

Trends Changing the Shape of Supply Chain Networks

Dr Andrew Palmer
Preston Solutions Ltd

The Supply Chain Chronology

- 1970's Oil crisis – proliferation of depots
- 1980's Stock reduction
- 1990's Customer service
- 2000's Internet home shopping
- 2010's Sustainability



Logistics Trends – 2000 onwards

City
Logistics

Delivery
Reliability and
Congestion

Multi Channel
Retailing /
Home Delivery

Reverse
Logistics

**Consumer needs – and the supply chain response
– produce fragmented and additional product flows**

Sustainability

Vertical and
Horizontal
Collaboration

Multi
Modal

Different
Types of
Warehouses

Rapid
Replenishment

Global
Sourcing /
Focused
Manufacturing

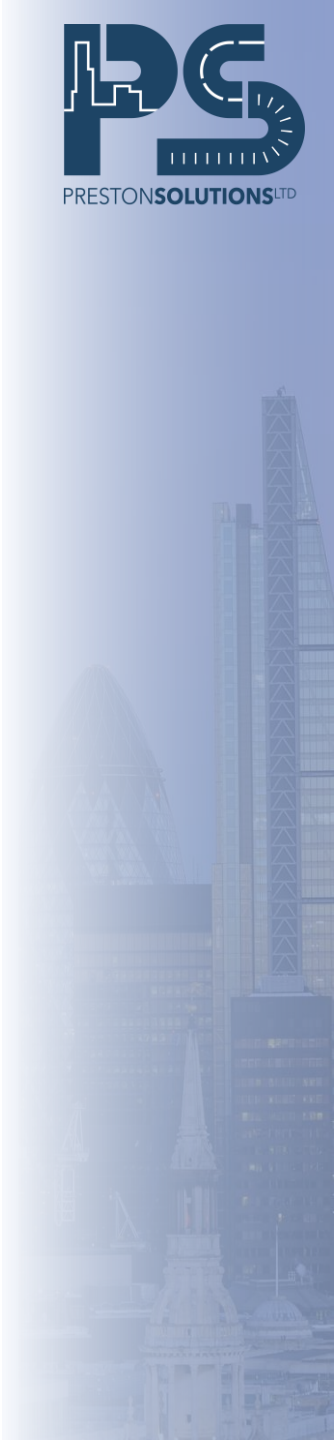
Product Line
Proliferation

All Year
Seasonal
Produce

What Causes Supply Chain Networks to Change

➤ Internal drivers such as:

- **Cost reduction**
- **Customer demands**
- **Service level**
- **Increased differentiation**
- **Increased competition**
- **Increased regulation**
- **Reduce CO₂**
- **Sustainability**



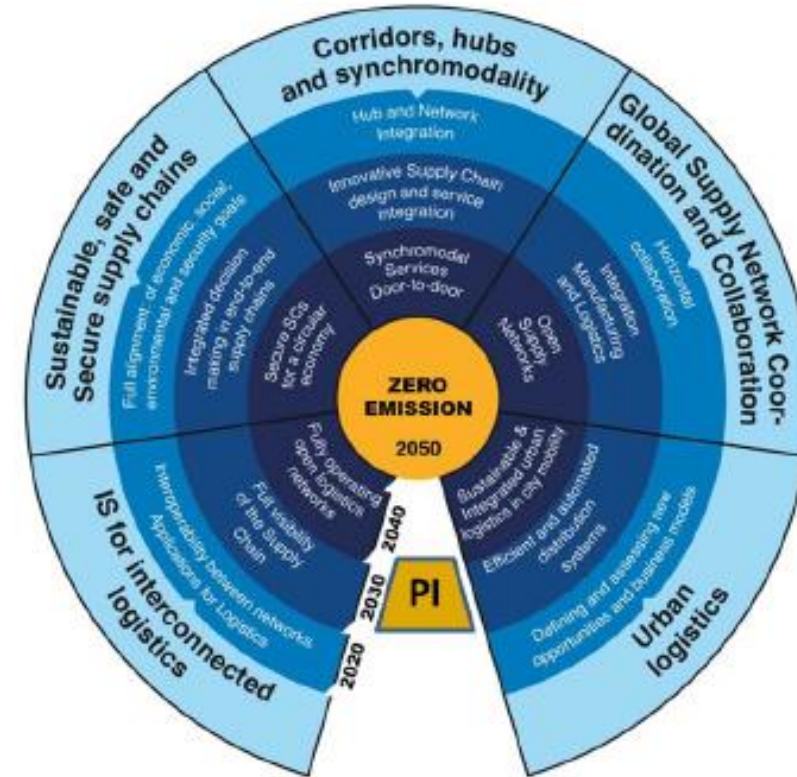
What Causes Supply Chain Networks to Change

