



DEVELOPING AN AIRPORT NET ZERO CARBON ROADMAP

ACI EUROPE Guidance Document



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Toulouse Blagnac Airport

Introduction

Climate change is one of the greatest challenges facing the world. Scientists are observing changes in the Earth's climate in every region and across the whole climate system. According to the latest Intergovernmental Panel on Climate Change (IPCC) Report (<https://www.ipcc.ch/>), emissions of Greenhouse Gases from human activities are responsible for approximately 1.1°C of warming from pre-industrial levels. The report provides new estimates of the risks of crossing the global warming level of 1.5°C in the coming decades and finds that unless there are immediate and large-scale reductions in Greenhouse Gas emissions, limiting global warming to close to 1.5°C or even 2°C, as per the goals of the Paris Agreement, will be beyond reach. Stabilising the climate will require strong, rapid, and sustained reductions in Greenhouse Gas emissions, and ultimately Net Zero Greenhouse Gas emissions.

Climate action is one of the key priorities on the airport agenda in order to safeguard the viability of the airport industry and address the challenge of climate change. The most significant Greenhouse Gas (GHG) associated with activities at an airport is CO₂. Since 2009, Airports Council International (ACI) EUROPE and its members have been systematically working to reduce their carbon emissions through *Airport Carbon Accreditation*¹. In May 2019, European airports committed, through ACI EUROPE, to achieve Net Zero Carbon emissions for operations under their control by 2050 at the latest. Since then, upon various occasions, ACI EUROPE and its member airports reconfirmed the commitment and even set earlier targets for many of the Net Zero Carbon objectives.

In accordance with these commitments, airports are drafting roadmaps to identify and implement the measures and actions needed to reach Net Zero Carbon. This document provides airports with guidance on the preparation of an actionable Net Zero Carbon roadmap in five steps.

In addition to this guidance, ACI EUROPE has developed an online repository of Net Zero Carbon roadmaps from those airports that have already made their roadmap publicly available (<https://aci-europe.org/netzero/repository-of-roadmaps.html>).



¹ [Airport Carbon Accreditation - Home](#)

Frequently Asked Questions

What does reaching Net Zero Carbon emissions mean?

- Globally, Net Zero Carbon emissions will be achieved when all CO₂ emissions released by humans are counterbalanced through carbon removal (i.e. nature-based or technology solutions).
- At an airport, achieving Net Zero Carbon will involve two main elements. Firstly, the airport reduces carbon emissions from its own operations (Scope 1 and Scope 2 emissions) to the greatest extent possible. Secondly, any remaining emissions that are difficult to reduce are neutralised through carbon removal or storage.

What is the difference between Carbon Neutrality as defined under *Airport Carbon Accreditation* and Net Zero Carbon?

- To achieve Carbon Neutrality, airports reduce carbon emissions and compensate for the remaining carbon emissions through offset reduction or removals.
- To achieve Net Zero Carbon, airports reduce carbon emissions from operations within their control as close to zero as possible and any residual emissions can only be addressed by carbon removals or storage.

What constitutes a Net Zero Carbon target?

- A Net Zero Carbon target should be built on two quantified targets; one for the absolute emissions reduction and the second for the carbon removal or storage (if any residual emissions are to be addressed).

What are the key components of the roadmap?

- Consistency, clarity and accuracy are essential. The roadmap should have certain key components in place and contain at least:
 - A high level of commitment from all members of the organisation, especially from senior management;
 - A Net Zero Carbon target including a reference year, a target date and a trajectory with intermediate targets;
 - Immediate emissions-cutting measures and identified medium-long term measures and,
 - A periodical (annual) reporting mechanism.
- If Scope 3 emissions are included, then the roadmap should include a commitment from all the parties involved.

How to build a credible trajectory?

- To build a trajectory, it is essential to analyse different pathways to achieve the target. Pathways are based on different assumptions, such as the different timing and selection of the reduction measures.
- To assess if the pathways are credible, it is essential to:
 - Quantify the emissions and reduction objectives in as detailed a way as possible and,
 - Make sure the selected measures are technically feasible and affordable.
- Based on this analysis, the trajectory is selected to be in accordance with the objectives and goals of the airport as well as the prevailing conditions.

