Logistics Initiative Hamburg

POM Oost-Vlaanderen

Interreg North Sea Region AVATAR
European Regional Development Fund
Sustainable urban freight transport with autonomous zero-emission vessels

EUROPEAN UNION

Market review on city freight distribution using inland waterways

Within the framework of the Interreg NSR project AVATAR work package 4, activity 1

AVATAR is a project co-funded by the
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Colophon

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List of abbreviations

AEA	Austrian Energy Agency
AMB	Antwerpen Multimodale Bouwlogistiek
AMS	Amsterdam Institute for Advanced Metropolitan Solutions
BeHala	Berliner Hafen – und Lagerhausgesellschaft mbH
BCCC	Brussels Construction Consolidation Center
B2B	Business to Business
B2C	Business to Customer
CCB-C	Brussels Capital Construction Confederation
CEP	Courier, Express and Parcel
CMDU	Centre Multimodal de Distribution Urbaine
DC	Distribution Centre
ERDF	European Regional Development Fund
GSM	Green Switch Meridian
GWUT	Green Wave Urban Transports
HoReCa	Hotels, Restaurants, Cafés
IWT	Inland Waterways Transport
IWW	Inland Waterways
LPM	Logistique propre et multimodale
LSP	Logistics Service Provider
MIT	Massachusetts Institute of Technology
NSR	North Sea Region
RAKO	Radkombitransport
THD	Reinigings en Havendienst Utrecht
ULS	Urban Logistics Solutions
VNF	Voies navigables de France

1. Introduction, objective and approach

The massive under-exploitation of inland waterways (IWW) in the North Sea Region (NSR), especially in and around urban environments, provides opportunities for technological innovations. The AVATAR project aims to deploy zero-emission automated vessels that can do regular trips between the urban consolidation centers outside of a city and inner city hubs, focusing on the distribution of palletized goods and waste return.

The AVATAR project aims to tackle challenges of city freight distribution by developing, testing and assessing adequate technologies and business models for urban autonomous zero-emission Inland waterway transport (IWT) solutions. Through this, the project unlocks the economic potential of urban vessels and corresponding waterways, increases available solutions for full-cycle automation and sets up a sustainable supply chain model for urban goods distribution and waste return.

Objectives

This paper focuses on aspects of the economic feasibility of city freight distribution using inland waterways. In order to identify, set up and calculate economic viability and business cases within the project framework of AVATAR, it is necessary to carry out a market review on city freight distribution cases using inland waterways. This market review will give inspiration to the business cases that will be developed later on within the AVATAR project. It should be seen in the framework of defining the necessary conditions that lead to a long-term (sustainable) uptake of the developed concepts in the AVATAR project.

As such, the objective of this report is to give an overview of cases of city freight distribution via inland waterways, whereby the vessel either enters the city, arrives close to the city or operates completely within an urban context. The focus is on existing examples (operational as well as pilots), but concepts are also included.

Approach

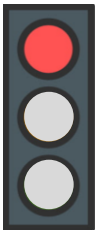
The cases included in this report are based on desk-research and available (online) sources. Examples of city freight distribution are shown with following characteristics:

- Goods are delivered in the city, return flows leave the city;
- A part of the trajectory is carried out by an inland vessel;
- The inland vessel enters the city (main focus) or the vessel is loaded/unloaded near the city center (case by case selection for market review);
- The inland waterway is running through the city or close to it;
- Last mile in the city could be an option;
- European examples are collected;
- Inland vessels arriving in a main port close to the city are not included.

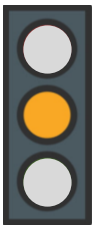
The cases are grouped into five categories (based on the main transported type of goods): building logistics, parcel logistics, retail logistics, waste logistics as well as mixed use cases.

This paper might be updated successively as new cases or information for already listed cases become available. The latest version will be available here. In case you have additions to this report, please contact one of the contributors (see page 2).

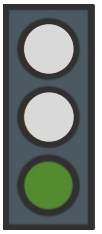
With regard to the maturity of the identified use cases, a classification into the three categories "concept", "living lab / pilot" and "operational" was made according to the well-founded assessment of the study authors. This classification was based on the information available from the named sources at the time of the research. The classification may be subject to change. For better clarity, a representation in the form of a traffic light system was chosen within the report, as shown below. The colors red, yellow and green do *not* represent a valuation of the use cases that goes beyond the above-mentioned classification.



Concept in terms of this classification means use cases, for which studies, concepts, strategies, plans or designs might exist, but no actual physical demonstration or pilot has been carried out (so far).



Living lab/pilot in terms of this classification means use cases, in which pilot projects, living labs or demonstrations are or have been carried out in order to test or showcase those use cases.



Operational in terms of this classification means use cases, which run or have been running on an operational level, with regard to an economical, one-off or regular use. Operational cases do not necessarily have to be still operational or run at an unlimited period of use in order to qualify as operational.

Each case follows the same type of description (location, maturity of the project, stakeholders, commodities, vessel characteristics, supply chain characteristics and sources). By using always the same typology, this has the consequence that some characteristics are not described in case the information is not available.

2. Building logistics

A first category of use cases focuses on building logistics and comprises the delivery of construction materials to wharfs or building sites located in city centers.

A total of ten existing use cases has been identified within the sector of building logistics. Six of them being operational use cases and four of them being pilots.

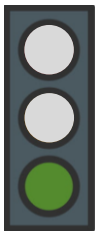
The region of Ghent (Belgium) as well as Paris (France) can be mentioned as the most active regions in which water-bound transportation of building materials is in use, with both representing three cases each. Antwerp (also Belgium) covers two use cases. Other regions with identified cases in building logistics are: Amsterdam (Netherlands) and Brussels (Belgium).

Following, the ten identified use cases in building logistics are presented in detailed profiles.

2.1. Amsterdam Vaart!

The location:

Amsterdam, Netherlands *(Source: LIHH)*



The project:

Transport vessel *(Source: amsterdamlogistics.nl)*

The aim of the "Amsterdam Vaart!" project is to shift logistics transport for construction sites from the roads onto waterways. The project consortium consists of following partners: Waternet, the municipality of Amsterdam, Netherlands Organization for applied scientific research (TNO) and the Port of Amsterdam. The Ministry of Infrastructure and Water Management supports the project. In total, the project comprises nine construction projects whose inner-city logistics flows are to be shifted to waterways.

Stakeholders	
Companies using the transport service	Construction companies
Type of clients in the city	Construction companies. Cluster Building projects: Small scale new building, renovation, and transformation
Receivers of the return flow	./.
Transport project organizers	Havenbedrijf Amsterdam, Waternet, Gemeente Amsterdam, Netherlands Organisation for Applied Scientific Research (TNO)
Other stakeholders	./.
Commodities	
Commodities flows into the city	Building materials
Return flows	Waste building materials
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	From supplier to DC (bouwhub) to city center
Last mile operation	./.
Location of DC	./.
Source	2, 6, 9, 26, 27

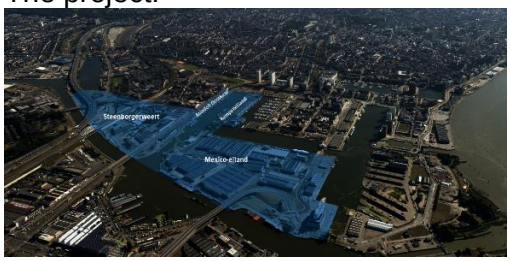
2.2. Antwerpen Multimodale Bouwlogistiek (AMB)

The location:

Antwerp, Belgium *(Source: LIHH)*

Living lab / pilot

The project:



Project area *(Source: www.antwerpenmorgen.be/nl)*

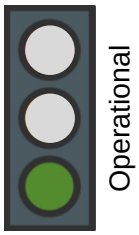
The purpose of this project is to inspire and guide the specific transition of the area into a hotspot for innovative manufacturing. The process must provide insight into what role Antwerp should take on as an investor and where a role as facilitator by creating a good investment climate will suffice. This requires a picture of the important area-wide infrastructural investments, but also a clear development framework with inviting images to enthuse companies and investors.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	Antwerpen Multimodale Bouwlogistiek (J. Janssens & Zonen, De Rycke Gebroeders, Blue Line Logistics (LSP))
Other stakeholders	Vespa (Autonomous Municipal Company of City of Antwerp), Xella, Gyproc and Wienerberger (users)
Commodities	
Commodities flows into the city	Building material
Return flows	./.
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	3 vessels
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	From producer/trader to border of city (Asiadok Port of Antwerp)
Last mile operation	Trucks
Location of DC	Asiadok (4000m² terrain)
Source	8

2.3. Brussels Construction Consolidation Center (BCCC)

The location:

Brussels, Belgium *(Source: LIHH)*



The project:

Construction vessel *(Source: bccc.brussels)*

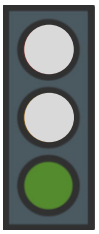
This project aims to improve the logistics of construction projects in Brussels. The goal is to develop and test an intelligent solution for the urban transport of building materials. The project aims to increase economic and social attractiveness of the city of Brussels.

