ARTFuels

The future use of energy in heavy duty transport in view of the targeted sector decarbonization

Thursday 05 November - 16:30 - 18:00 CET

ARTFuels

Support for alternative and renewable liquid
& gaseous fuels forum (policy and market issues)

Heavy Duty Transport
- Position of the ART Fuels Forum

Anders Röj
ART Fuels Forum - Heavy Duty Transport

Future Use of Energy in Heavy Duty Transport in View of the Targeted Sector Decarbonization
Webinar 5 November, 2020

ART Fuels Forum

- "ART Fuels Forum (https://artfuelsforum.eu/) brings together……

  …….the ***fuel producing industry***, the ***transport industry***, main ***international cooperation actors*** and ***EU policy makers*** …….
  …….towards facilitating ***discussion*** and ***elaboration*** of ***common issues of policy and market penetration barriers for these fuels***…."

- Transport sectors: ***Aviation, Heavy Duty Transport, Maritime, Passenger Cars***

- Production industries: ***Thermochemical, Biochemical, Lipid-based and Algae Fuels, Biomethane, Power-to-X***
- ***Future Concepts*** and ***Recycled Carbon Fuels***

AFF Position Heavy Duty – Overall summary

- EU's ambitious CO2 reduction goals - as expressed by the **Green Deal** and the **non-ETS effort sharing** requirements - **cannot be accomplished without a strong contribution from the transport sector**
- The expected CO2 reduction from the transport sector **cannot realistically be fulfilled without a strong contribution from sustainable renewable fuels**
- Heavy duty transport – particularly long-haul - is one of the sectors that is **most difficult to 'decarbonize'** (from fossil carbon)
- Heavy duty transport will **strongly depend on reliable and efficient ICE engines** (particularly diesel engines) for many years to come, even after 2040
- In a longer perspective, low-blending of bio-components into fossil basefuels will not be enough, **neat renewable fuels for dedicated ICE engines will be needed**
- **A level playing field** between the different energy carriers/fuels is strongly requested. This should be particularly based on **their ability to reduce fossil CO2** in a **Well-to-Wheels** perspective
- Better **alignment between regulations on fuels (REDII, FQD, AFID…) and the vehicle CO2 regulations** is needed

AFF position – fuels in the HDV CO2 directive

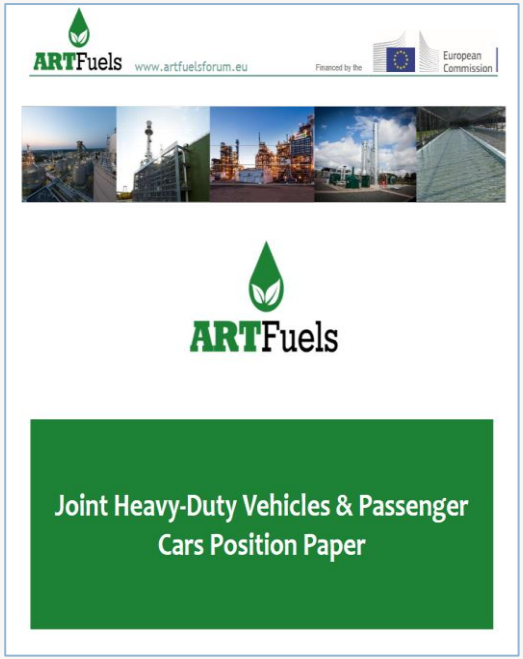
- The present HDV CO2 directive calls for **15% CO2 reduction in 2025 and 30% reduction in 2030** (from July 2019-June 2020 baseline)

- **Problems with the directive from a renewable fuels' perspective:**
  - the only metric used for legal purposes is **'g CO2 /ton km'** (VECTO simulation)
  - makes **no difference between fossil carbon and bio-carbon** in the fuel
  - the energy efficiency aspect (VECTO = Vehicle Energy Consumption calculation Tool) can basically be lost when there is no carbon in the fuel, or the carbon/energy ratio differs drastically from known hydrocarbon fuel systems
  - **energy carriers without a carbon content (electricity, hydrogen, NH3) will always be "zero CO2" regardless of their origin**
  - to ensure a level playing field between energy carriers: **well-to-wheels approach** is necessary

- **Article 15 in the HDV CO2 directive** calls for the Commission to make a **review by 31 December 2022**
  - DG Clima is about to start this review
  - **'Synthetic and advanced alternative liquid and gaseous renewable fuels, including e-fuels'** is mentioned in the review guideline in Article 15
  - AFF members are available to support the parts of this review that are related to fuels

ART Fuels Position – Heavy Duty and Passenger Cars

- Joint AFF position paper for Heavy Duty Vehicles and Passenger cars https://artfuelsforum.eu/wp-content/uploads/2020/07/ART-Fuels-Forum_Joint-Position-Paper_FINAL.pdf



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The European Green Deal and Research & Innovation as a Driver for Change

von der Leyen Commission

#EUGreenDeal

Maurizio Maggiore
EC DG RTD
ART Workshop
5/11/2020

Research and Innovation

Designing a set of deeply transformative policies

SMARTER, MORE SUSTAINABLE TRANSPORT

- Strategy for **Sustainable and smart mobility in 2020**
- Revise **the CO_2 emissions performance legislation** for light duty vehicles by June 2021
- **Extend EU's Emission Trading** to the maritime sector, and to reduce the free allowances for airlines by June 2021
- Support **public charging points: 1 million by 2025**
- Boost the production and supply of **sustainable alternative fuels** for the different transport modes
- Review the **Alternative Fuels Infrastructure Directive** and the TEN-T Regulation in 2021
- More **stringent emissions standards** for combustion-engine vehicles and updated **air quality** standards

HORIZON EUROPE'S EUROPEAN PARTNERSHIPS

- A new wave of 49 proposed research and innovation **European Partnerships**, including:
  - Clean **Steel**, **Circular & Bio-based** Europe
  - Clean **Hydrogen**, Clean **Energy Transition, Batteries**
  - Clean **Aviation**, Zero-Emission **Waterborne** Transport & Zero-Emission **Road** Transport (2ZERO)
  - Sustainable & Safe **Food System,** Environmental Observation for **Sustainable Agriculture**
  - **Rescuing Biodiversity** to Safeguard Life on Earth
  - Climate Neutral **Blue Economy, Water for All**

Towards zero-emission road transport (2ZERO)

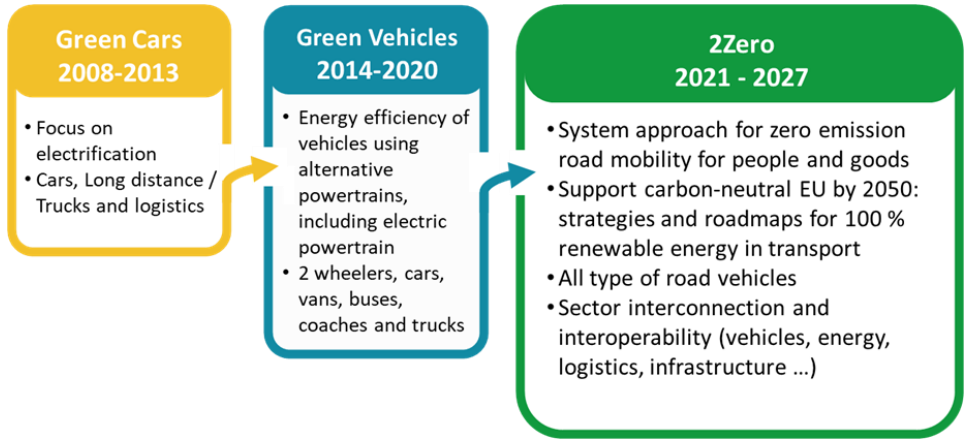
➢Co-programmed Partnership, successor of Green Vehicles Initiative cPPP

OBJECTIVES

- Develop **zero-emission, affordable user centric solutions** (technologies and services) for road-based mobility all across Europe, accelerating users' acceptance
- Develop technologies/solutions to **reduce all emission sources** (e.g. tyres and brakes), **noise and improve air quality**
- Develop and demonstrate affordable, user-friendly **charging infrastructure technology and V2G interaction** (digitalisation, smart charging solutions, efficient fast charging)
- Develop **innovative use cases** for integration of **zero-emission vehicles** and infrastructure for **mobility of people and goods**
- Support the development of **life-cycle tools and skills** and deployment of innovative concepts in products/services in a **circular economy context**

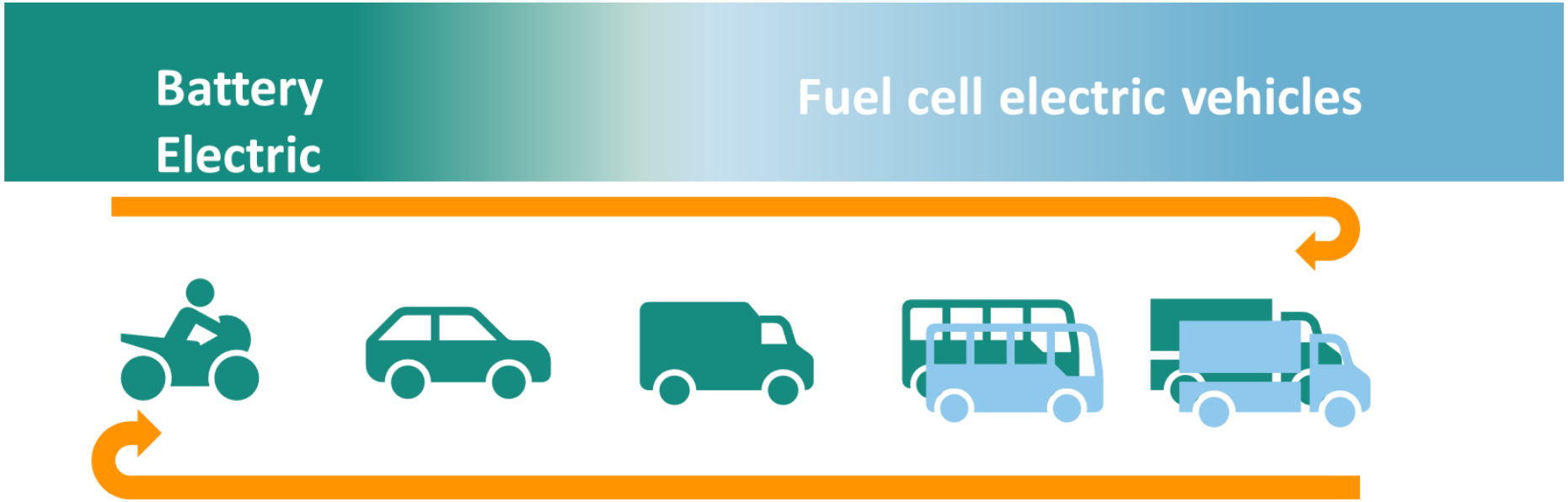
EXPECTED IMPACTS

- Support Europe as carbon-neutral continent by 2050
- Technology leadership supporting economic growth and job creation all over Europe
- Wide deployment of zero-emission, affordable user centric solutions
- CO2 emission reduction and air quality improvements



