

Webinar on the COPERT model to support National Greenhouse Gas Inventories from developing countries under the Enhanced Transparency Framework of the Paris Agreement

UNFCCC Transparency Division

United Nations Climate Chanae

23 – 27 September 2024

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Monday 23 September 2024

15:00 – 17:00 (Bonn Time)

Session 1

Opening Session

• Opening Remarks: objectives, expectations

- Modalities, Procedures and Guidelines for Transparency Framework of Paris Agreement
- Reporting requirements to estimate GHG emissions from anthropogenic sources (Energy Road Transportation)

UNFCCC Secretariat

Quiz on Mentimeter

Challenges faced by developing countries to estimate GHG emissions from road transportation in line with 2006 IPCC GLs



Mentimeter

https://www.menti.com/alst8x8wzy7b

Mentimeter code: 5948 7113

Work - Education - Features - Resources - Pricing Talk

Talk to sales

Enter access code to join a Menti presentation

1234 5678

Session 2

Overview of road transportation in developing countries

By the end of this session, you will know more about :

- 1. Different contexts of road transportation data in developing countries
- 2. Constraints and difficulties for data collection from road transportation
- 3. Data needs to improve GHG emission estimates from road transportation

Learning objectives

Trend of vehicles in use by region between 2000 - 2018



History of data development for road vehicles

- Vehicle manufacturer (safety and environmental regulations, compliance)
- Legal framework developpment
- Civil society (Pressure groups) and governance
- Traffic management and road infrastructure investment
- Air quality control and health protection
- Environmental protection awarness

Different contexts of road transportation data

- Activity Data (Fuels, Vehicle stock)
- Unit Emission Factors (Fuel, Vehicle)
- Vehicle fleet characterization
- Driving conditions and parameters
- * **Developed countries:** vehicle manufacturer, regulations (implementation of emission standards), fleet and traffic observatories, professional associations, scientific research, etc.
- * Developing countries: importer (new, used), vehicle assembler, absence of standards, absence of observatories, weak scientific research, etc.

Lack of data in developing countries



Vehicle fleet composition, annual mileage and traffic characteristics

- Weak Vehicle Registration Systems: fragmented, decentralized with gaps or inaccuracies in recorded data
- Limited Institutional Capacity: lack of resources, expertise, and technology to maintain accurate and comprehensive records (updating)
- Lack of Data Collection Infrastructure and management: requires investment which is not prioritized over issues such as poverty reduction, health, and education
- Limited Financial and human Resources for Surveys and Studies: collecting accurate vehicle mileage and other road vehicle driving parameters data require extensive surveys.

Lack of data in developing countries



Vehicle fleet composition, annual mileage and traffic characteristics

- Infrequent Vehicle Inspections: I/M is poorly enforced, or absent, data collected is not always centralized or properly utilized.
- Adoption of Emission Standards with Inconsistent Implementation: Several countries adopted pollutant emission standards (Euro, US standards or equivalents) but not fully implemented, Fuel quality regulations to reduce the sulfur content for enabling vehicles to meet emission standards but partially implemented and fuel composition data not collected.
- Challenges with Imported Used Vehicles: incomplete or inadequate data recorded

Challenges for data collection

- **1. Vehicle Fleet Data**: Lack, limited or outdated records of vehicle fleets (Data on vehicle types, fuel types, age, technology, emission standards and usage patterns are often incomplete or unavailable).
- **2. Fuel Consumption Data and characteristics**: Lack of accurate data on fuel sales, fuel usage and fuel quality (fuel composition).
- **3. Traffic and Road Use Patterns data**: Lack or poor data on vehicle road traffic (speed and mileage per vehicle category and road type).

Challenges for data collection

- **4. Emission Factors**: Lack of country specific emission factors, use of default EFs which may not be appropriate for the vehicle technologies and national driving conditions.
- 5. Vehicle Types: Lack of data on aging and maintenance per vehicle category.
- **6.** Low technical Expertise: Lack trained personnel and institutions to develop comprehensive GHG inventories.

Session 3

2006 IPCC GLs for estimating GHG emissions from road transportation

By the end of this session, you will :

1. Know all about the IPCC methodologies to estimate GHG emissions from road transportation

2. Understand the different tiers (T1, T2, T3)

3. Identify the needed data to move to higher tier to estimate GHG emissions

Learning objectives

Sources of pollutant emissions from road transport

Evaporative Emissions

Exhaust Emissions

Road Vehicles

Movement of goods and/or passengers

FUELS

Road vehicle tyre and brake wear Road wear caused by vehicles motion

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Sources of pollutant emissions from road transport



IPCC 2006 Classification: Fuel combustion



IPCC 2006 (Refinement 2019) : Classification of fugitive emissions of fuels

1.B: Fugitive emissions from oil/natural gas systems

1.B.2.a.1 Exploration **1.B.1: Solid Fuels** 1.B.2.a.2 Production 1.B.2.a: Oil 1.B.2.a.3 Transport 1.B.2.a.4 **1.B.2.b:** Natural gas **Refining/Storage** 1.B.2.a.5 Distribution of oil products (Previous 1.B.2.a.iii.5) **1.B.2:** Oil, natural gas **1.B.2.c: Venting & flaring** and other emissions **1.B.2.a.6 Other** from energy production 1.B.2.c: Other

Fundamental Concept of GHG Emission Estimation

Emission = Activity Data (AD) X Emission Factor (EF)



Activity Data required

- 1- Statistics on Fuel consumption:
 - Fuel type, composition
 - Vehicle category
 - Vehicle technology
- 2- Statistics on traffic characteristics
 - Total annual mileage
 - Average Speed
 - Road type
- 3- Statistics on vehicle stock
 - Vehicle category (fuel type)
 - Vehicle technology

Decision tree for CO2 emissions from fuel combustion in road vehicles

IPCC 2006, Vol. 2, Chap. 3, Fig. 3.2.2





IPCC 2006 decision tree for estimating CO2, CH4 and N2O emissions from road vehicles

IPCC 2006, Vol. 2, Chap. 3, Fig. 3.2.3

Tier 1: CO2 emission

EQUATION 3.2.1 CO₂ from road transport

$$Emission = \sum_{a} [Fuel_a \bullet EF_a]$$

IPCC 2006, Vol. 2, Chap. 3, Eq. 3.2.1

Where:

Emission = Emissions of CO2 (kg)

- Fuel_a = Fuel sold (TJ)
- EF_a = **Default EF** (kg/TJ). This is equal to the **carbon content** of the fuel multiplied by 44/12
- a = type of fuel (e.g. petrol, diesel, natural gas, LPG, etc.)

Tier 2: CO2 emission

EQUATION 3.2.1 CO₂ from road transport

$$Emission = \sum_{a} [Fuel_a \bullet EF_a]$$

IPCC 2006, Vol. 2, Chap. 3, Eq. 3.2.1

Where:

Emission = Emissions of CO2 (kg)

- Fuel_a = fuel sold (TJ)
- EF_a = **Country specific EF** (kg/TJ). This is equal to the **CS** carbon content of the fuel multiplied by 44/12.
- a = type of fuel (e.g. petrol, diesel, natural gas, LPG etc)

Tier 1: Emission of CH4 and N2O

EQUATION 3.2.3 TIER 1 EMISSIONS OF CH_4 and N_2O

 $Emission = \sum_{a} [Fuel_a \bullet EF_a]$

IPCC 2006, Vol. 2, Chap. 3, Eq. 3.2.3

Where:

Emissions = Emission in kg

EFa	= Default emission factor (kg/TJ)
Fuel _a	= Fuel consumed (TJ) (represented by fuel sold)
а	= Fuel type a (e.g., diesel, gasoline, natural gas, LPG

Tier 2: Emission of CH4 and N2O

EQUATION 3.2.4 TIER 2 EMISSIONS OF CH₄ AND N₂O

$$Emission = \sum_{a,b,c} [Fuel_{a,b,c} \bullet EF_{a,b,c}]$$

IPCC 2006, Vol. 2, Chap. 3, Eq. 3.2.4

Where:

Emission = emission in kg = emission factor (kg/TJ) (Tier 2, USA) EF_{a.b.c} Fuel_{a,b,c} = fuel consumed (TJ) (represented by fuel sold) for a given mobile source activity = fuel type (e.g., diesel, gasoline, natural gas, LPG) a b = vehicle type = emission control technology (such as uncontrolled, catalytic С converter, etc)

Tier 3: Emission of CH4 and N2O

EQUATION 3.2.5 TIER 3 EMISSIONS OF CH_4 AND N_2O

 $Emission = \sum_{a,b,c,d} [Distance_{a,b,c,d} \bullet EF_{a,b,c,d}] + \sum_{a,b,c,d} C_{a,b,c,d}$

IPCC 2006, Vol. 2, Chap. 3, Eq. 3.2.5

Where:

Emission	= emission or CH4 or N2O (kg)
EF _{a,b,c,d}	= emission factor (kg/km) (Tier 3, COPERT model)
Distance _{a,b,c}	_{c,d} = distance travelled (VKT) during thermally stabilized engine (km)
C _{a,b,c,d}	= emissions during warm-up phase (cold start) (kg)
а	= fuel type (e.g., diesel, gasoline, natural gas, LPG)
b	= vehicle type
С	= emission control technology (such as uncontrolled, catalytic converter, etc.
d	= operating conditions (e.g., urban or rural road type, climate, or other environmental factors)

Conclusions from 2006 IPCC GLs





Tuesday 24 September 2024

15:00 – 17:00 (Bonn Time)

Session 4

Higher tier methods for estimating GHG emissions from road transportation COPERT model: interface and functions

By the end of this session, you will:
1. Know more on Copert model features, requirements and installation
2. Discover the Copert Interface,
3. Identify the different functionalities
4. Understand the different modules & menus
5. Know more on the data needed to run it

Learning objectives

COPERT: Description

- COPERT: COmputer Program to calculate Emissions from Road
 Transport
- COPERT version 5.7.3 (latest version)
- European tool for the calculation of emissions from the road transport sector (EEA & JRC funded)
- Scientifically and technically supported by Emisia and the Laboratory of Applied Thermodynamics, University of Thessaloniki, Greece
- COPERT methodology is consistent with the 2006 guidelines for the calculation of GHG Emissions

COPERT: Uses & application

- It uses vehicle stock, mileage, speed and other data such as ambient temperature and calculates emissions and energy consumption for a specific country or region.
- Covers all classes of road vehicles
- Calculates emissions of all pollutants from road transport
 - regulated pollutants: CO, NOx, VOC, PM) and CO2,
 - unregulated pollutants (N2O, NH3, SO2, NMVOC, etc.)
- Calculates fuel consumption
- Applicable in all countries of the world

COPERT usage in the world (2021)



Based on ~800 unique downloads/year



COPERT Users (2021): Distribution by activity



COPERT Applications (2021)



COPERT installation Requirements

COPERT is a 32-bit application and requires a 32-bit/64-bit Microsoft Windows operating system.

Minimum software requirements:

- 1. Microsoft® Windows XP SP3 or newer Windows version
- 2. Microsoft .NET Framework v4.0 Clinet Profile or later
- Minimum hardware requirements
 - 1. 1 GHz, 32-bit(x86) processor
 - 2.1 GB RAM
 - 3. 30 MB for installation, 100 MB for full run
 - 4. Screen Resolution: 1024x768 pixels

Note that a higher frequency processor based computer and/or more on RAM memory are recommended if frequent use of the program is expected.
Download and install Copert Model





COPERT

https://copert.emisia.com · Traduire cette page

COPERT | Calculations of Emissions from Road Transport

Support. **COPERT** is the EU standard vehicle emissions calculator. It uses vehicle population, mileage, speed and other data such as ambient temperature and ...

Versions

COPERT version 5.5.1 - Sep 2021 Methodological Updated PM ...

COPERT Australia

The COPERT Australia software includes algorithms that are ...

Download

COPERT Download Form · First Name * · Last Name * · Email ...

COPERT Data EMISIA actively maintains reliable and up-to-date vehicle fleet and ...

Methodology

This is the EMEP/CORINAIR Atmospheric Emissions ...