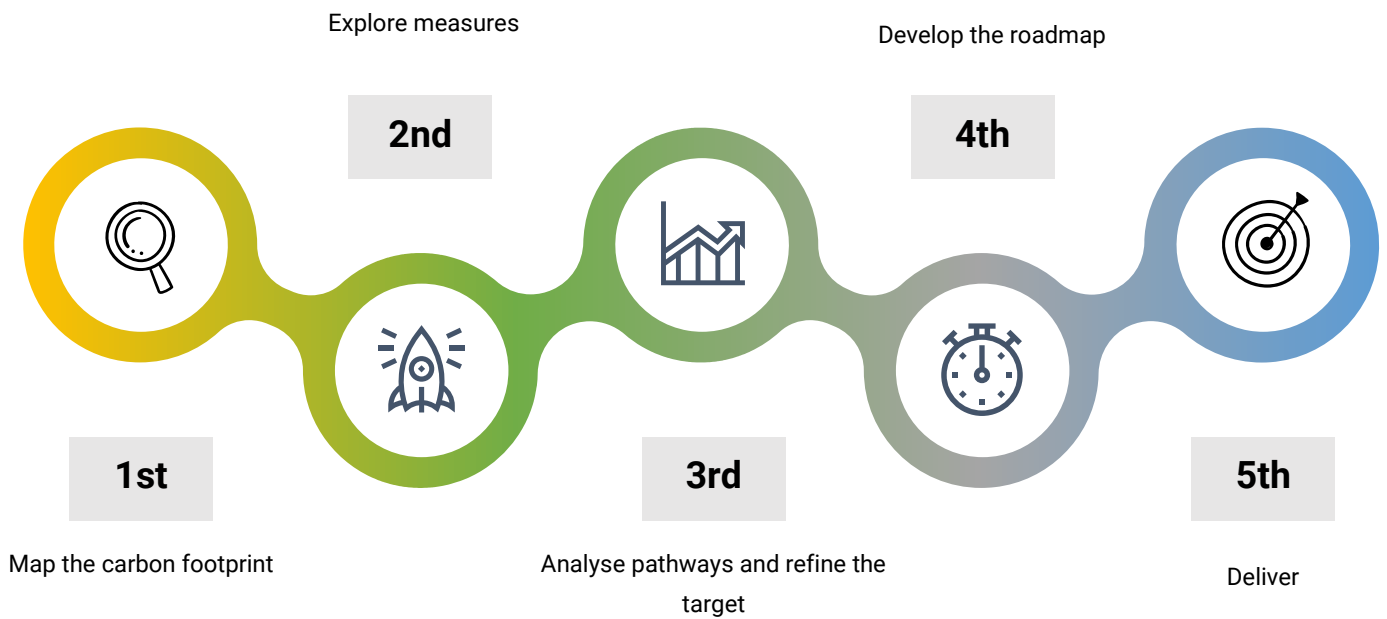
How to address uncertainties?

- As the Net Zero Carbon target is a long-term goal, airports need to address uncertainties. However, it is possible to manage these uncertainties by:
 - Specifying what assumptions the roadmap relies upon;
 - Creating interim target(s);
 - Establishing a governance board and,
 - Closely monitoring progress.

A methodology in 5 steps

There are five key steps that airports can take to accelerate progress towards Net Zero Carbon. These steps are partially derived from existing airport Net Zero Carbon roadmaps, but also take input from other industries.

Timely climate action will make airport operations more cost-efficient and resilient to increasingly stringent legislation. Cutting carbon emissions is becoming increasingly affordable and often results in reduced energy consumption. Using renewable energy also contributes to making airport operations more resilient to disruptions by protecting energy supply and delivering price certainty. The airport also legitimises its position within society, maintaining a so-called 'license to operate'.



Step 1 – Map the carbon footprint

The starting point is to measure the airport's past and current emissions in order to scope the roadmap. This will allow airports to understand the emissions impact of the various activities across the site and the value chain. It also provides a basis from which to set targets.