➤ External influences such as:

- Economic
 - Environmental
 - Social
- } Sustainability
- Political
 - Technological
 - Legislation

Zero emissions by 2050

Target adopted	Under consideration	No target (selected nations)
Bhutan	European Union	Argentina
Chile	France	Argentina
Costa Rica	Germany	Australia
Denmark	New Zealand	Brazil
Fiji	Spain	Canada
Finland	-	China
Iceland	-	India
Marshall Islands	-	Indonesia
Norway	-	Italy
Portugal	-	Mexico
Sweden	-	Japan*
Suriname	-	Russia
UK	-	Saudi Arabia
Uruguay	-	South Africa
-	-	South Korea
-	-	Turkey
-	-	US



The SRF Roadmapping model

- CSRGT base data
- Predicted to 2050
 - Cost of fuel
 - Carbon price (£/tCO₂e)
 - Annual kilometres
 - New vehicle fleet improvement in fuel efficiency
 - GDP/manufacturing output
- Vehicle and logistics measures with predicted fuel and kilometre savings and costs
- Predicted percentage take up of measures
- NPV and max CO₂ scenarios



Measures needed to achieve zero emissions

Vehicle/Driver Measures

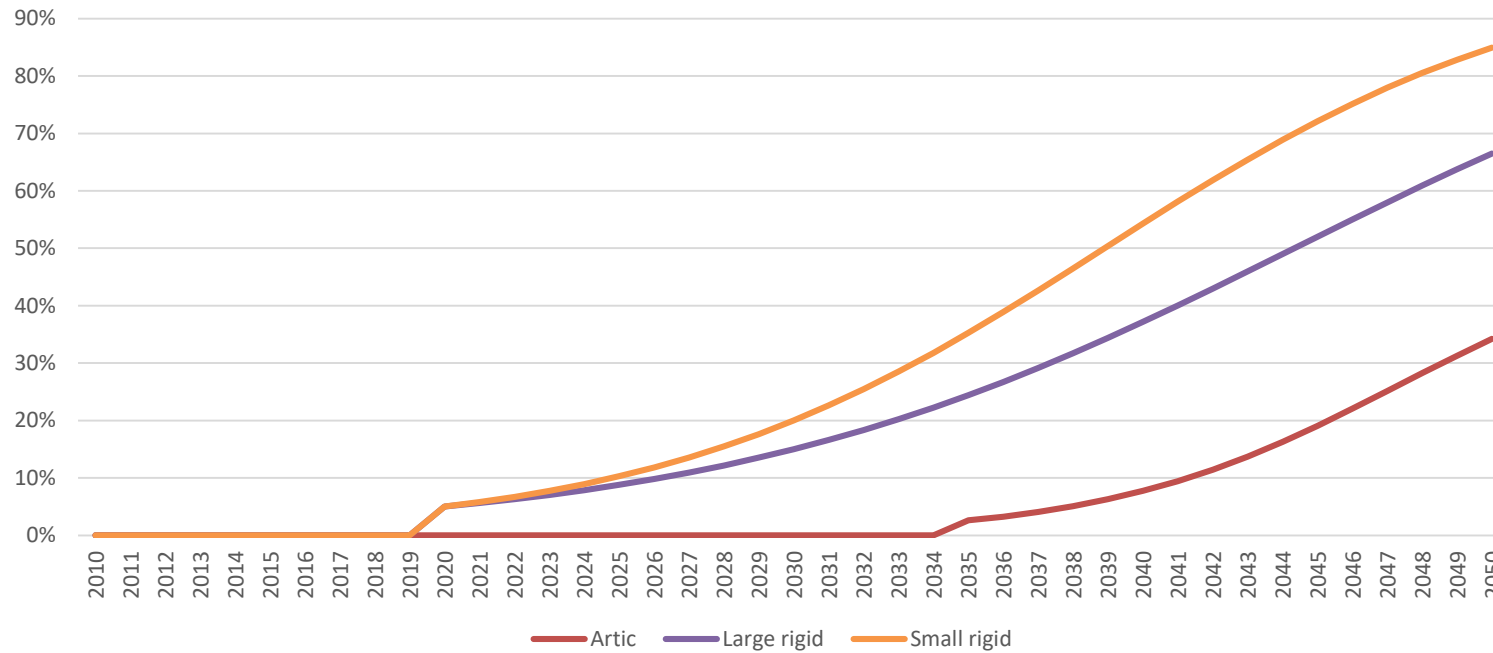
Use trailer with sloping front roof (double deck/high cube vehicles)
Use tear-drop trailers
Reduce engine idling
Switch from powered to fixed-deck trailers (for double-decks)
Reduce vehicle tare weight
Install cab roof fairing
Install body / trailer side panels
Install side skirts
Install boat tails
Adopt automated manual vehicle transmission
Set vehicle with slower speed
Reduce height of vehicle
More regular tyre inflation checks
Use low 'rolling-resistance' tyres
Fit super singles
Automatic tyre pressure adjustment
Use of fuel additives
Increase use of hybrid vehicles
Use of lubricants with lower viscosity
Give drivers training in fuel efficiency
Monitor and manage driver fuel performance (including use of telematics)
Autonomous vehicles
Use telematics to optimise vehicle routing

