



## 26th Annual Clinical Trial Supply Europe 2025

# Balancing GDP Compliance with Environmental Responsibility: The IPEL Approach to Green Clinical Logistics



JOINING UP THE SAFE AND SUSTAINABLE DISTRIBUTION OF MEDICINES FROM PRODUCER TO PATIENT



# The Sustainability Challenge in Clinical Trial Logistics

- Pharma logistics contributes significantly to global GHG emissions.
- Clinical trial supply chains require precise temperature control and compliance.
- Clinical trials are complex in execution: communications and data-intensive, involve inbound and outbound, and usually very time-sensitive.
- Clinical trial shipments are smaller in scale compared to commercial shipments and involve last-mile delivery, sometimes in very remote locations.
- Balancing sustainability with GDP compliance is key.

# GDP Compliance and Sustainability – A Complementary Approach

- GDP ensures product integrity; sustainability focuses on reducing emissions.
- Strategies include optimised routing, reusable packaging, and green transport modes.
- GDP compliance can be enhanced by sustainable practices.

# The Impact of Green Logistics on Operational Costs

- Sustainable solutions reduce fuel consumption and packaging waste.
- Improved efficiency leads to lower costs.
- Carbon tax implications and long-term savings.

# Carbon Accounting in Clinical Trial Supply Chains

- **Measuring and tracking emissions is critical for sustainability.**
- **Use of carbon accounting platforms for emissions benchmarking.**
- **Data-driven strategies for continual improvement.**