Define the target scope

The **Greenhouse Gas (GHG) Protocol** standard has been developed to enable businesses to calculate their Greenhouse Gas emissions. **Airport Carbon Accreditation** has adopted the principles of the GHG Protocol, as it sets a framework and key principles to develop the carbon footprint and identify projects to reduce emissions at airports. Sources of emissions are categorised as Scope 1, Scope 2, or Scope 3.

The boundary for GHG inventories and targets should be as comprehensive and accurate as possible. Emissions not covered by a quantified target cannot be responsibly managed or reduced. **All Scope 1 and Scope 2 emissions are to be included** in the Net Zero Carbon target and consequently, roadmap. An airport may also incorporate one or more sources of Scope 3 emissions, including upstream and downstream emissions, in its target, and thus partially or entirely cover the airport as a system. The option of setting a third-party inclusive emission reduction target allows airports to identify and pursue the most effective emission reduction opportunities, recognising that they may relate to the airport operator's Scope 3 sources.

Select the reference year

To facilitate target setting in line with the IPCC decarbonisation scenarios, it is recommended to use **2010 as the reference year** - i.e., the year against which emissions reductions required to reach Net Zero Carbon will be calculated. However, an airport can select a

different reference year, provided that it justifies its choice (i.e., availability of high-quality emissions data).

Measure the carbon footprint

In parallel to defining the target scope and reference year, it is important to calculate the carbon footprint. This calculation involves two main steps concerning the reference and latest activity year:

1. **Collecting the relevant business activity data** related to Scope 1 and Scope 2 (such as fuel or electricity used) and, if identified as part of the target, relevant Scope 3 emission sources (such as fuel used by aircraft handlers);
2. **Applying CO₂ emissions factors** to convert this activity data into CO₂ emissions.

The data should be **sufficiently detailed** to be able to identify the type of emissions and its sources. This will ease the categorisation of emissions, help define adequate measures to be taken and, at a later stage, determine what activities and which measures are prioritised in order to reach the target.

Recommendations

Building a solid baseline is fundamental to refining targets and preparing the roadmap. The baseline should contain as much detail as possible when mapping the carbon footprint and deciding which emission sources to include into the target scope.

Step 2 – Explore measures

Once there is a good overview of past and current emissions, identifying the measures to reduce emissions is the next step.

Generally speaking, the focus will be on improved efficiency of technology and operations, clean energy sources as well as innovations. Ideas can be gathered through consultation with the airport community and benchmarking against other airports.

After a successful carbon footprint analysis, the next step towards defining a Net Zero Carbon roadmap is to explore **effective and cost-efficient emission reduction measures** and, if needed, removals. Net Zero Carbon can be achieved by using contractual solutions (such as procurement of green electricity or green gas) or on-site technical solutions (such as renewable energy production on-site at the airport). Generally speaking, the latter help ensuring the highest additionality of the associated emission reductions and can offer a strong link to local development.

Involve the airport community and other stakeholders

Community and stakeholders know the airport well and, therefore, will have ideas and initiatives that will help define measures. Moreover, some of the measures that will be implemented might have an impact on community and stakeholders. Therefore, it is important that the roadmap is **acknowledged by the community and stakeholders**. Involving and including them in the journey as early as possible is highly recommended. This can be done through workshops, consultative meetings with key stakeholders, including airport employees, airlines, ground handlers, energy providers, and organisations such as local council, government, and transport authorities. Such a broad engagement is encouraged even if the target encompasses only Scope 1 and Scope 2 emissions.

After the consultation, **create a list of possible measures and actions** together with the expected results.

Perform benchmarking

Many airports and other businesses are already implementing effective measures. A **systematic benchmarking exercise** can provide an **overview of examples** that have proven to be successful or that are being trialled elsewhere. These measures and actions might also be applicable to the airport. The ACI EUROPE

Net Zero Carbon Roadmap repository gives access to a large number of existing roadmaps and is a very good source of measures that can be assessed for their application at an airport.