Increase use of electric vehicles
Increase use of biodiesel vehicles
Increase use of CNG vehicles
Increase use of dual-fuel vehicles (Diesel + CNG)
Increase use of LNG vehicles
Increase use of dual-fuel vehicles (Diesel + LNG)

Logistics measures

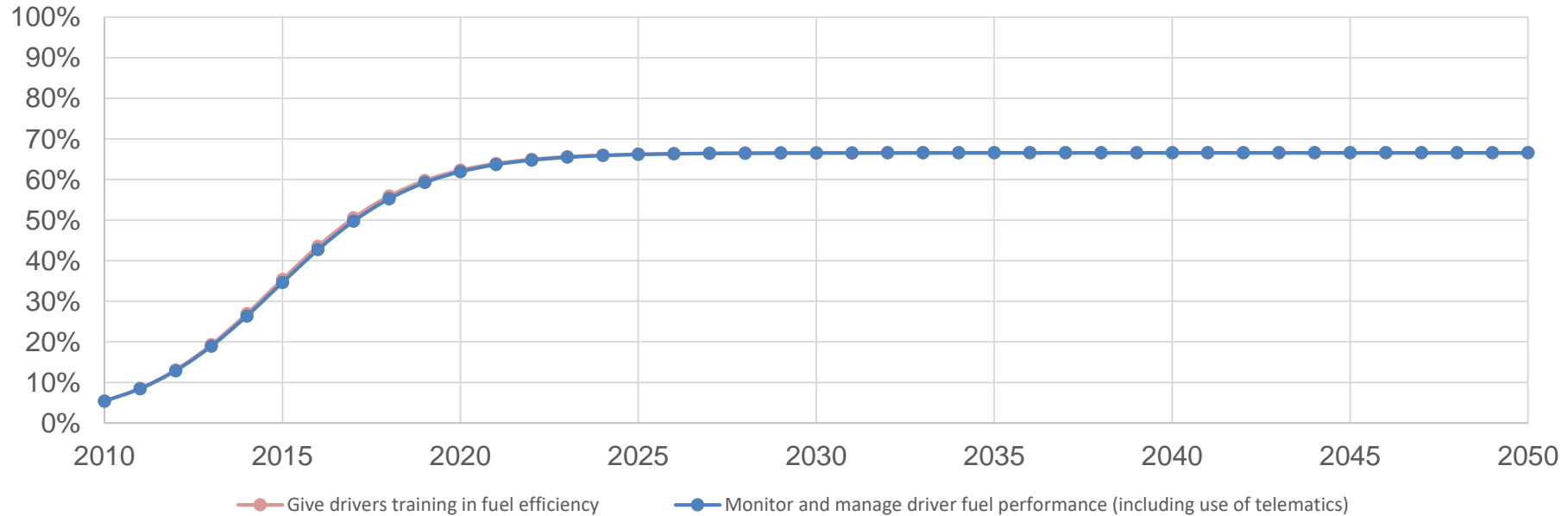
Reschedule deliveries to inter-peak periods and evening / night
Use of larger and heavier vehicles (long haul only)
Backhaul / Fronthaul
Synchronised consolidation
Use of urban consolidation centres
Restructuring of the supply chain network
Use of alternative transport modes
Extending delivery times/relaxation of JIT pressures
Platooning
Circular economy
Local manufacturing/on shoring
Freight exchanges/IFTS supporting the physical internet
Slow logistics

