GREEN SUPPLY CHAIN STUDY

REVEALS WAYS TO INCREASE FREIGHT EFFICIENCY AND REDUCE EMISSIONS.

THE HOME DEPOT

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

LOYOLA UNIVERSITY CHICAGO
QUINLAN SCHOOL of BUSINESS

SmartWay
U.S. ENVIRONMENTAL PROTECTION AGENCY

FREIGHT MATTERS
WEBINAR SERIES

LOYOLA UNIVERSITY CHICAGO
AD · MAJOREM · DEI · GLORIAM 1870
QUINLAN SCHOOL of BUSINESS

SmartWay®
U.S. ENVIRONMENTAL PROTECTION AGENCY

WELCOME TO THE FREIGHT MATTERS 2020 WEBINAR SERIES

February 12, 2020

Covered Today

- Welcome
- Freight Matters!
- The Home Depot Best Practices
- ICCT Green Supply Chain Study
- Q&A

Today's Speakers

Buddy Polovick
Team Leader

Harry Haney
Director

Kim Vaccaro
Sr. Manager Import Operation

Leticia Pineda
Researcher

Toward Greener Supply Chain:

How The Home Depot Reduces Its Environmental Footprint and Costs

February 12, 2020

Home Depot | Import Overview

Top US Importers

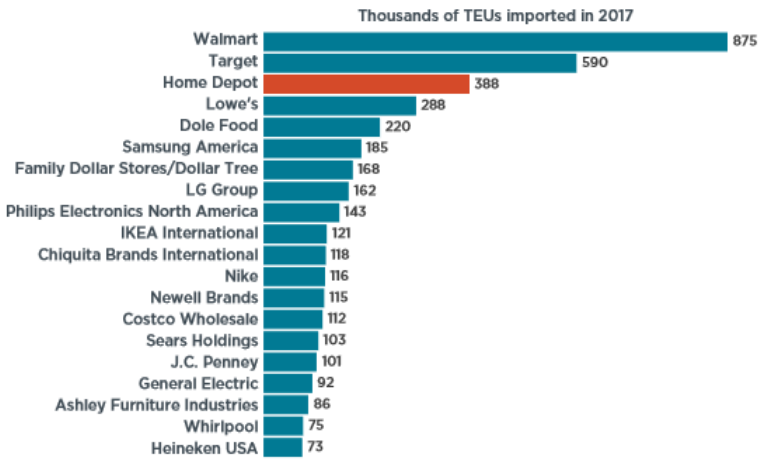


Figure 2. Largest U.S. importers of containerized cargo in 2017 (Johnson, 2018), based on number of twenty foot-equivalent units (TEUs)

Industry Trade Lanes

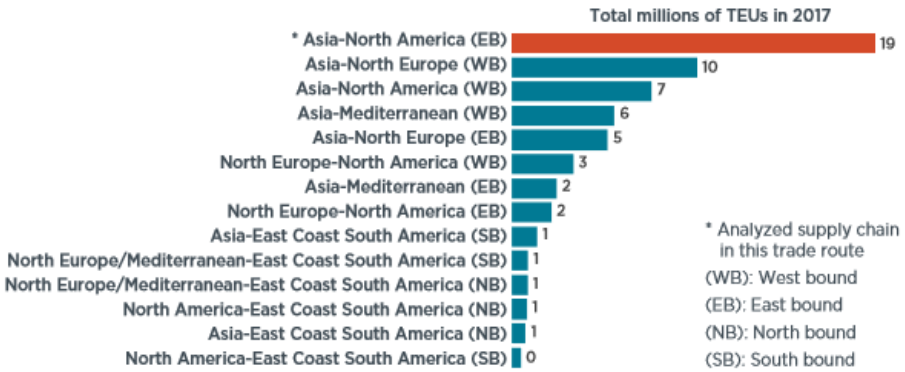


Figure 3. Largest trade corridors of containerized cargo in 2017. Adapted from World Shipping Council (2017)

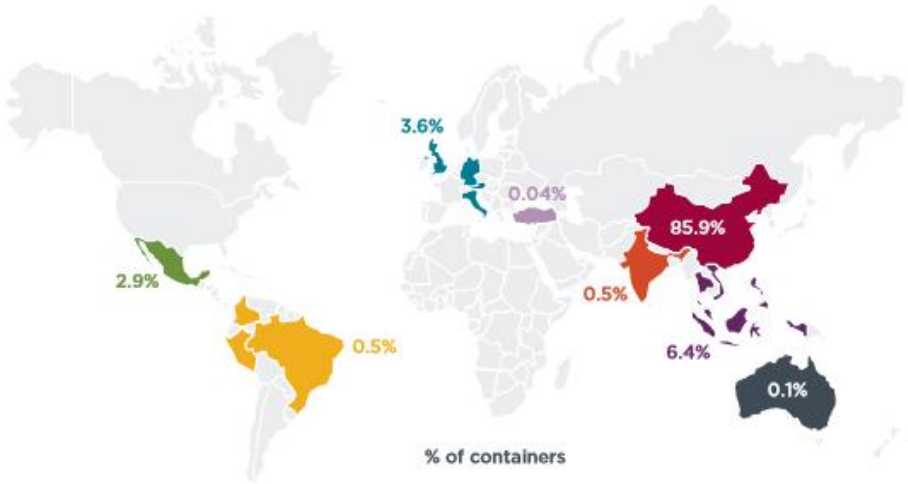


Figure 4. THD's imports by origin in 2017 (share of containers)

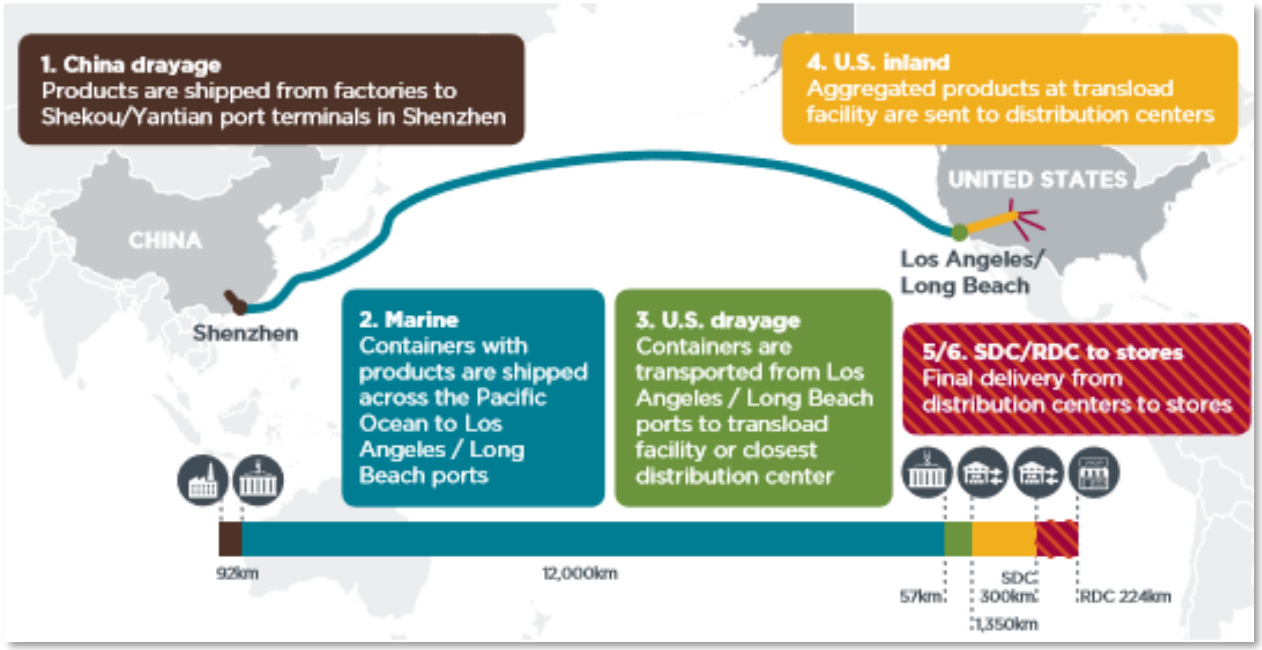
- Home Depot is the 3rd largest US importer
- Transpacific EB (Asia – North America) lane is the largest container shipping trade lane
- ~92% of THD volume transited via the Transpacific EB corridor in 2017

