

# Sustainable transport by Scania

How could better green transport procurement support the Paris goals?



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# Today's Agenda



- **Mega trends and background**
- **Commercial green solutions for cities and regions**
  - The green toolbox and how to apply it
  - Green toolbox applied on a EU level.
- **Green functional procurement**
- **Good examples**
- **Discussion and Q&A**



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# Today's Agenda

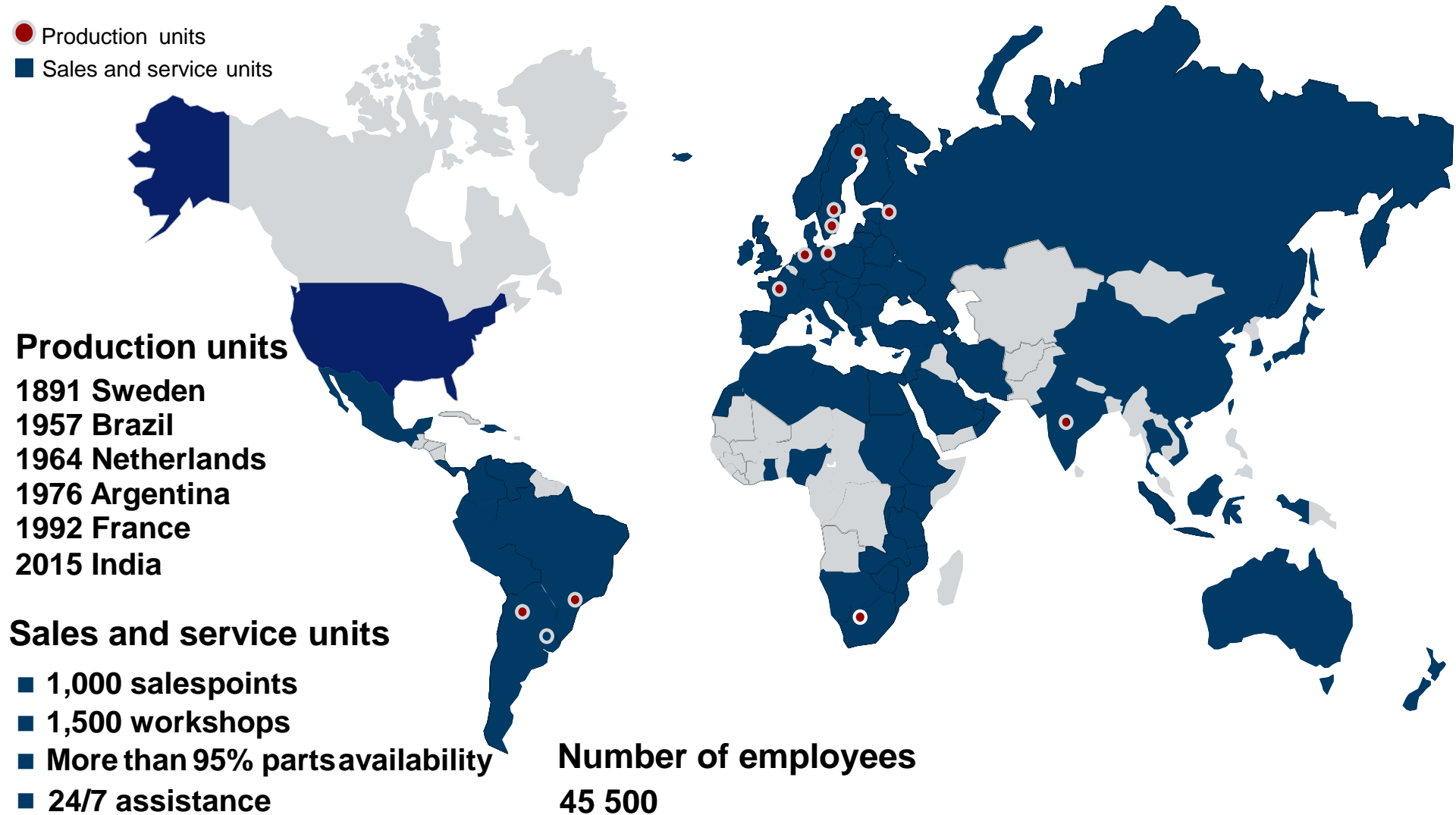


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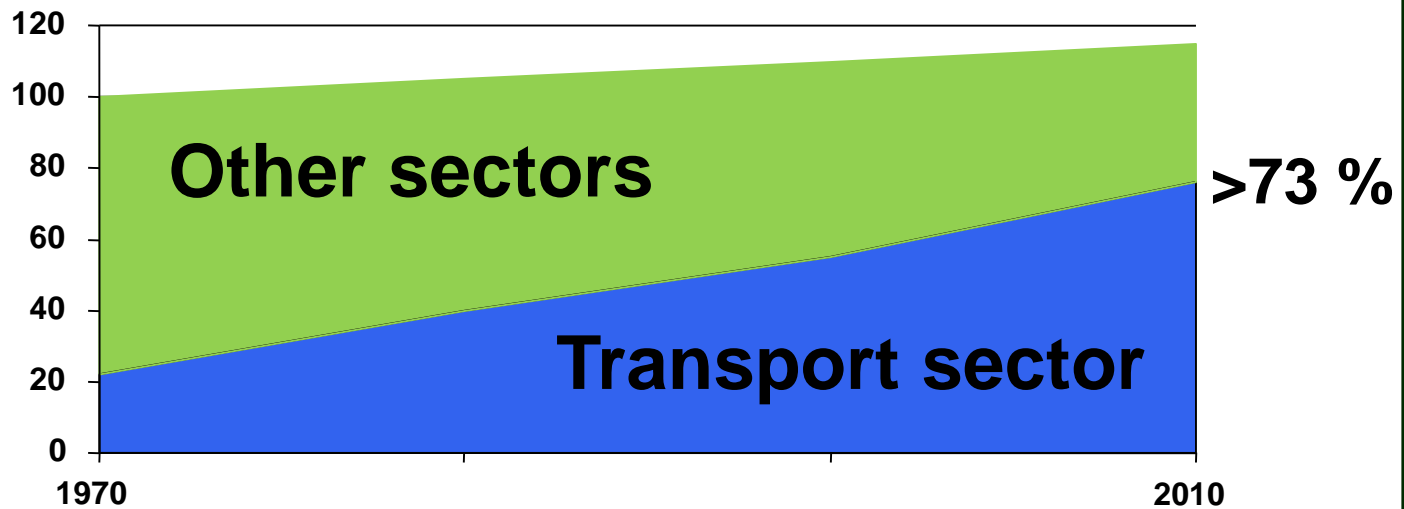
# World leading supplier of Trucks, Buses and Engines



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# Transport's oil addiction

## Oil use in OECD



1970: Index 100

Transport sector rapidly increasing it's GHG emissons

- EU imports 90% of its oil at >1 billion € a day
- Energy insecurity and political pressure
- *“The oil dependency remains the EU’s Achilles’ heel, because of dependence on imports from unstable, authoritarian regimes.”*



**Anders Fogh Rasmussen,**  
former Prime Minister of  
Denmark and Secretary General  
of NATO

**ENERGY IMPORTS COST  
THE EU €400 BILLION  
EACH YEAR**

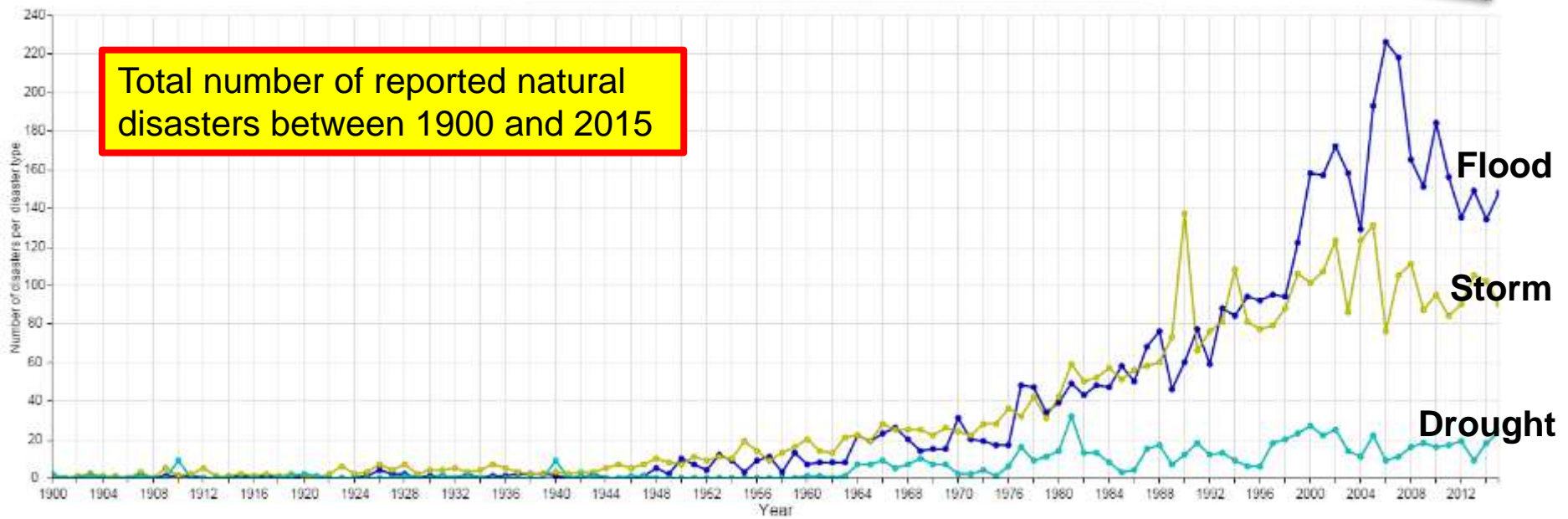


# Effects of global warming - Natural disasters increase



TOTAL NUMBER of reported Natural disasters between 1900 and 2015

All types Earthquake Flood Storm Drought Epidemic Other types



EM-DAT: The OFDA/CRED International Disaster Database - [www.emdat.be](http://www.emdat.be) - Université Catholique de Louvain, Brussels - Belgium



