
ICAO SEMINAR ON
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H2

Torino Airport:
an ideal ecosystem to create synergies for the future of aviation

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Overview

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02 Measure

03 Model

04 Smart Energy Hub

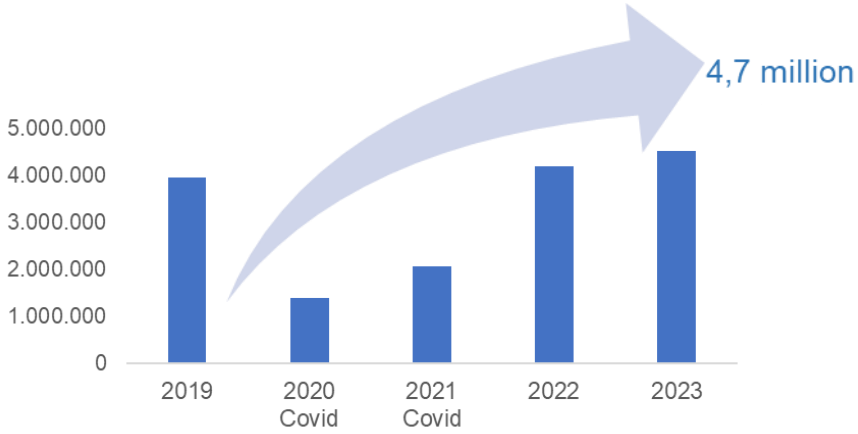
05 Scope 3

Torino Airport at a glance

Torino Airport at a glance

Torino Airport is a regional airport located in North Western Italy, managed by SAGAT SpA and owned by 2i Aeroporti the italian leading closed-end fund that created the first and most important network of italian airports (LIN, MXP, NAP, QSR, BLQ, TRS, AHO, OLB).

Torino Airport has recently experienced a double digit **growth in traffic** and received **several awards**.



Background and context elements

Turin airport has the unique characteristic of being located in an **ideal territorial context** for creating synergies and partnerships.

Turin Airport is a Regional Airport with all the **elements** of a large airport infrastructure and is characterized by the peculiarity to host two **production plants of Leonardo** (the main Italian aircraft manufacturer).

Turin for **Aerospace City**, a major urban and industrial redevelopment project, is dedicated entirely to the world of Aeronautics and Space and involves major industry players, small and medium-sized enterprises, and the world of academia, research and education.

Piemonte Region is one of the most industrialised regions in the Organization for Economic Co-operation and development (OECD) and has been able to develop a research ecosystem able to support local industries.

Founded in 1859, **Politecnico di Torino** is a leading University in Italy and in Europe in the field of technical-scientific research and supports the territory on technical decision-making.

