COPERT 4

Charis Kouridis
Dimitrios Gkatzoflias
Giorgos Mellios
Leon Ntziachristos

Ankara, 2012-09-18

Contents

- Background and general Info
- General methodology
- Activity data
- Some national approaches (Estonia, Serbia)
- NOx Emissions
- PM Emissions
- GHG Emissions
- Advanced characteristics
- Upcoming revisions, outlook and wishes

COPERT 4 Training

1. Background

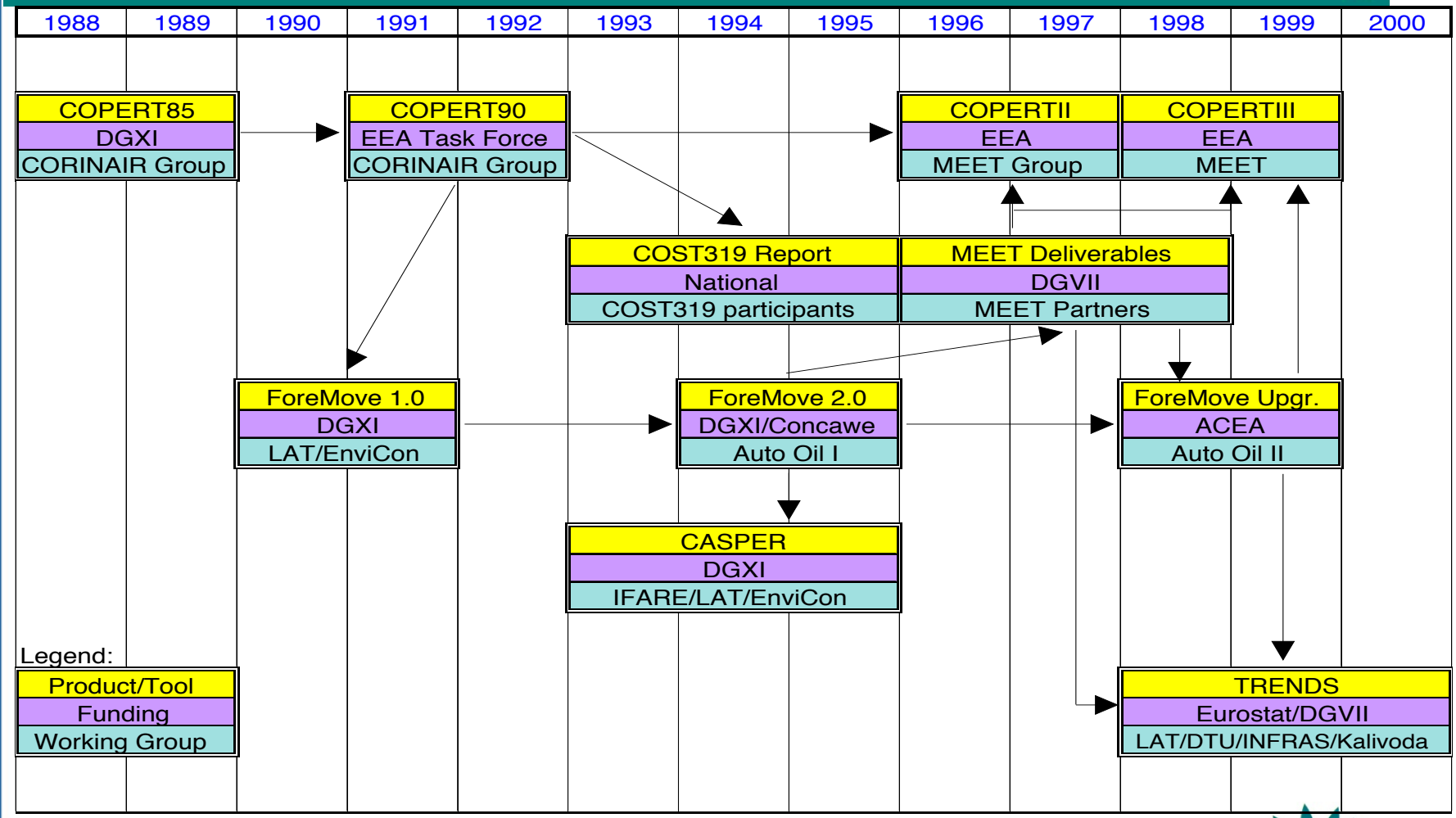
Administrative Status

- The name stands for **CO**mputer **P**rogramme to calculate **E**missions from **R**oad **T**ransport
- Now in its COPERT **4** Version (fourth update of the original COPERT 85)
- It incorporates results of several technology, research, and policy assessment projects
- It is continuously supported by the European Environment Agency through consecutive ETC budgets
- Its technical development is coordinated by the Joint Research Centre in Ispra
- It is scientifically and technically supported by Emisia and the Lab of Applied Thermodynamics

