

Statistics in focus

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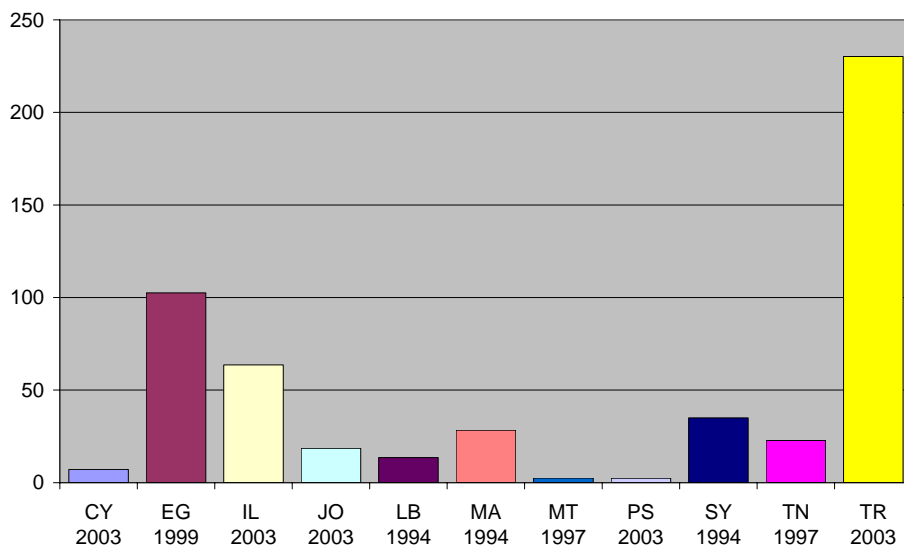
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Air pollutant emissions in the Mediterranean Partner Countries

Despite their demographic weight, the 12 Mediterranean Partner Countries (MPC) are modest contributors to global CO₂ emissions. However, since the mid 1990s, MPC emissions have increased on a par with those of the European Union (EU). In the Mediterranean, the main sources of emissions are industry and energy, as opposed to the EU, where emissions are essentially the result of the residential and transport sectors. The situation is very diverse for other types of pollutants: while industry has strived to reduce sulphur emissions, the increasing use of diesel fuel in the automobile fleet has led to significant increase in particle emissions.

Graph 1: CO₂ emissions in the Mediterranean Partner Countries (in millions of tons), latest year available



Source: Eurostat

Climate change and urban pollution are the main causes of air pollutant emissions. The impact of climate change is a global issue and its consequences on the Mediterranean are potentially significant: flooded delta zones, accelerated desertification, etc. Furthermore, the current strong development of energy and transport sectors, the main emitters of CO₂, may increase regional emission levels.

Although sulphur emissions have been recorded in the Mediterranean region, there is no evidence of acidification as in the case of Central and Northern Europe. On the other hand, nitrogen oxide emissions, tropospheric ozone precursors, are the cause of high urban pollution.

Urban pollution, caused primarily by the increasing number of automobiles, is a concern in view of its impact on the environment and human health.

Relatively moderate, but constantly increasing contribution of the 12 Mediterranean Partner Countries to world CO₂ emissions

At regional level, CO₂ emission levels in the Mediterranean generally remain much lower than those of the EU and of the world. The sum of the CO₂ emission of the MPC (excl. Algeria) for the latest available year accounts for less than 2% of the world CO₂ emissions and 13.4% of the EU-23 emissions (EU-23 is considered here as EU-25 less Cyprus and Malta which are included in the MPC aggregate). According to the latest available year, the total CO₂ emission of the 12 MPCs is 526.71 million tons (excl. Algeria) representing one eighth of the 1999 EU-23 total (3 922.75 million tons), for a population that is a little under half that of the EU-23.

CO ₂ Emissions	World (2003)	EU-23 (2000)	MPC (LYA)
Total (in million tons)	22 942.07	3 922.75	526.71
Per capita (tons/inhab./yr)	4	8.71	2.9

Sources: Population: NSO & New Cronos ; emissions: NSO & EEA for MT

The country share of CO₂ emissions is strongly correlated with demographic and economic weight. Turkey, for instance, is by far the strongest contributor, in absolute value, to the regional levels (231 million tons in 2003). Egypt, with a population of 63 million

inhabitants vs. Turkey's 67 million, emits half the emissions at 102 million tons in 1999.

There are two MPCs where levels exceed the European average of CO₂ emissions per capita: Israel with 9.50 tons/inhabitant/year in 2003, and Cyprus with 10.04 in 2003, versus the EU-23 average at 8.71 tons/inhabitant/year in 2000.

