

Reducing scope 3 emissions

Analysis document

February 2024

Our value proposition

A unique global network

We are a division of Expeditors, one of the world's foremost supply chain companies. Our core team of global, regional and industry experts is complemented by our extended network of logistics and supply chain practitioners on the ground in 350 locations in 100+ countries globally.

Quantifying impact is at the heart of our value

We believe that geopolitics and macroeconomics can shape any business. But understanding them is only half the story: we combine qualitative analysis and proprietary data to quantify impact on your business and produce actionable insights.

We focus on actionable insight

We fully integrate macroeconomic and geopolitical analysis, unlike any other consulting firm. Our approach is tailored to the issues, geographies and industries you care about. We focus on getting to the so-what of politics – so you don't have to.

Executive summary

Defining the Problem

- Sourcing-related emissions (Scope 3, Category 1) can be ~50% of firm-level emissions
- Freight-related emissions (Scope 3, Categories 4 & 9) make up 8% of total global emissions and 15-20% of industrial firms' carbon footprint
- The Onyx framework considers multiple lenses to manage trade-offs with a forward-looking view

Sourcing Tradeoffs and Policy Risk

- Careful analysis of tradeoffs and alternatives is required to meet Scope 3 goals
- Sourcing decisions face limited choices for low cost, low carbon intensity sources
- Policy decisions in emerging markets are a driver of divergent outcomes for corporate Scope 3 strategies

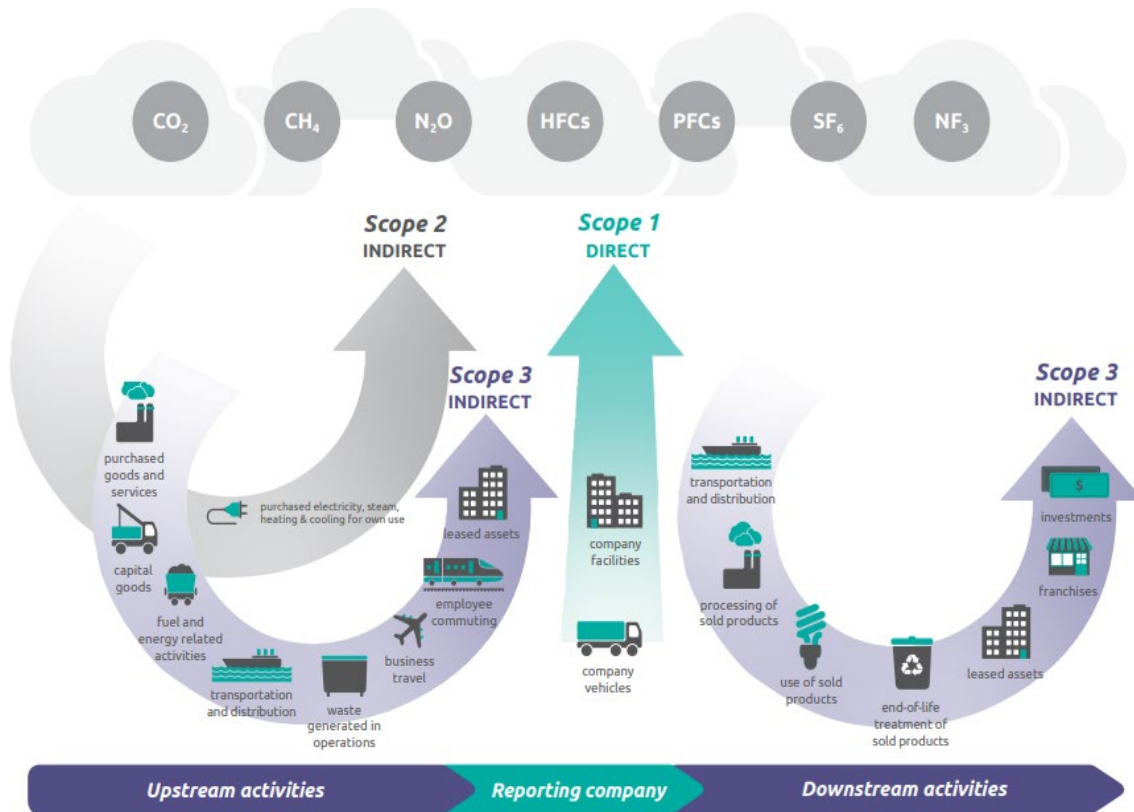
Transportation

- Companies have four main strategies to decarbonize logistics: avoid, reduce, in-set, and off-set
- However, there are multiple obstacles to reaching these goals – policy, fuel supply and cost
- Geopolitics, particularly industrial policy, will shape technology development, availability and cost