From vehicle to system

2Zero funding will focus on zero tailpipe emissions



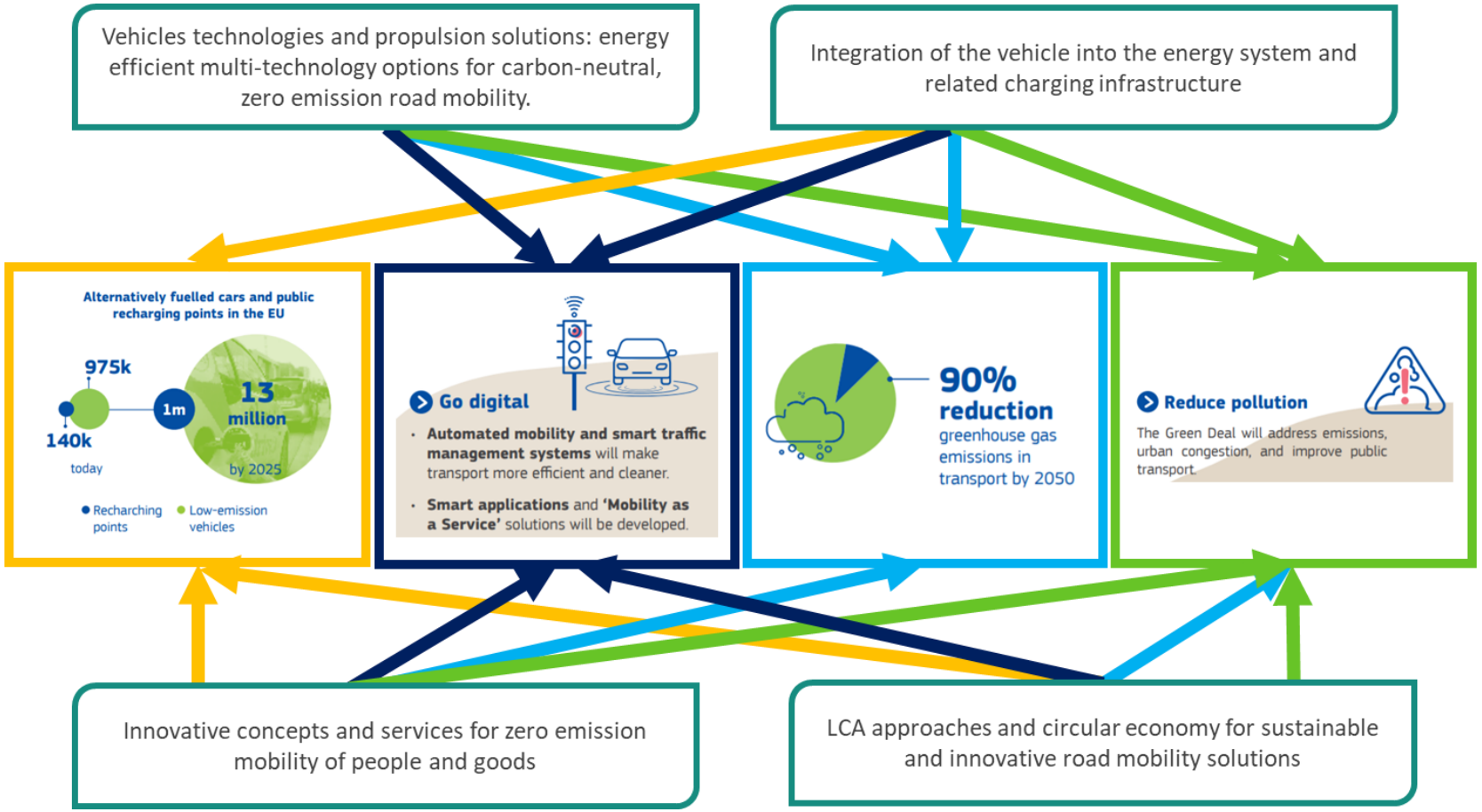
BEV

- Vehicle integration of innovative battery technologies
- Vehicle architecture
- Battery management systems and thermal system
- Battery packs and modules
- Power electronic and charging solutions
- Advanced electric motors
- Integration of BEV into the grid

FCEV

- Electrification of heavy duty vehicles
- Integration of fuel cell systems into vehicles, focusing on heavy duty vehicles
- Synergy of electronics and vehicles architecture with electric vehicles
- Integration of hydrogen components (tank, sensors,…)

2Zero contribution to the Green Deal objectives



HORIZON EUROPE GREEN DEAL MISSIONS

Adaptation to climate change, including societal transformation

Climate-neutral and smart cities

Soil health and food

Healthy oceans, seas, coastal and inland waters

THANK YOU

Contact: maurizio.maggiore@ec.europa.eu

ETIP Bioenergy
European Technology and Innovation Platform

ART Fuels Forum – Working Group session "HDV and Passenger Cars"

5 November 2020

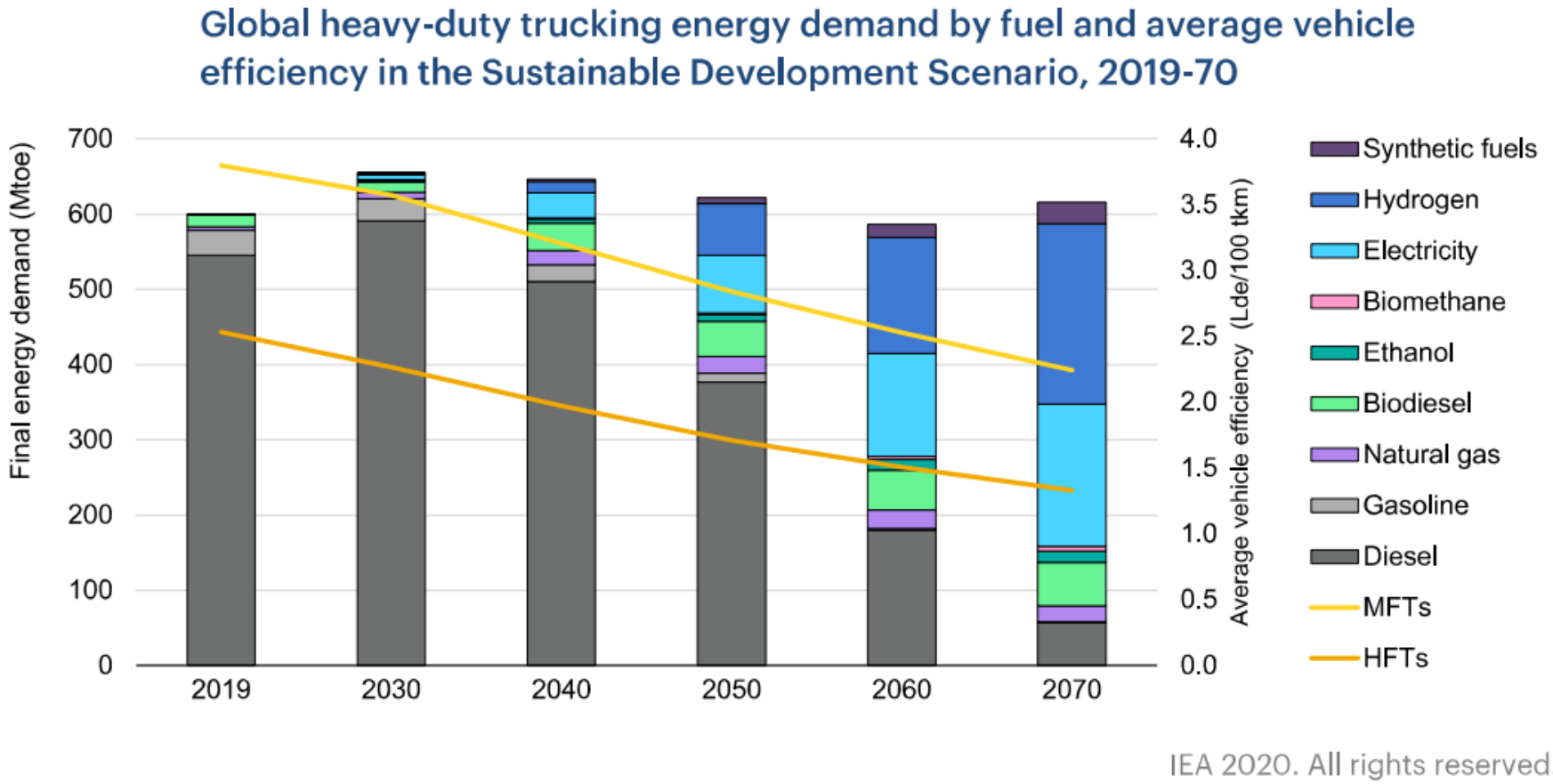
Patrik Klintbom, RISE

Act Focus Area Manager, Fossil Free Transport

Chair ETIP Bioenergy

ETIP Bioenergy
European Technology and Innovation Platform

HD Transport – Status and Outlook



Notes: Lde = litres of diesel equivalent; tkm = tonne-kilometres; MFTs = medium-freight trucks (3.5-15 tonnes GVW); HFTs = heavy-freight trucks (> 15 tonnes GVW). Efficiency improvements more than offset activity growth in the 2030-60 time period, but after 2060 activity demand growth overwhelms efficiency improvements, leading to increases in final energy demand.