Take up percentage of electric vehicles



- Peak level of adoption: all rigids 74%, articulated 35%
- Year of peak: 2050

Take up percentage of driver training & monitoring



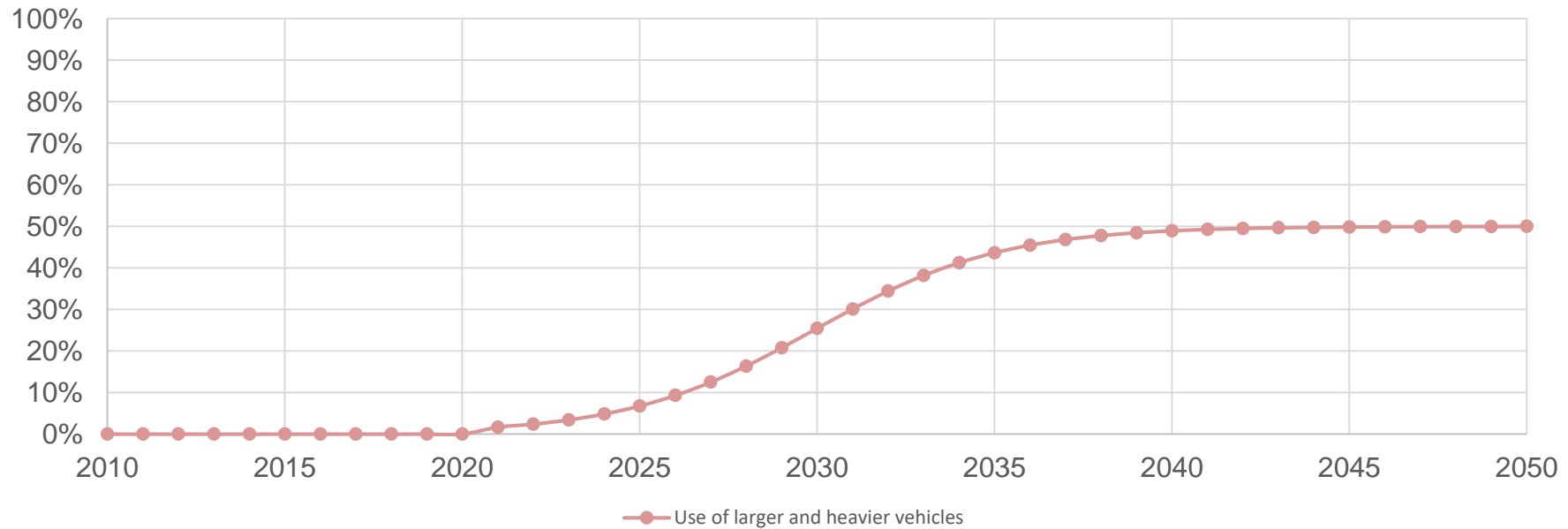
- Peak level of adoption: 67%
- Year of peak: 2030