Scope 3 includes a wide range of emissions sources

Logistics emissions focused in categories 4 and 9

OVERVIEW OF GHG PROTOCOL SCOPES AND EMISSIONS ACROSS THE VALUE CHAIN



UPSTREAM AND DOWNSTREAM SCOPE 3 EMISSIONS

(1) Purchased goods and services

(2) Capital goods

(3) Fuel- and energy-related activities*

(4) Upstream transportation and distribution

(5) Waste generated in operations

(6) Business travel

(7) Employee commuting

(8) Upstream leased assets

(9) Downstream transportation and distribution

(10) Processing of sold products

(11) Use of sold products

(12) End-of-life treatment of sold products

(13) Downstream leased assets

(14) Franchises

(15) Investments

*emissions not already included in Scope 1 & 2

Sourcing

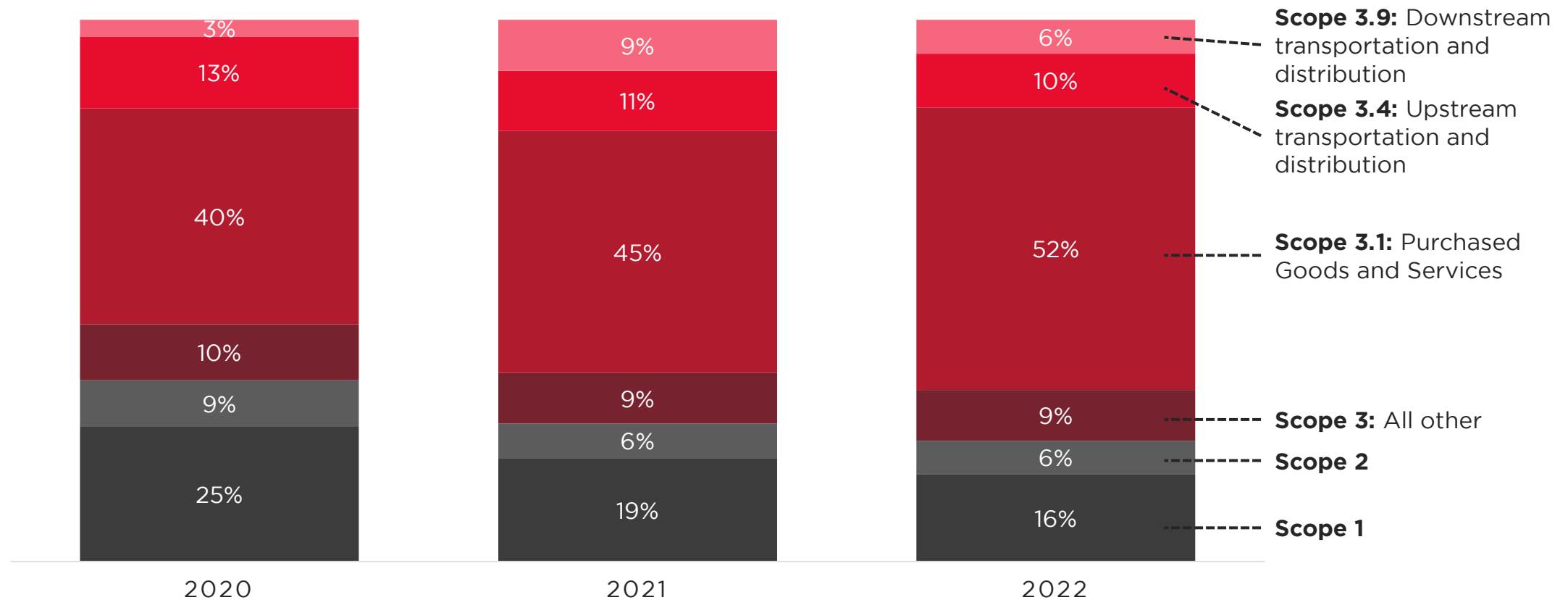
Freight Emissions

Industrial firm's Scope 3 emissions are >80% of their footprint

Freight makes up 15-20% of firm-level emissions

EXAMPLE OF A DIVERSIFIED INDUSTRIALS COMPANY'S EMISSIONS

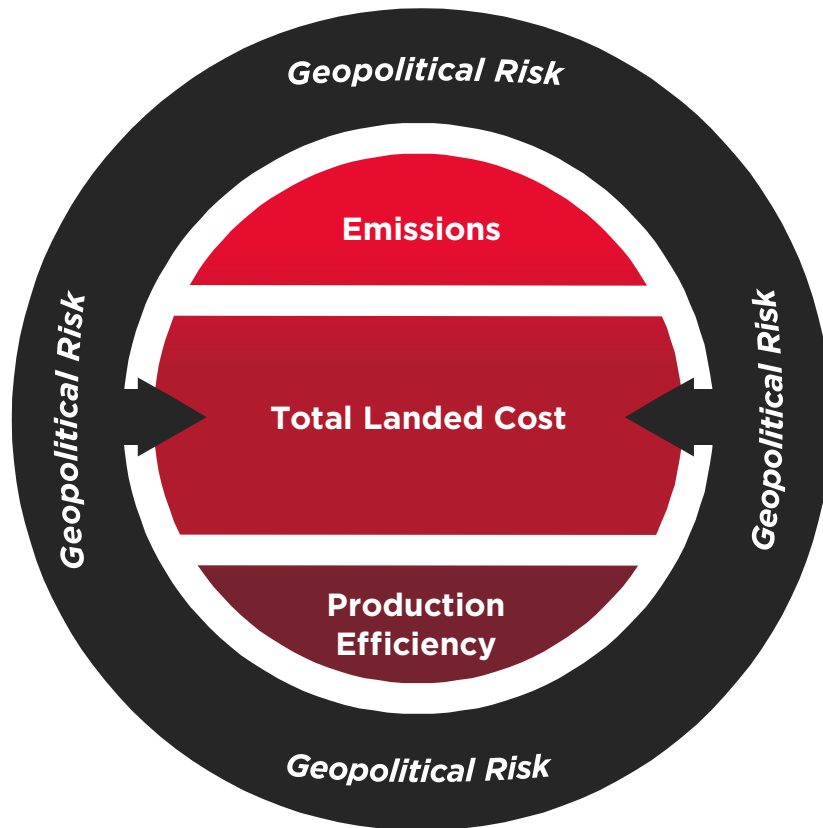
PERCENT SHARE BY SCOPE



Onyx framework for sustainable sourcing and freight

Weighing trade-offs, forward-looking view on an evolving landscape

THE DECARBONIZATION “QUADLEMMMA”



Total Landed Cost

- Production + Shipping + Customs + Risk + Overhead
- Detailed analysis of cost drivers
- Competition / value proposition

Emissions

- Absolute or intensity, depending on targets
- Reliability
- Feedback loop with cost

