

Motivation / Background

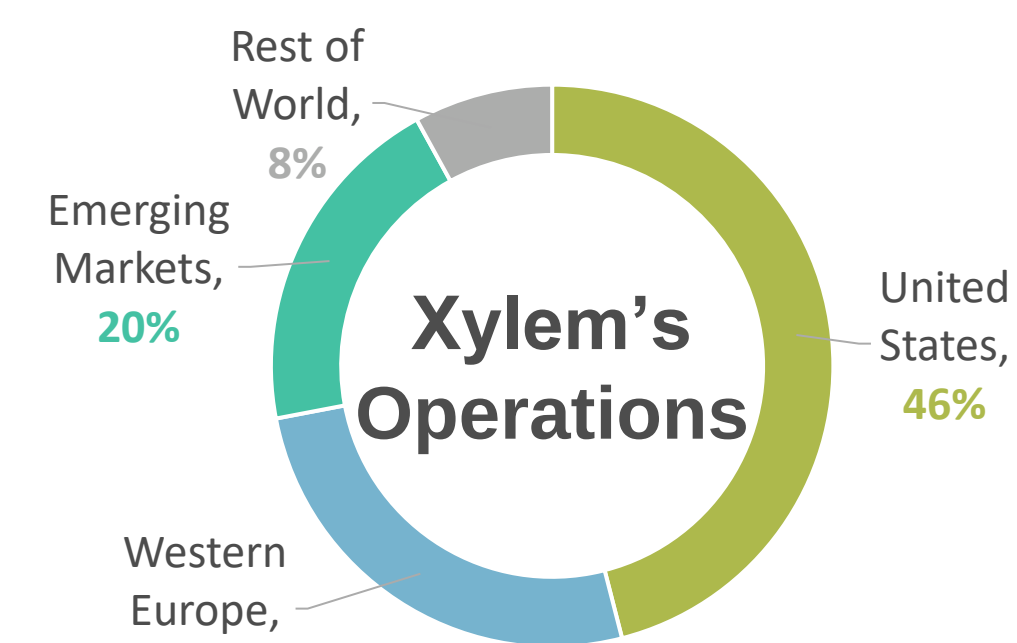
Up to 90%

Of a company's total emissions comes from its **supply chain and operations activities**
(GHG Protocol, 2021)

15% to 20%

Of the world's collective emissions are derived from **transportation and logistics**
(National Geographic Society, 2020)

About Xylem Inc. (Xylem Inc., 2021)



To decarbonize its global operations, Xylem aims to...

- **Reduce its CO₂eq footprint by 2.8 million metric tons by 2025**
- Minimize the emissions impact in its logistics operations and in **those of its logistics suppliers**

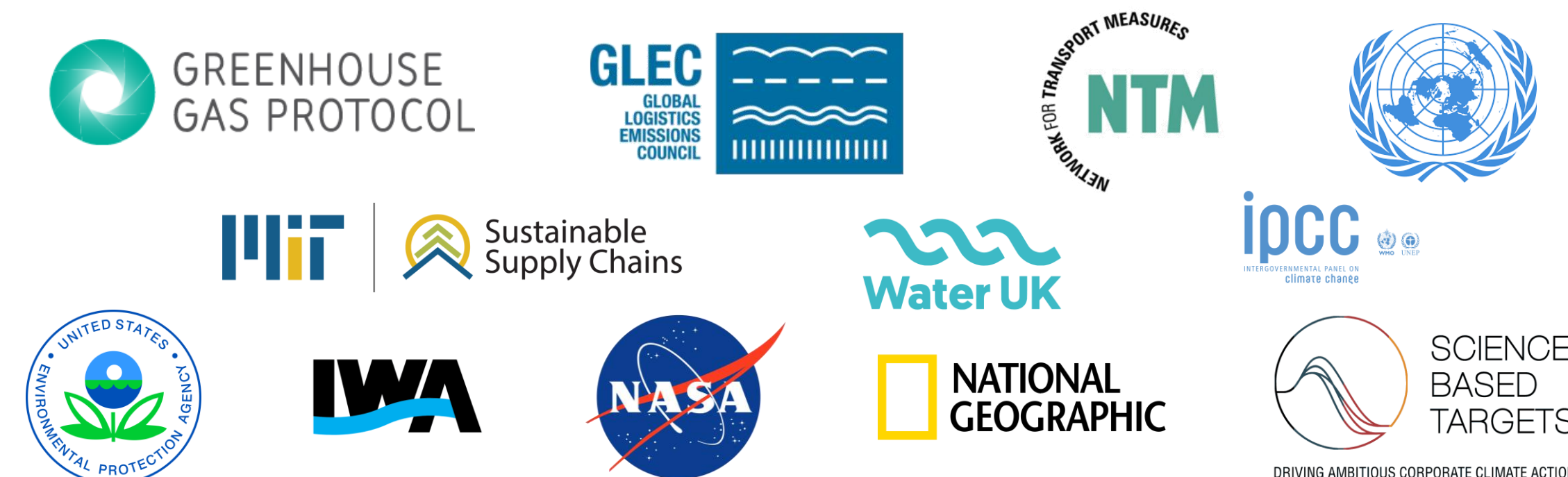
40 Countries | 360 Locations | 4 Business Lines

