

Climate Adaptation Action Plan





Climate risk management in airport hubs: the ADR Model

Our strategic vision for addressing the impacts of climate change is grounded in a deep understanding of how these dynamics may influence the long-term resilience of our business.

Executive summary

Climate change is identified as one of the risks affecting airport infrastructure. Extreme events (heatwaves, sea level rise, storms) may threaten the safety and continuity of operations at **Fiumicino** and **Ciampino** airports, and for this reason ADR has undertaken a process to turn this threat into a concrete and strategic action plan.

In the broader context of corporate risk management, ADR has adopted a structured process to assess climate-change-related risks based on international standards, including **UNI EN ISO 14091:2021** and **IPCC/ICAO** guidelines, to systematically analyse the impact of climate-related phenomena. The **aim** was to assess risks at both airports over time horizons extending to **2050**, covering four main risk categories: **temperature** (heatwaves, rising average temperatures); **wind** (strong winds, storms); **water** (intense precipitation, flooding, sea-level rise); **solid mass** (landslides, ground subsidence).

The process was structured into three key phases:

climate modelling based on historical data and future climate scenarios, the results of which were collected in the “**Climate Hazards Atlas**”;

analysis of potential impacts of climate change and a detailed **assessment** of all **critical assets** in terms of exposure, sensitivity and adaptive capacity (in summary, vulnerability), formalised in the “**Asset Assessment Sheet**”;

dynamic modelling with risk projections over time (up to 2050) to support **long-term decisions on infrastructure modernisation and development**.

The assessment results have enabled the definition of a **Climate Adaptation Action Plan** that integrates resilience into decisions relating to design, development and maintenance activities. Adaptation measures have been grouped into four strategic categories:

design and planning: measures aimed at updating or integrating design requirements, considering the evolution of climate phenomena to make infrastructure more resilient, for example by defining **new temperature parameters** and installing **enhanced drainage systems**;

integration and monitoring: the objective is to integrate or extend existing models, evolving towards **advanced simulation models** (such as water flow management in the event of extreme rainfall), and implementing **continuous monitoring** systems for climate phenomena and the condition of airport pavements;

preventive maintenance: strengthening monitoring and **preventive maintenance** programmes, with increased frequency for critical assets such as water treatment systems;

infrastructure resilience: increasing asset resilience through investment and the use of **new technologies**.

Climate risk assessment is used to integrate climate resilience into climate change mitigation projects. Among the most significant recent initiatives are the **Solar Farm**, the largest self-consumption photovoltaic plant at an airport in Europe, and the **PIONEER** project, which stores excess energy in second-life batteries to meet peak demand and enhance grid flexibility.

ADR’s mission is to ensure safe, efficient and sustainable infrastructure for the country, capable of meet future challenges and strengthening stakeholder trust.

Addressing the unexpected challenges of climate uncertainty

The world is changing at an unprecedented pace. We are not just talking about technology or the economy, but also the climate. Climate change, mainly caused by greenhouse gas emissions, is altering our planet's systems, leading to rising global temperatures and increasingly frequent and intense extreme weather events. This is neither a distant nor an abstract issue; it directly affects our daily lives and, for Aeroporti di Roma, it means facing new challenges to ensure **the safety and continuity of airport operations**.

Airports must be seen not only as places of transit, but as complex and vital systems — true **economic and social hubs**. Airports are among the infrastructure most vulnerable to climate change; extreme weather events, such as heavy rainfall, can cause delays, force flight diversions and temporarily jeopardise the full operability of runways.

In the long term, climate change could even affect the tourist attractiveness of certain destinations.

Beyond tourism, the cost of these phenomena is tangible for everyone: damage caused by extreme climate events in Europe is estimated at over EUR 738 billion between 1980 and 2023, with more than EUR 162 billion in the last three years alone¹.

Like a large city, an airport must protect itself from these phenomena and, for this reason, ADR has undertaken an in-depth and systematic analysis as part of its broader corporate risk management strategy: the **assessment of physical and transition climate-related risks** for our two main hubs, Leonardo da Vinci in Fiumicino (FCO) and Giovan Battista Pastine in Ciampino (CIA). The aim is to analyse **how climate change affects — or may affect — our activities and to define a plan** — continuously updated — to protect infrastructure, our employees and the millions of passengers who pass through our airports every year.