Since 1990, the absolute value of CO₂ emissions in the MPCs has increased steadily. In cases where long time-based series of data are available, strong increase of CO₂ emissions has been observed between 1990 and 2003: + 64% in Turkey, + 54% in Cyprus.

The strong economic growth of Cyprus is clearly revealed in the quasi-proportional increase of CO₂ emissions per capita. Similarly, in Turkey, the regular expansion of GDP is correlated with higher CO₂ emissions. The break in CO₂ emission series in Egypt, between 1990 and 1991, is the result of a change in calculation methodology. The drop in emissions recorded in Israel in 2003, can essentially be explained by the improvement of dump management and by the economic crisis.

Table 1: Trends of CO₂ emissions per capita (in tons/inhabitant/yr)

Country/ Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	8.10	8.07	8.73	8.97	8.81	8.64	8.94	8.90	9.46	9.30	9.67	9.44	9.62	10.04
DZ														
EG*	1.44	1.42	1.36	1.32	1.36	1.44	1.45			1.64				
IL							9.12				9.70			9.50
JO*					2.12	2.20	2.24	2.30	2.36	2.40	2.44	2.47	2.51	2.56
LB					4.67									
MA					1.09									
MT	6.27				6.51			6.61						
PS													0.64	0.69
SY					2.54									
TN					2.36			2.48						
TR	2.49	2.57	2.63	2.73	2.63	2.79	3.04	3.19	3.12	3.05	3.38	3.08	3.12	3.28

*Refers to the energy sector only. Egypt and Jordan report solely emissions from the use of fuels, i.e. CO₂ emissions from the CRF energy sector.

Source: Eurostat

Between 1990 and 2000, emissions increased by 3.01, 7.65 and 35.33 % respectively, in France, Italy and Spain. However, because MPCs are not bound to comply with the same constraints as regards the reduction of CO₂ emissions by 2010, they may potentially sell pollution rights to Northern rim countries,

under the Clean Development Mechanism. As a reminder, France is under the obligation to limit emission levels to those of 1990 at the latest by 2012, Spain is entitled to an increase of 15% compared with its 1990 level and Italy must reduce levels by 6.5% compared with the 1990 numbers.

Instruments of the Kyoto Protocol: an economic opportunity for MPCs

The Kyoto Protocol envisages three market-based "flexible mechanisms": emissions trading (ET), Joint Implementation (JI) and the Clean Development Mechanism (CDM, see http://unfccc.int/kyoto_mechanisms/items/2998.php). These are to allow industrialised countries to meet their targets through trading emission allowances between themselves and gaining credits for emission-curling projects abroad. JI refers to projects in countries that, too, have emission targets, and the CDM refers to projects in developing countries with no targets. The rationale behind these three mechanisms is that greenhouse gas emissions are a global problem and that the place where reductions are achieved is of less importance. In this way, reductions can be made where costs are lowest, at least in the initial phase of combating climate change.

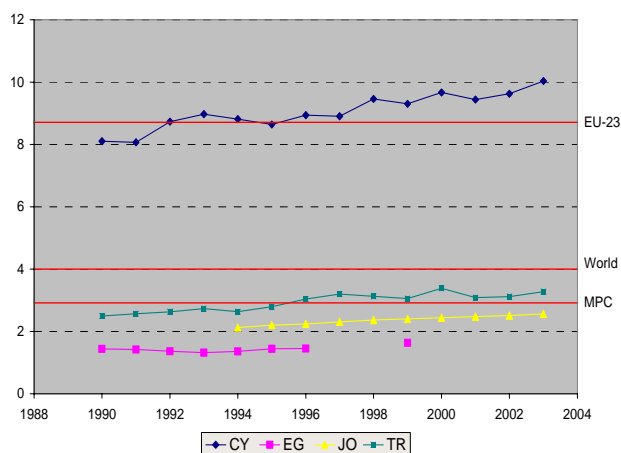
Basic principles of the CDM include the following:

- Developed countries invest in projects, which contribute to reduce greenhouse gas emissions in developing countries;
- Developing countries may undertake such projects independently;
- Such projects help modernize a given sector in the developing country, and contribute positively to the protection of global climate;
- Investments in developing countries may be credited to the emission reduction commitments of donor countries;
- Developing countries can sell the resulting emission credits to developed countries in the form of emission reduction units.

