Project Fact Sheet

Stargate within EU Green Deal

Digital Twin for airports

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement GA101037053

01 BASIC PROJECT INFORMATION

Project name	Digital Twin for Airports
Partners involved	IES, BRussels Airport Company, ATB, AIA and BUD
Implementing airport / site	Brussels, Athens, Budapest and Toulouse airports.
Period tested	2022-2024 scenario results modelled for baseline, 2030 and 2040 pathways.
Project lead / contact	IES

02 OBJECTIVE

What are we trying to solve or tackle with this project?

Help airport operators make evidence-based decarbonisation decisions in complex buildings. The Digital Twin creates a baseline of energy use and CO_2 emissions, then tests how measures such as heat pumps, renovation, PV, EV charging and demolitions interact before investment, implementation and monitoring. This reduces uncertainty and supports roadmap choices.

Success criteria

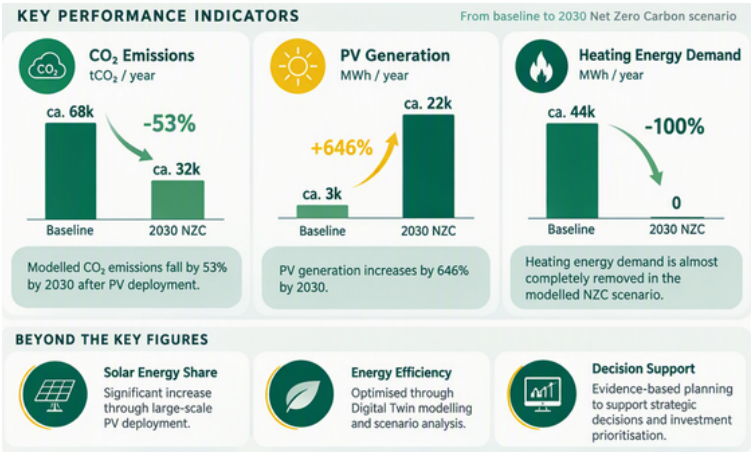
Create a reliable airport-energy baseline, model Net Zero Carbon scenarios for 2030/2040, quantify expected CO_2, fossil-fuel, PV and efficiency impacts, and prove replication at fellow airports when local data is collected and validated.

03 APPROACH (HOW WE TESTED)

Test set-up & method

IES built a physics-based model of airport buildings and energy networks, using available building and energy data to define a baseline. Scenario runs tested heat pumps, renovation, PV, EV charging infrastructure and demolitions. Athens, Budapest and Toulouse adapted the same process to local boundaries, data quality and decarbonisation priorities.

Data & measurement



Risks & mitigations

Main risks are incomplete or unreliable building, energy and network data; assumptions for future PV, EV charging and carbon intensity; and weak verification if measured baseline and post-intervention data are missing. Mitigation: data-readiness checks, clear assumptions and data ownership.