Stakeholders	
Companies using the transport service	Knauf
Type of clients in the city	Yards in Brussels
Receivers of the return flow	./.
Transport project organizers	Shipit
Other stakeholders	Scientific and Technical Center for the Construction Enterprise (WTCB), MOBI (research group at the VUB for mobility and urban logistics), Urbantz (logistic cloud solutions), CCB-C
Commodities	
Commodities flows into the city	Building materials
Return flows	./.
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	From Gent or Wielsbeke or Burcht to Brussels terminal (12000m²)
Last mile operation	Trucks
Location of DC	Ghent, Wielsbeke, Burcht
Source	10, 63

2.4. BMB Bouwmaterialen

The location:

Antwerp, Belgium *(Source: LIHH)*



The project:

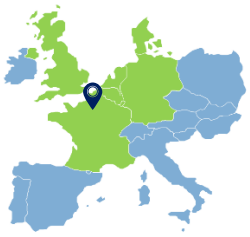
New sales location *(Source: www.flows.be)*

The aim of this project is the construction of a new location in Antwerp for the company BMB Bouwmaterialen using the nearby waterways to transport building materials.

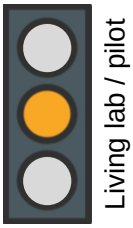
Stakeholders	
Companies using the transport service	BMB Bouwmaterialen
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	BMB Bouwmaterialen, Van Moer Logistics (LSP)
Other stakeholders	./.
Commodities	
Commodities flows into the city	Building materials
Return flows	./.
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	Building materials via IWW to hub, from that hub with trucks to destinations
Last mile operation	Trucks
Location of DC	./.
Source	64

2.5. Valdelia Experiment - Cemex Granulat - Green Switch Meridian

The location:



Paris, France *(Source: LIHH)*



The project:

Crane & vessel (Source: npi-magazine.com)

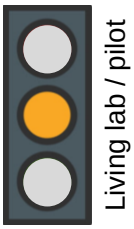
As part of the "Cemex-Valdelia" circular economy concept, Cemex intends to diversify the logistical use of its Paris ports in addition to ready-mix concrete production and construction waste transport. To this end, a test has already been carried out with GSM and Valdelia (an eco-organization for the collection and recycling of professional furniture). This pilot project was organized by the Urban Logistics Cluster for L'Ile-de-France. Prior to this pilot project, numerous other pilot projects had already been conducted.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	Cemex
Receivers of the return flow	Valdelia
Transport project organizers	VNF, IDF Region, Liebherr, Vaugon, Ports de Paris, Transport Lena, Suez
Other stakeholders	Port Paris Tolbiac Shared Wharf, Port Suez Gennevilliers Darse 5 Wharf
Commodities	
Flows into the city	Ready-mix concrete (construction material)
Return flows	Construction waste, Dead leaves
Vessel characteristics	
Load units	2 x 20 m^3 moving crates (for the waste transportation)
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	40m vessel, 600t vessel
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	63, 69, 70, 77

2.6. Green Wave Urban Transports (GWUT)

The location:

Ghent, Belgium *(Source: LIHH)*



The project:

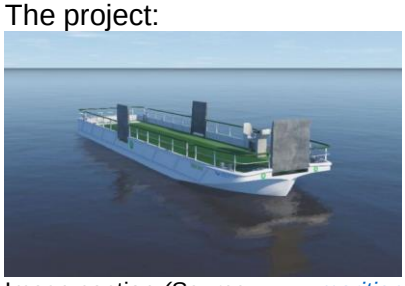


Image caption *(Source: www.maritiemnederland.com)*

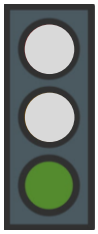
With the establishment of GWUT in 2019, Tesco aims to put zero-emission urban logistics at the top of its agenda to contribute to the sustainability of city centers. GWUT features the development of small new vessel types that meet the latest environmental standards and can operate in the confined canals and waterways of cities. One of these new types of vessel is the so-called "Urban Boat", modeled on the Green Wave, which was built at the Euroship shipyard in Heerewaarde.

Stakeholders	
Companies using the transport service	De Groote-Houtboerke
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	Tesco; De Groote-Houtboerke
Other stakeholders	Urban Waterway Logistics
Commodities	
Commodities flows into the city	Construction material
Return flows	Debris (big bags), empty bottles
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	./.
Engine characteristics	Electric engine. 4 tons of batteries (charged via solar panels at site De Groote-Houtboerke)
Crew members	./.
Payload/dimensions	15mx4m. Payload 20 ton. Aluminium vessel.
Range of sailing	8 hours
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of Distribution Center (DC)	Site along canal Ghent-Terneuzen
Source	47, 48, 49, 63

2.7. Henleykaai campus

The location:

Ghent, Belgium *(Source: LIHH)*



Operational

The project:

Construction site *(Source: pers.oost-vlaanderen.be)*

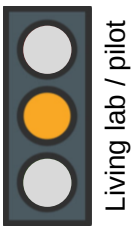
On the Henleykaai campus in Ghent, the province of East Flanders is building a new sports hall and classrooms. To reduce the nuisance of freight traffic delivering and transporting the construction materials, the Province of East Flanders, the City of Ghent, GentLevert, the Flemish Waterway NV and the contractor Furnibo have decided to use waterborne transport for part of the yard logistics.

Stakeholders	
Companies using the transport service	Furnibo
Type of clients in the city	Province of East Flanders
Receivers of the return flow	./.
Transport project organizers	GentLevert
Other stakeholders	Province of East Flanders, City of Ghent, Ghent Levert, Flemish Waterway NV, Furnibo
Commodities	
Commodities flows into the city	Building materials
Return flows	./.
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	From Menen downstream the Leie via the Ringvaart to the Henleykade in Ghent
Last mile operation	vessel/pontoon
Location of DC	Menen
Source	11, 19

2.8. Lange Munt

The location:

Ghent, Belgium *(Source: LIHH)*



The project:

Transport vessel *(Source: www.eltis.org/)*

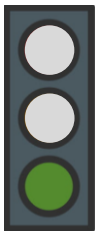
The aim of the project is the realization of sustainable and future-oriented logistics. In general, inland waterway transport is to play a much more important role in the supply chain and companies are to be convinced of the advantages of waterway logistics. With more water transports, roads and residential streets are relieved, the city is made safer for cyclists and pedestrians, and noise pollution as well as particulate matter pollution for residents is reduced.

Stakeholders	
Companies using the transport service	Furnibo
Type of clients in the city	Building contractor and others
Receivers of the return flow	./.
Transport project organizers	GentLevert
Other stakeholders	Province of East Flanders, City of Ghent, Ghent Levert, Flemish Waterway NV, Furnibo
Commodities	
Commodities flows into the city	Building materials and other goods
Return flows	./.
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	11, 19

2.9. Olympic village Paris (JOP 2024)

The location:

Paris, France *(Source: LIHH)*



The project:

Olympic village *(Source: www.jobtransport.com)*

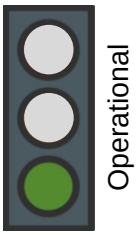
The project supports the construction of the Olympic Village for the 2024 Olympic Games. The materials required for this will arrive by ship.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	VNF and Haropa, Profession Bois (2 enterprises Normandes)
Other stakeholders	./.
Commodities	
Commodities flows into the city	Prefabricated elements (wood) and other building materials
Return flows	./.
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	L'Île Saint Denis
Source	63

2.10. Point-P

The location:

Paris, France *(Source: LIHH)*



The project:

Vessel and site (Source: www.batirama.com)

In the context of this case, the company Point P has established a new facility in Paris at the Seine river. From there, inner-city construction sites can be reached by a transport vessel. The transport vessel can supply 300 tons of materials annually. The aim is to relieve inner-city traffic and reduce CO2 emissions.

Stakeholders	
Companies using the transport service	Point-P (construction material distributor)
Type of clients in the city	Construction material distributors
Receivers of the return flow	./.
Transport project organizers	Le Freedom (river transport)
Other stakeholders	Navigable Waterways of France, Paris Port Authority
Commodities	
Commodities flows into the city	Construction material (cement, concrete blocks)
Return flows	Construction Waste
Vessel characteristics	
Load carries, load units	Pallets with bags of construction material
Transshipment equipment	Self-unloading vessel equipped with a crane
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	4, 5

3. Parcel logistics

This chapter focuses on the delivery of parcels (including Courier, Express & Parcel Services, so called CEP services) into or within cities, both in B2B as well as B2C context.