1. Source: European Environment Agency — indicator “Economic losses from weather- and climate-related extremes in Europe”.





FCO **1,600 ha**
of land

CIA **157 ha**
of land

55 Mlns
passengers in 2025

278,000 tons
of cargo in 2025

35.5%
of total added value
(transport and tourism) in 2024

540,000
jobs in 2024

Fiumicino Airport is among the most important European airports in terms of passenger numbers, thanks to a wide national catchment area and a high level of connectivity to major European and international destinations. Ciampino Airport, on the other hand, displays the typical characteristics of a “secondary airport”, with traffic mainly linked to low-cost flights and general aviation. Both airports benefit from Rome’s international significance, one of the world’s leading tourist and cultural destinations.

Fiumicino Airport covers an area of approximately **1,600 ha**, with three runways and a terminal system of about 430,000 m² dedicated to passengers and 140 aircraft stands over a paved area of approximately 155 ha. Ciampino Airport covers approximately **157 ha**, has a single runway and a passenger terminal of about 16,000 m², with around 70 stands for aircraft and helicopters, supported by service facilities.

Together, the two airports handled more than **55 million passengers** and **278 thousand tonnes of cargo** in 2025, reinforcing the Italian capital’s central role as a national and international air transport hub.

This trend is reflected in the results of a study conducted in 2025 based on 2024 data, according to which the effects of core business activities and tourism generate added value of approximately EUR 30.8 billion in Italy; the sectors most affected are transport and tourism, which together account for more than **35.5% of total added value** (*).

Activities related to the operations of Rome’s airports in 2024 generated more than **540,000 jobs**, 41% of which were direct, 24% indirect through the supply chain, and the remaining share was induced through the income–consumption cycle (*).

To provide a tangible comparison, the number of jobs generated by the two airports is comparable to the total urban population of a medium-sized Italian city.

(* The analysis was conducted with the support of PTSCLAS, an independent Italian consulting firm with over 60 years of experience in key sectors such as the modernisation of public administration, telecommunications, transport, energy, infrastructure, culture and tourism. Thanks to an interdisciplinary approach and well-established analytical techniques, PTSCLAS has established itself as a key partner in addressing the challenges of economic, social and cultural development in Italy and Europe.

How we address a changing climate

To address such a complex challenge, we have defined a process integrated into risk management activities that adopts a rigorous methodology based on international standards, such as those recommended by ISO (International Organization for Standardization)², the IPCC (Intergovernmental Panel on Climate Change) and ICAO (International Civil Aviation Organization) guidelines.

This approach has enabled us to analyse the challenge of climate change from multiple perspectives:

hazard: which climate events are potentially harmful to our airports?

These include extreme heat, heavy precipitation, strong winds and sea level rise;

exposure: which areas of our airports are exposed to these hazards?

Runways, terminals, drainage systems and all critical facilities;

sensitivity: how sensitive are our infrastructure to these hazards?

This depends on their age, the materials used and their construction characteristics;

adaptive capacity: to what extent are we able to respond and mitigate damage?