Aerodynamic vehicles and driver training



If 90% of HGV drivers were eco-driving trained, and continued to practise eco-driving techniques, we could save up to 3MtCO₂ and £300m in costs to the industry over a 5 yr period

Take up percentage of longer heavier vehicles



- Peak level of adoption: 50%
- Year of peak: 2043

Larger Higher Capacity Vehicles



Double Deck Trailers



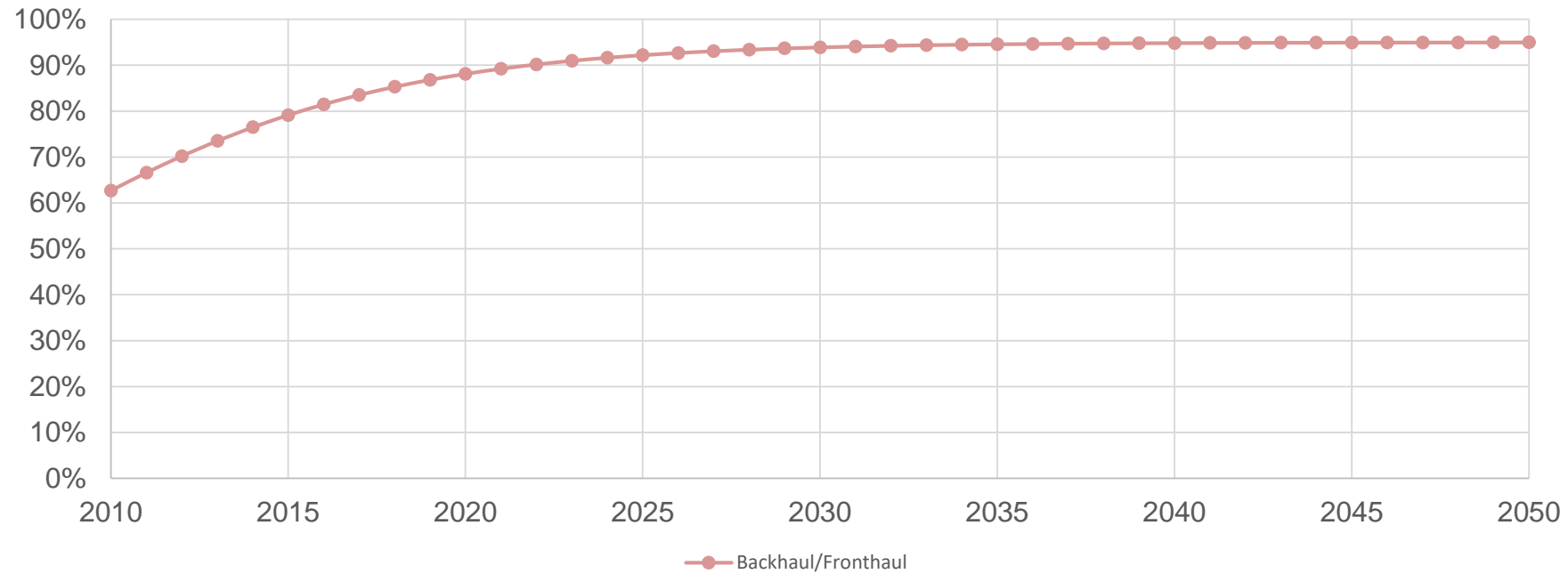
Longer Semi Trailers



Truck + dolly/semitrailer

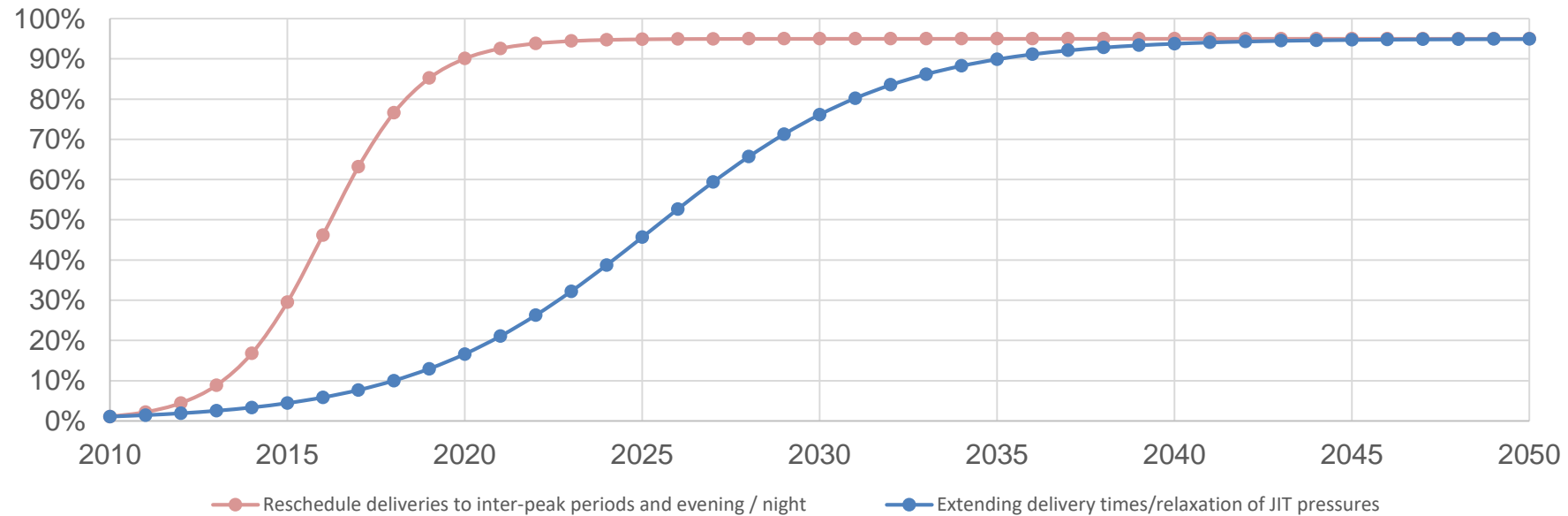
Longer Heavier Vehicles
(Mega Truck)

Optimising backhaul & fronthaul