Computer Program to Calculate Emissions from Road Transport

Logiciel :



COPERT Computer Program to calculate Emissions from Road Transport est à la fois un logiciel et une méthode. COPERT est un logiciel qui fonctionne sous MS Windows. Wikipédia

Download and install Copert Model

COPERT COPERT Data SIBYL Baseline COPERT Australia Contact

copert

copert

Demonstration online: https://copert.emisia.com/

The industry standard emissions calculator

Launching Copert for the first time

🔗 COF	PERT										- 8 x	
File	Year	Properties	Fuel	Vehicles	Factors	Results	Parameters	Exchange	Timeseries Results	About		
											Status 4	٦
				С	0	PE	ERT	- 5		arface	File Country : Run Mode : Created : Saved : -:- Fuel Balance : Improved Fuel Quality Year : Mileage Degradation : Lube-Oil CO2 Effect : A/C Effect : SCR CO2 Effect : SCR CO2 Effect : Fuel Balance Calculated : Perform Energy Balance Emissions Calculated : Calculate Emissions All Calculate All Configuration Perform automatic energy balance Add CO2 Emissions Due to Lube-C	

Enable A/C Calculations

Ŧ

Selection of the Tier mode: Tier 2 or Tier 3

6	Create file	—
		Country name
	Continent :	AFRICA -
	Country :	Algeria
	Name :	Custom name
		Run mode
	O Timeseri	ies 🔘 Entity :
		Tier mode
	O Tier 2	© Tier 3
		Create Cancel

Menu

COPERT

File Year Properties Fuel Vehicles Factors Results Parameters Exchange Timeseries Results About

COPERT 5 Interface

Year : Fuel Balance : Improved Fuel Quality Year : Mileage Degradation Lube-Oil CO2 Effect : A/C Effect : SCR CO2 Effect : Perform Energy Balance Emissions Calculated : Calculate Emissions All Years Calculate All Years Configuration Perform automatic energy balance sidebar Add CO2 Emissions Due to Lube-Oil Enable A/C Calculations Apply SCR CO2 Emissions Exclude Evaporative Emissions

Status

Country : Run Mode : Created : Saved :

COPERT model estimation procedure Tier 2



COPERT model estimation procedure Tier 3

The COPERT model was developed to calculate the amount of pollutant emissions per vehicle or fleet for a year



Comparison of Copert data input between Tier 2 vs Tier 3

Tier 2	Tier 3				
File > Create	File > Create				
Year > Add Year	Year > Add Year				
Properties > Environmental Information	Properties > Environmental Information				
	Fuel > Advanced Specifications				
	Fuel > RVP				
Vehicles > Stock Configuration	Vehicles > Stock Configuration				
Vehicles > Stock & Activity Data	Vehicles > Stock & Activity Data				
	Vehicles > Circulation Data				
Calculate Emissions (Factor	s, Results, Timeseries Results)				
Energy Balar Fuel > Statistica	nce (optional) al Consumption				

Flow chart of the application of the COPERT baseline methodology

RVP: Reid Vapor Pressure (tension de vapeur)



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Interface COPERT 5.7.3 (Tier 2)

🔗 COPERT - Algeria.	сор							- 2
File Year Prop	erties Fuel Vehicles	Results Exc	hange Timeseries Results	About				
8								Status
<u>8</u>								File
								Country : Niger
								Run Mode : Timeseries Created : 01 Mar 2023, 10:42
								Saved : 05 Mar 2023, 16:59
								Ver. 2022
								Fuel Balance : NO
								Improved Fuel Quality Year : 1996
								Mileage Degradation : No Effect
								A/C Effect : NO
								CO2 Effect : NO
								SCR CO2 Effect : NO
								Fuel Balance Calculated :
								Perform Energy Balance
								Emissions Calculated : YES
								Calculate Emissions
								All Years
								Airrears
								Calculate All Years
								Configuration
								Perform automatic energy balan
								Add CO2 Emissions Due to Lube-
								Enable A/C Calculations
								Enable CO2 Correction
								Apply SCR CO2 Emissions
								Exclude Evaporative Emissions
								Apply for all years

COPERT 5.7.3 interface

Detailed Menu of Tier 2

i 🙆 Ci	PERT - Algeria.cop								- 0
File	Year		Properties	Fuel	Vehicles	Results	Exchange	Timeseries Results About	
File	Year Add Entity Copy Entity Remove Entity Add Year Copy Year Remove Year Select Close	Ctrl+E Ctrl+P Ctrl+U Ctrl+T Ctrl+R Ctrl+D	Properties Environmental Information	Fuel Statistical Consumption Share of ETBE in Bioethanol Share of FAME in Biodiesel	Vehicles Stock Configuration Ch1+F, Ch1+V Stock & Activity Data SCR Utage	Results Total Emissions Implied Emission Factors NMVOC Speciation	Expont Input Structure (Excel File) Export Factors (Excel File) Export Results (Excel File) Export Energy & GHG breakdown (Excel File) Import Input Data (Excel File) Export CRF (Excel File) Export NFR (Excel File)	Timeseries Results About Total Emissions Implied Emission Factors	Status # File Country : Algeria Run Mode : Timeseries Createl : 22 Apr 2024, 15:21 Sevel : 22 Apr 2024, 15:23 Sevel : 22 Apr 2024, 15:23 Fuel Balance : NO Improved Fuel Quality Year : 1996 Micage Degradation : No Effect Lube-OI CO2 Effect : NO AC Effect : NO AC Effect : NO Fuel Balance Calculated : Perform Energy Balance Emissions Calculated : NO Calculate Emissions Configuration Perform automatic energy balance Add CO2 Emissions Due to Lube-OI Enable A/C Calculations Apply SCR CO2 Emissions Exclude Evaporative Emissions Apply for all years Apply for all years

COPERT 5.7.3 (Tier 3)

COPERT - Algeria Tier 3.cop	_ B
File Year Properties Fuel Vehicles Factors Results Parameters Exchange Timeseries Results About	
	Status
	File
	Country : Algeria
	Run Mode : Timeseries
	Created : 22 Apr 2024, 15:21 Saved : 22 Apr 2024, 15:23
	Year : 2023
	Fuel Balance : NO
	Mileage Degradation : No Effect
	Lube-Oil CO2 Effect : NO
	A/C Effect : NO
	SCR CO2 Effect : NO
	Fuel Balance Calculated :
	Perform Energy Balance
	Emissions Calculated : NO
	Calculate Emissions
	All Years
	Calculate All Years
	Configuration
	Perform automatic energy balance
	Add CO2 Emissions Due to Lube-C
	Enable A/C Calculations
	Apply SCR CO2 Emissions
	Exclude Evaporative Emissions
	Apply for all years

COPERT 5.7.3 Interface Detailed menu of Tier 3

File Year Add Lo	reject) ty Cui-E	Properties	Fuel	1	Vehicle	5		Factors		Result	lts	Paran	meters		Exch	ange	Т	imeseries Results	About		- Ø X
Copy 6	ity Col+P	Environmental Information		Specifications	St	ck Configuration	Ctrl+F, Ctrl+V	Hot		1	Total Emissions	H	Hot			Export Input Structure (Excel Fil	le)	Total Emissions	;		Fie
Add Ye Copy Y	CM-Y or CM-T Year CM-R	Trip Characteristics		Advanced Specifications	St	ock & Activity Data		Cole	for SPN23 and PM Exhaus		Implied Emission Factors	(Cold	C01122		Export Factors (Excel File)		Implied Emissio	on Factors	Country : A Run Mode Created : 1 Saved : 20	: Algeria : : Timeseries : 22 Apr 2024, 15:21 22 Apr 2024, 15:23
Select	Ctrl-D			cooncours specifications	0	culation Data		CON.		. 1	NMVOC Speciation		Cold for S	SPIN25 and PIM Exhaust							Vex: : 2023
Close		J		Statistical Consumption	Fu	el Evaporation Data		Eva	poration	E	Energy & GHG breakdown	4	A/C			export Energy & GHG breakdow	wn (Ex	cel File)		Fuel Balan	nce : NO
				Reid Vapor Pressure	D	ving Conditions		Beta				1	Mileage D	Degradation		Import Input Data (Excel File)				Improved I Mileage De	Fuel Quality Year : 1996 Degradation : No Effect
				Share of ETBE in Bioethanol	A	les Number		A/C				ι	Lubricant	t Consumption		Export CRF (Excel File)				A/C Effect	CO2 Effect : NO tt : NO
				Share of FAME in Biodiesel	so	R Usage		Mile	age Degradation				NINAVOC			Export NFR (Excel File)				SOR CO28	Effect : NO
			-		4	CUsage		Lub	ricant				NMVOC							Puel Balan	nce Calculated : reform Energy Balance
								Fue	Effect			(CH4 Cold	d						Emissions	Calculated : NO
					Te	chnology Share				-1		F	Parameter	ers for NH3 & N2O							Calculate Emissions
					BI	nd Share						S	Share of N	NO2 over NOx							All Years
					Bi	uel Share						s	Share of E	EC & OM over PM							Calculate All Years
												F	Reta Corre	rection Factor							Configuration
													v · · ·							Perform	m automatic energy balance
												· ·	venicie pe	erformance improvement						Enable	e A/C Calculations
												N	Mapping	HDVs to/from VECTO Groups						Apply S	SCR CO2 Emissions
																				Exdude	Se Evaporative Emissions
																				Apply f	for all years

Wizard execution

After creating or opening an inventory file, one can use a wizard, which performs the basic steps in order to produce and calculate a complete run.



Just press 'Next' and follow the instructions

File > Create

Country > add country

The methodology for the calculation of exhaust emissions may follow Tier 2 or Tier 3. In Tier 2 methodology, the calculations take into account the amount of fleet and the vehicle kilometers per technology while in Tier 3, emission factors are mode detailed and they depend also on temperature profile, driving pattern, parking pattern, and other activity parameters.

合 Create file	—
	Country name
Continent :	AFRICA 👻
Country :	Algeria 🔹
	Custom name
Name :	
	Run mode
O Timeseri	es 🔘 Entity :
	Tier mode
O Tier 2	© Tier 3
	Create Cancel

Label only, does not affect calculations

Year > Add Year

Label only, does not affect calculations

🛆 Add new Year	x
Year	add range
Copy data from	existing Year
Add	Cancel

Status	ф.
File	
Country : Algeria	
Run Mode : Timeseries	
Created : 22 Apr 2024, 15:15	
Saved : 22 Apr 2024, 15:20	
Year : 2022	
Fuel Balance : NO	
Improved Fuel Quality Year : 1996	
Mileage Degradation : No Effect	
Lube-Oil CO2 Effect : NO	
A/C Effect : NO	
SCR CO2 Effect : NO	

Properties > Environmental Information

Not required for a

E	nvironment	al Information	[- • •
	(Indo Redo 🌈	Import -	Export 🔻
	Month	Min Temperature [°C]	Max Temperature [°C]	Humidity [%]
	January	15	31	
	February	18	35	43 //6
	March	22	38	38%
	April	26	42	35%
	May	27	41	33%
	June	26	39	55%
	July	25	36	61%
	August	24	34	72%
	September	24	36	77%
	October	23	38	40%
	November	19	36	31%
Þ	December	16	33	35%
		ОК	Apply	Cancel

Import to and from Excel (functionality exists in all forms)

Properties > min et max temperatures et RVP

The user may provide values for monthly average minimum and maximum temperatures. These values may be different for every year.

The user may provide the relative humidity per month. This is required to calculate the load of airconditioning (A/C) and the fuel evaporation. A high value denotes high humidity and a higher load for the A/C that increases consumption.

•	Undo Redo 🖸	Import	Export T			
Month	Min Temperature [°C]	Max Temperature [°C]	e Humidity [%]			
January	15	31	42%			
February	18	35	43%			
March	22	38	38%			
April	26	42	35%			
Мау	27	41	33%			
June	26	39	55%			
July	25	36	61%			
August	24	34	72%			
September	24	36	77%			
October	23	38	40%			
November	19	36	31%			
December	16	33	35%			
	ОК	Apply	Cancel			

MonthReid Vapor Pressure [kPa]January800February800March800April800May800June800			r r	Import	Export
January80February80March80April80May80June80	Month	Month Reid Vapor [kP	r Pressure 'a]		
February80March80April80May80June80	January	January	80		
March80April80May80June80	February	February	80		
April 80 May 80 June 80	March	March	80		
May 80 June 80	April	April	80		
June 80	Мау	May	80		
	June	June	80		
July 80	July	July	80		
August 80	August	August	80		
September 80	September	September	80		
October 80	October	October	80		
November 80	November	November	80		
December 80		December	80		

Properties > Trip Characteristics

The user may change the country's average Trip Length in km and Trip Duration in hours for each vehicle category or keep the default values.

	Category	Trip Length [km]	Trip Duration [hour]	
Þ	Passenger Cars	12	0.25	
	Light Commercial Vehicles	12	0.25	
	Heavy Duty Trucks	44	0.85	
	Buses	44	0.85	
	L-Category	12	0.25	

Fuel > Specifications

The user may provide data for the Fuel specifications (energy content and fuel density) or keep the default values and Values for several heavy metal content and O:C ratio are also proposed. Those values may change if more accurate figures are available. These data can be different every year.

			_						1 Ondo	Redu		import ·	Export	<u> </u>		
		5	pecificatior	IS					Content I	n Species				_		
Primary Fue	Energy Content [MJ/kg]	H:C Ratio [-]	O:C Ratio [-]	Density [kg/m3]	S [ppm wt]	Pb [ppm wt]	Cd [ppm wt]	Cu [ppm wt]	Cr [ppm wt]	Ni [ppm wt]	Se [ppm wt]	Zn [ppm wt]	Hg [ppm wt]	[рр		
Petrol Grade 1	43.774	1.86	0	750	0	0.0016	0.0002	0.0045	0.0063	0.0023	0.0002	0.033	0.0087			
Petrol Grade 2	43.774	1.86	0	750	0	0.0016	0.0002	0.0045	0.0063	0.0023	0.0002	0.033	0.0087			
Diesel Grade 1	42.695	1.86	0	840	0	0.0005	0.00005	0.0057	0.0085	0.0002	0.0001					
Diesel Grade 2	42.695	1.86	0	840	0	0.0005	0.00005	0.0057	0.0085	0.0002	0.0001					COPERT defa
LPG Grade 1	46.564	2.525	0	520	0	0	0	0	0	0	0	0	0			values
LPG Grade 2	46.564	2.525	0	520	0	0	0	0	0	0	0	0	0		100	values
CNG	48	4	0	175	0	0	0	0	0	0	0	0	0			
Biodiesel	37.3	1.95	0.11	890	0	0.0005	0.00005	0.0057	0.0085	0.0002	0.0001	0.018	0.0053			
Bioethanol	28.8	3	0.5	794	0	0.0016	0.0002	0.0045	0.0063	0.0023	0.0002	0.033	0.0087			

Fuel > Advanced Specifications

The user may provide data the Advanced Fuel Quality Specifications and choose between four fuel types: 1996 (Base Fuel), 2000 (Stage 2000) and 2005 (Stage 2005), 2009 (Stage 2009) from the Fuel Year drop-down list.