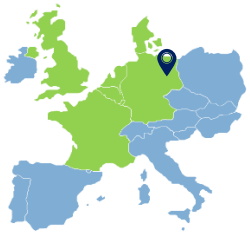
With seven parcel logistics use cases, fewer cases were identified compared to the previous building logistics section. It is also noticeable that the use cases for parcel logistics present themselves in a significantly more diversified and unbundled manner, both in terms of their degree of maturity (concept, pilot or operational) and in terms of their geographical distribution.

Two of the seven cases have been identified as pilot projects and two cases are in the conceptual phase. Three operational use cases within parcel logistics were found. The seven total cases are spread over seven different cities, namely Amsterdam (Netherlands), Berlin (Germany), Ghent (Belgium), Gothenburg (Sweden), London (United Kingdom), Paris (France) and Vienna (Austria), from seven different countries.

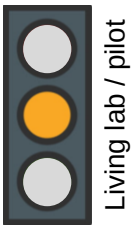
Following, the seven identified use cases in parcel logistics are presented in detailed profiles.

3.1. A-SWARM

The location:



Berlin, Germany *(Source: LIHH)*



The project:

A-SWARM (Source: www.spiegel.de)

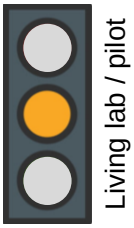
The "A-SWARM" project aims to combat traffic congestion, delays, and pollution in major cities. The project aims to achieve this with the help of autonomous electric shipping. The idea is that several of the yellow mini-ships will set off from the outskirts of the city in an energy-efficient swarm and split off in the center to head for their respective destinations and deliver the cargo. Without a crew on board. "It doesn't pay to have a crew," Masilge says. "Besides, there's hardly any staff in inland shipping." Autonomously, the boats could operate around the clock.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	Small businesses and private customers (presumably)
Receivers of the return flow	./.
Transport project organizers	Berliner Hafen- und Lagerhausgesellschaft mbH (BEHALA)
Other stakeholders	./.
Commodities	
Flows into the city	./.
Return flows	./.
Vessel characteristics	
Load units	Autonomous vessel
Transshipment equipment	./.
Engine characteristics	Electric drive (hydrogen)
Crew members	None (autonomous vessel)
Payload/dimensions	21ft vessel
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	Ship to hub, hub to electric bike, bike to customer
Location of DC	./.
Source	34, 35, 63, 76

3.2. Blue Line Logistics/DHL Express

The location:

Ghent, Belgium *(Source: LIHH)*



The project:

"ZULU 03" (Source: www.dhlexpress.be)

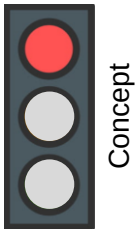
With this project, DHL is presenting an alternative for inner city parcel and mail transport in the city of Ghent. The aim is to minimize the volume of traffic in the city as well as delivery times. The parcels are transported from the quay to the customers by e-trucks or electric cubicycles. The aim of this project is the reduction of CO2. Deutsche Post DHL Group is to reach its own 2050 CO2-neuatral transport goal.

Stakeholders	
Companies using the transport service	DHL Express
Type of clients in the city	Customers of DHL Express
Receivers of the return flow	DHL Express
Transport project organizers	Blue Line Logistics/DHL Express
Other stakeholders	./.
Commodities	
Flows into the city	Parcels
Return flows	Parcels
Vessel characteristics	
Load units	E-trucks or electric cubicycles
Transshipment equipment	Crane
Engine characteristics	Combustion engine
Crew members	./.
Payload/dimensions	Flat vessel (Zulu); length overall 50 m.; width is 7 m.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	Cargobikes (electric cubicycles) with commodities on vessel at DC close to Ghent. With vessel to inner city.
Last mile operation	Electric cubicycles (already loaded, on vessel)
Location of DC	Border Ghent (Wiedauwkaai)
Source	7

3.3. DenCity

The location:

Gothenburg, Sweden *(Source: LIHH)*



The project:

DenCity (Source: www.citylogistics.info)

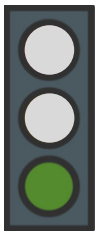
Urban waterways: Development and test of a multimodal transport chain including barge, cargo-bike, and small electric vehicles to make use of the largely un-utilized infrastructure (waterways) in Swedish cities. Urban deliveries and services: Development and preliminary testing of a last and for the first mile distribution concept enabling consolidated e-commerce parcel flows by use of a neutral delivery infrastructure in real estates.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	SSPA Sweden AB, DHL Freight Sweden
Other stakeholders	./.
Commodities	
Flows into the city	Parcels and others
Return flows	Waste
Vessel characteristics	
Load units	./.
Transshipment equipment	The waste was loaded using the truck's container lifting devices and goods were rolled onto the barge using small ramps. This means that no additional land-based cargo handling equipment was needed.
Engine characteristics	Electric drive (presumably)
Crew members	./.
Payload/dimensions	The vessel used was a small barge, well suited for the desired route, with an accompanying tugboat.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	Cargo bikes and in electric vehicles. Packages arriving in Rosenlund are transported onwards by bike. Packages arriving in Lindholmen are transported onwards by employees using small electric vehicles.
Location of DC	DHL terminal a couple of kilometers upstream from Gothenburg city center
Source	57, 58

3.4. DHL Vessel

The location:

Central London, United Kingdom *(Source: LIHH)*



The project:

DHL parcel vessel *(Source: www.dpdhl.com)*

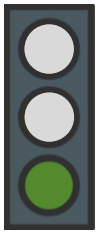
With this project, DHL is looking for an alternative way to transport mail and parcels to central London. The aim is to minimize the volume of traffic in the city as well as delivery times. The parcels are transported from the quay to the customer by e-bike.

Stakeholders	
Companies using the transport service	DHL Express
Type of clients in the city	Customers of DHL Express
Receivers of the return flow	DHL Express
Transport project organizers	DHL Express
Other stakeholders	City of London
Commodities	
Commodities flows into the city	Parcels
Return flows	Parcels
Vessel characteristics	
Load carries, load units	None
Transshipment equipment	None
Engine characteristics	Combustion engine
Crew members	Presumably, 2
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	DC to ship, ship to electric bike, bike to customer; customer to bike, bike to vessel, vessel to DC
Last mile operation	The parcels are delivered to the customer on an electric bike
Location of DC	Heathrow
Source	20, 21

3.5. FLUDIS

The location:

Paris, France *(Source: LIHH)*



The project:

Transportvessel *(Source: www.powertechsystems.eu)*

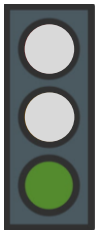
FLUDIS is an innovative and combustion engine free solution for urban logistics. The aim of the project is to create a sustainable supply chain thanks to the coordination between a storage vessel, the electric cargo bikes, and an optimized organization.

Stakeholders	
Companies using the transport service	Ikea and Lyreco
Type of clients in the city	(Online) Customers and Ikea shop
Receivers of the return flow	Papre
Transport project organizers	Fludis
Other stakeholders	Scat
Commodities	
Flows into the city	Ikea products and office equipment
Return flows	Waste small elektro
Vessel characteristics	
Load units	./.
Transshipment equipment	./.
Engine characteristics	Electric
Crew members	./.
Payload/dimensions	7 tonnes or 3000 collis and packages. Represents 1800m².
Range of sailing	./.
Supply chain characteristics	
Logistic chain	From warehouse Ikea (port Gennevilliers) to 4 locations in Paris. Vessel: fulfillment center.
Last mile operation	Cargobikes (max. 30 available on vessel) carrying max. 250kg
Location of DC	Gennevilliers
Source	7, 63

3.6. Hollands Glorie / Floating Service Center

The location:

Amsterdam, Netherlands *(Source: LIHH)*



Operational

The project:

DHL parcel vessel *(Source: www.dhl.de)*

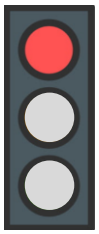
This converted excursion ship is used by DHL Express in Amsterdam to transport parcels and letters to the city center. From there, the last leg to the customer is covered by bicycle. This boat is part of DHL's GoGreen initiative.