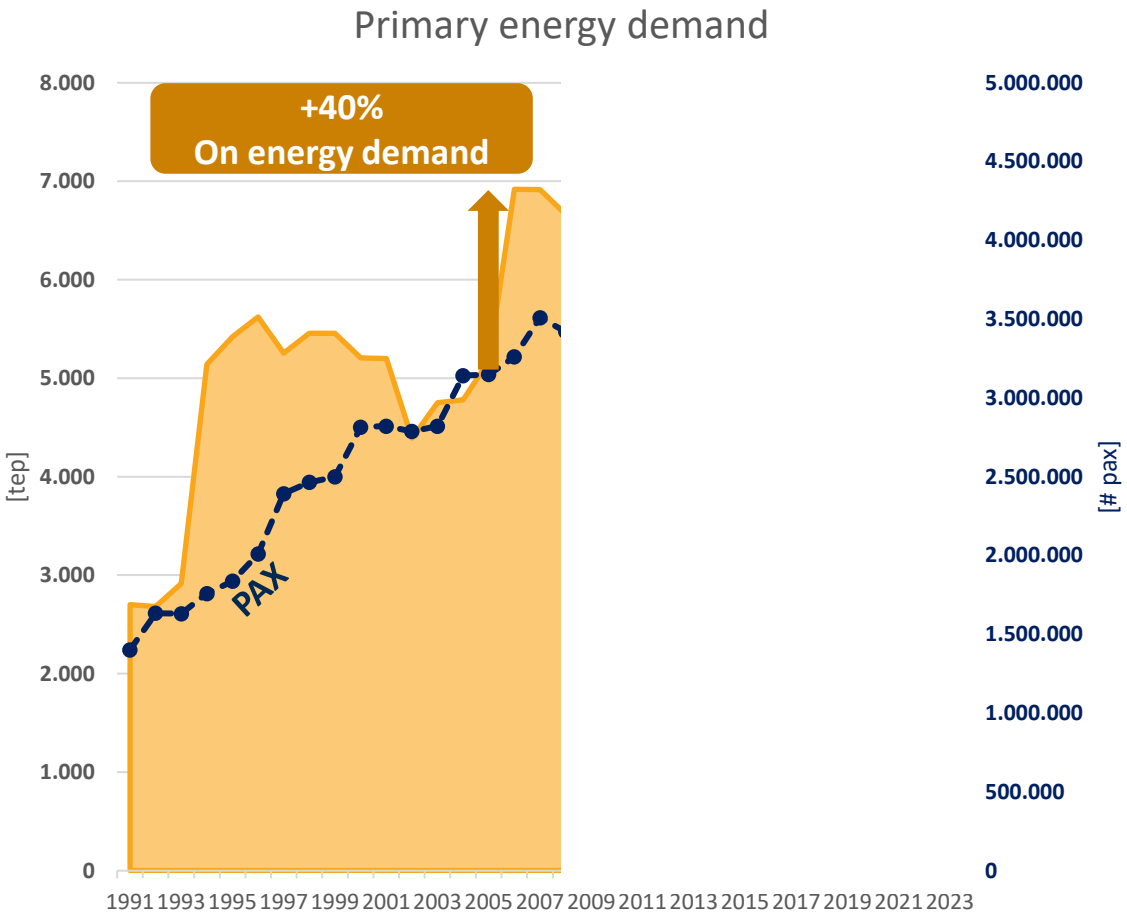
02

Measure

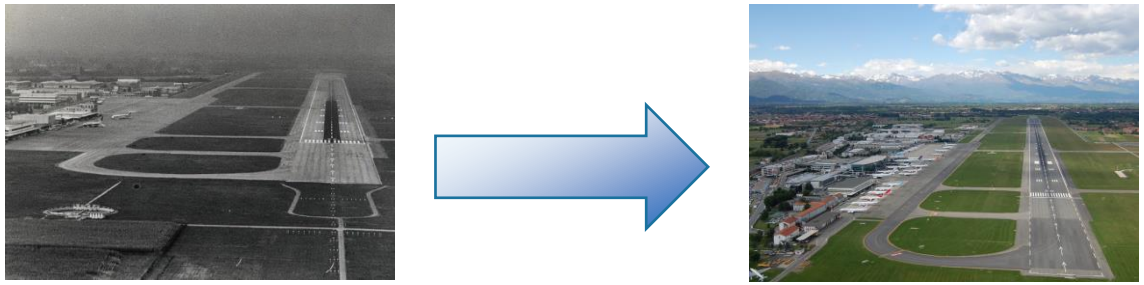
Where do we come from….?

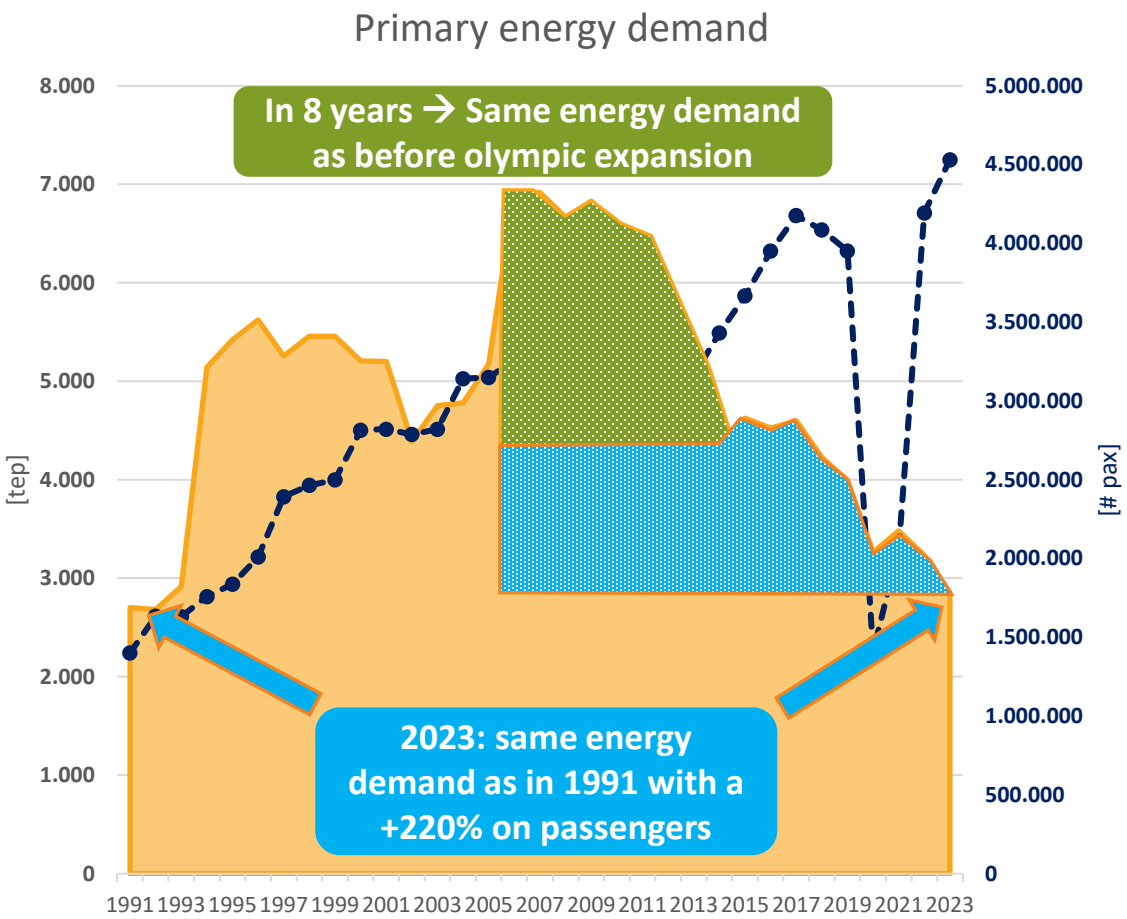
With the expansion of **2006 winter Olympics**, the public spaces increased of **+76%.**
This has caused a massive increase also on the energy demand due to the remarkable dimensions of the structure used at those times at **40% of its capacity**.

First step -> **measure** where the energy flows.
A methodological approach has been adopted thanks to the **ISO 50.001 certification** obtained in 2010 (second airport in Europe).



Where do we come from….?