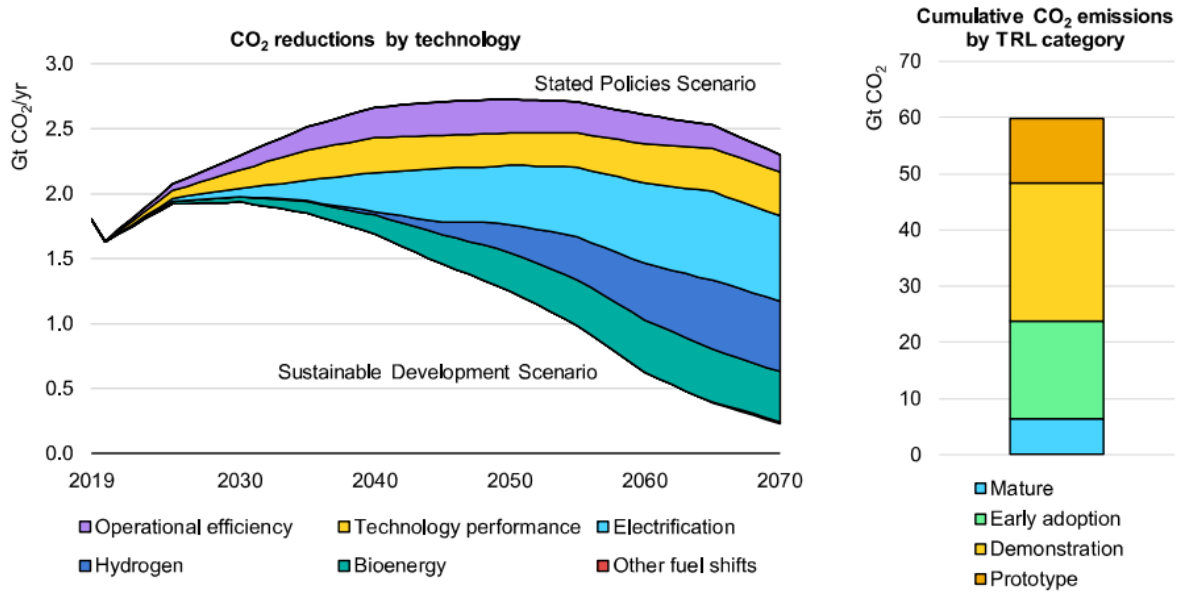
Source: IEA, 2020: Energy Technology Perspectives 2020 (https://www.iea.org/reports/energy-technology-persp

HD Transport – Status and Outlook

- According to the Stated Policies Scenario, emissions in the road freight sector continue to increase through 2045;
- Net-zero emissions will not be achieved until after 2070;

→High costs of fully decarbonising road freight in comparison to other options in the energy system as a whole.

Global CO_2 emissions from trucks by abatement measure (left) and technology readiness level (right) in the Sustainable Development Scenario relative to the Stated Policies Scenario, 2019-70



Source: IEA, 2020: Energy Technology Perspectives 2020 (https://www.iea.org/reports/energy-technology-perspectives-20

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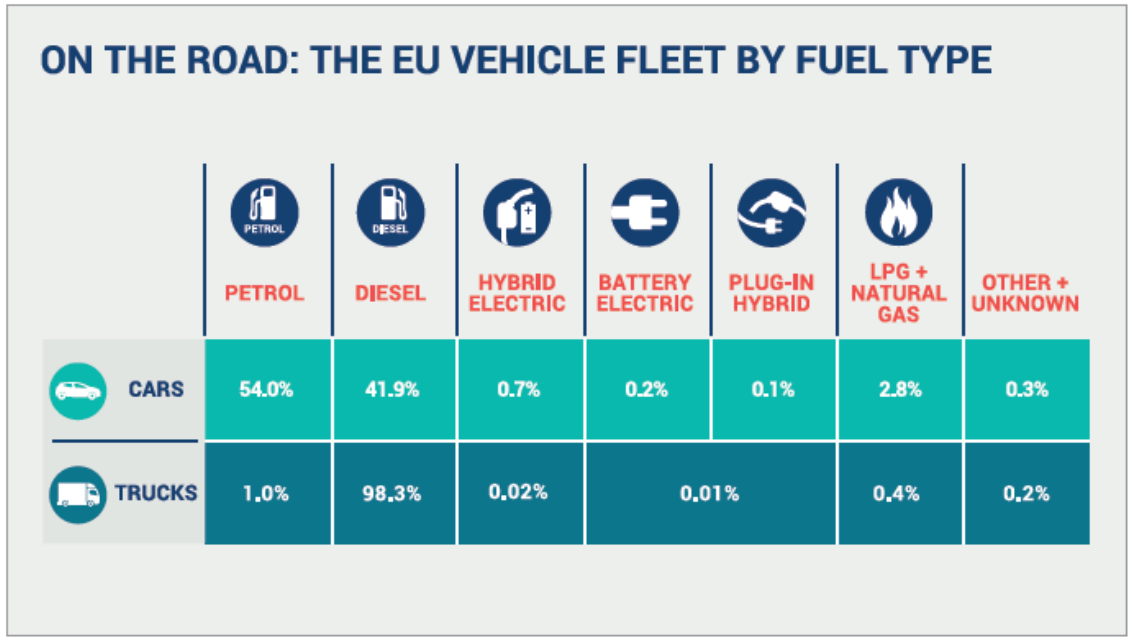
HD Transport – Status and Outlook

- HDVs mostly use diesel today (more than 98% market share);
- Electricity and hydrogen are foreseen to significantly expand in the next decades;
- However, the pre-eminence of liquid, fossil fuels will not be challenged in the mid-term;
- Bioenergy is the only option reducing GHG emissions in the transport sector immediately – as low level blends and drop in fuels can be used in the whole vehicle fleet;

→ Lack of alternatives in the short term

- Well-to-wheel approach to ensure a fair comparison of vehicles running partly or fully on renewable fuels and electric vehicles.



Source: ACEA, Vehicles in use - Europe 2019 | Trucks = medium and heavy-duty commercial vehicles

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HD Transport - Challenges

- The HDV sector can be described as highly cost-competitive, concentrated in decision-making and fleets/refueling;
- Highly dependent on equipment/engine on-the-road reliability;
- Clear impact on Total Cost of Operation (TCO), critical to competitiveness, and a request for fuel stability to avoid excessive wear and tear and consequent unreliability;
- The concentration in the sector will obviously open the possibility of modified motorisations, using other alternative fuels, i.e. beyond biofuels;

  →Options: e.g. (bio)methane, alcohols like methanol or ethanol (ED95), DME or electricity;

  →Use in vehicle fleets in a limited range only;

  →Some Options do not have the advantages of drop-in solutions;

  →Requirement: The forthcoming equipment regulation proves to be too severe for traditional ICEs, and/or related cost and fuel infrastructure are proven doable.

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Research & Innovation for HD Transport

KEY R&I SUBJECTS – Short- (now) and mid-term (by 2030)

- Increasing the FAME blend wall to maximise incorporation in diesel (stability issue) for specific applications, e.g. captive fleets; — Short-term
- Development of renewable diesel:
  - R&D mainly focused on the sustainability of the feedstock production process value chain;
  - Ensure a deep understanding of this new fuel;
  - Maximisation of alcohols incorporation in diesel: R&D on qualities required for these bio-components to allow incorporation in diesel;

  — Short- & mid-term
- Impact of biodiesel on engine performance: exhaust emissions, fuel stability, material and component compatibility, interaction with engine oil, consequences of blending several different fuels. — Mid-term

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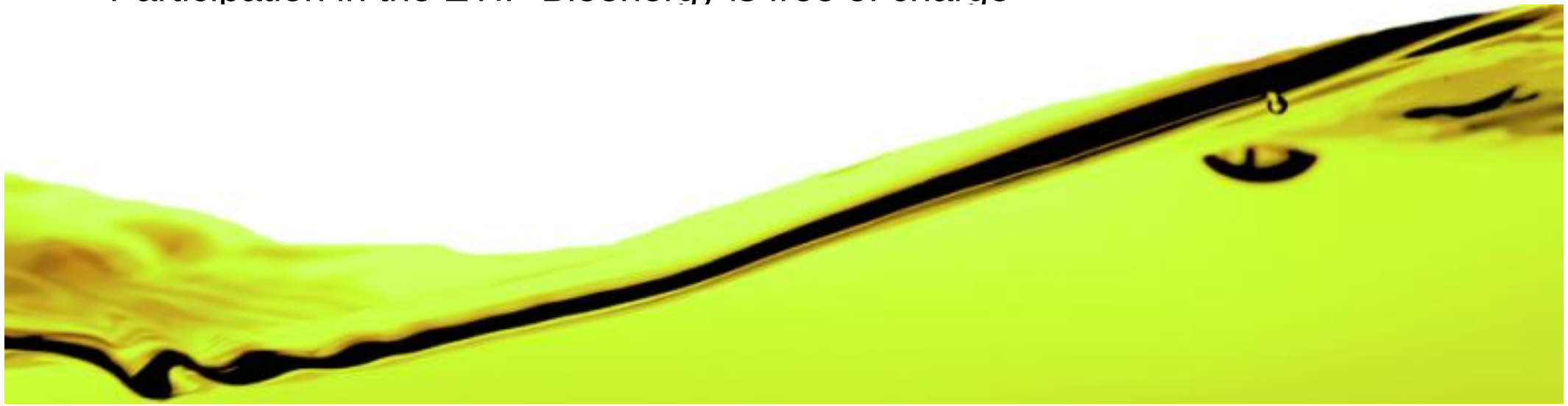
How to participate in ETIP Bioenergy

- You are kindly invited to join the ETIP Bioenergy!
- How can we serve you?

  → We would be happy to discuss collaboration possibilities with you
- Participation in the ETIP Bioenergy is free of charge



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Thank you!