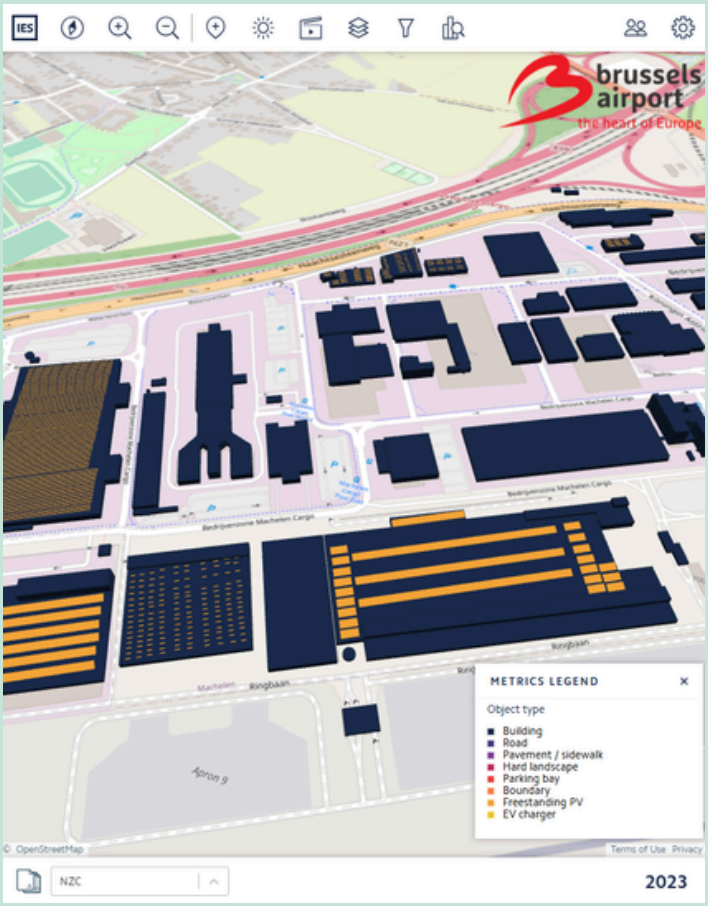
Limitations

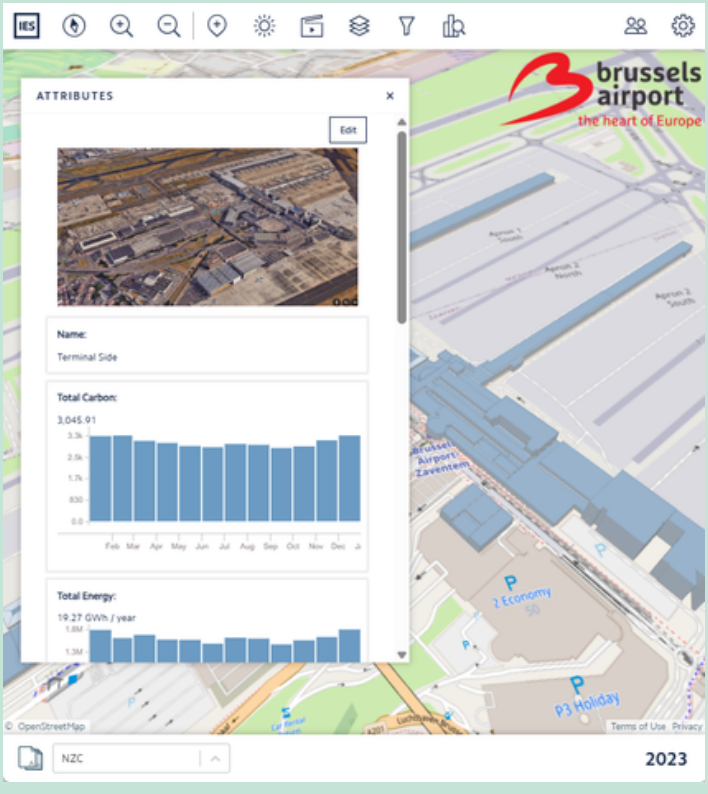
Results are modelled forecasts, not measured operational savings. Some buildings lacked sufficient baseline data. Actual impact depends on implementing the measures, improving metering and comparing reliable pre/post intervention data.

04 RESULTS & IMPACT

Key results

The Digital Twin created a baseline and Net Zero Carbon scenario pathway for Brussels Airport. Modelled CO_2 emissions fall over half by 2030. Natural gas demand is almost removed. PV generation increase 6 times 2030. The method was replicated at Athens, Budapest and Toulouse, showing transferability where local data is available.





05 RATINGS (QUICK ASSESSMENT)

Deployment Approach

How standardised is the solution: can it be deployed off the shelf, or does it require extensive customization?

Off The Shelf — Custom-Built

Investment Magnitude

From low-cost deployment to major investment.

Low Investment (less than €10k) — High Investment (more than €15mio)

OPEX — CAPEX

Sector Readiness

From non-existing or emerging standards, regulations, and certification pathways to fully established industry practices.

Emerging Framework — Established Framework

Innovation Maturity

How does the solution score in terms of maturity, from low TRL experimental/pilot-stage to high TRL market-ready.

Experimental — Market-Ready

Operational Impact

Does the innovation deliver targeted improvements or rather drastically transform processes and/or operations.

Incremental Improvement — Transformational Change

06 NEXT STEPS / RECOMMENDATION

Recommendation

Continue and scale as a decision-support and monitoring tool; use it for roadmap choices, but improve measured data quality before claiming realised savings.

Next steps

1. Update the model with implementation and metered performance data
2. Finalise ownership for data, assumptions and model maintenance
3. Use fellow-airport models as replication templates
4. Start each new airport with a data-readiness and boundary assessment

Links: https://www.iesve.com/