Sustainable Logistics

Transportation

Multimodal

DP WORLD
rouvia
CS CARGO SUPPORT

Space Optimization

paccurate
SKAYM
VOIDLESS

Containers & Hardware

Cold Chains

ARTYC
SUNSWAP
THERMO KING
TemperPack
CARNOTFLEET
MAGNOTHERM SOLUTIONS
Envirotainer The Active Cold Chain
ember | LifeSciences
COLDSPACE

Delivery & Marketplaces

Land

PACKFLEET
HIVED
fin
Uber Connect
relay
wanda
fairsenden

Route & Loading Optimization

Trucksters
THE EIGHTH NOTCH PLATFORM
Owlery.ai
data & algorithms
Pelikan Mobility
Optimal Dynamics
YOLDA
leaf logistics
OFLOAD
FLOCK Freight

Fleet Decarbonization

Upshift
Clearly
TRANSPOREON
ZETI

Voyage & Fleet Optimization

Sea

deepsea
spinergie
Mythos AI
GELECTRIC
bluepulse
searoutes Build a greener supply chain
SOFAR
BEARING.ai
Port change
Marine Digital
ZERO NORTH
Arinto
StormGeo
NAUTILUS LABS
ORCA AI
TOQUA

Allowance Trading

OceanScore
ZERO44
VERTIS
braemar

Warehousing & Fulfillment

Maintenance & Energy Mgmt

SNOFOX
BeeBryte New ways for energy efficiency
facilio
roambee
ACCRUENT
FMX
AXIOM CLOUD

PV Deployment

metris
unbound energy
ENVIRIA
Alight
Photon Energy Group

Microhubs

VIA DELIVERY
Fillogic
THE ROUNDS
Packsmith

SUSTAINABLE LOGISTICS CHEAT SHEET

by AENU

The **logistics** sector, including transportation and warehousing, is **responsible for 11% of global GHG emissions** (MIT). These stem from (1) the **distance travelled** by goods, (2) **fossil-fuel based transportation**, and (3) **inefficient cold chains**. While air is the most emissions-intensive mode per tonne-kilometre (tkm), road and sea are the largest emissions contributors in absolute terms. Accordingly, **new regulation** is incentivizing the emergence of both hardware and software plays addressing these two modes of transportation. As the **demand for freight is expected to triple by 2050** (OECD), **sustainable logistics** solutions are **more pressing than ever**.

Thesis: Reducing the emissions of the logistics sector will require (1) software plays to reduce excess distance travelled by freight through a combination of route and loading optimization, (2) hardware plays to enable fuel-switching across land, sea and air transportation and (3) a connected cold chain to intelligently manage energy and detect refrigerant leakage.

The Impact Problem

Excess distance travelled: The logistics industry is widely undigitzed with actors predominantly communicating bilaterally via email and spreadsheets. Resultantly, limited data transparency and analytics lead to suboptimal routing & loading of transport modes.

Fossil-fuel based transportation: across land, sea and air, freight transportation is still heavily reliant on fossil fuels.

Analog cold chains: a lack of preventive maintenance leads to refrigerant leakage. Connected cold warehouses could modulate their energy demand to enable renewables uptake.

Key Impact Facts

Globally, 87Mt CO2e/year are attributed to trucks driving empty miles (FreightWaves)

The lifespan of freight ships is between 10-25 years, thereby locking in propulsion hardware investments for a considerable time (IOP)

Emissions from refrigerant leakage are estimated to be 148 MtCO2e/year in the EU alone (TSEP)

Business Opportunity

- Regulatory tailwinds for maritime decarbonization, including carbon pricing with EU ETS and direct measures with CII (EU Commission, IMO)
- Growing market, with demand for freight expected to triple by 2050 (OECD)
- Rising deployment of EV charging infrastructure – 55% YoY increase in 2022 (IEA)
- Truck driver shortage is creating additional incentives to make freight more efficient (IRU)
- Stricter emissions requirements for heavy duty vehicles (EU Commission)

CO2 Emissions by Freight Transportation Mode

Mode	Road	Sea & Waterways	Rail	Air
% of total	69%	21%	5%	5%
Absolute emissions [Mt CO2e/yr]	2'230	657	170	155
Per weight/ distance [g CO2e/tkm]	83	6	16	512

Source: MIT

Solutions

- Route & Loading Optimization
- Voyage & Fleet Optimization
- Electrified Transportation & Mode Switching
- Warehouse & Cold Chain Management

Tech Plays

Early Stage

- Maritime voyage and fleet optimization software, enabling immediate and Capex-free emissions reduction
- Software platforms pooling package delivery

Growth Stage

- Electrified and optimized last mile delivery platforms
- Integrated cold warehouse energy management and predictive maintenance platforms

Startups to Watch

Mythos AI · ZERO NORTH · The Eighth Notch TBN Platform · BEARING.ai · rouvia · Pelikan Mobility · SNOFOX · TOQUA · PACKFLEET · facilio