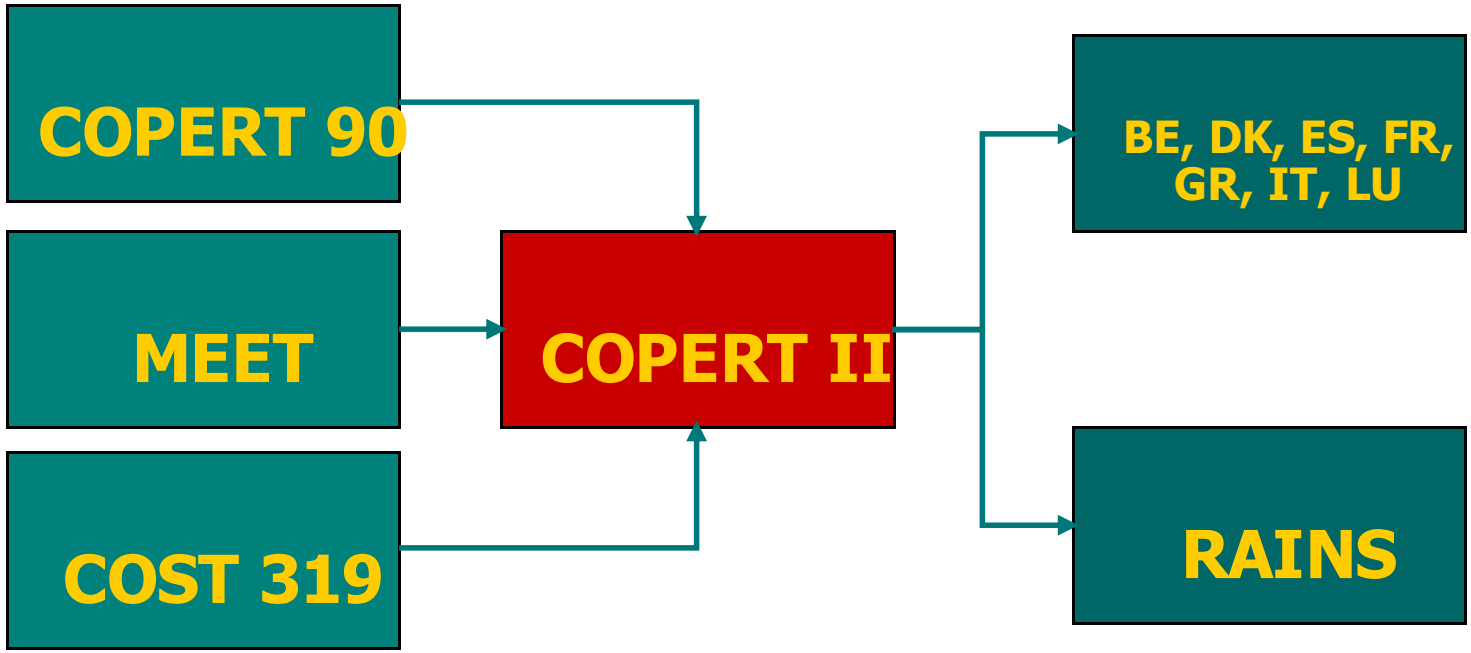
Technical Status

- Calculates emissions of all (important) pollutants from road transport
- Covers all (important) vehicle classes
- Can be applied in all European countries, in Asia, S. America and Oceania
- Can be used to produce total emission estimates from 1970 to 2030
- Provides a user-friendly (MS-Office like) GUI to introduce, view, and export data

History - Early Generations

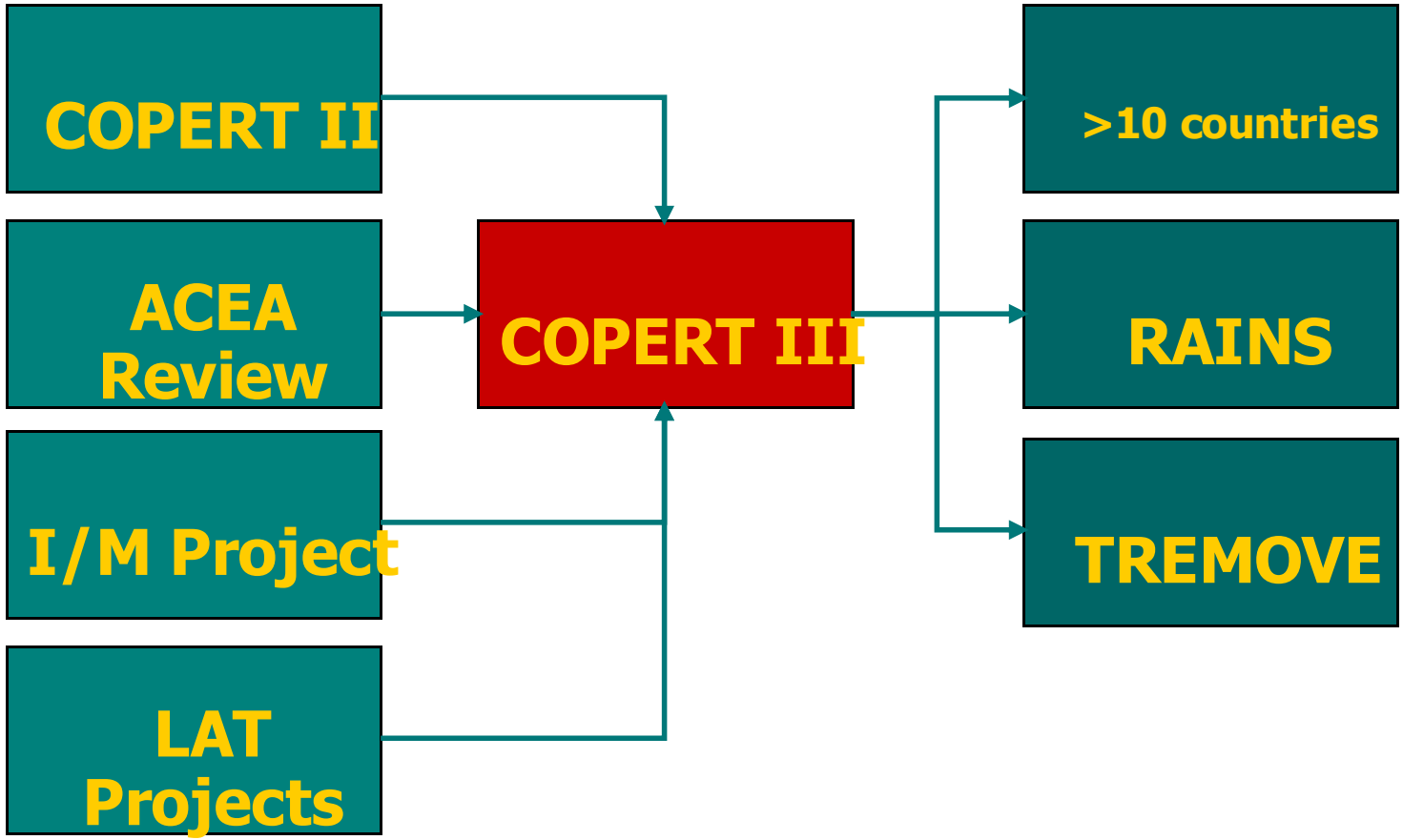


COPERT II (1996-2000)