- Peak level of adoption: 95%
- Year of peak: 2035

Longer & slower deliveries



- Peak level of adoption: 95%
- Year of peak: Rescheduling deliveries off-peak - 2024, extending delivery times & reducing JIT pressure - 2043

Measures with greatest impact:

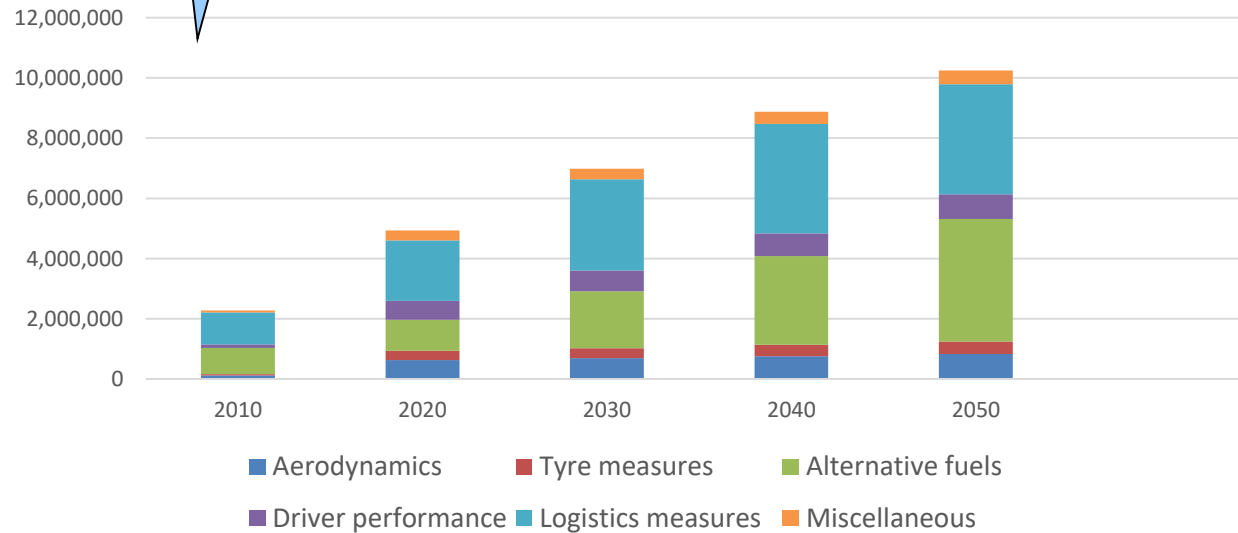
Vehicle-level Measure	CO2 Savings (%)		
	Urban	Regional	Long Haul
Electric vehicles	45%	35%	27.5%
LNG vehicles	15.5%	15.5%	15.5%
CNG vehicles	13%	13%	13%
Dual fuel vehicles (diesel + LNG/CNG)	10.5%	10.5%	10.5%
Driver training in fuel efficiency	4%	7%	9%
Monitoring driver fuel performance	4%	7%	9%