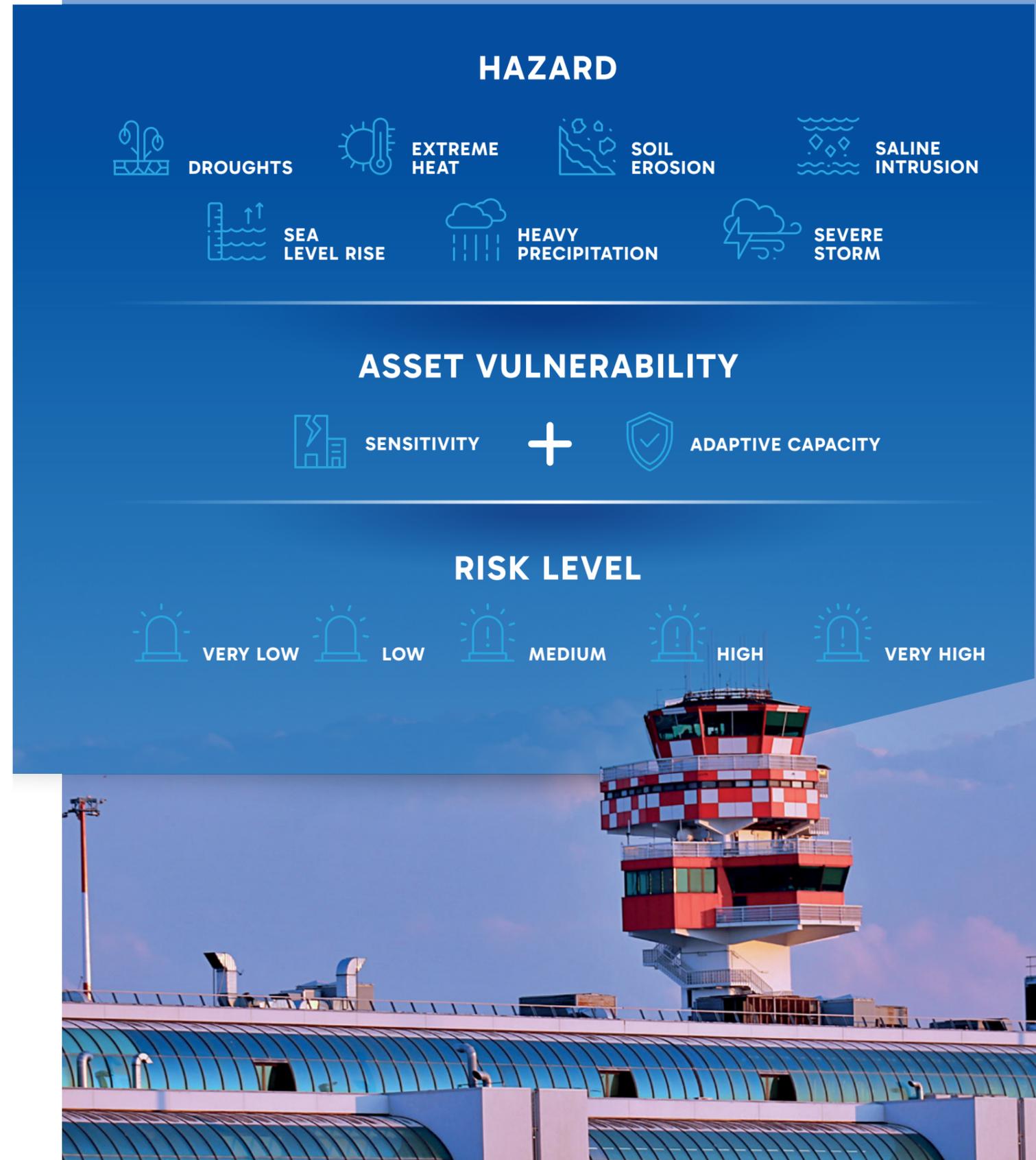
Our emergency procedures, maintenance systems and the ability to integrate new technologies play a crucial role;

vulnerability: directly linked to the two factors above (adaptive capacity and sensitivity), it measures the potential damage that a climate event may cause;

risk: this is the result of combining all these factors, and it provides a clear picture of the potential threat.

Physical climate hazards arise directly from climate-related phenomena and may manifest in different ways:

- **acute risks:** these refer to sudden extreme events that may temporarily disrupt airport operations. For example, strong winds or storms can cause delays or cancellations preventing flights from departing or landing at our airports;
- **chronic risks:** these relate to gradual changes over time, such as rising temperatures, which require increased energy consumption for the climate control of airport buildings and infrastructure.



2. This refers specifically to UNI EN ISO 14091:2021, the international standard that provides guidelines for the assessment of climate change-related risks. Essentially, it helps organizations systematically understand how specific climate hazards (such as droughts or floods) may impact their activities. To do this, it considers an organization's exposure to these hazards, its sensitivity and its adaptive capacity, allows for the calculation of vulnerability and, consequently, the overall risk.