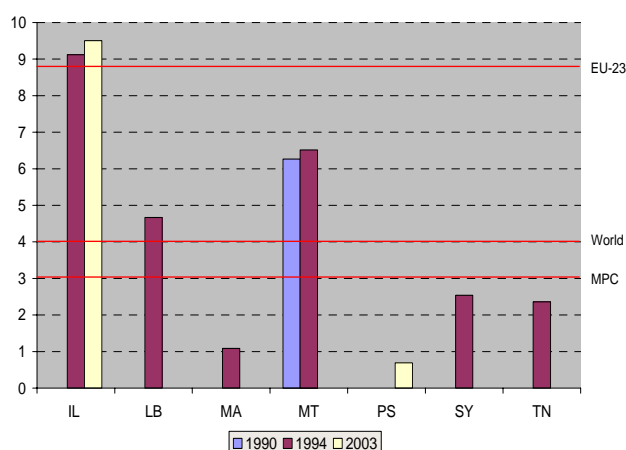
The CDM is accessible to host countries if they have ratified the Kyoto Protocol. In the Mediterranean, this is the case for DZ, CY, EG, IL, JO, MA, MT, TN, SY.

CO₂ emissions largely stem from fuel combustion for energy production and transport, as well as from industry insofar as it consumes fuels or uses emission-producing processes. In the MPCs, waste can also be a non-negligible source of CO₂ emissions, in view of the fact that it is often burned outdoors.

Graph 2.1: CO₂ emissions per capita (in tons/inhabitant/yr)



Graph 2.2: CO₂ emissions per capita (in tons/inhabitant/yr)



IL: 1996 instead of 1994

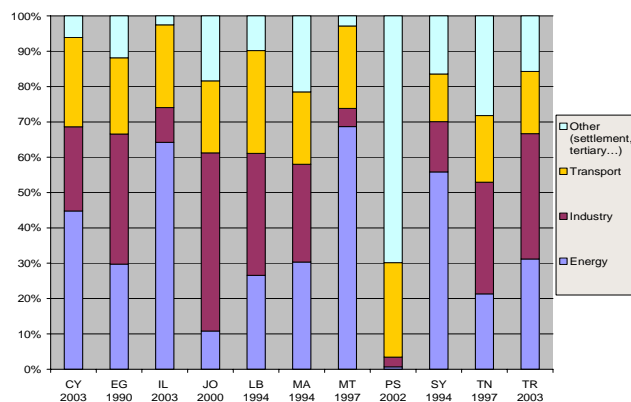
Source: Eurostat

Industry and energy: main polluters

In the European Union, the main sources of pollution are the residential and transport sectors, while in the MPCs, pollution from CO₂ emissions essentially stems from the industry and energy sectors. In some cases, this is due to difficulties in modernizing local industry, which is often supported by polluting sectors (such as phosphates, potassium and fertilizers in Jordan, the metal and petrochemical industry in Turkey, phosphates and petrochemicals in Egypt) or by a large energy industry (Syria). The significant levels of energy sector emissions in Malta and Israel result from the use of polluting fuels in electricity production. Two countries are "atypical" examples: Lebanon, where emission levels are closer to those of the EU, and the Palestinian Authority, where transport and residential are the most polluting sectors.

It is essential to consider transport, as in Jordan, where growth is expected to increase in the future, as potentially replacing the industry and energy sectors.

Graph 3: Country sectoral share in CO₂ emissions (in %), last year available



Source: Eurostat

In this graph, CRF sector emissions (see Methodological Notes) for manufacturing industries and industrial processes have been aggregated under « Industry », excluding biomass and international bunkers.

Stabilization of SO₂ emissions through industrial sector efforts

Table 2: Trends in total SO₂ emissions (in 1000 tons)

Country/ Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	46.20					40.10	45.40	47.20	48.80	51.30	52.75	48.30	50.68	45.43
DZ						49.21								
EG														
IL						286.50	282.49		256.00	315.14	272.52	237.73	222.92	226.34
JO														
LB					82.99									
MA					295.00		237.00							
MT	6.07				15.79			33.22						
PS														
SY	354.00				367.00									
TN					77.86			78.68						
TR						1093.75	1202.55	1266.15	1395.98	1366.28	1381.08	1358.13	1037.75	753.74

Source: Eurostat

Fossil combustion produces SO₂ and NO_x emissions, the content of which depends on fuel heat-producing characteristics, chemical structures and sulphur content.