Logistics Measure	Fuel Savings (%)	Travel Savings (km %)
Longer heavier vehicles	14.3%	13.9%
Optimising backhaul & fronthaul	8.2%	7.9%
Reschedule deliveries off-peak	4.25%	4.25%
Extend delivery times & reduce JIT pressure	5%	3%

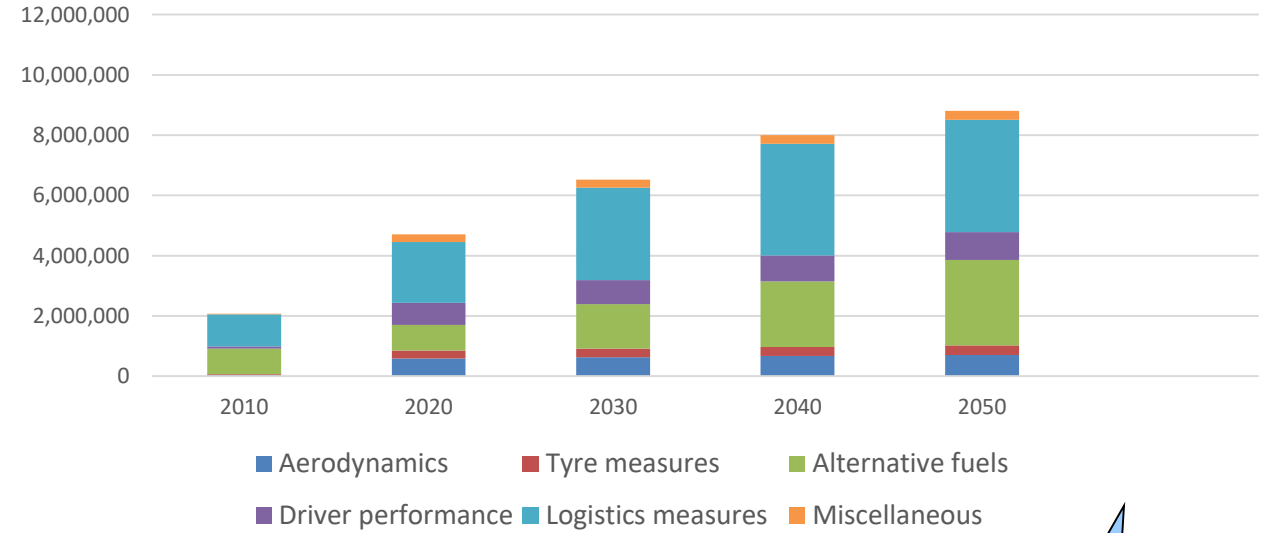
Results of roadmapping model

78% reduction in CO₂ emissions over 1990 levels