The global roadmap for aviation resilience

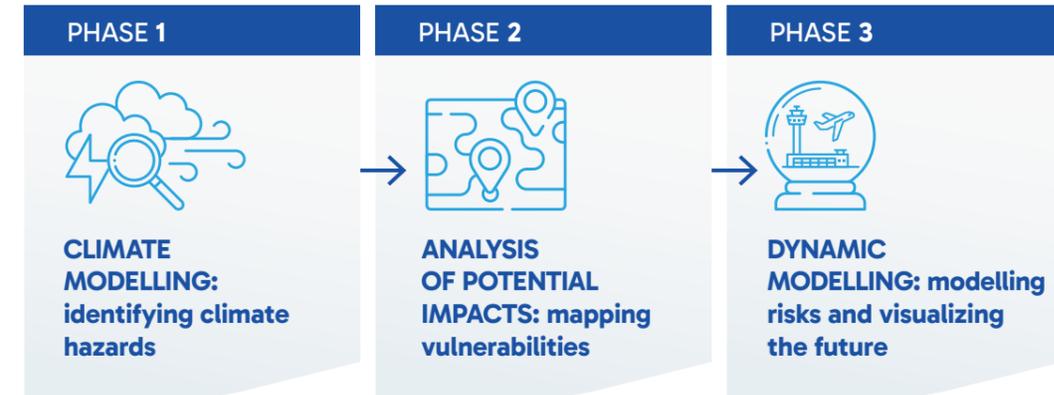
The discussion on climate adaptation in the aviation sector formally began in 2013, thanks to the work of the **International Civil Aviation Organization (ICAO)** and **EUROCONTROL**. Since then, a series of in-depth studies have been carried out to examine the impact of extreme weather events such as storms, sea level rise and changes in wind patterns. Based on this research, in 2018 ICAO published its first **Climate Adaptation Synthesis Report** to collate and summarise existing information. This work culminated in 2022 with the publication of a more detailed guide,

a comprehensive framework to help airports, aircraft operators and air navigation service providers assess risks and build resilience.

In September 2025, the analysis carried out by ADR on climate change adaptation for Fiumicino Airport was included in the *working papers* presented at the 42nd ICAO Assembly, under the agenda item “Item 16: Environmental Protection – International Aviation and Climate Change”. The document, submitted by the Italian regulator ENAC (Italian Civil Aviation Authority), was included in the references for the development of international guidelines intended for all airport operators.

The assessment methodology

The assessment process was developed in **three main phases**, which required close collaboration between our internal teams and external experts, combining in-depth knowledge of our infrastructure with scientific climate expertise.



PHASE 1 CLIMATE MODELLING

We first identified the most relevant climate hazards for our geographical area. To do so, we referred to the **European Union Taxonomy**³, which classifies climate-related risks into four main categories:

TEMPERATURE
Heat waves, increase in average temperatures

WIND
Strong winds, storms

WATER
Heavy rainfall, flooding, rising sea levels, drought

SOLID MASS
Landslides, ground subsidence

3. The **European Union Taxonomy** is a classification system that establishes criteria for defining which economic activities can be considered environmentally sustainable. Created with the aim of steering investments towards a greener economy, it serves as a guide for companies and investors. In 2024, the ADR Group’s activities showed a high degree of alignment with the EU Taxonomy for climate change mitigation, in line with previous years. In particular, 77.7% of turnover was derived from activities fully compliant with the Taxonomy. Similarly, 77.4% of capital expenditure (CapEx) was allocated to projects and investments aligned with the required standards, highlighting the Group’s commitment to supporting sustainable development consistent with European ecological transition objectives.

For each hazard, we analysed historical data and future scenarios. For the past, we used the **ERA5** dataset, which covers the period from 1940 to the present, providing a solid overview of climate trends. For the future, we worked with projections based on the **IPCC Shared Socioeconomic Pathways (SSPs)**, which allowed us to explore different possible future scenarios, using the **Copernicus Climate Data Store (CDS)** for the following three SSPs:

- **Optimistic scenario (SSP1-2.6):** the world commits to sustainability, limiting global temperature rise;
- **“Middle of the road” scenario (SSP2-4.5):** current trends continue, leading to a more significant increase in temperatures;
- **Extreme scenario (SSP5-8.5):** a future still dominated by fossil fuels, with a steep rise in global temperatures.



Average temperature increase by the end of the century compared to pre-industrial levels

SSP1-2.6	SSP2-4.5	SSP5-8.5
≤2°C	≈2.7°C	≈4.5°C

The data underpinning the climate study

ERA5 is a global dataset describing past climate and weather from the early 1940s to the present day. It is a “reanalysis” product, meaning it combines billions of historical observations (from satellites, weather stations and weather balloons) with advanced mathematical models to create a consistent and comprehensive representation of the atmosphere and oceans. It can be likened to a climate “time machine”, providing a reliable and detailed reconstruction of weather conditions at every point on the globe, and is managed by **ECMWF (European Centre for Medium-Range Weather Forecasts)**;

