

# ALIGHT

SUSTAINABLE AVIATION

## D8.4 : Recommendation for replication

Version number:	4.0
Dissemination level	PU (public)
Work package:	WP8 – Exploitation and Replication Toolbox
Date:	13-11-2023
Lead beneficiary:	BMGI (BMGindroz Consulting)
Author:	Dr. Bernard GINDROZ
Contact person	Dr. Bernard GINDROZ – gindrozb@bmg-consulting.com

### Disclaimer

This report reflects only the author's view; the Agency and Commission are not responsible for any use of the information it contains.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957824

# Recommendation for Replication

## Table of content

1. Background .....	3
2. Preamble.....	3
3. The ALIGHT methodology.....	4
4. Objective of this deliverable.....	5
5. Replication concept .....	6
5.6 Replication content.....	7
5.7 Methodology .....	8
5.8 Collaborative Approach .....	10
5.9 Value chains .....	13
6. Recommendation .....	13
6.1 Workstream A: Sustainable Aviation Fuels (SAF) .....	13
6.2 Workstream B: Smart Energy Airport.....	14
6.3 Sustainability.....	15

## 1. Background

The overall mission of the ALIGHT project is to enhance sustainable aviation. With Copenhagen Airport (CPH) as lighthouse the project will bring forward the necessary solutions, knowledge, guidelines and best practice handbooks supporting an efficient airport paradigm shift towards zero emission aviation and airport operation. Fellow airports will replicate the example set by Copenhagen Airport. Through effective communication, the mission is to ensure maximum impact throughout the European and international aviation industry both during and beyond the duration of the project.

## 2. Preamble

This Deliverable intends to align understanding about how to design replication toolboxes about SAF and Smart Energy, including Sustainability aspects. Outcomes from this Deliverable D8.4 consider:

- Recommendations towards scoping the toolboxes
- Principles about considering related value chains (holistic approach)
- Principles towards defining boundaries
- Recommendations for considering local context & policies in addition to EU and National strategies & commitments, and regulations/legislation
- Recommendations about flexibility for toolboxes, in terms of making them adaptable to any context, towards easing appropriation and implementation by other airports in Europe (and beyond)
- Guiding ALIGHT workstreams A and B, as well as WP6 about sustainability, in the development of their handbooks and related WP8 replication toolboxes

Objective 7 – figure 1 - of the Grant Agreement, requests ALIGHT to maximize the impacts of the project through dedicated exploitation activities, development of replication toolboxes and a bold vision for future airports (2050) (WP8).

**Objective 7: To maximize the impacts of the project through dedicated exploitation activities, development of a replication toolbox (including best practice handbooks) and a bold vision for future airports (2050) (WP8).**

**Description:** The exploitation plan will summarize the beneficiaries' strategy and concrete actions related to the protection and exploitation of the project results. The best practice input, including sustainability, will be compiled into two handbooks (for SAF and smart energy) and further integrated into a replication toolbox.

**Deliverables:** D8.1, D8.2 D8.3, **D8.4**, D8.5, D8.6

Figure 1 : Objective 7 from the Grant Agreement

Best practices input, including sustainability, will be compiled into two handbooks (for SAF and Smart Energy) and further integrated into replication toolbox.

### 3. The ALIGHT methodology

The ALIGHT methodology will support the development, implementation, demonstration and replication of the described comprehensive and innovative ALIGHT concept, which will:

- facilitate Copenhagen Airport, as a Lighthouse Airport, showing the sustainable way towards zero emission airport operation
- facilitate the deployment of sustainable aviation fuels (SAF), e-mobility, energy storage and waste heat recovery at Copenhagen Airport (Lighthouse airport), Rome Airport, Vilnius Airport (fellow airport) and the new Warsaw Airport
- secure knowledge transfer and tools supporting a smooth and efficient replication on a pan-European scale.
- facilitate the integration of smart & sustainable airport deployment into urban planning and cities strategic development for a bold vision by 2050

The concept will be implemented and demonstrated at the lighthouse airport while replication at fellow airports, the new Warsaw airport hub and other relevant airports will be supported by several different means such as:

- close involvement of the two fellow airports, Aeroporti di Roma and Lithuanian airports, and the new Warsaw airport hub in the implementation of the ALIGHT concept at Copenhagen Airport. They will, among other types of involvement, be part of the full reviewing process.
- Development of a replication toolbox with guidelines and comprehensive handbooks to support the overall concept replication at the fellow airports including the new Warsaw Airport.
- Cooperation activities with similar activities and projects to both support replication and the development of a bold smart airports vision for 2050.

