Turība University

INTENSIVE COURSE
GREEN LOGISTICS
RIGA, 16.-27.07.2019

Nordplus

Energy efficiency improvement measures in the transport fleet management

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About the lecturer

Professional Master's Degree in Innovative Entrepreneurship

Workplace: Director of the Latvenergo AS transport fleet services

27 years of professional experience in the automotive sector, including: fleet management, automotive electronics manufacturing, logistics and financial processes management, automotive service processes management

Scientific publications on transport:

- The Green Economics Institute (UK);
- Kaunas University of Technology (LT);
- Latvian University of Agriculture (LV)
- Riga Technical University (LV).

Main topics

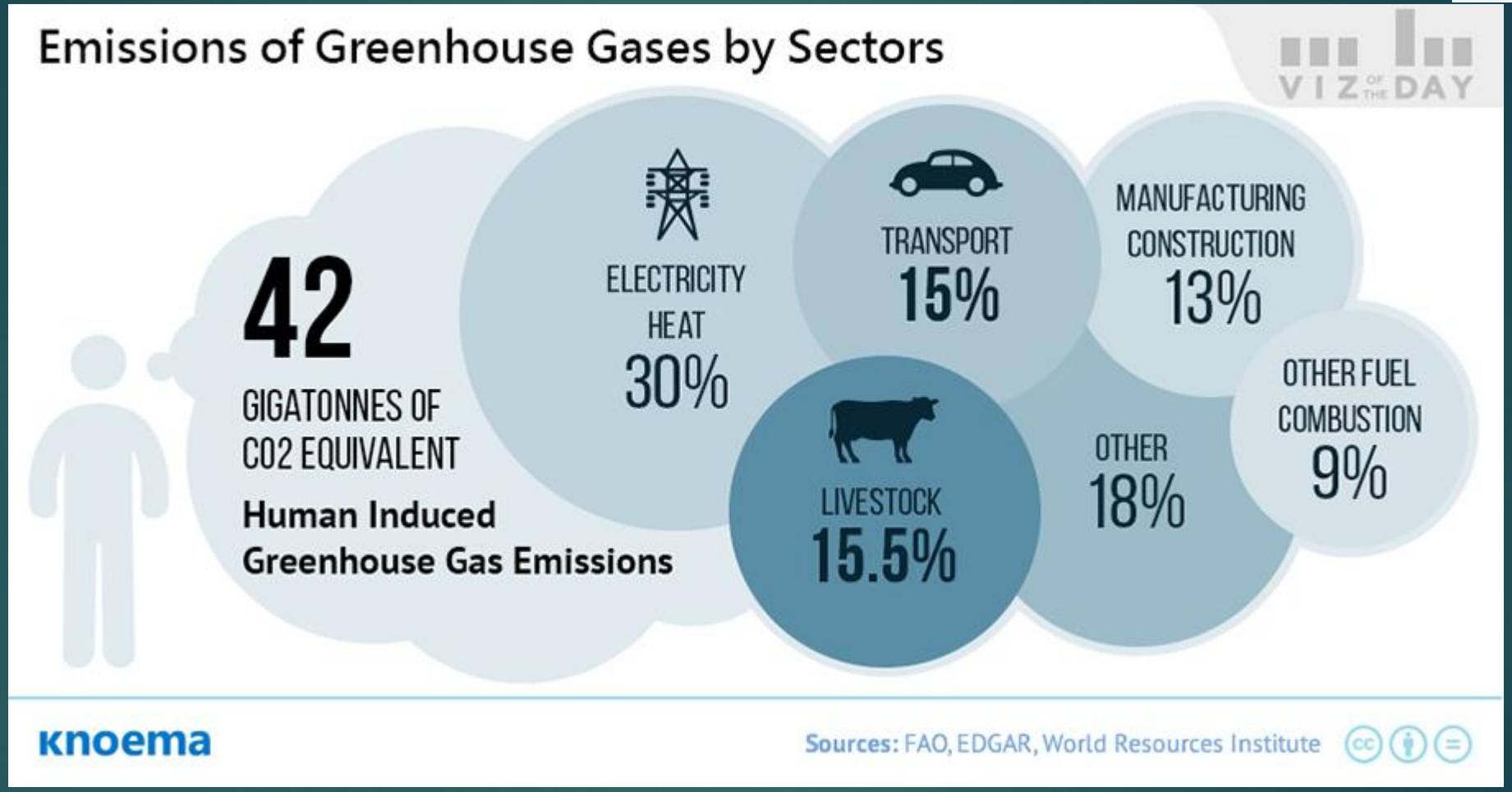
10:00 – 12: 00

1. Theory and statistics
2. Environmental transport

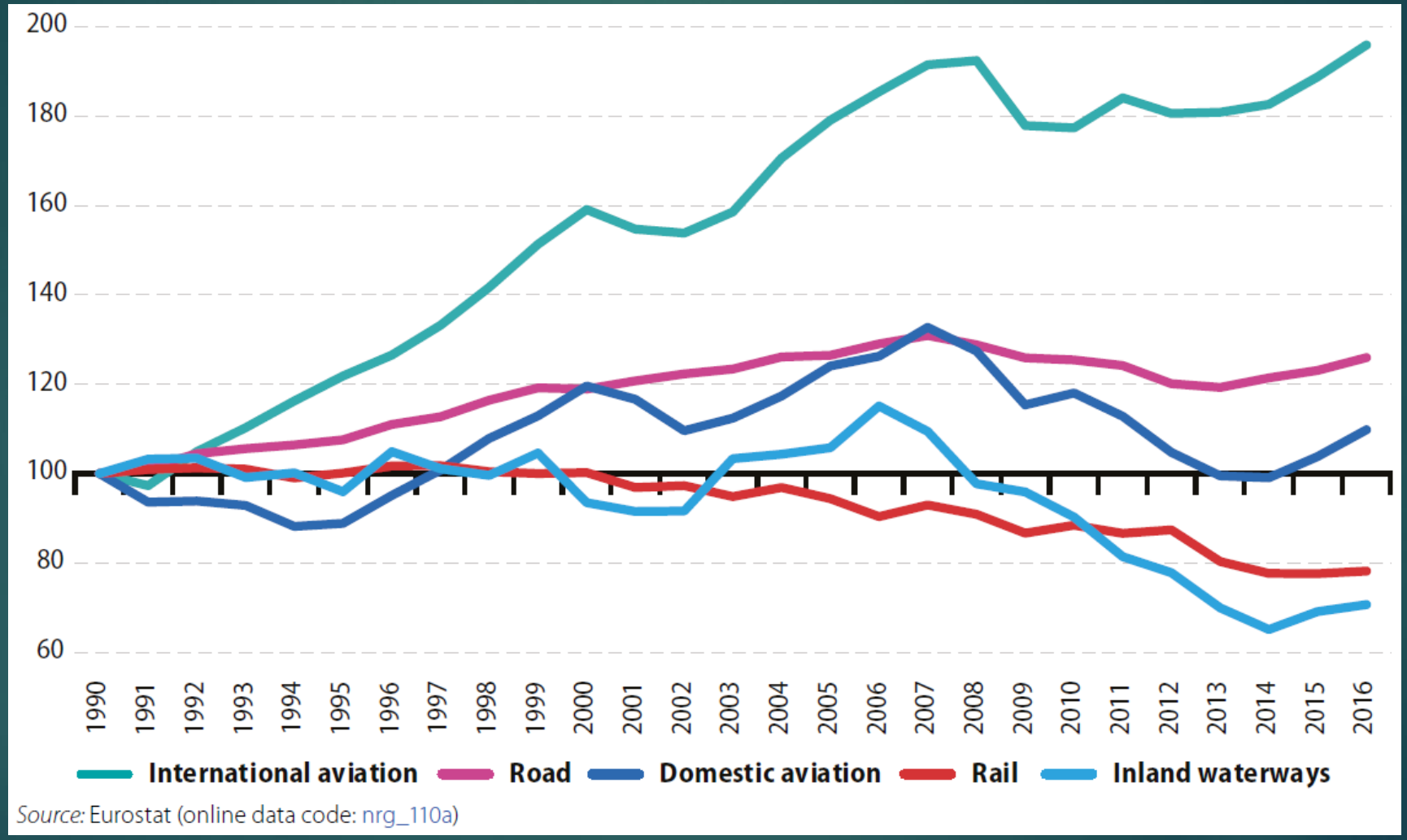
13:00 – 17:00

3. Practical work in groups
4. Group presentations

Why green transport?