The default value is 1996. If this option is selected then all vehicles are assumed to operate on a conventional – Base – fuel (corresponding to 1996 EU15 market average).

		4	Undo F	tedo 🛛 🥕	Import		port 👻		
		Pe	trol			Diesel			
Year	E100 [% vol]	E150 [% vol]	Aromatics [% vol]	Olefins [% vol]	PCS [% vol]	CN	T95 [oC]		
1996	52%	86%	39%	10%	9%	51		a an	COPERT default
2000	52%	86%	37%	10%	7%	53	130		values
2005	52%	86%	33%	10%	5%	53	320		
2009	52%	86%	33%	10%	5%	53	320		

Fuel > Statistical energy consumption

The user may provide the statistical energy consumption in case he/she wants COPERT to perform an energy balance. Providing values is not enough for taking into account statistical energy consumption, the user also has to select to "perform automatic energy balance".

Data provided here are for primary fuels only, and there is an option to provide 2 different Petrol, Diesel, and LPG energy consumption values if such information exists. Different values denote that in the Fuel>Specifications form different fuel characteristics have been provided by the user.

		🕈 Undo	Redo 🥕	Import -	Export -
	Primary Fuel	Total Fuel sales [TJ]			
Þ	Petrol Grade 1	0			
	Petrol Grade 2	0			
	Diesel Grade 1	0			
	Diesel Grade 2	0			
	LPG Grade 1	0			
	LPG Grade 2	0			
	CNG	0			
	Biodiesel (incl. FAME)	0			
	Bioethanol (incl. ETBE)	0			
	Electricity	0			

Fuel > RVP (Reid Vapor Pressure)

The user may provide the Reid Vapor Pressure for each month in kPa.

 Undo 	Redo A	Import v Export	
Month	Reid Vapor Pressure [kPa]		
January	80		
February	80		
March	80		
April	80		
May	55		
June	55		
July	55		
August	55		
September	55		
October	80		
November	80		
December	80		

Fuel information

The user may provide the statistical energy consumption in case he/she wants COPERT to perform an energy balance The user also has to select to "perform automatic energy balance" The user may provide data for the Fuel specifications such as energy content and fuel density or keep the default values, also the hydrogen to carbon atom ratio (H:C ratio)

		Undo	Redo 🦟	Import	Export *
	Primary Fuel	Total Fuel sales [TJ]			
,	Petrol Grade 1	0			
	Petrol Grade 2	0			
	Diesel Grade 1	0			
	Diesel Grade 2	0			
	LPG Grade 1	0			
	LPG Grade 2	0			
	CNG	0			
	Biodiesel (incl. FAME)	0			
	Bioethanol (incl. ETBE)	0			
	Electricity	0			

										• Undo	Redo	~	Import 🔻	Export	Ŧ
			5	pecification	15					Content I	n Species				
	Primary Fuel	Energy Content [MJ/kg]	H:C Ratio [-]	O:C Ratio [-]	Density [kg/m3]	5 [ppm wt]	Pb [ppm wt]	Cd [ppm wt]	Cu [ppm wt]	Cr [ppm wt]	Ni [ppm wt]	Se [ppm wt]	Zn [ppm wt]	Hg [ppm wt]	Đ
Þ	Petrol Grade 1	43.774	1.86	0	750	0	0.0016	0.0002	0.0045	0.0063	0.0023	0.0002	0.033	0.0087	
	Petrol Grade 2	43.774	1.86	0	750	0	0.0016	0.0002	0.0045	0.0063	0.0023	0.0002	0.033	0.0087	
	Diesel Grade 1	42.695	1.86	0	840	0	0.0005	0.00005	0.0057	0.0085	0.0002	0.0001	0.018	0.0053	
	Diesel Grade 2	42.695	1.86	0	840	0	0.0005	0.00005	0.0057	0.0085	0.0002	0.0001	0.018	0.0053	
	LPG Grade 1	46.564	2.525	0	520	0	0	0	0	0	0	0	0	0	
	LPG Grade 2	46.564	2.525	0	520	0	0	0	0	0	0	0	0	0	
	CNG	48	4	0	175	0	0	0	0	0	0	0	0	0	
	Biodiesel	37.3	1.95	0.11	890	0	0.0005	0.00005	0.0057	0.0085	0.0002	0.0001	0.018	0.0053	
	Bioethanol	28.8	3	0.5	794	0	0.0016	0.0002	0.0045	0.0063	0.0023	0.0002	0.033	0.0087	

Vehicles > Stock Configuration

This window represents one of the necessary inputs the user selects which types of vehicles will be in the fleet of the selected year The user may also apply the fleet configuration to other years of the selected run by checking the "All years" option at the bottom of the form The user may also export the categories to an excel/CSV file. When the configuration is complete press

OK and the appropriate data will be updated

All	•		🔦 Undo	Redo A	Export
Category	Fuel	Segment	Euro Standard	Include	
Passenger Cars	Petrol	Mini	Euro 4		
Passenger Cars	Petrol	Mini	Euro 5	\checkmark	
Passenger Cars	Petrol	Mini	Euro 6 a/b/c	\checkmark	
Passenger Cars	Petrol	Mini	Euro 6 d-temp	\checkmark	
Passenger Cars	Petrol	Mini	Euro 6 d	\checkmark	
Passenger Cars	Petrol	Small	PRE ECE	\checkmark	
Passenger Cars	Petrol	Small	ECE 15/00-01	\checkmark	
Passenger Cars	Petrol	Small	ECE 15/02	\checkmark	
Passenger Cars	Petrol	Small	ECE 15/03	\checkmark	
Passenger Cars	Petrol	Small	ECE 15/04	\checkmark	
Passenger Cars	Petrol	Small	Improved Conventional	\checkmark	
Passenger Cars	Petrol	Small	Open Loop	\checkmark	
		- "	All Years	- <i>1</i>	

Vehicles > Stock & Activity Data

This window represents one of the necessary inputs

The user types (or imports) input data for Stock, Mean Activity (km/year), and Lifetime Cumulative Activity (km)

The user is able to import/export these data from/to an excel/CSV file, and there are also the options of undo/redo available

Exercise data

					 Undo 	Redo 🦰	Import V Export
			Vehicle			Stock	& Activity
	Category	Fuel	Segment	Euro Standard	Stock [n]	Mean Activity [km]	Lifetime Cumulative Activity [km]
P	Passenger Cars	Petrol	Small	Euro 2	11,522	30	(
P	Passenger Cars	Petrol	Small	Euro 3	6,840	25	(
P	Passenger Cars	Petrol	Medium	Euro 3	9,270	56	(
H	Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II	3,247	33	(
B	Buses	Diesel	Urban Buses Midi <=15 t	Euro I	568	18	(
B	Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro III	645	22	(
E	Buses	CNG	Urban CNG Buses	Euro I	312	31	

Vehicles > Circulation Data

This window represents one of the necessary inputs

The user types (or import) the average speed(which should be within the given range in the last column) and the mileage percentage (sum should always be 100%) driven by each vehicle technology per driving mode

To filter vehicle sectors use the Sector drop-down list in the top left corner of the form

HVARCICA	data
	uala

•						• U	ndo F	Redo 🥕	Import 🔻	Export 🔹
		Vehicle			Share				Speed	
Category	Fuel	Segment	Euro Standard	Urban Peak [%]	Urban Off Peak [%]	Rural [%]	Highway [%]	Urban Peak [km/h]	Urban Off Peak [km/h]	Rural [km/h]
assenger Cars	Petrol	Small	Euro 2	100%	0%	0%	0%	33	0	0
assenger Cars	Petrol	Small	Euro 3	100%	0%	0%	0%	27	0	0
assenger Cars	Petrol	Medium	Euro 3	100%	0%	0%	0%	29	0	0
leavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II	100%	0%	0%	0%	21	0	C
uses	Diesel	Urban Buses Midi <=15 t	Euro I	100%	0%	0%	0%	22	0	C
uses	Diesel	Urban Buses Standard 15 - 18 t	Euro III	100%	0%	0%	0%	21.5	0	C
uses	CNG	Urban CNG Buses	Euro I	100%	0%	0%	0%	21.8	0	0
									_	

Vehicles > Fuel Evaporation Data

We can find input data for Fuel Tank Size (I), Canister size (I), percentage of vehicles equipped with Fuel Injection (%), percentage of vehicles equipped with Evaporation Control (%), and the distribution of evaporative emissions to different driving modes (%) To enter your own values, simply replace the proposed value by typing in the corresponding cell

- O X Fuel Evaporation Data + Undo Redo -All Import Export -Vehicle Vehicle Specific Properties Evapo Fuel Tank Size Canister Size Fuel Injection Evaporation Control Urban Off Peak Urba Euro Standard Category Fuel Segment П [I] [%] [%] [%] Mini Euro 4 35 100% 40% Passenger Cars Petrol 0.8 100% Passenger Cars Petrol Mini Euro 5 35 0.8 100% 100% 40% Mini Euro 6 a/b/c 35 0.8 100% 100% 40% Passenger Cars Petrol Passenger Cars Petrol Mini Euro 6 d-temp 35 0.8 100% 100% 40% Euro 6 d 35 100% Passenger Cars Mini 1.6 100% 40% Petrol Petrol Small PRE ECE 50 0 1% 0% 40% Passenger Cars Passenger Cars Petrol Small ECE 15/00-01 50 0 1% 0% 40% ECE 15/02 50 0 1% 0% Passenger Cars Petrol Small 40% 50 ECE 15/03 0 0% 40% Passenger Cars Petrol Small 1% ECE 15/04 50 0 1% 0% 40% Passenger Cars Petrol Small 50 0% 40% Passenger Cars Petrol Small Improved Conventional 0 1% OK Apply Cancel

Vehicles > Driving Conditions

Window representing the driving conditions (loads of heavy vehicles and buses and road slopes) of the different traffic modes

A default value of 50% is given and this corresponds to the baseline emission factors of COPERT The slope factors are calculated and applied during the calculation of the hot emission factors

4II -							🕇 Un	Jndo Redo 🥕 Import 👻 Export					
		Vehicle			Load			Road Slope					
Category	Fuel	Segment	Euro Standard	Urban Off Peak [%]	Urban Peak [%]	Rural [%]	Highway [%]	Urban Off Peak [%]	Urban Peak [%]	Rural [%]	Highway [%]		
Heavy Duty Trucks	Petrol	>3,5 t	Conventional	50%	50%	50%	50%	0%	0%	0%	0°		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Conventional	50%	50%	50%	50%	0%	0%	0%	04		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro I	50%	50%	50%	50%	0%	0%	0%	01		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro II	50%	50%	50%	50%	0%	0%	0%	01		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro III	50%	50%	50%	50%	0%	0%	0%	0		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro IV	50%	50%	50%	50%	0%	0%	0%	0		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro V	50%	50%	50%	50%	0%	0%	0%	0		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro VI A/B/C	50%	50%	50%	50%	0%	0%	0%	0		
Heavy Duty Trucks	Diesel	Rigid <=7,5 t	Euro VI D/E	50%	50%	50%	50%	0%	0%	0%	0		
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Conventional	50%	50%	50%	50%	0%	0%	0%	0		
Heavy Duty Trucks	Diesel	Rigid 7,5 - 12 t	Euro I	50%	50%	50%	50%	0%	0%	0%	0		
											Þ		

Vehicles > A/C Prametres

The user may provide the vehicles equipped with air-conditioning system (Vehicles equipped with A/C(%). Some 'default' values are proposed which are rough estimates only For simplicity, one single usage factor is proposed regardless of urban, rural, or highway driving This usage factor is uniformly applied to all driving conditions This usage factor should be integrated over the year, i.e. there is no seasonal differentiation

ł	All	•	*	Undo Redo (→ Import →	Export	1
	Category	Fuel	Segment	Euro Standard	Vehicles with A/C [%]	A/C Usage [%]	
Þ	Passenger Cars	Petrol	Mini	Euro 4	95%	40%	Π
	Passenger Cars	Petrol	Mini	Euro 5	95%	40%	
	Passenger Cars	Petrol	Mini	Euro 6 a/b/c	95%	40%	
	Passenger Cars	Petrol	Mini	Euro 6 d-temp	95%	40%	
	Passenger Cars	Petrol	Mini	Euro 6 d	95%	40%	
	Passenger Cars Petrol Small		PRE ECE	10%	40%		
	Passenger Cars	Passenger Cars Petrol Small ECE Passenger Cars Petrol Small ECE Passenger Cars Petrol Small ECE		ECE 15/00-01	10%	40% 40%	
	Passenger Cars			ECE 15/02	10%		
	Passenger Cars			ECE 15/03	10%	40%	
	Passenger Cars Petrol Small ECE		ECE 15/04	10%	40%		
	Passenger Cars	Petrol	Small	Improved Conventional	10%	40%	
	Passenger Cars	Petrol	Small	Open Loop	10%	40%	
	Passenger Cars	Petrol	Small	Euro 1	20%	40%	