#### 4. Objective of this deliverable

The purpose of Deliverable D8.4 “Recommendation for Replication” is to ensure the development of complete, useful and attractive toolboxes, due by M56, as one of the main deliverables from ALIGHT project towards optimizing impacts, and as contributing to carbon neutrality and bold vision 2050, through supporting replication for:

1. Sustainable Aviation Fuel strategies (SAF) – Workstream A
2. Smart Energy Airport – Workstream B
3. Sustainability

This deliverable D8.4 contents practical recommendations about how to organize the replication toolboxes, to be delivered by M56, and their respective reference documents. These replication toolboxes are expected to consider technical, regulatory, legal and data security/protection aspects, description of effective business models, needs expressed in workshops, as well as requirements for future (post Alight) standardization development.

However, there is a need to keep flexibility in scoping the recommendations, as boundaries for replication are also specific to local context and policies, with different fields of responsibilities of the airports, existing integration of airports’ in smart and sustainable cities strategies and related roadmaps, and others specificities. The recommendations are expected towards replication ready, which will be a driver of the development of the replication toolboxes

The ALIGHT concept will then bring forward the necessary solutions, knowledge, guidelines and best practice recommendations in a comprehensive tool for replication. ALIGHT will thereby contribute to achieving the environmental and sustainable targets set by the European Union, by national governments, of the Paris Agreement, and others, through the reduction of GHG and other air emissions of the aviation sector.

ALIGHT will also contribute to developing a bold vision for the sustainable airports of the future.

## 5. Replication concept

ALIGHT will support the replication of the described comprehensive and innovative ALIGHT concept, which will:

- facilitate knowledge transfer
- facilitate decision making at other airports
- facilitate the deployment of sustainable aviation fuels (SAF),
- facilitate the deployment of e-mobility, renewable energy production, energy storage, waste heat recovery at other airports, with energy efficiency as a first principle complemented by renewable energies
- facilitate the integration of smart & sustainable airport deployment into urban planning and cities strategic development
- Accelerate actions towards zero emission airport operation with robust and efficient proven concepts

The replication concept is based on a few major considerations:

- Practical experience and outcomes from real implementation of actions and their evaluations at CPH airports
- Feedbacks from fellow airports - Aeroporti di Roma and Lithuanian airports –
- Integration by the new Warsaw airport hub and other relevant airports of the proposed sets of pathways towards zero emission airports
- Local context, local regulation and local energy, environmental and climate commitments in addition to EU ones
- Specific airports legal responsibilities and capacities
- Maturity of local airports integrated in smart cities strategies and sustainable development plans
- Existing local sustainable pathways and airports' initiatives

Thus, the strategy for replication will include the expectation/needs from the different stakeholders' categories with role and responsibilities, measurable objectives and monitoring tools, including reliable ESG reporting, as well as the robust communication and dissemination work as carried out in WP10.

Standardization development is also a key element of boosting replication and innovation to market(s). ALIGHT will feed EU standardization Organizations (ESOs) with its outcomes, in a way to share (best) practices in support of ESOs'

future development of standards in support of meeting our EU objectives about carbon neutrality and, especially, towards zero emission airports.

A CEN Workshop Agreement (CWA) will be developed in support of implementing SAF in other airports, by setting reference guidance towards decision making.

## 5.1 Replication content

Replication toolboxes are expected to provide:

- Practical recommendations relating to **regulatory, legal and data security/protection aspects**,
- description of effective **business models**, mainly considering impacts on existing business models from best practices developed and implemented by Alight and its partners
- **answers/pathways to needs expressed in workshops**,
- requirements/inputs for future **standardization development**.

It is important to develop replication toolbox with the aim to be replication ready for other airports; this means that:

- Challenges and Needs have to be identified, with opportunities and potential sources of benefits
- Replication guidance and recommendation shall be easily understood by other airports as fully relevant for implementation in their local context
- Scope(s) of the replication toolbox shall be clearly defined, with aims and targets
- Boundaries have to be set with considering the local context (that includes responsibilities, etc..)
- Regulatory frameworks that apply to the concerned airports (EU, National, local, ...)

In addition, it is key to consider Metrics and major KPIs, from the initiation of replication action plans, for setting targets and allowing a proper follow-up of progress and impacts.

Replication toolbox should be results/targets oriented, and the list of metrics (D8.2 due by M50) should be used as reference ones towards setting KPIs, which will help in feeding benchmark of best practices in support of decision making, planning and setting targets/objectives, managing implementation of actions by following progress against targets, as well as communication and reporting.

## **5.2 Methodology**

One of the key elements when developing replication guidelines and toolboxes is to consider local context and local specificities.