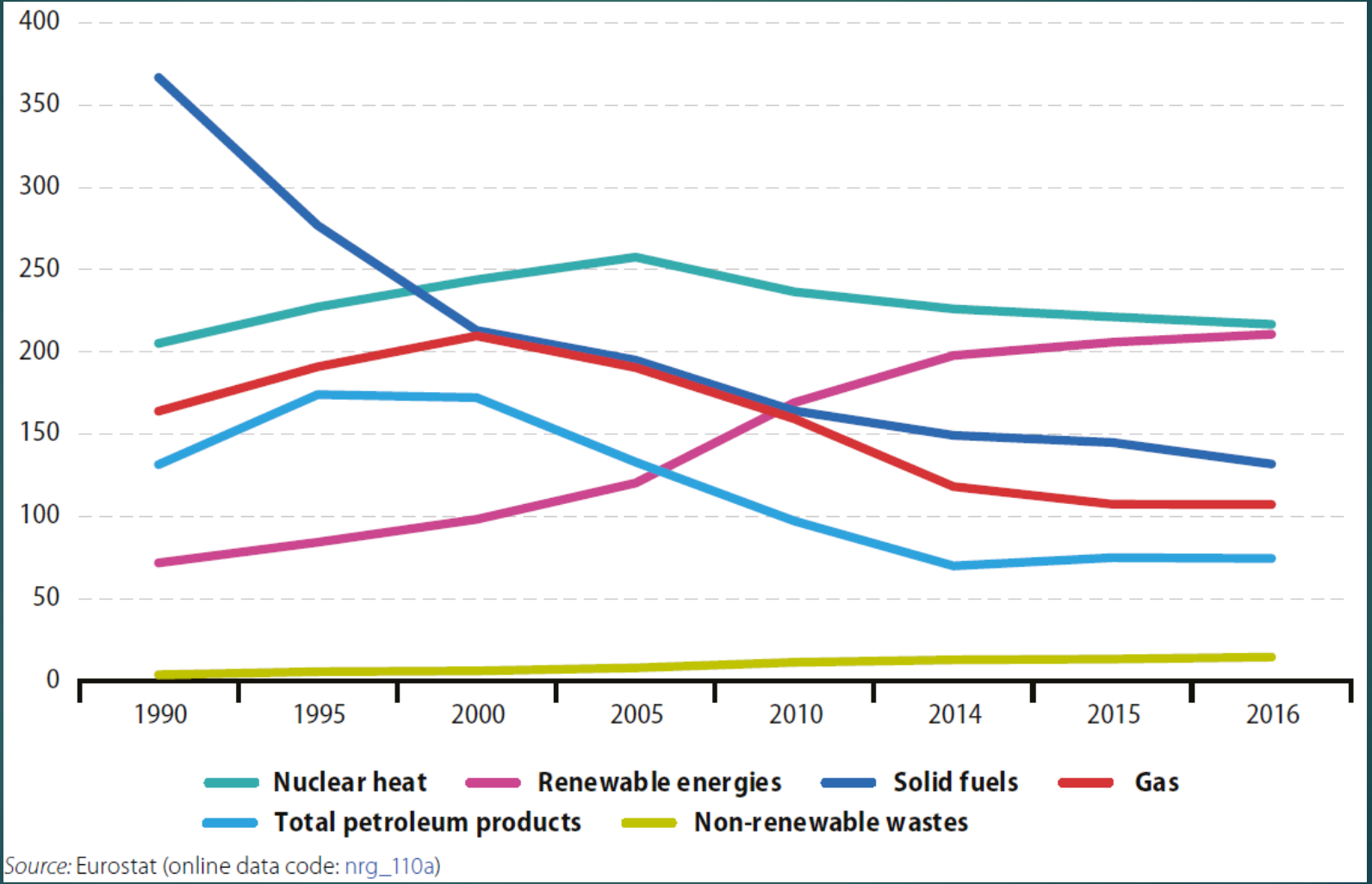


Energy consumption by transport mode, EU-28, 1990-2016 (1990 = 100, based on tonnes of oil equivalent)



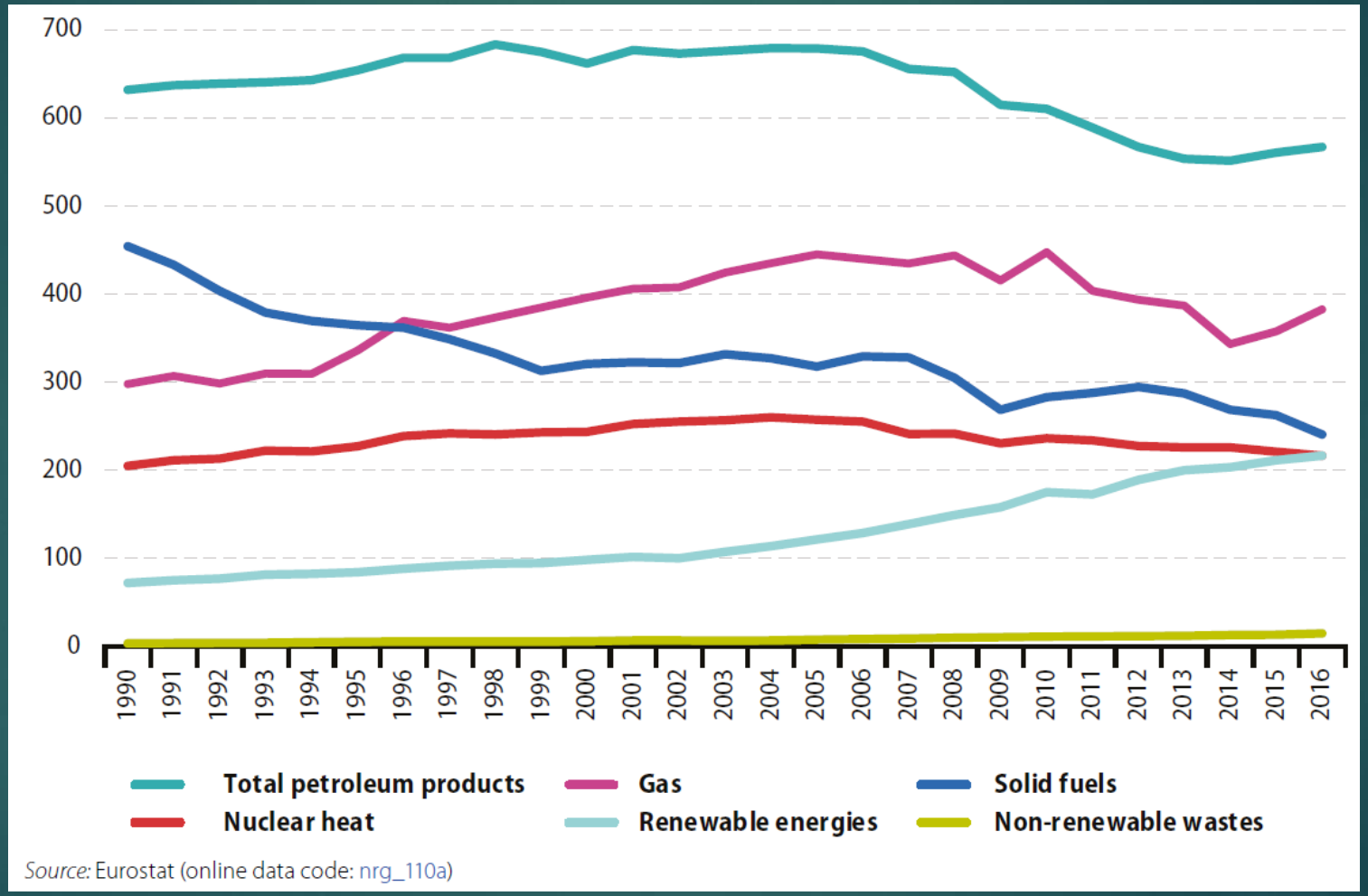
Source: Eurostat (online data code: nrg_110a)

Primary energy production by fuel, EU-28, in selected years 1990-2016 (Mtoe)



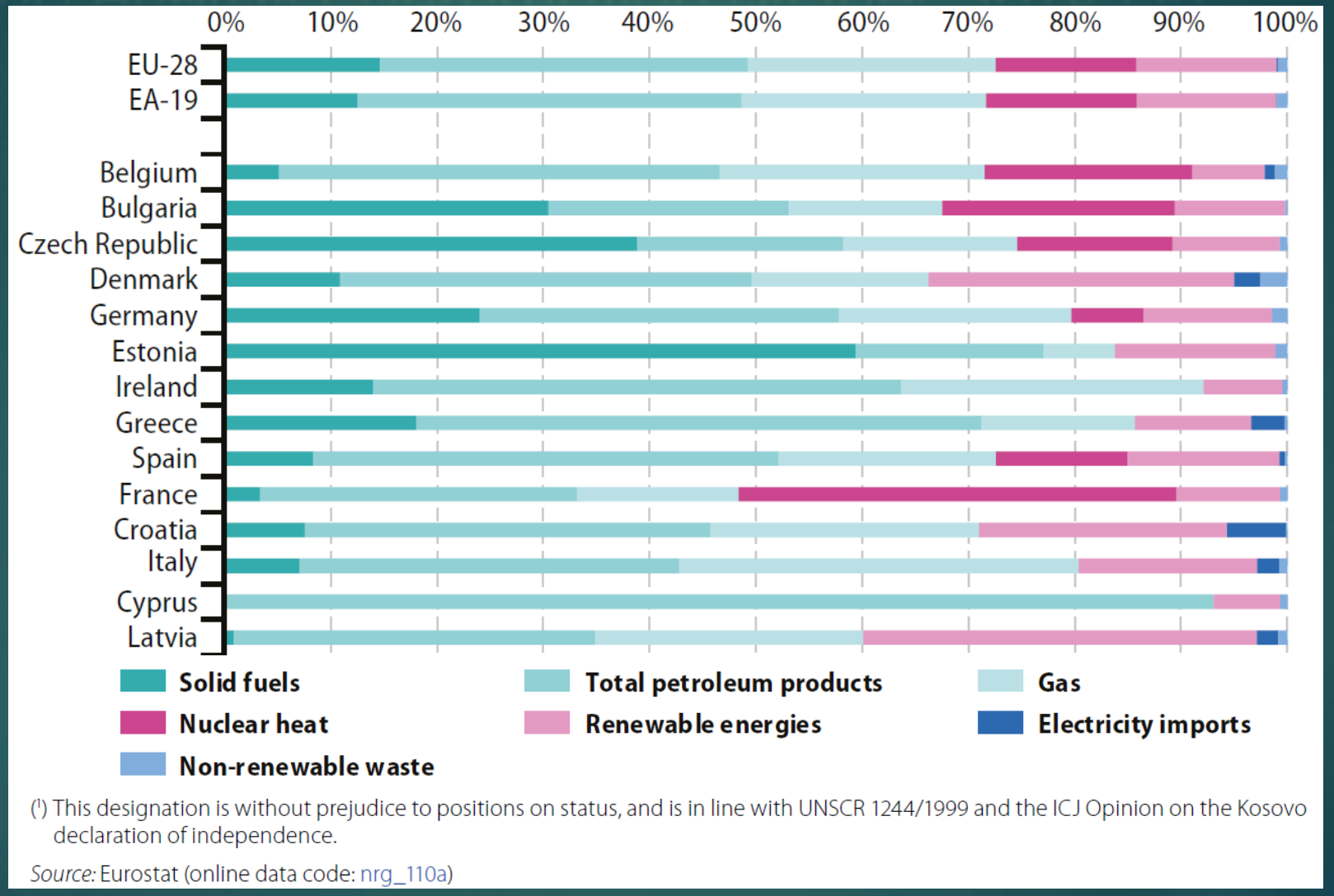
Source: Eurostat (online data code: nrg_110a)