Production Efficiency

- Minimize waste
- Impact on resource utilization

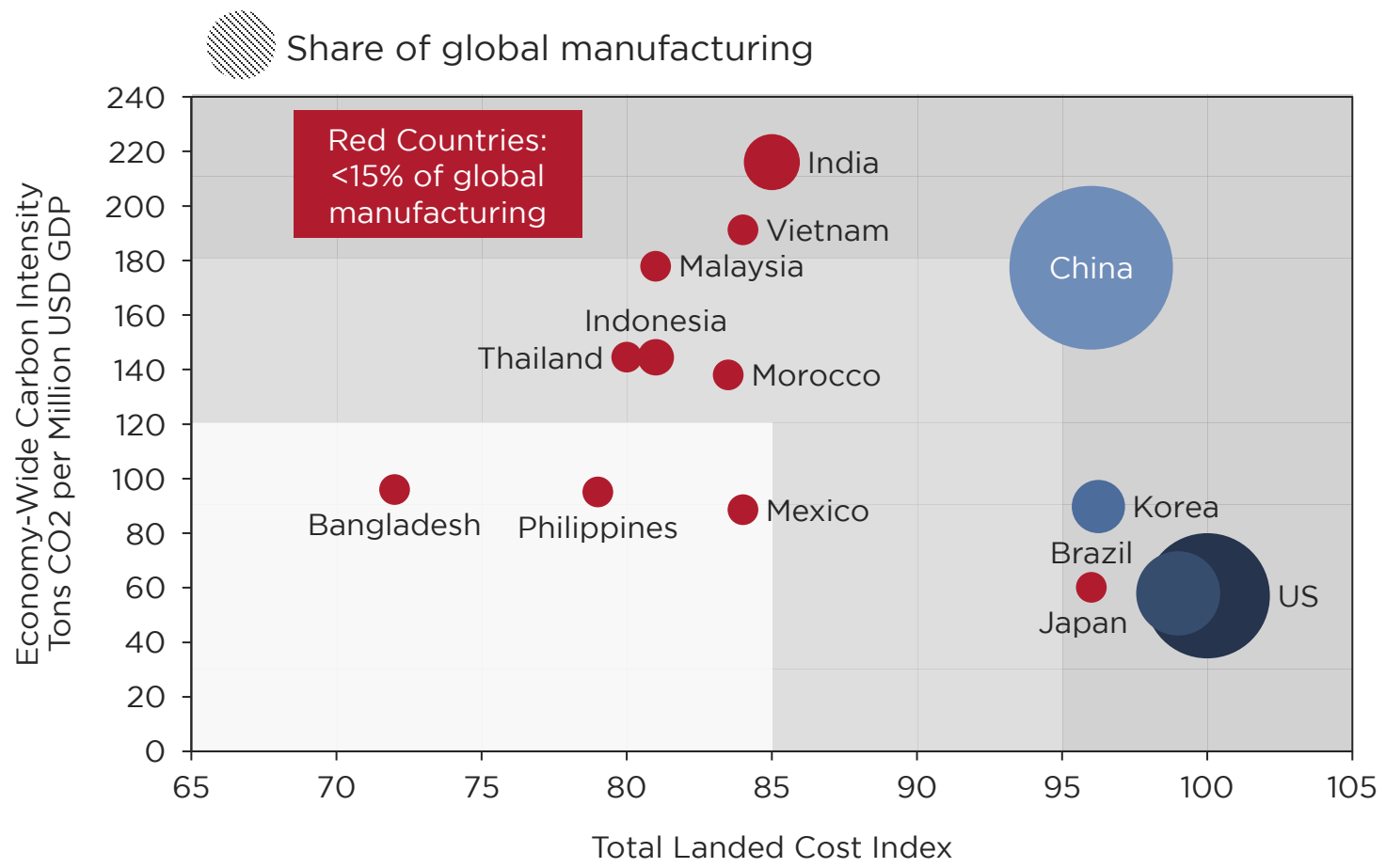
Geopolitical Risk

- Policies and incentives that enable markets
- Changing priorities and fiscal constraints
- Competition for resources

Sourcing decisions must consider emissions to reach net zero

This is increasingly challenging in a fraught geopolitical environment

TOTAL LANDED COST AND CARBON INTENSITY



LIMITED ALTERNATIVES

- China's manufacturing base is more than 2x the size of ASEAN, India, Brazil and Mexico combined
- Companies must invest heavily in new capacity paired with renewable energy

EMs DUAL CHALLENGE

- Historically, industrialization has come with emissions
- Emerging Markets will need to grow their manufacturing base while simultaneously decarbonizing

LOW-HANGING FRUIT

- Renewable power is the most scalable and economically viable solution
- Decarbonizing heavy industrial processes requires carbon costs of \$50 to \$100 per ton or more

Source: Oxford Economics, BCG, Onyx
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Policy is driving divergent decarbonization outcomes

Some sourcing regions struggling to keep pace with climate goals

INVESTMENT ATTRACTIVENESS OF COUNTRY POLICIES V. CHINA FROM FOREIGN INVESTOR PERSPECTIVE

Decreases attractiveness Neutral Increases attractiveness



POLICY AREAS	VNM	MYS	THA	IDN	INDIA	MEX
LABOR	Red	Grey	Red	Red	Dark Grey	Red
INDUSTRIAL	Dark Grey	Dark Grey	Dark Grey	Dark Grey	Dark Grey	Grey
TRADE	Grey	Dark Grey	Grey	Red	Dark Grey	Red
INFRASTRUCTURE	Dark Grey	Dark Grey	Dark Grey	Dark Grey	Dark Grey	Grey
TAXES	Red	Red	Dark Grey	Dark Grey	Red	Grey
ESG	Red	Dark Grey	Grey	Grey	Dark Grey	Red

DECARBONIZATION OUTLOOK FOR KEY SOURCING REGIONS

CHINA: EARLY SUCCESS

- Will hit 2030 emissions targets by 2025 with new renewable energy capacity
- But persistent concerns over energy security are driving **coal build-out**

ASEAN-6: VARIED SUCCESS

- Singapore, Thailand, and Malaysia will lead the pack - **solar power development, low-carbon power import, and carbon taxes** will emerge as key strategies
- Indonesia, Philippines, and Vietnam are the laggards