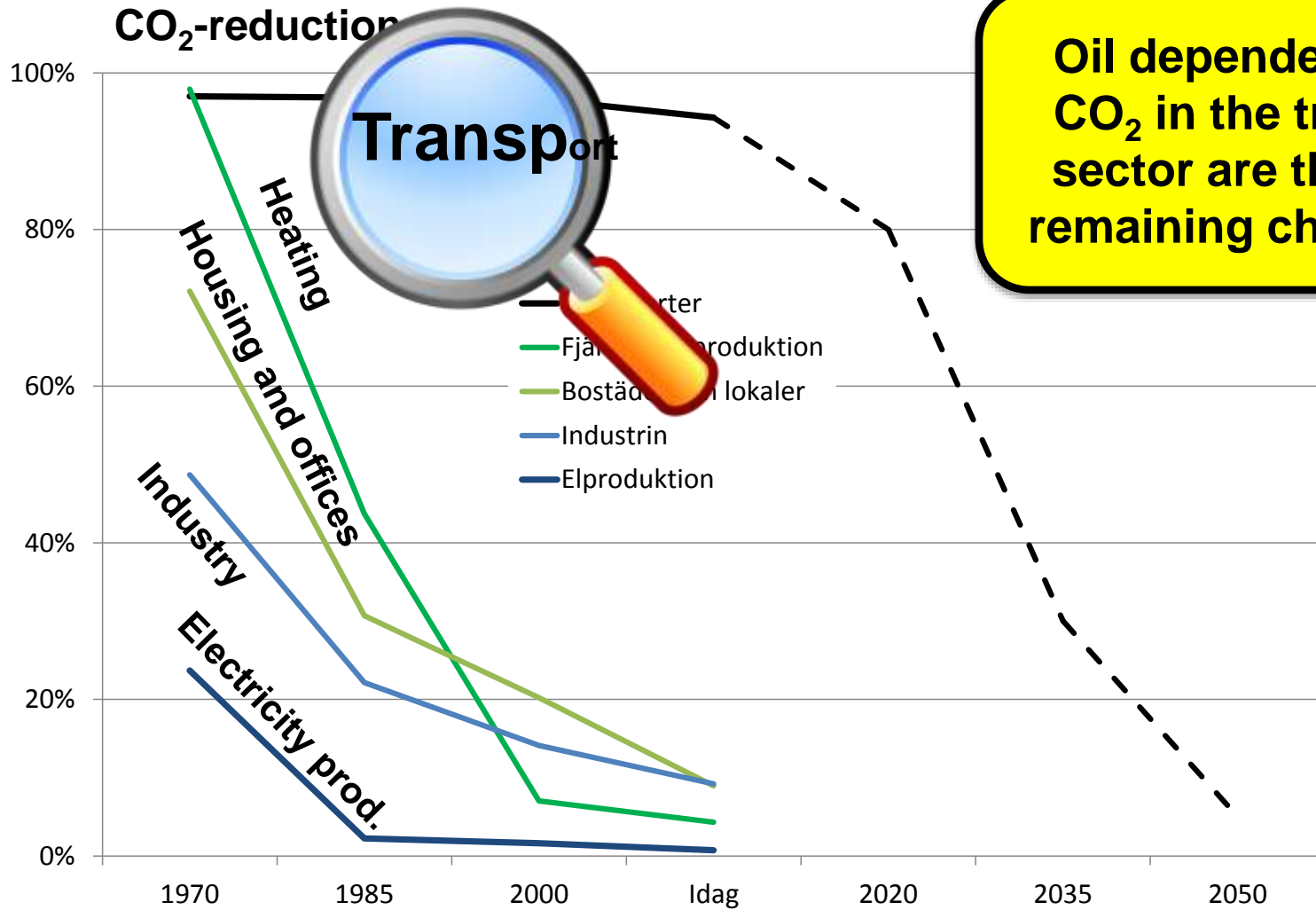


- **Rapid Global Warming**
- **The window for action is rapidly closing.**
- **Any further investment in fossil and energy inefficient systems will cause devastating lock-in effects (IPCC).**
- **Paris goal: Stabilize at 1,5°C**
- **Actions → City level**



# The last battle....

Source: Elforsk, rapport 12:68, 2013



- **EU Energy Union**
- **EU goals 2030:**
  - - 40% CO<sub>2</sub> in 2030 (For transport: - 30%)
  - - 27% energy use
  - +27 % share of renewable energy



**Non-transport  
-15% CO<sub>2</sub>**

**Transport  
+33% CO<sub>2</sub>**



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**80 %  
Population**

**80 %  
CO<sub>2</sub>**

**80 %  
Energy use**

**x3 mobility**

**A City World**



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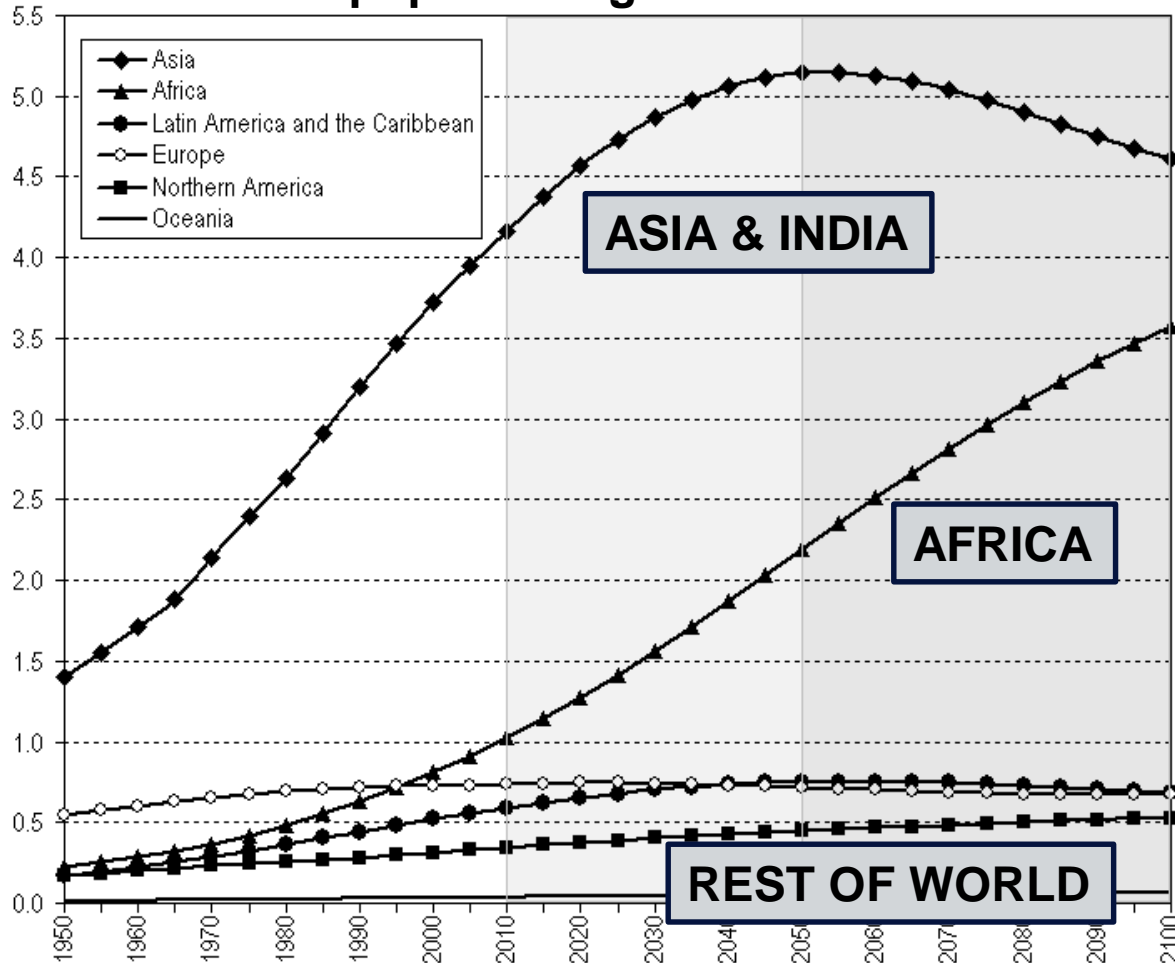
# **Congestion and air quality problems threaten many cities' economical growth**

**1 out 8 deaths related to poor air quality**

**HD diesel → over 50% of particle emissions**



## Global population growth 1950-2100



Source: United Nations, Department of Economic and Social Affairs The 2010 Revision. (Updated: 15 April 2011)

**Clean**  
**Low Carbon**  
**Robust**  
**Commercial**  
**Outcompete diesel!**

**Where is the challenge?**



# Climate Change and CO<sub>2</sub>

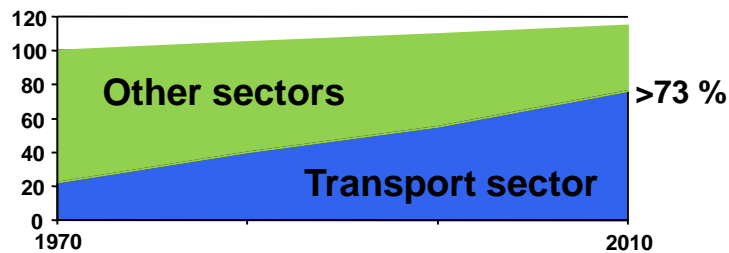


# Air Quality & Congestion



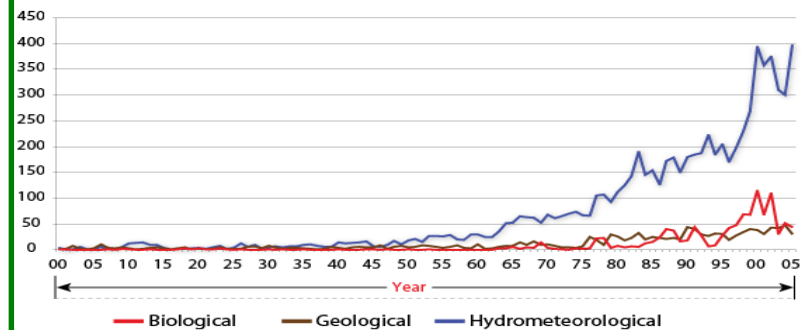
Are you part of the **problem**?  
Or part of the **solution**?