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Project Partners

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CEI CENTRAL EUROPEAN INITIATIVE
RISE

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The Fuel Quality Directive and the HDV Standards Regulations

ART Fuels Forum workshop on decarbonisation of the road transport sector

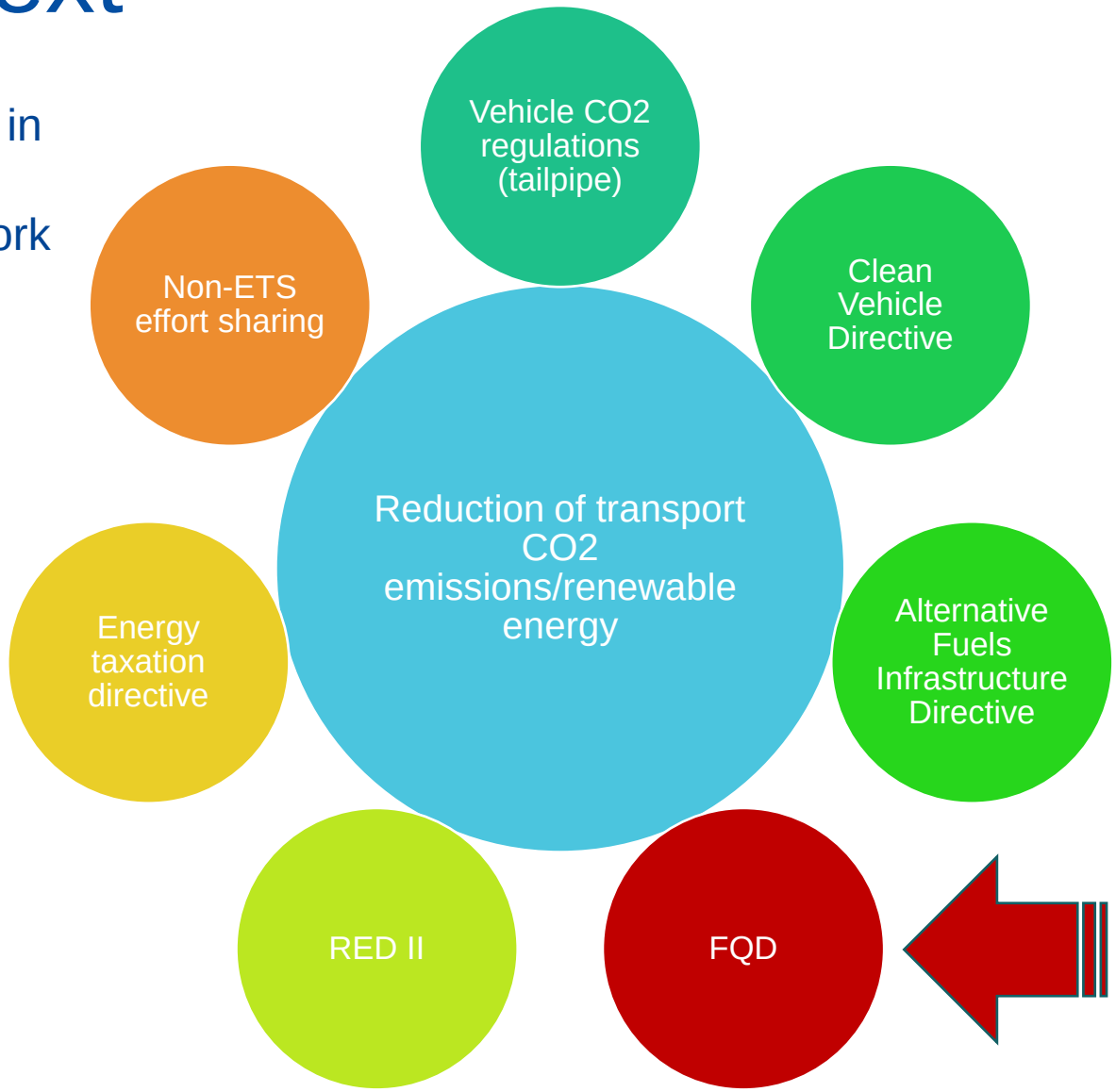
5 November 2020

Laura Lonza and Nikolaus Steininger

Road transport – DG CLIMA – European Commission

FQD Context

Multiple legal acts in a coordinated regulatory framework



FQD Objectives

High level of protection of the environment and human health

- Reduce pollution from transport sector
- Enhance air quality
- Reduce greenhouse gas emissions and ensure biofuel sustainability
- Ensure proportionality (derogations)

Compatibility of fuels with engines and after treatments

- Ensure the proper functioning of engines and after treatment systems
- Guarantee quality of petrol and diesel
- Contribute to the single market for petrol and diesel fuels

Fuel Quality and Renewable Energy Directives

Features	FQD	RED
2020 Targets	Requires MS to oblige fuel suppliers to achieve at least 6% GHG saving from fuels supplied in 2020	Requires MS to meet 10% renewable energy share in the transport sector by 2020
Scope	Fuels used in on-road vehicles, NRMM, inland navigation, rail, agricultural/forestry tractors, recreational craft …excludes: Electricity used in rail …opt in: Aviation fuels	Fuels used in on-road vehicles, inland navigation, rail …excludes: NRMM, agricultural/forestry tractors …opt in: Aviation fuels
Compliance means	All transport fuel options Renewable electricity UER (optional)	Biofuels, bio-methane Renewable electricity Multiple counting factors for non food/feed competing feedstocks
Market mechanisms	UER (optional)	None
Sustainability criteria	Mandatory: determining fuels' eligibility in the EU regulatory scheme) Sustainable cultivation and production of biofuels Minimum GHG savings per energy unit (increasing stringency)	
iLUC emissions	Reported but not counting towards targets 7% cap on food/feed competing feedstocks: optional	Reported but not counting towards targets 7% cap on food/feed competing feedstocks: mandatory

Renewable Energy Directive recast 2030

- Directive 2018/2001/EU
- 32% Renewable Energy Sources consumption by 2030
- 14% transport sub-target of renewables in energy consumed in road and rail transport by 2030

- Revised sustainability criteria
- Revised default values

FQD revision in a nutshell

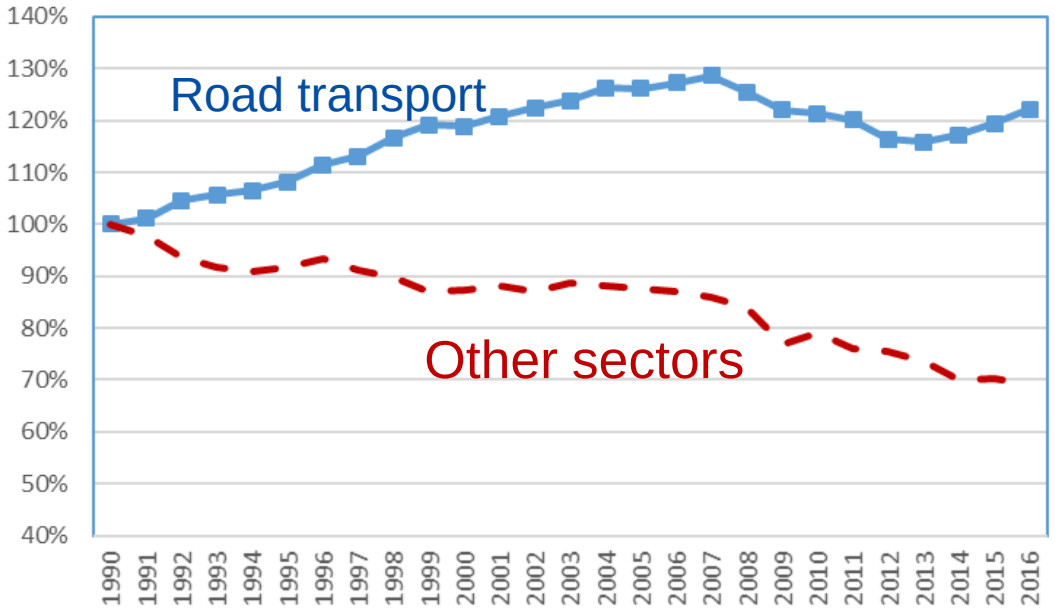
#1 Potential barriers to renewable energy transport targets in RED II

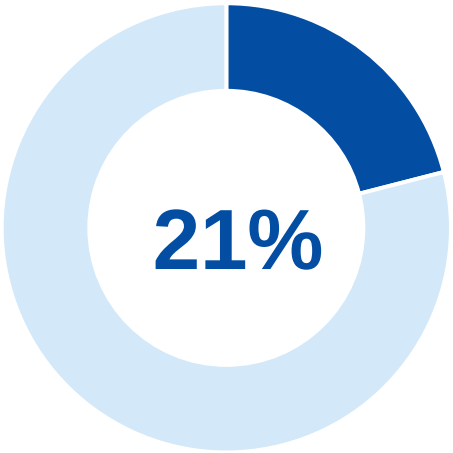
#2 High(er) blends of alternative fuels

#3 Further evolution of fuel quality requirements and monitoring

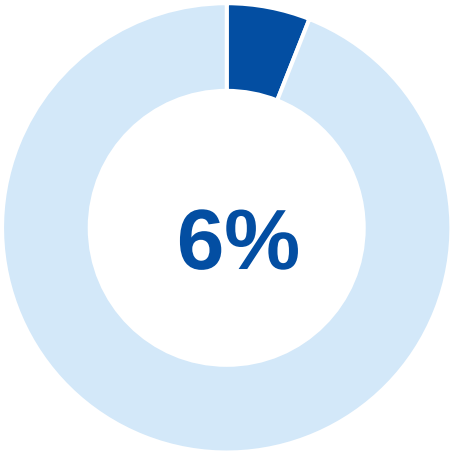
European Commission

EU transport CO_2 emissions figures





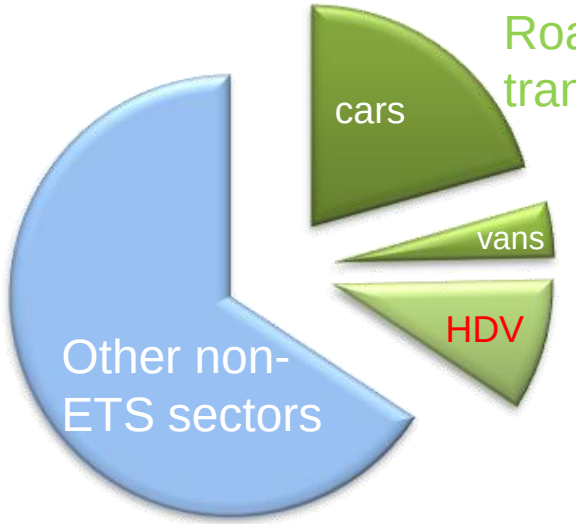
Road transport



HDV

Of total EU CO_2 emissions

2015 Emissions in non-ETS sectors



Road transport: 34% of non-ETS emissions in 2015

Despite some improvements in fuel consumption efficiency in recent years, **HDV CO_2 emissions are still rising**, mainly due to increasing road freight traffic.