# COP 29: UN Climate Talks, Azerbaijan

**"Planet Earth is in critical condition"**  
***with change needed at***  
**"exponential speed and scale"**



Source: Open letter to UN from leading climate scientists November 2024

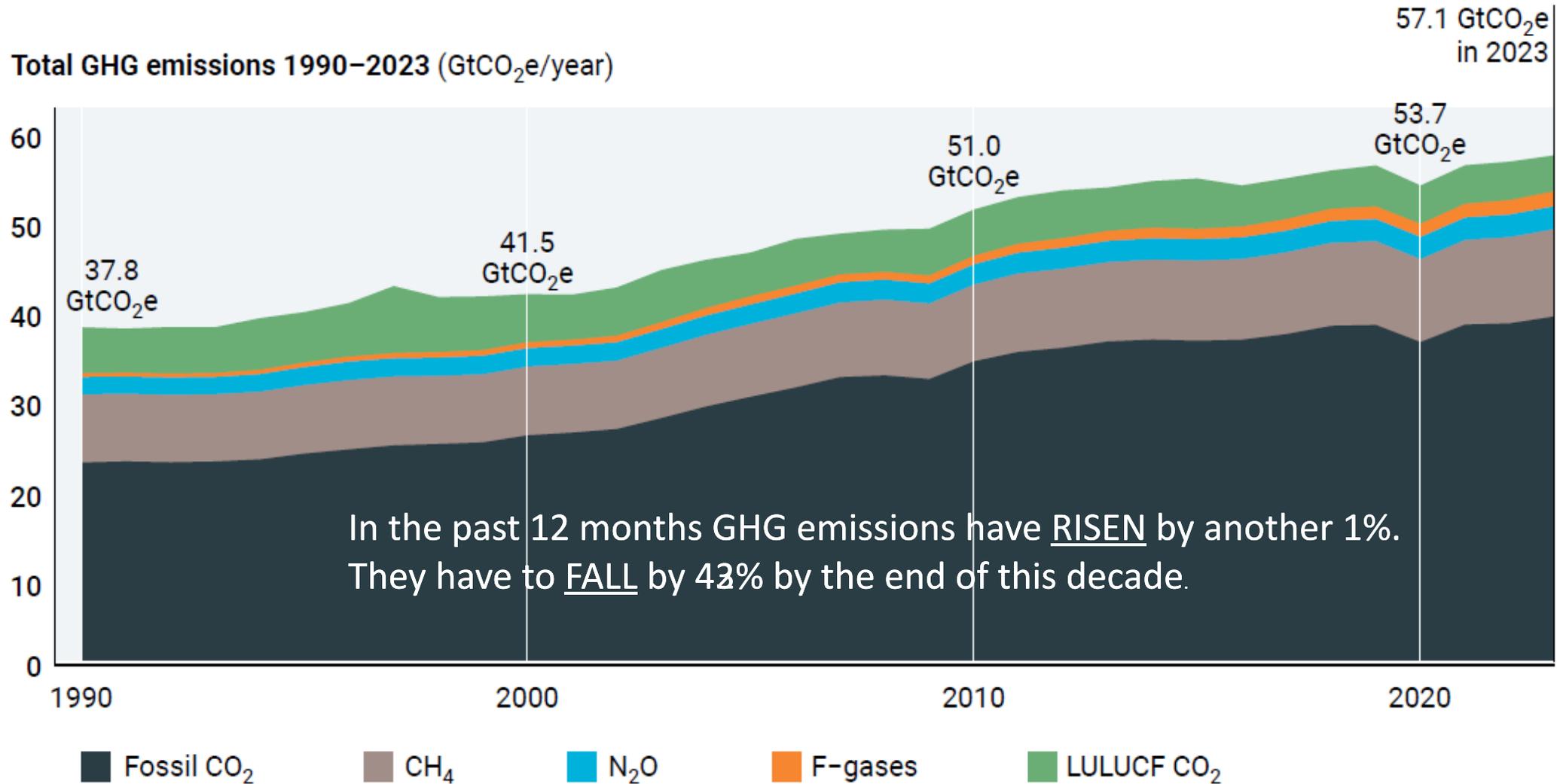


JOINING UP THE SAFE AND SUSTAINABLE DISTRIBUTION OF MEDICINES FROM PRODUCER TO PATIENT



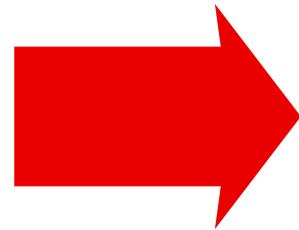
# Total GHG Emissions 1990 -2023

Total GHG emissions 1990–2023 (GtCO<sub>2</sub>e/year)



# Freight Logistics

responsible for over

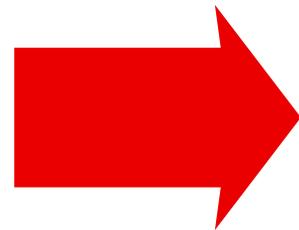


**13%**

of total global CO<sub>2</sub> emissions



& around



**10%**

of total global GHG emissions



# COMPARISON OF CO<sub>2</sub> EMISSIONS BETWEEN MODES OF TRANSPORT

CO<sub>2</sub> Efficiency Comparison: Grams of CO<sub>2</sub> emitted per ton-kilometer (gCO<sub>2</sub>/ton-km):

Short-haul Flights (under ~1,500 km):  
1,500-2,000 gCO<sub>2</sub>/ton-km



Long-haul Flights (over ~1,500 km):  
1,000-1,500 gCO<sub>2</sub>/ton-km



Road Freight: 60-150 gCO<sub>2</sub>/ton-km



Inland Waterways: 30-50 gCO<sub>2</sub>/ton-km



Sea Freight: 7-40 gCO<sub>2</sub>/ton-km



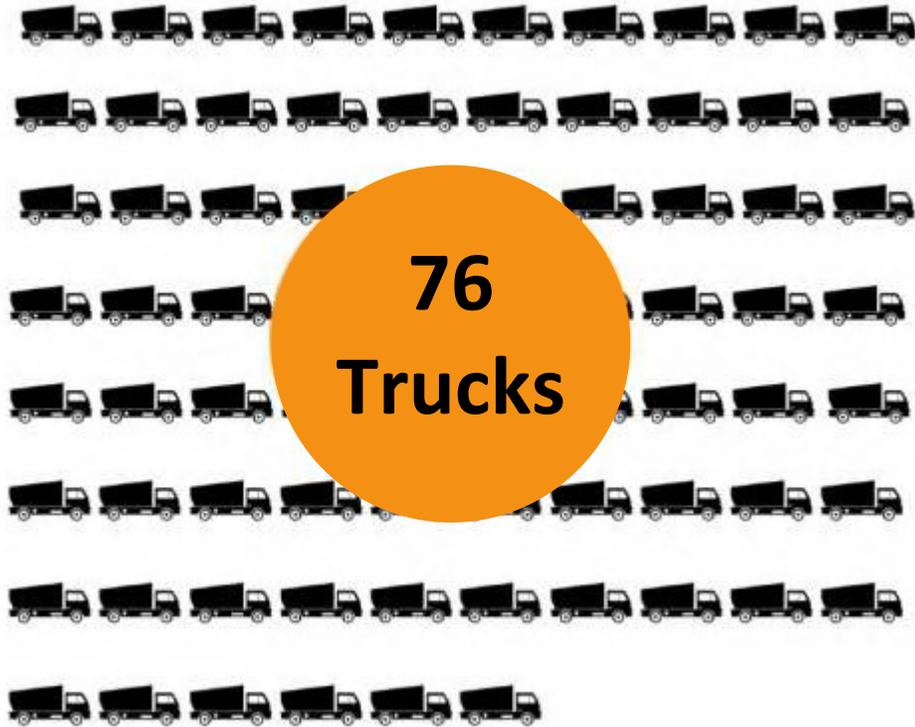
Rail Freight: 15-30 gCO<sub>2</sub>/ton-km