Create an extensive list of possible measures and actions

Thanks to the consultation and the benchmark analysis, **best practices and actions will have been gathered**. They can now be **classified within groups of measures**. It is recommended to identify some groups or domains to better understand where the actions will have an impact. An indicative categorisation can be found in the ACI World Long Term Goal Study.²

Select measures

The measures identified in the extensive list might not be suitable for all airports; a technical solution might not be sufficiently mature to be implemented; the logistics and supply might not be available in and around the airport, or the implementation costs might be too high. This is why a selection of measures needs to be **mapped against the emissions calculated** in Step 1 and analysed with respect to:

- Relevance to the airport, regarding its location, the airport's operations, and its emissions scope;
- Status, maturity, and associated risks (technology in development for example);
- Timeframe and requirements for implementation;
- Financial estimation and Return on Investment (ROI), and;
- CO₂, energy savings and other related-benefits.

Recommendations

A good and broad understanding of sustainability goals and actions taken elsewhere inside and outside the airport sector, extends the list of initiatives and ideas that might be replicated at the airport.

² ACI World Long Term Goal Study can be accessed via [this link](#). Other useful sources include the UK Department of Transport (2022) "Feasibility of Zero Emissions Airport Operations in

England by 2040" and the ACRP (2019) "Airport Greenhouse Gas Reduction Efforts."

Step 3 – Analyse pathways and refine the target

With the baseline calculated and a list of identified measures, the next step is to model different emission reduction pathways. They are based on scenarios with different assumptions and projections on energy use, carbon emissions and costs to give greater certainty on the impact of various mitigation measures and investment timelines.

Identify and evaluate pathways

With the list of measures established in Step 2, different pathways can be identified through the **creation of multiple scenarios**. These scenarios are based on factors that include the:

- Mix of projects to achieve emission reductions;
- Impact and feasibility for the airport;
- Level of investment required;
- Maturity of the technology, and;
- Applicable regulations.

Each scenario results in a pathway relying on a set of measures, the investment required and the target years for achieving the associated reductions that will ultimately enable the airport to reach Net Zero Carbon.

Airport Carbon Accreditation, and especially the guidance it provides on defining emissions reduction targets under Levels 4/4+, can also help to build emission pathways towards Net Zero Carbon.

Break down the target and define trajectory

Once the different pathways have been evaluated, one of them can be selected, becoming the airport's planned emission trajectory. It will be the backbone of the roadmap. Based on this trajectory, the airport will also be able to identify a specific year in which it aims to reach Net Zero Carbon, thus potentially refining an initial commitment to reach that goal by 2050 at the latest.

For the target year, the airport should then split the Net Zero Carbon goal into a "twin target" - including a quantified, absolute emissions reduction target, complemented by, if required, a quantified removal target for any remaining emissions.

Carbon removal examples include afforestation and reforestation, soil carbon enhancement, or direct air capture. Related solutions and associated international quality and accounting standards are under development.

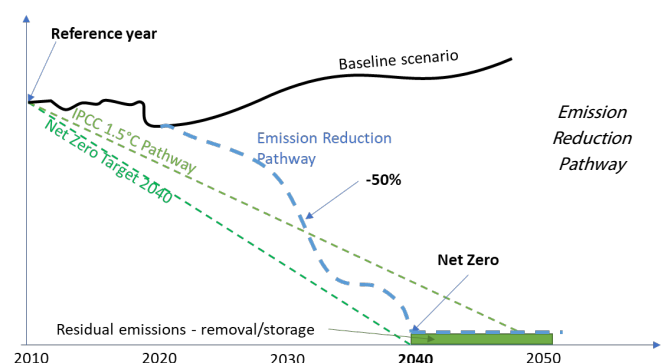
The set-up of the target and the trajectory should be **done in coordination with the entire organisation and especially with executive management**. The measures and actions that are derived from this target and trajectory will impact and affect the entire airport, its employees, and stakeholders. It is therefore important that they are included in this process and committed to the ultimate goal.

Define interim targets

The roadmap is often **built to cover a 15-30 year period from the reference year, and intermediate steps of 5-10 years are recommended**.

Some interim targets might include:

- Reaching 2010 emission levels by 2030;
- Reducing 2030 emission levels by 40% compared to the baseline;
- Becoming carbon neutral by 2040; or
- Planning achievements such as a percentage of renewable energy used, renewal of a fleet, etc.