MEXICO: ONCE A LEADER, BACKSLIDING

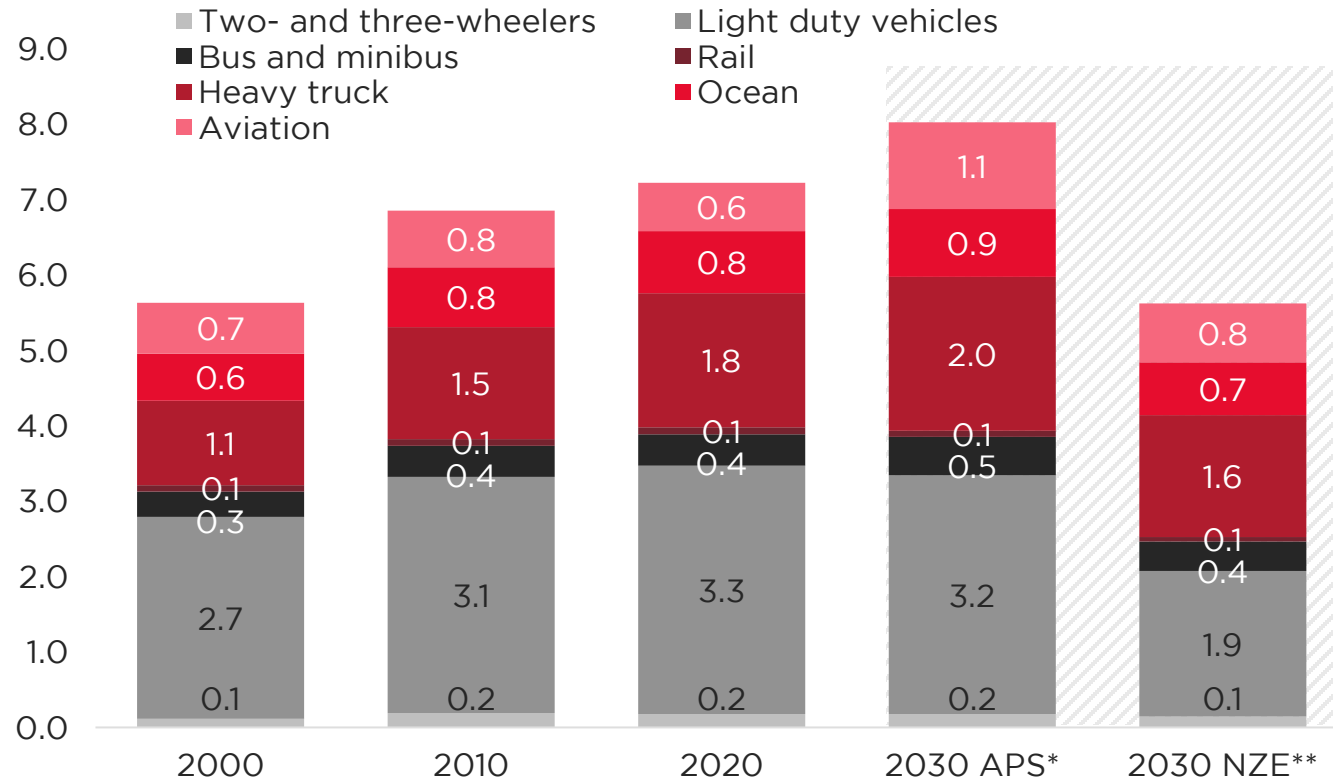
- Under AMLO there will be little change in climate backsliding and underperformance against stated objectives