**NOTE: ADDITIONAL IMPACT OF AIR FREIGHT:**

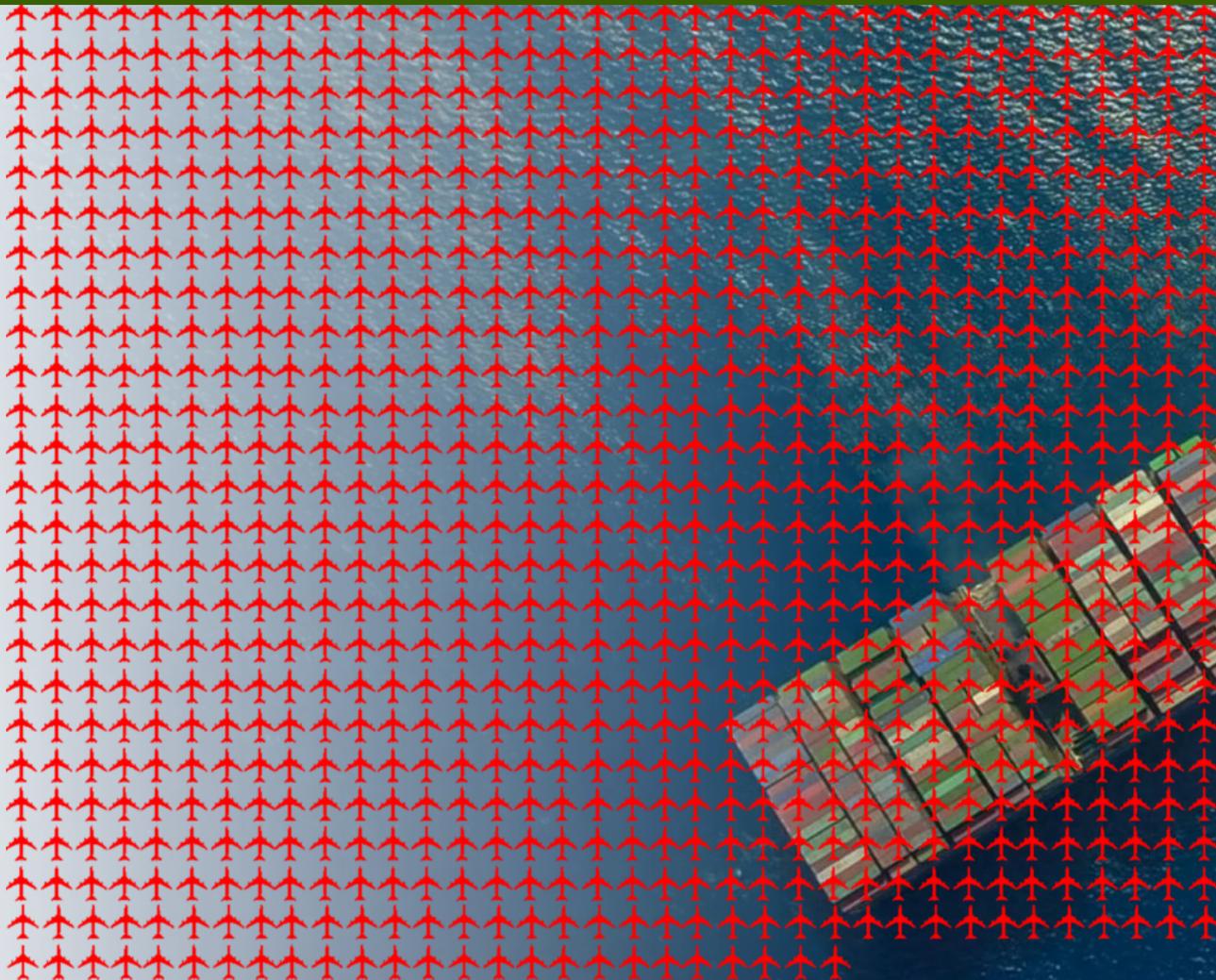
+ a radiative forcing multiplier  
(1.9 to 2.0 times the CO<sub>2</sub> emissions)  
applies to both short- and long-haul flights

# COMPARISON OF CO<sub>2</sub> EMISSIONS BETWEEN MODES OF TRANSPORT



Source: HS2.org.uk 2024

# COMPARISON OF CO<sub>2</sub> EMISSIONS BETWEEN MODES OF TRANSPORT



20-foot high-cube ocean reefer



25 m<sup>3</sup> usable space



A very large container ship can hold 24,000 20-foot containers

One large container ship has the volumetric capacity equivalent to more than 800 Boeing 777-200F wide body freighters

# IPEL

## Overview

Overview

# INTEGRATED PHARMA ECO-LANE

“An ‘Integrated Pharma Eco-lane’ (IPEL) in pharmaceutical logistics refers to a specialized supply chain route optimised to transport pharmaceutical products in an environmentally and sustainable manner while ensuring the integrity and safety of the pharmaceuticals through compliance with regulatory standards and other GDP guidelines”



JOINING UP THE SAFE AND SUSTAINABLE DISTRIBUTION OF MEDICINES FROM PRODUCER TO PATIENT



# IPEL: A Sustainable Framework for Pharma Logistics

- IPEL is a framework for compliance and sustainability.
- Integrated Pharmaceutical Eco-Lanes bring a structured approach to green logistics.
- Integration of GDP standards into intermodal Eco-Lanes.
- Collaborative approach with pharma shippers, carriers, freight hubs, logistics providers & regulators.