Recommendations

When setting intermediate targets, the airport should align the level of ambition with the IPCC 1.5°C scenario, ensuring consistency between the long-term goal and the trajectory, as well as recognising that early action is critical to limit global warming.

Step 4 – Develop the roadmap

The Net Zero Carbon target is a long-term goal – progress towards it can be difficult to monitor. When building the roadmap, it is essential to combine all the elements gathered in the previous steps to turn them into an actionable plan.

Build the roadmap

The roadmap consolidates the outputs of the previous steps and as such, should contain an overview as well as a **detailed analysis on how to reach Net Zero Carbon**. The more information available, the easier it is to build the roadmap. The key components of the roadmap are:

- A high level of commitment from all members of the organisation, especially senior management;
- A Net Zero Carbon target (including a reference year, a target year, and a trajectory with intermediate targets, leading to a quantified “twin target”, as per Step 3);
- Immediate emission-cutting measures and identified medium-long term measures and,
- A periodical (annual) reporting mechanism.

Implement a governance plan

For several stakeholders this may be their first involvement with carbon reduction activities. Therefore, it is important to **build a strong governance structure** to take the Net Zero Carbon initiative forward. It is recommended to create a governance board, **including members from different departments of the airport and from different employee levels, where everyone has clearly identified roles**. The purpose of the board would be to hold periodic meetings and set concrete goals/objectives.

In addition to the governance board, the next step is to transform the roadmap into an action plan. Some good practices to build the action plan are:

- Present the Net Zero Carbon roadmap to the management board for signoff;
- Work with an internal lead to drive implementation;
- Set action owners to work;
- Monitor and report progress.

Communicate using a public document

The roadmap is primarily dedicated to the airport but it addresses a broader audience. **Communication to the public** about the objectives, measures, actions, commitments, etc. is also important. A public roadmap document can take **multiple formats**. From simple tables to a PowerPoint or a technical report; the most important point is to be concise and precise. This document will be updated regularly along the journey with achievements, new measures, updated forecasts, etc. An indicative list of recommended contents (not in specific order) of the roadmap is presented below:

- Airport information
- Global/National/Airport climate context
- Strategy/Policy
- Targets/Objectives/Commitment
- Governance/Stakeholders
- Historical carbon footprint/Projections/KPIs
- Focus areas/Measures/Initiatives
- Offsetting information
- Pathways/Trajectories
- Risks/Opportunities
- Communication
- Way forward

The ACI EUROPE Net Zero Carbon Roadmap repository is the perfect place to obtain some inspiration on how to build this document and highlight what is important for the airport.

Recommendations

The roadmap represents a long journey covering a long-term period. Many uncertainties might appear, and assumptions will have to be made. The roadmap will thus be a living document. Acknowledging this - it should not prevent the airport from making the roadmap public.

Step 5 – Deliver

The roadmap is now ready to be implemented. Through feasibility and design studies for individual measures, it will be possible to consolidate the roadmap and its delivery. In the meantime, periodic/yearly reviews will allow assessing the impact of the measures, the evolution of the carbon footprint and, when needed, identifying adjustments to be made.

Develop feasibility and design studies

All along the journey, the development of the market, the maturity and the cost of a solution will evolve. This is why the initial feasibility analysis, performed in Step 2, needs to be updated and consolidated. This will also allow the airport to better design the selected measures and consolidate the implementation of solutions.

During a **feasibility study**, it will be possible to examine all the options for energy efficiency, decarbonisation of electricity, heating/cooling, and transport. This is to ensure that the Net Zero Carbon targets can be met while minimising risks and costs, following as closely as possible the emissions trajectory established under Step 3.

The **timing of implementation is a critical component** of the roadmap. Therefore, it will include the planned timescale for each major measure and the critical path to implementation, considering their priority, urgency, and interplay with other measures as well as the technology and commercial readiness.

Communicate, train, and engage with the community

The success of any management plan is highly dependent on the competencies and participation of employees and other stakeholders. When assessing training and information needs, the airport should consider:

- The level of understanding of the business risks presented by climate change;
- Job-specific knowledge and skills required by those whose activities have a direct impact on the airport's carbon footprint;
- The need for a general level of awareness of the airport's progress, and;
- Any specific behavioural changes required.