Gross inland energy consumption by fuel, EU-28, 1990-2016 (Mtoe)



Source: Eurostat (online data code: nrg_110a)

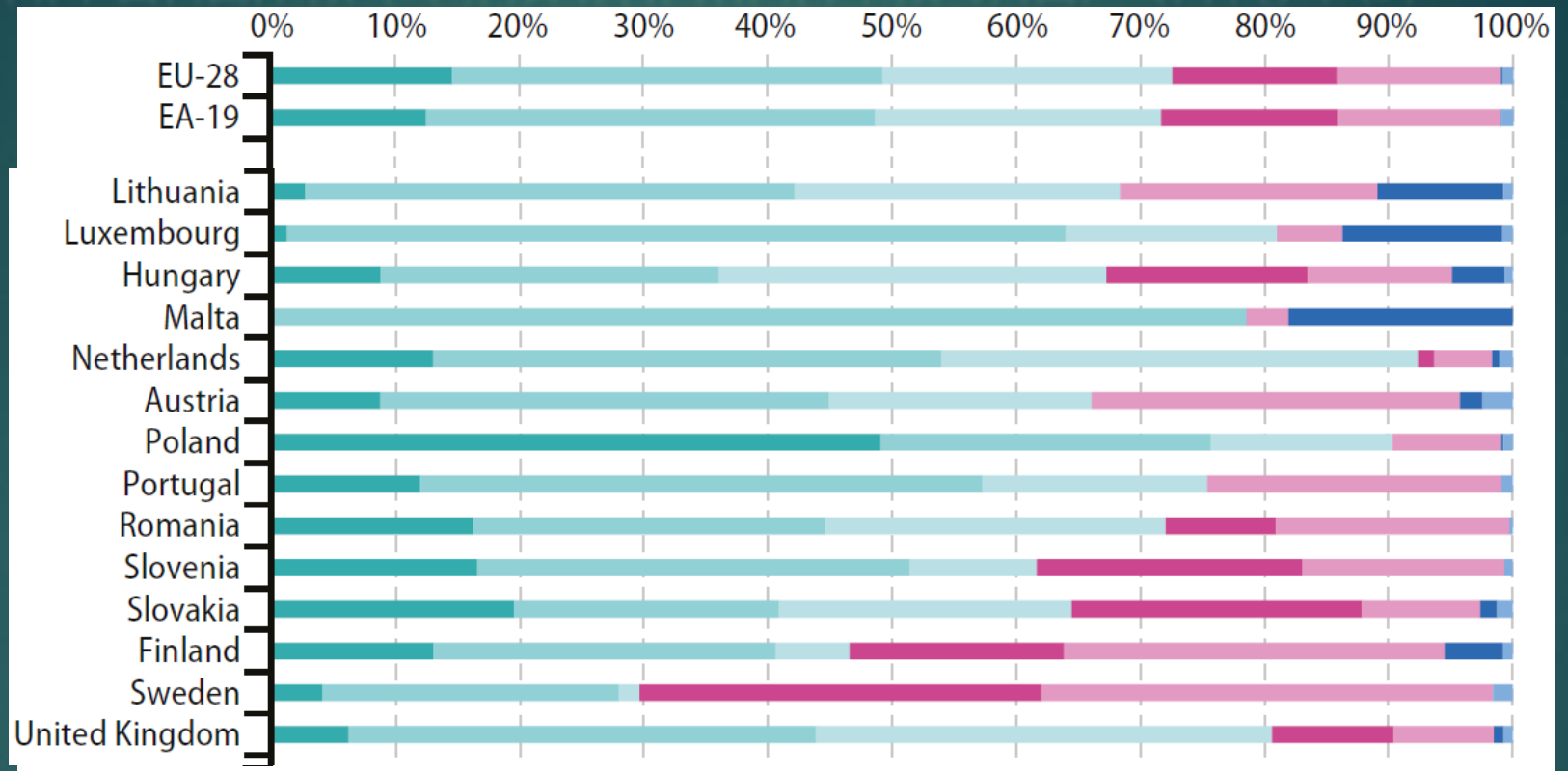
Gross inland energy consumption by fuel, 2016 (%)



(1) This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Source: Eurostat (online data code: nrg_110a)

Gross inland energy consumption by fuel, 2016 (%)



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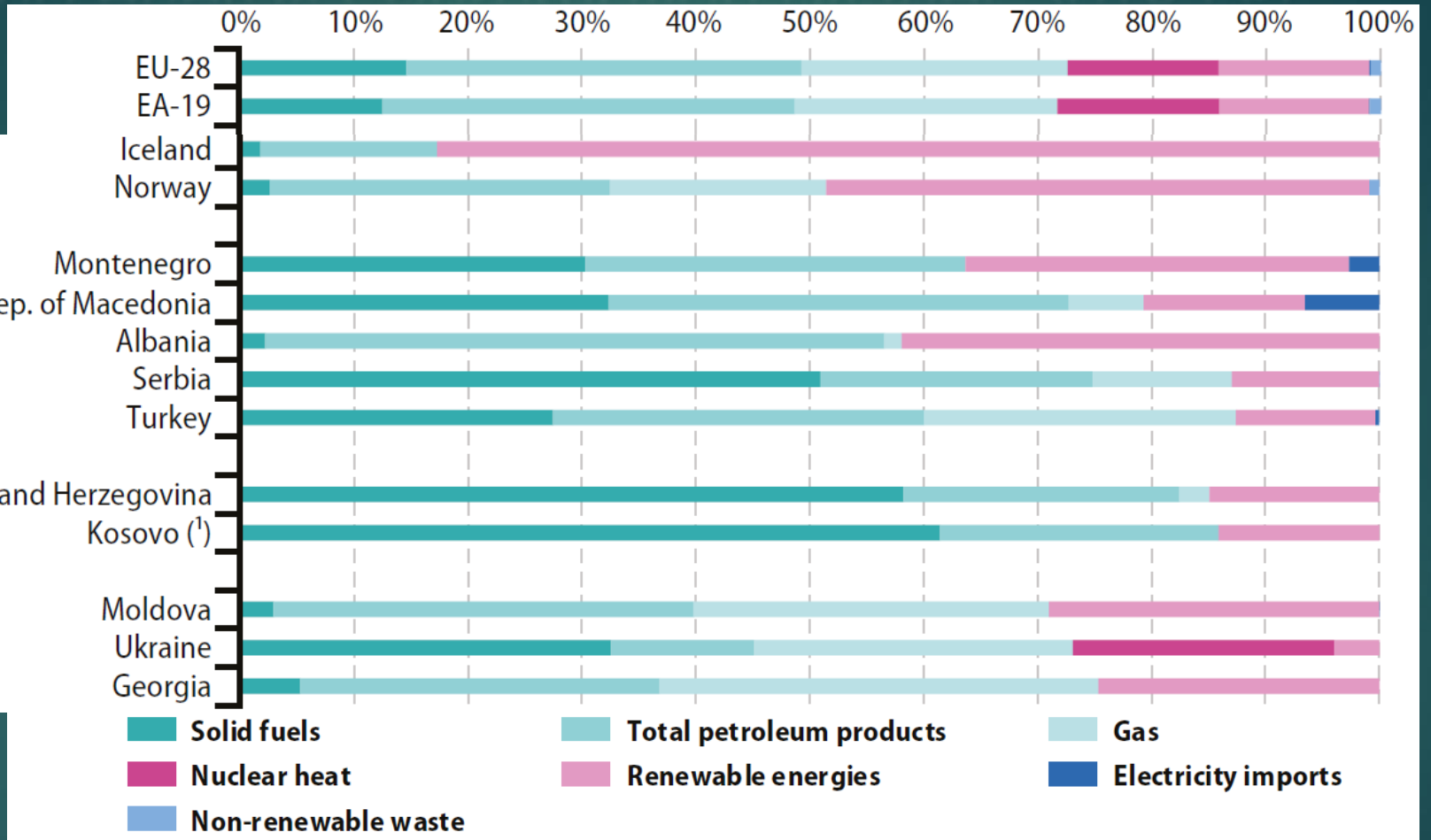
Gross inland energy consumption by fuel, 2016 (%)