- It was the first one with a GUI, built on MS Access 2
- It provided emission factors up to Euro 1
- Was used to set emission ceilings through RAINS

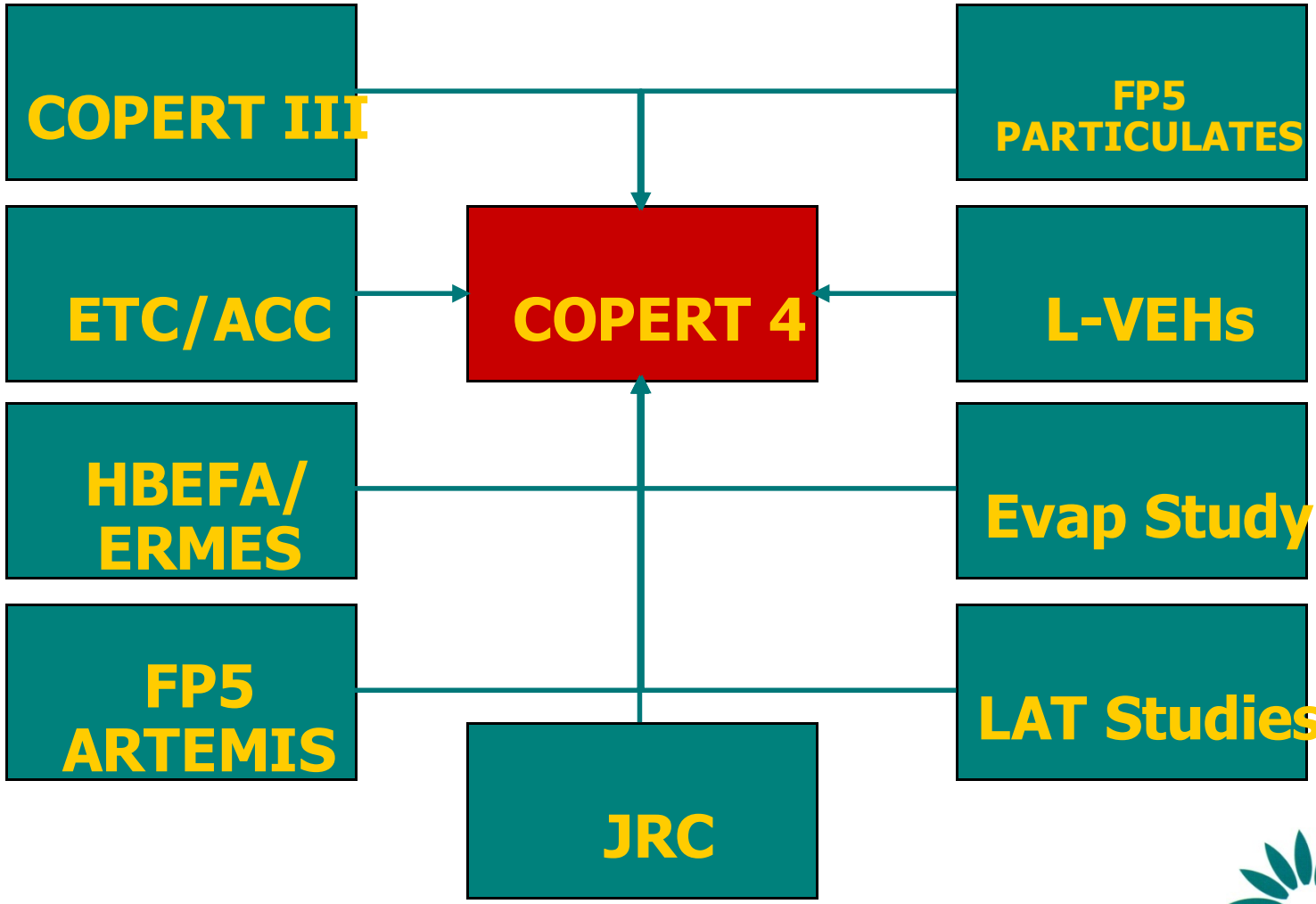
COPERT III (2000-2006)