Monitor through regular progress reporting

The **governance board meetings and periodic project meetings** allow airports to update the roadmap regularly, assess the impact of the measures taken and the evolution of the carbon footprint.

It is common to **update the roadmap** every 2-3 years. A quarterly meeting with the governance board can be planned to monitor the measures and actions closely.

Recommendations

The monitoring process is an important measure to help manage uncertainties. It allows to proactively keep the roadmap up to date and plan the feasibility/design studies for a successful delivery.



Definitions

Terms	Definition
Absolute CO₂ Emissions	Absolute emissions refer to the total quantity of carbon emissions being emitted, thus without comparing the amount of emissions to some unit of economic output.
Absolute Target	A target defined by a reduction in absolute emissions over time (e.g., reduce CO ₂ emissions by 25% below 2015 levels by 2020, or reduce CO ₂ emissions by 10.000 tonnes below 2015 levels by 2020)
Carbon Neutral	Condition in which during a specified period there has been no net emission of GHGs to the atmosphere as the carbon footprint of the subject has been counterbalanced by offsetting.
Net Zero Carbon	Condition in which human-caused residual carbon emissions are balanced by human-led removals over a specified period and within specified boundaries. ³
Offsetting	Emission reduction or removal resulting from an action outside the organisation's boundaries, used to counterbalance the organisation's residual emissions.
Pathways	Range of alternative routes to a desirable vision. They represent scenarios based on different assumptions such as the different timing and selection of the reduction measures.
Roadmap	Normative approach to sketch out detailed plans and processes for achieving a desired future state of development.
Scope 1	Greenhouse gas emissions from sources owned or directly controlled by the airport.
Scope 2	Greenhouse gas emissions from the generation of purchased electricity, heat, cooling, or steam consumed by the airport.
Scope 3	Greenhouse gas emissions that are a consequence of the airport's activities but arise from sources that are not owned or directly controlled by the airport. Examples include emissions from airlines and other tenant activities, and ground transport vehicles not owned and controlled by the airport operator.
Trajectory	The pathway followed to reach Net Zero Carbon.

Additional resources and related documents

- ACI World Long Term Carbon Goal Study - <https://store.aci.aero/product/long-term-carbon-goal-study-for-airports-report-2021/>
- ACI EUROPE FAQ on Net Zero commitment - <https://www.aci-europe.org/netzero/faq.html>
- *Airport Carbon Accreditation* Application Manual - <https://www.airportcarbonaccreditation.org/airport/technical-documents.html>
- UN Race to Zero campaign - <https://racetozero.unfccc.int/>
- ISO 2022, "Net Zero Guidelines, Accelerating the Transition to Net Zero"
- IWA 42:2022(E); ISO/DIS 14068 (en) "Greenhouse gas management and climate change management and related activities — Carbon neutrality."

³ Adapted from IWA 42:2022.



We sincerely hope that this document proves useful to airport operators worldwide who are considering developing their Net Zero Carbon Roadmap. Please reach out should you have questions or feedback.

About ACI EUROPE

Airports Council International (ACI) EUROPE is the voice of Europe's airports. It is a non-profit organisation, whose prime purpose is to represent and lead the European airport industry as well as to promote professional excellence in airport management and operations. ACI EUROPE represents the European region of ACI, the only worldwide professional association of airport operators. It represents over 500 airports in 55 European countries. Air transport supports 13.5 million jobs, generating €886 billion in European economic activity (4.4% of GDP). In response to the Climate Emergency, in June 2019, members of ACI EUROPE committed to achieving Net Zero Carbon emissions for operations under their control by 2050.

Learn more - <https://www.aci-europe.org/netzero>

About To70

To70 has a long track record of helping airports with baselining, developing, and implementing carbon reduction strategies and policies and responding to environmental legislation. Since 2012, we have completed over 50 *Airport Carbon Accreditation* projects for 20 airports in all ACI regions. In recent years this has been expanded with the wider airport sustainability strategies.

Learn more - www.to70.com