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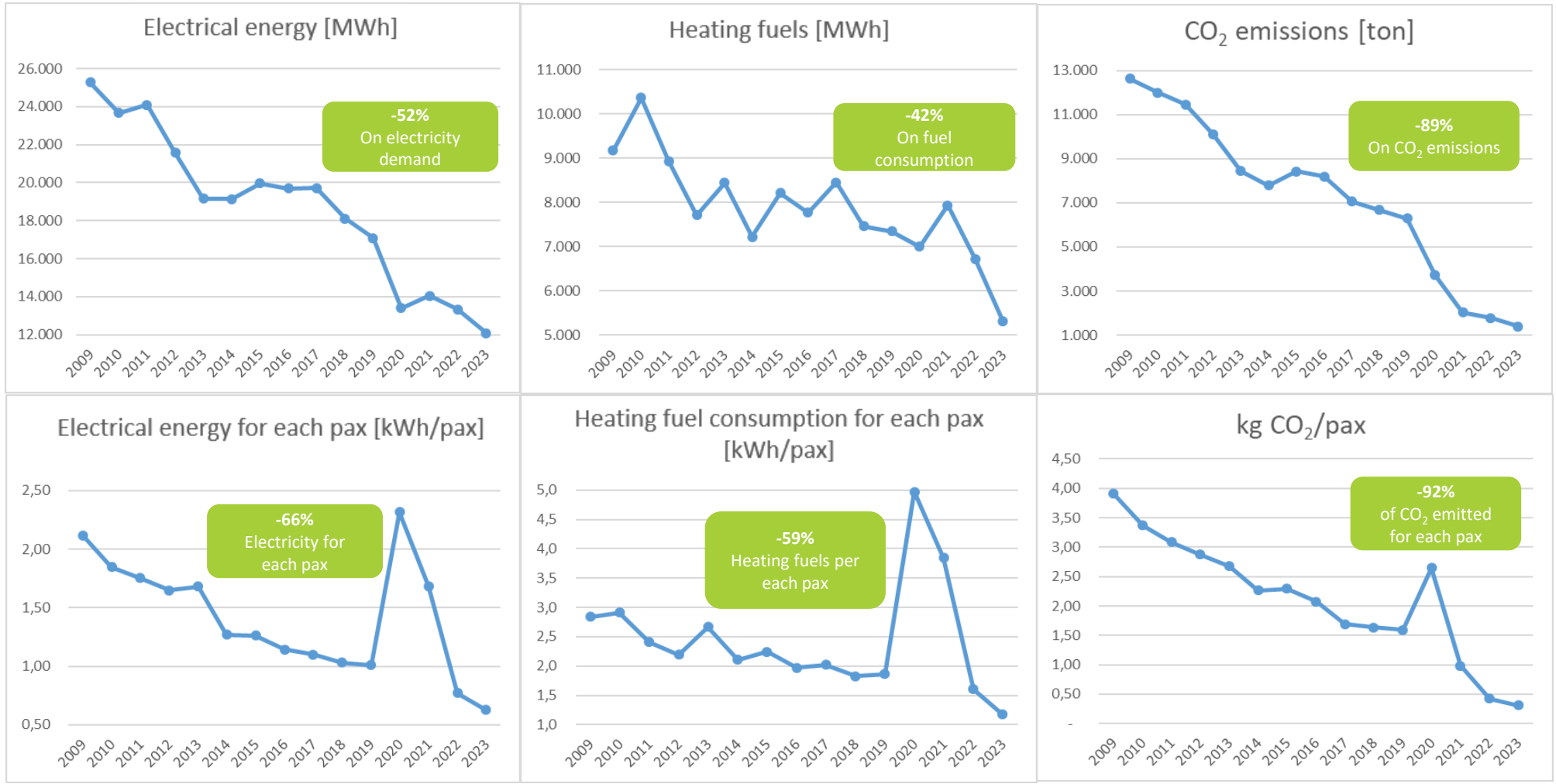
The first phase has relied on traditional efficiency measures with **fast PBTs** (few months) and based on LED relampings, high efficiency motors and pumps, inverters and monitoring systems.

The second phase has relied on implementations with **longer PBTs**: improved insulation on ceilings and on district heating piping, change on boilers and chillers with higher performances.

The third phase has been based on the exploitation of **innovative systems**: f.e. smart dimming of lights, IOT systems for the control of thermo-hygrometric conditions and optimisation on the baggage handling system.

Energy demand reduction

The implementation of actions aimed at improving **energy efficiency** led to **halving** the primary energy demand and to substantially reduce Scope 1 and 2 emissions.



03

Model

TULIPS

DemonsTrating lower pollUting soLutions for sustaInable airPorts acrosS Europe

WORK PACKAGES WITH DEMO-ACTIVITIES

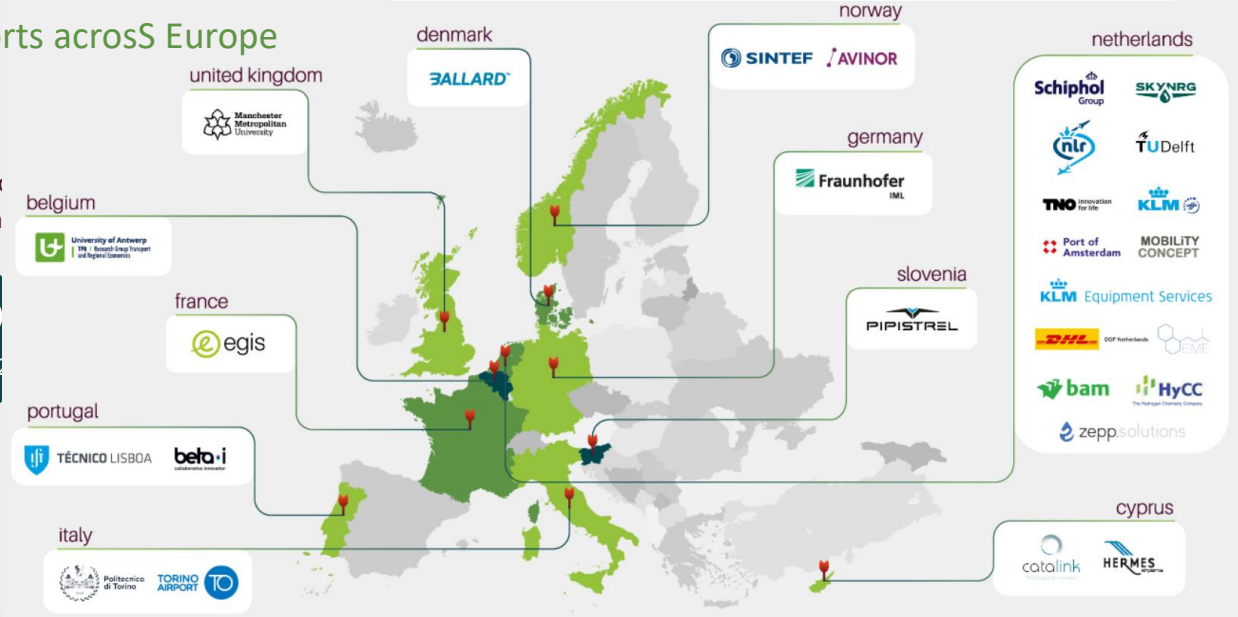
WP1
Sustainable Inter-modal Transport Connections