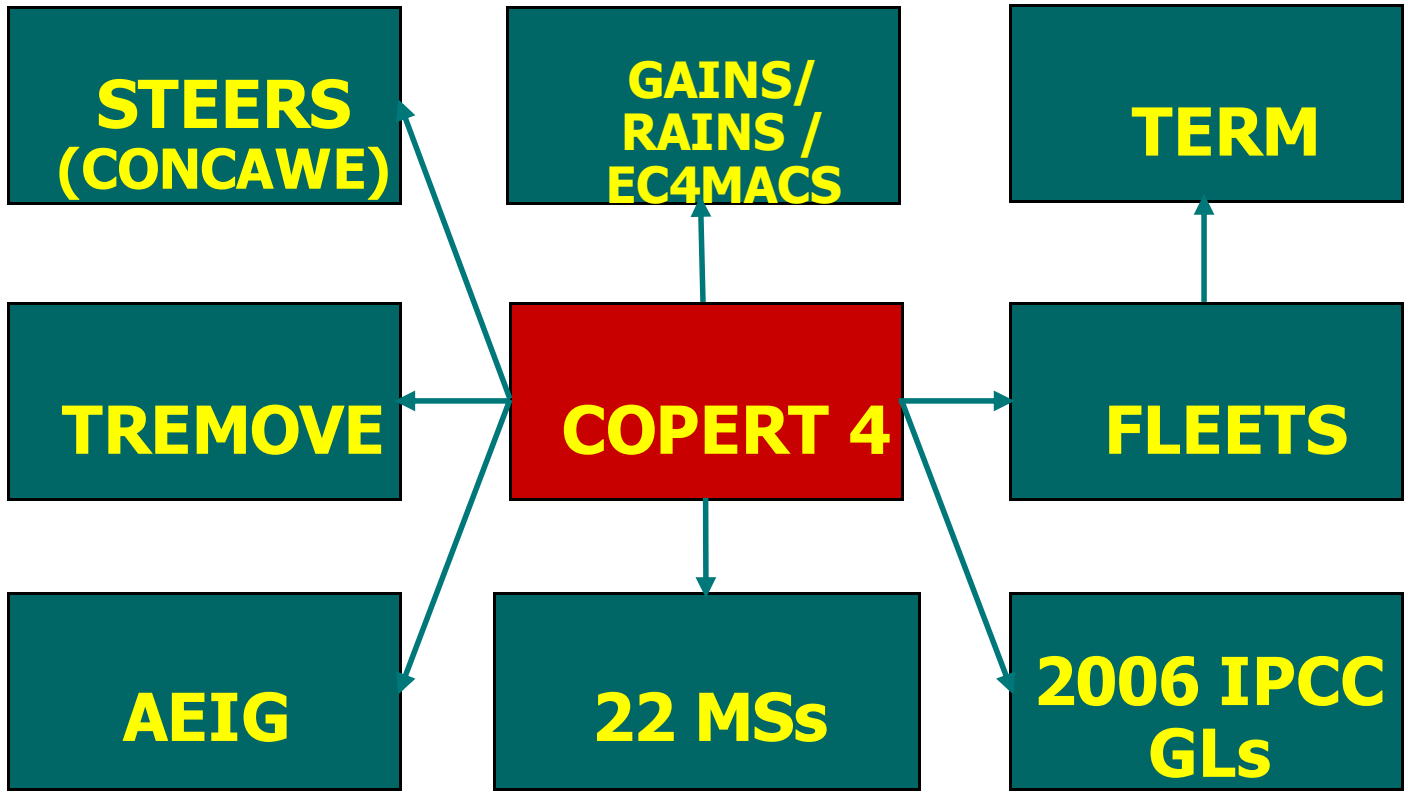
COPERT III

- COPERT III was based on menus, similar to MS Office (2000) and it was built on VBA for MS Access 97. Compared to version II:
  - New hot emission factors for Euro 1 passenger cars
  - New reduction factors over Euro 1 according to AutoOil
  - Impact on emissions from 2000, 2005 fuel qualities
  - Cold-start methodology for post Euro 1 PCs
  - Emission degradation due to mileage
  - Effect of leaded fuel ban in Europe
  - Alternative evaporation methodology
  - Detailed NMVOC speciation (PAHs, POPs, Dioxins and Furans)
  - Updated hot emission factors for non regulated pollutants