European Commission

How are HDV CO2 emissions regulated? (1)

Software tool based on tests

- Step-wise approach
- Compliance with targets verified on basis of emissions determined at type approval
- HDV type approval based on **VECTO** simulation tool as a 'virtual laboratory' to determine fuel consumption and CO2 emissions
- Only for newly registered HDVs placed on the EU market
- **Certification** regulation: Procedure to calculate CO_2 emissions and fuel consumption with VECTO

VECTO
Vehicle Energy Consumption Calculation Tool

Certification regulation

Monitoring and reporting

- CO_2 emission standards
- Setting of baseline

2017 2018 2019

First official data to be published in 2021

(Buses and coaches at a later stage)

European Commission

How are HDV CO2 emissions regulated? (2)

Trucks are divided within Regulation 2017/2400 (CO_2 determination) into 18 different vehicle groups

Description of elements relevant to the classification in vehicle groups			Vehicle group	Allocation of mission profile and vehicle configuration						
Axle configuration	Chassis configuration	Technically permissible maximum laden mass (tons)		Long haul	Long haul (EMS)	Regional delivery	Regional delivery (EMS)	Urban delivery	Municipal utility	Construction
4x2	Rigid lorry	> 3,5 –7,5	(0)							
	Rigid lorry (or tractor)**	> 7,5 – 10	1			R		R		
	Rigid lorry (or tractor)**	> 10 – 12	2	R+T1		R		R		
	Rigid lorry (or tractor)**	> 12 – 16	3			R		R		
	Rigid lorry	> 16	4	R+T2		R		R	R	
	Tractor	> 16	5	T+ST	T+ST+T2	T+ST	T+ST+T2	T+ST		
	Rigid lorry	> 16	4v***						R	R
	Tractor	> 16	5v***							T+ST
4x4	Rigid lorry	> 7,5 – 16	(6)							
	Rigid lorry	> 16	(7)							
	Tractor	> 16	(8)							
6x2	Rigid lorry	all weights	9	R+T2	R+D+ST	R	R+D+ST		R	
	Tractor	all weights	10	T+ST	T+ST+T2	T+ST	T+ST+T2			
	Rigid lorry	all weights	9v***						R	R
	Tractor	all weights	10v***							T+ST
6x4	Rigid lorry	all weights	11	R+T2	R+D+ST	R	R+D+ST		R	R
	Tractor	all weights	12	T+ST	T+ST+T2	T+ST	T+ST+T2			T+ST
6x6	Rigid lorry	all weights	(13)							
	Tractor	all weights	(14)							
8x2	Rigid lorry	all weights	(15)							
8x4	Rigid lorry	all weights	16							R
8x6 8x8	Rigid lorry	all weights	(17)							

* EMS - European Modular System
** in these vehicle classes tractors are treated as rigid lorries but with specific curb weight of tractor
*** sub-group "v" of vehicle groups 4, 5, 9 and 10: these mission profiles are exclusively applicable to vocational vehicles

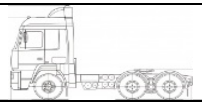
T	=	Tractor	
R	=	Rigid lorry & standard body	
T1, T2	=	Standard trailers	
ST	=	Standard semitrailer	
D	=	Standard dolly".	

4 categories summing up to 2/3 of the total CO_2 emissions from HDVs

European Commission

How are HDV CO2 emissions regulated? (3)

- Targets: Defined within Regulation (EU) 2019/1242 setting CO_2 emission standards for HDV
- Scope: As a first step, the Regulation 2019/1242 for HDV covers only some large truck categories: vehicle groups 4,5,9 and 10 with a technically permissible maximum laden mass (TPMLM) > 16t
- Vocational vehicles (garbage trucks, etc.), smaller trucks, buses, coaches… are excluded for the moment of the regulatory scope

Vehicle group	Axle and chassis configuration	Without trailer
4	4x2 Rigid	
5	4x2 Tractor	
9	6x2 Rigid	
10	6x2 Tractor	

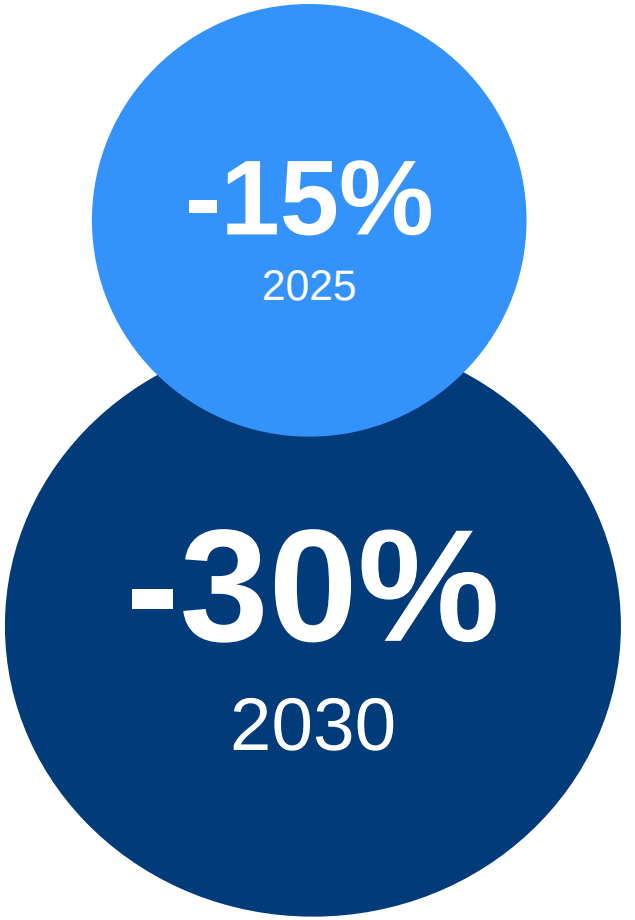
4 categories summing up to 2/3 of the total CO_2 emissions from HDVs

Vans up to 3.5 ton are not HDV

Regulation (EU) 2019/1242: CO_2 targets

Binding CO_2 reduction targets for fleets of new trucks for the regulated HDV categories

- For each manufacturer ('specific CO2 emissions target')
- Reduction as compared to the 2019 baseline (= average of all manufacturers).
- Sufficient lead time combined with the possibility of early uptake of existing fuel-efficient technologies
- **Unit:** g CO_2/t km
- Tailpipe based approach. Based on type-approval values from Regulation 2017/2400 and VECTO simulations.
- Full flexibility for manufacturers to balance emissions between the different groups of vehicles within their portfolio, including ZEV contributions, even from non-regulated vehicle categories



European Commission

Incentive mechanism for ZEV/LEV

- No ZEV / LEV quotas currently
- Scope covering both ZEV and LEV: technology-neutral
- Also smaller ZE trucks with TPMLM < 16t and vocational ZE trucks, not regulated yet for their CO_2 emissions, can contribute to incentives! (nevertheless, ZE buses and coaches excluded)
- **Until 2024:**
  - Super-credits subject to a 3% CO_2 reduction cap (for early adoption credits facilitating compliance in 2025).
  - ZEV counted as two vehicles. LEV *up* to two vehicles according to: its specific CO_2 emissions and the low-emission threshold of the vehicle sub-group to which the vehicle belongs
- **From 2025:**
  - One-way/bonus-only crediting system based on a 2% benchmark from 2025 onwards
- 2030 ZEV/LEV benchmark to be set by the next Regulatory review in 2022

Low-emission heavy-duty vehicle

LEV

Emissions below 50% of the reference CO_2 emission of the sub-group to which the vehicle belongs (other than ZEV)

Zero-emission heavy-duty vehicle

ZEV

No combustion engine or emissions less than 1 gCO2/kWh at type-approval of engine*

Governance provisions

CO_2 emissions reference baseline

- 2019; review in 2022
- Avoid inflated reference CO_2 emissions baseline
- Setting criteria for determining undue increases and how they should be corrected

Penalties (€/gCO_2/tkm)

- 2025: €4,250
- 2030: €6,800
- Above the marginal cost of meeting the targets → deterrent for manufacturers

Real-world CO2 emissions

- Ensure type-approval certification procedures (VECTO) result in CO_2 emission values representative of real-world emissions
- Prevent an increase of the **gap** between real and certified emission values
- 2027: Mechanism to adjust concerning 2030 specific manufacturer's emissions, if needed

In-service verification

- Type-approval certification validation of CO_2 emission values in vehicles in use
- Commission to lay down principles and procedures. Verification by Member States (type-approval)

European Commission

Review of Regulation (EU) 2019/1242

Art 15 - Reg 2019/1242

Review proposal for 2022

- Assessment based on cost-efficient CO_2 reduction technical potential

Other concerned policies pending of revision

- TEN-T
- Eurovignette
- Fuel Quality Directive

CO_2 emission targets review

- Overall ambition assessment for 2025, 2030
- Possible targets for 2035 and 2040

Review of existing targets

2025 & 2030

New binding targets

- 2025 and beyond (depending on HDV categories)

ZEV / LEV

- Key role for 2030
- Deployment assessment and potential

Incentives

- Evaluation of current incentive mechanism
- Assessment to stimulate ZEV/LEV market uptake

Bio- and e-fuels

- Including hydrogen
- Assessment of ccontributions to decarb.
- CO_2 credits for manufacturers?
- Life-cycle assessment of CO_2 emissions?

VECTO
Vehicle Energy Consumption Calculation Tool

- Assessment to ensure tool updating
- More certificated HDV categories

CO_2 Standards scope extension

- Smaller trucks' categories
- City buses and coaches
- Trailers and semi-trailers
- Vocational vehicles
- EMS concept
- Pooling

Refueling infrastructure

- Assessment within revised AFID (Alternative Fuels Infrastructure Directive)