WP2
Energy Supply of Future Aircraft

WP3
Smart Airport Energy Hub

WP4
Zero Emissi
Airside Opera

SAF Market



- Zero Waste & Zero Airport Emissions in 2030
- Net Zero Aviation Emissions in 2050

COLLABORATION, COORDINATION & ASSESSMENT WORK PACKAGES

WP8
Performance Monitoring and Economic Data Collection and Analysis

WP9
Deployability, Upscaling and Exploitation

WP10
Roadmaps Vision to 2030

WP11
Project Management

WP12
Dissemination and Communication

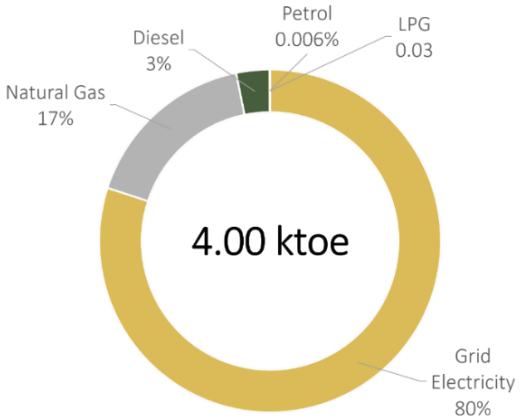
Grant Agreement No. 101036996

Creation of a «digital twin»

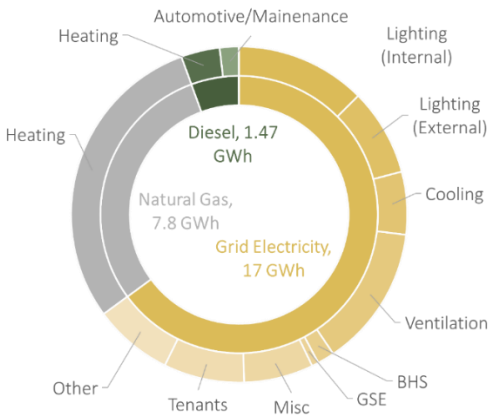
In order to face the challenge of decarbonisation of sources, a **“digital twin”** of the airport has been created to analyse the drivers that influence the energy demand.
The model is crucial to **simulate future scenarios** and to study the flexibility needed to feed the GSE and the future aircrafts.
In addition, the model gives the opportunity to make **OPEX and CAPEX evaluations** in order to take well-considered decisions on **targets** to set.