Indeed, the replication toolbox will need to fit with any airport's context and specificities. This is why, ALIGHT replication toolboxes will consider a value chain related approach, where each element will be defined with regards to local context (i.e. regulations, policies, environmental, societal, geographical and climate related specificities), as well as areas/framework of responsibilities of the concerned airport.

These recommendations will motivate a realistic approach towards setting the local specific airports' boundaries and roles & responsibilities. In addition, these recommendations shall also promote the identification of local existing structures towards certifying and accrediting the new schemes to be implemented.

Thus, there is a crucial need to include from the beginning of the process consideration of local airport's stakeholders' domains of responsibilities and capacities to make decisions.

The methodology proposed, towards drafting replication toolboxes, includes the following generic categories of items/steps, that will be described in more details for each workstream (SAF and Smart Energy) in the following subchapter 5.4 :

1. Identification of Challenges and Needs
2. Mapping related legislative and regulatory framework, commitments and EU/national/local strategies & targets, as well as related/reference standardization and certification
3. Mapping roles and responsibilities of the airport's authorities

4. Defining scopes and objectives, with a clear identification of what is under the responsibility of the airport itself
5. Defining objectives and setting targets, based on the list of metrics from D8.2 and workstreams' related KPIs towards allowing "comparisons" and enriching a benchmark of case studies and best practices.
6. Defining boundaries for each scope (as in coherence with the responsibilities of the airport and relevant in the framework of the local context)
7. Identifying cross cutting issues, such as safety & security, quality, sustainability
8. Setting data collection, monitoring and analysis towards progress follow-up against planned targets for improvement and optimization, as well as towards reporting on impact and communicating to target groups of stakeholders, including users/customers/citizens

In addition, a special consideration of sustainability (WP6) will be ensured as replication drivers, and impacts related monitoring and reporting, where, for instance, reference and contribution to UN SDGs (United Nation Sustainable Development Goals, figure 2 ) will be included to the extent in which it makes sense for the project and the subsequent work carried out.



Figure 2: 17 UN SDGs

### 5.3 Collaborative Approach

These recommendations for replication are developed with all ALIGHT partners in a collaborative approach, and especially using inputs from vertical WPs, about Sustainable Aviation Fuels (SAF) - WPs 2 and 3 –, respectively Smart Energy Airport - WPs 4 and 5 –, as well as horizontal WP 6 about sustainability, and inputs from WP 7 Cooperation Activities and WP 9 about Airport Development, transfer and tailoring of solutions (Figure 3).

In addition, ALIGHT Advisory Board will also be included in the collaborative approach towards developing replication toolboxes, in order to also reflect activities of the three other Airports related lighthouse projects (OLGA, TULIPS, STARGATE)