COPERT 4 Inputs



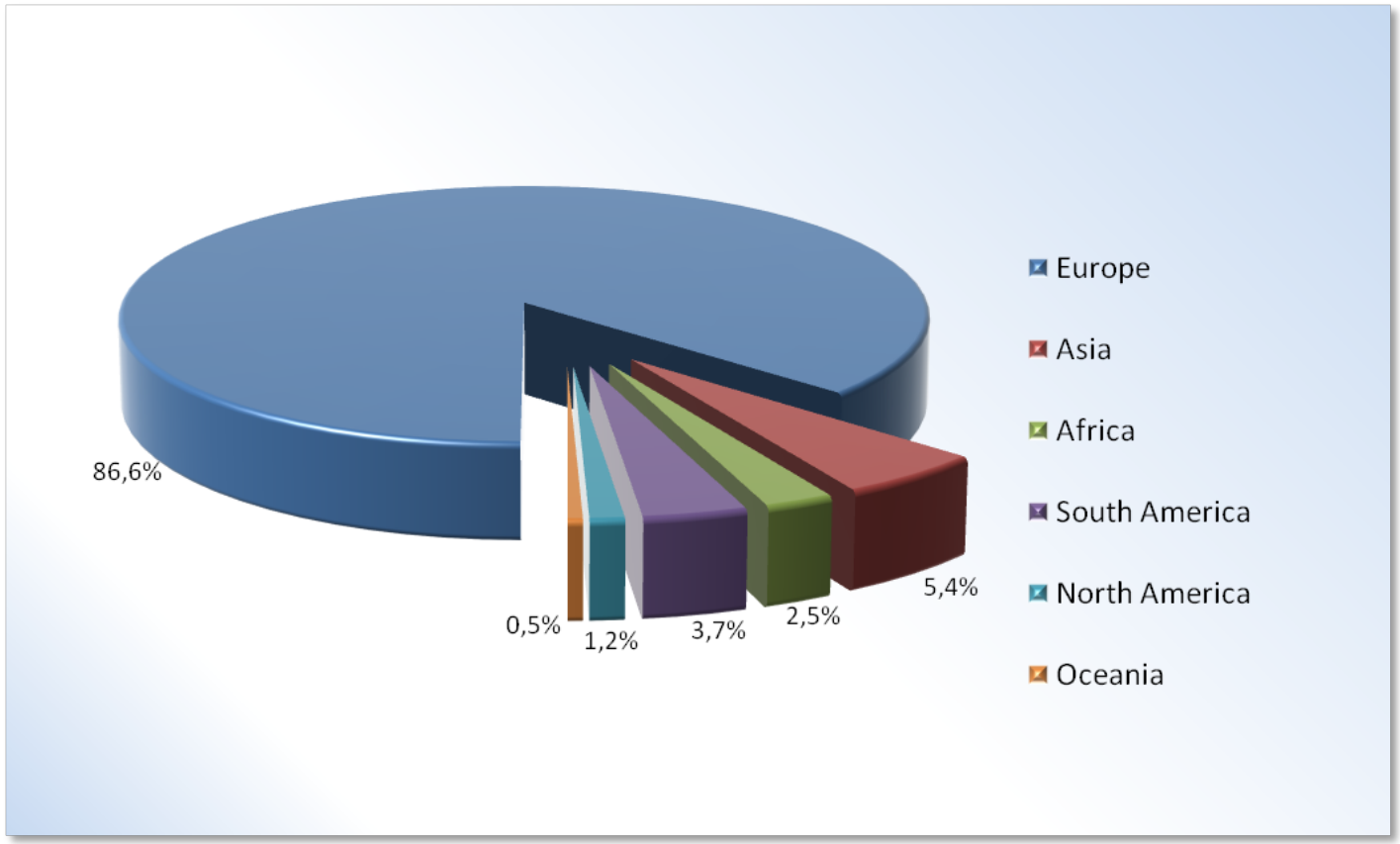
COPERT 4 Usage



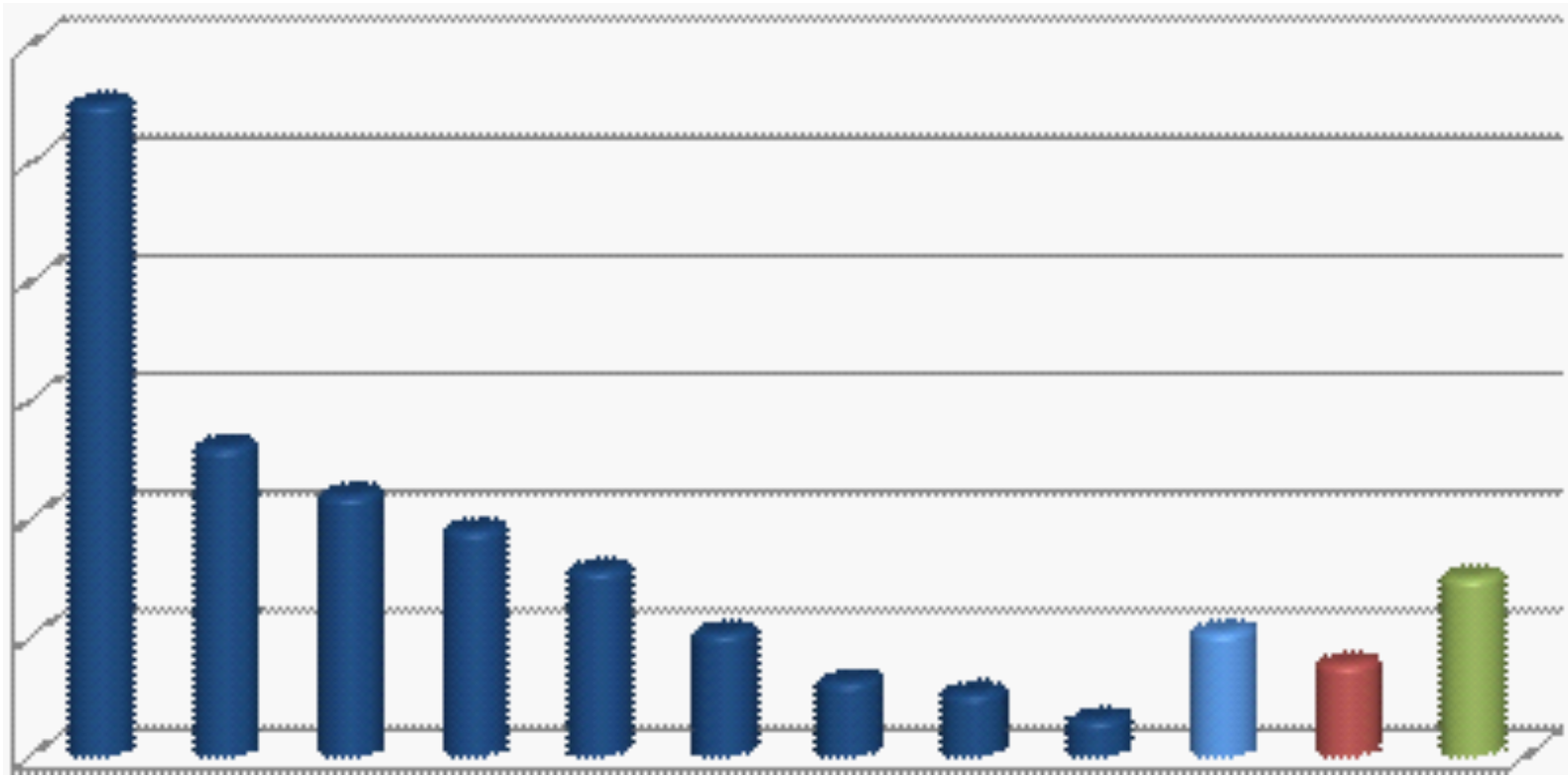
National contact points

Country	Model	Contact Person	Email
EU27			
Austria	GLOBEMI	Barbara SCHODL	Barbara.schodl@umweltbundesamt.at
Belgium	COPERT	Catherine SQUILBIN	csq@ibgebim.be
Bulgaria	Tier 1	Ivan LERINSKI	Ileriniski@mt.government.bg
Cyprus	COPERT	Chrysanthos SAVVIDES	csavvides@dli.mlsi.gov.cy
Czech Republic	COPERT	Pavel MACHALEK, Jiri DUFEK	machalek@chmi.cz, dufek@cdv.cz
Denmark	COPERT	Morten WINTHER	MWI@dmu.dk
Estonia	COPERT	Helen HEINTALU	Helen.Heintalu@ic.envir.ee
Finland	LIPASTO (LIISA)	Kristina SAARINEN	kristina.saarinen@environment.fi
France	COPERT	Jean Pierre CHANG	jean-pierre.chang@citepa.org
Germany	TREMOD	Gunnar GOHLISCH	gunnar.gohlisch@uba.de
Greece	COPERT	Alexandros KARAVANAS	akaravanas@ekpaa.gr
Hungary	COPERT	Tamas MERETEI	meretei@kti.hu
Ireland	COPERT	Eimer COTTER	e.cotter@epa.ie
Italy	COPERT	Riccardo DE LAURETIS	riccardo.delauretis@anpa.it
Latvia	COPERT	Sabine KRUMHOLDE	Sabine.Krumholde@lvgma.gov.lv
Lithuania	COPERT	Jolanta KOTVICKAJA	j.kotvickaja@am.lt
Luxembourg	COPERT	Marc SCHUMAN	Marc.Schuman@aev.etat.lu