Sizing up the freight challenge

Freight transport makes up about 8% of global GHG emissions

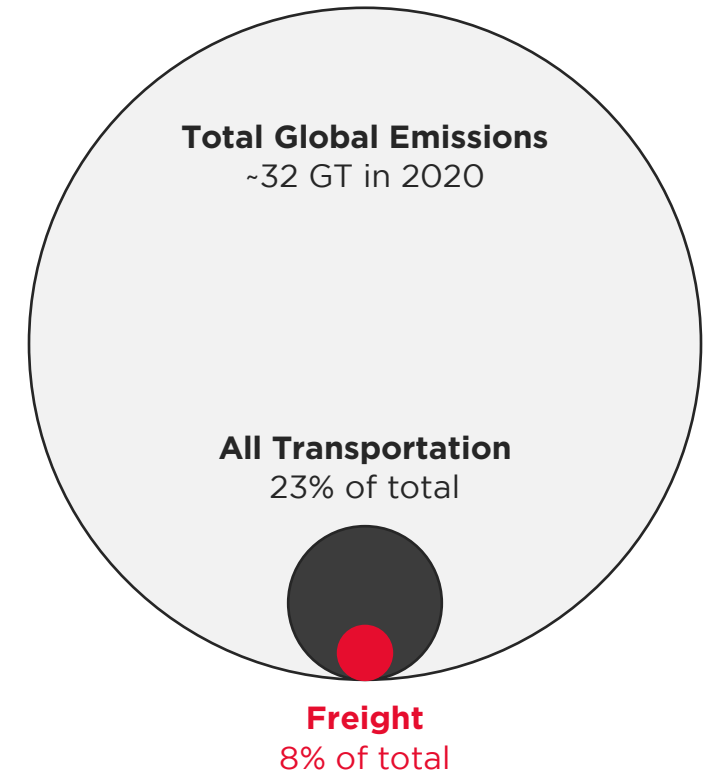
GLOBAL CO2 EMISSIONS FROM TRANSPORT

GT CO2



EMISSIONS BY FREIGHT TRANSPORT

GT CO2



*APS: Announced Pledges Scenario

**NZE: Net zero emissions by 2050 scenario

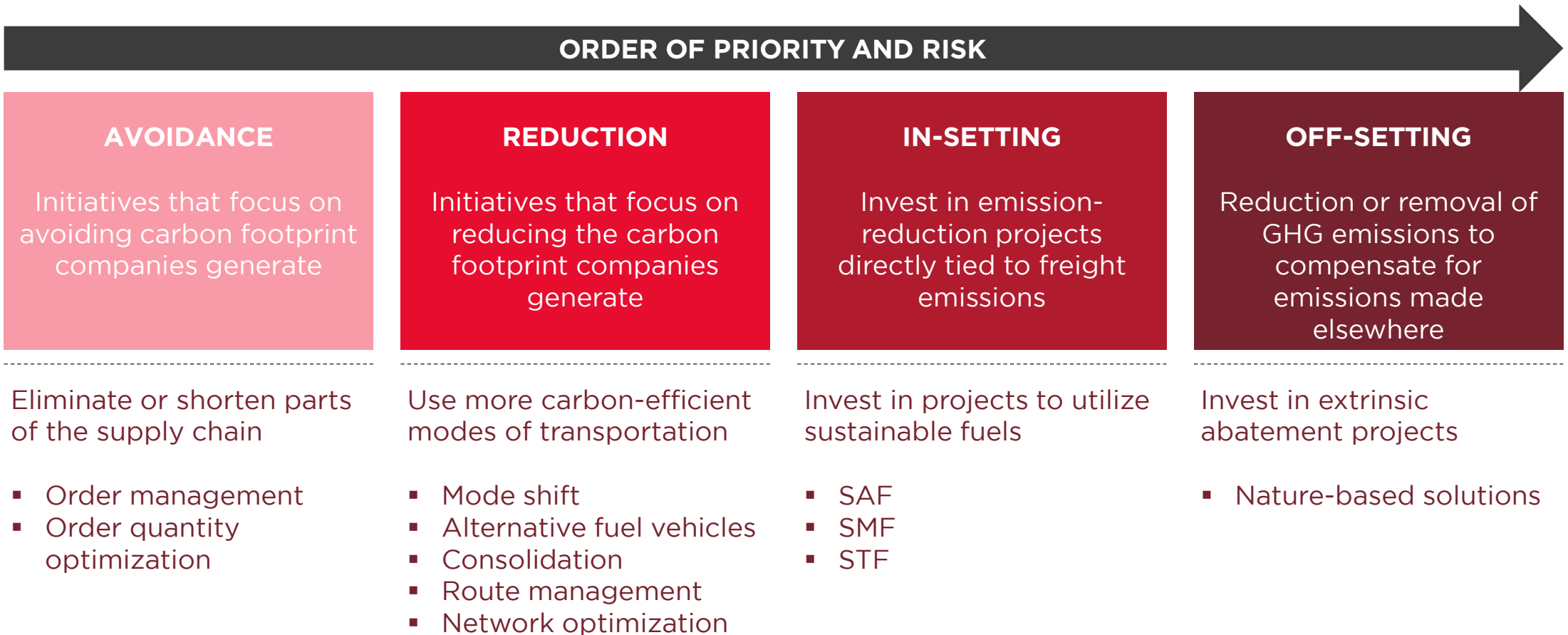
Source: IEA, Onyx

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Four viable logistics decarbonization strategies