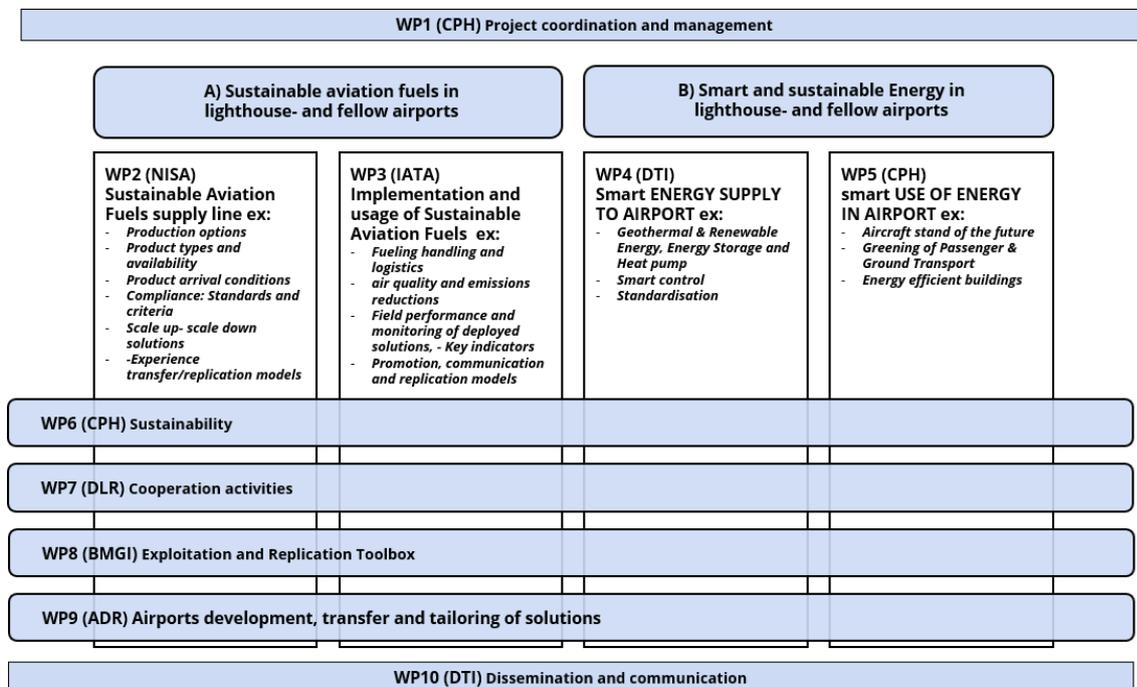


Figure 3: ALIGHT Work Package structure

Several deliverables from the above-mentioned WPs, will feed or be part of the replication toolboxes, and, thus, will contribute to the identification of not only challenges and barriers, but especially to the establishment of pathways and frameworks to closing gaps, solving challenges, and overcoming barriers.

The table 1 below sums-up those deliverables:

WP	Deliverable	Scope
WP2	D2.1	Report on the decision process and other circumstances involved to establish a production facility and identification of possible alternative delivery options
WP2	D2.2	Guidance on sustainability criteria and best practice framework
WP3	D3.1	Detailed plan of field performance monitoring and parameters captured in SimFuel
WP3	D3.2	Best practice handbook and tools for fuel logistics, quality monitoring and accounting
WP3	D3.3	Report on broader environmental benefits
WP3	D3.4	Definition of parameters and metrics for field performance monitoring
WP3	D3.5	Report on field performance monitoring
WP3	D3.6	Report on feasibility and added values of Smart Sensors for the Smart Airport in 2050
WP3	D3.7	Report on the digital platform for smart use of SAF
WP3	D3.8	SAF usage scenarios
WP3	D3.9	System design requirements for smart SAF usage – on-ground & in-flight
WP3	D3.10	SAF Best Practices: Risks and mitigations for non drop-in fuels
WP4	D4.1	Fossil Free Airport Roadmap report – infrastructure, supply, use and flexibility
WP4	D4.2	Smart Energy Management and ancillary services SAT and Software Functionality test descriptions
WP4	D4.3	Best practices for smart energy supply and management collected as guidelines, handbooks, case studies, business case tools
WP5	D5.1	Best practice toolbox for Greening of Ground Equipment and Passenger Transport
WP5	D5.2	Best practice toolbox on Greening of Airport Buildings with a smart energy management
WP5	D5.3	Design manual for Aircraft Stand of the future

WP6	D6.1	Guidance on procurement of SAF for EU airports
WP6	D6.2	Certification of SAF at lighthouse airports
WP6	D6.3	GHG monitoring system
WP6	D6.4	Sustainability report Including organization tailored solution for delivering SAF in fellow and other airports
WP6	D6.5	Results for Cost Benefit Analysis of Smart Usage scenarios of SAF
WP7	D7.2	Report on "Requirements for Smart Airport 2050 WS"
WP7	D7.3	Report on "bold vision 2050 WS"
WP7	D7.4	Report on the main findings of SAP for sustainable development in airports
WP9	D9.1	Detailed scheme and report of the infrastructure tailored solution for delivering SAF in fellow and other airports
WP9	D9.2	Detailed scheme and description of the organization tailored solution for delivering SAF in fellow and other airports
WP9	D9.3	Detailed report of the data and quality control tailored solution for delivering SAF in fellow and other airports
WP9	D9.4	Detailed report of the local/national regulatory compliance for delivering SAF in the fellow airports, and in other airports
WP9	D9.5	Detailed report on smart energy solutions transferred and tailored in fellow and other airports

Table 1: Deliverables in support of replication toolboxes

## 5.4 Value chains

To allow a holistic approach, as well as a full integrated approach in airports' development plans, value chain concepts are implemented in ALIGHT, in coherence with its respective domains of activities, sustainability and needs towards replication of:

- a) Sustainable Aviation Fuels (to facilitate the deployment of sustainable aviation fuels)
- b) Smart Energy Airport (to facilitate the achievement of a zero carbon emission airport)

For the purpose of these value chain approaches, boundaries need to be clearly identified and fixed, considering both, local context and airports' roles and responsibilities (as described in chapter 5.1, 5.2 above).

The process towards identifying these boundaries is a full part of the recommendations towards replication toolboxes.

## 6. Recommendation

From the above chapters' description and methodology approaches, the following recommendations will be considered when drafting the replication toolboxes as well as pathways for the development of the handbooks for each Workstream.