SSPs (Shared Socioeconomic Pathways) are the socioeconomic scenarios used

for the sixth phase of the **Coupled Model Intercomparison Project (CMIP6)**. The results of these climate models provided the basis for the assessment of past and future climate change that is included in the **IPCC Sixth Assessment Report (AR6)**;

The **Copernicus Climate Data Store (CDS)** is an online platform that provides data and tools to explore and analyse the Earth’s climate. It is part of the European Earth Observation Programme (Copernicus) and acts as a single source of scientific climate information. The CDS collects historical data, real-time data and future projections from various sources, such as satellites and ground-based stations. In practice, it is a crucial resource for scientists, researchers and companies that require accurate climate information to study impacts, assess risks and develop adaptation strategies.

Analysing these scenarios up to 2050 enables long-term planning, while taking future uncertainties into account. To make the data immediately usable, we developed a “**Climate Hazards Atlas**”, a visual document rich in charts and maps.

PHASE 2 ANALYSIS OF POTENTIAL IMPACTS

As previously noted, airports are complex ecosystems. Their infrastructure — such as **runways, taxiways, aprons, terminals, drainage systems and electrical facilities** — are all interconnected, and a problem in one system can have cascading effects on all others.

For this reason, we have identified all critical assets and assessed their **exposure, sensitivity, and current adaptive capacity**.

This detailed analysis has enabled us to create an “**Asset Assessment Sheet**” that summarises the status of each critical component.

PHASE 3 DYNAMIC MODELLING

The final stage of the process was **dynamic risk modelling**, i.e. a comprehensive assessment simulating how assets could be affected across different climate scenarios and time horizons, taking into account the **implementation of adaptation measures**. By combining data on future hazards with the vulnerability of our assets, we were able to assign a **risk score to each component for each period**.

To optimise the analysis, we selected a reference climate scenario, **SSP2-4.5**, considered the most realistic, and defined a threshold corresponding to a **medium level of risk**.

Risks exceeding this threshold were considered a priority, as they represent significant potential impacts on assets and operations, allowing us to focus resources and adaptation measures on the most relevant threats. We did not limit ourselves to a snapshot of the present, but projected the risks into the future, up to **2030, 2040 and 2050**, to support decisions regarding the modernisation of the airport system, also considering a long-term development perspective.

The risk assessment provided us with a deep understanding of the vulnerabilities and resilience of our airports, encapsulated in two tools: the “**Climate Hazards Atlas**” and the “**Asset Assessment Sheet**”.



From Assessment to Action: ADR's Adaptation Plan

These results led to the development of a **Climate Adaptation Plan**, which comprises two key elements:

- **adaptation measures:** short-, medium- and long-term actions to reduce the impact of risks and increase infrastructure resilience;
- **benefits analysis:** the advantages of each action, including synergies with emission reduction initiatives.

The document outlines the measures we are implementing or intend to implement to make our infrastructure more resilient, defining a strategic and operational approach across several fronts.

The measures identified to reduce exposure to climate-related physical risks for Fiumicino and Ciampino airports can be grouped into four main categories:



DESIGN AND PLANNING

Adopting new construction standards to make future and renovated infrastructure more resilient

Rethinking construction practices: building or renovating infrastructure using more modern and resilient criteria is the first step in addressing climate challenges. This means adopting more robust construction standards, introducing drainage systems capable of handling increasingly intense rainfall, using more durable materials and trialling innovative solutions that help reduce heat impact. In this context, we are updating the design guidelines for runways and facilities, and defining new temperature parameters to ensure that our structures remain functional even under future climate scenarios.



INTEGRATION AND MONITORING

Developing and integrating advanced simulation models and real-time monitoring systems for climate phenomena to ensure a faster response

Anticipating and responding in real time: increasing resilience requires the ability to foresee and react promptly. For this reason, we are developing advanced simulation models — for example, to manage water flows during extreme rainfall — and continuous monitoring systems for climate phenomena. Through these technologies, we can improve temperature management in buildings, assess the resilience of the water system under new scenarios, and continuously monitor the condition of runway pavements, ensuring timely interventions.



PREVENTIVE MAINTENANCE

Increasing the frequency and quality of maintenance activities to strengthen the resilience of existing assets before damage occurs

Preserving and strengthening existing assets: the goal is not only to build better, but to maintain and enhance our current infrastructure. Strengthening asset maintenance means acting before damage occurs, with more frequent and targeted inspections. For example, we monitor debris transport in drainage networks, update maintenance plans, and expand control and isolation programmes for wastewater networks, reducing the risk of saltwater infiltration into underground infrastructure.