Home Depot | Project Scope

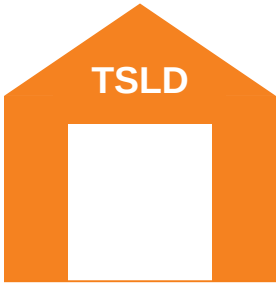
Segment name	Origin nodes	Destination nodes	Transportation modes
1. China drayage	13 factories in China: Supplier A: 1 factory Supplier B: 1 factory Supplier C: 11 factories	Two port terminals in Shenzhen metropolitan area (Shekou and Yantian)	
2. Marine	Two port terminals in Shenzhen metropolitan area (Shekou and Yantian)	7 port terminals in Los Angeles/Long Beach	
3. U.S. drayage	7 port terminals in Los Angeles/Long Beach	1 transload facility (TSLD) 1 stocking distribution center (SDC) in Mira Loma	
4. U.S. inland	1 TSLD	4 SDCs 7 rapid deployment centers (RDC)	
5. SDC to store	4 SDCs	615 stores	
6. RDC to store	7 RDCs	622 stores	

Supplier	Products	Total annual units	Total annual weight (tonnes)	Average weight (kg/unit)	Total annual volume (m^3)	Average volume (m^3/unit)
A	Ceiling fans	587,419	5,003	9	31,362	0.05
B	BBQ grills	109,430	4,453	41	30,545	0.28
C	Lighting fixtures and equipment	2,131,764	4,295	2	31,821	0.01

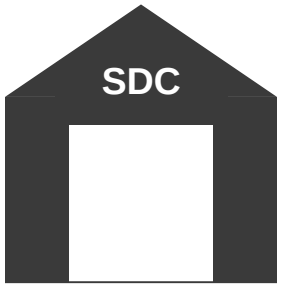
Home Depot | Import Freight Flow



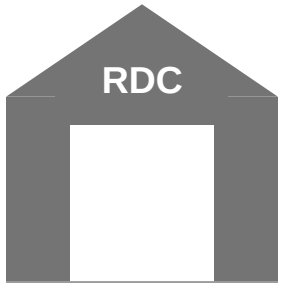
Distribution Platforms



Import Cross-Dock



Stocking Distribution Center



Rapid Deployment Center

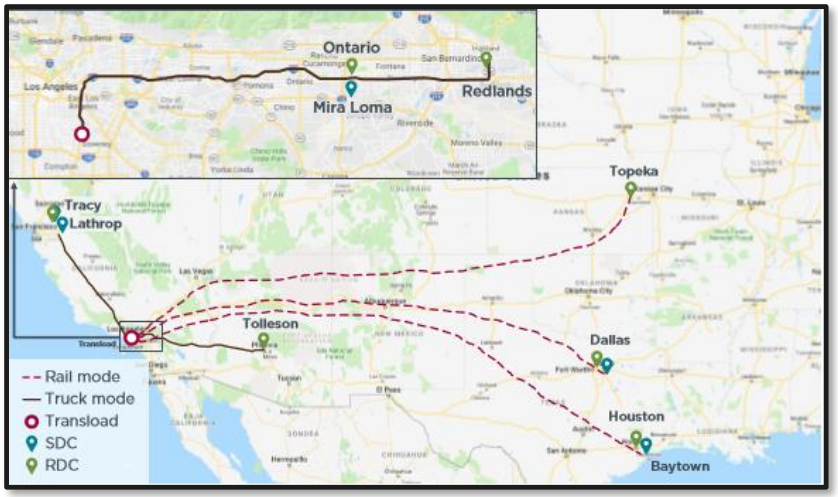
Home Depot | Dray Overview

~ 60% of freight flowed through the transload facility

Supplier	Share of containers by supplier	Destination	Distance from port (km)	Total containers	Share of containers by destination (%)	Total weight (tonnes)	Share of weight by destination (%)
Supplier A	28%	Mira Loma SDC	100	120	24%	1,127	23%
		Transload	30	386	76%	3,876	77%
Supplier B	46%	Mira Loma SDC	100	418	92%	4,040	91%
		Transload	30	35	8%	413	9%
Supplier C	25%	Mira Loma SDC	100	34	4%	197	5%
		Transload	30	785	96%	4,098	95%
Total	**100%**	**Mira Loma SDC**	**100**	**572**	**32%**	**5,364**	**39%**
		Transload	**30**	**1,206**	**68%**	**8,387**	**61%**

Home Depot | Inland Transport & Final Mile Delivery

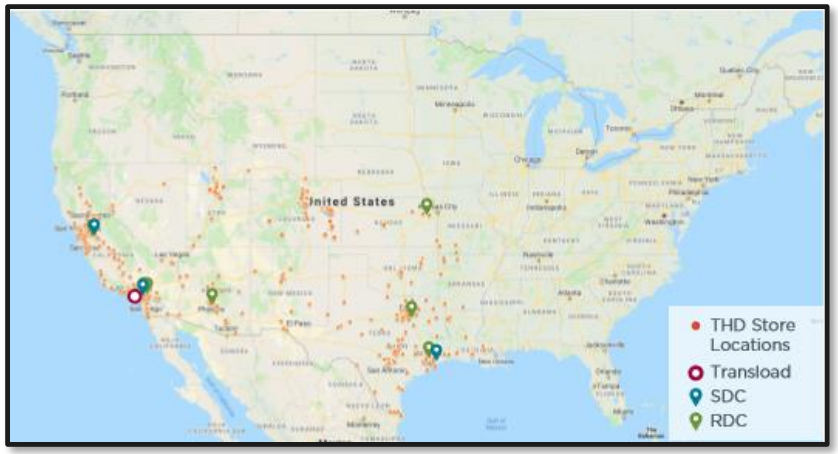
Inland Transportation



Transload aggregates product from different suppliers and ships outbound to 4 SDCs and 7 RDCs using 53' Trailers