Annual Energy balance

Primary energy demand

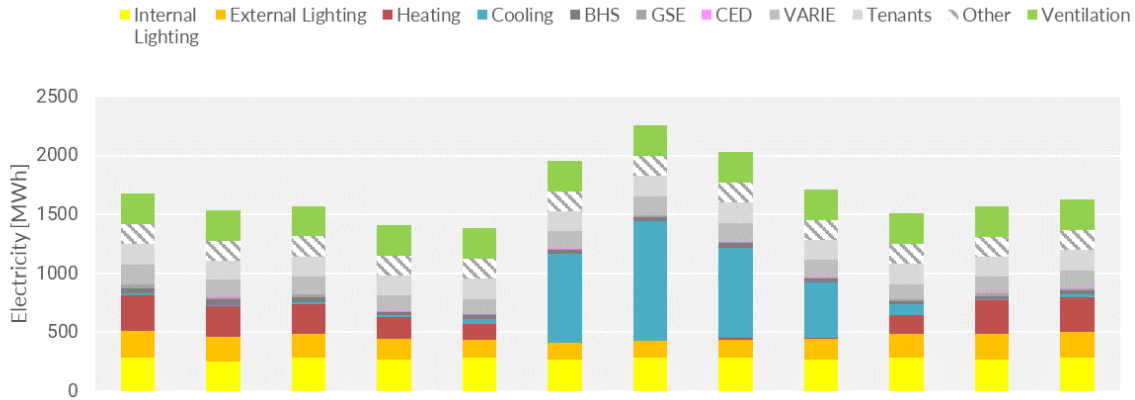


Final uses

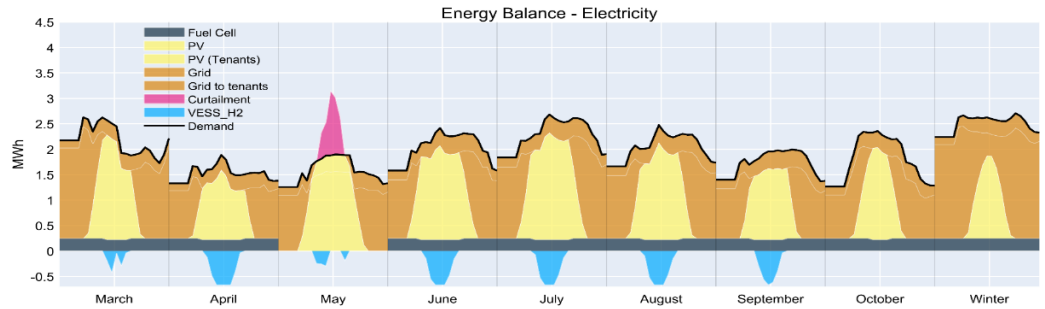


Monthly Energy balance

Monthly evolution

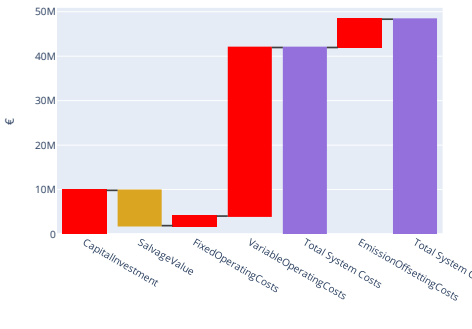


Hourly Energy balance

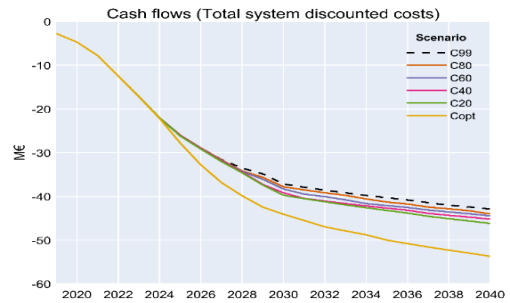


CAPEX/OPEX

System costs breakdown



Cash flows



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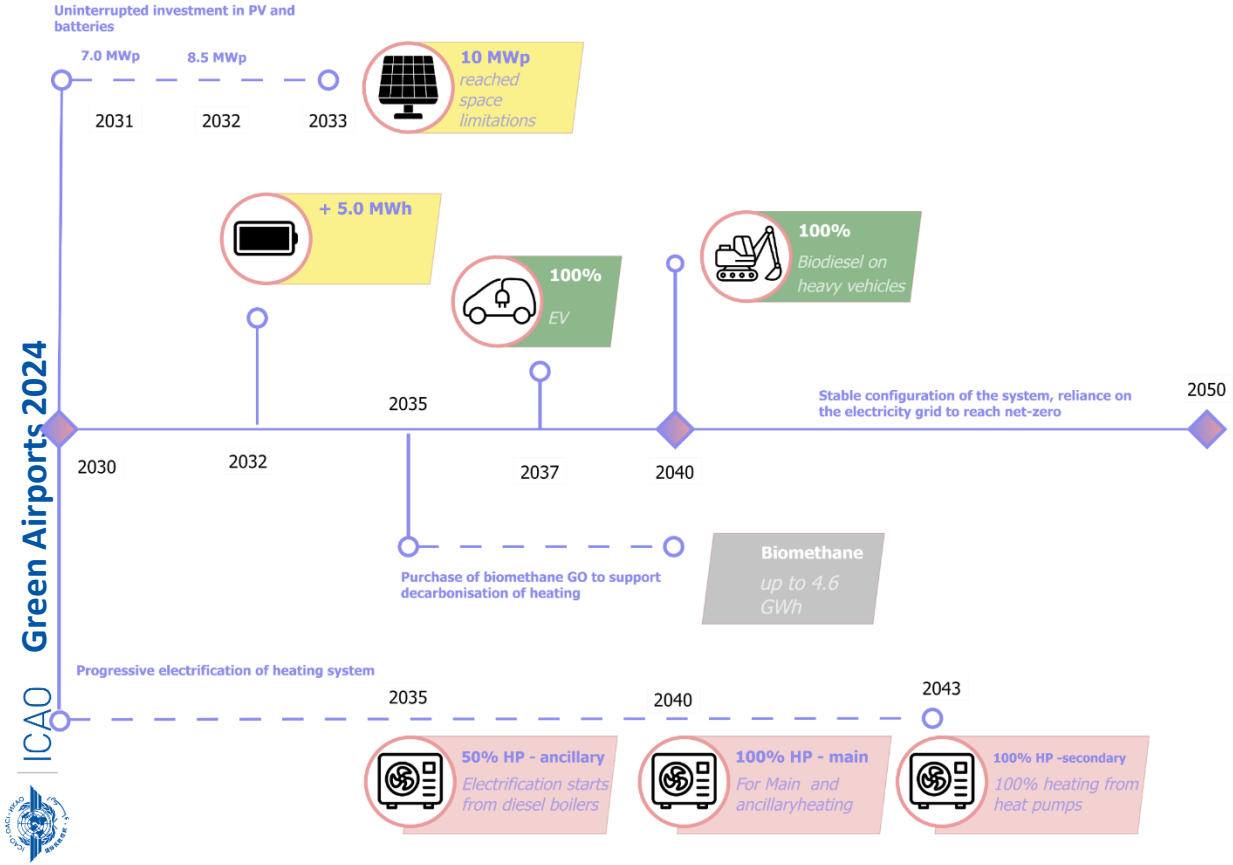
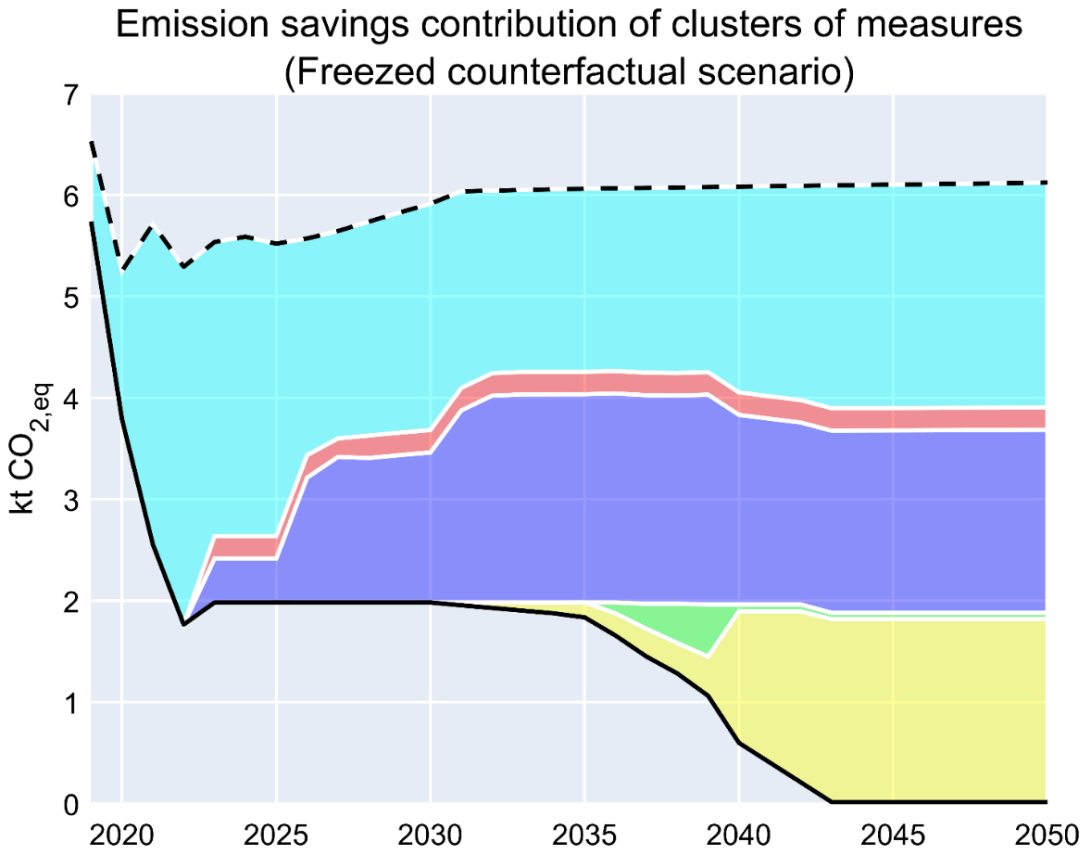
Decarbonisation roadmap