Optimize, use low carbon fuels, in-set and off-set as a last resort

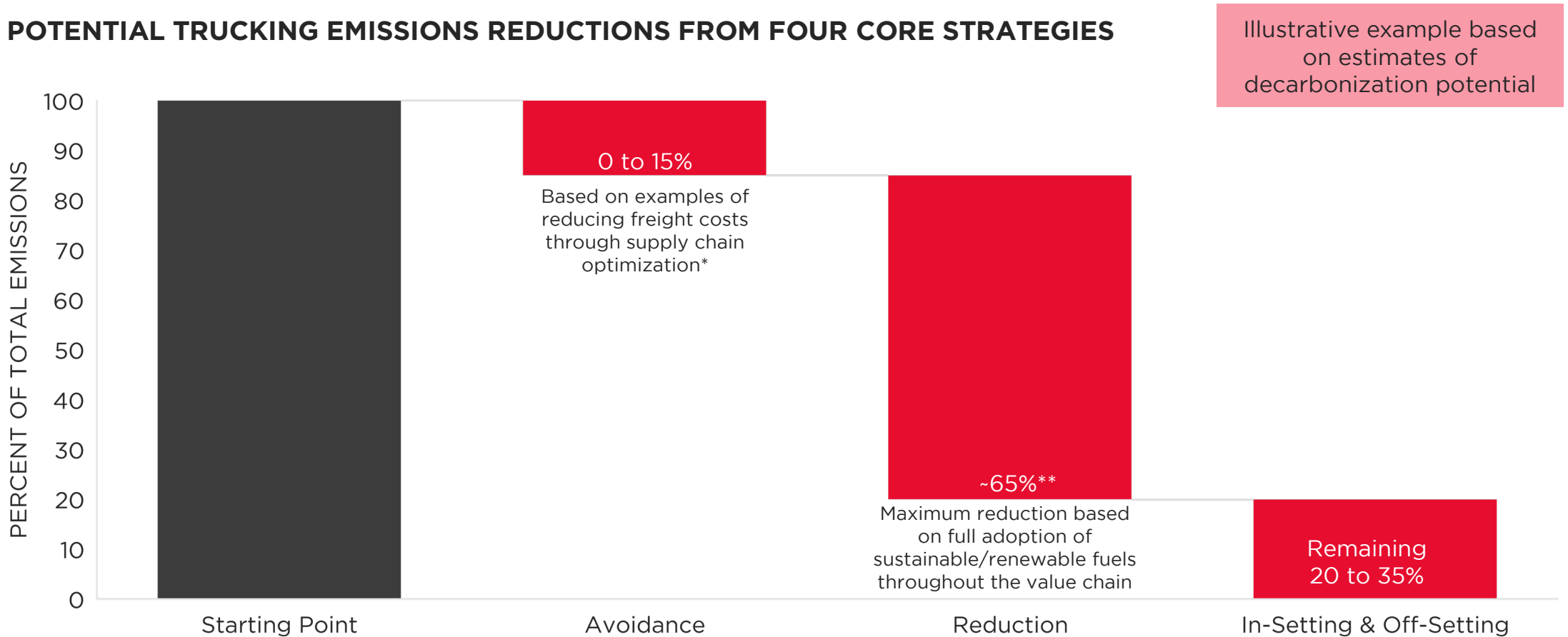
CORE STRATEGIES TO IMPROVE LOGISTICS SUSTAINABILITY



Reduction offers major opportunities in decarbonization

65% to 80% reductions and avoidance are achievable with current technologies

POTENTIAL TRUCKING EMISSIONS REDUCTIONS FROM FOUR CORE STRATEGIES



*Combination of renegotiating lower rates and optimizing network and shipments which lowers overall carbon footprint

**Renewable diesel carbon reductions can vary, but recent analysis suggests a 65% reduction in lifecycle emissions compared to traditional diesel

Source: Logistics Bureau, California Air Resource Board, Onyx

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What's standing in the way of sustainable fuels?

Policy needed to reach cost-effective scale

FRAGMENTED POLICY DELAYS INFRASTRUCTURE BUILD-OUTS...

Examples

Shifting signals to producers

- US Renewable Volume Obligations (RVO) set below production trend, driving down credit value

Competition for feedstock

- Demand is greater than supply of waste-based feedstock
- US turns to imports and agricultural feedstocks

Unclear signals

- Supply/Demand Chicken/Egg dilemma delaying infrastructure build-out

...RESULTING IN LIMITED BIOFUEL SUPPLY...

Jet

- SAF will make up only 0.5% of global jet fuel demand in 2024 and 1-2% by 2027
- EU set a 5% SAF blend goal by 2030
- Recent ethanol-to-jet plant in Illinois implies \$20/gallon in capex, or \$60Bn capex needed by 2030¹

Ocean

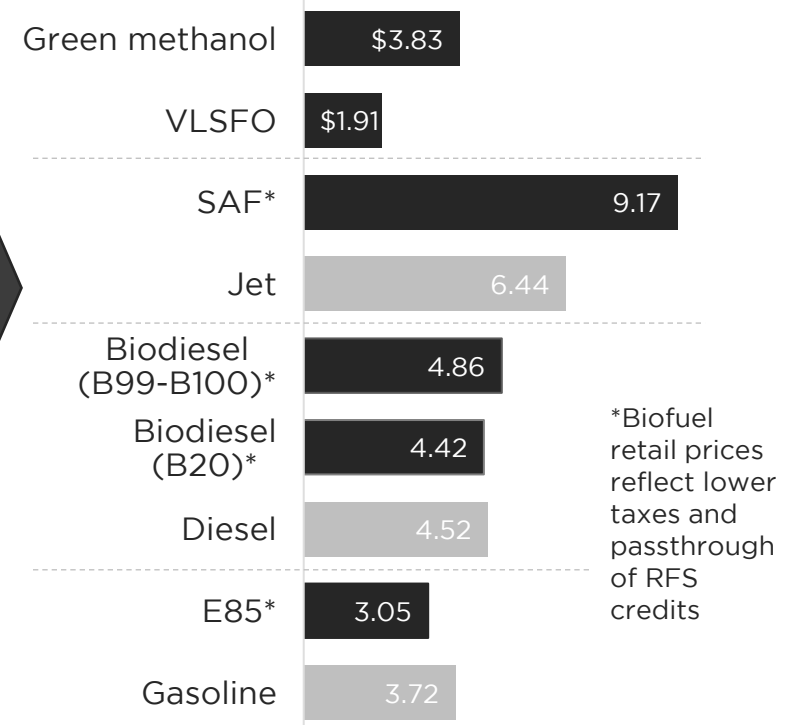
- IMO aims to reduce carbon intensity of international shipping by 40% by 2030
- But low-carbon marine fuel projected to make up only ~2% of global demand by 2030