Final Mile Transportation

SDCs and RDCs service 622 stores in the western United States

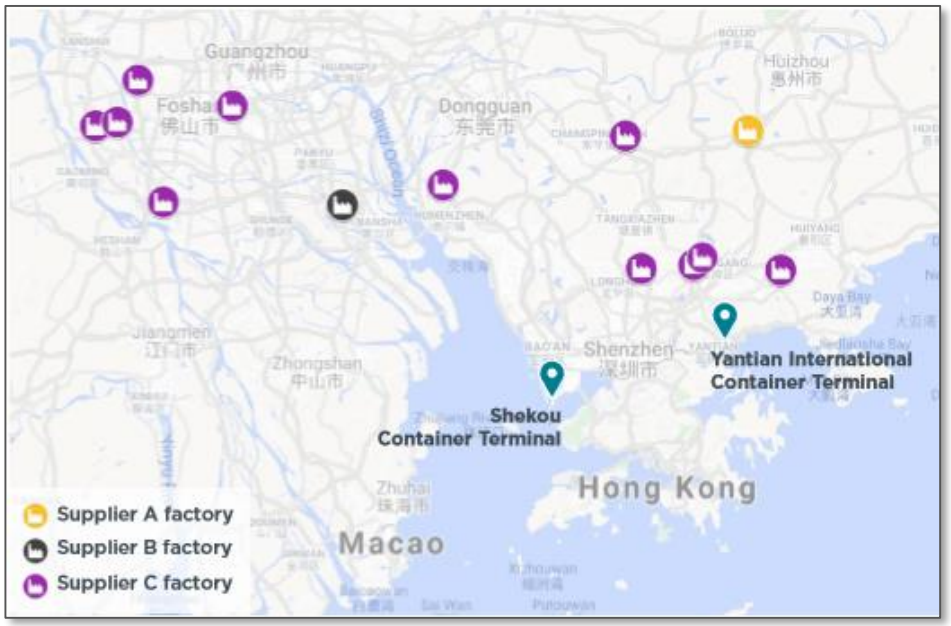


Home Depot | Utilization Initiatives

- ✓ **Load Optimization Software**
- ✓ **Consolidated Freight Stations (CFS) at Origin**
- ✓ **Destination Transload Operations**
- ✓ **Floor Loading**

Strategy	Parameter	Supply chain segment	Value *Conventional*	Value *Green*
Cargo consolidation (CFS)	Container type and utilization factor for 12% of containers shipped from China	China drayage	20-ft container; 45% utilization factor	40- or 45-ft containers; 86% utilization factor
Cube optimization	Percentage of container volume filled with THD products	All	75%	85%
Transloading (Logistics)	Distance from LA port to next node.	U.S. drayage	100 km (distance to closest SDC)	30 km (distance to TSLD)
Transloading (Mode)	Container capacity from TSLD outbound freight	U.S. inland	40-foot containers	53-foot trailers
Floor loading	Percentage of additional products fit into containers	All segments	—	4%

Home Depot | CFS Consolidation

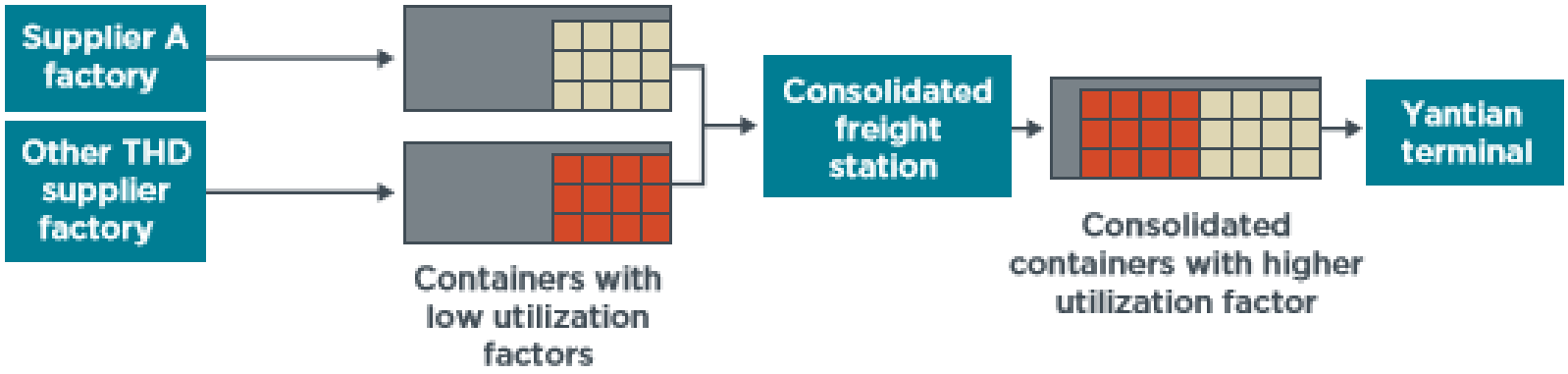


Supplier A = 1 Factory *(Ceiling Fans)*

Supplier B = 1 Factory *(BBQ Grills)*

Supplier C = 11 Factories *(Lighting)*

CFS Process

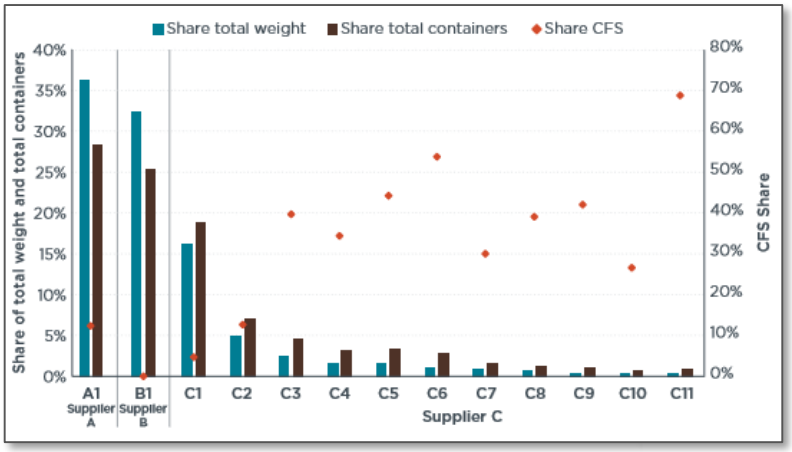


Home Depot | CFS Consolidation

- **~12% of the orders for this study were consolidated through CFS at origin**
- **Supplier A & B ship +87% Full Containers**
  - Larger product type
  - Production aggregated to 1 single factory in the region
- **Supplier C shipped 22% through CFS location**
  - Smaller product type
  - Product spread across 11 different factories

CFS Penetration

Supplier	Type of shipment	Type of shipment (%)	Number of containers shipped	Container load average weight (tonnes)	Container average load factor
Supplier A	Direct to port	87.5%	443	10.9	89%
	CFS	12.5%	63	2.9	25%
Supplier B	Direct to port	100.0%	453	9.8	88%
	CFS	0.0%	—	—	—
Supplier C	Direct to port	77.9%	638	6.5	65%
	CFS	22.1%	181	1.0	13%