### 6.1 Workstream A: Sustainable Aviation Fuels (SAF)

Value chain for SAF replication toolbox will include the definition /identification of :

1. Challenges and Needs
2. Related legislation and regulation, commitment and EU/national/local strategies & targets
3. Related standardization and certification
4. Scope(s) and objectives (in coherence with level of responsibilities)

5. Boundaries:
  - Supply chains, considering permanent supply vs batches of SAF, logistics issues
  - Entering the airport: Zoning and permitting procedures and processes
  - Transport and storage at airport
  - Distribution
6. Cross cutting issues: safety & security
7. Professional Development and Training
8. Maintenance and repairs related activities
9. Monitoring, Reporting, Impacts and communication
10. Approaches how to use the available amounts of SAF to realize the maximum reduction in climate impact, considering both CO<sub>2</sub> and non-CO<sub>2</sub> emissions
11. A schematic to assess costs and benefits of the different approaches identified under 10. This includes costs on the implementation of the different approaches at an airport, future non-CO<sub>2</sub> emission penalties and modeling of the climate impact reduction by using SAF
12. How smart sensors for fast characterization of jet fuels and SAF can help establishing an advanced fuel monitoring at airports

## **6.2 Workstream B: Smart Energy Airport**

In the case of Smart Energy (Workstream B), 4 different domains of main activities are considered:

- Energy Management System and Smart charging
- Battery Energy Storage System and Vehicle to Grid
- Ground Support Equipment
- Passenger Transport

Value chains for Smart Energy replication toolbox will include the definition /identification of:

1. Challenges and Needs
2. Related legislation and regulation, commitment and EU/national/local strategies & targets
3. Related standardization and certification
4. Scopes and objectives (in coherence with level of responsibilities)
  - Energy Management System and Smart charging
  - Battery Energy Storage System and Vehicle to Grid
  - Ground Support Equipment
  - Passenger Transport
5. Boundaries:
  - Energy storage and/or conversion
  - Fields of energy consumption
  - Energy distribution (to usages) and Management
6. Cross cutting issues: safety & security

### **6.3 Sustainability**

Sustainability is a key driver of the strategy to carbon neutral airports. In addition, sustainability is a main/priority engagement of the European Union and all EU Member States.

These engagement and commitment have been reinforced in the framework of the Paris Agreement and the UN SDGs (Sustainable Development Goals). Thus, recommendations for replication toolboxes include sustainability components that shall be measured, collected and monitored, towards ensuring alignment with targets set, as well as reporting about sustainability improvement from dedicated action plans.

Recommendations for the replication of Sustainability measures within both workstream A and B, are addressed accordingly above (5.4.1, respectively 5.4.2). General measures for understanding and defining sustainability have been set up through the work conducted in task 6.4 with its related deliverable. Sustainability shall be understood through economic, social and environmental aspects, although in the context of Alight with the focus on respectively SAF and Smart

Energy. A definition of sustainability has been established and considered in both Workstreams:

*“Sustainability in ALIGHT encompasses the combination of social, economic and environmental aspects, with emphasis on environment to account for the aviation industry's climate impact. Thus, contributing to a long-term and inspiring decarbonization of the aviation sector”*

Thus, recommendations for Sustainability in the future replication toolboxes, include consideration of:

1. Related Legislation and Regulation, commitment and EU objectives, such as (but not limited to):
  - Paris Agreement
  - Green Deal and its roadmap Fit for 55
    - ReFuelEU
    - ReFuel EU Aviation
  - Energy Efficiency Directive
  - Renewable Energy Directive
  - Carbon Offsetting and reduction scheme for aviation
  - Regulation concerning batteries and waste batteries
  - Alternative Fuel Infrastructures Regulation
2. National and local regulation and policies, strategies & targets
3. Standardization and certification, such as (but not limited to):
  - Science base targets initiative
  - Roundtable on sustainable biomass (RSB)
  - International sustainability and carbon certification
  - Voluntary schemes
  - Sustainability strategy for airports (ACI)
  - Airport carbon accreditation (ACA)
4. Monitoring and reporting:
  - By considering the metrics defined in Alight Deliverable D8.2

- towards fulfilling global, EU, National and local obligations, including UN SDGs related
- towards feeding benchmarking of practices and impacts
- towards Initiating common and “unified” reporting scheme between all different levels of reporting’ s obligations/expectations
- ...

The above should work as the overarching understanding of sustainability across Alight, albeit with specifications depending on the focus being on either SAF or Smart energy. The sustainability report (D6.4) should be a compilation of best practices and conclusions from both workstreams, to ensure the sustainability of potential replication.