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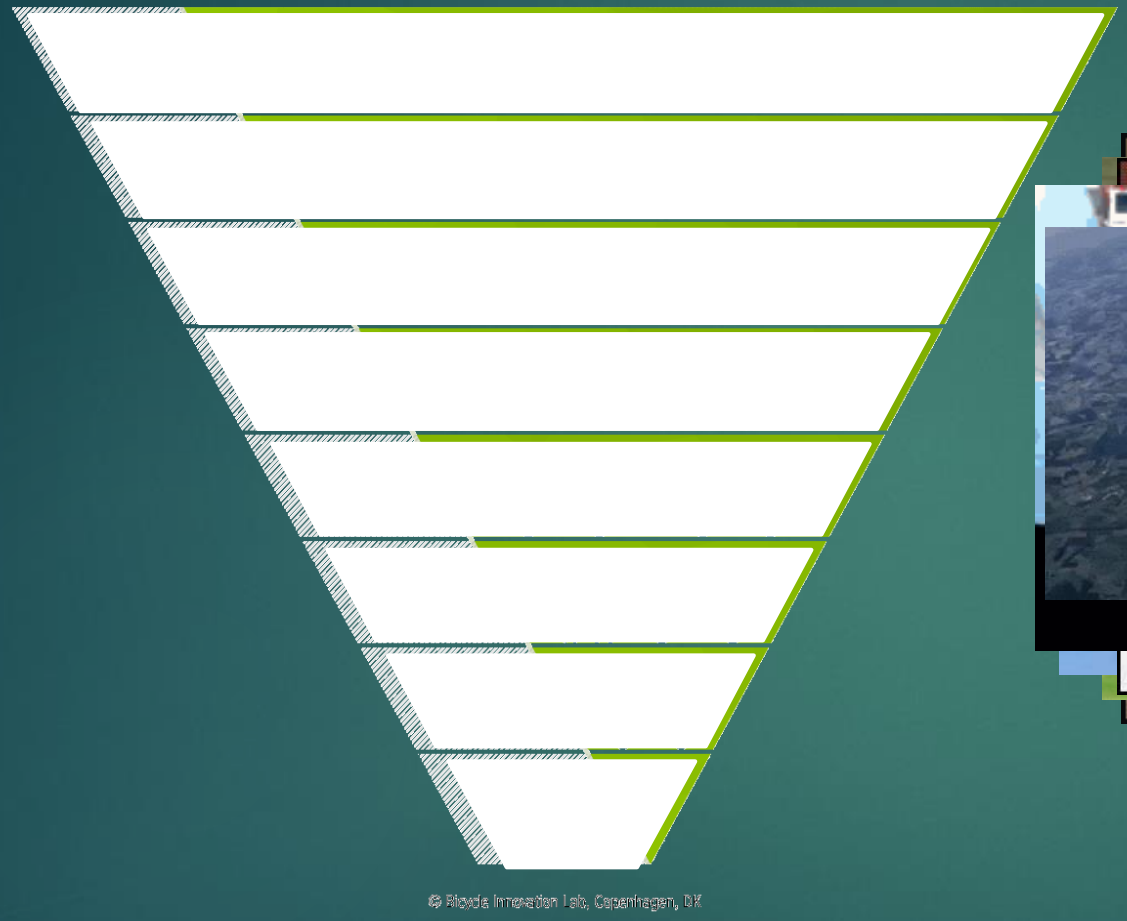
Source: Eurostat (online data code: nrg_110a)

What is environmentally friendly transport?

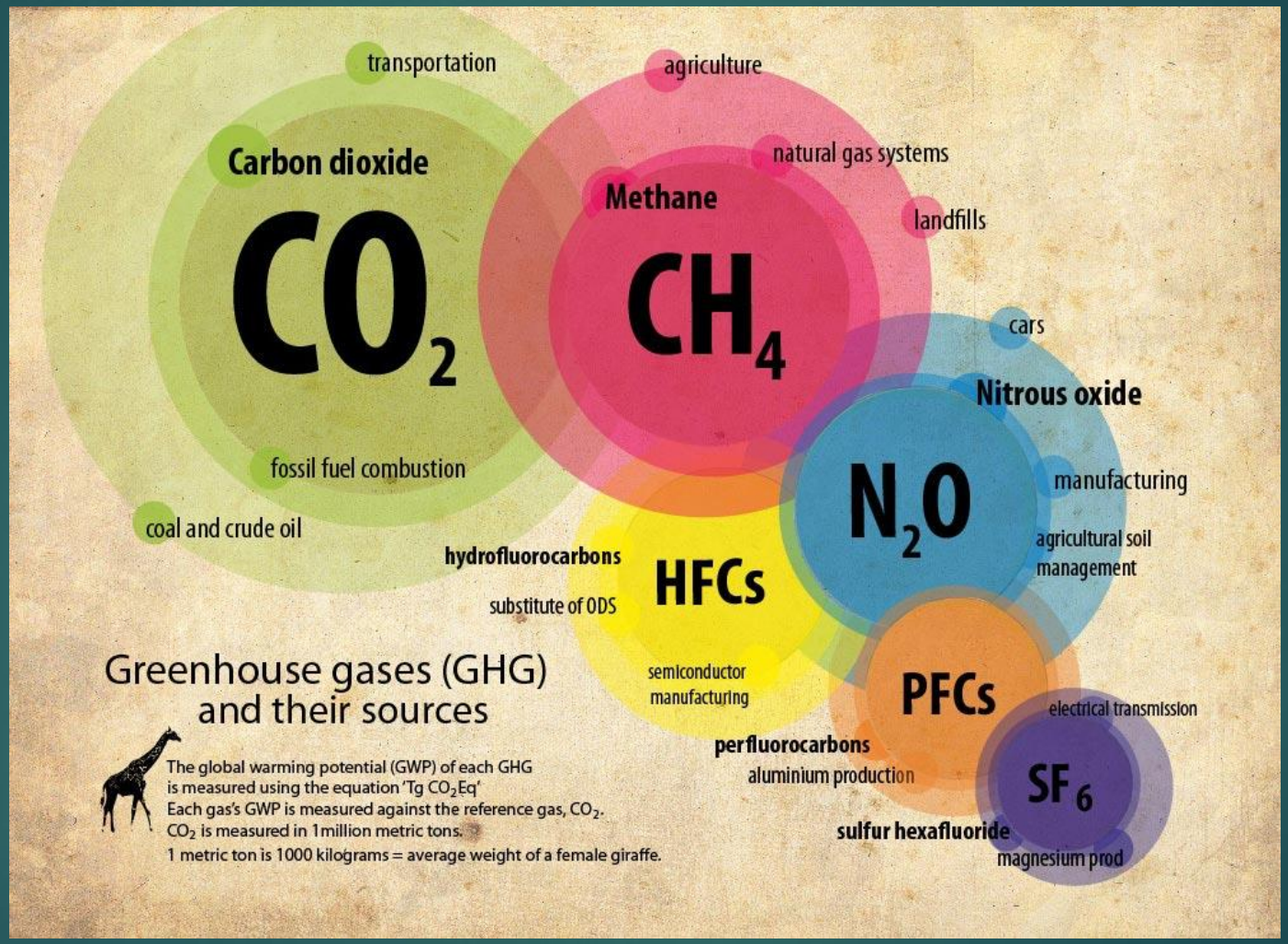
Sustainable transport system:



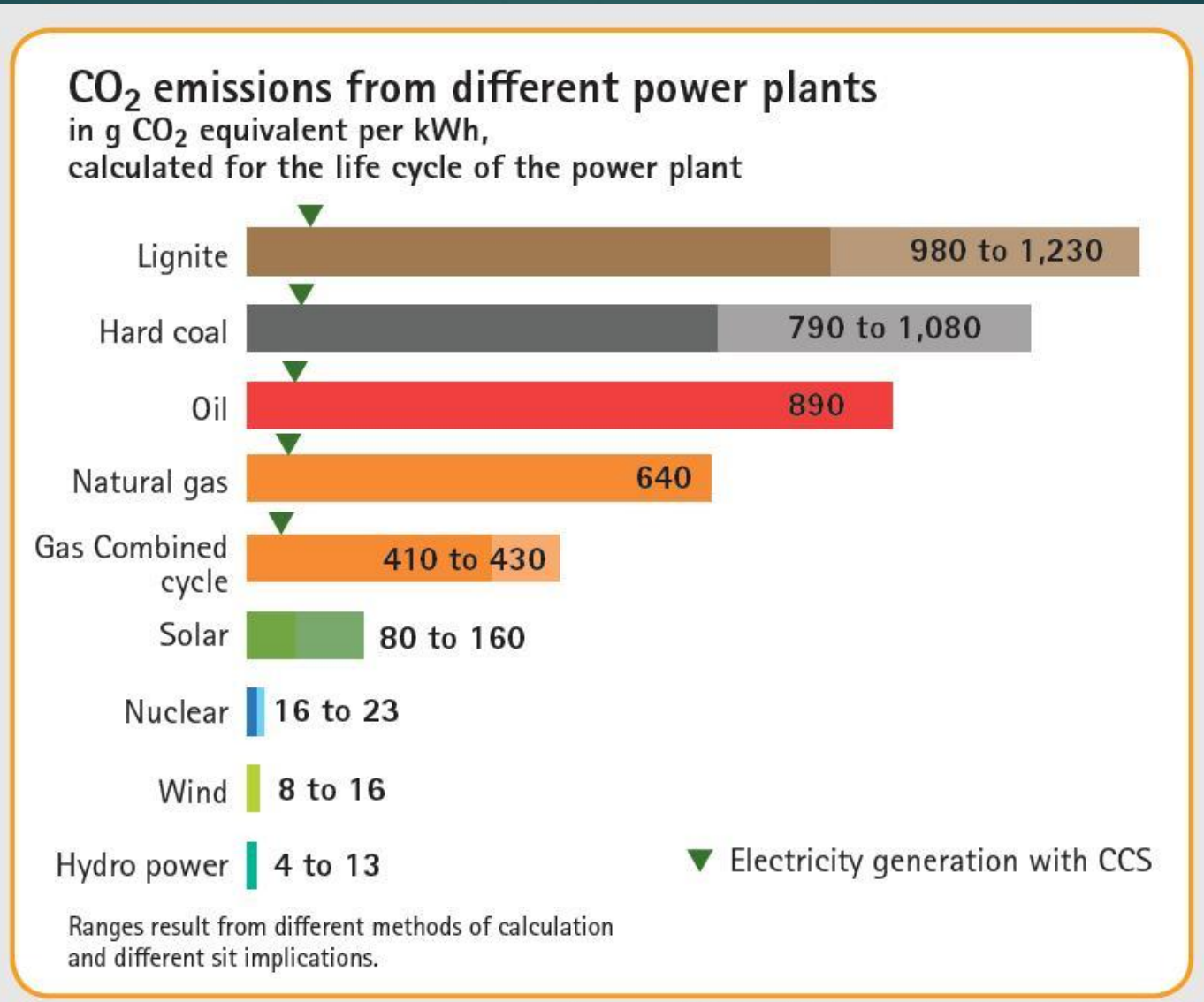
SOURCE: BICYCLE INNOVATION LAB, COPENHAGEN, DK

Sustainable transport system:

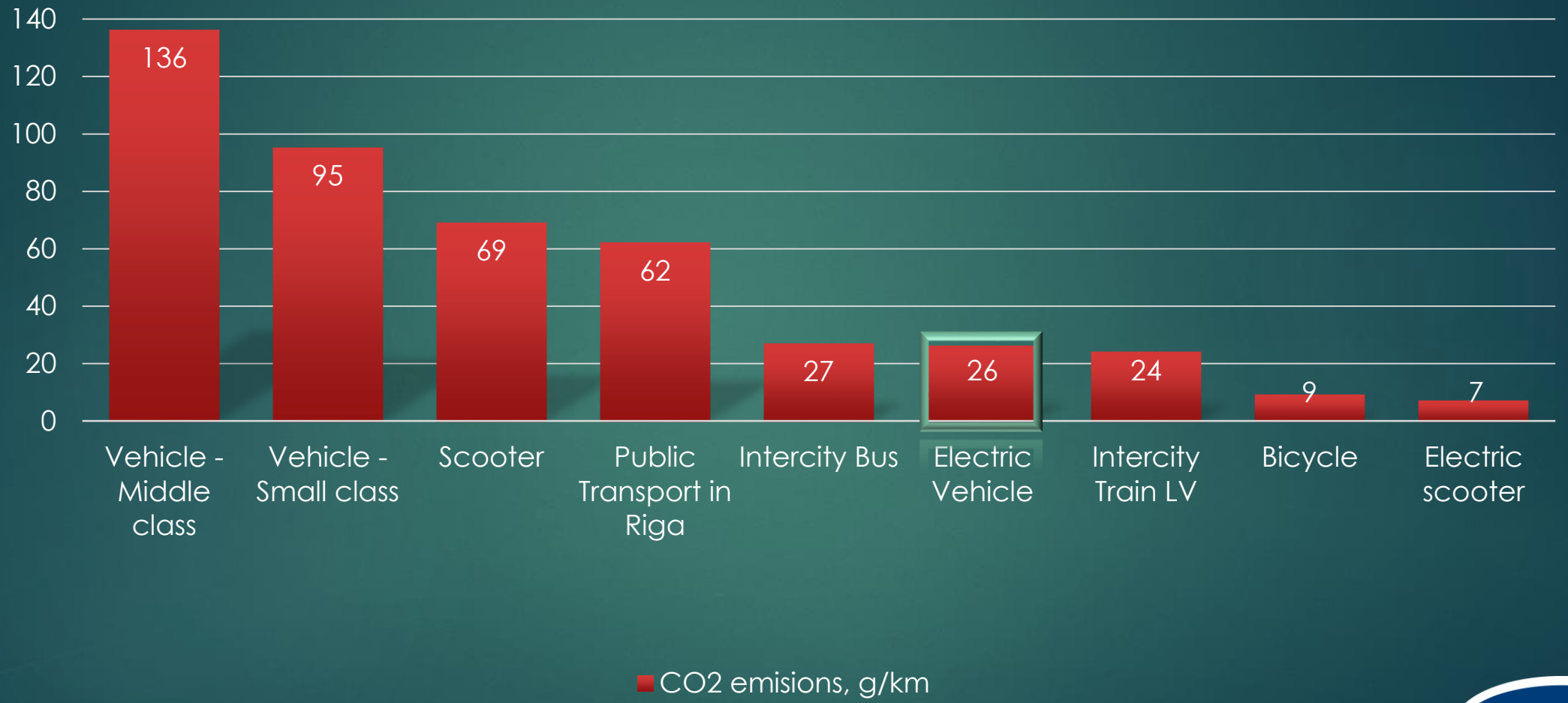
What Are Greenhouse Gases?



SOURCE: GREEN GROWING


CO_2 emissions from different power plants
in g CO_2 equivalent per kWh,
calculated for the life cycle of the power plant
Lignite
980 to 1,230
Hard coal
790 to 1,080
Oil
890
Natural gas
640
Gas Combined cycle
410 to 430
Solar
80 to 160
Nuclear
16 to 23
Wind
8 to 16
Hydro power
4 to 13
Electricity generation with CCS
Ranges result from different methods of calculation and different sit implications.
Source: PSI Paul-Scherrer-Institut, Switzerland

CO2 efficiency of vehicles



Transport cost items

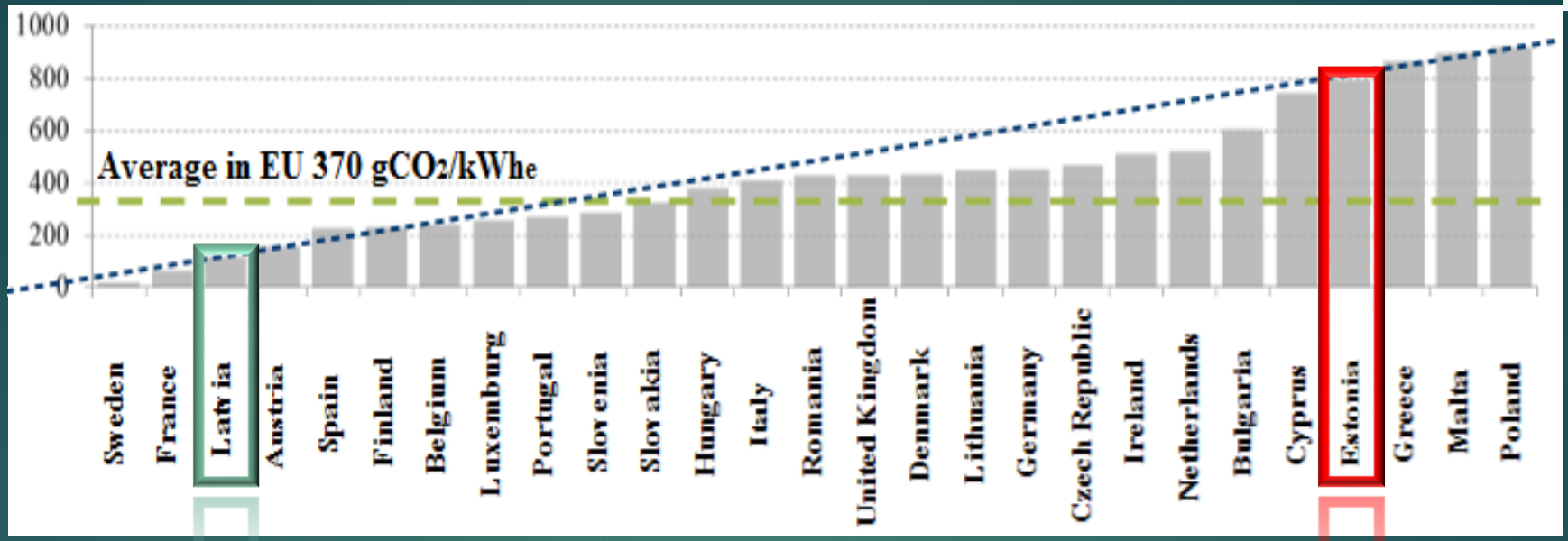
- ✓PURCHASE: LEASING / RENT / FULL SERVICE RENT
- ✓TAXES
- ✓INSURANCE
- ✓FUEL
- ✓TECHNICAL SERVICING
- ✓MAINTENANCES
- ✓PARKING, CITY ENTRY FEE

Types of environmental transport fuels

- ✓NATURAL GAS
- ✓BIO-FUEL
- ✓MILD HYBRID
- ✓HYBRID
- ✓PLUG-IN HYBRID
- ✓ELECTRIC
- ✓HYDROGEN

Transport cost items

CO2 emissions from power generation



NISSAN LEAF ELECTRIC:

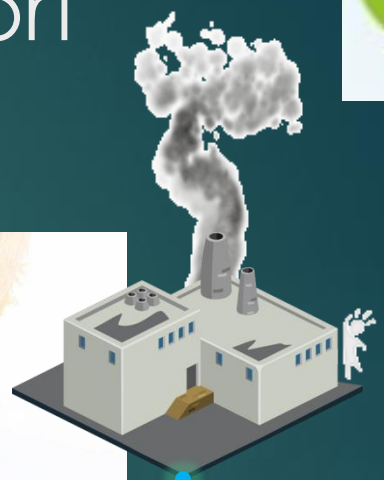
LATVIA: ~117 G CO2/KWH = 18 G/KM

EU28: ~370 G CO2/KWH = 53 G/KM

ESTONIA: ~800 G CO2/KWH = 121 G/KM

SOURCE: EURELECTRIC

Environmental impact of electric transport



Recognize the Electric Vehicle models

Recognize the Electric Vehicle models

Zero Emission

Recognize the Electric Vehicle models

Topic

TRANSPORT COST OPTIMIZATION METHODS TO PROMOTE GREEN BUSINESS

MG. ANDRIS VALDEMARS, SCHOOL OF BUSINESS AND FINANCE (LATVIA)

Turība University

BANKU AUGSTSKOLA
SCHOOL OF BUSINESS AND FINANCE

Main principles

AVOID	UNNECESSARY TRIPS;
REDUCE	DISTANCE TRAVELED AND / OR DRIVING INTENSITY;
COMPENSATE	OPPORTUNITY TO SAVE CO2 EMISSIONS;
ENCOURAGE	SUPPORT, ENCOURAGE INTEREST AND INSPIRE BY SELF-EXAMPLE.

Cost (and CO2) optimization methods

Telephone and video conferencing technologies:

- ✓Eliminates the need for employees to move around and saves employees valuable time;
- ✓Reduced direct transport costs;
- ✓The risk of accidents and incapacity for work is reduced.

Cost (and CO2) optimization methods

Adaptation of working hours and conditions to the volume of traffic:

- ✓Saves time on the go;
- ✓Reduces fuel consumption;
- ✓Reduces causes of employee stress, promotes quality of work performance;
- ✓Promotes employee loyalty to the company.