## Oil use in OECD



1970: Index 100

Across the years 1900-2000



Source of data: EM-DAT : The OFDA/CRED International Disaster Database.  
Http: //www.em-dat.net, UCL - Brussels, Belgium



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# 3 most important sustainability challenges for heavy duty transportation

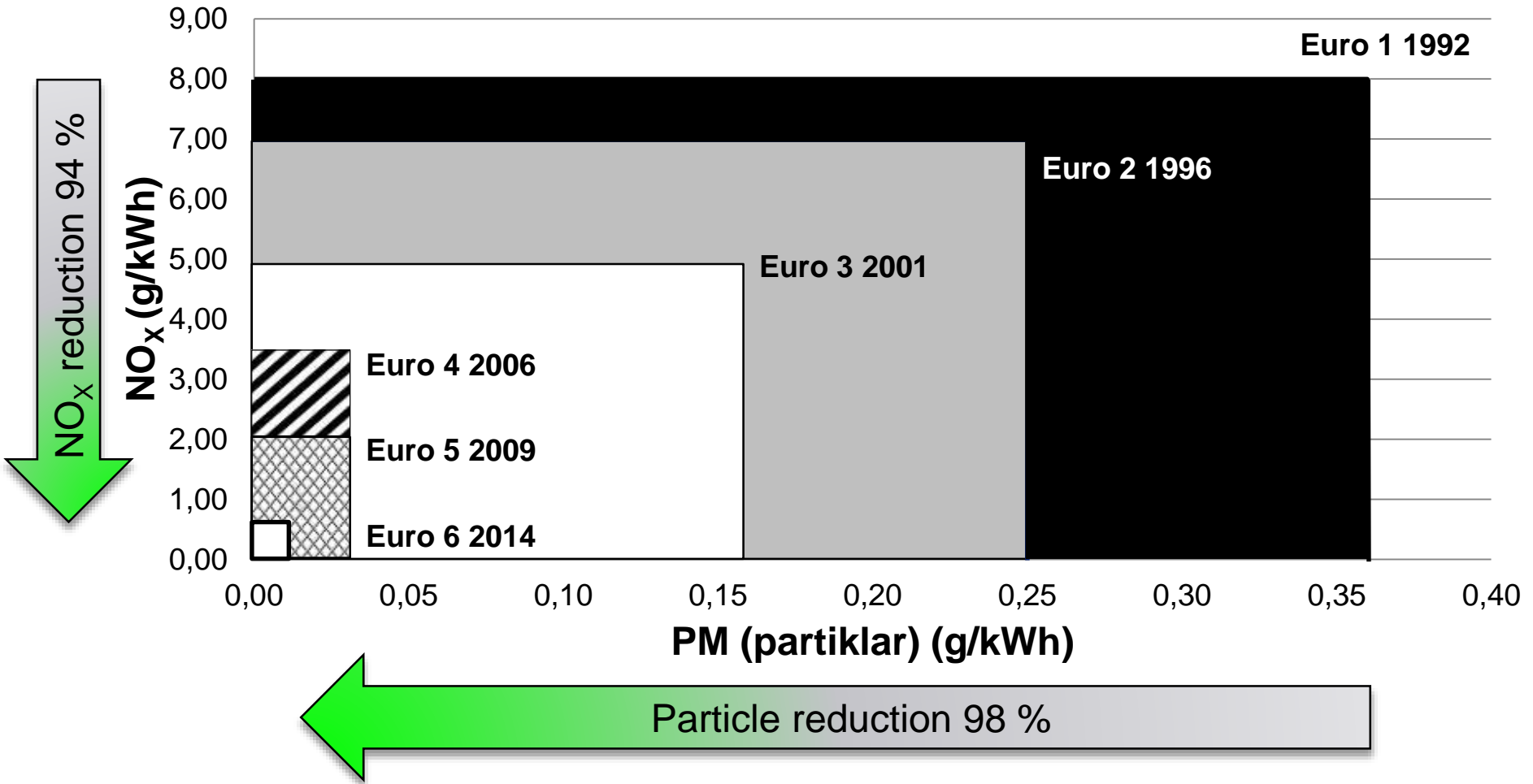
- status report -

1. Local emissions  
(particles, NOx, noise...)
2. Energy efficiency
3. Emissions of fossil CO<sub>2</sub>



# 1. Local emissions and noise

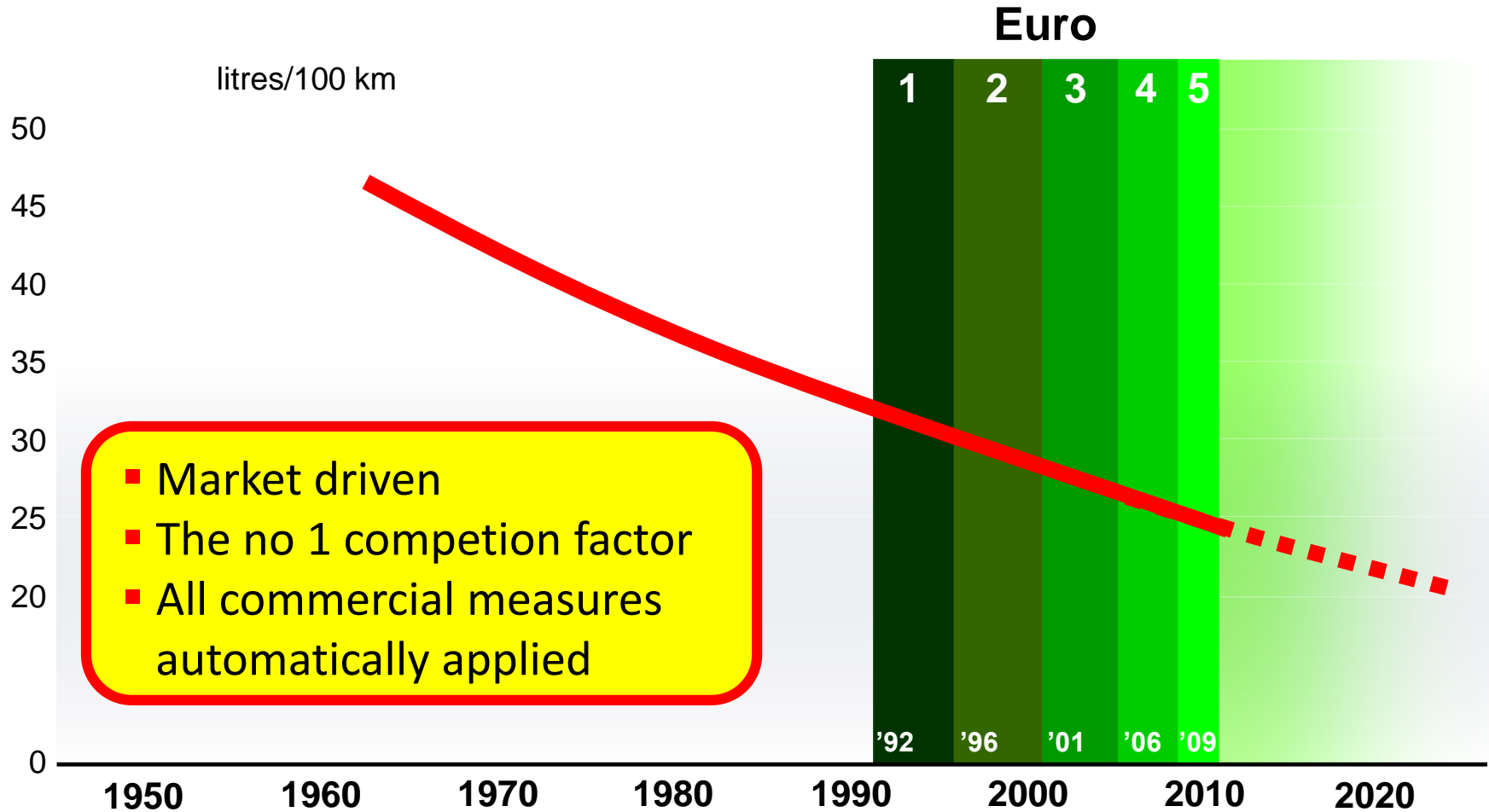
## Driven by legislation





# 2. Energy Efficiency

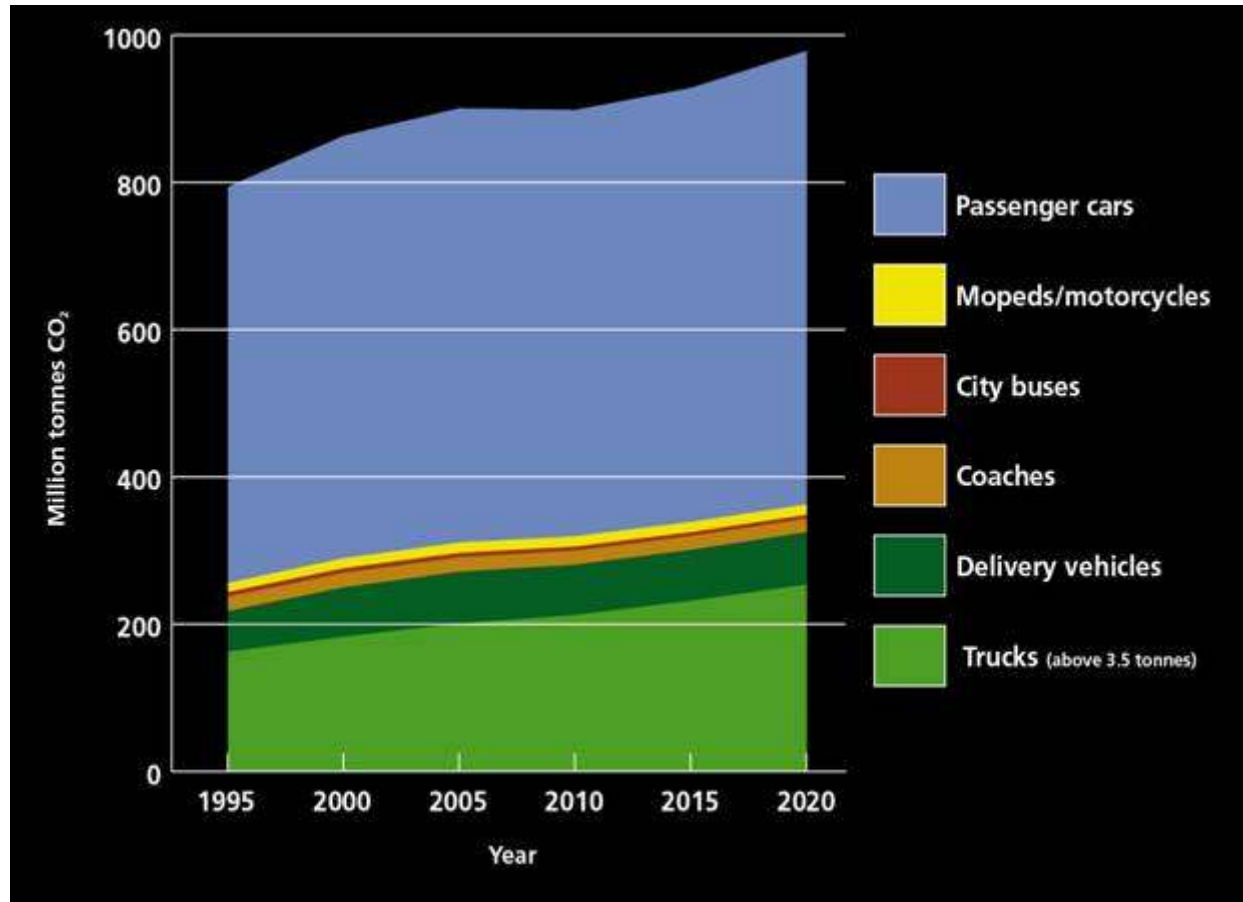
100 % Market driven



# 3. But what about the big challenge?

No real incentives for reductions of fossil CO<sub>2</sub> from the transport sector

Projected CO<sub>2</sub>-emissions  
from road transport in EU



Data from TREMOVE

**Sustainability and CO<sub>2</sub> is not valued enough today – a great market and political failure!**



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# Solutions for sustainable transport

## No silver bullets - a broad, green toolbox



1. Save energy – all kinds
2. Smarter transport – for people and goods
3. Replace fossil energy with renewable energy

- **Most important energy saver: The Driver. On average 11% fuels savings with Scania Driver Training and follow-up.**