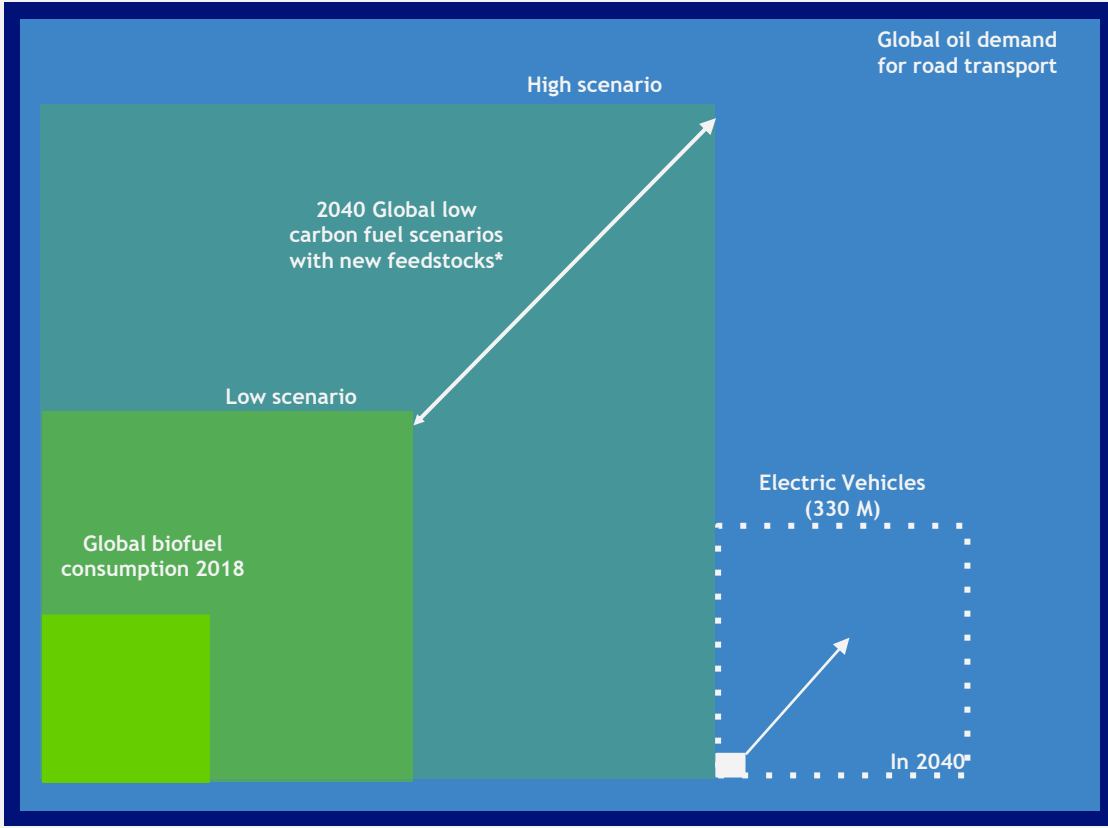
European Commission

Neste

On a journey to a carbon neutral world

Mats Hultman | Head of OEM Partnerships

Global Oil Consumption today (4,500 Mt/a)



The decarbonization challenge is huge!
Every solution is needed and should be exploited to the maximum.

Low carbon fuels are a truly scalable and system level solution to reduce GHG emissions!

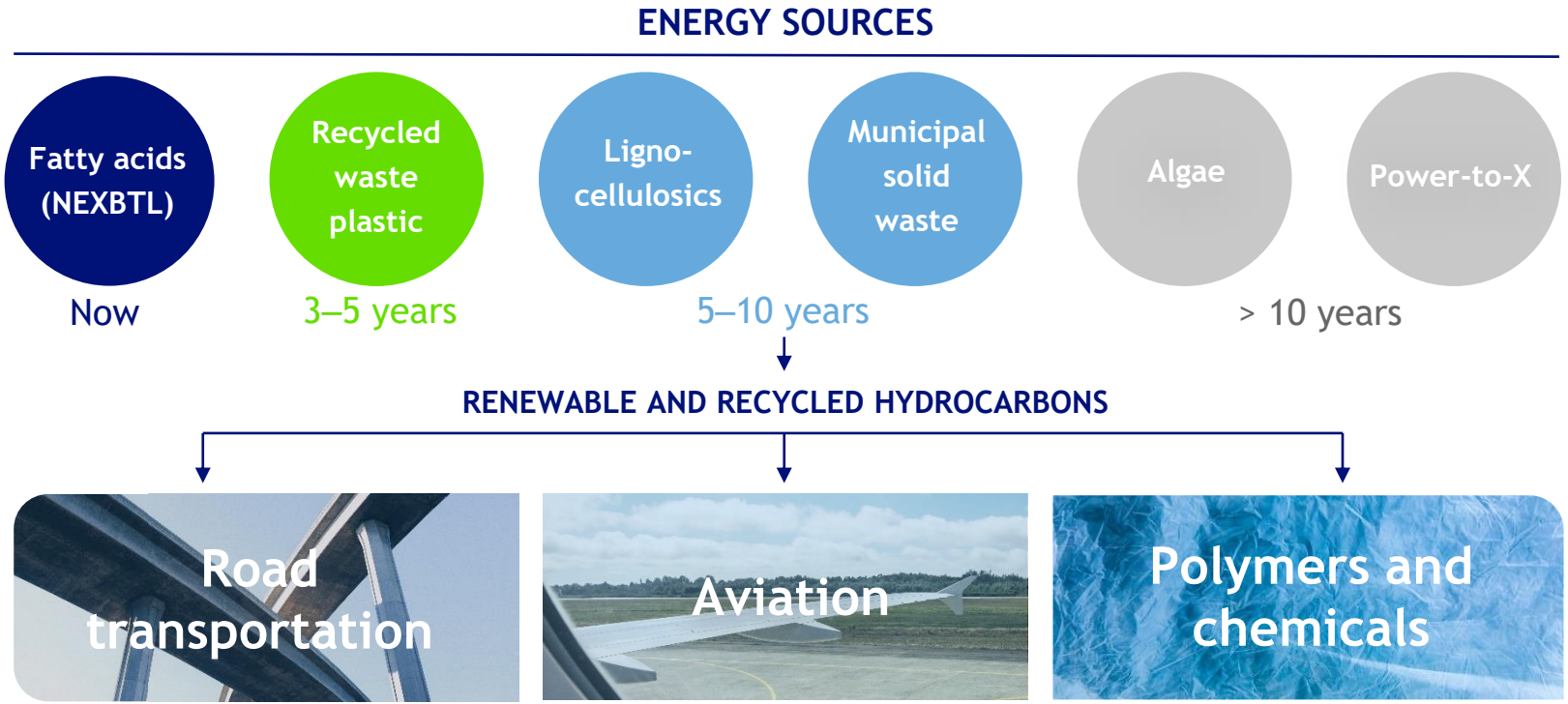
To fully utilize this potential, we need favorable regulation that recognizes their potential.

* New feedstocks: Waste and residue fats and oils, waste plastic, municipal solid waste, lignocellosic biomass, algae and PtX

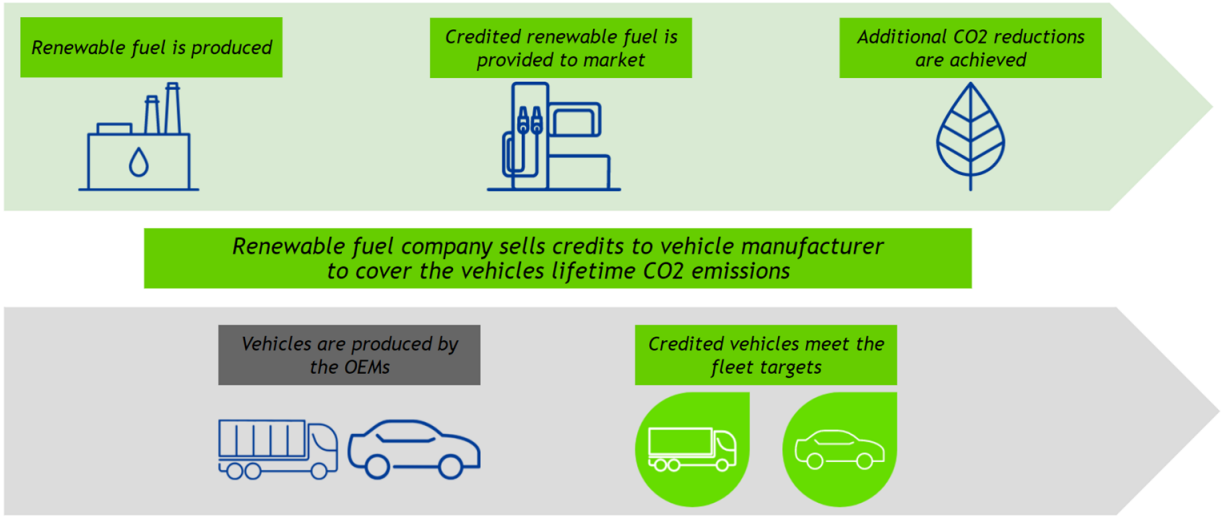
Source: Neste based on IEA World Energy Outlook 2019, Stated Policies Scenario. UNDP, ExxonMobil and others

NESTE

We are set to become a global leader in renewable and circular solutions with a strong focus on innovation



Crediting system for renewable fuels enables additional CO2 reductions



The Environment: Additional CO2 reduction.

OEM's: Alternative to paying penalties, Potential for additional Zero-emission vehicles, backup if targets are increased.

Renewable fuel producers: Incentaments to invest in increased capacity and new technologies. Stable framework.

The Customers: Lower prices and additional Zero-emission vehicles.