Factors > Hot, Cold and evaporation emission factors and Beta factors

Exercise data

Segment al	Euro Standard	Pollutant	Urban Off Peak [g/km]	Urban Peak [g/km]	Rural [g/km]	Highway [g/km]
all	Euro 2	со	0			
all	Curra 2			0.73	0	0
	EURO S	CO	0	0.5	0	0
dium	Euro 3	CO	0	0.49	0	0
id 20 - 26 t	Euro II	со	0	2.11	0	0
an Buses Midi <=15 t	Euro I	CO	0	2.01	0	0
an Buses Standard 15 - 18 t	Euro III	со	0	0 2.84		0
an CNG Buses	Euro I	со	0	8.4	0	0
	an Buses Midi <=15 t an Buses Standard 15 - 18 t an CNG Buses	an Buses Midi <=15 t Euro I an Buses Standard 15 - 18 t Euro III an CNG Buses Euro I	an Buses Midi <=15 t Euro I CO an Buses Standard 15 - 18 t Euro III CO an CNG Buses Euro I CO	an Buses Midi <=15 t Euro I CO 0 an Buses Standard 15 - 18 t Euro III CO 0 an CNG Buses Euro I CO 0	an Buses Midi <=15 t Euro I CO 0 2.01 an Buses Standard 15 - 18 t Euro III CO 0 2.84 an CNG Buses Euro I CO 0 8.4	an Buses Midi <=15 t

1	All 🔻	All	▼ CO	→ ndo F	Redo 🥕	Impor	t 👻 Export
	Category	Fuel	Segment	Euro Standard	Pollutant	Month	Cold Start Ratio
Þ	Passenger Cars	Petrol	Small	Euro 2	со	January	2.2
	Passenger Cars	Petrol	Small	Euro 2	CO	February	
	Passenger Cars	Petrol	Small	Euro 2	CO	March	
	Passenger Cars	Petrol	Small	Euro 2	CO	April	
	Passenger Cars	Petrol	Small	Euro 2	CO	May	
	Passenger Cars	Petrol	Small	Euro 2	со	June	
	Passenger Cars	Petrol	Small	Euro 2	CO	July	
	Passenger Cars	Petrol	Small	Euro 2	со	August	
	Passenger Cars	Petrol	Small	Euro 2	CO	September	
	Passenger Cars	Petrol	Small	Euro 2	CO	October	
	Passenger Cars	Petrol	Small	Euro 2	CO	November	
	Passenger Cars	Petrol	Small	Euro 2	со	December	1.

ŀ	All 🔻	Diurnal		▼ Undo	Redo A	Import	✓ Export ▼
	Category	Fuel	Segment	Euro Standard	Evaporation Type	Controlled [g/day]	Uncontrolled [g/day]
Þ	Passenger Cars	Petrol	Small	Euro 2	Diurnal	19.08	26.79
	Passenger Cars	Petrol	Small	Euro 3	Diurnal	10.91	26.79
	Passenger Cars	Petrol	Medium	Euro 3	Diurnal	8.29	31.99
					ОК	Anniv	Cancel

Ľ	All ·	✓ All	- co u	Indo Redo 🏼 🧨	⇒ Im	port 👻	Export
	Category	Fuel	Segment	Euro Standard	Pollutant	Month	Beta F
Þ	Passenger Cars	Petrol	Small	Euro 2	со	January	16
	Passenger Cars	Petrol	Small	Euro 2	со	February	14
	Passenger Cars	Petrol	Small	Euro 2	со	March	13
	Passenger Cars	Petrol	Small	Euro 2	CO	April	12
	Passenger Cars	Petrol	Small	Euro 2	со	May	12
	Passenger Cars	Petrol	Small	Euro 2	CO	June	12
	Passenger Cars	Petrol	Small	Euro 2	CO	July	13
	Passenger Cars	Petrol	Small	Euro 2	CO	August	13
	Passenger Cars	Petrol	Small	Euro 2	CO	September	13
	Passenger Cars	Petrol	Small	Euro 2	CO	October	13
	Passenger Cars	Petrol	Small	Euro 2	CO	November	14

Results > Total Emissions

The results for all pollutants, vehicle types, driving modes and emission types (hot, cold, evaporation, A/C, Lubricant, Tyre, Brake Wear, Road abrasion) are calculated by COPERT and cannot be modified by the user

The user can by appropriately placing the drop-down lists to group and filter the available information The user can make export directly from the form to and from an Excel or csv file



Results > Implied Emission factors

This pivot table form indicates the implied emission factors for all pollutants and energy consumption in g/km or MJ/km Please note that these are implied emission factors, which means that they are dependent not only on the traveling speed but also on the fleet configuration and input data (eg temperatures) of each run Data are not updatable

EC [MJ/km] Ϋ			All digits		Export			
				Here				
Category	Fuel	Segment	Euro Standard	Total Total				
Passenger Cars	Petrol	Small	Euro 2	6.5581				
			Euro 3	5.2113				
		Small Total		6.1123				
		Medium	Euro 3	4.0232				
	Petrol Total		5.0653					
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II	13.3823				
Buses	Diesel	Urban Buses Midi <=15 t	Euro I	10.8094				
		Urban Buses Standard 15 - 18 t	Euro III	14.8138				
	Diesel Total			13,1369				
	CNG	Urban CNG Buses	Euro I	26.64				
Buses Total				16.9684				

Exercise Data

Results > Specification of NMVOC Emissions

In this Pivot table form, the Non-methane volatile organic compounds (NMVOCs) are displayed for all vehicle types and emission types (hot, cold, evaporation) and cannot be modified by the user The user can by appropriately placing the drop-down lists to group and filter the available information

NMVOC Speciatio	on						
ALKANES / ethane	[kg] 9				All di	gits	Export
				Emission			
Category	Fuel	Segment	Euro Standaro	Hot	Cold	Evaporation	Grand Total
Passenger Cars	Petrol	Small	Euro 2	0.7666	0.0625	87.4032	88.2323
			Euro 3	0.0734	0	29.67	29.7433
		Small Total		0.8399	0.0625	117.0731	117.9756
		Medium	Euro 3	0.2663	0	30.5463	30.8125
	Petrol Tota	al		1.1062	0.0625	147.6194	148.7881
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II	0.0172			0.0172
Buses	Diesel	Diesel Urban Buses Midi <=15 t		0.0014			0.0014
		Urban Buses Standard 15 - 18 t	Euro III	0.002			0.002
	Diesel Tota	al		0.0034			0.0034
	CNG	Urban CNG Buses	Euro I	0.0006			0.0006
Buses Total				0.004			0.004

Exercise data



Results > Energy & GHG breakdown

This is a new feature in COPERT

Exercise

Data

In this pivot table form, there is an extra level of information for the results regarding the origin of each primary fuel (bio/fossil) for Energy Consumption (EC) and GHG (CO2, CH4, N2O) for all vehicle types The user can by appropriately placing the drop-down lists to group and filter the available information The user can make export directly from the form to and from an Excel or csv file

Emission EC	[CT]												All digit:	S	Expor
				Fuel Categor	Fuel Category Primary Fuel										
						Fossil			Faceil Tatal		Bio)		Pie Tetal	Crond Tab
Category	Fuel	Segment	Euro Standard	Fossil Petrol	Fossil Diesel	CNG	ETBE	FAME	Possii Totai	Biodiesel	Bioethanol	ETBE	FAME	DIO TOLAI	
Passenger Cars	Petrol	Small	Euro 2	2,1867			0		2.1867		0.0802	0		0.0802	2.266
			Euro 3	0.8596			0		0.8596		0.0315	0		0.0315	0.891
		Small Total		3.0463			0		3.0463		0.1117	0		0.1117	3.15
		Medium	Euro 3	2.0146			0		2.0146		0.0739	0		0.0739	2.088
	Petrol Tot	al		5.061			0		5.061		0.1855	0		0.1855	5.246
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II		1.3405			0.004	1.3445	0.0187			0.0708	0.0894	1,433
Buses	Diesel	Urban Buses Midi <=15 t	Euro I		0.1033			0.0003	0.1036	0.0014			0.0055	0.0069	0.110
		Urban Buses Standard 15 - 18 t	Euro III		0.1965			0.0006	0.1971	0.0027			0.0104	0.0131	0.210
	Diesel Tot	el Total			0.2998			0.0009	0.3007	0.0042			0.0158	0.02	0.320
	CNG	Urban CNG Buses	Euro I			0.2577			0.2577						0.257
Buses Total					0.2998	0.2577		0.0009	0.5584	0.0042			0.0158	0.02	0.578
Grand Total				5.061	1.6404	0.2577	0	0.0048	6,9638	0.0229	0.1855	0	0.0866	0.295	7,258

Close
Parameters > Hot parameters

The user can view and edit the hot emission parameters that are used for the calculation of the hot emission factors in the Factors>Hot The parameters are displayed for each pollutant and vehicle type Different parameters may also apply in the case of different driving modes

	•) (-)														🖴 Undo	Redo A	Import -	Expor
Category	Fuel	Segment	Euro Standard	Technology	Pollutant	Mode	Road Slope	ad Min Speed [km/h]	Max Speed [km/h]	Alpha	Beta	Gamma	Delta	Epsilon	Zita	Hta	Reduction Factor [%]	Bio Reducti	on Fact
ssenger Cars	Petrol	Small	Euro 2		со			5	130	-0.0000064949227	0.00587795799838248	2.33993697767885	0.00000000000	-0.0009742384	0.135279404	0.03866025461	0		
ssenger Cars	Petrol	Small	Euro 2		NOx			5	130	0.00038308744307	-0.0292020164931834	0.952859261097693	-0.0000000034	0.00148866436	-0.07863373	3.36041616711	0		
senger Cars	Petrol	Small	Euro 2		VOC			5	130	0.0000000000271	-0.00724486214247	2.04784539213734	0.904703519982	-0.0051295037	0.826484533	0.36555660778	0		
senger Cars	Petrol	Small	Euro 2		PM Exhaust	Urban Peak		10	130	0	0	0.00322	0	0	0	1	0		
senger Cars	Petrol	Small	Euro 2		PM Exhaust	Urban Off		10	130	0	0	0.00322	0	0	0	1	0		
senger Cars	Petrol	Small	Euro 2		PM Exhaust	Rural		10	130	0	0	0.00184	0	0	0	1	0		
senger Cars	Petrol	Small	Euro 2		PM Exhaust	Highway		10	130	0	0	0.0019	0	0	0	1	0		
senger Cars	Petrol	Small	Euro 2		EC			5	130	0.00120588900638	-0.0476767169682851	17.5002225972279	0.00000000021	-0.0009632190	0.205599107	1.92643812638	0		
senger Cars	Petrol	Small	Euro 2		CH4	Urban Peak		10	130	0	0	17	0	0	0	1,000	0		
senger Cars	Petrol	Small	Euro 2		CH4	Urban Off		10	130	0	0	17	0	0	0	1,000	0		
enger Cars	Petrol	Small	Euro 2		CH4	Rural		10	130	0	0	13	0	0	0	1,000	0		
enger Cars	Petrol	Small	Euro 2		CH4	Highway		10	130	0	0	11	0	0	0	1,000	0		
enger Cars	Petrol	Small	Euro 2		SPN23	Urban Peak		5	110	0	0	6,160,000,000,000	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 2		SPN23	Urban Off		5	110	0	0	6,160,000,000,000	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 2		SPN23	Rural		5	110	0	0	2,670,000,000,000	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 2		SPN23	Highway		5	110	0	0	11,800,000,000,000	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 3	GDI	со			5	130	0.0000000000007	6.75329473854208	42.3272490063793	0.000000322666	-0.1465731916	20.90033724	0.59029409389	0		
enger Cars	Petrol	Small	Euro 3	GDI	NOx			5	130	0.00001832501329	-0.00418135831647	0.260842824674338	0.000000000006	0.00011140934	-0.03423662	2.80628074931	0		
enger Cars	Petrol	Small	Euro 3	GDI	VOC			5	130	0.00018247923815	-0.0160581729579195	0.813127485235472	-0.00000000004	-0.0027444877	0.533185224	14.5983390524	0		
enger Cars	Petrol	Small	Euro 3	GDI	PM Exhaust	Urban Peak		10	130	0	0	0.00128	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 3	GDI	PM Exhaust	Urban Off		10	130	0	0	0.00128	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 3	GDI	PM Exhaust	Rural		10	130	0	0	0.000836	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 3	GDI	PM Exhaust	Highway		10	130	0	0	0.00119	0	0	0	1	0		
enger Cars	Petrol	Small	Euro 3	GDI	EC			5	130	0.00048248709708	0.0404481579668006	16.3956381803513	0.00000000024	-0.0009984064	0.204982554	2.20886373229	0		
enger Cars	Petrol	Small	Euro 3	GDI	CH4	Urban Peak		10	130	0	0	3	0	0	0	1,000	0		
enger Cars	Petrol	Small	Euro 3	GDI	CH4	Urban Off		10	130	0	0	3	0	0	0	1,000	0		
senger Cars	Petrol	Small	Euro 3	GDI	CH4	Rural		10	130	0	0	2	0	0	0	1,000	0		
senger Cars	Petrol	Small	Euro 3	GDI	CH4	Highway		10	130	0	0	4	0	0	0	1,000	0		

Apply

Cancel

73

Parameters > Cold parameters

The user can view and edit the cold emission parameters that are used for the calculation of the cold over-emission factors in the Factors>Cold The parameters are indicated for each pollutant and vehicle type Different parameters may also apply in the case of different driving modes