- **Hybrids and electrification: Important for the future...**
- **...but no silver bullet - only one part of the future transport puzzle.**
- **Scania test projects of inductive power transfer and opportunity charged battery buses ongoing...**
- **...to be cost efficient, electrification has to be part of an industrial modular system!**



**Allow for all energy saving tools in procurement!**

**1. Save energy**  
**Driver/electrification/hybrids**

- 
- **Dedicated bus lanes**
  - **High frequency**
  - **Attractive and efficient stations**
  - **Bus priority**
  - **High quality customer info**
  - **Modal integration at stations**
  - **Flexible traffic management**
  - **Greatly improved road safety**
  - **High capacity at low cost - and quick implementation**

- BRT Bogota: 45 000 pass/hour - \$ 5 M/km

- Metro Mexico City : 39 000 pass/hour - \$ 41 M/km

## **2. Smarter transport**

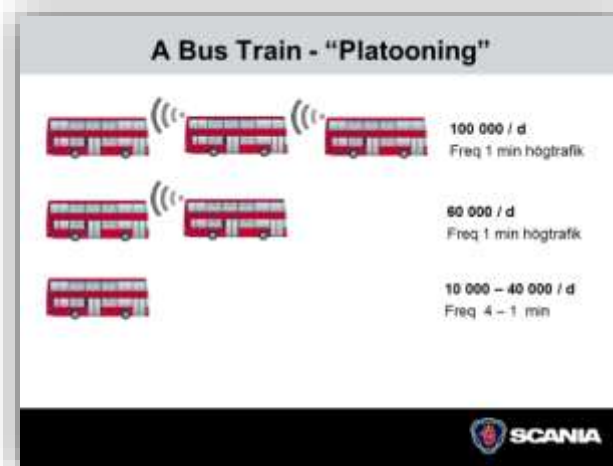
**Bus systems by Scania**



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# The “Stockholm Arc”

## A modern BRT system for a growing City





# The "Stockholm Arc"

# The “Stockholm Arc”

A modern BRT system for a growing City



A Bus Train - "Platooning"

An industry consortium is ready to deliver.

But could procurement of whole public transport systems be made without specifying technology and transport mode?