## The Role of Cross-Industry Collaboration in Sustainable Logistics

- Success in sustainability requires multi-stakeholder engagement.
- Collaboration between manufacturers, distributors, 3PLs, and regulators.
- Shared responsibility for sustainability goals.
- Co-ordinated logistics planning.

## The Need for Advance Planning

- Multi-modal transport requires careful planning.
- Transit times are often longer than direct shipments.
- Logistics planning should begin at trial inception stage.

## Challenges in Rail & Sea Transport for Temperature-Sensitive Shipments

- Longer transit times increase exposure to temperature variations.
- Rail freight: high-temperature fluctuations in summer/winter.
- Sea freight: crossing multiple climate zones with slow transit times.
- Multiple handling points create additional risks.

# IPEL

TWO PHASES:

**1. PILOT STAGE**

**2. COMMERCIALISATION STAGE**

**Reefers with on-board gen-sets and/or dual refrigeration units provide security of power, automatic emergency back-up and minimal reefer power-off times**

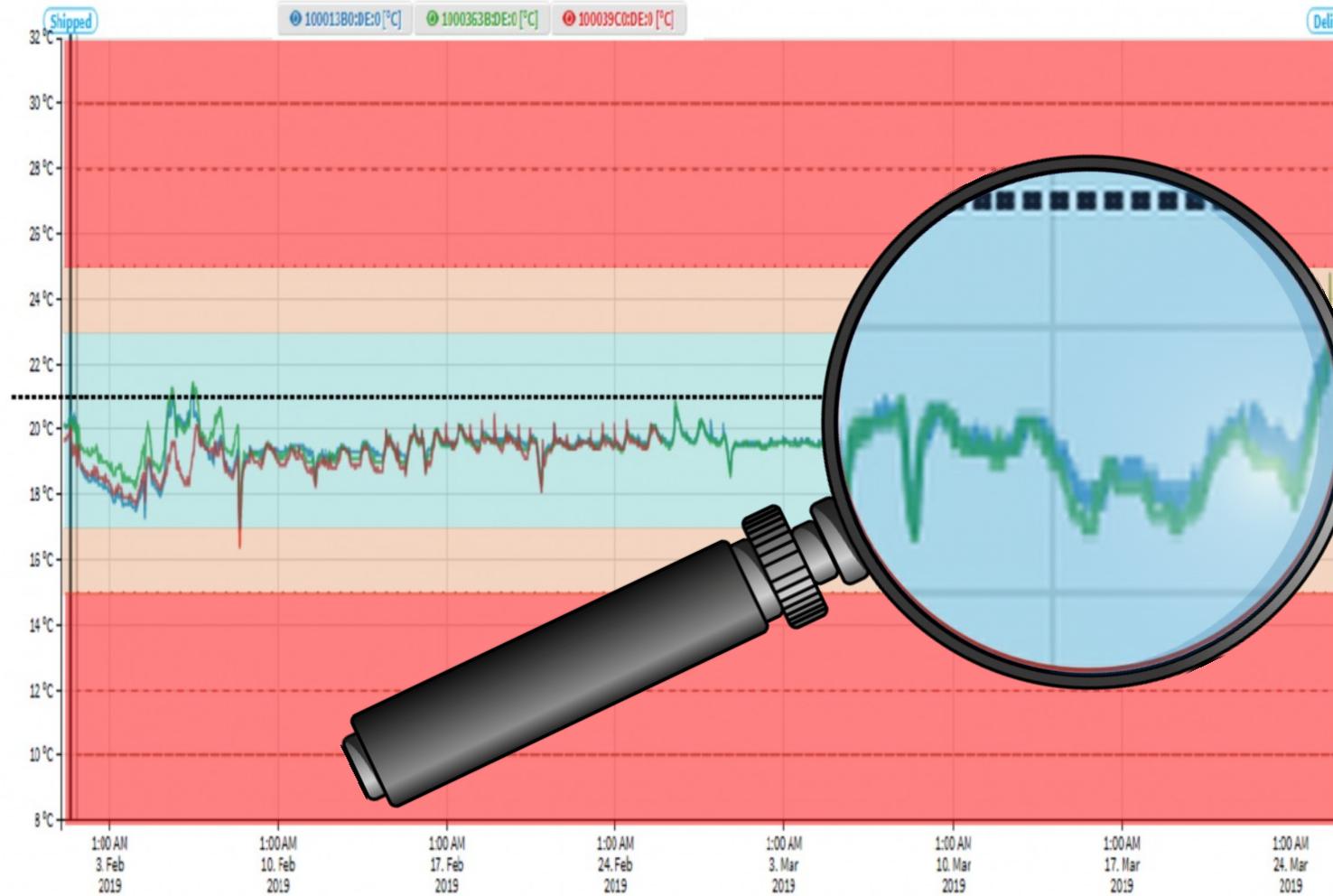
**Klinge Model PFP-572**

The dual refrigeration system automatically switches to its back-up in an emergency to provide the ultimate peace of mind when shipping valuable high value pharmaceuticals.