This tool has allowed to measure in a more thorough way the impact of the different drivers and to foresee which measures to implement in order to **reduce the carbon footprint** of the airport.
The model affords us to understand the future energetic evolution of the airport and draw decarbonisation scenarios in order to anticipate the **Netzero target to 2040**.





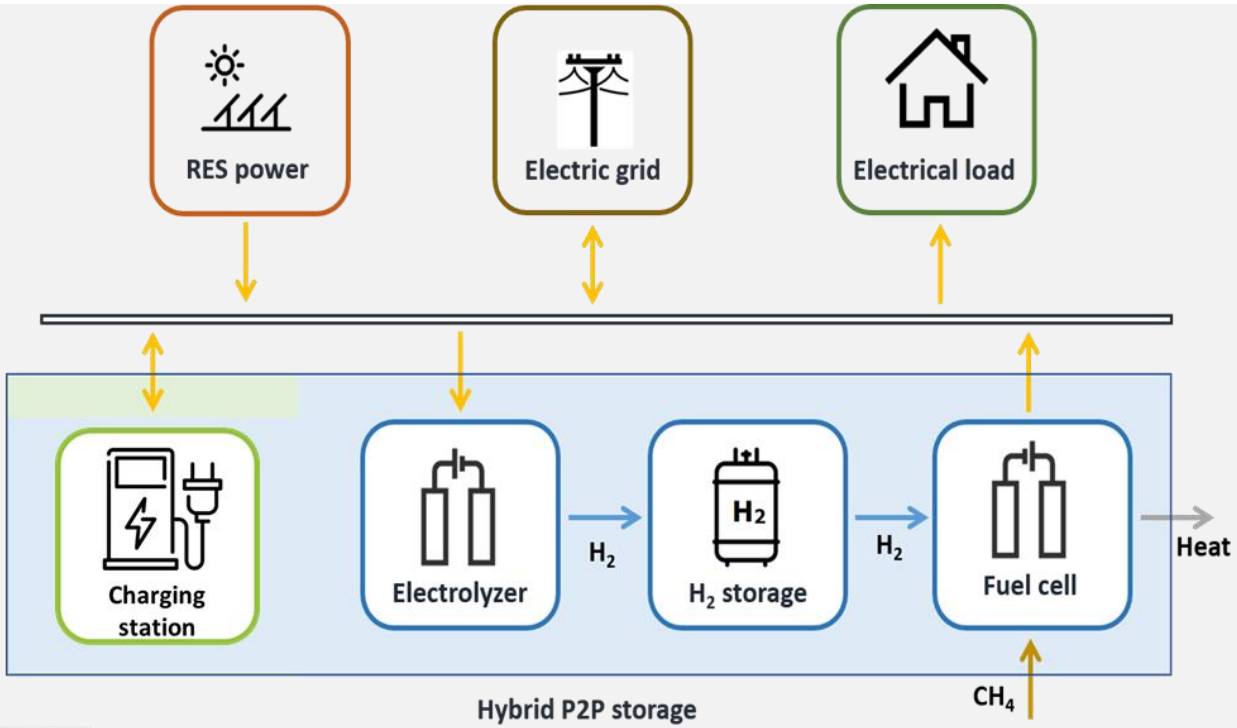
04

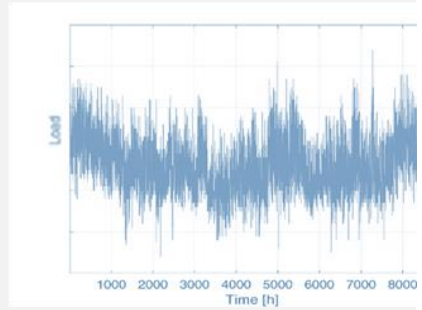
Smart Energy Hub

Smart energy hub pilot plant

TULIPS

PV PLANT: 83,6 kWp





ELECTRICAL LOAD
FIRE STATION: 30 kW

FUEL CELL
POWER: 2 kWe

N. 7 CAR BATTERY CHARGERS:
7,5 kW EACH

ELETTROLYZER
FLOW RATE ~ 1 Nm3/h

STORAGE:
VOLUME ~ 0,75 m3
PRESSURE > 15 bar

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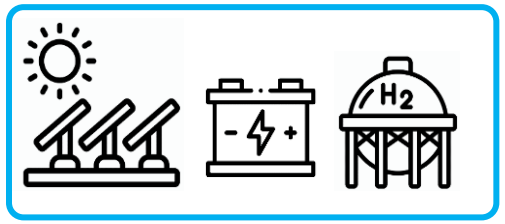
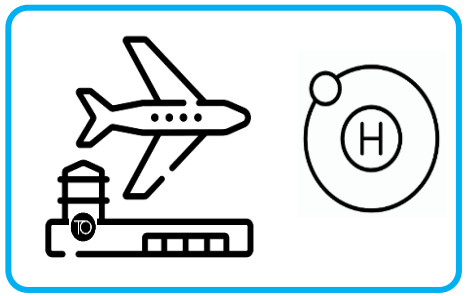
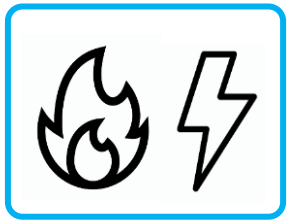
The Airport as a Smart energy hub