Stakeholders	
Companies using the transport service	DHL Express
Type of clients in the city	Customers of DHL
Receivers of the return flow	DHL Express
Transport project organizers	DHL Express
Other stakeholders	City of Amsterdam
Commodities	
Flows into the city	Mail and Parcels
Return flows	Mail and Parcels
Vessel characteristics	
Load units	None
Transshipment equipment	None
Engine characteristics	Combustion engine (new ships with electric drives followed starting 2018)
Crew members	1 (Captain)
Payload/dimensions	Length 17m. 30m²
Range of sailing	./.
Supply chain characteristics	
Logistic chain	DHL truck delivers mail to vessel; vessel makes roundtrip in city center. Airport to DC, DC to ship, ship to electric bike, bike to customer.
Last mile operation	Cargobikes or vans. Electric bike. Special bikes or electric vehicles.
Location of DC	Amsterdam
Source	1, 4, 5, 15, 36, 54, 56

3.7. Radkombitransport (RAKO) Donaukanal

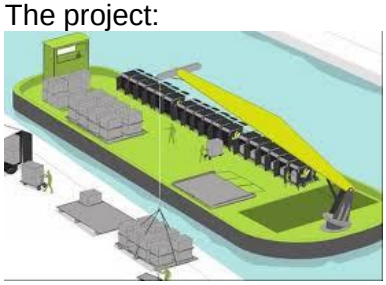
The location:

Vienna, Austria *(Source: LIHH)*



Concept

The project:



RAKO Donaukanal (Source: mobilitaetderzukunft.at)

The project "RAKO Donaukanal" is a research project that investigates an innovative strategy for the sustainable organization of freight transport in cities using the example of the Vienna Donaukanal. The project combines the transport modes transport vessel and cargo bicycle. Specifically, an exploratory study was conducted to determine which prerequisites and framework conditions are necessary to implement a logistics concept and a business model for the lowest possible CO2 emissions and thus environmentally friendly delivery of goods in the districts of Vienna near the Donaukanal.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	Small businesses and private customers
Receivers of the return flow	./.
Transport project organizers	AEA
Other stakeholders	Scat
Commodities	
Flows into the city	Parcels
Return flows	Parcels
Vessel characteristics	
Load units	Vessel
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	Ship to hub, hub to electric bike, bike to customer
Location of DC	./.
Source	30, 66

4. Retail logistics

The third category of users are retailers within cities. For retail logistics, a total of six use cases were identified.

Just as for building logistics, they are geographically focused in France (three cases, of which two are in Paris and one in Strasbourg), the Netherlands (two cases, one being in Amsterdam, one being in Utrecht) and one being located in Ghent (Belgium).

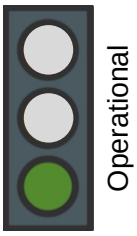
In terms of maturity of the use cases, five out of the six identified cases are operational, whereas one case is currently in the status of a pilot.

Following, the six identified use cases in retail logistics are presented in detailed profiles.

4.1. Au fil de l'eau (Vert chez Vous)

The location:

Paris, France *(Source: LIHH)*



The project:

"Vocoli" (Source:www.faq-logistique.com)

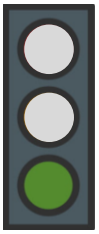
The project "Au fil de l'eau" uses the barge "Vocoli" to transport a large number of parcels (weighing up to 30 kg) to a collection point in the centre of Paris. From there, the parcels are delivered to the clients in delivery tours on tricycles. The project aims to tackle congestion, pollution and particulate emissions in Paris.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	Small businesses and private customers
Receivers of the return flow	./.
Transport project organizers	Vert chez Vous (LSP, initiator), Euroflots (ship operator), Port of Paris, Navigable Waterways of France
Other stakeholders	Public authorities (minor role, supportive attitude). Fludis.
Commodities	
Flows into the city	Small parcels (<30kg)
Return flows	Parcels
Vessel characteristics	
Load carries, load units	./.
Transshipment equipment	Built-in crane
Engine characteristics	Electric
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	Truck to DC, Ship to city landing stage, c.l.s. to customers). During the sailing time, the tricycles are loaded with consolidated orders from different customers - the route is planned. The delivery teams, after having served all their clients, board the ship back at one of its next stops.
Last mile operation	Electric bike. Having up to 20 tricycles which can each transport up to 160 kg-200 kg (2m³) of goods at one time, the company delivers 1500 packages on average on each day of the week (except Sunday). Up to 10 stopovers. The maximum capacity of the system is around 3000 deliveries per day with a dozen of tricycles.
Location of DC	Port of Tolbiac
Source	3, 4, 5, 22, 37, 38, 56, 63

4.2. Beerboat (1 and 2)

The location:

Utrecht, Netherlands *(Source: LIHH)*



The project:

"Beerboat" (Source:www.duurzaamnieuws.nl)

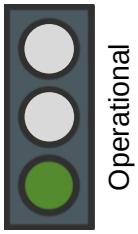
The Cleaning and Port Authority Utrecht initiated this project. The use of waterways is intended to relieve the impact on roads, streets and the environment. While a combustion engine still powers the first vessel, the second vessel is powered by an electric motor. The beer boat transports food into the city and waste out of the city.

Stakeholders	
Companies using the transport service	4 different breweries and one wholesaler from the catering industry
Type of clients in the city	HoReCa and shops; wholesalers; 2010: 65 customers; also possible for moving and building materials. Local shops, hotels, and restaurants.
Receivers of the return flow	./.
Transport project organizers	RHD
Other stakeholders	./.
Commodities	
Flows into the city	Drinks and material for HoReCa, refrigerated food, beer barrels (full).
Return flows	Cardboard; waste flows from cafes and restaurants; beer barrels (empty).
Vessel characteristics	
Load carries, load units	Roll containers
Transshipment equipment	Hydraulic, built-in crane.
Engine characteristics	Beerboat 1 started with combustion engine, replaced electric engine in 2010. Electric motors. Beerboat 2: 55kW, 480 Volt battery, 86.4 kWh (83 kW Diesel generator back up)
Crew members	2
Payload/dimensions	Concept: 18 tons. 40-48 roll containers. Beerboat 1: 18.80m length, 4.26m width, draft 1.1m, creeping line 1.65m
Range of sailing	Beerboat 1: 8-9 hours on one charge.
Supply chain characteristics	
Logistic chain	Truck to DC to vessel to city center.
Last mile operation	Cooperation with cargohopper (distribution of goods with electric vehicles pulling cars).
Location of DC	Utrecht
Source	1, 3, 4, 5, 13, 23, 24

4.3. Bioboot

The location:

Ghent, Belgium *(Source: LIHH)*



The project:

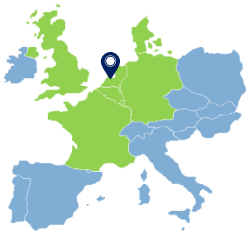
loading point (Source:goedinge.be)

With the Bioboat, local organic farmers have found a climate-friendly alternative to conventional transport.

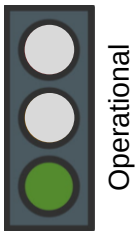
Stakeholders	
Companies using the transport service	Goedinge
Type of clients in the city	Construction companies. Restaurants and private persons
Receivers of the return flow	./.
Transport project organizers	VlotGent (Dekleermaeker)
Other stakeholders	./.
Commodities	
Flows into the city	Vegetables
Return flows	./.
Vessel characteristics	
Load carries, load units	Blue vegetable containers
Transshipment equipment	Manual
Engine characteristics	Electric engine (solar panels)
Crew members	1 Captain
Payload/dimensions	Max. 1.5-ton payload. Dimensions 6x2.7m. Maximum speed 8 km/h. Catamaran in aluminum.
Range of sailing	Full day on solar power.
Supply chain characteristics	
Logistic chain	From production site on vessel to city center
Last mile operation	Electrical cargo bikes
Location of DC	Afsnee
Source	16, 17, 18, 63

4.4. City Supplier (Vracht door de gracht)

The location:



Amsterdam, Netherlands *(Source: LIHH)*



The project:

Transport vessel (Source:www.logistiek.nl)

The project "Freight through the Canal" aims at a clean, quiet and efficient transport by means of a vessel with an electric engine. By using the canals built centuries ago to facilitate traffic, it actively reduces congestion in the center of Amsterdam. There are no traffic jams on the water, so the vessel delivers its goods to its customers on time.

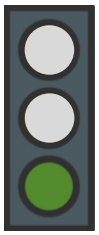
Stakeholders	
Companies using the transport service	./.
Type of clients in the city	Food Center Amsterdam (wholesale market). Restaurants, supermarkets, hotels, hospitals, healthcare facilities.
Receivers of the return flow	./.
Transport project organizers	Mokum Mariteam; cooperation between 3 shipowners (Rederij 't Smidtje, Rederij de Nederlanden, Canal Company), 1 waste collector (Icova) and 1 logistics service provider (Koninklijke Saan). Rutte Groep, Associated enterprises Food Centre Amsterdam, Renewi / Icova, Materials Office of the City of Amsterdam, Greenchoice.
Other stakeholders	Binnenstadservice
Commodities	
Flows into the city	Focus on goods with high volumes. Food and beverages for restaurants, supermarkets and various shops, building material, linens for hotels, hospital and healthcare facilities, books, refrigerated products
Return flows	Organic waste (HoReCa) to be processed in biodiesel (own use)
Vessel characteristics	
Load carries, load units	Rolling containers, pallets and mesh containers (gaascontainers)
Transshipment equipment	Hydraulic crane
Engine characteristics	Electric engine
Crew members	./.
Payload/dimensions	85m³ or 56 tones. Length 20m, width 4.25m, draft 1m, creeping line 1.85m
Range of sailing	8-10 hours sailing. 2 diesel generators as backup
Supply chain characteristics	
Logistic chain	Truck to DC to vessel to city center

Last mile operation	Clarks or platform trucks. Pallet trucks (electric) on board: used for the last mile, they can run up to 150m. In other cases, cargobike or electric truck are being used
Location of DC	Urban consolidation center at outskirts of town
Source	1, 3, 4, 5, 13, 14, 25, 36, 54, 56

4.5. Dentressangle/Franprix

The location:

Paris, France *(Source: LIHH)*



Operational

The project:

Franprix's vessel (Source:www.dvz.de)

A motor vessel brings 26 containers to the Bourdonnais quay on the Seine every morning. Distribution trucks are waiting there to take over the boxes with goods for 80 of the 350 Franprix shops in Paris. None of the shops is more than 4 km away from the quay. The starting point of the ship tour is the port of Bonneuil-sur-Marne, 20 km away.

