



ResC4EU
RESILIENT SUPPLY CHAINS FOR EUROPE

Interactive Demonstrator

... **for Energy Savings**



Try it now
 <https://resc4eu.greentwin.app/demonstrator-1>

Overview

This demonstrator is an interactive visualisation tool that allows users to explore how selecting energy-efficient maritime, rail, and multimodal supply chain routes, instead of standard transportation methods, reduces carbon footprint and operational costs. The demonstrator evaluates both transport-based emissions (distance × transport mode) and energy-based processing emissions at nodes (ports, warehouses, distribution centers) throughout the supply chain. By visualising complete supply chain networks and their environmental impact, users can make informed decisions about route selection and understand the trade-offs between route length, transport mode, and energy efficiency. The demonstrator is publicly accessible via the ResC4EU platform: <https://resc4eu.greentwin.app/demonstrator-1>

Sample Data

This demonstrator uses static sample data for supply chain route analysis, Global Warming Potential (GWP) calculations, and route optimisation strategies. The sample data is **not stored in the database**.

Data Structures

A **RouteSegment** is an individual transport segment within a supply chain route.

Field	Description
id	Unique segment identifier
from	Origin location or port
to	Destination location or port
fromLocode	UN/LOCODE of origin (optional)
toLocode	UN/LOCODE of destination (optional)
originLocode	Alternative origin code
destinationLocode	Alternative destination code
mode	Transport mode (Sea, Rail, Road, Air)
distance	Transport distance (km)
gwp	Transport emissions (kg CO ₂ e)
duration	Transit duration (hours, optional)
geojson	GeoJSON feature for route visualization (optional)

A **SampleRoute** is an entire supply chain route composed of multiple transport segments.

Field	Description
id	Unique route identifier
name	Route name
description	Description of the route
segments	List of transport segments
totalDistance	Total transport distance (km)
totalGWP	Total route emissions (kg CO ₂ e)

GWP Calculation Methodology

Transport-related GWP is calculated using **distance-based emission factors**.

Transport Mode	Emission Factor
Sea	0.008 kg CO₂e/km
Rail	0.025 kg CO₂e/km
Truck	0.085 kg CO₂e/km
Air	0.255 kg CO₂e/km

Example Calculations

- Sea: 1,863 km × 0.008 = **14.90 kg CO₂e**
- Rail: 1,368 km × 0.025 = **34.20 kg CO₂e**
- Truck: 500 km × 0.085 = **42.50 kg CO₂e**
- Air: 2,000 km × 0.255 = **510.00 kg CO₂e**

In addition to transport emissions, the demonstrator estimates **energy emissions** at nodes. These vary according to location and assumed energy efficiency.

Location	Energy-based Emissions
Chinese Ports (Lianyungang, Yulin)	42–60 kg CO ₂ e/node
Spanish Ports (Bilbao)	35–50 kg CO ₂ e/node
German Ports (Bremerhaven, Hamburg)	28–40 kg CO ₂ e/node
Other Locations	30–45 kg CO ₂ e/node

Data Consistency

Deterministic GWP Values

Energy-based GWP values are generated using seeded randomization based on route identifiers and node names. This ensures that repeated selections of the same route always produce identical results.

Total GWP

Total GWP combines:

- Transport emissions (distance × emission factor)
- Processing emissions at supply chain nodes

This provides a more comprehensive estimate of the environmental impact of a supply chain route.

GeoJSON Support

Maritime transport segments include GeoJSON features for visualization on interactive maps. Rail and road segments currently do not include geographic path data.

About the ResC4EU Project

The ResC4EU project aims to support EU businesses, especially small and medium sized enterprises (SMEs), to become more resilient and sustainable and be able to quickly adapt to supply chain disruptions such as experienced during COVID-19 crisis, geopolitical tensions or disasters by adopting advanced technologies. ResC4EU will provide an open space for collaboration, develop and provide models and tools that can assist SMEs in detecting and anticipating disruptions in their supply chains, and offering SMEs tailored support and training programmes as part of the ResC4EU Net-Zero Industry Academies. Further, manufacturing SMEs in need of implementing advanced technologies will be brought together with tech-savvy SMEs providing innovative solutions.

For more details: <https://cordis.europa.eu/project/id/101137643/results>



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Demonstrator Owner

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