Cold Emissions F	arameters												
All	00	Э								4	Undo Re	edo 🎓 Imp	ort - Export -
Category	Fuel	Segment	Euro Standard	Pollutant	Speed/Temperature range	Month	Alpha	Beta	Gamma	Min Speed [km/h]	Max Speed [km/h]	Min Temperature [°C]	Max Temperature [°C]
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	January	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	February	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	March	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	April	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	Мау	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	June	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	July	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	August	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	September	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	October	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	November	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 1	December	0.16	-0.16	3.52	5	25	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	January	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	February	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	March	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	April	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	Мау	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	June	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	July	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	August	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	September	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	October	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	November	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 2	December	0.54	-0.37	-6.24	25	45	-20	15
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 3	January	0.08	-0.44	9.83	5	45	15	50
Passenger Cars	Petrol	Small	Euro 2	со	RANGE 3	February	0.08	-0.44	9.83	5	45	15	50
					D 11105 0		0.00	· · · ·	0.00	-			

OK

Apply

Cancel

74

Exchange > Export Input Structure, Factors and Results in Excel

This form indicates a list of years included in the inventory and another list of the required input data By clicking on the corresponding check box the user can select which information he/she wants to export to an Excel file

For compatibility reasons both Excel 2010 and Excel 2003 formats can be selected

Export Input St	tructure to EXCEL				E	Export Results to EXC	EL	
Year	Input Data		Export Factors to EXCEL			Year	Pollutants	Emission
2022	Stock [n]	Max Temperature Reid Vapor Pressu		Year		2022	As	LC Hot
	Total Activity [km]	Humidity [%]	2022				Cd	NH V Evaporation
	Lifetime Cumulative Activity [km Lifetime Off Peak Speed [km/b]	Trip Length [km]					CH4	□ Ni 🗹 A/C
	Urban Peak Speed [km/h]	Fuel Tank Size []						□ NM 🗹 Lubricant □ NO 🗸 Tyre
	Rural Speed [km/h]	Canister Size []				Modes Urban Peak	Cr	NO Brake Wear
	Highway Speed [km/h] Urban Off Peak Share [%]	Fuel Injection [%] Evaporation Cont				Urban Off Peak		□ NO 🗹 Road abrasi
	Urban Peak Share [%]	Urban Off Peak E				Highway	Hg	D Pb
	Rural Share [%] Highway Share [%]	Urban Peak Evap				/ Total	-	•
	Min Temperature [°C]	Highway Evap Sha	Export Excel 2010	Export Excel 2003 Cancel			roort Excel 2010	port Excel 2003 Cano
		+				(194) E.		

Exchange > Import Input Data (Excel File)

By clicking on the corresponding check box the user can select which input information he/she wants to import from an Excel file and for which years For compatibility reasons, both Excel 2010 and Excel 2003 formats can be selected

🛆 Import Input Data	From EXCEL	- • ×
Year	Input Data	
2022	Stock [n]	Reid Vapor Pressu
	Mean Activity [km]	Humidity [%]
	Lifetime Cumulative Activity [km]	Trip Length [km]
	🔲 Urban Off Peak Speed [km/h]	Trip Duration [hou
	🔲 Urban Peak Speed [km/h]	Euel Tank Size []
	Rural Speed [km/h]	Canister Size []
	Highway Speed [km/h]	Fuel Injection [%]
	Urban Off Peak Share [%]	Evaporation Cont
	Urban Peak Share [%]	🔲 Urban Off Peak Ev
	Rural Share [%]	🔲 Urban Peak Evap
	Highway Share [%]	Rural Evap Share
	Min Temperature [°C]	🔲 Highway Evap Sha
	Max Temperature [°C]	🔲 Urban Off Peak Lo
	1	
		F
Impor	t Excel 2010 Import Excel 200	03 Cancel

Exchange > CRF Export (CRT MPGs/Accord Paris)

Export data to the CRF file after calculating emissions from all years Before performing any export, the user should export the corresponding excel template (including the structure/nodes and the years) from the CRF reporter Select the year(s) and the relevant information (i.e. activity data, emissions etc) that he/she wishes to export By clicking the option "Clear all excel years" all information included in the file (as exported by the CRF reporter) will be erased

In order to upload the exported data to the CRF Reporter, this empty file should be imported in the CRF

Reporter

CRF Export	
Year	Input Data
2022	AD (TJ) - EC
	CO2 (kt)
	CH4 (kt)
	□ N2O (kt)
	Calorific Value - Energy Content
	Method CO2
	Method CH4
	Method N2O
	Emission factor information CO2
	Emission factor information CH4
	Emission factor information N2O
🗸 Clear all excel y	ears Export Cancel



Timeseries Results > Total Emissions - Timeseries

This is the same pivot form as the Results>Total Emissions form with the difference that the user can have an overview of all results for the complete timeseries, if exists in the file

CO [t] Y								All d	igits		Export	-
			Year Emissi	on								
							2022	!				
				Hot					Cold			
Category	Fuel	Segment	Urban Off Peak	Urban Peak	Rural	Highway	Total	Urban Off Peak	Urban Peak	Rural	Highway	
Passenger Cars	Petrol	Small	0	0.34	0	0	0.34	0	0.0257	0		
		Medium	0	0.2551	0	0	0.2551	0	0.0107	0		
	Petrol To	tal	0	0.5951	0	0	0.5951	0	0.0364	0		
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	0	0.2263	0	0	0.2263					
Buses	Diesel	Urban Buses Midi <=15 t	0	0.0205	0	0	0.0205					
		Urban Buses Standard 15 - 18 t	0	0.0403	0	0	0.0403					
	Diesel To	tal	0	0.0609	0	0	0.0609					
	CNG	Urban CNG Buses	0	0.0812	0	0	0.0812					
Buses Total			0	0.1421	0	0	0.1421					

Close

Timeseries Results > Implied Emission Factors -Timeseries

This is the same pivot form as the Results>Implied Emission Factors with the difference that the user can have an overview of all results for the complete timeseries, if exists in file

CO [g/km]							
			Year				
				202	2		
Category	Fuel	Segment	Urban Off Peak	Urban Peak	Rural	Highway	Total
Passenger Cars	Petrol	Small	0	0.7078	0	0	0.7078
		Medium	0	0.5121	0	0	0.5121
	Petrol Tot	al	0	0.6097	0	0	0.6097
Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	0	2.1118	0	0	2,1118
Buses	Diesel	Urban Buses Midi <=15 t	0	2.0094	0	0	2.0094
		Urban Buses Standard 15 - 18 t	0	2.842	0	0	2.842
	Diesel Tot	al	0	2.4933	0	0	2.4933
	CNG	Urban CNG Buses	0	8.4	0	0	8.4
Buses Total			0	4.1694	0	0	4.1694

Conclusions

COPERT interface and functions :

- Can be utilized by all countries
- Calculating emissions of all pollutants from road transportation (GHG, Precursors, NMVOCs)
- All categories of road vehicles covered
- Fuel consumption calculated (energy balance)



Wednesday 25 September 2024

15:00 – 17:00 (Bonn Time)

Session 5

Higher tier methods for estimating GHG emissions from road transportation COPERT model: input data and database construction

By the end of this session, you will:

1. Get familiar with the different menus, buttons and options

2. Data entry and use of different structure of databases

3. Identify difficulties while using Copert features

Learning

objectives

Entry of activity data

 Data input of all activity data (fleet, circulation and evaporation data) can be done in 3 ways:
 A. Direct data entry Input (Manually): with and without Wizard
 B. Imported from Microsoft Excel
 C. Imported from COPERT

Direct data Input 1/3

Enter activity data directly via the forms under the 'Vehicles' menu: •

- ✓ Stock & Activity Data
- ✓ Circulation Data
- ✓ Fuel Evaporation Data

Open each form; fill the desired values for every vehicle category •

🔗 Sto	ck & Activity Da	a					-															
All	•	1			← Undo	Redo 🏞	🙆 Circulation acti	vity														
			Vehicle			Stock 8							(
	Category	Fuel	Segment	Euro Standard	Stock	Mean Activity	All	•	Vehicle			Share	Und	10 Rec	do 🖝	Import	eed					
	assenger Cars	Petrol	Small	Euro 2	11.522	30					Urban Peak	Urban Off Peak	Rural I	Highway II	Irhan Peak	Urban Off P	eak Rural					
P	assenger Cars	Petrol	Small	Euro 3	6,840	25	Category	Fuel	Segment	Euro Standard	[%]	[%]	[%]	[%]	[km/h]	[km/h]	[km/h]					
P	assenger Cars	Petrol	Medium	Euro 3	9,270	56	Passenger Car	s Petrol	Small	Euro 2	100%	0%	0%	0%	33		0 0	10000000				
H	leavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II	3,247	33	Passenger Car	s Petrol	Small	Euro 3	100%	0%	0%	0%	35		0 0					
B	uses	Diesel	Urban Buses Midi <=15 t	Euro I	568	18	Passenger Car	s Petrol	Medium	Euro 3	100%	0%	0%	0%	28		0 0					
B	uses	Diesel	Urban Buses Standard 15 - 18 t	Euro III	645	22	Heavy Duty Tr	ucks Diesel	Rigid 20 - 26 t	Euro II	100%	0%	0%	0%	25		0 0					
B	uses	CNG	Urban CNG Buses	Euro I	312	31	Buses	Diesel	Urban Buses Midi <=15 t	Euro I	100%	0%	0%	0%	22		0 0					
							Buses	Diesel	Urban Buses Standard 15 - 18	t Euro III	100%	0%	0%	0%	21.5		0 0					
							Buses	CNG	Urban CNG Buses	Euro I	100%	0%	0%	0%	21.8		0 0					
						ок				Fuel Evap	oration Data							← Undo	Redo 🏕	Import	- Exp	port
_		_										Vehicle				Vehicle Spe	ecific Propertie	s		Evaporation §	Share	
										Cate	gory Fue	el Segment	Euro Standa	rd Fuel Tai	nk Size Ca]]	nister Size [1]	Fuel Injection [%]	Evaporation Contro [%]	Urban Off Peak [%]	Urban Peak [%]	Rura [%]	il
										Passeng	er Cars Petrol	Small	Euro 2		50	0.5	100%	100%	40%	40%	10	0%
										Passeng	er Cars Petrol	Small	Euro 3		50	0.8	100%	100%	40%	40%	. 10	0%
										Passeng	er Cars Petrol	Medium	Euro 3		60	1	100%	100%	40%	40%	10	0%
										•==												
																			ОК	Apply	C	ancel
													and the second	100102007	000000000	0.5-510000			And Address of Automatic			

xport *

Direct data Input 2/3

The information is provided by the user or calculated by COPERT and can be modified by the user A modified value will be displayed in red color, and if the "Apply" button is pressed, this color changes to the default color, which is black

All forms are equipped with "Undo" and "Redo" buttons and import and export buttons directly from the form to and from an Excel or csv file

	• U	Indo	Redo 🏾 🧨	Import	-	Export
	Month	Min Te	emperature [°C]	Max Tempera [°C]	ture	Humidity [%]
•	January		15		31	42%
	February		18		35	43%
	March		22		38	38%
	April		26		42	35%
	Мау		27		41	33%
	June		26		39	51%
	July		25		36	61%
	August		24		34	72%
	September		24		36	75%
	October		23		38	40%
	November		19		36	31%
	December		16		33	35%
	December		16	A marky	33	35%

	🔶 ι	Indo Redo	Import	-	Export
	Month	Min Temperature [°C]	Max Tempera [°C]	ture	Humidit [%]
•	January	1	5	31	449
	February	1	3	35	439
	March	2	2	38	389
	April	2	5	43	359
	Мау	2	7	41	33%
	June	2	5	39	51%
	July	2	5	36	61%
	August	2	1	35	72%
	September	2	1	36	78%
	October	2	3	38	40%
	November	1	9	36	31%
	December	1	5	33	35%

	م ا	Jndo Redo 🌈	Import *	Export
	Month	Min Temperature [°C]	Max Temperature [°C]	Humidity [%]
Þ	January	15	31	(449
	February	18	35	439
	March	22	38	38%
	April	26	43	35%
	Мау	27	41	339
	June	26	39	519
	July	25	36	619
	August	24	35	729
	September	24	36	789
	October	23	38	40%
	November	19	36	319
	December	16	33	35%

Direct data Input 3/3

 Data entry on COPERT interface (Tier 2 & Tier 3)
 Export of data entered on COPERT (Tier 2 & Tier 2) to Excel file

 Modification of data (Tier 2 & Tier 3) in Excel file
 Import modified (Tier 2 & Tier 3) Excel data file to COPERT

Import Data from Microsoft Excel file (1/4)

- Import data from Excel file
- Open the form 'Vehicle'>Stock & Activity Data'> 'Import (Format Excel File)'

ŀ	All 🔻				🔦 Undo	Redo 🦰	In	port 🔻 Expo	ort
			Vehicle			Stock	& Ac	Excel 2010	
	Category	Fuel	Segment	Euro Standard	Stock [n]	Mean Activity [km]	Life	Excel 2003	y
•	Passenger Cars	Petrol	Small	Euro 2	11,522	30			0
	Passenger Cars	Petrol	Small	Euro 3	6,840	25	क	csv	0
	Passenger Cars	Petrol	Medium	Euro 3	9,270	56			0
	Heavy Duty Trucks	Diesel	Rigid 20 - 26 t	Euro II	3,247	33			0
	Buses	Diesel	Urban Buses Midi <=15 t	Euro I	568	18			0
	Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro III	645	22			0
	Buses	CNG	Urban CNG Buses	Euro I	312	31			0
									ncel