Malta	Tier 1 (COPERT)	Christopher CAMILLERI	Christopher.Camilleri@mepa.org.mt
Netherlands	AGG. VERSIT+	Winand SMEETS	winand.smeets@rivm.nl
Poland	COPERT	Janina FUDALA, Stanislaw RADZIMIRSKI	j.fudala@ietu.katowice.pl. stanislaw.radzimirski@its.waw.pl
Portugal	COPERT	Pedro TORRES	pmt@fct.unl.pt
Romania	COPERT	Vlad Ioan GHIUTA TARALUNGA	ghiuta.vlad@anpm.ro
Slovakia	COPERT	Jozef MACALA	Jozef.Macala@tuke.sk
Slovenia	COPERT	Alenka FRITZEL	alenka.fritzel@gov.si
Spain	COPERT	Ana Rodriguez SECO	ana.rodriguez@cedex.es
Sweden	HBEFA 3.1	Malin Kanth	malin.kanth@naturvardsverket.se
UK	COPERT Based	Tim MURRELLS	tim.p.murrells@aeat.co.uk
Other Countries			
Belarus	COPERT	Hanna MALCHYCHINA	anna_malchihina@tut.by
Bosnia	COPERT	Martin TAIS	martin.tais@smartnet.ba
Croatia	COPERT	Zeljko JURIC, Vjeko BOLANCA	zeljko.juric@ekonerg.hr, vjekoslav.bolanca@mppv.hr
FYROM	COPERT	Igor PAUNOVSKI	I.paunovski@moepp.gov.mk
Norway	COPERT Based	Alice GAUSTAD	alice.gaustad@sft.no
Switzerland	EMIS	Sophie HOEHN	sophie.hoehn@bafu.admin.ch
Turkey	Tier 1	Ayse YILDIRIM COSGUN, Fatma Betül BAYGÜVEN	aycosgun@cevreorman.gov.tr, afbay@tubitak.gov.tr
Ukraine	COPERT	Kateryna SAVCHENKO	k.savchenko@ukrntec.com