Key Question / Hypothesis



1. How can Xylem estimate its **current Scope 3 emissions** from inbound transportation?
2. How can Xylem **monitor data from suppliers** and identify CO₂eq emissions improvements?
3. What are the emissions **trade-offs and impacts** of Xylem's supply chain decisions?

Relevant Literature



Decarbonizing the Inbound Transportation Network

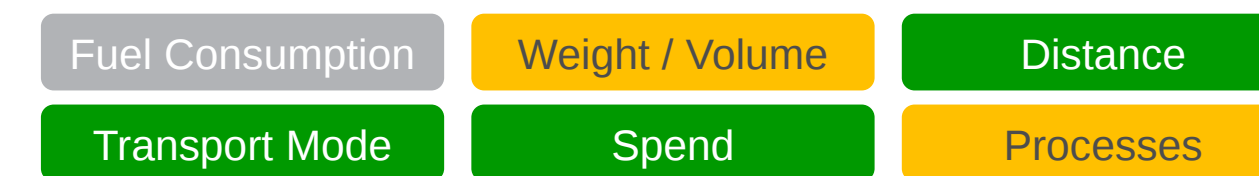


Methodology

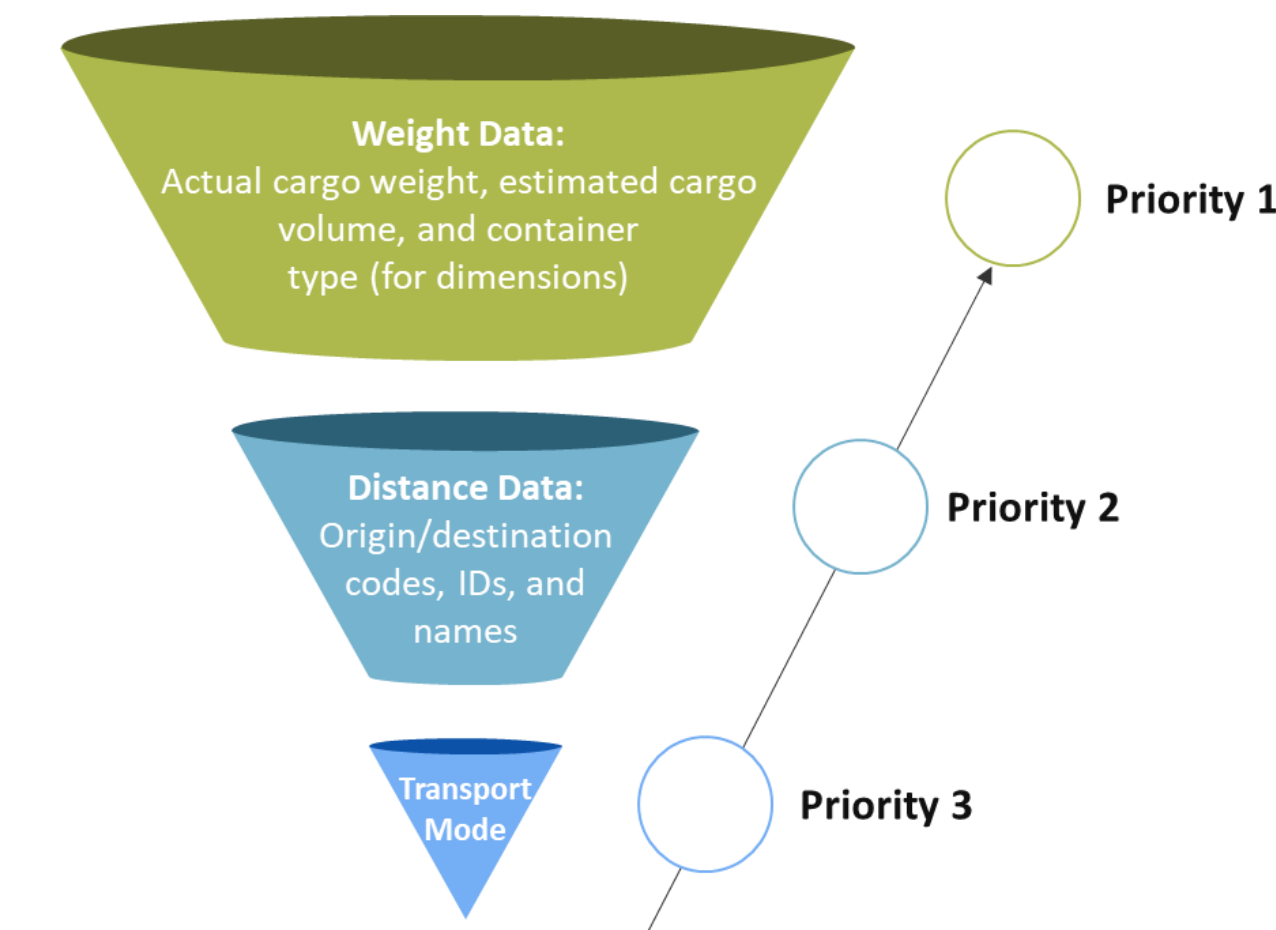
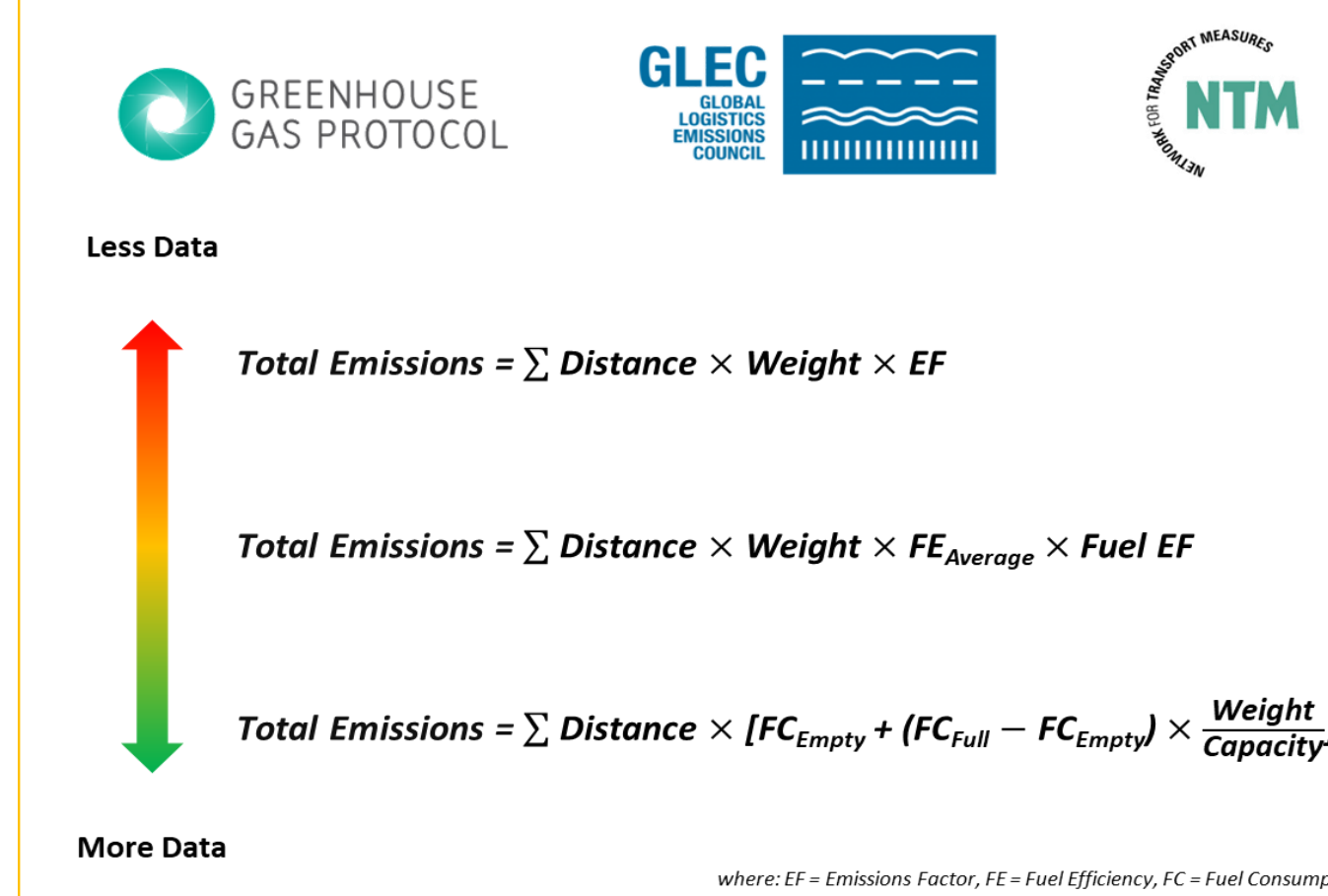
Our capstone consists of three phases:



Available data: ■ Unavailable ■ Insufficient ■ Deficient ■ Sufficient



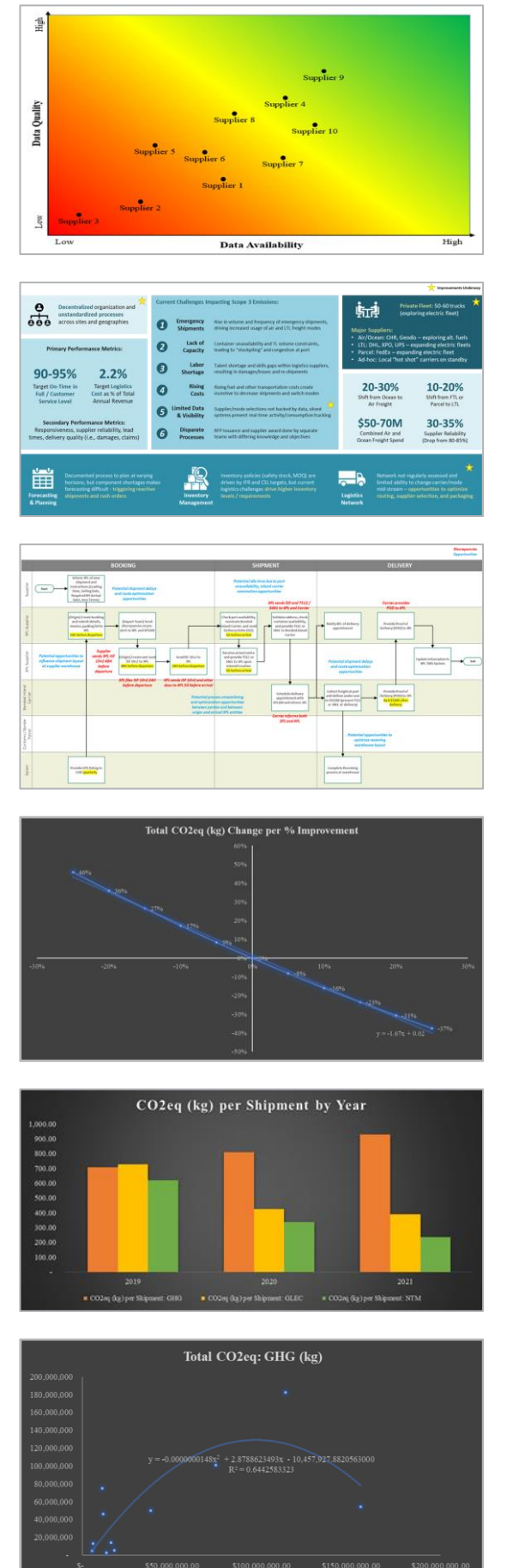
Hybrid Activity-based Approach:



Final Results (Click Thumbnails for Details)

We uncovered the following insights:

- Supplier data maturity may cause **discrepancies of up to 40%** in Scope 3 emissions baselines
- Every shipment carries **an inherent CO₂eq amount** (ex. 472.56 kg CO₂eq for Xylem)
- Mode selection has the greatest CO₂eq impact (**magnitudes of >10x**)
- Shipment type, load type, and transit time have additional impacts on emissions (i.e., **0.05 – 0.56 kg CO₂eq per unit change**)
- Increasing weight per shipment actually **decreases** net carbon emissions **by 87.77 kg CO₂eq per 1 tonne** weight increase
- A 1% improvement in these levers may drive a combined **1.67% Scope 3 CO₂eq reduction**
- A **maximum spend threshold exists** beyond which emissions decrease per +\$1 spent



Our Contribution

Our research contributes **thought leadership** to sustainable SC:

- Test and enhance established Scope 3 estimation methods
- Create a ready-to-use **Scope 3 emissions calculation tool and trade-off analyses** to quantify the effects of various shipment levers and supply chain decisions
- Pioneer a comprehensive approach and framework to identify carbon emissions reduction initiatives
- Cultivate a **prioritized, customizable roadmap** to shape a company's transformation journey

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