INFRASTRUCTURAL RESILIENCE

Investing in new technologies and materials, such as electrical equipment that is less sensitive to heat to make our infrastructure inherently more resilient

Making infrastructure inherently more resilient: we look to the future by investing in new technologies and solutions that strengthen our assets. This means adopting electrical equipment less sensitive to heat, improving protection systems for runway lighting against water and corrosion, developing drought management plans for water supply and collaborating with relevant stakeholders to strengthen the drainage system.

Analysis of design criteria from a climate change perspective: the “Pier D” Boarding area redevelopment and the Taxiway doubling

In 2024, we conducted an in-depth analysis of two **strategic projects** for Fiumicino Airport — the **redevelopment of Pier D at Terminal 1** and the **doubling of “Taxiway Bravo”**, which runs parallel to the runway — to assess the adequacy of the design criteria in addressing **climate change** scenarios.

The analysis highlighted several actions that will make these projects more resilient. For example, to cope with rising temperatures, the use of **modified bituminous binders** is prioritised, alongside careful selection of **aggregates**, to ensure that asphalt mixtures exhibit reduced thermal susceptibility, even beyond the projected climate scenarios. The issue of water management was also addressed with innovative solutions: **updated hydraulic models** were adopted based on severe future climate scenarios, enabling the management of risks from intense and short-duration rainfall events and preventing flooding.

For the **“Pier D” Boarding area**, the focus was primarily on HVAC and plumbing systems, taking into account the risks

associated with rising temperatures. Here, the design approach has already integrated several **resilience elements**: stricter temperature and humidity parameters to ensure long-term system efficiency, backup systems for evaporative towers in case of failure during extreme heat, rainwater collection and reuse tanks, and a clear separation between potable and industrial water networks to prevent contamination. Similarly, measures have been implemented to address exceptional weather events, such as **pumping systems** that reduce flood risks in underground areas, supported by storage tanks with multiple drains to manage potential water surges.

Alongside the measures already introduced, the analysis also identified areas for improvement to be explored in the coming years. In particular, **the definition of new temperature curves** to serve as a reference for the sizing of runways and facilities, **the update of the hydraulic model** based on the latest climate scenarios and **the revision of design guidelines** to steer future technical choices toward increasingly resilient standards. This verification activity is therefore not simply a check, but an opportunity to strengthen our ability to design infrastructure capable of facing an uncertain climate future with greater safety, efficiency, and foresight.

In addition to making infrastructure more resilient, these actions are part of a larger journey: one that will lead us to progressively reduce emissions until we achieve Net Zero.

The road to Net Zero

To achieve Net Zero emissions for our operations (Scope 1 + Scope 2) **by 2030, ahead of European targets**, we are pursuing a strategic path focused on efficiency, innovation and sustainability.

A concrete example of this commitment is the combination of the **Solar Farm** and **PIONEER** projects. With Solar Farm, we have built Europe's largest airport

self-consumption photovoltaic plant, producing over 30 GWh per year. In addition, the PIONEER project uses second-life batteries to store excess energy, allowing us to cover consumption peaks.

In parallel, we continue to focus on other key initiatives, such as upgrading buildings to green standards, converting our corporate fleet to electric vehicles, and using biofuels such as HVO. Moreover, we are promoting the adoption of **Sustainable Aviation Fuel (SAF)** and encouraging **low-emission mobility** to and from the airport to further reduce indirect emissions (Scope 3).





Net Zero 2030



Assessing climate risks is not merely a theoretical exercise, but a fundamental step for our future. The results of this analysis allow us to fully integrate climate resilience into both the **Airport Development Plan**, guiding infrastructure investments in a sustainable and safe way, and into our **Business Plan**.

This means that every decision we make, from the construction of a new terminal to runway maintenance,

takes into account future climate scenarios and the Net Zero 2030 target. Our commitment is to ensure that, despite the challenges of a changing climate, Rome's airports remain safe, efficient, and sustainable for the millions of people who fly to and from Rome every year.

By doing so, we aim to strengthen the trust of all our stakeholders and ensure the long-term sustainability of the infrastructure we manage.