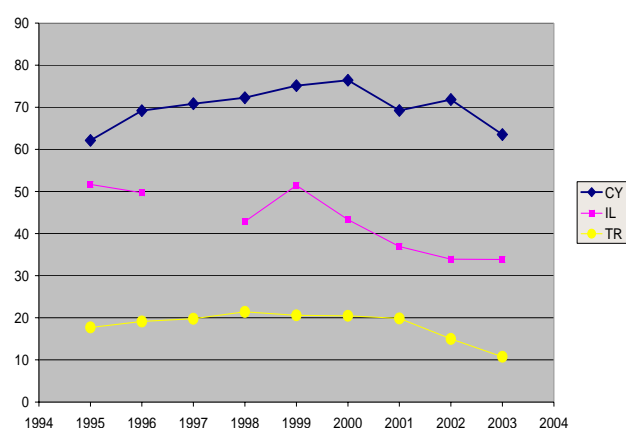
The industrial combustion of fuels where sulphur content is still high, produces sulphur oxide emissions.

Three countries show SO₂ emission levels above 20 kg/yr per capita: 88.8 kg/inhabitant/yr in Malta in 1997, 63.5 in Cyprus in 2003 and 33.8 in Israel in 2003. In these three countries, the very high sulphur dioxide emission levels can be explained by the use of high sulphur content fuels in the production of electricity; to a lesser extent, this is also true in Turkey (10.7 kg/inhabitant/yr).

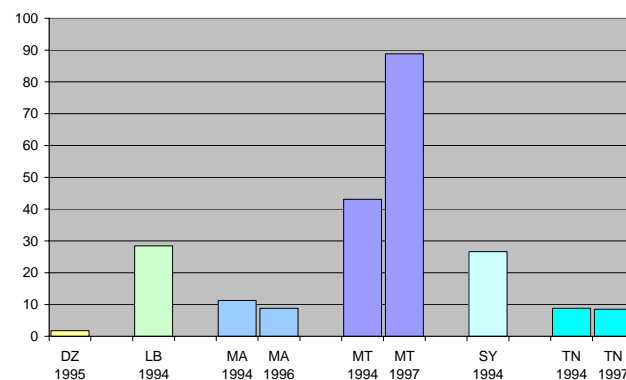
Such emissions must be carefully monitored as they are not only responsible for soil acidification and eutrophication, but also strongly impact human health, by causing bronchial inflammation and pulmonary diseases.

When available, time series reveal a levelling, and even a reduction in sulphur dioxide emissions, after a decade of strong demographic and/or economic growth in most of the countries involved. This is specifically the case for Turkey, where levels dropped considerably in 2003 (-27% as compared to 2002), and Cyprus (-10%).

Graph 4.1: SO₂ emissions per capita (in kg/inhabitant/yr)



Graph 4.2: SO₂ emissions per capita (in kg/inhabitant/yr)



Source: Eurostat

Highly contrasted situation for NO_x emissions

Table 3: Trends in total NO_x emissions (in 1000 tons)

Country/ Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	18.10					18.70	20.80	20.80	21.60		21.63	21.40	22.21	20.88
DZ						179.54								
EG	33.02													
IL	145.60						219.90				236.64			219.35
JO					79.40	83.10	86.30	90.20	94.00	97.60	101.30	105.10	108.90	113.70
LB					54.11									
MA					152.00									
MT	16.88				16.30			10.00						
PS							11.66						11.09	19.37
SY	74.55				94.50									
TN					68.45			76.35						
TR	633.37	638.50	657.34	736.88	721.67	770.36	842.09	849.72	830.66	847.09	920.11	873.35	895.00	941.03

Source: Eurostat

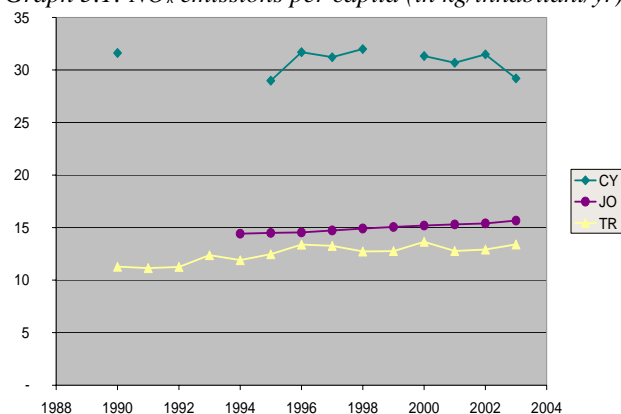
Emissions of nitrogen oxides (NO_x) are highest in the transport sector. Despite the progress made by automobile manufacturers, the trend towards increased NO_x emissions remains strong in the region, due to both an ageing fleet and heightened motorization (+ 4.5% per year between 1984 and 2000 for the region – figures excluding Jordan and Palestinian Authority, according to the International Road Federation).

Conversely, in Malta and Israel, massive imports of vehicles under European and/or American standards explain the recent drop recorded for NO_x emissions, at – 38% between 1997 and 2003 for Malta, and – 12% between 2000 and 2003 in Israel.