# Pharma by Rail

# Montreal to Chicago 1650 km (1025 miles)



100013B0	Date	Time	°C
HIGH:	23/3	20:10	23.1
LOW:	8/2	11:00	17.0
PACKING:	4/2	18:00	18.8
SHIPMENT DATE:	8/2	14:30	18.8
DELIVERY DATE:	21/3	11:40	22.6
UNPACK DATE:	25/3	15:00	-
(recording stopped)	25/3	12:00	22.5)

1000363B	Date	Time	°C
HIGH:	23/3	20:40	23.4
LOW:	8/2	11:10	16.9
PACKING DATE:	4/2	18:00	19.6
SHIPMENT DATE:	8/2	14:30	19.0
DELIVERY DATE:	21/3	11:40	22.8
UNPACK DATE:	25/3	15:00	22.9

100039C0	Date	Time	°C
HIGH:	19/2	00:20	20.5
LOW:	8/2	11:10	16.4
PACKING DATE:	4/2	18:00	19.0
SHIPMENT DATE:	8/2	14:30	18.8
DELIVERY DATE:	21/3	11:40	-
UNPACK DATE:	25/3	15:00	-
(recording stopped)	26/2	00:00	19.6)

# Pharma by Waterway (Rhine)

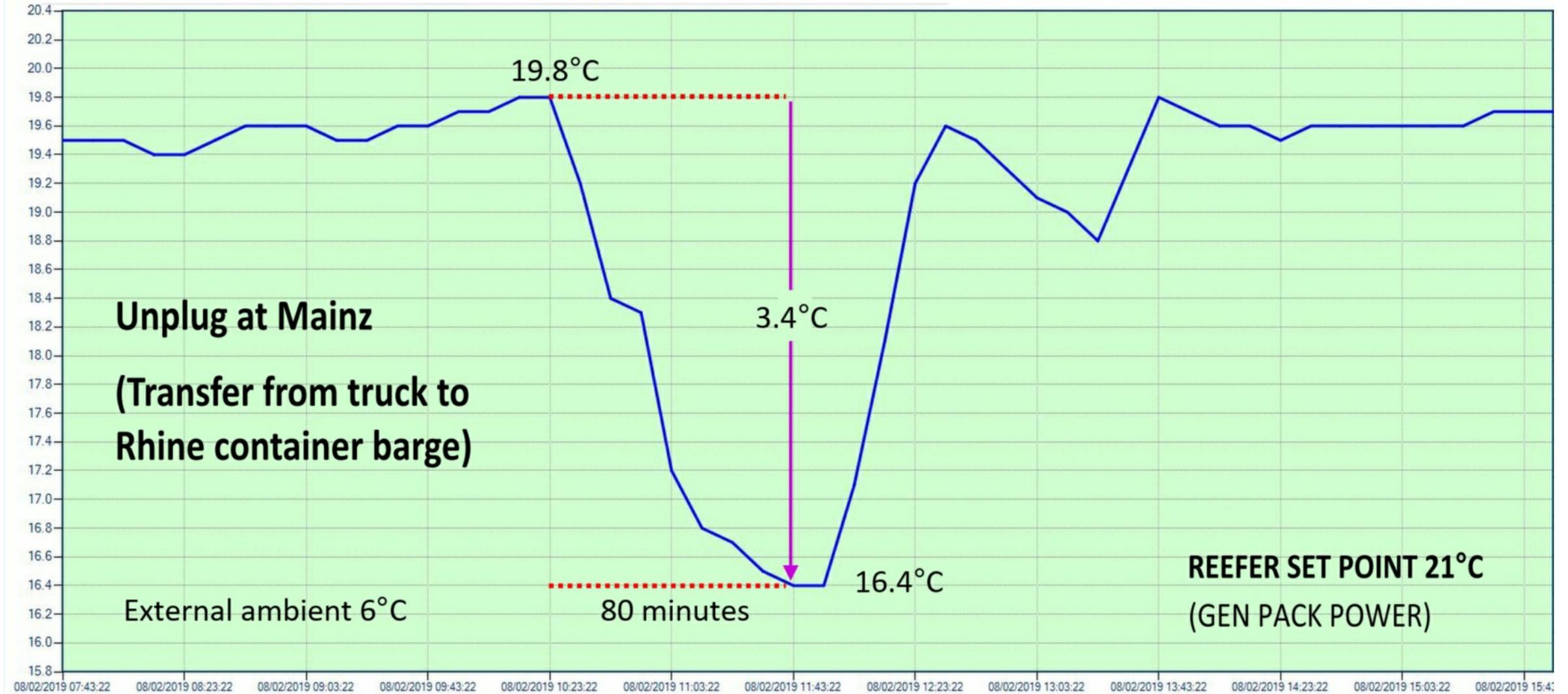
# Mainz to Antwerp 550 km (340 miles)