Renewable energy self-production and over-production storage: batteries, thermal storage, green hydrogen

Airport Energy Hub





Thermal and electrical energy production: use of flexible technologies that can operate with variable multi-fuel blends (methane, biomethane, hydrogen)

Transition to electrical airport vehicles, vehicle-to-grid experiments and hydrogen fuelled equipment trials

Sinergy with local communities: charging points for light vehicles, hydrogen fuelling for buses and heavy duty vehicles

Preparation of the infrastructure for the introduction of SAF, electric and hydrogen fuelled aircrafts

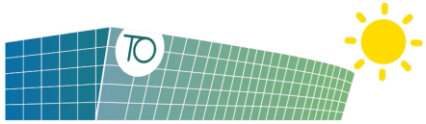
Scaling up the smart grid: first step

6.454 m²
Superficie coperta da pannelli
Surface area covered by panels

32 km
di cavo / *of cable*

come la distanza tra l'aeroporto e il centro di Torino (andata e ritorno)
as the distance between the airport and Turin city centre (round trip)

1.585 MWh
Energia prodotta in un anno
Energy produced in one year



406 tons
Emissioni di CO_2 evitate in un anno
CO_2 emissions avoided in one year

12 %
fabbisogno energetico annuale dello scalo con l'impianto a regime
of annual energy needs the airport with plant at full capacity

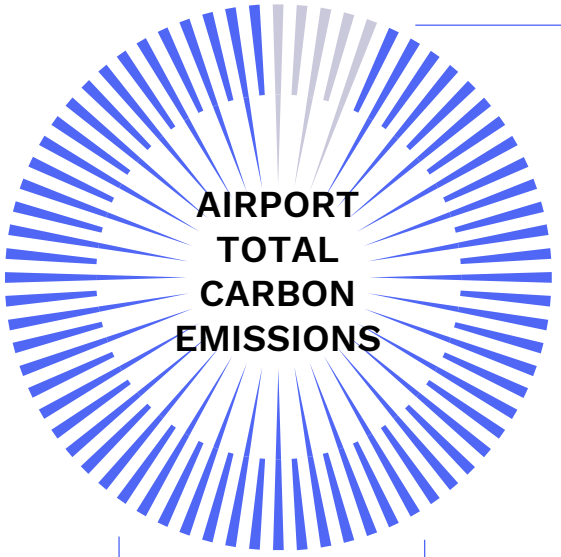
57 %
consumo energetico orario in una giornata assolata
hourly energy consumption on a sunny day