Toward Greener Supply Chains: Case study of a U.S. – China supply chain

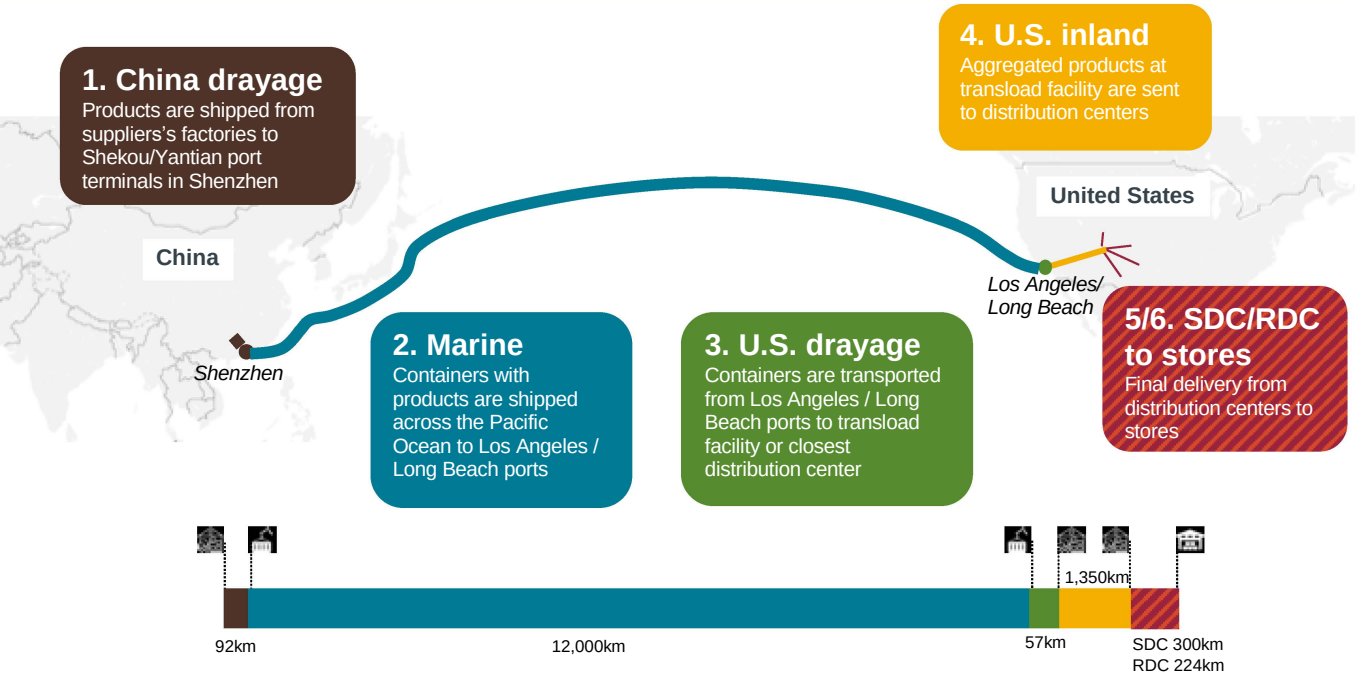
Leticia Pineda

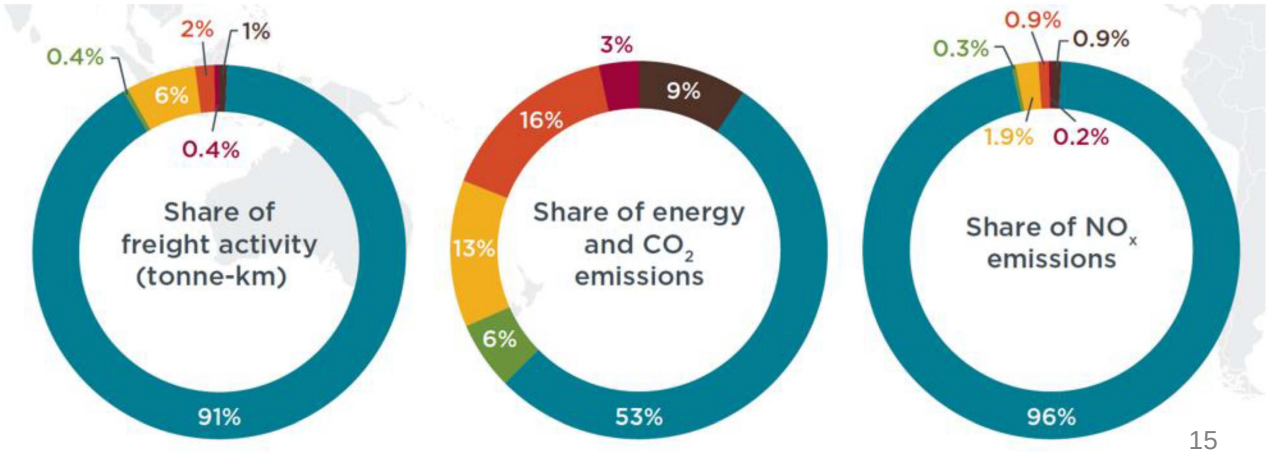
Freight Matters webinar series

February 12, 2019

icct
THE INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION

The analysis evaluates each supply chain link based on real-world data





15

The analysis considers three scenarios to evaluate emission reduction strategies

- **Conventional Scenario:** Basic supply chain without strategies considered in the green scenario, instead those strategies are replaced by basic technology and operational practices.

- **Green Scenario:** Current supply chain considering improvements already adopted (green strategies).

- **Green Plus Scenario:** Future supply chain with additional improvements to those already implemented in the green scenario. To consider implementation timeframe, we divide this scenario into:
  - Short-term (2020)
  - Medium-term (2025)
  - Long-term (2030)

The study categorize strategies in three groups

Strategies to improve supply chain efficiency through reduction of vehicle activity.

Strategies to leverage the use of the cleanest and most energy efficient modes.

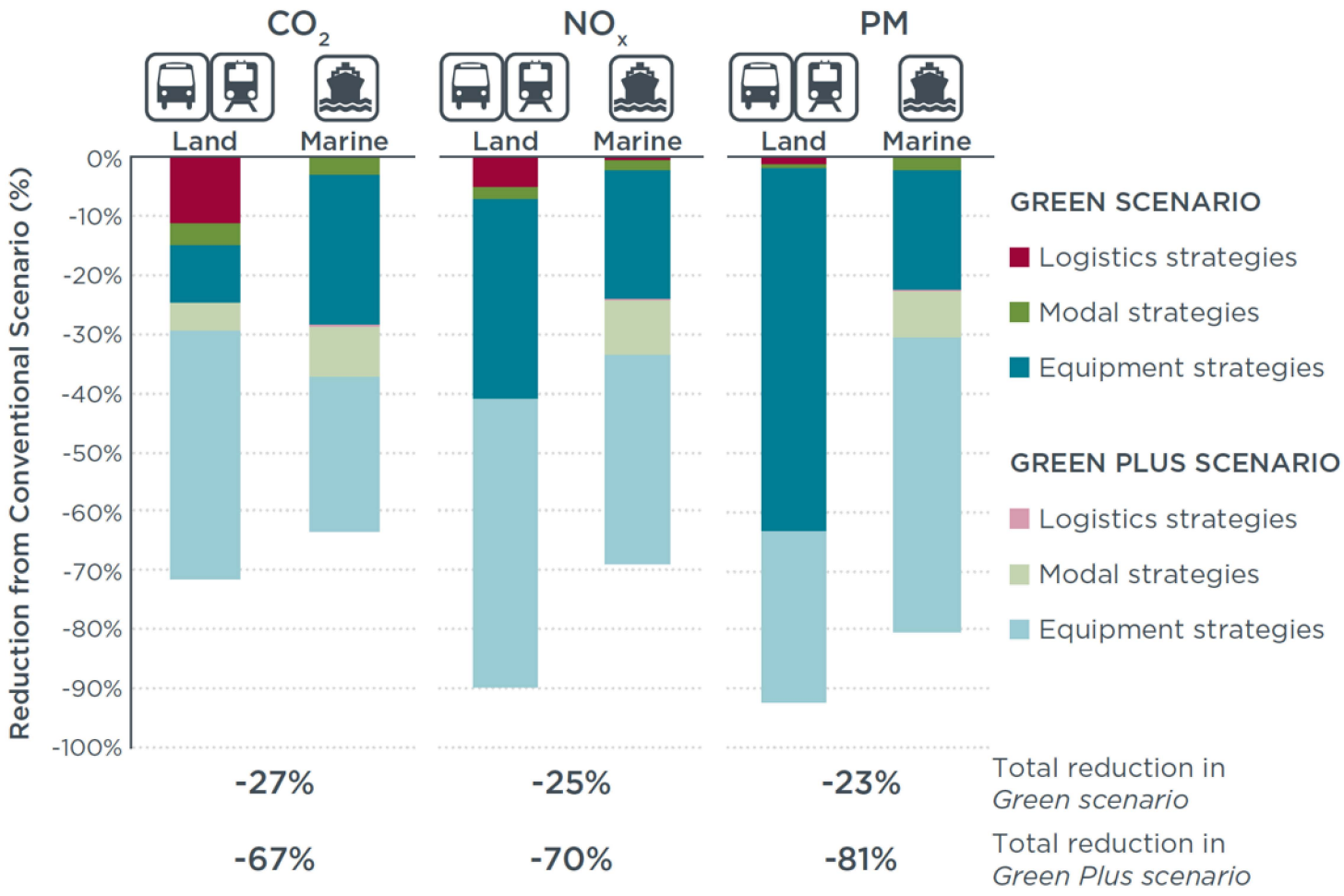
Strategies to improve truck/rail/vessel efficiency through technologies or eco-driving.