NESTE
The only way is forward

DECARBONIZATION OF HEAVY DUTY TRANSPORT

THE HERE AND NOW SOLUTIONS AND THE INNOVATIONS

BIOFUELS AND WASTE TO FUEL

ELECTRIFICATION

PLATOONING , CONNECTED & AUTONOMOUS

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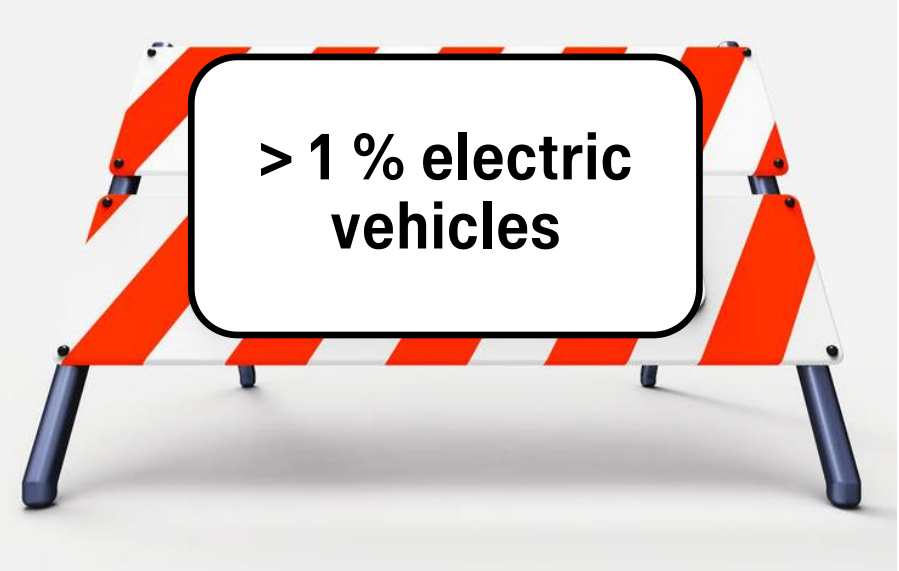
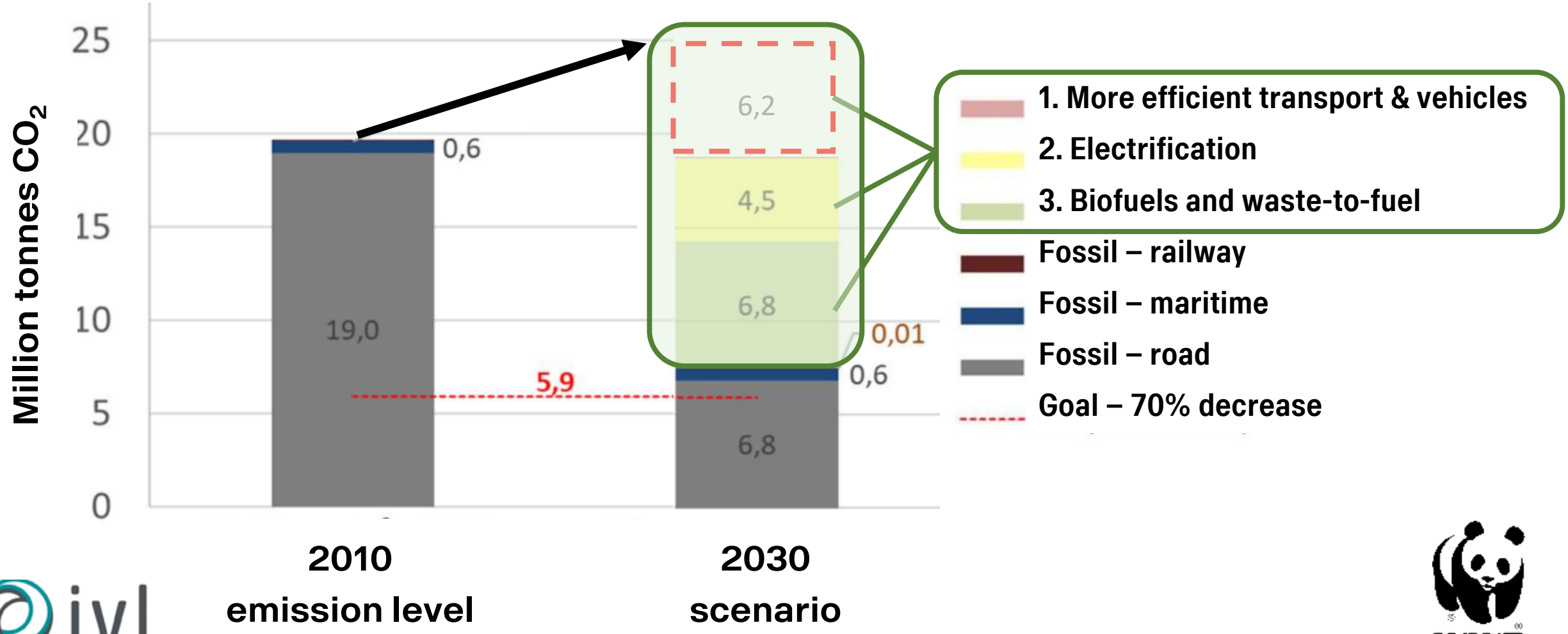
SCANIA

THE CHALLENGE FOR THE HEAVY DUTY TRANSPORT SECTOR



3 KEY TOOLS - EFFICIENCY + ELECTRIC + BIOFUELS
A SWEDISH OUTLOOK FOR DECARBONISATION OF TRANSPORT

WWF and IVL scenario for reaching the Swedish 2030 goal (-70% CO_2) for decarbonisation of transport



Ref: Transportstudien 2019, Analys av åtgärder för en hållbar transportsektor, IVL (Swedish Environmental Research Institute) & WWF, Report Nr C 450

LOW CARBON HEAVY DUTY SOLUTIONS

A BROAD RANGE IS VITAL FOR ACHIEVING PARIS GOALS

BIODIESEL & HVO

-85 % CO_2

BIOETHANOL

-90 % CO_2

BIOGAS & NATURAL GAS

-90 % CO_2

HYBRIDS & ELECTRIC

-92 % CO_2

CITY

SUBURBAN

INTERCITY/REGIONAL

LONG HAULAGE

TOUGH TERRAIN

Need for replacing diesel in rolling fleets

Customers increase GHG demands and goals!

Revision of HD CO_2 directive necessary to include WTW

DID YOU KNOW?

Waste from 1 000 citizens could power a biogas bus/truck for a year!

17 % biogas in EU vehicle gas

94 % biogas in Swedish vehicle gas

4 TWh biogas today. HD transport = 20 TWh

www.bioadvantage.eu

WE NEED TO BOTH

IMPLEMENT THE EXISTING COMMERCIAL LOW CARBON SOLUTIONS,

AND SPEED UP DEVELOPMENT OF THE INNOVATIONS

– AT THE SAME TIME.

There is always an exciting new technology around the corner...

...but do not let perfect be the enemy of good!

Voltaire

THANK YOU FOR YOUR ATTENTION!

BIOFUELS AND WASTE TO FUEL

ELECTRIFICATION

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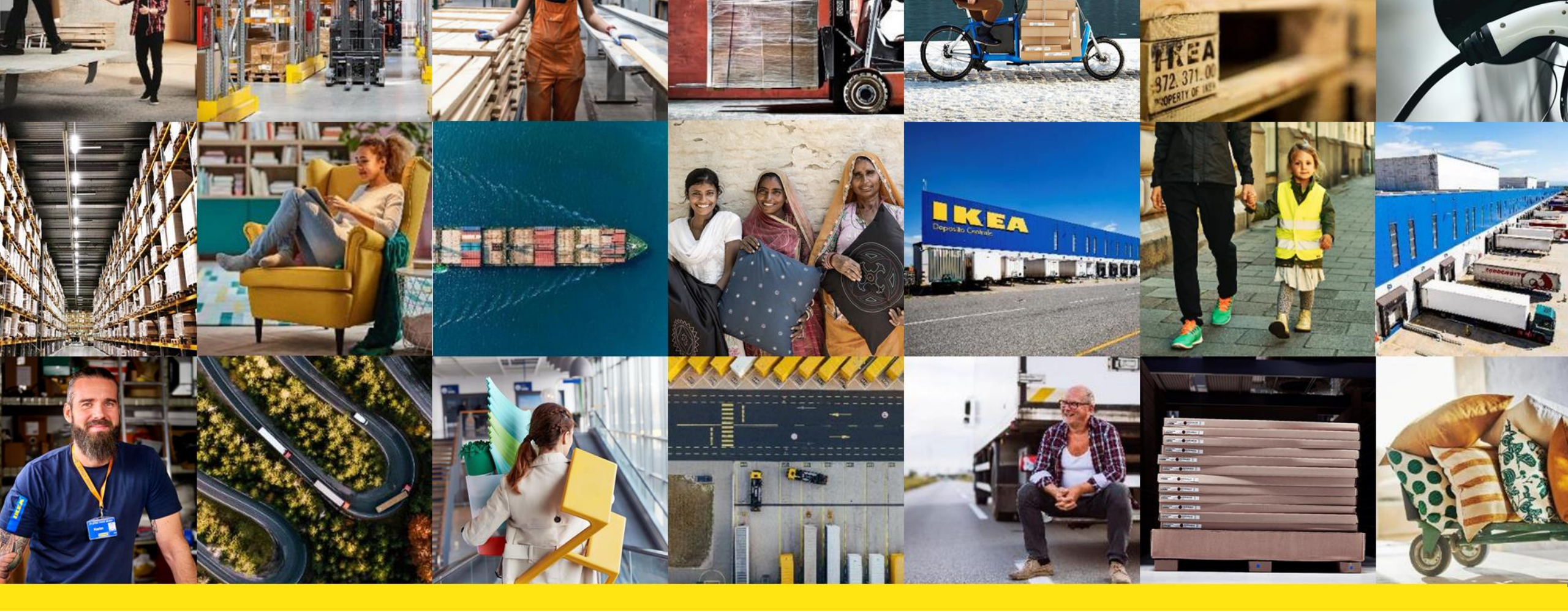


Decarbonising Supply Chain Operations

Nov 5th, 2020

By 2030 our ambition is to **become climate positive** by reducing more greenhouse gas emissions than the IKEA value chain emits, **while growing the IKEA business.**

IKEA is committed to limiting global warming to 1.5°C and has set science based targets