Cost (and CO2) optimization methods

Right size and vehicle types fleet:

- ✓Is the a…owntime should …
- ✓Are the…e (TAXI benchr…
- ✓Is it pos…t units (multip…
- ✓Can a …y of work execut…

Cost (and CO2) optimization methods

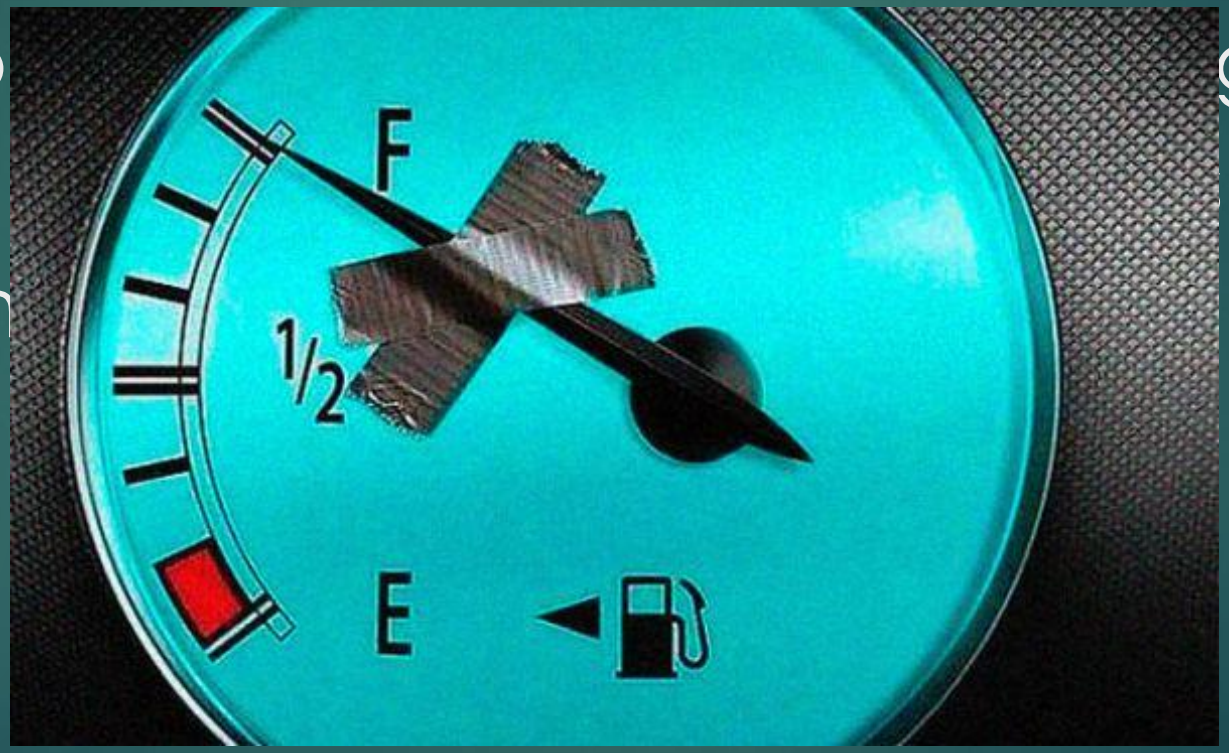
Route analysis and planning:

- ✓It is cost effec…oning System (GPS) equipm…se balance);
- ✓Disciplines em…away from work;
- ✓Motivates not…speed;
- ✓Ensures reduc….

Cost (and CO2) optimization methods

Introduction of a fuel consumption control procedure (more efficient for larger fleets):

- ✓Ensures imp g mode;
- ✓Promotes a port;
- ✓Reduces un



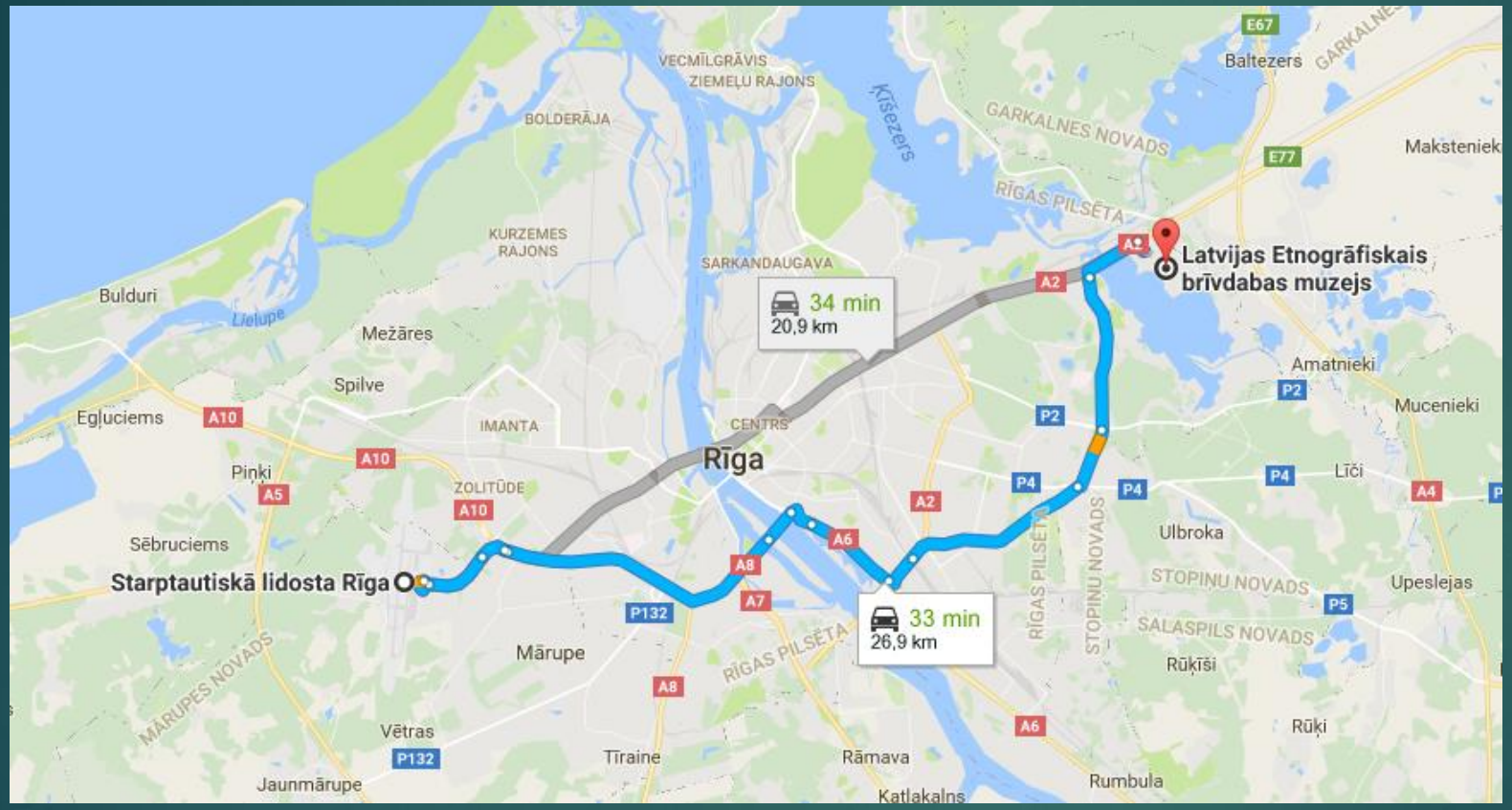
Cost (and CO2) optimization methods

Investments in employee economic driving training:

- ✓Immediate … pected;
- ✓Transport c…
- ✓Reduces t…
- ✓Decrease … ks of transport c…

Cost (and CO2) optimization methods

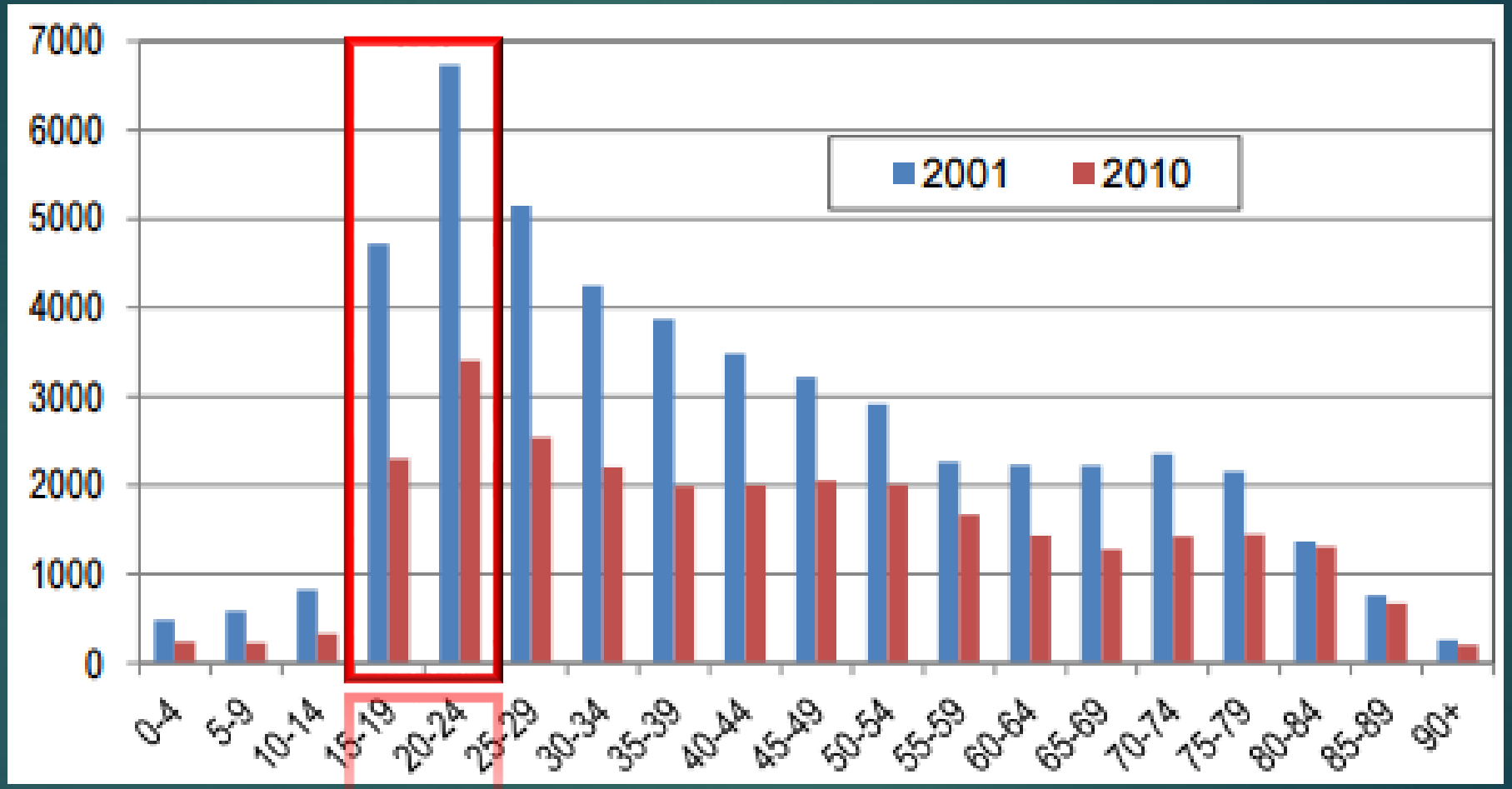
Comparison of choosing the most economical route