We evaluated a number of strategies applied to specific segments under different scenarios

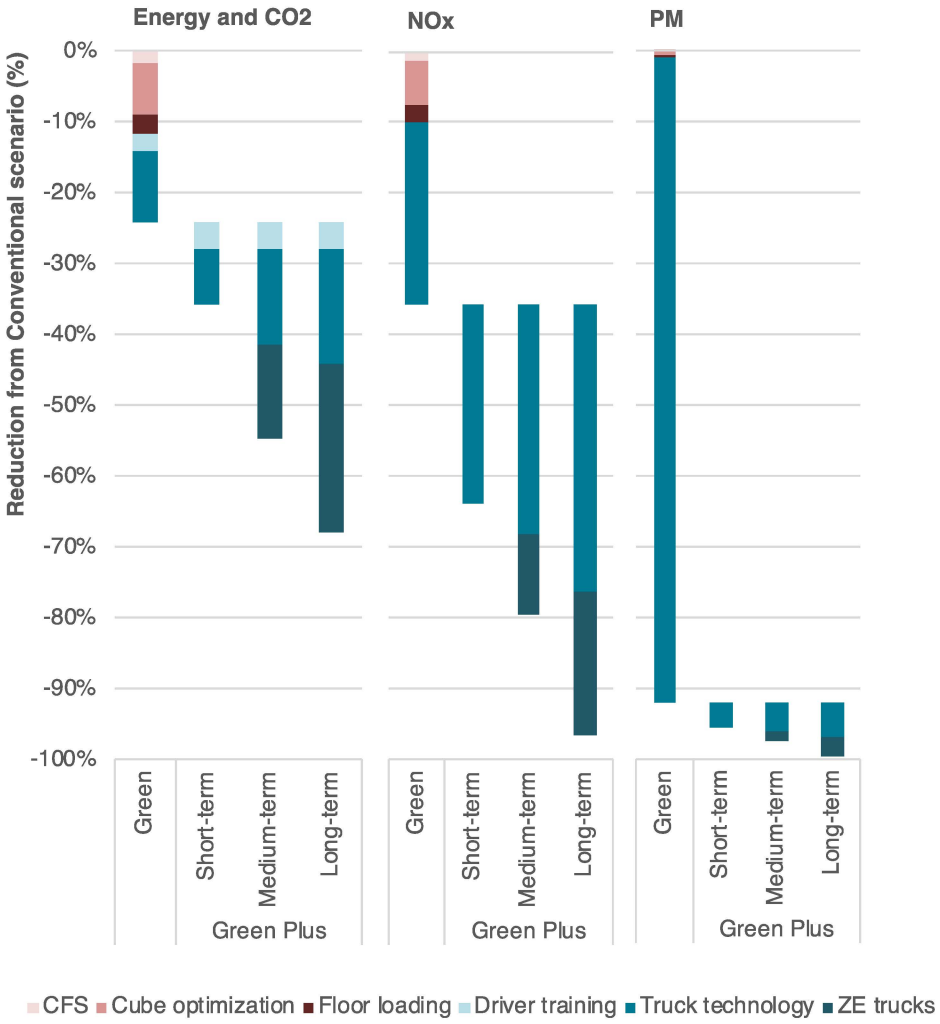
Strategy Type	Strategy	Supply chain Link					
		China drayage	Marine	US drayage	US inland	SDC to Store	RDC to Store
Clean and efficient logistics	Cargo consolidation (Consolidated Freight Station)	●		●			
	Cube optimization	●	●	●	●	●	●
	Transloading (network reconfiguration)			● ●	● ●		
	Floor loading	●	●	●	●	●	●
	Direct routing + Short sea shipping		● ●				
	Schedule optimization (port and ship)		● ●				
Clean and efficient modes	Truck to rail				● ●		
	Transloading (container switch)				● ●		
	Move to larger ships (Tripple E etc.)		● ●				
Clean and efficient equipment	Shore power		● ●				
	Slow steaming		● ●				
	Vessel technology		● ●				
	Vessel operations		● ●				
	Truck technology	● ●		● ●	● ●	● ●	● ●
	Truck electrification	●		●	●	●	●
	Rail technology	●		●	●	●	●
	Driver training	● ●		● ●	● ●	● ●	● ●

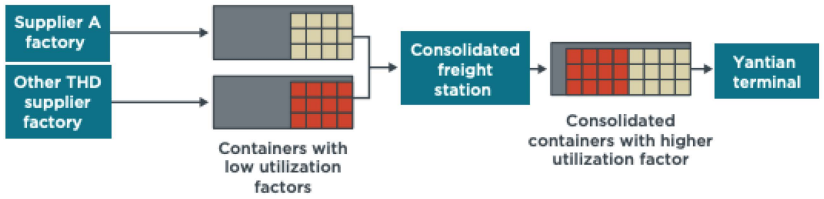
● Strategy applied to Green scenario
● Strategy applied to Green plus scenario

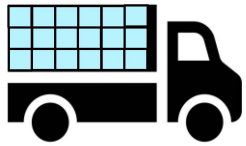
Summary of energy and emissions reduction potential

