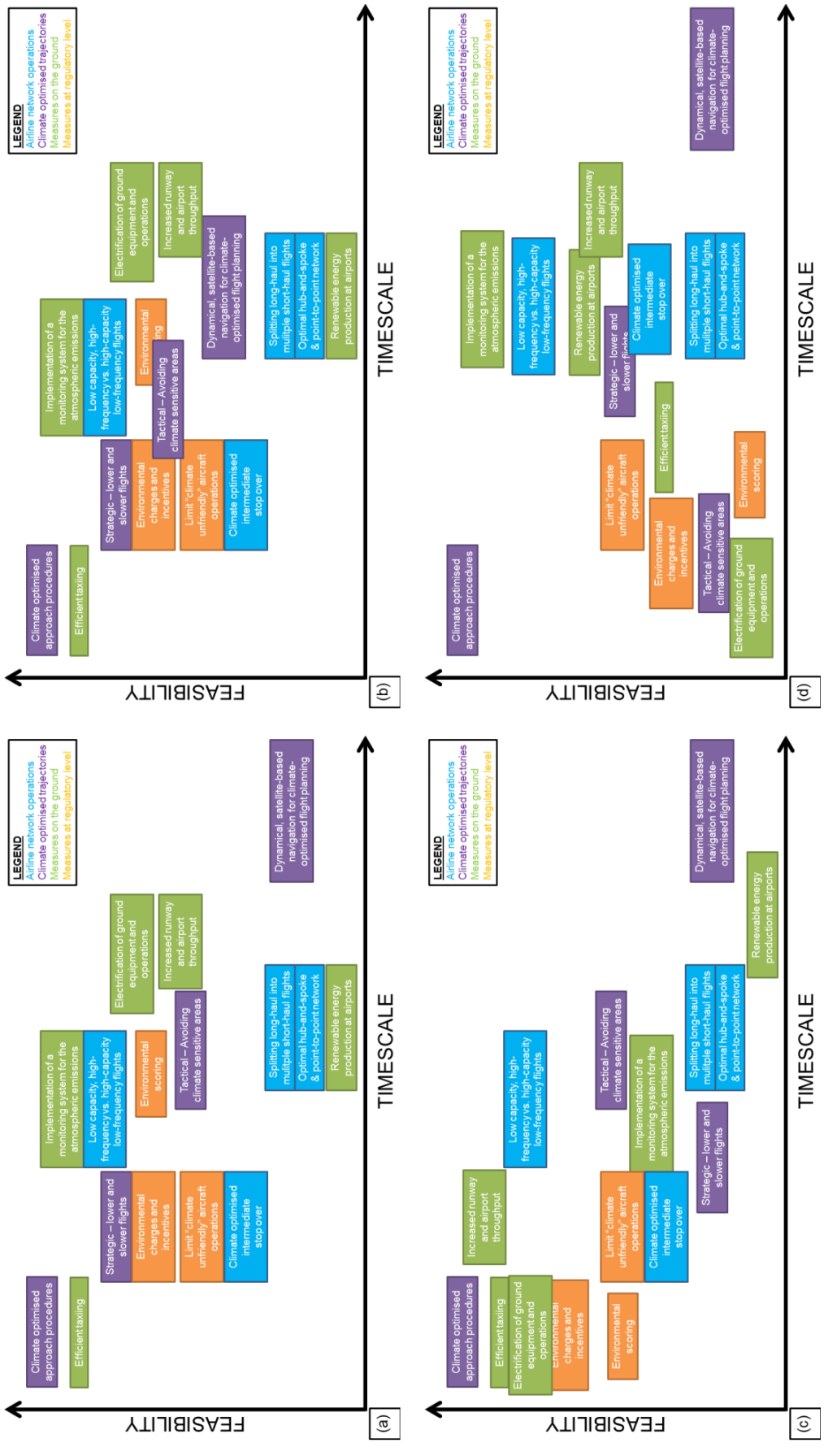
Figure c), the proposed changes focused on modifying the position of individual OIs while maintaining the general trend which was identified in D1.2, in which the most feasible OIs have the lower timescale and the less feasible an OI is, the more time it will require to be implemented. Interestingly, in the third case (Fig.

Figure d) this trend is not clearly visible. By contrast, there are a bulk of OIs at low feasibility and short timescale (namely, the regulatory OIs, efficient taxiing, electrification of the ground equipment and avoiding climate sensitive areas), a region of OIs at intermediate timescales and various degrees of feasibility, and two 'isolated' OIs that are in the same position as originally identified in Fig. 7 of D1.2 (climate-optimised approach procedures and satellite navigation for climate-optimised flight planning).

In conclusion, this exercise shows that there is no general agreement on the feasibility of different OIs and the likely timescale at which they will be implemented in aviation, with the exception of a handful of OIs that are in the same position in all maps (climate-optimised approach procedures, splitting long-haul into multiple short-haul flights, optimal hub-and-spoke and point-to-point network, and limit "climate-unfriendly" aircraft operations). A possible explanation of the discrepancies is that many of the proposed OIs still lack a quantitative estimation of their actual impact on climate and a clear business case study to determine the financial effort and benefits the stakeholders will need to introduce these measures. One of the goals of the ClimOp project is precisely to seal this gap and to provide a better understanding of all these aspects.

In the progress of the project, the ClimOp consortium will take into account the input received from the AB by carefully assessing the impact of those OIs that have been identified to need a shorter timescale for their implementation. In addition, the ClimOp consortium will commit to identifying the OIs that represent an "easy win" for the stakeholders, that is they have a positive impact on climate while they do not require a significant financial or operational effort to be introduced.

Figure 7 (next page). (a) Timescale and feasibility of different OIs (adapted from Fig. 7 of ClimOp's deliverable D1.2). (b) – (d) Same as (a) but from the input of AB members.


LEGEND
Airline network operations
Climate optimised trajectories
Measures on the ground
Measures at regulatory level
Climate optimised approach procedures
Efficient taxiing
Strategic – lower and slower flights
Environmental charges and incentives
Limit "climate unfriendly" aircraft operations
Climate optimised intermediate stop over
Implementation of a monitoring system for the atmospheric emissions
Low capacity, high-frequency vs. high-capacity low-frequency flights
Environmental scoring
Tactical – Avoiding climate sensitive areas
Electrification of ground equipment and operations
Increased runway and airport throughput
Dynamical, satellite-based navigation for climate-optimised flight planning
Splitting long-haul into multiple short-haul flights
Optimal hub-and-spoke & point-to-point network
Renewable energy production at airports
FEASIBILITY
TIMESCALE
(a)
(b)
(c)
(d)

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