13.552
alberi equivalenti
equivalent trees

05

Scope 3

The Airport as a part of the aviation sector



1%

SCOPE 1

ENERGY GENERATION

AIRPORT VEHICLES

3%

SCOPE 2

PURCHASED ENERGY GENERATION

96%

SCOPE 3

AIRCRAFT LTO

GROUND SUPPORT EQUIPMENT

SURFACE ACCESS

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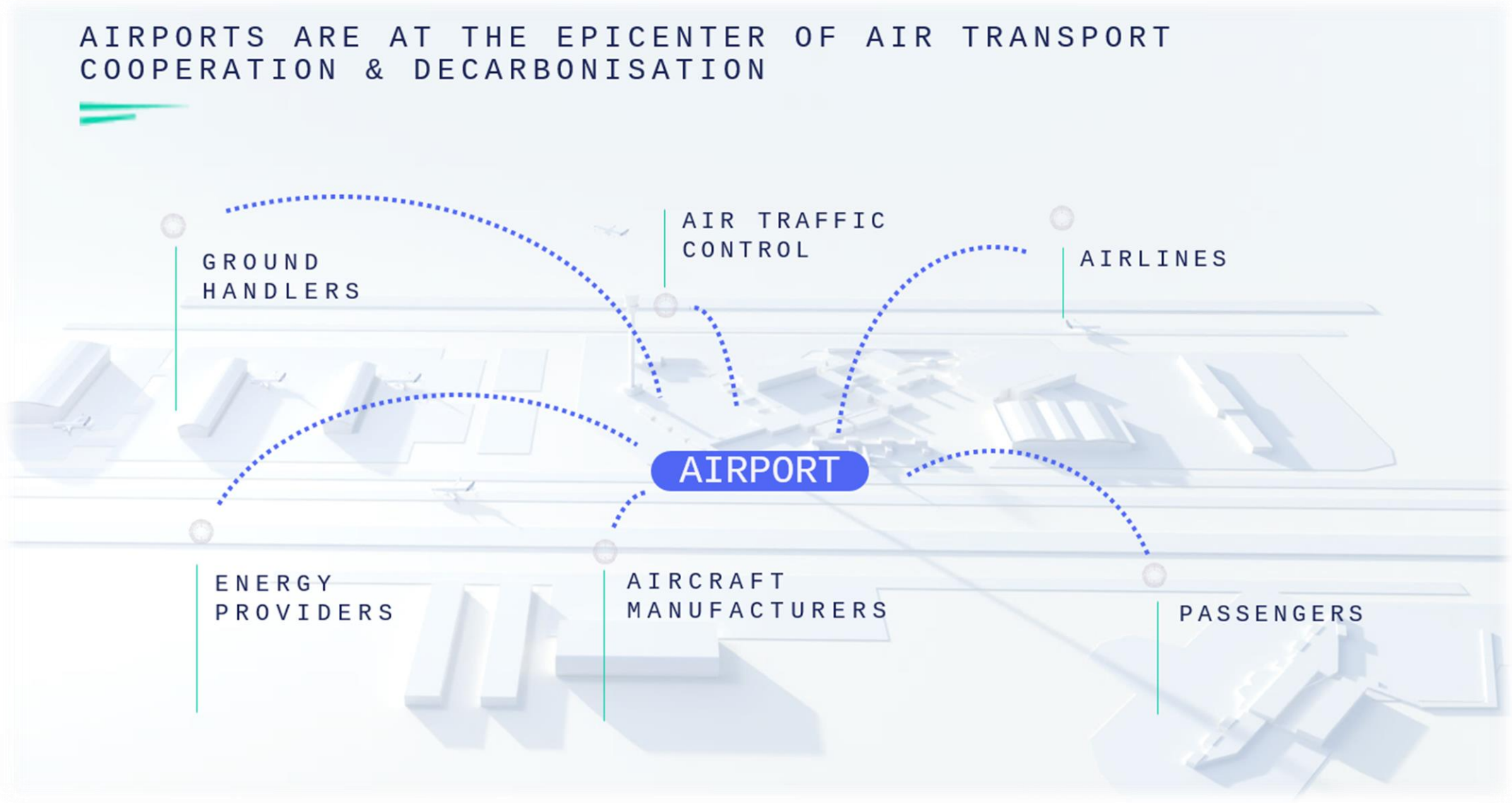
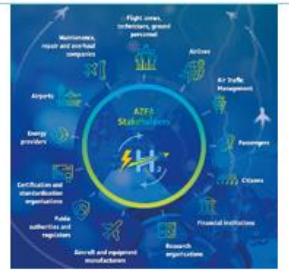
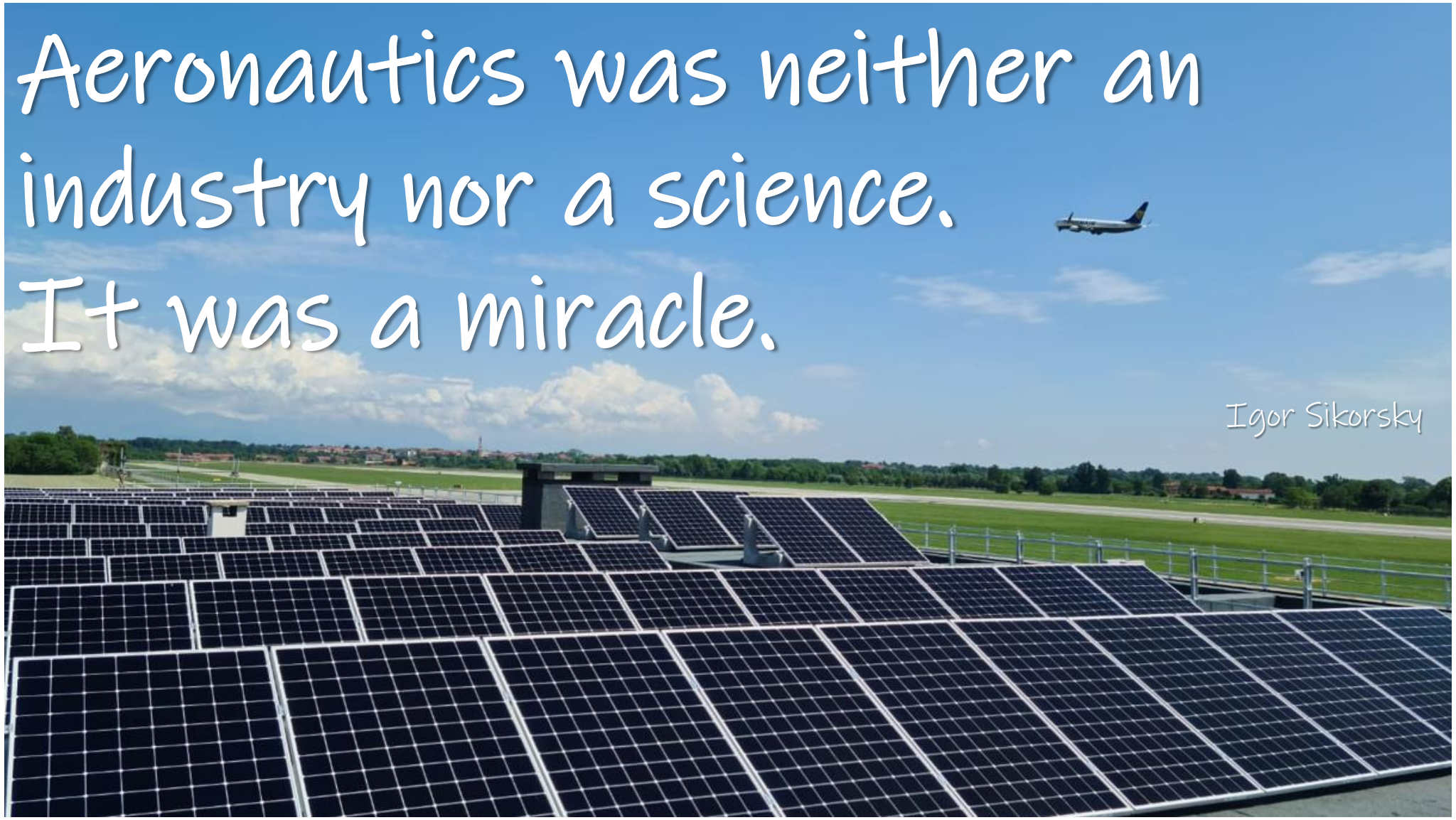
The Airport as a center of integrated evolution



Strategy: dense network of cross-cutting alliances and multi-level partnerships

Global airport	airport carbon accreditation	NET ZERO 2050 ACI Airports Council International — Toulouse Declaration
Aviation Alliances		TULIPS
Aerospace Industry	DAP Distretto Aerospaziale Piemonte	LEONARDO
Renewable Energy	sorgenia	EF Solare Italia
Sustainable Fuels and Gases	snam	air bp

Territory	Camera di Commercio Industria Artigianato e Agricoltura di Torino Regione Piemonte	H2
Universities	Politecnico di Torino	Università di Torino
Scientific research centre	Environment Park Parco Scientifico Tecnologico per l'Ambiente	iit Istituto Italiano di Tecnologia
Vertical mobility	F2i Fondi italiani per le infrastrutture SGR	Italian airport network company


Aeronautics was neither an industry nor a science. It was a miracle.
Igor Sikorsky