Begonia

USE CASE 13:

Carboon footprint in logistic operations

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Use case 13: Carboon footprint in logistic operations

Use case identification

Table 1. Identification of use case 13.

ID	Name of Use Case	Geographical scope	Cross-sector domains			Interoperability layers
			Electric	Mobility	Data	
BEG.13	Carbon footprint of ports supply chain	☐ Local ☐ Regional ☐ National ☒ Cross-border ☒ Outermost	☐ Customer ☐ DER ☐ Distribution ☐ Transmission ☐ Generation	☐ Customer information ☐ Vehicle ☐ Energy station ☐ Infrastructure ☒ Traffic and logistic	☒ Edge ☐ Fog ☒ Cloud	☐ Component ☒ Communication ☒ Information ☒ Function ☒ Business

The scope and objectives of the use case

Table 2. Scope and objectives of 13 use case.

Scope and Objectives of the Use Case	
Scope	Provide society with reliable, standardize and verifiable data on the carbon footprint of goods transport, mainly in ports operations.
Objective	The main objectives of the use case are as follows: • Analyze different transport combinations based on the carbon footprint from a standardized methodology. • Promote the use of environmental data in the citizens decision-making. • Combine information from companies, port operators and all the entities involved in the transport to calculate the carbon footprint of goods.
Reference country(ies)	Spain, Portugal, the Netherlands
Related Business Cases	Logistics, Freight operation, Port operation, Shipping, Manufacturing (generic)
Possible Stakeholders	Port operators, Shipping companies, Manufacturers, Logistics companies

Narrative of the use case

Society is increasingly aware of the environmental impact of transport. Carbon footprint (CF) is a key indicator commonly used to quantify the impact of human activities. Logistic and transport operations are global process where commonly multiple actors and countries are involved in the transport of a single item. For that reason, there is a huge diversity of methods for CF calculation. This variety cause uncertainty and CF data are considered unreliable by citizens. This use case promotes an ODP to integrate existing information and data provided by manufacturers and transport to calculate the CF accurately in Ports operations. Ports are central to the green transition due to their role as bunkering facilities for the ships importing and exporting our goods. Their role as energy and transport hub is to become increasingly important during the green transition, given that much green hydrogen will be produced, refined and used near ports, as well as imported and exported via the ports. Ports therefore have a huge potential to provide clean energy infrastructure to the share of the maritime supply chain involved. The calculation of maritime supply chain emissions of ports is complex, given

the lack of measurements and the uncertainty of shipping emissions on individual voyages and the complexity of global logistics. Ideally, in the case for freight, each product delivered to or sent from a port would have its origin and destination known, the type of ship it was shipped on with its fuel consumption on that route, with emissions associated to it. However, current methods do not account for products that are transshipped to ports without a standard accounting procedure (for example other continents) and the CF is not properly labelled from the origin, making impossible to update the cumulative emissions to specific goods and complicating decision making.

Developing a Green Logistic (GL) and Cologistic Business Platform (CBP) at European level can provide valuable information regarding logistic services offered by companies in the Euroregion Northern Spain-Portugal. A potential user interested in transport services, introduces origin and destination for a single event and the CBS offers all the available options and GL calculates the CF for each option. Therefore, the customer can choose considering cost, time, type of transport and CF. Both tools are combined in an ODP where all the entities involved in logistic can share data (before and after) and the CF of goods can be updated trusty with advance technologies like blockchain. Therefore, logistic companies would increase the visibility and increase the competitiveness with better green policies. Finally, the end consumers will receive products with a reliable CF label that includes the CF life cycle.

Figure 1. The framework of the use case 13.

Diagram of the use case

The diagram of the use case 13 is presented in Figure 2. Actors' actions and scenarios' descriptions are presented in Table 3 and Table 4, respectively.