Stakeholders	
Companies using the transport service	Franprix / Sanofi-Aventis
Type of clients in the city	Franprix stores/ Sanofi-Aventis. 300 stores in Paris.
Receivers of the return flow	./.
Transport project organizers	Franprix, Norbert Dentressangle (last mile transport)
Other stakeholders	Navigable waterways of France, Port of Paris, Terminal de Seine, Paris Terminal (dock work), SCAT (river transport)
Commodities	
Flows into the city	Containers (caisse mobiles)
Return flows	Containers
Vessel characteristics	
Load carries, load units	Containers
Transshipment equipment	./.
Engine characteristics	Fossil fuel
Crew members	./.
Payload/dimensions	80m vessel
Range of sailing	./.
Supply chain characteristics	
Logistic chain	Truck to DC, Ship to city landing stage, truck to shops. The goods packed in containers are transported between the port of Bonneuil-sur-Marne and the port of Bourdonnais in the center of Paris, before being delivered by truck on the last mile to the retail stores, located within a radius of 4 km, 450 pallets of goods are prepared and loaded in 26 containers. A truck transports the containers to the port. The Plan is to ship 48 containers per day (5 days per week) by the end of 2021.
Last mile operation	Regular diesel trucks
Location of DC	Chennevières-sur-Marne (Entrepot, 20 km Southeast of Paris); charged at port de Bonneuil
Source	4, 22, 37, 38, 53, 63

4.6. Strasbourg

The location:

Strasbourg, France *(Source: LIHH)*

Living lab / pilot

The project:

Vessel on a Stasbourg Waterway (Source:www.visit.alsace)

The aim of the project is to reduce freight traffic in the city center and the total number of vehicles in the city center with a riverboat shuttling between the port and the city center. The project also aims to improve the distribution scheme: optimization of the loading process (consolidation) and delivery routes.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	HoReCa, Parcel delivery companies, Construction sites
Receivers of the return flow	./.
Transport project organizers	ULS
Other stakeholders	./.

Commodities	
Flows into the city	Drinks (barrels) for HoReCa, Parcels, bricks (for construction)
Return flows	Waste, recycable material (paper, cardboardand empty bottles/barrels)

Vessel characteristics	
Load carries, load units	Colli
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.

Supply chain characteristics	
Logistic chain	./.
Last mile operation	Cargovélo (electric cargo bikes)
Location of DC	./.
Source	63, 68

5. Waste logistics

The fourth category for which relevant use cases have been identified within this paper are waste logistics use cases. Thus, in this chapter, examples are presented in which inland vessels are being used to carry waste, mainly from city centers towards a location elsewhere.

A total of four use cases were identified for the waste logistics sector. A clear regional focus on France was able to be identified, with three out of four cases being located in France, one located in Paris as well as one in Lille and Lyon each. The other identified use cases is located in Utrecht, Netherlands.

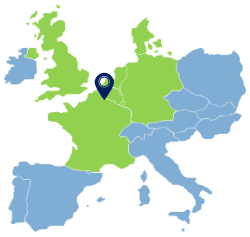
All four cases are operational cases.

Following, the four identified use cases in waste logistics are presented in detailed profiles.

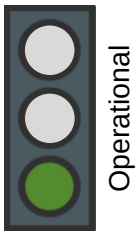
In addition, waste logistics plays a minor role in several more use cases identified. They are shown under the chapter covering their major commodity, e.g. building logistics.

5.1. Centre Multimodal de Distribution Urbaine (CMDU)

The location:



Lille, France *(Source: LIHH)*



The project:

Port de Lille (Source: sustainable-everyday-project)

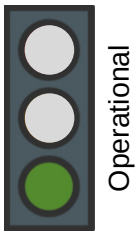
The city of Lille has been using a barge system for the transport of domestic waste since 1999 when the city had to close its incinerators for domestic waste, which had previously processed up to 1,300 tons of waste a day. The port of Lille organized a barge system with open top containers to send part of its domestic refuse to a landfill plant in the area. Every day, between 30 and 40 containers were sent by barge. Since September 2007, barges, transporting a volume of approximately 220,000 tons per year, link Lille's 2 most important valorization plants.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	Port of Lille
Other stakeholders	Lille urban community
Commodities	
Flows into the city	./.
Return flows	Household waste and renewable waste
Vessel characteristics	
Load units	Open top containers
Transshipment equipment	./.
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	4, 5, 67

5.2. Ecoboat (Wasteboat)

The location:

Utrecht, Netherlands *(Source: LIHH)*



The project:

Wasteboat (Source: civitas.eu)

The current disposal boat deals only with waste from bars and restaurants along the canals in Utrecht. On the street, however, garbage truck collection company and household waste damage historic basements under the roadway. To avoid further long-term damage, the municipality is now looking into the possibility of collecting all waste on the canals - both at quay and street level by boat.

Stakeholders	
Companies using the transport service	4 different breweries and one wholesaler from the catering industry
Type of clients in the city	Bars and Restaurants
Receivers of the return flow	./.
Transport project organizers	City of Utrecht
Other stakeholders	./.

Commodities	
Flows into the city	./.
Return flows	Organic waste (considered as residual waste)

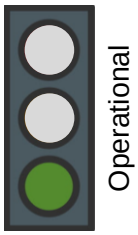
Vessel characteristics	
Load units	Waste is emptied in containers. Max. 8 containers on board (each 3m³). Also, possible: 26 roll containers or 24 cool/freezer containers.
Transshipment equipment	Hydraulic crane
Engine characteristics	Electrical engine
Crew members	./.
Payload/dimensions	1 container = 3m³. The vessel has a length of 16.80 meters, a width of 4.20 meters. The average height is 1.00 meters and a cruise line height of 1.63 meters. The Ecoboot is equipped with four battery packs of 480 volts each, which power the 55-kW electric motor and all equipment present on the vessel. Among other things, the Ecoboot is equipped with a telescopic spud pole installed at the front of the vessel, which allows the vessel to lay still anywhere.
Range of sailing	./.

Supply chain characteristics	
Logistic chain	From city center to incinerator
Last mile operation	./.
Location of DC	./.
Source	13, 25, 39

5.3. River'Tri & FLAGSHIPS Lyon

The location:

Lyon, France *(Source: LIHH)*



The project:

Wasteboat (Source: flagships.eu)

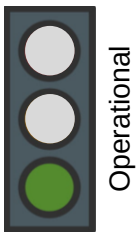
River'tri docks on the Saône in the French city of Lyon once a week. It's Europe's first waterborne waste collection facility and sorting unit of its kind. The boat can collect up to 300 tonnes of waste a year and is used by 5000 people. Lyon is France's 3rd largest populated city and it has only two permanent waste collection centres. That's why River'tri was created, to meet waste disposal needs there. The barge takes just 30 minutes to set up and every Saturday unwanted bulky items can be dropped off on Quai Fulchiron where it docks.
Combined with a push-boat design realised through the Flagships EU project it will be possible to move it with a 300kg capacity tank of compressed hydrogen. This pusher-tug will operate in the city centre of Lyon to deal with a special garbage barges on the city's riverside.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	Compagnie Fluvial de Transport (CFT)
Other stakeholders	VTT Technical Research Centre of Finland Ltd., NCE Maritime CleanTech, Norled AS, ABB Marine Systems, LMG Marin, Westcon Power & Automation, Ballard Power Systems Europe, PersEE
Commodities	
Flows into the city	./.
Return flows	Waste
Vessel characteristics	
Load units	Waste collection unit
Transshipment equipment	./.
Engine characteristics	hydrogen engine (200 kW fuel cells, mobile fuel tank with a 300kg compressed hydrogen capacity)
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	71, 73, 74

5.4. Syctom

The location:

Paris, France *(Source: LIHH)*



The project:

New plant site (Source: www.ams-institute.org)

In Paris, Syctom (Household waste treatment company) and the paper company UPM Kymmene operate a truly unique system which consists in shipping collected old newspapers and magazines for recycling to Grand-Couronne (Rouen) with a motorbarge equipped with an onboard crane, and sending back the newly manufactured paper rolls (2.5 m wide) by ship to Paris where they are be used to print daily newspapers and magazines. The operation started in 2005 with 17,000 tons of paper and reached 113,000 tons per year in 2008

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	SITA, Syctom
Other stakeholders	UPM Kymmene (paper company), Paris Port Authority, Rouen Port Authority, Navigable Waterways of France, French Environment and Energy Management Agency
Commodities	
Flows into the city	Newly manufactured paper rolls (2.5 m wide)
Return flows	Old newspapers and magazines
Vessel characteristics	
Load units	./.
Transshipment equipment	Onboard crane
Engine characteristics	./.
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	Old newspapers and magazines are collected in Paris, shipped to Grand-Couronne where paper rolls are produced. Paper rolls are shipped to Paris.
Last mile operation	./.
Location of DC	./.
Source	4, 5

6. Mixed use cases, others

Finally, in this chapter, further use cases have been included for which the type of goods are either not yet determined or where a variety of goods/commodities are considered for city freight distribution, so that no meaningful classification into one of the previously discussed categories could be made.