Target FY17-FY30

-70%

co_2e per shipment

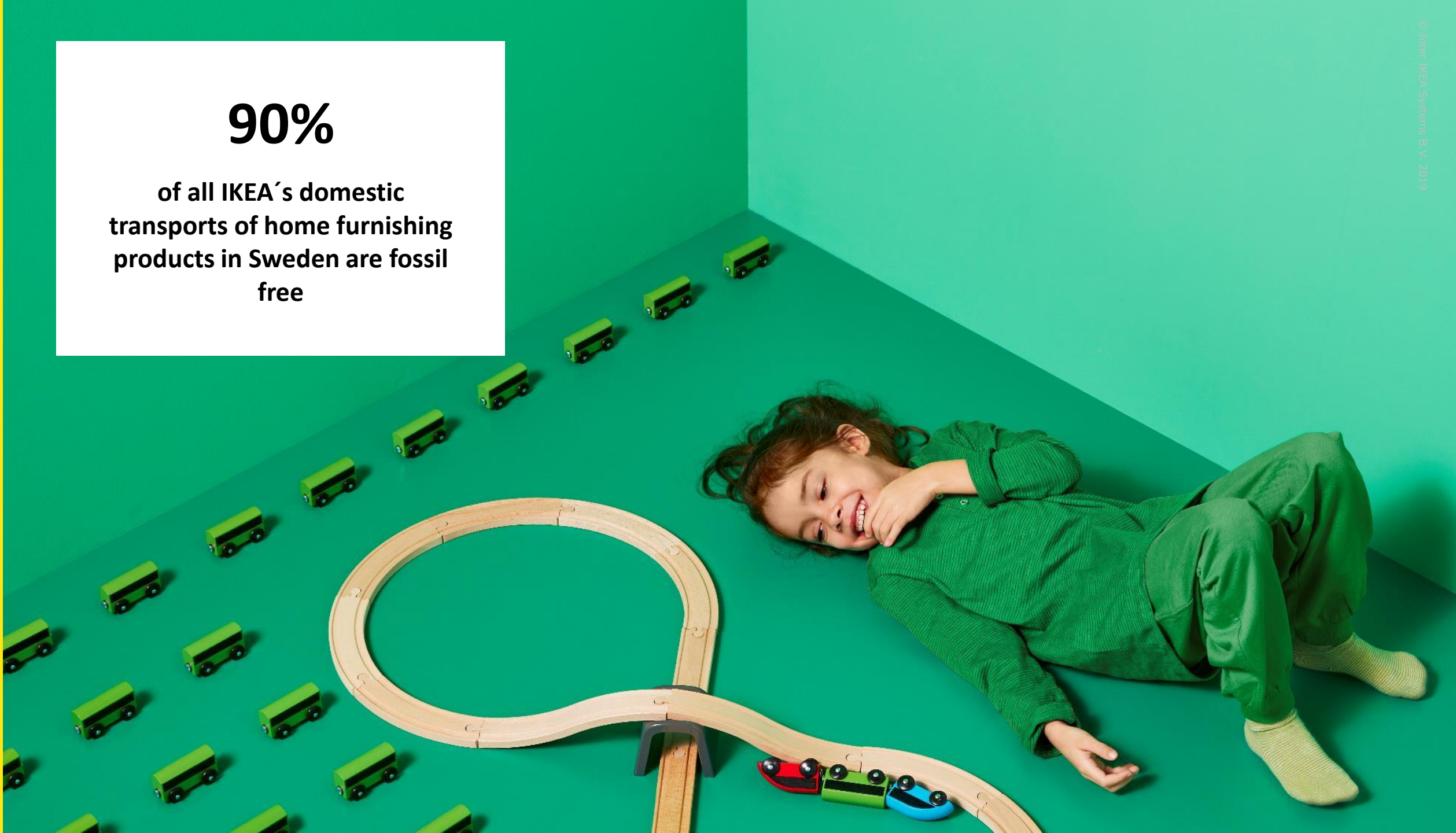
So how do we do this in Supply Chain Operations?

We…

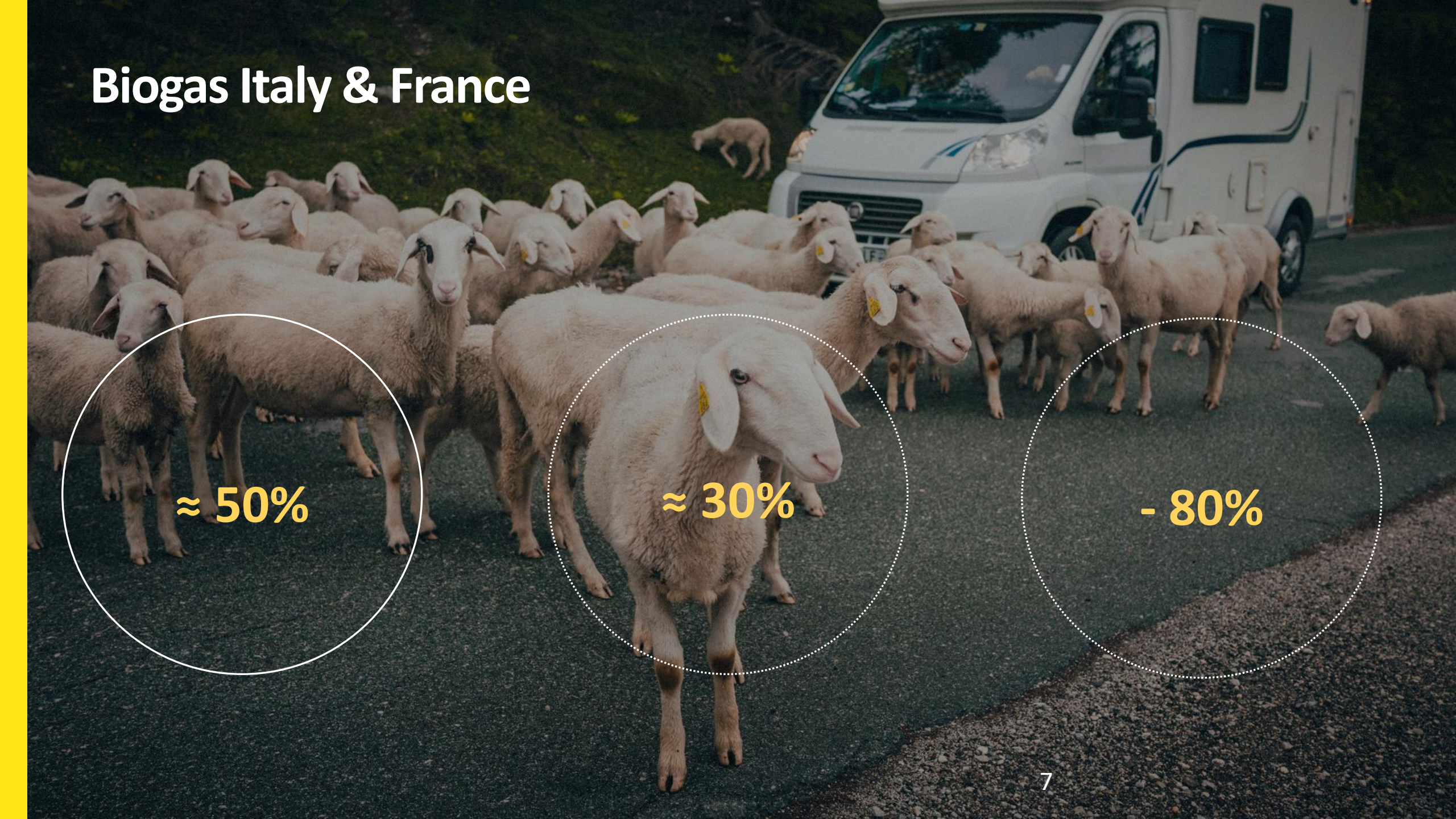

Decarbonise agenda
Innovation
Partnerships
Commercial approach
Rethink
Integrate innovation and partner with others
Reduce
Do more with less, continuously increase efficiency
Replace
Increase share of alternative fuels and intermodal
Equipment utilization
Technology improvements
Network optimization
Alternative fuels
Intermodal
IKEA

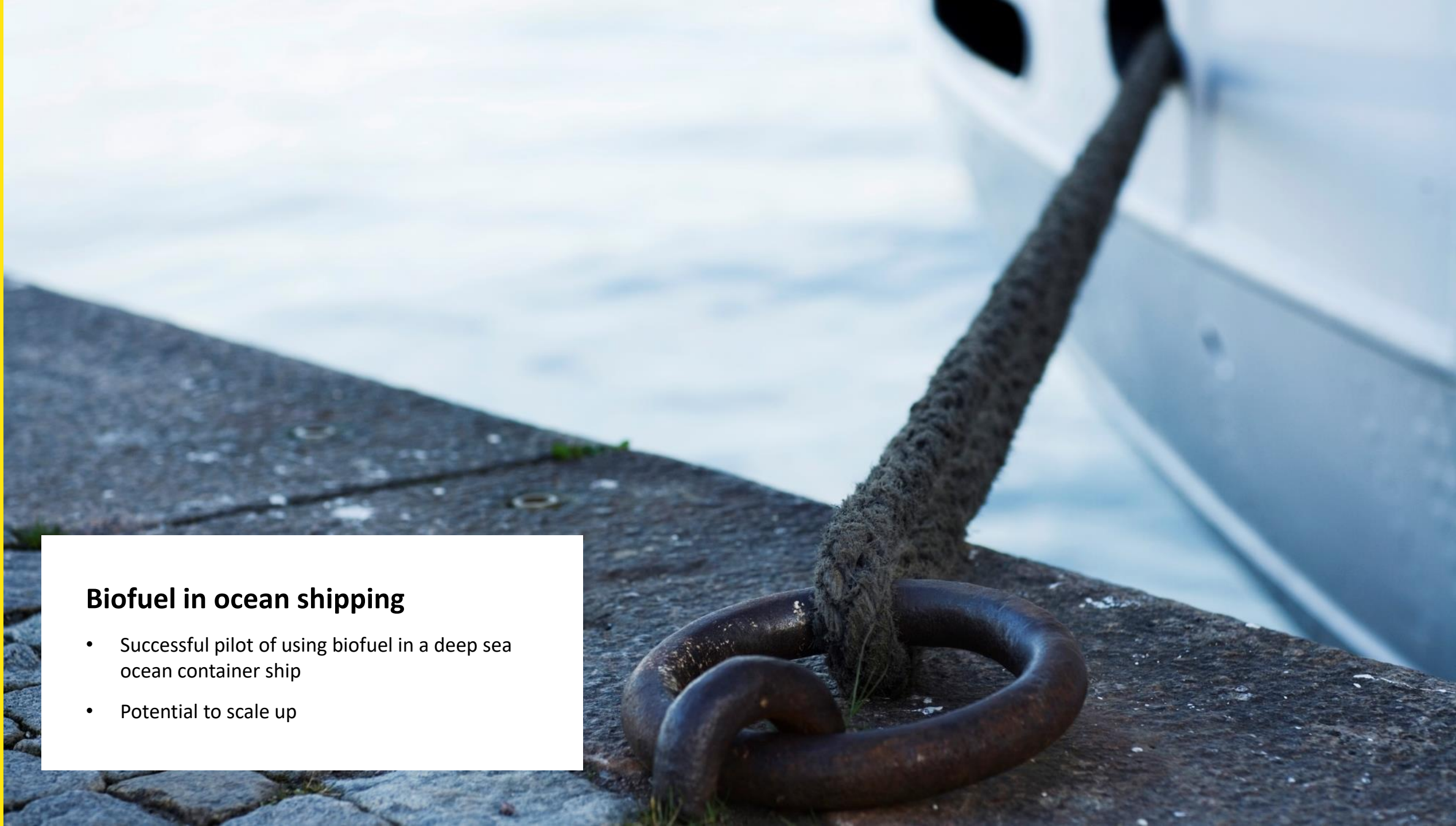
90%

of all IKEA´s domestic transports of home furnishing products in Sweden are fossil free



Biogas Italy & France





Biofuel in ocean shipping

- Successful pilot of using biofuel in a deep sea ocean container ship
- Potential to scale up

How we make it happen!

- There is no silver bullet
- Collaborations and togetherness are fundamental
- Key to IKEA is to find solutions that are sustainable **and** affordable
  for the many people