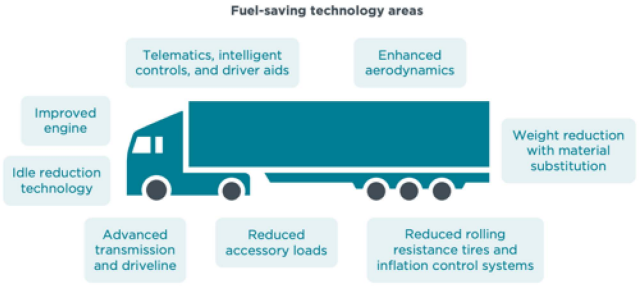


China drayage energy and emission savings

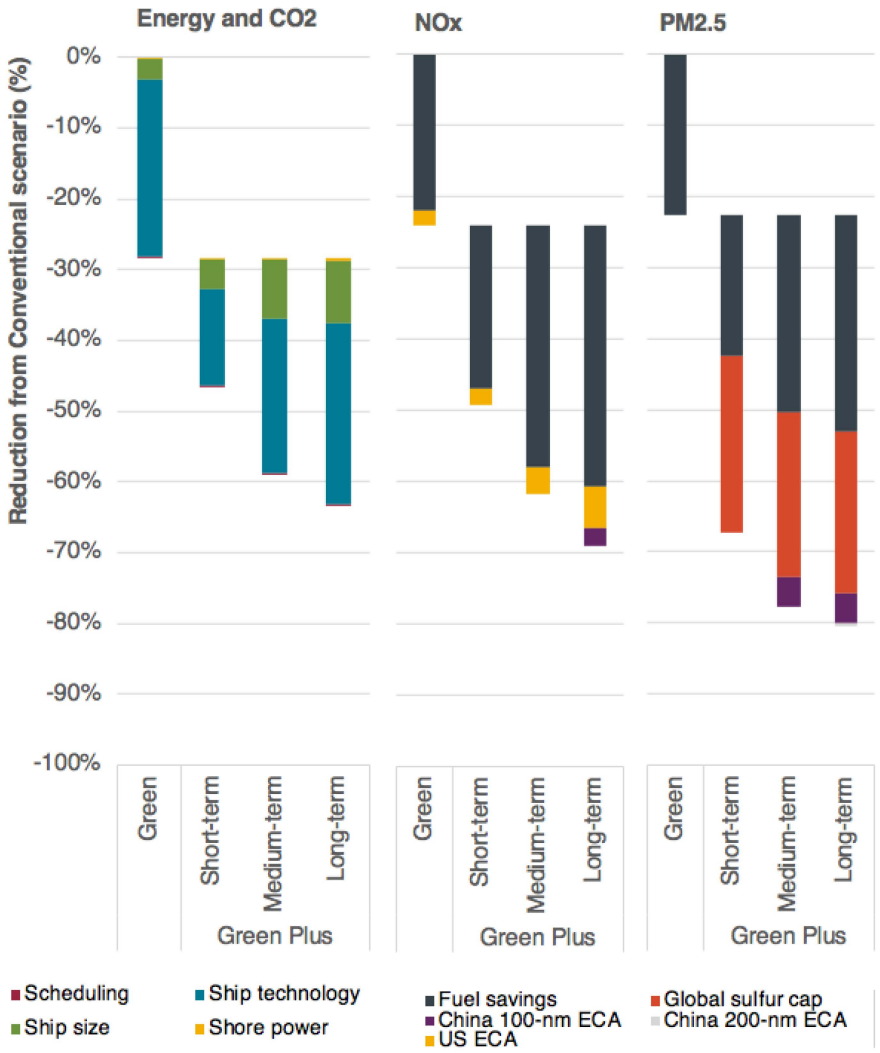


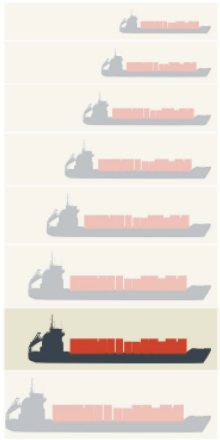






Marine energy and emission savings

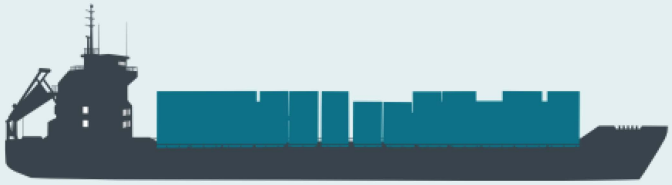




Operational
Weather routing **1-4%**
Autopilot upgrade **1-3%**
Speed reduction **10-30%**

Auxiliary power
Efficient pumps, fans **0-1%**
High efficiency lighting **0-1%**
Solar panel **0-3%**

Aerodynamics
Air lubrication **5-15%**
Wind engine **3-12%**
Kite **2-10%**

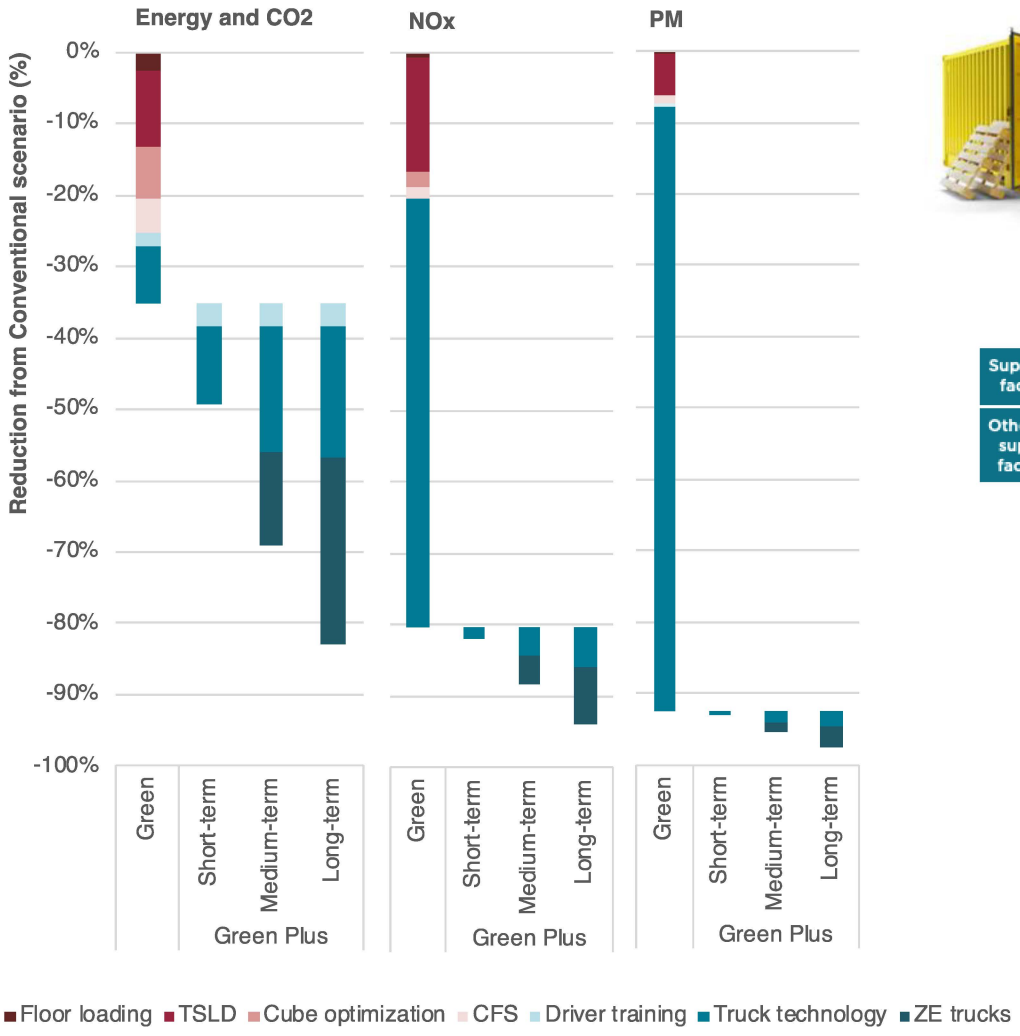


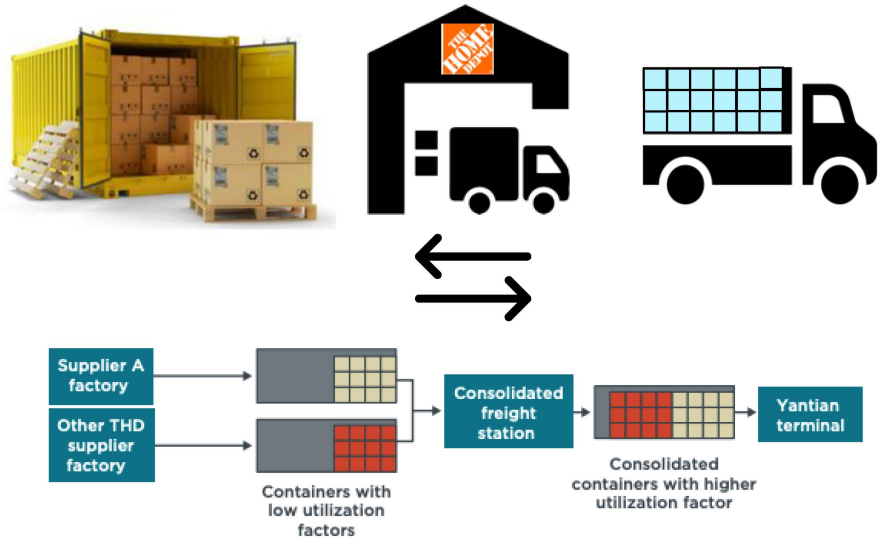
Thrust efficiency
Propeller polishing **3-8%**
Propeller upgrade **1-3%**
Prop/rudder retrofit **2-6%**