Maximum CO₂ Saving Scenario

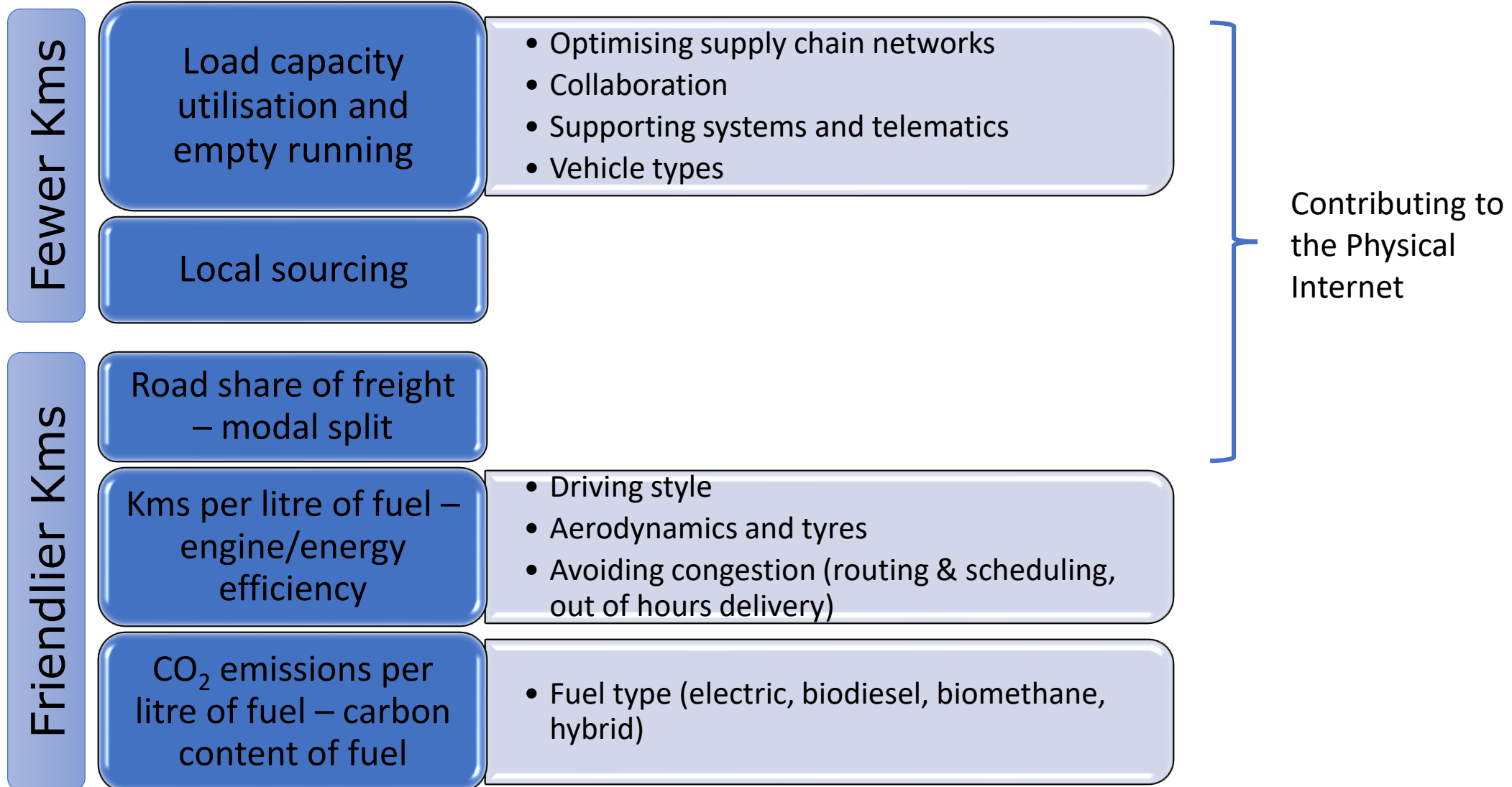


Positive Net Present Value Scenario



60% reduction in CO₂ emissions over 1990 levels

Opportunities for Sustainable Cost Effective Logistics



Contributing to the Physical Internet

Trends Changing the Shape of Supply Chain Networks

Thank You
Questions?