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**USD 2,000**  
millions



**USD 400**  
millions



**USD 100**  
millions

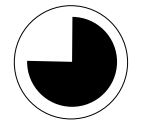


**USD 50**  
millions

**Could procurement of public transport systems be made without specifying technology and transport mode?**



**Metro**



**9 years**



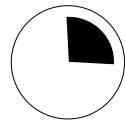
**Light rail**



**5 years**



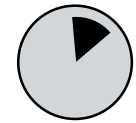
**BRT**



**3 years**



**BRS**

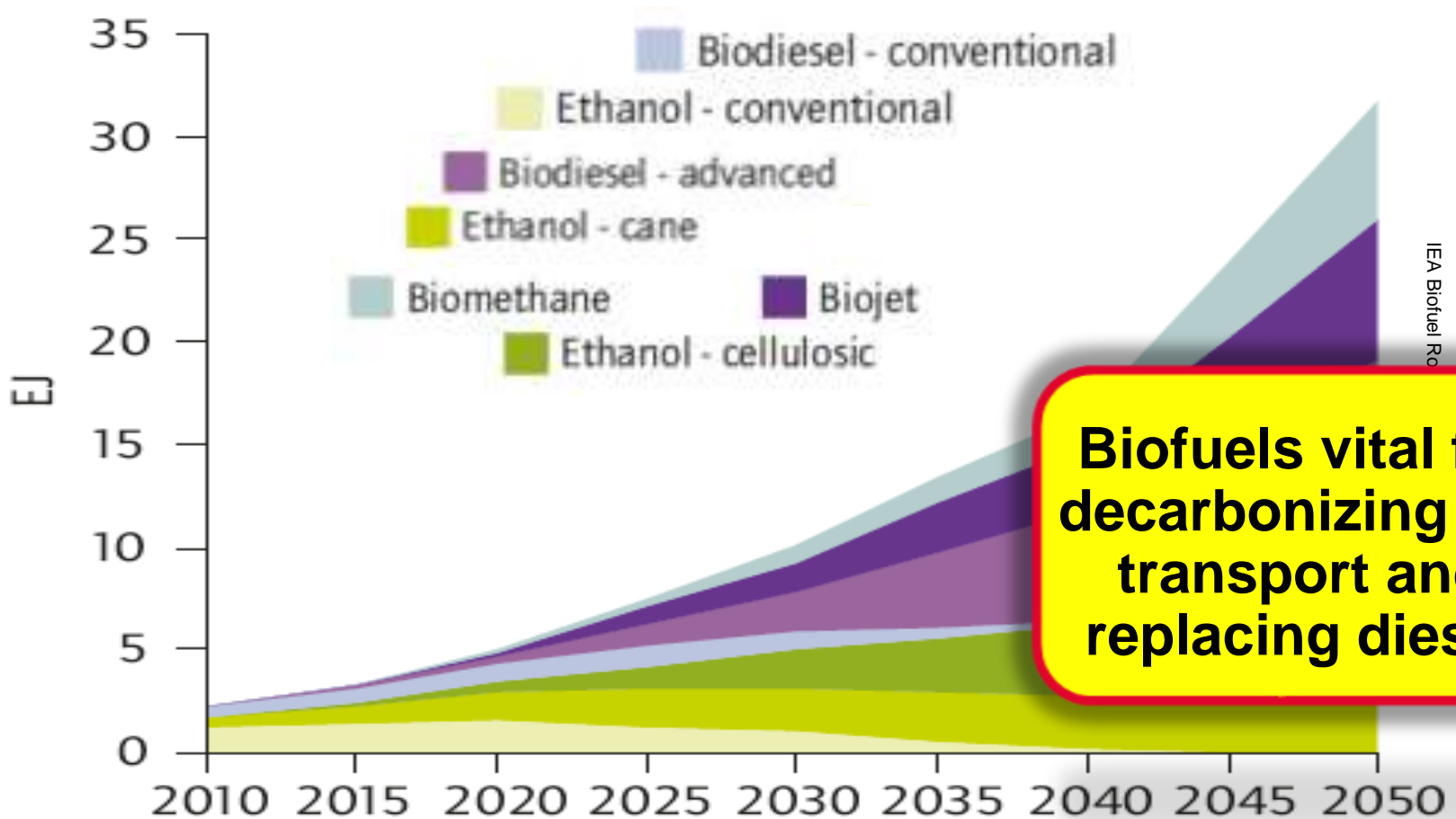


**1 year**

**How much does it cost to construct 10 km of public transport?**



## Biofuels Worldwide (IEA)



**Biofuels vital for decarbonizing HD transport and replacing diesel**

**3. Replace fossil with renewable**

Rapid growth of biofuel use



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## Bioethanol/ED95

World's No. 1 biofuel  
Diesel engine & efficiency

Up to 90 %  
CO<sub>2</sub> reduction

*Buses, coaches  
waste collectors,  
distribution trucks.*

## Biodiesel & HVO

Low blends to B100  
Diesel engine

Up to 60 %  
CO<sub>2</sub> reduction

*All types of  
applications, including  
long-haulage and  
coaches.*

## Biogas/Natural gas

Compressed or liquid  
Otto engine

Up to 90 %  
CO<sub>2</sub> reduction

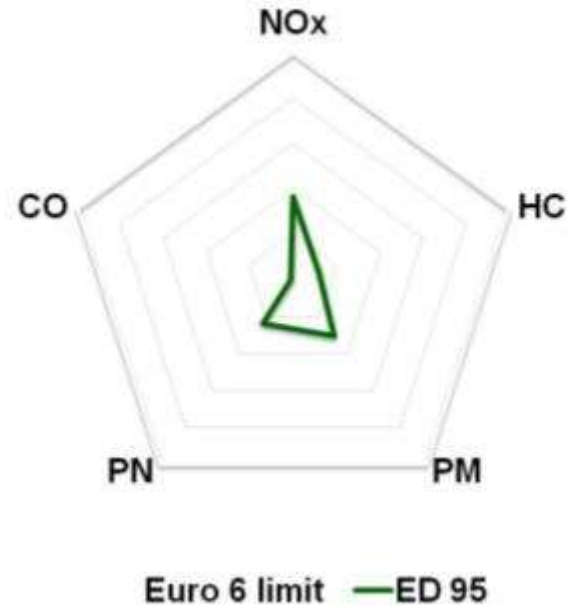
*City/Intercity buses,  
waste collectors,  
distribution trucks.*

**Scania will find the best local fuel solution**

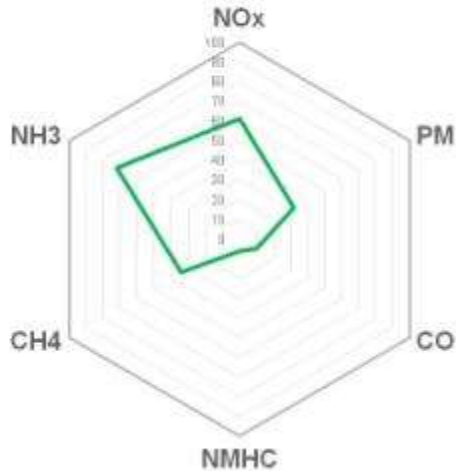


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# Bioethanol emissions as compared to Euro 6 legislation



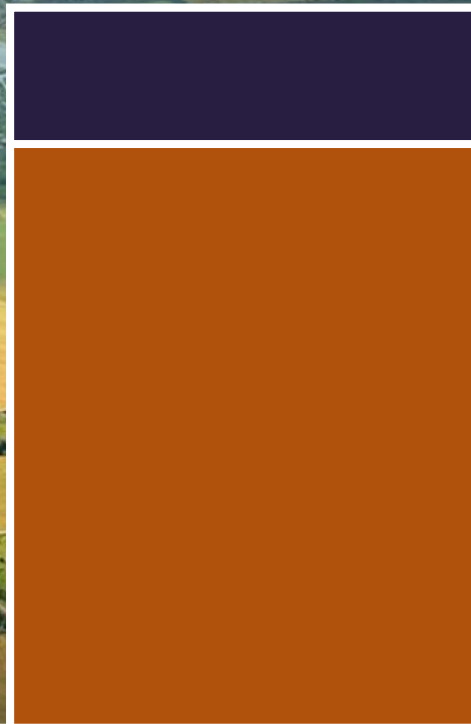
—Euro 6 demand —Scania Euro 6 Gas



## Gas emissions as compared to Euro 6 legislation

# Ultra-clean operation with biofuels

# 25 Mha of abandoned farmland in EU



1950

1/5

2010

Active cropland Europe

- A low carbon fuel
- An ultra-clean fuel
- Solving local water, waste and sludge problems, and generating bio-fertilizer/CO<sub>2</sub>
- Sweden is a biogas pioneer, with biogas expertise - from waste to vehicle!
- 10 % of fuel mix



SymbicCity

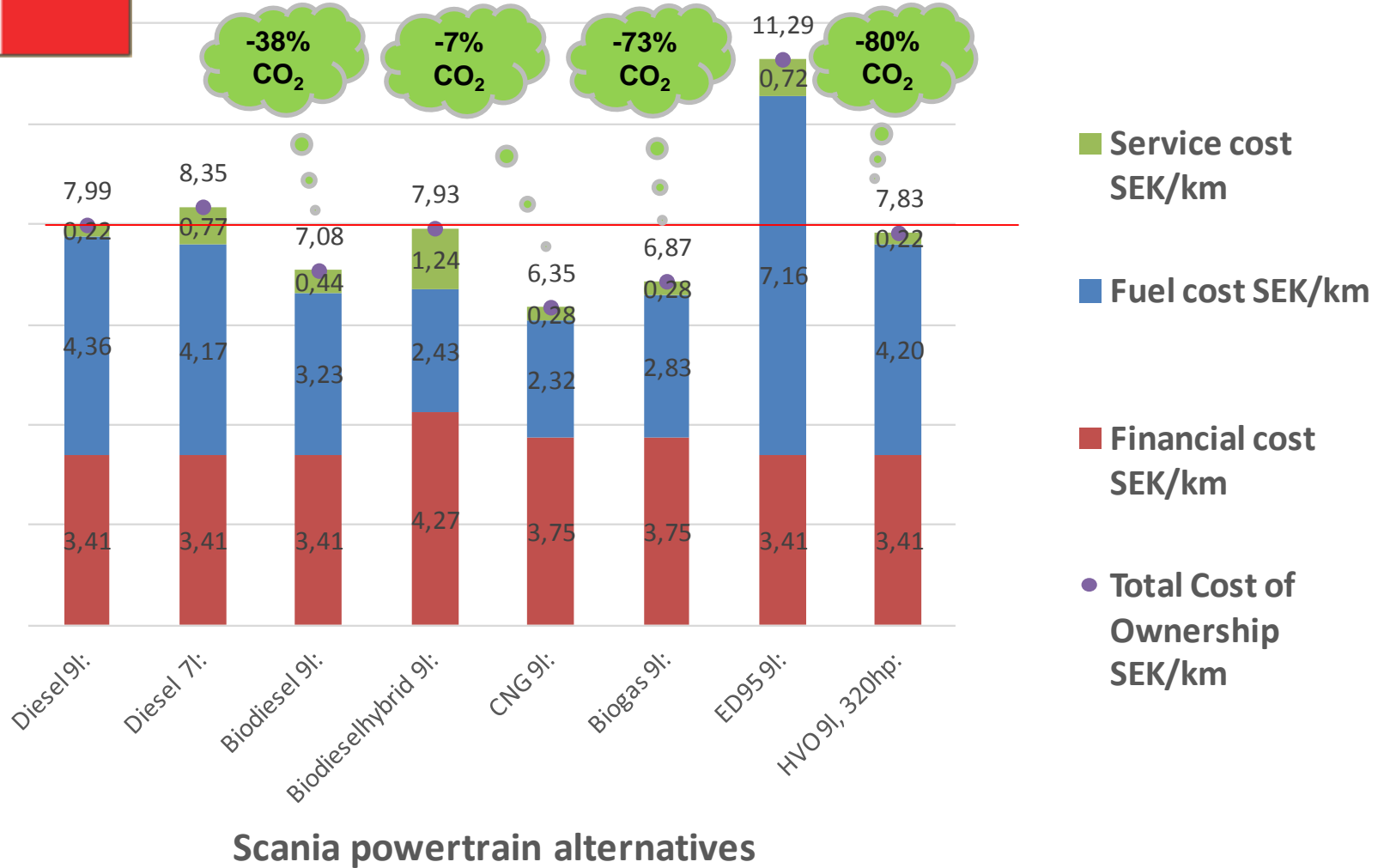
**Turn-key package solutions  
From waste to clean biogas fleets**