- ✓ Distances:
  shortest 20,9 km
  longest 26,9 km
- ✓ Driving mode:
  shortest Urban
  longest Combined
- ✓ Fuel consumption:
  shortest 7,4 L/100km
  longest 5,5 L/100km
- ✓ Fuel cost:
  shortest 1,70 EUR
  longest 1,63 EUR

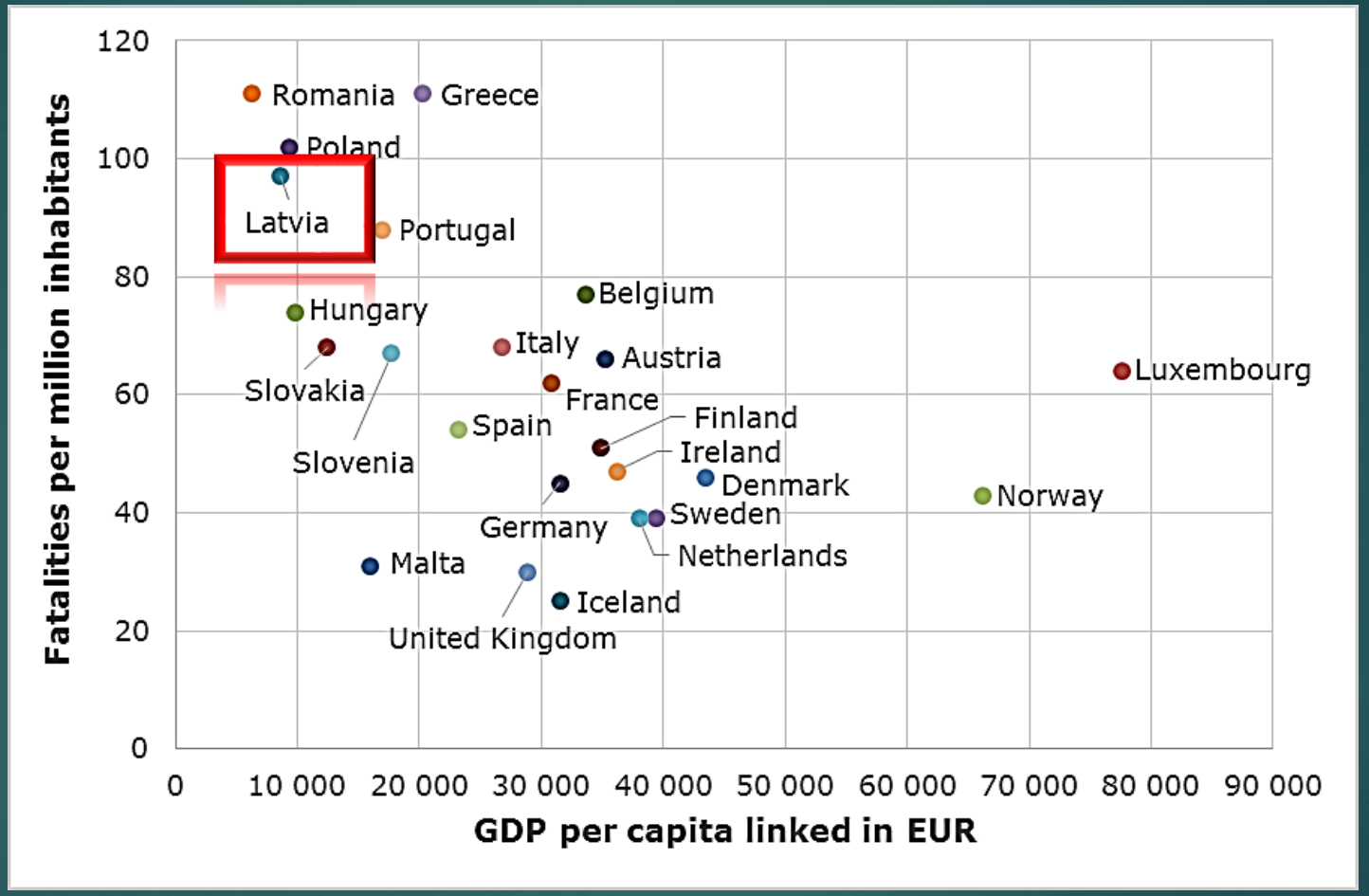
SOURCE: AUTHORS' COMPARISON, VEHICLE: FORD FOCUS, 1,0 ECO-BOOST, 92 KW AT, 2015
FUEL DATA: CONSUMPTION - URBAN 7,4 L/100 KM, COMBINED 5,5 L/100 KM; PRICE 1,10 EUR / L

Major accidents in the EU by age group



SOURCE: CARE DATABASE

Major accidents in the EU by GDP



SOURCE: CARE DATABASE

Cost (and CO2) optimization methods

Application of sustainable selection principles in transport (and other) procurement:

- ✓Calculation o… …or the entire transport lifec…
- ✓Environmenta… …ria (emissions, tire energy eff… …ycling) should be applied;
- ✓Co-operation … …eneurs who support enviro… …usiness, eco-labeling and s… … encouraged.

Cost (and CO2) optimization methods

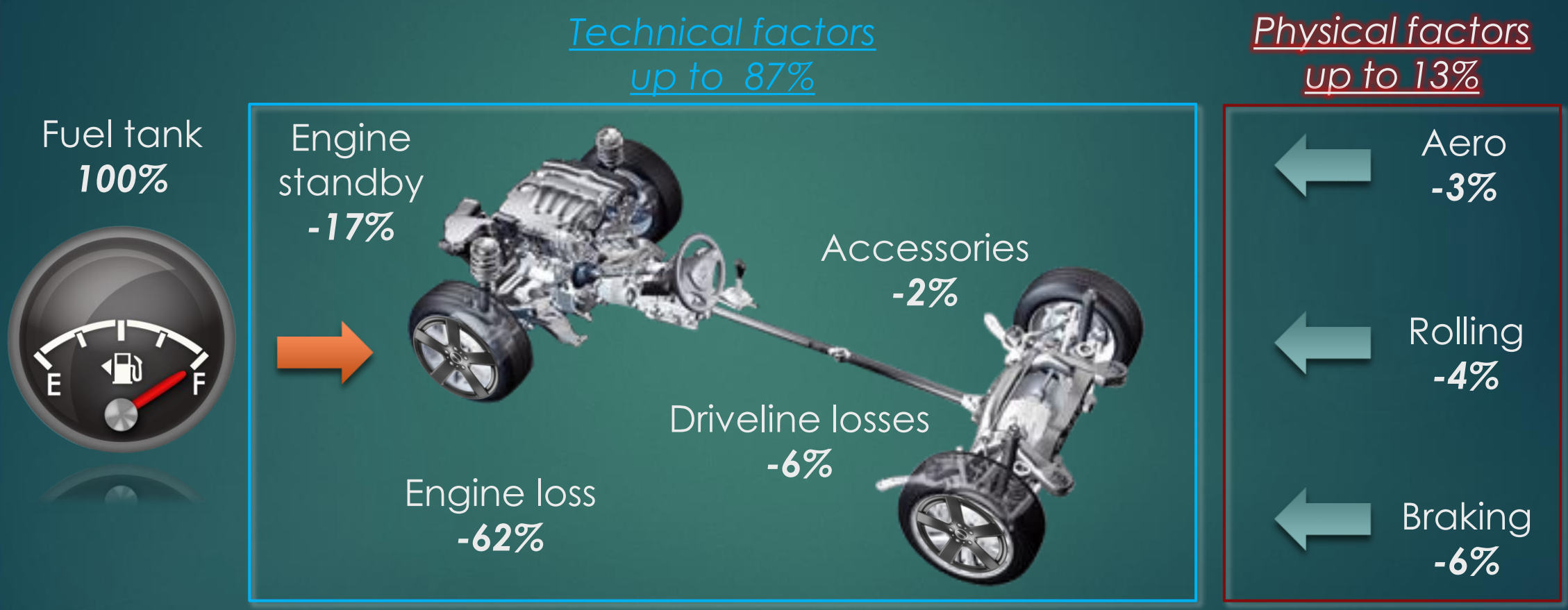
Social activities with sustainable impact and environmental impact:

- ✓Remuneratio… transport costs;
- ✓Arriving on c…king available);
- ✓Inclusion of s…policy;
- ✓Promotes a p…proves the health of employees.

Topic

WHICH PHYSICAL FACTORS IMPACTS THE FUEL ECONOMY?