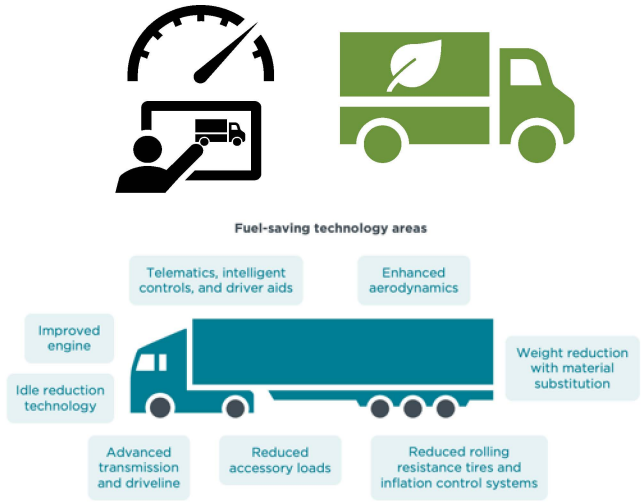
Engine efficiency
Waste heat recovery **6-8%**
Engine controls **0-1%**
Engine common rail **0-1%**
Engine speed de-rating **10-30%**

Hydrodynamics
Hull cleaning **1-10%**
Hull coating **1-5%**
Water flow optimization **1-4%**

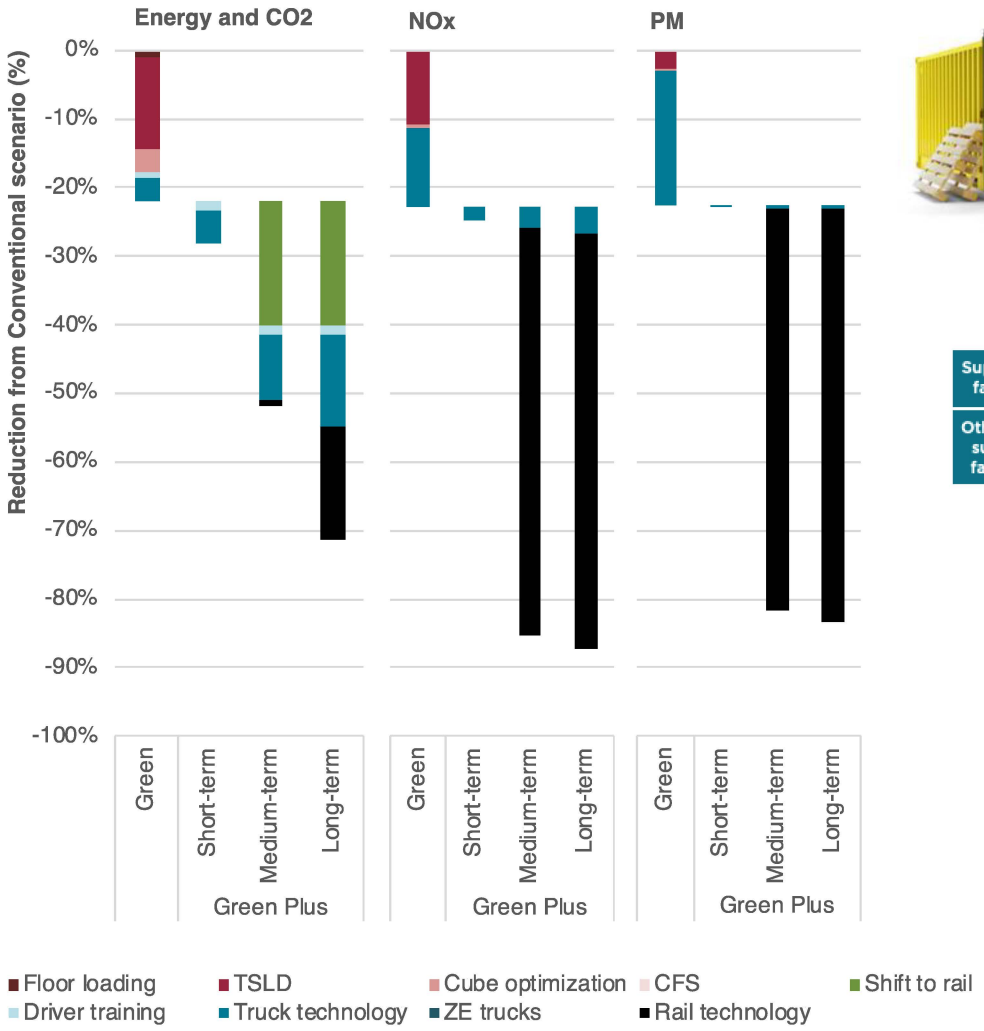
U.S. drayage energy and emission savings