# TCO - Reference fuel consumption

## K UB 4x2 City operation, 70 000km/year, 10 years



Analyze and incentivize most CO<sub>2</sub>/€



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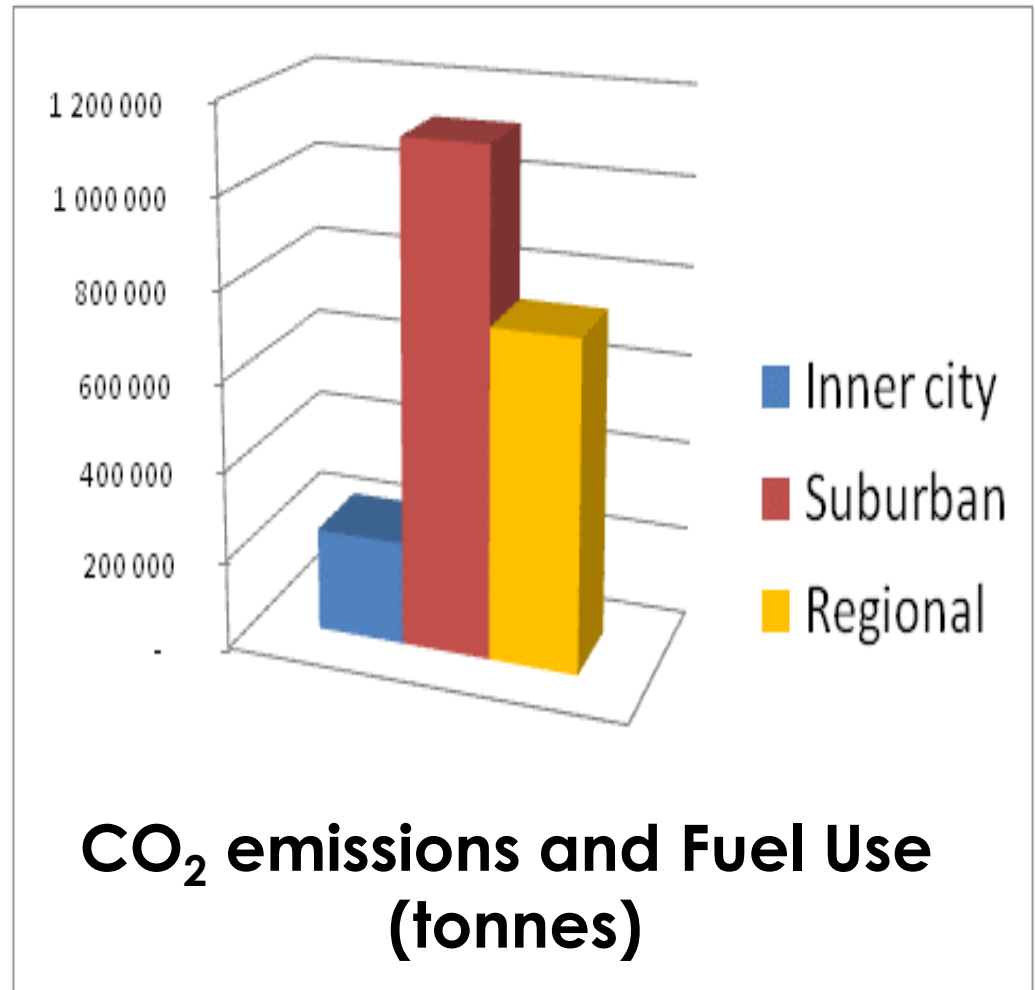
# The Rise and Growth of Cities

- Typically, many cities grow through regional hubs, *(could be either sectorial hubs or new city centres.)*
- Transport inside the city centre (0 – 5 km) is often less affected.
- Most transport growth is often generated in regional and suburban patterns;
  - between hubs and
  - city centre to hub (5 – 30 km)



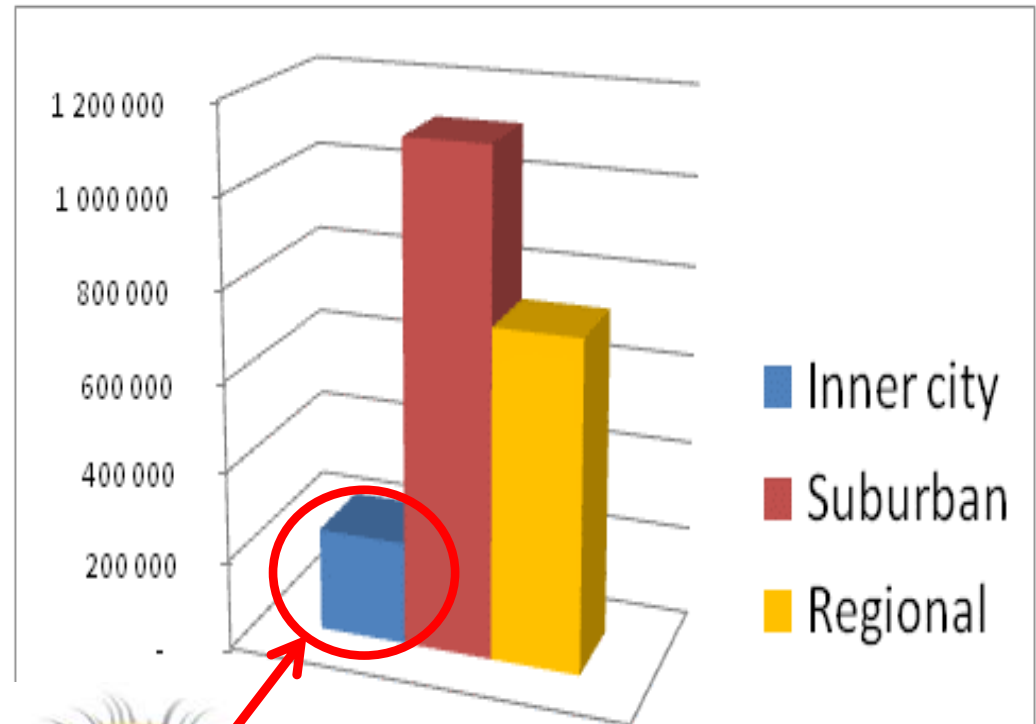
# Emission/fuel use effects of « suburbanization »

- Example of a « million-citizen-city » (E.g. Stockholm)
- ~2 000-3 000 buses
  - ~200-300 in city centre
  - ~1 000-1500 suburban
  - ~500-1 000 regional
- Majority of CO<sub>2</sub> emissions and fuel usage are outside city centres...
- Sweden:
  - 20 TWh HD transport
  - 1,5 TWh in cities
- Waste and goods transport grow accordingly...



# Effects on city and regional transport

- ...but solution focus is often only on city centres...
- Focus need to be broader, on optimizing whole regional transport systems, in order to achieve real and cost efficient sustainable transport.
- Goods & waste transport should be included in this focus.
- Air Quality of growing concern also outside city centres



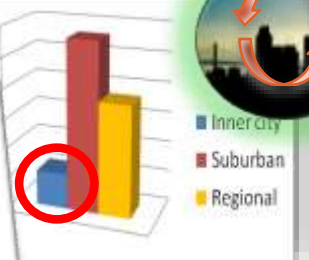
**Emissions and Fuel Use  
(tonnes)**

# City centre Green Solutions

- Frequent, defined routes, many stops, and short travel times → The best possibility for achieving a realistic cost for full electric solutions in the future.

- Opportunity charging/PHEV/BEV – tests ongoing.

- City buses for all alternative fuels, hybrids or alternative fuel hybrids are commercial city solutions already today. 90-100% CO<sub>2</sub> reduction



**City type  
Alternative Fuel  
Hybrids**

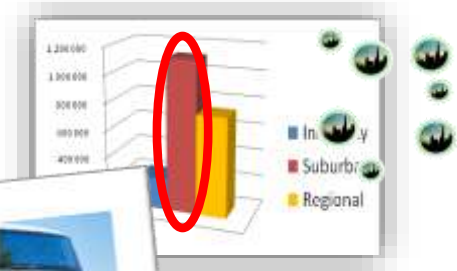
**Inductive Charging/PHEV/BEV**



**Alternative Fuel  
City Buses**



# Suburban Green Solutions



- Travel times of (15-30 min), higher comfort demands and higher average speeds.
- Longer, low entry type vehicles offer accessibility capacity and comfort.
- Suburban type hybrids show high fuel savings
- Dedicated Bus Systems/BRT type of operation strongly add to efficiency and attractiveness.
- These solutions could reduce up to 90% of CO<sub>2</sub> emissions at no or very low extra cost.



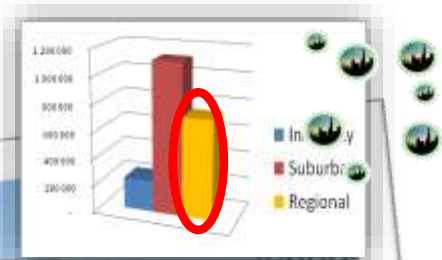
**Suburban alternative fuel buses (Biogas, Bioethanol, Biodiesel, HVO)**



**Biofuelled Suburban type Hybrid (Best hybrid case!)**

# Regional Green Solutions

- Long travel times (30-60 min), high demands for comfort and time utilisation. Car → Public transport!
- These commercial green solutions could reduce up to 90% of CO<sub>2</sub> emissions at no or very low extra cost.
- Bus Systems/BRT type of operation strongly add to attractiveness and flexibility.
- Platooning increases capacity, flexibility and fuel efficiency even further.