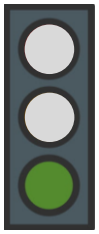
A total of six mixed, or miscellaneous cases have been identified, being located in the regions of Rhine-Ruhr (Germany), Leiden and Delft as well as Amsterdam (Netherlands), Paris (France) as well as Ghent (Belgium). Two of them are operational, two of them represent concepts and two cases are a pilot project.

Following, the six identified mixed/ miscellaneous use cases are presented in detailed profiles.

6.1. CityBarge

The location:

Leiden and Delft, Netherlands *(Source: LIHH)*



The project:

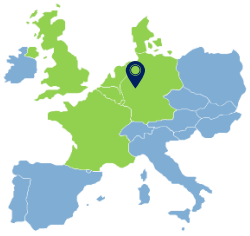
Vessel and pontoon (Source: citybarge.eu)

Cities are struggling with densification and thus a lot of traffic and logistics in the inner city. This worsens the livability, air quality and many CO2 emissions in cities. CityBarge helps improve the quality of life in cities by providing sustainable, affordable and simple water logistics solutions for the inner city. The existing urban water infrastructure (canals) is used.

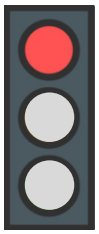
Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	CityBarge, Provincie Zuid-Holland, Skoon Energy, KOTUG International and FYNLY
Other stakeholders	./.
Commodities	
Flows into the city	Building materials, waste, parcels
Return flows	Waste
Vessel characteristics	
Load units	./.
Transshipment equipment	./.
Engine characteristics	Electric drive
Crew members	./.
Payload/dimensions	Electric Push barges, modular barges and mini-pontons
Range of sailing	./.
Supply chain characteristics	
Logistic chain	Mini hubs in the city
Last mile operation	./.
Location of DC	./.
Source	44, 48, 49, 51, 52

6.2. DeConTrans

The location:

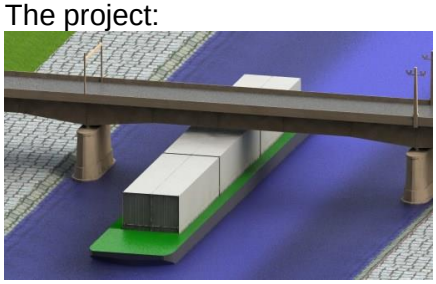


Region Rhine-Ruhr, Germany *(Source: LIHH)*



Concept

The project:



Autonomous vessel (Source: jrf.nrw)

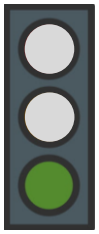
The decentralized approach envisaged here is also intended to help tap the yet untapped potential and capacity reserves both on the Rhine and its tributaries and in the canal network and adjacent waterways for inland shipping. The approach pursued here is based on the use of existing (waterway) infrastructure and - apart from the transshipment points themselves - does not give rise to any new infrastructure investments.

Stakeholders	
Companies using the transport service	DeConTrans is a concept, Deltaport Wesel (if the project is a success)
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	DST Entwicklungszentrum für Schiffstechnik und Transportsysteme e. V.
Other stakeholders	./.
Commodities	
Flows into the city	Containers
Return flows	Containers
Vessel characteristics	
Load units	Swap body (20m³) (lighter than maritime 20ft container) developed by Green
Transshipment equipment	./.
Engine characteristics	Electric drive
Crew members	./.
Payload/dimensions	Autonomous vessel
Range of sailing	./.
Supply chain characteristics	
Logistic chain	Ports to the DC, DC to ports
Last mile operation	./.
Location of DC	Old coal piers in the Rhine-Ruhr area (concept)
Source	33

6.3. FLAGSHIPS Paris

The location:

Paris, France *(Source: LIHH)*



The project:

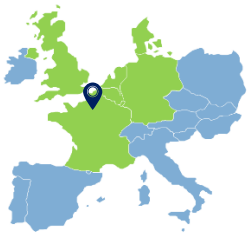
Zulu vessel (Source: flagships.eu)

"Green and sustainable shipping is a prerequisite for reaching national and international emission reduction targets. Ships powered by renewable hydrogen will make a substantial contribution to reducing emissions from shipping and improving air quality in cities and other densely populated areas," says Flagships Project Coordinator Jyrki Mikkola from VTT Technical Research Centre of Finland.

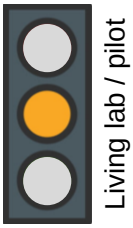
Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	Compagnie Fluvial de Transport (CFT)
Other stakeholders	VTT Technical Research Centre of Finland Ltd., NCE Maritime CleanTech, Norled AS, ABB Marine Systems, LMG Marin, Westcon Power & Automation, Ballard Power Systems Europe, PersEE
Commodities	
Flows into the city	Other goods
Return flows	./.
Vessel characteristics	
Load units	pallets, in bigbags and roll containers
Transshipment equipment	onboard crane
Engine characteristics	fossil fuel engine (hydrogen engine till the end of 2021)
Crew members	1
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	70, 72

6.4. Urban Logistics Cluster for Ile-de-France 2021 River delivery test campaign

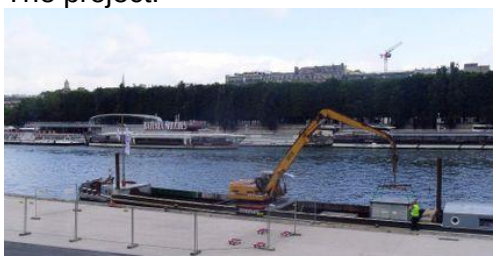
The location:



Paris, France *(Source: LIHH)*



The project:



vessel (Source: cluster-logistique-urbaine-idf.fr)

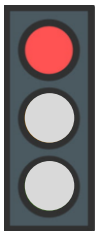
The Urban Logistics Cluster for L'Ile-de-France offers, in partnership with Haropa Ports de Paris and VNF, a river testing campaign from Gennevilliers or Bonneuil-sur-Marne to urban ports in the center of the east and west of Paris. Offered from January to December 2021 over a period of one to six weeks per charger, these tests are customized according to the schedule and the route requested for interested users. For the test, 95% of the additional costs of experimentation, compared to road deliveries are being covered by local funding. A technical report and CSR gains from the modal deferral is delivered at the end of the test.

Stakeholders	
Companies using the transport service	White label approach / multi-user concept, open for any interested user
Type of clients in the city	./.
Receivers of the return flow	Valdelia
Transport project organizers	Urban Logistics Cluster for L'Ile-de-France
Other stakeholders	Haropa Ports de Paris, VNF
Commodities	
Flows into the city	food, parcels and other goods
Return flows	waste (Furniture, lighting, selective deconstruction, etc.)
Vessel characteristics	
Load units	9 dry mobile crates (20 m^3); unit loading capacity of 9 pallets (80 x 120 cm) or 200 e-commerce bins (60 x 40 x 30 cm); 2 refrigerator crates (6 pallets)
Transshipment equipment	onboard crane
Engine characteristics	fossil fuel engine
Crew members	./.
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	transportation of the commodities into the inner-city-area of France
Location of DC	./.
Source	77

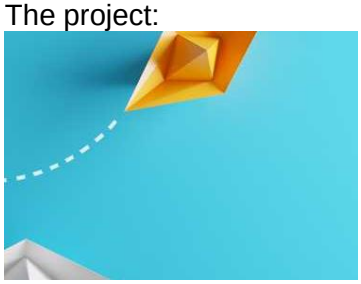
6.5. SmartWaterWay

The location:

Ghent, Belgium *(Source: LIHH)*



The project:



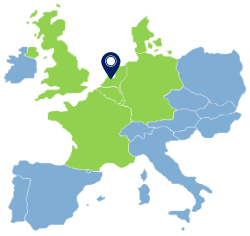
SmartWaterWay (Source: www.imec-int.com)

The SmartWaterWay project aims to make autonomous shipping with PSBs profitable for logistics companies. It will use low-cost alternatives for communication, positioning and sensor technology to reduce automation costs to EUR 100,000 or less.