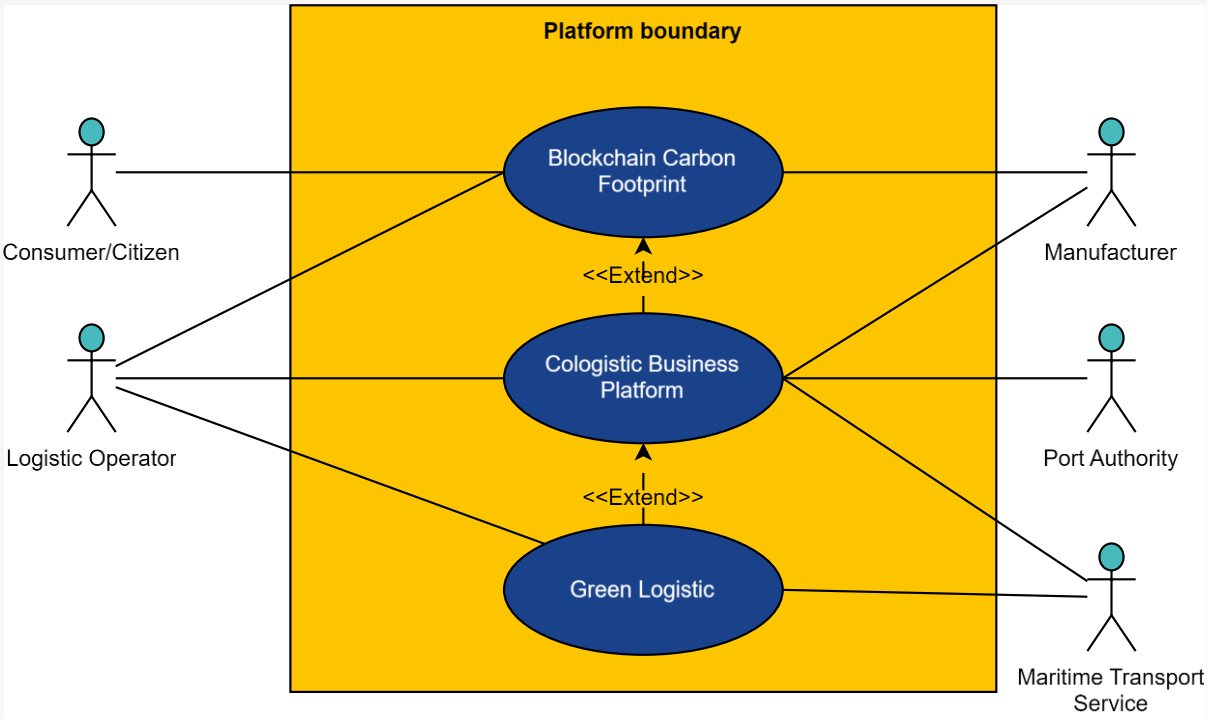

Figure 2. The diagram of the use case 13.

Actors of the use case

Table 3. Description of the actions of use case 13 actors

Actor Name	Actor Type	Actor description	Actions	Standards
Manufacturer	Role	Generic manufacturer of goods that require maritime transport and logistic services	It registers the carbon footprint of its products at the final point of manufacture. Check out the CBP to find the logistics operator with the best price/emissions ratio.	No
Consumer/Citizen	Role	Consumer of goods	Check the final carbon footprint of their products (e.g., QR code) in the platform.	No
Logistic Operator	Role	Support companies with transportation, storage, shipment, and distribution of goods	Access the CBP to offer different transport mechanisms and routes. Access the GL to audit CF of maritime transport services. Check the historical CF of transport operations.	No
Maritime Transport Service	Role	Waterborne transport of goods (cargo) via waterways	Register the energy consumption (e.g. fuel) of transport operations (routes, duration, load...)	No
Port Authority	Role	Public manager of the port (operation and maintenance)	Access the CBP to know the CF impact of different transport operations to/from the port	No

Scenarios

Table 4. Description of use case 13 scenarios.

S.No	Scenario Name	Triggering Event	Scenario Description	Primary Actor
BEG.13.S1	New route completed	Route completed: goods have arrived at the destination port	The transport service accesses the platform and register the route updates, arriving time and remaining fuel/energy. The platform update the CF of goods transported and inform logistic operators and Port Authorities involved. The customer can track the carbon footprint of his order if the manufacturer (or seller) has provided him with the code.	Maritime Transport Service
BEG.13.S2	Audit Port CF operations	The Port Authority audits the annual CF of transport operations	Download of annual CF indicators and savings (in case of smart services)	Port Authority

Policy and digitalisation needs

Table 5. Description of use case 13 policy and digitalisation needs.

Policy needs	• Support the application of common methodologies and procedures to measure and estimate the carbon footprint in port operations across the life cycle. • Alignment of standards with the International Maritime Organization guidelines. • Require ports to regularly report their carbon emissions to national and European authorities. • Provide financial support for ports to invest in digitalization and green technologies through EU funds, national grants, and public-private partnerships. • Foster collaboration between European ports and international stakeholders to share best practices and technologies. • Support capacity-building initiatives to equip port authorities and staff with the necessary skills and knowledge for effective carbon management and digitalization.
Digitalisation needs	• Establish systems for comprehensive data collection covering all aspects of port operations, including logistics, transportation, and energy use. • Invest in the digital infrastructure necessary for real-time monitoring of carbon emissions, such as IoT sensors and data analytics platforms. • Integrate data from various sources to create a holistic view of the port's carbon footprint. • Implement robust data privacy and security measures to protect sensitive information while ensuring data integrity and accuracy.