	DERT F CODEDT Algeria march 2024		O Rechercher dans : Formation			
	COPERT Algeria march 2024					
Nouveau	dossier		EE 🔻 🔟 🕐			
^	Nom	Modifié le	Type Taille			
	Circulation_activity_ Algeria	02/03/2024 14:20	Feuille de calcul			
nts	🖬 Emissions_for_Year_~_2022_Algeria	02/03/2024:14:23	Feuille de calcul			
	📧 Emissions_total 2022 Algeria	02/03/202413:49	Feuille de calcul			
	🖬 Environmental_Information_A1geria	01/03/2024 12:12	Feuille de calcul			
	Export_Input_Structure_to_EXCEL_ Algeria	05/03/2024:09:51	Feuille de calcul			
2	Export_Results_to_EXCEL_Algeria	05/03/2024 10:58	Feuille de calcul			
gement:	😼 Fuel_Reid_Vapor_Pressure_A1geria	01/03/2024:14:19 Feuille de calcul				
	🖬 Hot_emission_factors_A1geria	02/03/2024 13:44	Feuille de calcul			
ocal (C:)	🔀 Stock_&_Activity_Data_Algeria	02/03/2024 14:17	Feuille de calcul			
ocal (D:)						
······ · ·	<		>			
Nom c	du fichier : Stock_&_Activity_Data_Algeria	~	MS EXCEL file 2007 - 2010 (*.xls: V			
	Annuler 8					

mport Data from Microsoft Excel file (2/4)

- 1. Select Exchange > Import Input Data (Excel file)'
- 2. Select the year or years (if there are several)
- 3. Select the data you wish to import (list of 'Input Data') by checking the corresponding boxes

		🔗 Import Input Da	ta From EXCEL	
Exchange Timeseries Results	About	Year	Input Data	
Export Input Structure (Excel F Export Factors (Excel File) Export Results (Excel File) Export Energy & GHG breakdo Import Input Data (Excel File) Export CRF (Excel File) Export NFR (Excel File)	ile) own (Excel File)	2022 Imp	 Stock [n] Mean Activity [km] Lifetime Cumulative Activity [km] Urban Off Peak Speed [km/h] Urban Peak Speed [km/h] Rural Speed [km/h] Highway Speed [km/h] Urban Off Peak Share [%] Urban Peak Share [%] Urban Peak Share [%] Rural Share [%] Rural Share [%] Highway Share [%] Highway Share [%] Min Temperature [°C] Max Temperature [°C] Import Excel 2010 	 Reid Vapor Pressu Humidity [%] Trip Length [km] Trip Duration [hou Fuel Tank Size [] Canister Size [] Fuel Injection [%] Evaporation Conta Urban Off Peak Evap Rural Evap Share Highway Evap Share Urban Off Peak Lc

mport Data from Microsoft Excel file (3/4)

- Open the Excel file created
- Every selected data type is a different sheet in the Excel file
- Every selected vehicle category is a row
- Every selected year is a column

	Microsoft Excel - D	enmark 2004.xls	Window Help	_ □ ×
		→ f _* 100% → × 10		
				· · · · · ·
			🔽 💀 🕼 🔽 🖓 Reply with <u>C</u> hang	es E <u>n</u> d Review ₊
	D2 -	fx		
	A	В	С	
1	Sector	Subsector	Technology	2004
2	Passenger Cars	Gasoline <1,41	PREECE	
3	Passenger Cars	Gasoline <1,41	ECE 15/00-01	
4	Passenger Cars	Gasoline <1,41	ECE 15/02	
5	Passenger Cars	Gasoline <1,41	ECE 15/03	
6	Passenger Cars	Gasoline <1,41	ECE 15/04	
7	Passenger Cars	Gasoline <1,41	Improved Conventional	
8	Passenger Cars	Gasoline <1,41	Open Loop	
9	Passenger Cars	Gasoline <1,41	PC Euro 1 - 91/441/EEC	
10	Passenger Cars	Gasoline <1,41	PC Euro 2 - 94/12/EEC	
11	Passenger Cars	Gasoline <1,41	PC Euro 3 - 98/69/EC Stage2000	
12	Passenger Cars	Gasoline <1,41	PC Euro 4 - 98/69/EC Stage2005	
13	Passenger Cars	Gasoline <1,41	PC Euro 5 (post 2005)	
14	Passenger Cars	Gasoline <1,41	PC Euro 6	
15	Passenger Cars	Gasoline 1,4 - 2,0 I	PRE ECE	
16	Passenger Cars	Gasoline 1,4 - 2,0 I	ECE 15/00-01	
17	Passenger Cars	Gasoline 1,4 - 2,0 I	ECE 15/02	
18	Passenger Cars	Gasoline 1,4 - 2,0 I	ECE 15/03	
19	Passenger Cars	Gasoline 1,4 - 2,0 I	ECE 15/04	
20	Passenger Cars	Gasoline 1,4 - 2,0 I	Improved Conventional	
21	Passenger Cars	Gasoline 1,4 - 2,0 I	Open Loop	
22	Passenger Cars	Gasoline 1,4 - 2,0 I	PC Euro 1 - 91/441/EEC	
23	Passenger Cars	Gasoline 1,4 - 2,0 I	PC Euro 2 - 94/12/EEC	
24	Passenger Cars	Gasoline 1,4 - 2,0 l	PC Euro 3 - 98/69/EC Stage2000	
25	Passenger Cars	Gasoline 1,4 - 2,0 I	PC Euro 4 - 98/69/EC Stage2005	
-26	Dacconnor Care	Gasoline 14-201	PC Euro 5 (post 2005)	
•		_DATA Population / Milea	ge_km_per_year / M⊧ ◀	
Read	tv.			NUM

Import Data from Microsoft Excel file (4/4)

- Fill the cells of the year columns with the desired values
- For example, the mileage for the year '2004' of a vehicle category is 10,000 km
- Leave a cell empty if you want the database data value not to be changed

Note:

If a vehicle category does not exist in a fleet configuration of a specific year then the cell of the Excel file will have the value 'not exists'. You should not change that value

After you fill the desired values save and close the Excel file

	Microsoft Excel - D	enmark 2004.xls		_			
8	<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>I</u>	Insert F <u>o</u> rmat <u>T</u> ools <u>D</u> ata	<u>W</u> indow <u>H</u> elp	_ & ×			
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1	A	B	Tachnology	2004			
2	Sector Bessenger Cere	Subsector	DDEECE	2004			
2	Passenger Cars Deccondor Caro	Gasoline X1,41	FRE EVE				
4	Passenger Cars Passonger Cars	Gasoline <1,41	ECE 15/00-01				
5	Passenger Cars	Gasoline <1.41	ECE 15/03				
6	Passenger Cars	Gasoline <1,11	ECE 15/04	10000			
7	Passenger Cars	Gasoline <1.41	Improved Conventional				
8	Passenger Cars	Gasoline <1,41	Open Loop				
9	Passenger Cars	Gasoline <1,41	PC Euro 1 - 91/441/EEC				
10	Passenger Cars	Gasoline <1,41	PC Euro 2 - 94/12/EEC				
11	Passenger Cars	Gasoline <1,41	PC Euro 3 - 98/69/EC Stage2000				
12	Passenger Cars	Gasoline <1,41	PC Euro 4 - 98/69/EC Stage2005				
13	Passenger Cars	Gasoline <1,41	PC Euro 5 (post 2005)				
14	Passenger Cars	Gasoline <1,41	PC Euro 6				
15	Passenger Cars	Gasoline 1,4 - 2,0 I	PREECE				
16	Passenger Cars	Gasoline 1,4-2,01	ECE 15/00-01				
17	Passenger Cars	Gasoline 1,4-2,01	ECE 15/02				
18	Passenger Cars	Gasoline 1,4 - 2,0 I	ECE 15/03				
19	Passenger Cars	Gasoline 1,4 - 2,0 I	ECE 15/04				
20	Passenger Cars	Gasoline 1,4 - 2,0 I	Improved Conventional				
21	Passenger Cars	Gasoline 1,4 - 2,0 I	Open Loop				
22	Passenger Cars	Gasoline 1,4-2,01	PC Euro 1 - 91/441/EEC				
23	Passenger Cars	Gasoline 1,4-2,01	PC Euro 2 - 94/12/EEC				
24	Passenger Cars	Gasoline 1,4-2,01	PC Euro 3 - 98/69/EC Stage2000				
25	Passenger Cars	Gasoline 1,4-2,01	PC Euro 4 - 98/69/EC Stage2005	_ _			
14 4	INPUT DATA \ Population / Mileage km per year / Mi ◀						
Read	lv	· // · · · · · · · // · · · · · ·		NUM			

Results > Implicit emissions factors

- • × Implied Emission Factors for Year ~ 2022 Select **Export to Excel** CO [g/km] All digits Export Pollutant Category Fuel Segment Euro Standard Total Total Filter Passenger Cars Petrol Small Euro 2 0.7844 Euro 3 0.5529 Small Total 0.7078 Medium Euro 3 0.5121 Petrol Total 0.6097 Euro II Heavy Duty Trucks Diesel Rigid 20 - 26 t 2.1118 Urban Buses Midi <=15 t Euro I 2.0094 Buses Diesel Urban Buses Standard 15 - 18 t Euro III 2.842 Diesel Total 2.4933 Urban CNG Buses Euro I CNG 8.4 Buses Total 4.1694 Close

Show all numbers

Export Data to Microsoft Excel file

The final step is to export all the emissions Open the 'File > Import/Export > Create Import Format Excel File' form



🔗 Export Results to EXC	EL		- • ×			
Year	Poll	utants	Emissions			
2022	As BC	LC N2 ⁱ	✓ Hot ✓ Cold			
	□ Cd □ NH □ CH4 □ Ni ☑ CO □ NM	A/C SCR				
Modes Urban Peak Urban Off Peak Rural Highway Total	CO2 Cr Cu EC Hg	□ NO □ NO □ NO □ OM □ Pb	 ☐ Tyre ☐ Brake Wear ☐ Road abrasion ☑ Total 			
Export Excel 2010 Export Excel 2003 Cancel						

Hands-on exercises to enter, select and modify data

Online demonstration using COPERT

Input data needed

- 1. Fleet (vehicle fleet in operation per category)
 - A. Passenger transport (passenger cars, buses, L-category vehicles)
 - B. Freight transport (light commercial vehicles, heavy duty trucks)
 - C. Split per fuel (energy) type, segment subcategories, and technologies/Euro standards
- 2. Mileage: Average annual distance driven [km/vehicle]
- **3. Speeds:** Average travelling speeds in urban, rural, highway modes [km/h]
- 4. Activity shares: Share of activity in urban, rural, highway modes [%]
- 5. Temperatures: Country average [°C]
- 6. Fuel consumption: sales (Statistics) [TJ]
 - Energy content of primary fuels [MJ/kg]
 - Fuel mixture(s) used
 - Energy share of fuel mixtures [%]

Conclusions

- Practical use of COPERT features
- Calculation of GHG and other pollutants (precursors, fugitives) emissions
- Import/export of input data with Excel
- Export of emissions results to Excel



Thursday 26 September 2024

15:00 – 17:00 Bonn Time

Session 6

Higher tier methods for estimating GHG emissions from road transportation COPERT model: implementation of Tier 2 and Tier 3 methods to estimate GHG emissions

Demonstration using COPERT interface with hands-on exercice

By the end of this session, you will:
1. Build the vehicle database with all categories
2. Understand how to enter data for T1 and T2
3. Know how extracting and exporting the results in XLS format

4. Know how exploring and using T1 and T2 results

Learning objectives

Hands-on Exercise to estimate GHG emission with Tier 2

Calculation of road transport emissions with Tier 2
 Use of data set from the Niger vehicle stock (2016 – 2020)

3. - Use of average annual mileage travelled by each category of vehicles in Niger

Online Demonstration using COPERT

Hands-on Exercise to estimate emission with Tier 3

- 1. Calculation of GHG road transportation emissions with Tier 3
- 2. Use of data set from the Niger vehicle stock (2016 2020)
- 3. Use of average annual mileage travelled by each category of vehicles in Niger
- 4. Use of traffic activity data (average urban speeds) for the different categories of vehicles running in Niger

Online Demonstration using COPERT

Hands-on exercice

Estimation of GHG, precursors and fugitive emissions

Conclusions

- COPERT does not use Tier 1
- COPERT applies only higher tiers (Tier 2 and Tier 3)
- Accuracy of calculation results and large range of pollutants covered
- Required input data and calculation steps for Tier 2 and Tier 3
- Need of development of practical skills to use COPERT



Friday 27 September 2024

15:00 – 17:00 Bonn Time

Session 7

Other key functions of the COPERT model: Energy balance of road transportation, GHG emission and fuel consumption projections (NDC) By the end of this session, you will: 1. Know how COPERT estimates the fuel consumption of the vehicle stock Learning objectives 2. Understand how to set assumptions to build scenarios for emission projections 3. Understand how to use COPERT to estimate GHG emission projections based on different scenarios

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Hands-on exercises

Estimation of fuel balance from road transportation

Vehicle stock of NIGER



Assumptions on annual mileage in NIGER

Vehicles	Fuels	Assumptions Average annual mileage
		(km/y)
Passenger Cars	Petrol	8 000
	Diesel	8 000
Light Commercial Vehicles	Petrol	10 000
	Diesel	10 000
Heavy Duty Trucks Rigid	Diesel	13 000
Heavy Duty Trucks – Articulated	Diesel	13 000
Buses - Coaches Standard	Diesel	15 000
Mopeds 2-stroke	Petrol	3 000

Fuel consumption estimation by COPERT using vehicle stock data and assumptions on mileage for NIGER

