Stargate
within EU Green Deal

Project Fact Sheet

Autonomous tow tractor

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	Autonomous tow tractor
Partners involved	Brussels Airport Company, Charlatte Autonom, WFS Cargo N.V.
Implementing airport / site	Brussels Airport
Period tested	2026
Project lead / contact	Brussels Airport Company

02 OBJECTIVE

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

Assess whether autonomous electric tow tractors can safely and reliably support cargo transport operations within a complex airport environment while integrating with existing infrastructure, procedures and operational traffic.

The project evaluates vehicle behaviour, safety performance, operational integration and regulatory readiness while exploring autonomous logistics solutions for future airside cargo transport.

Success criteria

- Safe autonomous operation in an active airside environment.
- Effective integration with airport infrastructure, procedures and traffic.
- Validation of operational, technical and regulatory requirements.
- Improved understanding of opportunities and constraints.

03 APPROACH (HOW WE TESTED)

Test set-up & method

An electric autonomous tow tractor is deployed at Brussels Airport as a supervised proof of concept.

The vehicle operates on predefined and geofenced routes while transporting cargo dollies between cargo handling facilities and operational airside locations.

Several use cases are evaluated with increasing operational complexity, ranging from movements within controlled airside areas to cargo transport routes involving security screening procedures and interactions with operational airport traffic.



Data & measurement

The project focuses on collecting operational data such as autonomous route completion, driven kilometres, safety interventions, manual takeovers, system reliability and operational availability. It also evaluates interaction with airport infrastructure and traffic, personnel training and operational readiness, stakeholder acceptance, and lessons learned to support future deployment and scalability.

Risks & mitigations

Risks include safe integration of autonomous technology into a live airport environment, internal and external regulatory compliance, operational approvals and stakeholder acceptance.

The risks are mitigated by comprehensive safety and compliance assessments, route and vehicle validation, stakeholder coordination and continuous safety oversight.

Limitations

The proof of concept was conducted under controlled operational conditions using predefined routes, approved use cases and continuous safety supervision.

The project focused on assessing technical feasibility, operational integration and the requirements for future deployment of autonomous cargo transport at airports.

04 RESULTS & IMPACT

Key results

The proof of concept demonstrated the feasibility of supervised autonomous cargo transport on predefined routes in an active airport environment. Key findings include:

- Real cargo movements: testing progressed from empty dollies and dummy loads to supporting live cargo operations.
- Process integration: warehouse–apron transport incorporated existing security screening and access-control processes.
- Operational dependencies: route suitability, complete tractor–dolly behaviour, traffic interaction and recovery after unexpected stops proved essential.
- Continued supervision: onboard operators remained necessary for intervention and operational continuity.

The findings provide a practical basis for further development and replication in similar environments. Readiness for unattended, routine operations remains to be demonstrated.



Notes

The reported figures cover acceptance testing and operational trials, including empty dollies, dummy loads and real cargo. They represent test activity rather than cargo throughput or demonstrated productivity gains.

The PoC generated practical experience and implementation lessons; efficiency gains and a complete operational business case remain to be assessed.

The phased testing approach provides a useful reference for other airports, while routes, convoy configurations and approval requirements require local assessment.



05 RATINGS (QUICK ASSESSMENT)

Development 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

Development Approach

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

Off The Shelf — Custom-Built



06 NEXT STEPS / RECOMMENDATION

Recommendation:

Further develop autonomous cargo transport through phased operational validation, prioritising use cases with clear logistical value. Assess the complete transport process, including tractor–dolly behaviour, traffic interaction, security interfaces and recovery procedures. A shared maturity roadmap should guide any expansion of operating conditions or reduction in supervision, supported by evidence of safety, reliability and operational value.

Next steps:

- Define a joint maturity roadmap with operational partners, including acceptance criteria for each development phase.
- Extend supervised testing to assess repeatability, full-convoy behaviour and recovery under representative operating conditions.
- Further integrate warehouse, security-screening and access-control interfaces into the complete transport process.
- Assess operational performance and the business case before considering additional routes, vehicles or changes in supervision.