100039B5	Date	Time	°C
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LOW:	4/2	19:30	18.3
PACKING:	4/2	18:00	18.3
SHIPMENT DATE:	8/2	14:30	18.8
DELIVERY DATE:	21/3	11:40	20.2
UNPACK DATE:	5/3	15:00	-
(recording stopped)	25/3	00:00	22.7

100011CA	Date	Time	°C
HIGH:	23/3	21:10	22.7
LOW:	8/2	10:50	15.4
PACKING DATE:	4/2	18:00	18.0
SHIPMENT DATE:	8/2	14:30	19.2
DELIVERY DATE:	21/3	11:40	22.3
UNPACK DATE:	25/3	15:00	21.8

10003E09	Date	Time	°C
HIGH:	21/3	12:10	22.9
LOW:	8/2	10:50	16.5
PACKING DATE:	4/2	18:00	17.9
SHIPMENT DATE:	8/2	14:30	19.6
DELIVERY DATE:	21/3	11:40	22.6
UNPACK DATE:	25/3	15:00	-
(Last recording)	25/3	00:00	22.3



# IPEL

## The GDP-UCI Integrated Pharma Eco-Lanes (IPEL) Program

Harmonising Pharmaceutical Good Distribution Practice (GDP) with Sustainability Goals and Obligations

JULY 2024

### IPEL Project Proposition

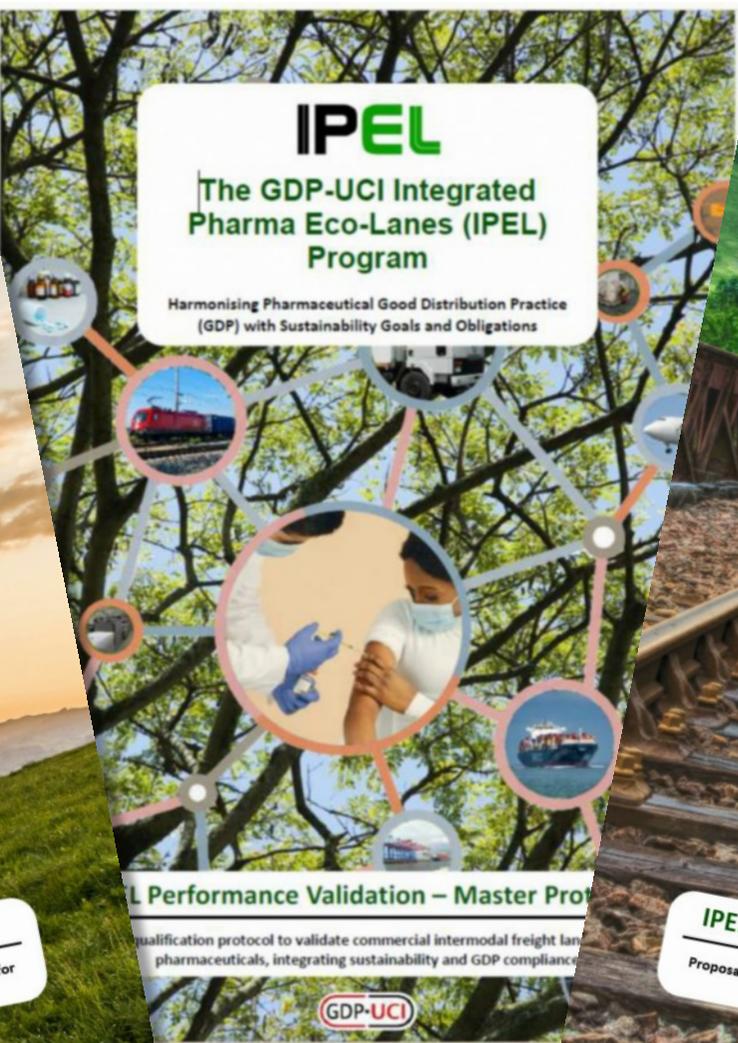
Proposal for Pilot Exercise to Validate the IPEL Sustainable Freight Model for Medicines & Vaccines



# IPEL

## The GDP-UCI Integrated Pharma Eco-Lanes (IPEL) Program

Harmonising Pharmaceutical Good Distribution Practice (GDP) with Sustainability Goals and Obligations



### IPEL Performance Validation – Master Protocol

Qualification protocol to validate commercial intermodal freight lanes for pharmaceuticals, integrating sustainability and GDP compliance



# IPEL

## Terrestrial Field Pilot (Europe) Integrated Pharma Eco-Lanes (IPEL) Program

Harmonising Pharmaceutical Good Distribution Practice (GDP) with Sustainability Goals and Obligations