Land

- Biodiesel made up about 3.6% of US diesel demand in 2022

...AND HIGH BIOFUEL PRICES

US national average retail fuel price (\$/Gallon)



(1) Onyx calculation based on LanzaJet \$200 million, 10 million gallon SAF plant and Biden Administration goal to hit 3 billion gallons of SAF production by 2030

Source: IEA, EIA, S&P Global, Onyx

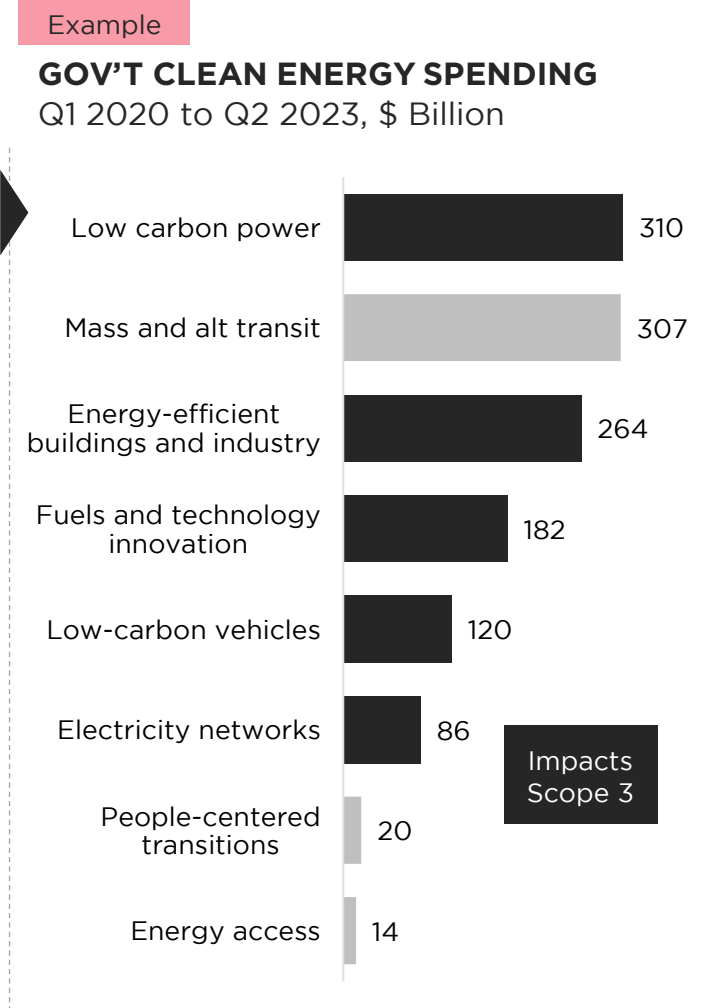
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Geopolitical competition impacts relevant technologies

Technology packages have varying risk profiles

KEY POLICY AREAS AND POTENTIAL SCOPE 3 IMPACTS

1	Industrial Policy	National security and environmental interests driving public spending on low-carbon fuels, vehicles, power, and industrial processes
2	Trade Policy	US-China relations, USMCA Uncertainty of potential 2 nd Trump Administration
3	Regulatory Competition	Countries competing to produce the defining regulatory and standards system that most advantages their economies
4	Physical Risks	Growing size and volume of containerships passing through narrow waterways, chokepoints, are increasingly at risk Diversions add to fuel-related emissions and reduce reliability
5	Fiscal Limitations	Government investment is circumscribed by competing priorities - including defense - and fiscal constraints
6	Bottlenecks	Production of critical minerals, semiconductors, and other key materials tend to be highly concentrated in certain countries



Source: IEA, Onyx
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