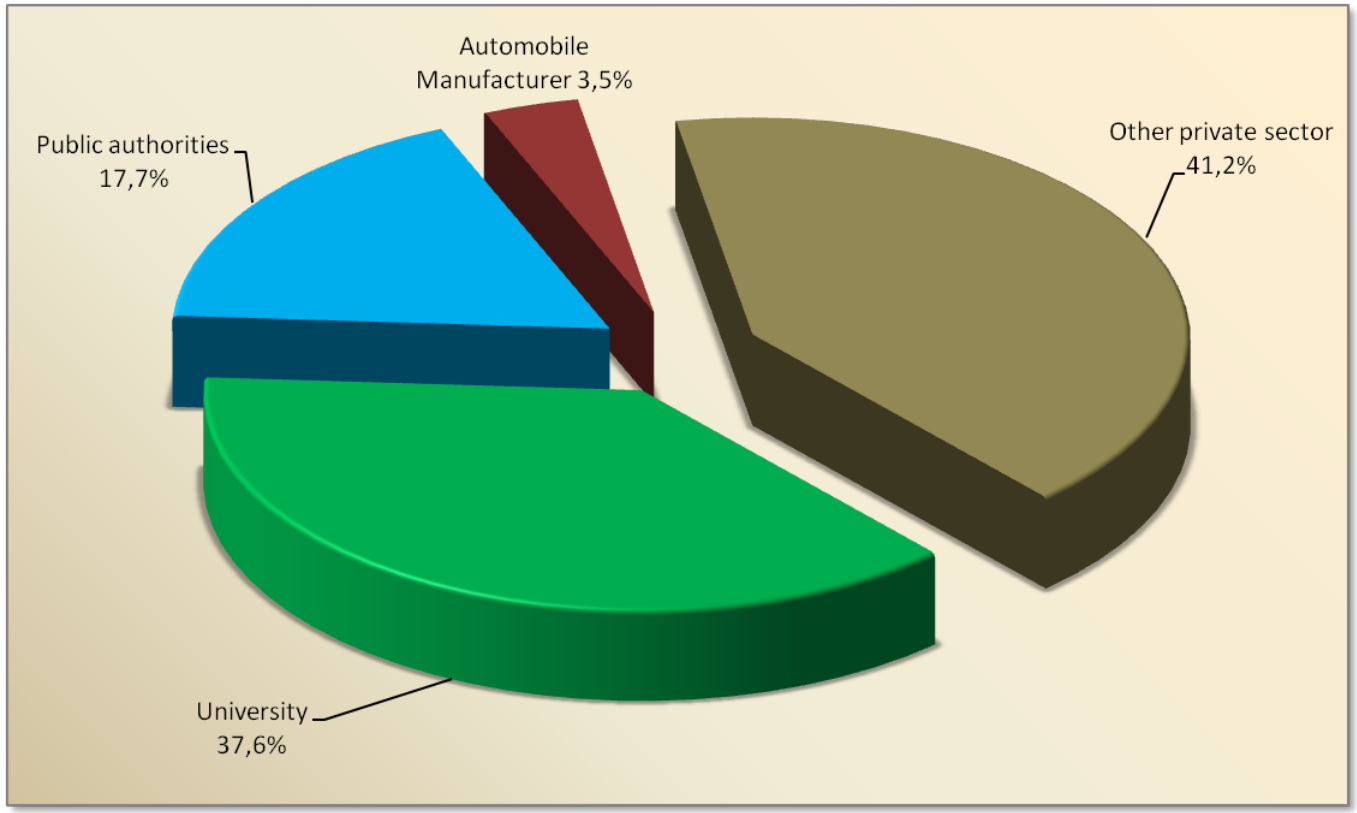
Users: Continent Distribution



Distribution of users from Europe

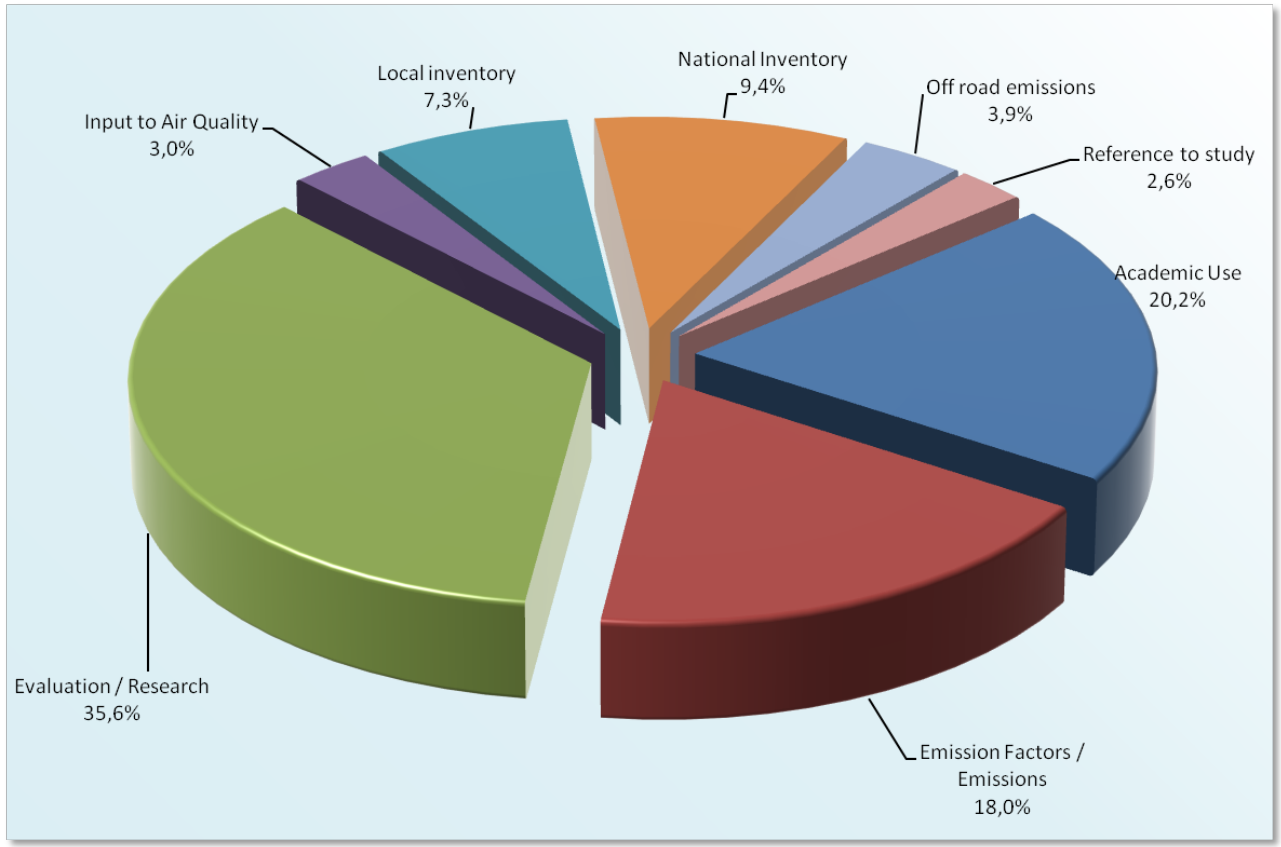


User Affiliation



Private sector includes consultants, construction companies, emission and transport research, etc.
International organizations include fuel, insurance and transport companies and authorities
Local authorities mainly include regional environmental offices

Applications



Academic use is for lectures, courses, theses

Evaluation / research : General application not specified in more detail by the users

Emissions / emission factors: Application on particular studies necessitating total estimates or just derivation of emission factors

Summary of COPERT application

- There is a great interest for national inventories
  - Requires simplicity in interface and limited input from the user
  - There is a great interest for GHGs emissions
  - They require a link to higher-level software (i.e. CollectER, CRF, etc.)