Years	2016	2017	2018	2019	2020
Passenger Cars	4 128	3 952	3 666	4 391	4 693
Petrol	2 014	1 929	1 789	2 143	2 290
Small	2 014	1 929	1 789	2 143	2 290
Diesel	<mark>2 113</mark>	2 023	1 877	2 248	2 403
Small	2 113	2 023	1 877	2 248	2 403
Light Commercial Vehicles	930	895	836	996	1 050
Petrol	371	357	334	395	419
N1-I	371	357	334	395	419
Diesel	559	538	503	602	631
N1-I	559	538	503	602	631
Heavy Duty Trucks	4 249	4 101	3 750	4 449	4 787
Diesel	4 249	4 101	3 750	4 449	4 787
Rigid 7,5 - 12 t	1 384	1 298	1 204	1 491	1 614
Articulated 34 - 40 t	2 865	2 803	2 546	2 958	3 174
Buses	2 296	2 219	2 083	2 435	2 532
Diesel	2 296	2 219	2 083	2 435	2 532
Coaches Standard <=18 t	2 296	2 219	2 083	2 435	2 532
L-Category	582	559	516	624	666
Petrol	582	559	516	624	666
Mopeds 2-stroke <50 cm ³	582	559	516	624	666
Total	12 185	11 726	10 852	12 895	13 729

NIGER: Energy balance

2016	Unités : Milliers de tonnes équivalent pétrole						trole	
	Charbon	Pétrole brut	Produits pétroliers	Gaz naturel	Géothermiq ue/ Solaire/ etc.	Biomasse, Biocarburant et déchets	Electricité	TOTAL
Production	117,81	767,05	-	19,43	0,85	1 764,65	-	2 669,79
Importations		-	123,48	-	-	-	66,99	190,47
Dont importations			(0.10					(0.40
illicites			09,49		-	-	-	09,49
Exportations			- 262,73		-	-	-	- 262,73
Variation de stocks	1,46	6,75	- 14,72	-	-	-	-	- 6,51
Approvisionnement								
totale en énergie	119,27	773,79	- 153,97	19,43	0,85	1 764,65	66,99	2 591,01
primaire (ATEP)								
Transferts		-	-	•	-	-	-	-
Ecarts statistiques	- 2,21	0,01	3,40	- 19,43	-	0,00	- 0,33	- 18,56
Secteur	110.04	17 20.00	(2) (2)		0.05	20.20	F.0.00	150.01
Transformation	- 112,24	- 773,80	636,76		- 0,85	38,29	52,83	- 159,01
Centrales électriques	- 111,08	-	- 59,49	-	- 0,85	-	40,34	- 131,09
Centrales								
autoproductrices	-	-	- 77,10	•	-	-	12,50	- 64,60
d'électricité								
Fabriques de briquettes	- 1.16				-		-	- 1.16
de lignite et de tourbe	1,10							1,10
Raffineries de pétrole		- 773,80	773,35	•	-	-	-	- 0,45
Unité de production de			-		-	38,29	-	38,29
charbon de bois								
Secteur Energie	•	•	•	•	•		- 8,88	- 8,88
Autres utilisations du		-	-		-	-	- 8,88	- 8,88
secteur Energie	1.10		2.40				10.77	24.05
Pertes de distribution	- 4,40	•	- 2,69	•	-		- 19,77	- 26,85
Consommation finale	0,42	-	483,50	-	-	1 802,94	90,85	2 377,71
totale (CF1)								
Secteur industrie	•	•	48,85	•	•	•	19,49	68,34
Non spécifié ci-dessus	•	•	48,85	•	-	-	19,49	68,34
Secteur transport	•	•	406,96	•	•	•	-	406,96
Aérien	•	•	47,56	•	-	-	-	47,56
Koutier	•		359,40	•	-		-	359,40
Transports non spécifié	-		-		-	-		1 000 40
Autres secteurs	0,42		27,68			1 802,94	71,36	1 902,40
Residentiel	0,13		17,03	•	-	1 762,75	48,20	1 828,11
Commerce et Services publics	0,29	-	10,65	-	-	40,19	22,43	73,56
Autres	-	-	-		-	-	-	-
International Data sources of fuel consumption



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Transport, n.e.s



				Nig	er						
	Primary	Coal and		Terajo	ules						
	coal and peat	peat products	Primary Oil	Oil Products	Natural Gas	Biofuels and waste	Nuclear	Electricity	Heat	Total energy	of which: renewables
2019			00074		4004	170440		440		****	170005
Primary production	3619		. 38271		1334	*70118		. 118		. *113460	*70235
Imports				2333	-			. 3806		. 6139	
Exports				-4382						4382	
International marine bunkers					-						
International aviation bunkers				*-2046						. *-2046	
Stock changes			6332							6332	
Total energy supply	3619		. 31939	-4095	1334	*70118		. 3924		. *106839	*70235
Statistical difference	31	(0 2	714	34	0		. 67		. *848	*118
Transfers											
Transformation	-3300	*95	5 -31937	23789	-1300	-3393		. 2136		-13910	-3393
Electricity plants	-3214			-3912	-1300)	-	. 2136		-6290	-
CHP plants											-
Heat plants					-		-				
Coke ovens					-						-
Briquetting plants	-87	*95	5		-					- *9	
Liquefaction plants					-						
Gas works					-						-
Blast furnaces											
NGL plants & gas blending					-						
Oil refineries			31937	27701						-4236	
Other transformation					-	-3393				-3393	-3393
Energy industries own use	-144				-			. *-404		. *-548	
Losses	-144							1126		1270	
Final consumption		*95	5	*18980		*66725		. 4462		. *90262	*66725
Final energy consumption		*95	5	*18980		*66725		. 4462		. *90262	*66725
Manufacturing, const., mining				*2520				. 789		. *3309)
Iron and steel											
Chemical and petrochemical											
Non-ferrous metals											
Non-metallic minerals											
Transport equipment											
Machinery											
Mining and quarrying											
Food and tobacco											
Paper, pulp and printing											
Wood and wood products											
Textile and leather											
Construction											
Industries n.e.s				*2520				789		*3309	
Transport				*14583						*14583	
Road				*14583						*14583	
Rail				14000						14000	, .
Domestic aviation											
Domestic pavigation											
Dineline transport											
ripeline transport											

Data Comparison: COPERT and Statistics

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	Years	Fuels	2016	2019	2020	Assumptions on Average Annual Mileage
E	Passenger Cars	Petrol	2 014	2 143	2 290	(km/y) 8 000
ulatio		Diesel	2 113	2 248	2 403	8 000
calcu	Light Commercial Vehicles	Petrol	371	395	419	10 000
ERT		Diesel	559	602	631	10 000
COF	Heavy Duty Trucks Rigid	Diesel	1 384	1 491	1 614	13 000
s of	Heavy Duty Trucks – Articulated	Diesel	2 865	2 958	3 174	13 000
sult	Buses - Coaches Standard	Diesel	2 296	2 435	2 532	15 000
Re	Mopeds 2-stroke	Petrol	582	624	666	3 000
		COPERT	12 185	12 895	13 729	
Road	Totals	AIE data	15 144	16 394	15 818	Source 1: IEA, website
Transportation		UN statistics		14 583	14 669	Source 2: UNSD, website
		National Statistics	15 047	16 287	15 742	Source 3: Energy Balance, Niger, 2021, MPEER website
	Difference = National -	TJ	2 863	<mark>3 3</mark> 91	<mark>2 014</mark>	
	Copert	ktep	68	81	48	

Hands-on exercises

Estimation of emission projections for different scenarios of road transportation

Assumptions for road transportation scenarios

- Vehicle stock: number of vehicles registered (new, used) per category, fuel , age, technology (new transportation policy, vehicle emission regulations , vehicle incentives, etc.)
- Vehicle use: public transportation policy, fuel pricing, regulations, inspection & maintenance,
- Road traffic characteristics : road type, speed mileage, hot and cold start (infrastructure, traffic managment plan, etc.),

Current vehicle stock

Category	Fuel	Segment	Euro Standard	1990	1995	2000	2005	2010	2015	2020	2024	2030	2035	2040
Passenger Cars	Petrol	Small	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Passenger Cars	Petrol	Medium	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Passenger Cars	Petrol	Large-SUV-Executive	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Passenger Cars	Diesel	Small	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Passenger Cars	Diesel	Medium	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Passenger Cars	Diesel	Large-SUV-Executive	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Light Commercial Vehicles	Petrol	N1-I	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Light Commercial Vehicles	Diesel	N1-I	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Buses	Diesel	Urban Buses Midi <=15 t	Euro I	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro I	Х	Х	Х	Х	Х	Х	Х	Х	?	?	?

Vehicle stock evolution

Category	Fuel	Segment	Euro Standard	1990	1995	2000	2005	2010	2015	2020	2024	2030	2035	2040
Passenger Cars	Petrol	Small	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	XX	ххх	xxx
Passenger Cars	Petrol	Medium	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	x	ххх	XXX
Passenger Cars	Petrol	Large-SUV-Executive	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	x	x	x
Passenger Cars	Diesel	Small	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	ХХ	ххх	XXX
Passenger Cars	Diesel	Medium	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	X	XXX	ххх
Passenger Cars	Diesel	Large-SUV-Executive	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	x	x	x
Light Commercial Vehicles	Petrol	N1-I	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	x	X	X
Light Commercial Vehicles	Diesel	N1-I	Euro 1	Х	Х	Х	Х	Х	Х	Х	Х	x	X	X
Buses	Diesel	Urban Buses Midi <=15 t	Euro I	Х	Х	Х	Х	Х	Х	Х	Х	xxx	xxxx	xxxx
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro I	Х	Х	Х	Х	Х	Х	Х	Х	ххх	xxxx	xxxx

Development of road transportation scenarios



Vehicle Stock evolution without new technology (standard) Scenario 1

Category	Fuel	Segment	Euro Standaro	1990 1	1991 1	992 19	93 19	94 199	95 199	96 199	97 19	98 19	99 20	00 200	1 2002	2 2003	2004	2005	2006 2	007 2	008 20	009 2	010 2	011 2	012 2	2013 2	014 2	015 2	016 20	017 20	018 201	.9 2020	2021	2022 20	23 202	202	5 2026	5 2027	2028	2029	2030	2031	2032	2033 2	034 20	35 2036	2037	2038 2	039 20	040
Passenger Cars	Petrol	Small	Euro 1	100	101 1	101 1	02 10	02 10	03 10	3 10	04 10	04 10	05 10	05 10	6 10	5 107	107	108	108 1	109 1	.09 1	110 1	110	111 :	112	112 :	113 1	13	L14 1	.14 1	15 11	.6 116	117	117 1	18 11	.8 <mark>12</mark>	0 121	1 122	2 123	125	126	127	128	130 :	L 31 13	32 134	l 135	136	<mark>138</mark> 1	139
Passenger Cars	Petrol	Medium	Euro 1	120	121 1	121 1	22 12	23 12	24 12	4 12	25 12	26 12	27 12	27 12	8 129	9 130	130	131	132 1	133 1	.34 1	134 1	135 :	136 :	137 :	138 :	139 1	.39	140 1	.41 1	42 14	3 144	144	145 1	46 14	7 <mark>14</mark>	9 150	0 152	2 153	155	156	158	159	161 :	L62 10	54 16e	5 167	169 :	171 1	172
Passenger Cars	Petrol	Large-SUV-Executive	Euro 1	10	10	10	10	10 1	LO 1	.0 1	10 1	10 2	10	10 1	.0 10	0 11	. 11	11	11	11	11	11	11	11	11	11	11	11	11	11	11 1	.1 11	11	11	11 1	.1 <mark>1</mark>	1 11	1 12	2 12	12	12	12	12	12	12 :	12 12	2 12	12	12	12
Passenger Cars	Diesel	Small	Euro 1	30	30	30	30 3	31 3	31 3	31 3	31 3	31 3	31 3	32 3	2 32	2 32	32	32	32	33	33	33	33	33	33	34	34	34	34	34	34 3	5 35	35	35	35 3	6 <mark>3</mark>	6 36	6 37	37	37	38	38	38	39	39 4	40 40	40	41	41	42
Passenger Cars	Diesel	Medium	Euro 1	160	161 1	162 1	63 10	64 16	55 16	6 16	57 16	58 16	59 1	70 17	1 172	2 173	174	175	176 1	177 1	.78 1	179 1	180	181 :	183	184 :	185 1	.86	187 1	.88 1	89 19	0 191	193	194 1	95 19	6 19	8 200	0 202	2 204	206	208	210	212	214 2	217 2:	19 221	223	225	<mark>228</mark> 2	230
Passenger Cars	Diesel	Large-SUV-Executive	Euro 1	90	90	91	91 9	91 9	92 9	92 9	93 9	93 9	93 9	94 9	4 94	4 95	5 95	96	96	96	97	97	97	98	98	99	99	99 :	100 1	.00 1	01 10	1 101	102	102 1	03 10	3 <mark>10</mark>	3 103	3 103	<mark>103</mark>	104	104	104	104	104 :	LO4 10	04 104	104	105	105 1	105
ight Commercial /ehicles	Petrol	N1-I	Euro 1	10	10	10	10 :	10 1	LO 1	.0 1	10 1	10 2	10	10 1	.0 10	0 10	10	10	10	11	11	11	11	11	11	11	11	11	11	11	11 1	.1 11	11	11	11 1	.1 1	1 11	1 11	11	11	11	11	11	11	11 :	11 11	12	12	12	12
ight Commercial /ehicles	Diesel	N1-I	Euro 1	90	90	91	91 9	92 9	92 9	93 9	93 9	94 9	94 9	95 9	5 96	5 96	5 97	97	97	98	98	99	99 :	100 :	100 :	101 :	101 1	.02 :	102 1	.03 1	03 10	4 105	105	106 1	06 10	07 10	7 108	8 108	3 109	109	110	110	111	112 :	112 1:	13 113	8 114	114	115 1	115
Buses	Diesel	Urban Buses Midi <=15 t	Euro I	30	30	30	30 3	30 3	31 3	13	31 3	31 3	31 3	31 3	1 3:	1 32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	34 3	4 34	34	34	34 3	4 3	5 35	5 35	36	36	36	37	37	38	38	38 <mark>3</mark> 9	39	39	40	40
Buses	Diesel	Urban Buses Standard 15 - 18 t	Euro I	50	50	50	51 !	51 5	51 5	51 5	51 5	52 5	52 !	52 5	2 52	2 53	53	53	53	54	54	54	54	54	55	55	55	55	55	56	56 5	6 56	57	57	57 5	57 5	8 58	8 59	60	60	61	61	62	63	63 (54 65	65	66	66	67