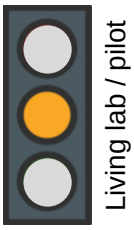
Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	Seafar, Blue Line Logistics, Citymesh, Pozyx, Imec, Uantwerpen
Other stakeholders	./.
Commodities	
Flows into the city	./.
Return flows	./.
Vessel characteristics	
Load units	./.
Transshipment equipment	./.
Engine characteristics	./.
Crew members	None
Payload/dimensions	Autonomous vessel
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	50

6.6. Roboat (Waste Streams)

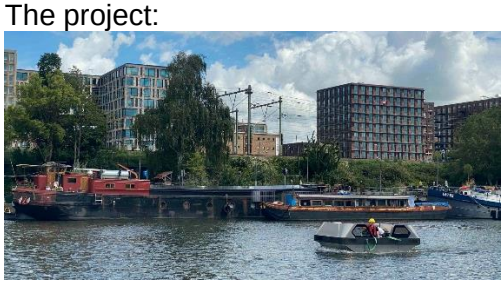
The location:



Amsterdam, Netherlands *(Source: LIHH)*



The project:



Roboat (Source: www.spiegel.de)

The famous Amsterdam Canals — a UNESCO heritage and known for its scenic views — are still marred by curbside trash. By bringing back the original purpose of the canals — access to the inner city for transport and collection of goods — the city's water-rich infrastructure can be used to innovatively and efficiently manage the collection of household waste by using autonomous boats.

Stakeholders	
Companies using the transport service	./.
Type of clients in the city	./.
Receivers of the return flow	./.
Transport project organizers	MIT and AMS
Other stakeholders	./.
Commodities	
Flows into the city	Parcels and packages
Return flows	Waste
Vessel characteristics	
Load units	Floating containers taken into the inner-city by an autonomous vessel, autonomous vessel that transports parcels and packages
Transshipment equipment	./.
Engine characteristics	./.
Crew members	None (autonomous vessel)
Payload/dimensions	./.
Range of sailing	./.
Supply chain characteristics	
Logistic chain	./.
Last mile operation	./.
Location of DC	./.
Source	28, 29, 31, 32, 76

7. Further cases

During the research for this paper, numerous further cases were identified. Nonetheless, information on these use cases could not be identified in sufficient detail during the research for this paper or was not publicly available. Therefore, no profiles, in a manner such as carried out in chapters 2 to 6, could be created for these cases.

For the sake of completeness, these are therefore named below in form of an undetailed list.

7.1. Ligne de metro

Theme	Building logistics
Trial/Real Case/Plan/Project	Plan
Location	Toulouse, France
Source	63

7.2. De Krook

Theme	Building logistics
Trial/Real Case/Plan/Project	Trial
Location	Ghent, Belgium
Source	11

7.3. BMN

Theme	Building logistics
Trial/Real Case/Plan/Project	Real Case
Location	Netherlands
Source	62

7.4. Le chantier de la Confluence

Theme	Building logistics
Trial/Real Case/Plan/Project	Plan
Location	Lyon, France
Source	63

7.5. Maritieme Campus Antwerpen

Theme	Building logistics
Trial/Real Case/Plan/Project	Project
Location	Antwerp, Belgium
Source	43

7.6. Croix Rousse Tunnel

Theme	Building logistics
Trial/Real Case/Plan/Project	Project
Location	Lyon, France
Source	38, 63

7.7 Barge fluviale de stockage déporté	
Theme	Building logistics
Trial/Real Case/Plan/Project	Project
Location	Paris, France
Source	63

7.8. Le Grand Paris Express	
Theme	Building logistics
Trial/Real Case/Plan/Project	./.
Location	Paris, France
Source	63

7.9. Le chantier de Notre Dame	
Theme	Building logistics
Trial/Real Case/Plan/Project	Project
Location	Paris, France
Source	63

7.10. Le chantier du Grand Palais	
Theme	Building logistics
Trial/Real Case/Plan/Project	Plan
Location	Paris, France
Source	63

7.11.Spie Batignolles	
Theme	Building logistics
Trial/Real Case/Plan/Project	Test
Location	Toulouse, France
Source	63

7.12. Lignes de tram	
Theme	Building logistics
Trial/Real Case/Plan/Project	Plan
Location	Liège, Belgium
Source	63

7.13. Chantier Manufacture des Tabacs	
Theme	Building logistics
Trial/Real Case/Plan/Project	./.
Location	Strasbourg, France
Source	63

7.14. Green Deliriver

Theme	Not clear yet
Trial/Real Case/Plan/Project	Project
Location	Paris, France
Source	63

7.15. Box2Home

Theme	Not clear yet
Trial/Real Case/Plan/Project	Project
Location	Paris, France
Source	63

7.16. Logistique urbaine fluviale combinée

Theme	Not clear yet
Trial/Real Case/Plan/Project	Project
Location	Paris, France
Source	63

7.17. LPM

Theme	Not clear yet
Trial/Real Case/Plan/Project	Project
Location	Paris, France
Source	63

7.18. Rouen

Theme	Not clear yet
Trial/Real Case/Plan/Project	Plan
Location	Paris, France
Source	63

7.19. Distri Seine

Theme	Not clear yet
Trial/Real Case/Plan/Project	Real Case
Location	Paris, France
Source	63

7.20. DHL

Theme	Parcel logistics
Trial/Real Case/Plan/Project	Real Case
Location	Venice, Italy
Source	61

7.21. PostNL

Theme	Parcel logistics
Trial/Real Case/Plan/Project	Plan
Location	Amsterdam, Netherlands
Source	36

7.22. IKEA

Theme	Retail logistics
Trial/Real Case/Plan/Project	Test
Location	Paris, France
Source	63

7.23. Sainsbury's

Theme	Retail logistics
Trial/Real Case/Plan/Project	Trial
Location	London, UK
Source	4, 5

7.24. Velib

Theme	Service logistics
Trial/Real Case/Plan/Project	Real Case
Location	Paris, France
Source	4, 5

7.25. Déchetterie fluviale

Theme	Waste logistics
Trial/Real Case/Plan/Project	Trial
Location	Paris, France
Source	63

8. Conclusion

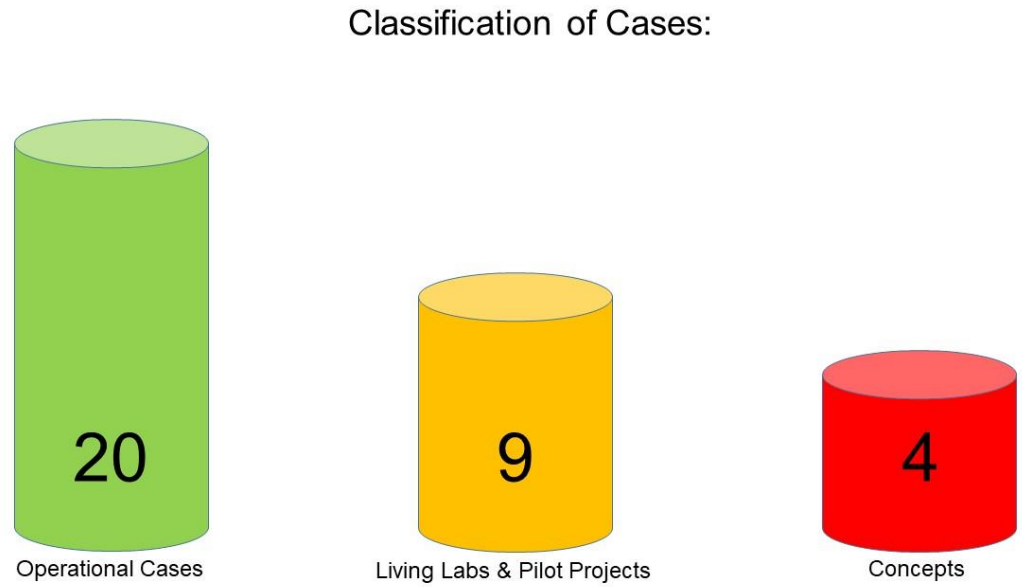
This chapter aims at concluding the key findings of the market review conducted within this paper and also reflecting the findings towards the overall AVATAR project context.

Numerous use cases exist in city freight distribution via IWT.

This market review summarizes a variety of identified use cases for water-bound city freight distribution. The authors were able to identify a total of 58 use cases. For 33 of which, sufficient information was available and they have been presented in use case profiles throughout the chapters 2 to 6 of this paper. 25 further cases were identified with insufficient publicly available information, resulting in them being listed as further cases under chapter 7. In the following paragraphs, only the 33 use cases for which detailed profiles could be developed are considered.