- Several new MSs and neighboring countries still consider that input data are difficult to collect
  - How to allocate technology classes
  - How to estimate mileage and road shares
  - Sometimes use “rule of thumb” methods of questionable quality

Summary of COPERT application

- Several “advanced” countries hesitate using a common methodology
  - Have developed own tools and are familiar with
  - Trust own methods provide more accurate results than a more international model
  - Politics and priorities may also play a role

As a result:

  - Countries’ absolute contribution may be misjudged
  - Complex science vs compliance trade-offs arise (need for flexibility mechanisms)

Individual applications

- Air quality and impact assessments
- Projections (energy, CO2, pollutants)
- Urban/regional inventories
- New road (road section) construction
- Airports (ground traffic)
- Captive fleets (refuse trucks, private fleets, taxis)
- Optimisation of loading capacity of HDVs

Scientific Literature 1(2)

Evaluation of COPERT

Robin Smit, Muriel Poelman, Jeroen Schrijver, Improved road traffic emission inventories by adding mean speed distributions, Atmospheric Environment, Volume 42, Issue 5, February 2008, Pages 916-926.

Fabio Murena, Giuseppe Favale, Continuous monitoring of carbon monoxide in a deep street canyon, Atmospheric Environment, Volume 41, Issue 12, April 2007, Pages 2620-2629.

Spyros P. Karakitsios, Vasileios K. Delis, Pavlos A. Kassomenos, Georgios A. Pilidis, Contribution to ambient benzene concentrations in the vicinity of petrol stations: Estimation of the associated health risk, Atmospheric Environment, Volume 41, March 2007, Pages 1889-1902.

Ioannis Kioutsioukis, Stefano Tarantola, Andrea Saltelli, Debora Gatelli, Uncertainty and global sensitivity analysis of road transport emission estimates, Atmospheric Environment, Volume 38, Contains Special Issue section on Measuring the composition of Particulate Matter in the EU, December 2004, Pages 6609-6620.

M. Ekstrom, A. Sjodin, K. Andreasson, Evaluation of the COPERT III emission model with on-road optical remote sensing measurements, Atmospheric Environment, Volume 38, Contains Special Issue section on Measuring the composition of Particulate Matter in the EU, December 2004, Pages 6631-6641.

M. Pujadas, L. Nunez, J. Plaza, J. C. Bezares, J. M. Fernandez, Comparison between experimental and calculated vehicle idle emission factors for Madrid fleet, Science of The Total Environment, Volumes 334-335, Highway and Urban Pollution, December 2004, Pages 133-140.

R. Smit, A.L. Brown, Y.C. Chan, Do air pollution emissions and fuel consumption models for roadways include the effects of congestion in the roadway traffic flow?, Environmental Modelling & Software, Volume 23, October-November 2008, Pages 1262-1270.

Robert Joumard, Michel Andre, Robert Vidon, Patrick Tassel, Characterizing real unit emissions for light duty goods vehicles, Atmospheric Environment, Volume 37, Issue 37, 11th International Symposium, Transport

Scientific Literature 2

Application

Leonidas Ntziachristos, Marina Kousoulidou, Giorgos Mellios, Zissis Samaras, Road-transport emission projections to 2020 in European Urban environments, Atmospheric Environment, October 2008, accepted.

Rajiv Ganguly, Brian M. Broderick, Performance evaluation and sensitivity analysis of the general finite line source model for CO concentrations adjacent to motorways: A note, Transportation Research Part D: Transport and Environment, Volume 13, May 2008, Pages 198-205.

Hao Cai, Shaodong Xie, Estimation of vehicular emission inventories in **China** from 1980 to 2005, Atmospheric Environment, Volume 41, December 2007, Pages 8963-8979.

B.M. Broderick, R.T. O'Donoghue, Spatial variation of roadside C2-C6 hydrocarbon concentrations during low wind speeds: Validation of CALINE4 and COPERT III modelling, Transportation Research Part D: Transport and Environment, Volume 12, December 2007, Pages 537-547.

Seref Soylu, Estimation of **Turkish** road transport emissions, Energy Policy, Volume 35, Issue 8, Pages 4088-4094.

R. Bellasio, R. Bianconi, G. Corda, P. Cucca, Emission inventory for the road transport sector in **Sardinia** (Italy), Atmospheric Environment, Volume 41, February 2007, Pages 677-691.

Pavlos Kassomenos, Spyros Karakitsios, Costas Papaloukas, Estimation of daily traffic emissions in a **South-European** urban agglomeration during a workday. Evaluation of several 'what if' scenarios, Science of The Total Environment, Volume 370, November 2006, Pages 480-490.

G. Lonati, M. Giugliano, S. Cernuschi, The role of traffic emissions from weekends' and weekdays' fine PM data in **Milan**, Atmospheric Environment, Volume 40, Issue 31, 13th International Symposium on Transport and Air Pollution (TAP-2004), October 2006, Pages 5998-6011.

R. Berkowicz, M. Winther, M. Ketzel, Traffic pollution modelling and emission data, Environmental Modelling & Software, Volume 21, Issue 4.

Jose M. Buron, Francisco Aparicio, Oscar Izquierdo, Alvaro Gomez, Ignacio Lopez, Estimation of the input data for the prediction of road transportation emissions in **Spain** from 2000 to 2010 considering several scenarios, Atmospheric Environment, Volume 39, Pages 5585-5596.

Jose M. Buron, Jose M. Lopez, Francisco Aparicio, Miguel A. Martin, Alejandro Garcia, Estimation of road transportation emissions in **Spain** from 1988 to 1999 using COPERT III program, Atmospheric Environment Volume 38, February 2004, Pages 715-724.

Roberto M. Corvalan, David Vargas, Experimental analysis of emission deterioration factors for light duty catalytic vehicles: Case study: **Santiago, Chile**, Transportation Research Part D: Transport and Environment Volume 8, July 2003, Pages 315-32[illegible]

Salvatore Saija, Daniela Romano, A methodology for the estimation of road transport air emissions in urban areas of **Italy**, Atmospheric Environment Volume 36, Issue 34, November 2002, Pages 5367-5383.

Scopus

- Over 200 citations to COPERT