**High-comfort + alternative fuels**



**High-capacity BRT + alternative fuels**

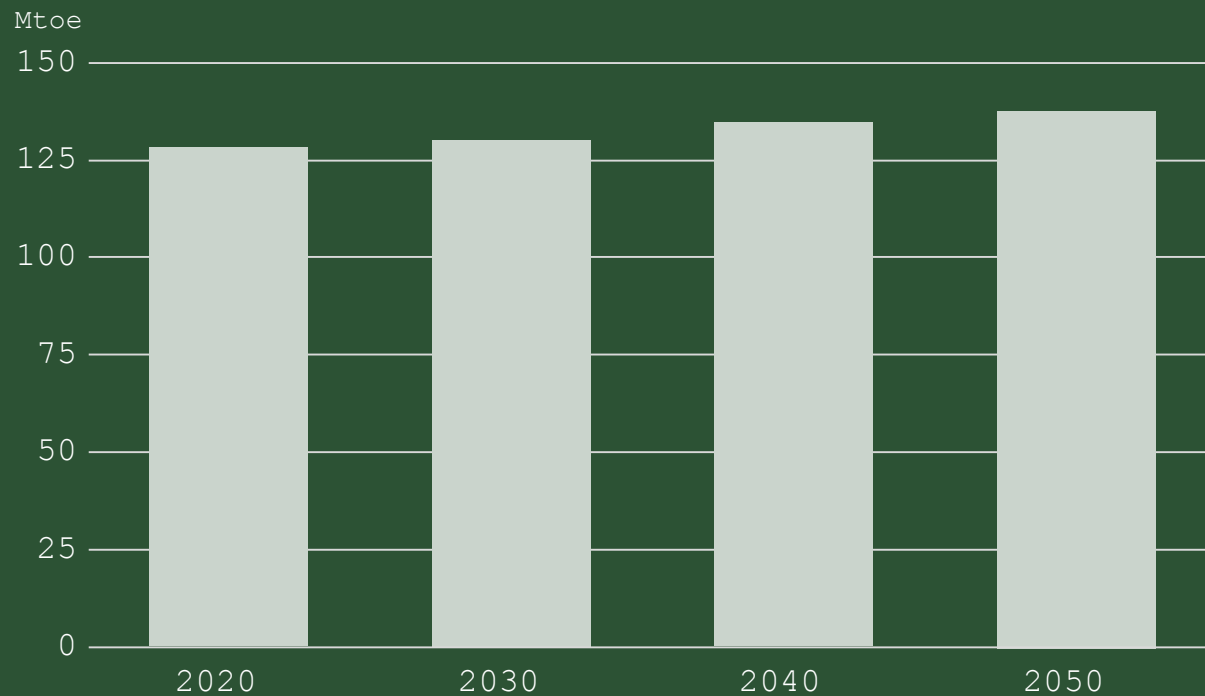


**Platooning**





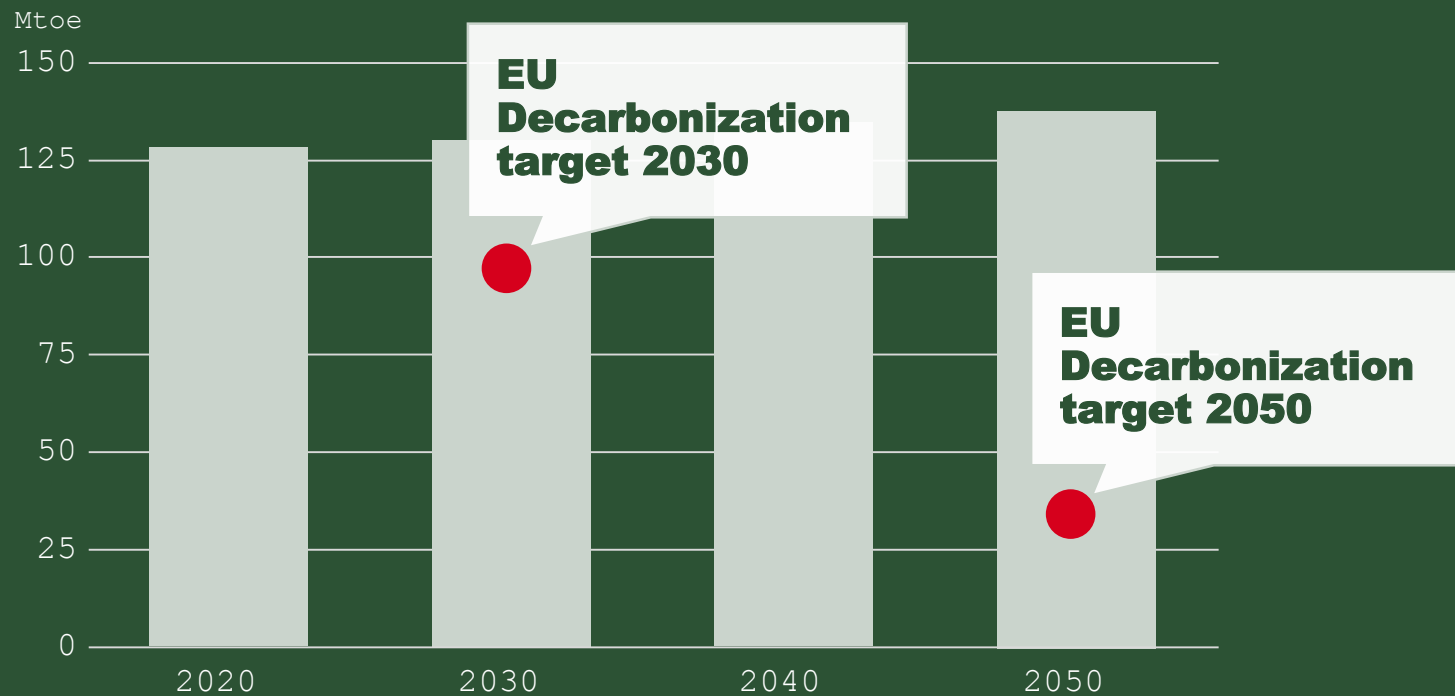
# Energy demand projection HDT in EU



**The projection assumes 20% energy efficiency improvement by 2050 in comparison to today's level**



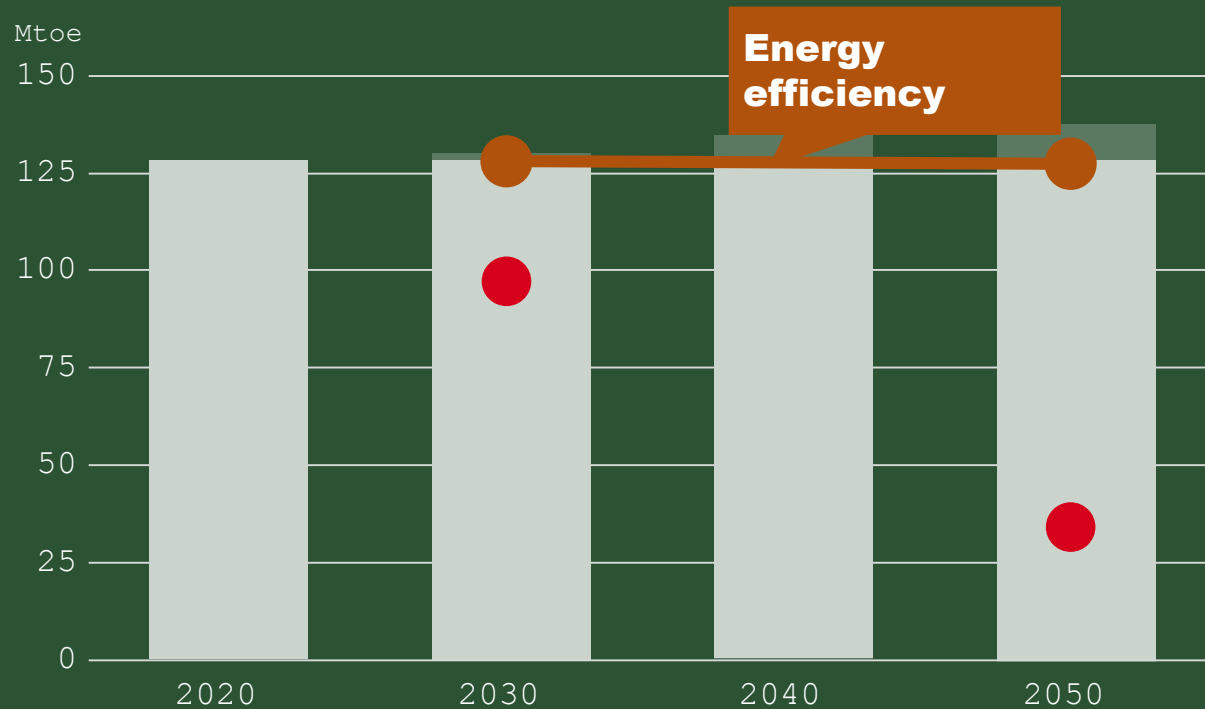
# Energy demand projection HDT in EU





# Energy demand projection

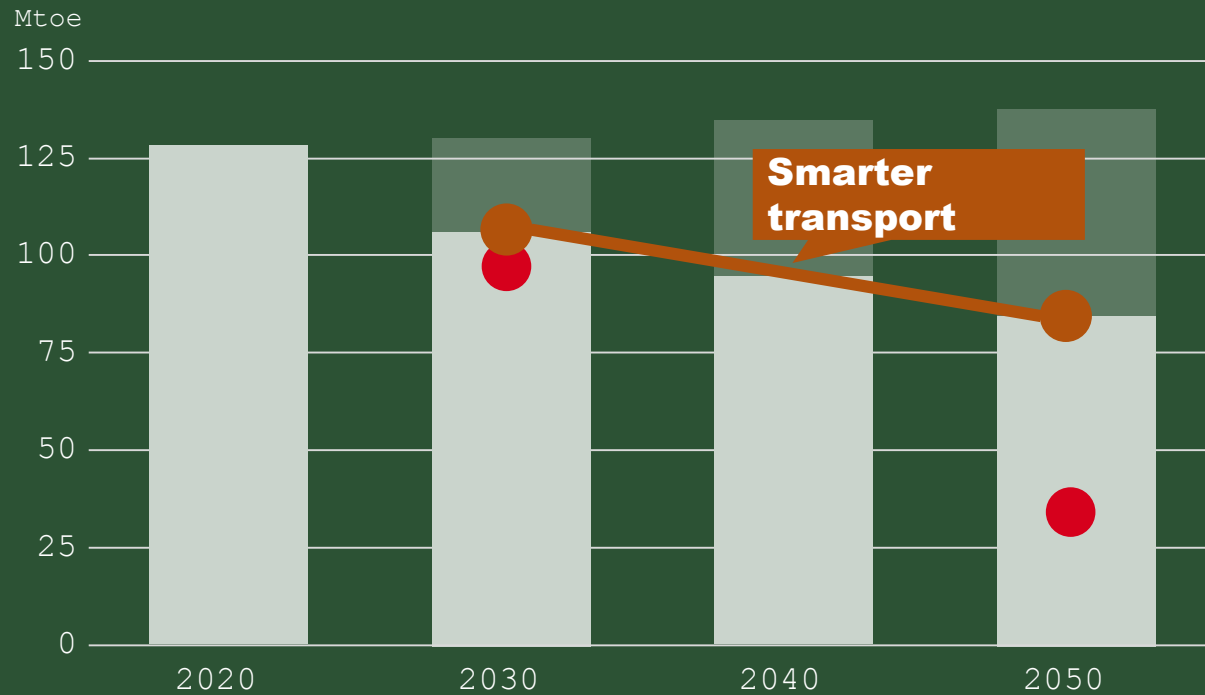
HDT in EU



**Energy efficiency**



# Energy demand projection HDT in EU

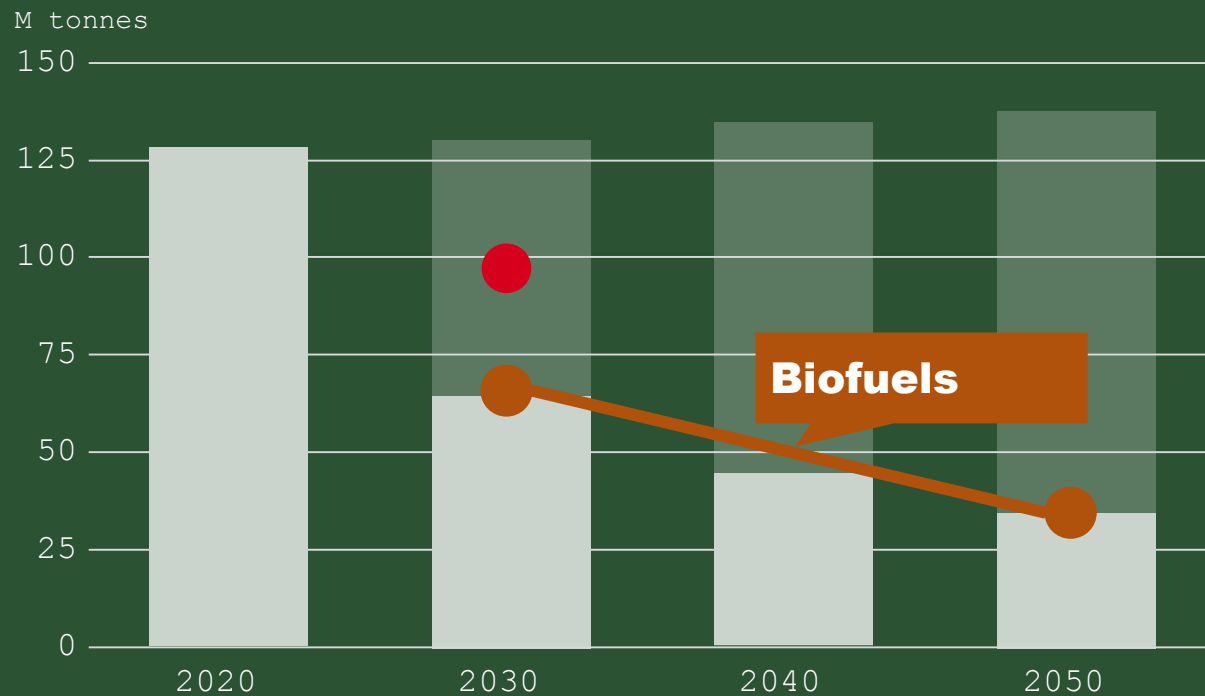


**Energy  
efficiency**

**Smarter  
transport**



# Energy demand projection HDT in EU



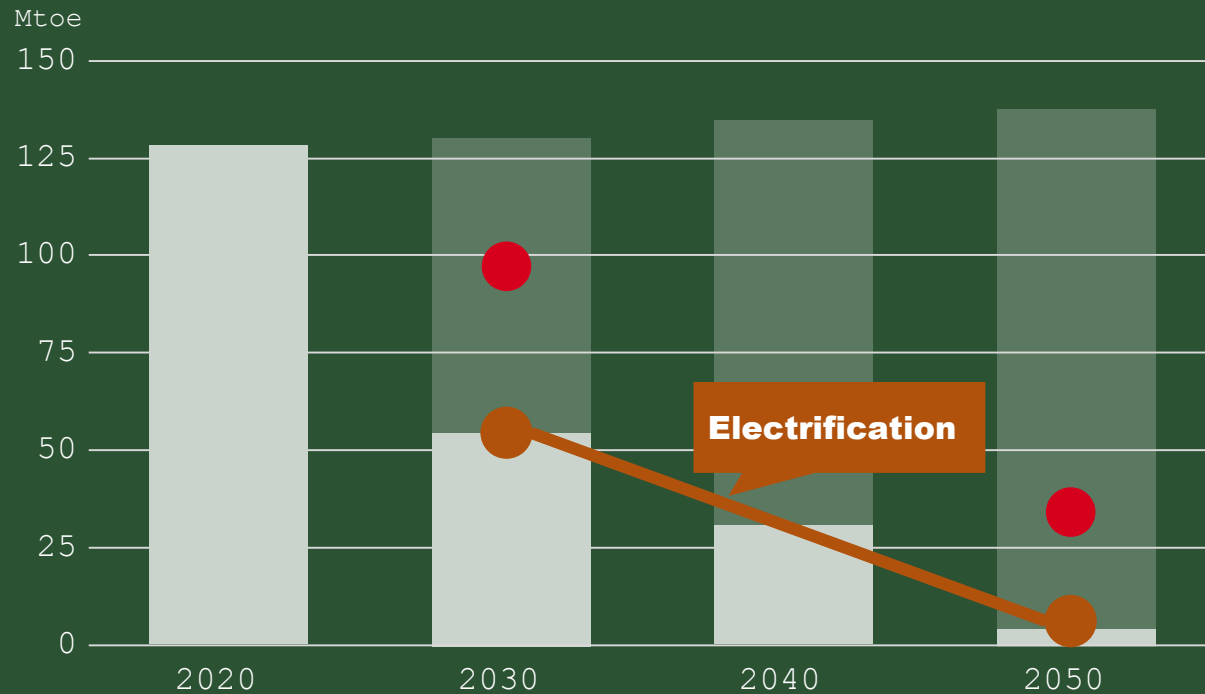
**Energy  
efficiency**

**Smarter  
transport**

**Biofuels**



# Energy demand projection HDT in EU



**Energy  
efficiency**

**Smarter  
transport**

**Biofuels**

**Electrification**

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# Optimised City Transport Systems

- Emissions of goods and waste transport grow accordingly.
- « Silo » thinking between different City/Regional transport (bus, truck, waste...) operations.
- Commercial solutions are available that could reduce up to 90% of CO<sub>2</sub> emissions at no or low extra costs.
- Great cost and emission benefits from co-ordinated:
  - *Alternative fuel infrastructure*
  - *Service/maintenance*
  - *Procurement & CO<sub>2</sub> incentives*



**City and regional distribution, waste collect  
(Biogas, Bioethanol, Biodiesel, HVO, Hybrid)**



**Service and Fuel Supply**





# How to achieve sustainable transport?

- Focus on optimizing whole regional systems – do not only focus on city centres.
- Utilize the benefits from sharing fuel/energy infrastructure and service/maintenance for both buses and trucks in the city/region.
- Use local waste to create local jobs and clean fuels/energy.
- Including transport, fuel/energy and infrastructure package in the procurement → open for full-scale commercial industry offers
- Focus on and incentivize CO<sub>2</sub> performance and CO<sub>2</sub>/Euro in procurement and planning – not on technologies or »silver bullets«.