October 2024

### IPEL Project Plan and Brief for Participants

Proposal for Pilot Exercise to Validate the IPEL Sustainable Freight Model for Medicines & Vaccines

WORKING DOCUMENT V4 24<sup>th</sup> January 2019

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# IPEL PROOF-OF-CONCEPT PILOTS

# IPEL

## Proof-of-Concept

# Pilots

Source: European Commission



- Main pharmaceutical sales markets (ranked)
- Trans-European Transport Network (Ten-T)
- Major "banana" logistics corridors
- Main pharmaceutical production concentrations
- Major cold-chain seaports
- Major pharma airports
- IPEL pilot routes

**IPEL 1**  
Barcelona to Posnan  
2150km

Source: European Commission

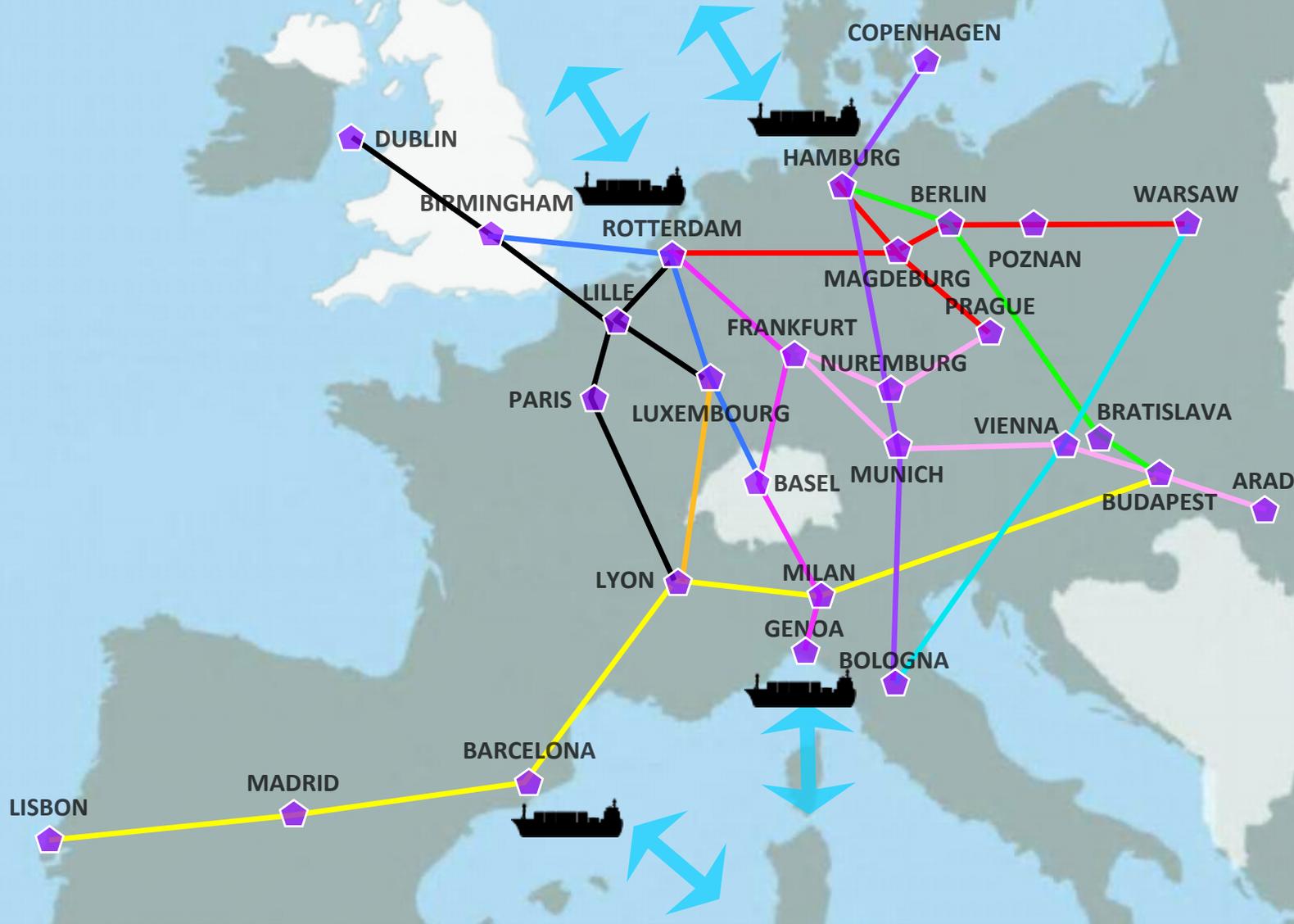


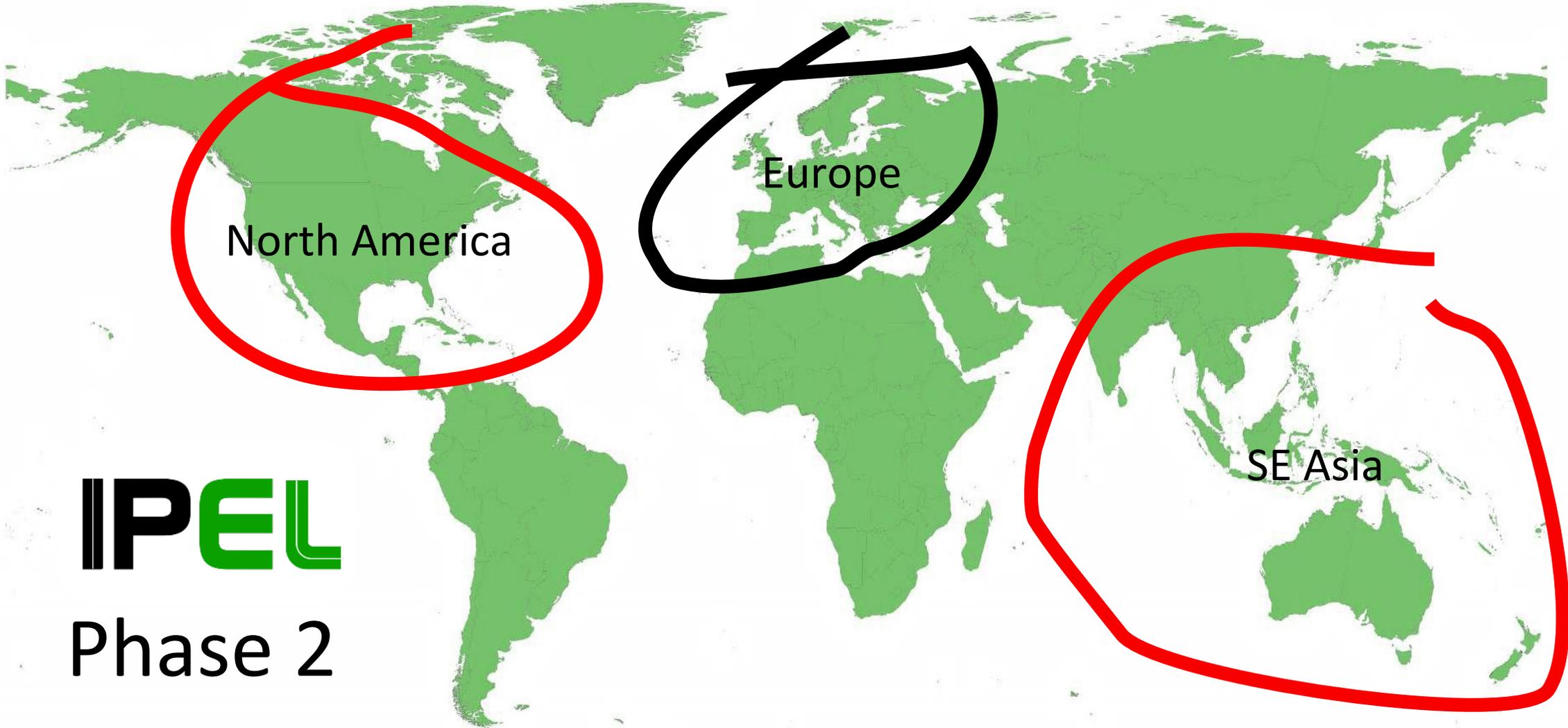
- Main pharmaceutical sales markets (ranked)
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**IPEL 2**  
Rotterdam to Budapest  
1600km



EUROPEAN NETWORK 2030





North America

Europe

SE Asia

**IPEL**

Phase 2

## Key Takeaways

- **Clinical trial logistics must balance GDP compliance with sustainability.**
- **Industry-wide collaboration is essential for real change.**
- **Sustainable logistics solutions can drive cost savings.**
- **IPEL provides a practical framework for greener clinical transport.**
- **Clinical trial shipments may require tailored sustainability solutions.**
- **Multi-modal transportation requires advance planning and takes longer transit time, making early logistics planning crucial.**

## Final Thoughts & Call to Action

- Start implementing sustainable logistics strategies today.
- Engage with IPEL to explore collaboration opportunities.
- Take an active role in reducing logistics-related emissions and advocate for policy changes supporting sustainable pharma logistics.



**Alone we are pieces**

The background of the slide is a puzzle pattern. The puzzle pieces form a landscape scene. In the center, there is a large, dark tree with green foliage. Below the tree is a field of purple lavender flowers. The sky above is a mix of blue and pinkish-purple, suggesting a sunset or sunrise. The puzzle pieces are arranged in a grid, with some pieces missing or slightly offset, creating a textured effect.

**Together we are the solution**

# IPEL

## Let's do it!

Register Now

<https://team-up.glasscubes.com/form/e3bd3da4-c3eb-4a17-867d-1252866be22b>