City freight distribution via IWT can be economically viable in operational terms.

The paper shows that under certain circumstances, economic viability of water-bound city freight distribution can already be achieved today, proven by a total of 20 identified use cases that are running on an operational level.

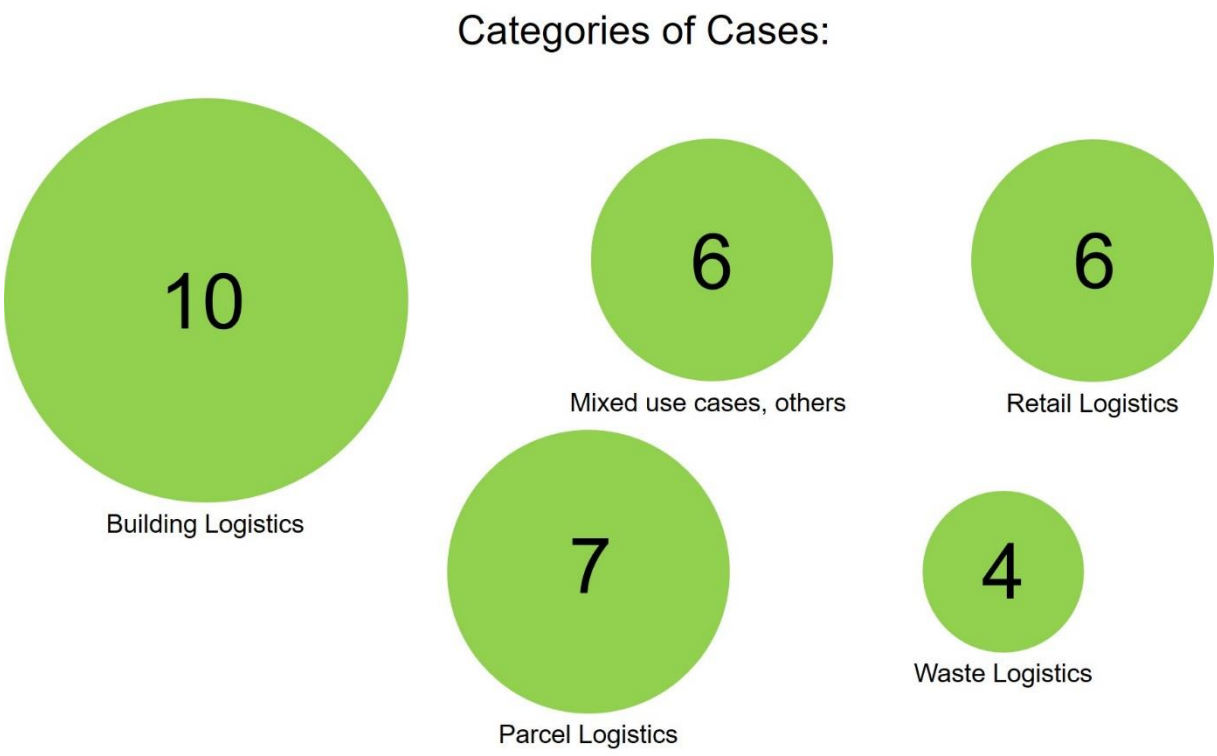


Furthermore, nine use cases were identified and portrayed in this report, that are currently on a pilot or living lab level. Four use cases were identified currently representing concepts.

There are characteristic transport segments that seem to be most suitable for city freight distribution via IWT.

All identified use cases covered the transport of freight/goods either in the segment of building logistics, parcel logistics, retail logistics or the transport of waste. Building logistics being the most common category (ten cases), followed by parcel logistics, including CEP services (seven cases), retail logistics (six cases) and waste return (four cases).

Mixed use cases (six cases) that were identified in this paper also usually cover several of the aforementioned transport categories.



France, Belgium and the Netherlands are pioneers in the use of inner-city canals and waterways for urban freight distribution.

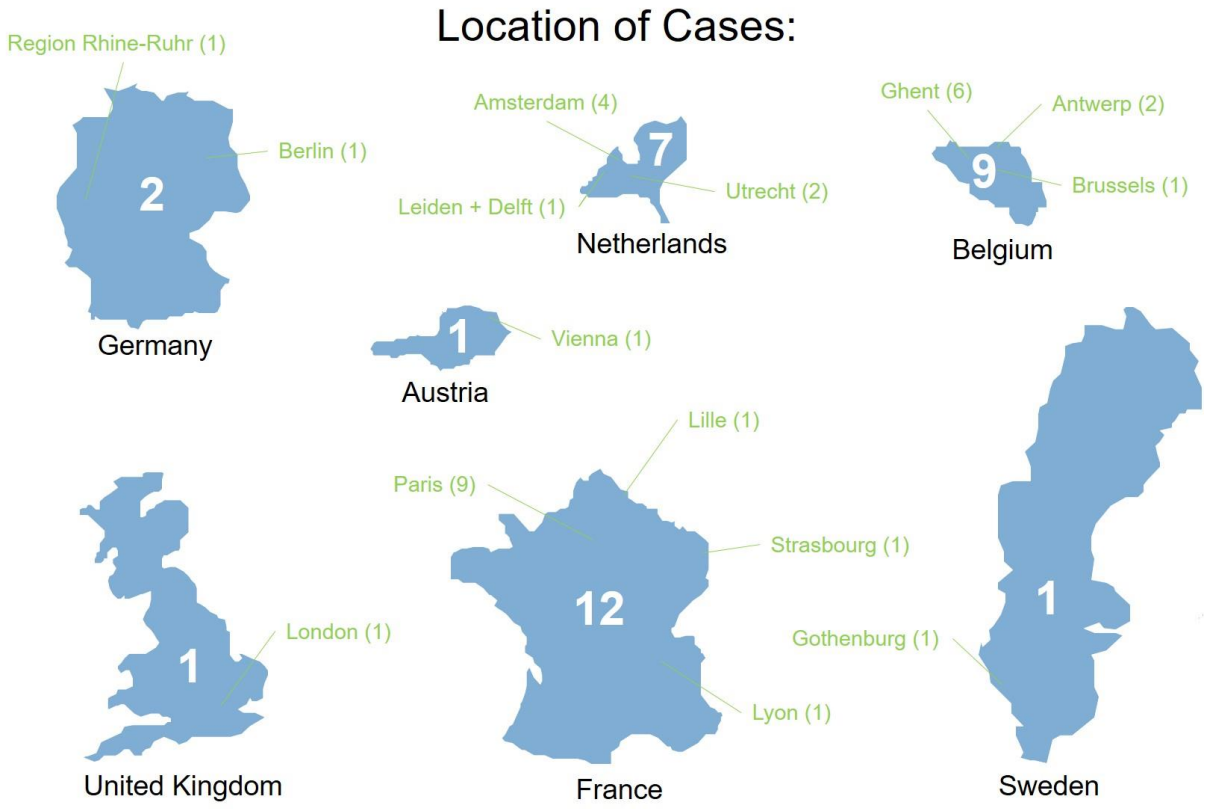
When it comes to the geographical distribution of identified use cases France (twelve cases), Belgium (nine cases) and the Netherlands (seven cases) are leading by example when it comes to the utilization of IWT for city freight distribution, as of today.

Further cases have been identified in Germany (two cases) as well as Austria, Sweden and the United Kingdom (one case each).

In terms of identified use cases by cities and regions, Paris (France) is the leading city with a total of nine identified cases. In terms of the maturity of use-cases, Paris also leads by example with seven out of those nine use cases being operational as of today. The two other cases are currently in pilot / living lab status.

The second most active city identified in this paper is Ghent (Belgium), representing a total of six use cases. With two of them being operational, three being in pilot status and one being in a concept phase, city freight distribution via IWT is less operationally implemented yet compared to Paris, but Ghent is quite active with their three current pilots. However, the extent to which a direct comparison of a metropolis like Paris with a city of the size of Ghent is admissible would have to be critically questioned here anyway.

Thirdly, Amsterdam (Netherlands) also shows above-average activity in the area of water-bound city freight distribution with a total of four cases, of which three are operational and one being in the concept phase.



Altogether, this shows that water-bound city freight distribution solutions can in general be implemented and achieved in a large variety of circumstances, both in large metropolises like Paris as well as in urban areas and cities with less than 300,000 inhabitants, such as Ghent.

Based on the key findings of this paper, the AVATAR project will now look deeper into the structural success factors for those cases identified in this study but also into factors that hinder or prevent the implementation of such solutions, including infrastructural, economic as well as regulative and policy-related factors.

Furthermore, the core aim of the AVATAR project will be to analyze and elaborate strategies on how the automation of small inland vessels can foster the utilization of urban inland

waterways and canals and create a market-uptake of innovative city freight distribution solutions via IWT.

The AVATAR project is an ongoing innovation project. For future project results and findings please visit https://northsearegion.eu/avatar/.

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Number	Reference
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