Vehicle stock evolution with new technology (Standard) Scenario 2

| Fuel | Segment | Euro Standard 199 | 90 199

 | 1 1992 | 1993

 | 1994 19

 | 95 199 | 6 1997

 | 1998 1 | 999 20 | 00 200 | 1 2002 | 2003 2 | 004 200 | 05 2006 | 2007 | 2008 2
 | 009 201 | 0 201 | 1 2012 2

 | 013 201 | 4 2015 | 2016 2

 | 017 201

 | 8 201

 | 9 2020 | 2021 | 2022 2
 | 023 2024
 | 2025 | 2026 | 2027 2 | 028 20 | 029 203 | 0 2031 | 1 2032 | 2033 | 2034 20 | 035 203
 | 5 2037 | 2038 | 2039 2 | 040 |
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| Petrol | Small | Euro 1 1 | .00 10

 | 01 101 | 1 102

 | 102 1

 | .03 10 | 03 104

 | 104 | 105 1 | 05 10 | 6 106 | 107 | 107 1 | 08 108 | 3 109 | 109
 | 110 11 | LO 11 | 1 112

 | 112 11 | 3 113 | 114

 | 114 1

 | 15 11

 | 6 116 | 117 | 117
 | 118 11
 | <mark>8</mark> 118 | 117 | 117 | 116 1 | 116 11 | 15 11/ | .4 114 | 113 | 113 | 112 11
 | .2 111 | . 110 | 110 | 109 |
| Petrol | Small | Euro 5 | 0

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 | 0 100 | 101 | 101 | 102 1 | 102 1C | <mark>)3 10</mark> | 3 104 | 104 | 105 | 105 10
 | 6 106 | 107 | 107 | 108 |
| Petrol | Medium | Euro 1 | 0

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| Petrol | Medium | Euro 5 | 0

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| Petrol | Large-SUV-Executive | Euro 1 | 0

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| Petrol | Large-SUV-Executive | Euro 5 | 0

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 1992 1995 1996 1997 1990 2001 2002 2003 2004 2005 2004 2005 2007 <th>Fuel Segment Euro Standard 1990 1992 1993 1993 1997 1993 1997 1997 1997 1900 1001 100 101 101 102 103 104 104 105 105 106 107 107 108 108 100 101 111 112 112 113 114 Petrol Small Euro S 0 0 0 0<th>Fuel Segment Euro Standard 1990 1991 1993 1993 1995 1997 1998 1997 1998 1990 2001 2003 2007 2007 2007 2007 2017<th>Fuel Segment Euro Standard 1990 1991 1992 100 100 100 101 111 112 112 113 1</th><th>Fuel Segment Euro Standard 1990 1992 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 111 111</th><th>Fuel Segment Euro Standard 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 112 113 114 <t< th=""><th>Fuel Segment Euro Standard 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1990 100 101 101 101 1</th><th>Fuel Segment Euro Standard 1990 1992 1993 1993 1993 1993 1993 1993 1903 100 0 0 0 0</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1992 1992 1992 1992 1992 1902</th><th>Fuel Segment S</th><th>fuel Segment Luro Standard 1992 1992 1992 1992</th><th>Fuel Segment Euro Standard 1 strop 1</th><th>fuel Segment Euro Standard Jago Jago</th><th>fuel segment turo stand segment turo stand segment segment</th><th>func func 5tandard func 5tandard <thunc 5tandard<="" th=""></thunc></th><th>furb Sugment Furb
 Standard Sugment Furb Sugment Sugmen</th><th>fuel Segment Euro Standard Segment Euro Standard Segment Segment</th><th>Fuel Segment Euro Standard Segment Euro Standard Segment Euro Standard Segment Segment<</th><th>Fuel Segment S</th></t<></th></th></th> | Fuel Segment Euro Standard 1990 1992 1993 1993 1997 1993 1997 1997 1997 1900 1001 100 101 101 102 103 104 104 105 105 106 107 107 108 108 100 101 111 112 112 113 114 Petrol Small Euro S 0 0 0 0 <th>Fuel Segment Euro Standard 1990 1991 1993 1993 1995 1997 1998 1997 1998 1990 2001 2003 2007 2007 2007 2007 2017<th>Fuel Segment Euro Standard 1990 1991 1992 100 100 100 101 111 112 112 113 1</th><th>Fuel Segment Euro Standard 1990 1992 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 111 111</th><th>Fuel Segment Euro Standard 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 112 113 114 <t< th=""><th>Fuel Segment Euro Standard 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1990 100 101 101 101 1</th><th>Fuel Segment Euro Standard 1990 1992 1993 1993 1993 1993 1993 1993 1903 100 0 0 0 0</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1992 1992 1992 1992 1992 1902</th><th>Fuel Segment S</th><th>fuel Segment Luro Standard 1992 1992 1992 1992</th><th>Fuel Segment Euro Standard 1 strop 1</th><th>fuel Segment Euro Standard Jago Jago</th><th>fuel segment turo stand segment turo stand segment segment</th><th>func func 5tandard func 5tandard <thunc 5tandard<="" th=""></thunc></th><th>furb Sugment Furb Standard Sugment Furb Sugment Sugmen</th><th>fuel Segment Euro Standard Segment Euro Standard Segment Segment</th><th>Fuel Segment Euro Standard Segment Euro Standard Segment Euro Standard Segment Segment<</th><th>Fuel Segment S</th></t<></th></th> | Fuel Segment Euro Standard 1990 1991 1993 1993 1995 1997 1998 1997
1998 1990 2001 2003 2007 2007 2007 2007 2017 <th>Fuel Segment Euro Standard 1990 1991 1992 100 100 100 101 111 112 112 113 1</th> <th>Fuel Segment Euro Standard 1990 1992 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 111 111</th> <th>Fuel Segment Euro Standard 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 112 113 114 <t< th=""><th>Fuel Segment Euro Standard 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1990 100 101 101 101 1</th><th>Fuel Segment Euro Standard 1990 1992 1993 1993 1993 1993 1993 1993 1903 100 0 0 0 0</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1992 1992 1992 1992 1992 1902</th><th>Fuel Segment S</th><th>fuel Segment Luro Standard 1992 1992 1992 1992</th><th>Fuel Segment Euro Standard 1 strop 1</th><th>fuel Segment Euro Standard Jago Jago</th><th>fuel segment turo stand segment turo stand segment segment</th><th>func func 5tandard func 5tandard <thunc 5tandard<="" th=""></thunc></th><th>furb Sugment Furb Standard Sugment Furb Sugment Sugmen</th><th>fuel Segment Euro Standard Segment Euro Standard Segment Segment</th><th>Fuel Segment Euro Standard Segment Euro Standard Segment Euro Standard Segment Segment<</th><th>Fuel Segment S</th></t<></th> | Fuel Segment Euro Standard 1990 1991 1992 100 100 100 101 111 112 112 113 1 | Fuel Segment Euro Standard 1990 1992 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111
111 111 111 111 | Fuel Segment Euro Standard 1992 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1903 100 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 101 111 112 113 114 <t< th=""><th>Fuel Segment Euro Standard 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1990 100 101 101 101 1</th><th>Fuel Segment Euro Standard 1990 1992 1993 1993 1993 1993 1993 1993 1903 100 0 0 0 0</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1990 1992</th><th>Fuel Segment Euro Standard 1992 1992 1992 1992 1992 1902</th><th>Fuel Segment S</th><th>fuel Segment Luro Standard 1992 1992 1992 1992</th><th>Fuel Segment Euro Standard 1 strop 1</th><th>fuel Segment Euro Standard Jago Jago</th><th>fuel segment turo stand segment turo stand segment segment</th><th>func func 5tandard func 5tandard <thunc 5tandard<="" th=""></thunc></th><th>furb Sugment Furb Standard Sugment Furb Sugment Sugmen</th><th>fuel Segment Euro Standard Segment Euro Standard Segment Segment</th><th>Fuel Segment Euro Standard Segment Euro Standard Segment Euro Standard Segment Segment<</th><th>Fuel Segment S</th></t<> | Fuel Segment Euro Standard 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1999 1990 100 101 101 101 1 | Fuel Segment Euro Standard 1990 1992 1993 1993 1993 1993 1993 1993 1903 100 0 0 0 0 | Fuel Segment Euro Standard 1990 1992 | Fuel Segment Euro Standard 1990 1992 | Fuel Segment Euro Standard 1992 1992 1992 1992 1992 1902 1902 1902 1902 1902
1902 1902 | Fuel Segment S | fuel Segment Luro Standard 1992 1992 1992 1992 | Fuel Segment Euro Standard 1 strop 1 | fuel Segment Euro Standard Jago Jago | fuel segment turo stand segment turo stand segment segment | func func 5tandard func 5tandard <thunc 5tandard<="" th=""></thunc> | furb Sugment Furb Standard Sugment Furb Sugment Sugmen | fuel Segment Euro Standard Segment Euro Standard Segment Segment | Fuel Segment Euro Standard Segment Euro Standard Segment Euro Standard Segment Segment< | Fuel Segment S |

Vehicle Mileage evolution Scenario 1 & 2

Category I	Fuel 1	Segment	ro Standa	1990 1	.991 19	992 19	93 19	94 1	.995 1	1996 1	1997 :	1998 1	.999 2	000 20	01 20	002 2	003 2	004 2	005 20	06 20	07 20	08 20	009 2	010 2	011 2	012 20	13 20	14 20	15 201	16 20	17 20	18 201	19 202	0 202	1 2022	2023	2024	2025	2026 20	027 20	028 202	9 2030	2031	2032	2033	2034	2035 20	36 20	37 203	38 2039	9 2040
Passenger Pet	trol S	Small E	Euro 1	1 000,0 1	010,0 10	20,1 1 0	30,3 104	40,6 1 0	051,0 1	061,5 1	072,1 1	082,9 1	093,7 1 :	104,6 1 11	15,7 11	126,8 1 1	138,1 1 1	49,5 1:	161,0 1 1	72,6 11	84,3 1 1	96,1 1 2	208,1 1 2	220,2 1	232,4 1	44,7 1 2	57,2 1 2	69,7 128	32,4 1 29	5,3 1 3 (08,2 1 32	1,3 1 33	4,5 1 347	7,8 1 361	L,3 1374,	9 1 388,7	1402,6	1 332,4 1	265,8 1 2	02,5 11/	42,4 1 08	5,3 1 031	,0 979,	930,5	884,0	839,8	797,8 7	57,9 72	20,0 68	4,0 649	9,8 617,3
Passenger Pet	trol S	Small B	Euro 5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	1 500,0 1	507,5 15	15,0 15	22,6 1 53	0,2 1 537	9 1 545,6	1 553,3	1 561,1 :	1568,9 1	576,7 1 5	84,6 1 5	92,5 1 60	0,5 1 608	8,5 1 6 1 6 ,5
Passenger Pet	trol N	Medium B	Euro 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 O,C
Passenger Pet	trol N	Medium B	Euro 5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	3,0 0,0
Passe nger Pet	trol L	Large-SUV B	Euro 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 O,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0,0
Passenger Pet	trol L	Large-SUV B	Euro 5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Passenger Die	isel S	Small E	Euro 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	٥,٥ ٥,٥
Passenger Die	esel S	Small B	Euro 5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0,0
Passenger Die	sel N	Medium B	Euro 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Passenger Die	esel N	Medium B	Euro 5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 O,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Passenger Die	sel L	Large-SUV B	Euro 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	o,o o,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Passenger Die	esel L	Large-SUV B	Euro 5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Passenger Bat	ttery eles	Small B	Euro 6 a/b	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 O,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0,0
Passenger Bat	ttery ele N	Medium B	Euro 6 a/b	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Passenger Bat	ttery el L	Large-SUV B	Euro 6 a/b	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Light Com Pet	trol N	N1-I E	Euro 1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Light Com Pet	trol N	N1-I E	Euro 5	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Buses Die	isel U	Urban Buse	Euro I	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Buses Die	esel U	Urban Bus	Euro V	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Buses Die	isel U	Urban Buse	Euro I	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O
Buses Die	esel U	Urban Bus <mark></mark> B	Euro V	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	0,0 0	0,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	,0 0,	0,0	0,0	0,0	0,0	0,0	0,0	0,0 0	J,O 0,O

Projection of GHG, Precusrsors and Fugitives emissions for road transportation

Online Demonstration with COPERT



Closing session

- Lessons learnt from the Webinar
- Next steps
- Closing remarks by the UNFCCC Secretariat

Thanks for your participation and interest in CORERT