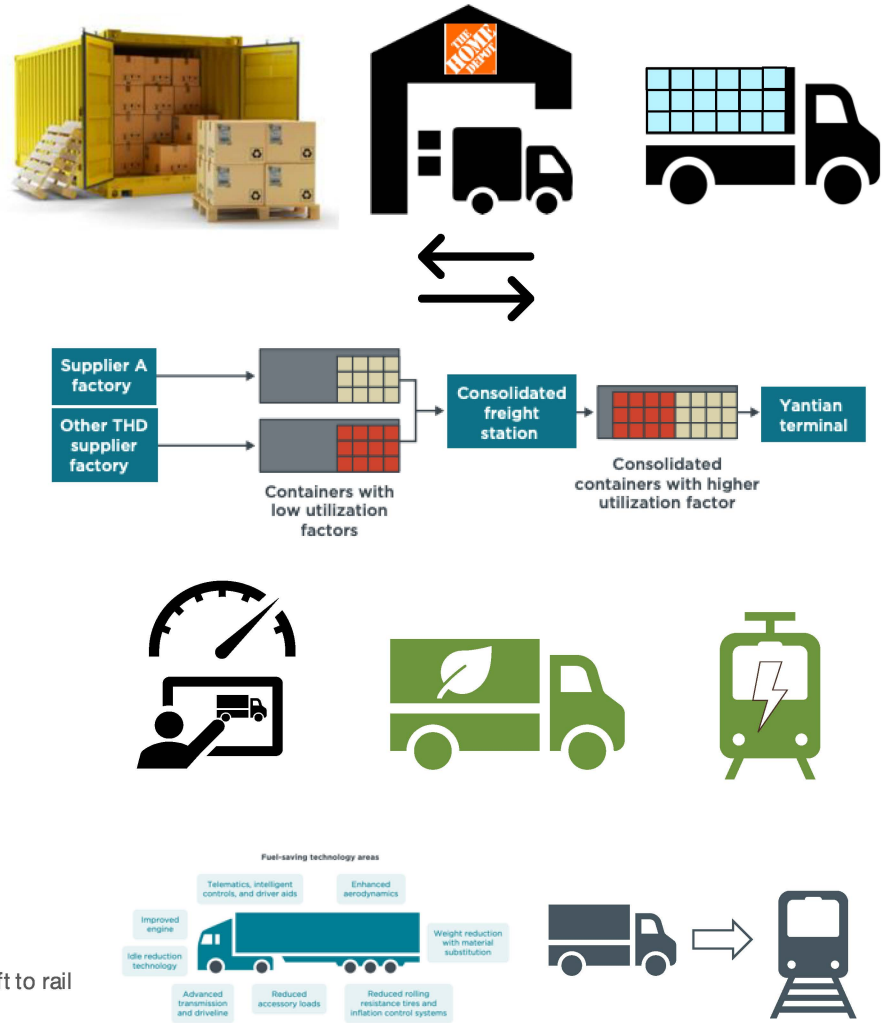




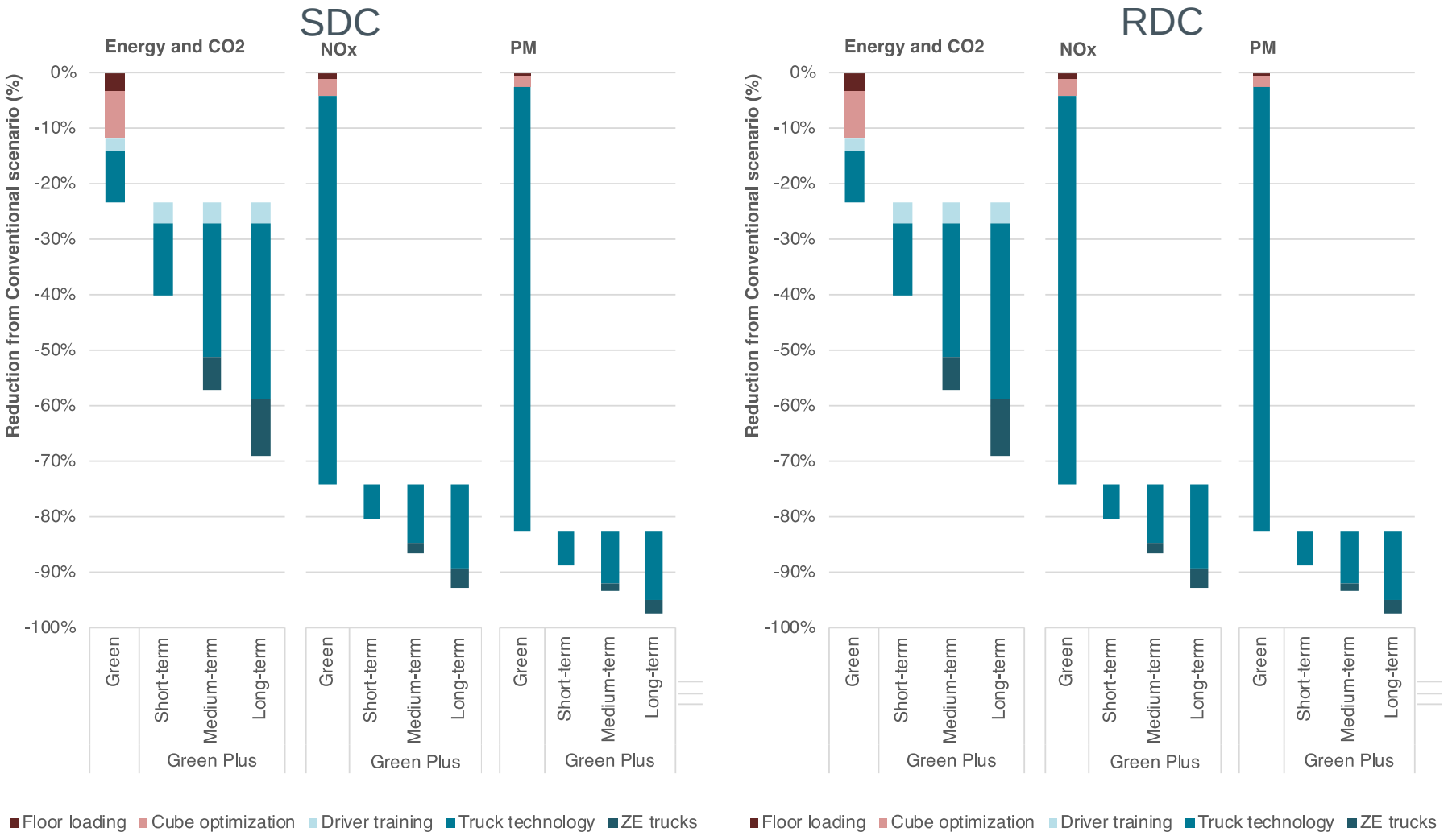


U.S. inland energy and emission savings



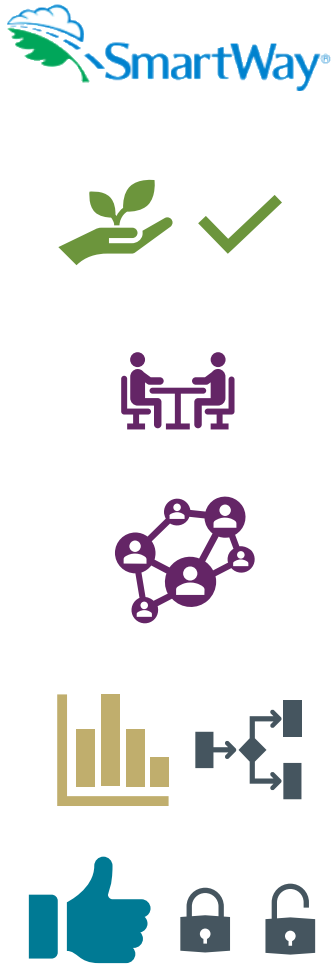


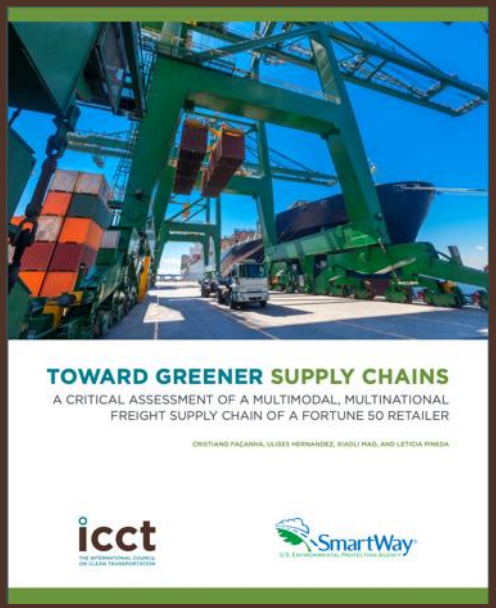
RDC to store energy and emission savings



Key takeaways

- Sustainable practices and green freight programs like SmartWay are delivering real cost savings, efficiency gains and environmental benefits.
- Many of the green strategies are already being implemented by companies proving that they work, reducing uncertainty and cost.
- Operational and vehicle technologies are both necessary
- Collaboration among stakeholders is key!
- Other companies and supply chains can leverage from the work developed in other projects by sharing experiences and best practices
- Data analysis is a powerful tool to inform decision making processes
- Robust assessments using private data are possible without disclosing sensitive information





Check out the full report at the link below:

https://theicct.org/sites/default/files/publications/ICCT_Toward-Greener-Supply-Chains_201909.pdf

Thank you!

l.pineda@theicct.org

Questions?