Capacity for improvement in vehicles fuel efficiency, ***Urban Driving:***



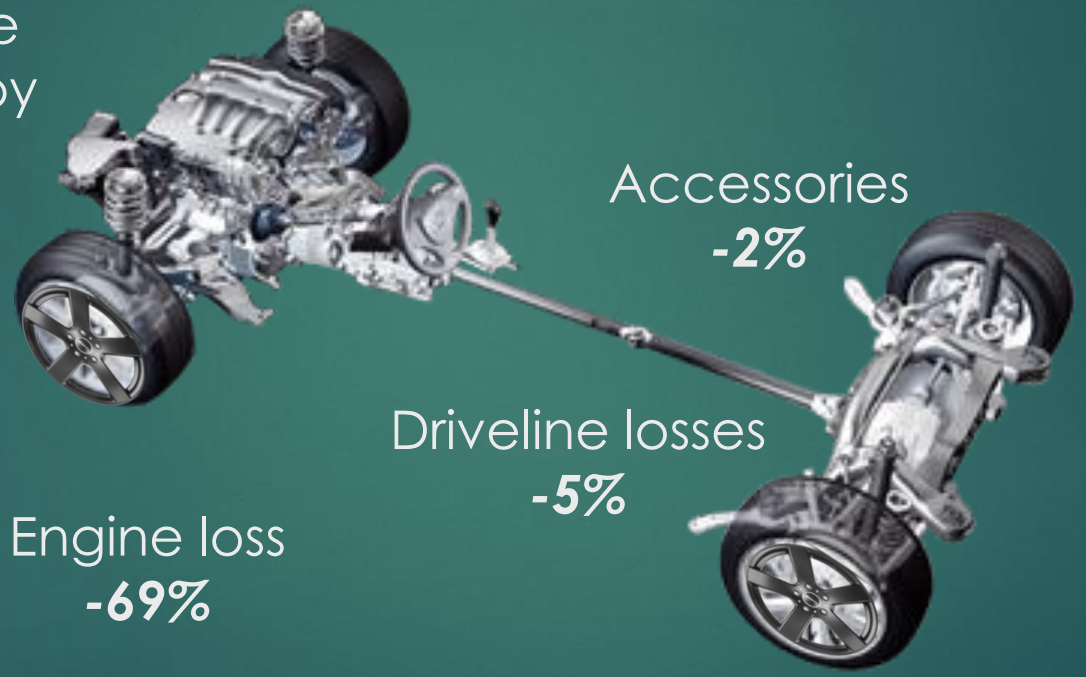
SOURCE: A.E. ATABANI ET AL. / RENEWABLE AND SUSTAINABLE ENERGY REVIEWS *15 (2011)*
AUTHORS' VISUALISATION

Capacity for improvement in vehicles fuel efficiency, ***Highway Driving :***

Fuel tank
100%

Technical factors up to 80%

Engine standby
-4%



Accessories
-2%

Driveline losses
-5%

Engine loss
-69%

Physical factors up to 20%

Aero
-11%

Rolling
-7%

Braking
-2%

SOURCE: A.E. ATABANI ET AL. / RENEWABLE AND SUSTAINABLE ENERGY REVIEWS *15 (2011)*
AUTHORS' VISUALISATION

Currently Available Energy Efficient Technologies

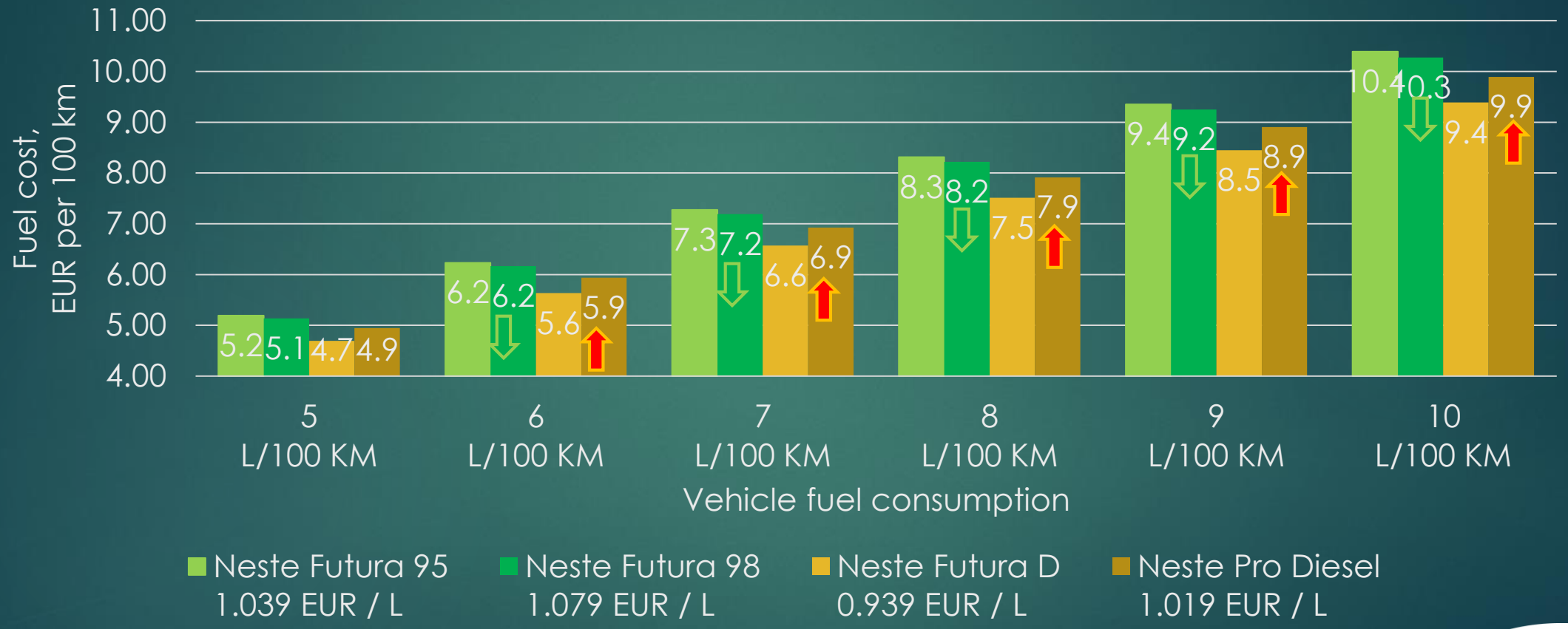
Technologies	Technology	Efficiency Increase
Engine	Cylinder deactivation	Up to 5%
	Turbochargers	**Up to 8%**
	Gasoline Direct Injection (GDI)	1%
	Valve Timing & Lift Technologies	3% – 4%
Transmission	Additional gears	2% – 4%
	Continuously Variable Transmissions (CVTs)	3% – 4%
	Dual-clutch transmissions	3% – 4%
Hybrid	Start-Stop	2%
	Mild hybrids	3% – 6%
	Hybrids	**27% – 35%**
Other	Reducing vehicle weight	1% – 3% per 5% reduction

SOURCE: NATIONAL ACADEMY OF SCIENCES. 2015. COST, EFFECTIVENESS AND DEPLOYMENT OF FUEL ECONOMY TECHNOLOGIES FOR LIGHT-DUTY VEHICLES. THE NATIONAL ACADEMIES PRESS, WASHINGTON, D.C.
CONCLUSIONS MADE BY: U.S. DEPARTMENT OF ENERGY, WWW.FUELECONOMY.GOV/FEG/TECH_ADV.SHTML

The ***fuel type*** impact on the fuel consumption

- ✓ The conclusions from the researches (Pirs, V., Birzietis, G., Gailis, M., Latvia University of Agriculture, 2016) of comparison of the impact of different types of fuel on vehicle fuel consumption were:
  - ✓ A decrease up to 4,76% in fuel consumption in real mixed driving circumstances (urban and extra-urban) was achieved by using gasoline Neste Futura 98 in comparison to Neste Futura 95.
  - ✓ A decrease from 2,9% up to 3,9% in fuel consumption in different driving circumstances was achieved by using Neste Pro Diesel in comparison to Neste Futura D.

The ***fuel type*** impact on the fuel consumption



SOURCE: AUTHORS' COMPARISON, FUEL PRICE: NESTE ON 25-TH, SEPTEMBER, 2016

The ***tire efficiency*** impact on fuel consumption

- ✓ A fuel efficiency label based on the Rolling Resistance means, the difference in vehicle fuel consumption between A and G-rated tires could be as much as 7.5% (European Commission's impact Assessment SEC, 2008).
- ✓ For an average passenger vehicle with consumption 8,7 L per 100 km, the economy is around 0,65 L per 100km (Bridgestone).

The ***tire efficiency*** impact on fuel consumption

Comparison of choosing tires with different labels

✓ The size ***205/55R16*** 91H tires in Latvian market:

Tire model	*Fuel Efficiency Label*	*Tire price, EUR per 4 pieces*	*Fuel cost up to 30 000 km, EUR*	*Tires and fuel total cost, EUR*
Not available	**A**	-	2 871	-
Michelin ENERGY SAVER+	**B**	520	2 904 ↑	3 424
Continental ContiPremiumContact 5	**C**	480	2 944 ↑	3 424 →
Kleber DYNAXER HP3	**E**	401	2 990 ↑	3 391 ↓
Kormoran RUNPRO B3	**F**	288	3 039 ↑	3 327 ↓
Not available	**G**	-	3 086	-

SOURCE: AUTHORS' COMPARISON, DATA: CONSUMPTION - COMBINED 8,7 L/100 KM; FUEL PRICE 1,10 EUR / L; TIRES' PRICE: LANEKS.LV , WITH SAME 91H LOAD AND SPEED INDEXES

Topic

GROUP TASK

Group task

1. To prepare the overview about eco-friendly transport in your home city
2. To calculate the most sustainable transport methods for 1 year with the most effective cost for:
   - ✓ Family with 3 children goes to work / school at 25 km / daily (each) – use your habits after school too
   - ✓ 3 employees deliver parcels (up to 20 kg) around the city 250 km / week (each)
   - ✓ 3 employees deliver goods (up to 100 kg) outside city 1000 km / week (all together)
3. The results should be prepared and presented to the others!

Thank you!

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