- Commercial technology for infrastructure and vehicles to reduce 90% of emissions is already here.



# Today's Agenda



- Mega trends and background
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- Green functional procurement
- **Good examples**
  - **Lots of show/tests but little delivery in scale**
- Discussion and Q&A

# Stockholm → 100% fossil free city transport



- All buses on biofuels or biofuel + hybrid in Stockholm.
- Major effect on both air quality and CO<sub>2</sub>.
- Also introduced for waste collect & trucks.
- Long term functional procurement → Cost efficient emission and CO<sub>2</sub> reduction.
- Long term goals/policy & key actors co-op.



# Finland

- Point system
- The more CO<sub>2</sub> efficient from a WTW basis, the higher the points

## Kasviuonekaasujen (CO<sub>2</sub>) pisteet

Referenssitaso 1200 g/km kaksiakseliselle bussille

Vahenema	Pisteet
20 %	0,7
40 %	1,4
60 %	2,1
80 %	2,8
100 %	3,5

## 1.1. Haitalliset päästöt NOx ja PM

Päästöluokkien pisteet

HSL-päästöluokka	Euroluokka	Pisteet
1	Euro 3	0,0
2	Euro 4	0,9
3	Euro 3 CNG	1,2
4	Euro 5	1,5
5	EEV Di	2,0
6	EEV energiatehokas*	2,7
7	EEV CNG	4,1
8	Euro 6	5,3
9	Euro 6 energiatehokas*	5,4
10	Sähköbussi**	5,5

\* = oletettu kulutussäästö min. 20 % esim. hybriditekniikalla

\*\*=lähipäästöt 0g/km



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- **Waste Water to biogas feasibility study by Swedish Environmental Research Institute:**
- **Market value of biogas (per m<sup>3</sup>):**
  - Heat: ~3 ZAR
  - Electricity: ~4,5 ZAR
  - Fuel: ~8,5 ZAR
- **An industry consortia has formed and will offer a complete package:**
  - All infrastructure for biogas production, distribution and refuelling + operation
  - Bus operation
  - Service/maintenance
  - Fully financed
  - Fuel price locked at 80% of diesel over 10 years
  - 100 buses + 35 waste collectors
- **Total cost/km below diesel guaranteed. Risk minimized for PTA/Operators**



**POC of that functional procurement would work.**

**Package offering → lower costs**



# Sustainable Transport is not difficult



**It is here and now!**





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