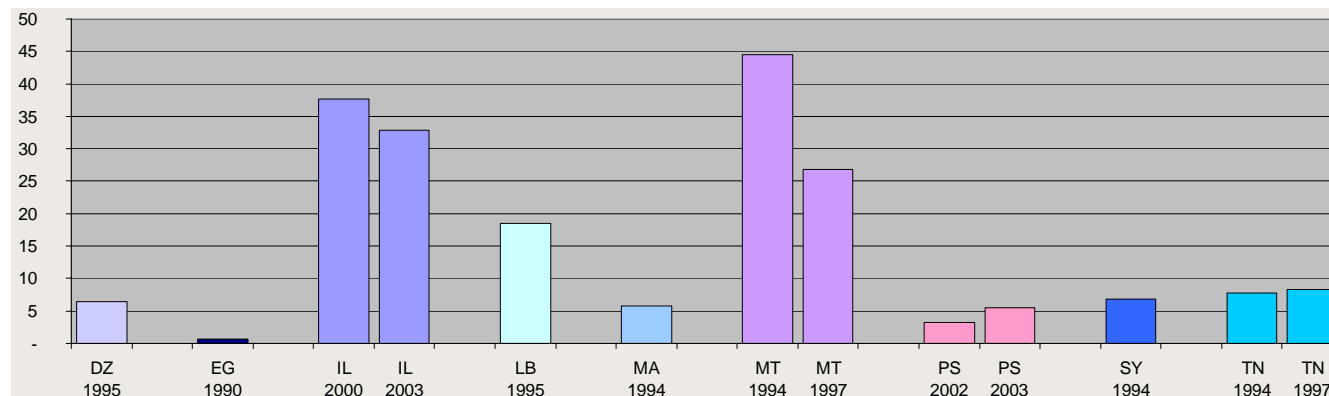
In Jordan, NO_x emissions have significantly increased (+ 43% between 1994 and 2003) due to the industrial infrastructures and the growing fleet of vehicles. In the Palestinian Authority, the automobile factor is the main source of emissions. Turkey has recorded strong increases in NO_x emissions since 2000, essentially due to the fact that the automobile sector has not yet

fully implemented the new technologies enabling better control of emissions.

Graph 5.1: NO_x emissions per capita (in kg/inhabitant/yr)



Graph 5.2: NO_x emissions per capita (in kg/inhabitant/yr)



Source: Eurostat

Air Quality: local pollution

Road transport is the essential reason behind emissions, which jeopardize human health, and are found at high concentrations in urban areas. Progress has been recorded, but the ban on leaded fuel has not been applied in all MPCs.

Leaded fuel therefore remains the most popular fuel in Syria, Lebanon, Jordan, Tunisia, Morocco and Algeria (according to Emissions Controls Associations, 2003). Leaded fuel was banned in Cyprus as early as 1992, followed in 1999 by Egypt, and in 2003 by Israel. Lebanon and Tunisia have banned leaded fuel in all new vehicles since 2002.

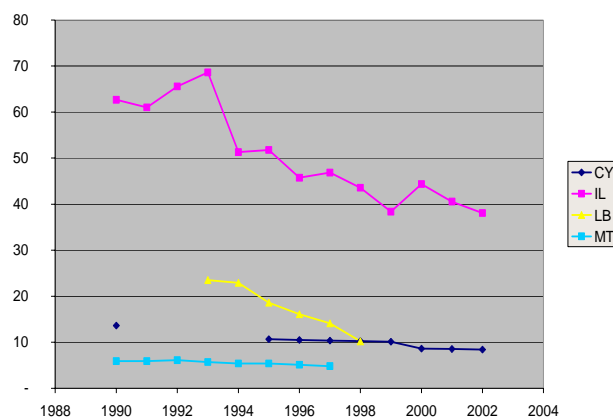
In Cyprus, the share of unleaded fuel in global fuel consumption has gone from 0 to 7.07% between 1990 and 1995 to reach 59.43% in 2000 (Statistical Abstract of the Republic of Cyprus 2001) and from 4.11% in 1995 in Malta to 41.05% in 2000 (NSO News Release May 2004).

The use of unleaded fuel, albeit limited, has led to significant drops in lead emissions.

The drop in lead emissions is quite significant in the four countries for which time series are available: - 38% between 1990 and 2003 for Cyprus, - 39% for Israel over the same period,

- 57% between 1993 and 1998 for Lebanon, and - 20% between 1990 and 1997 for Malta.

Graph 6: Per capita lead emissions from transport (in g/inhabitant/yr)



Sources: Mediterranean National Statistics Offices

Growing diesel-fueled fleets

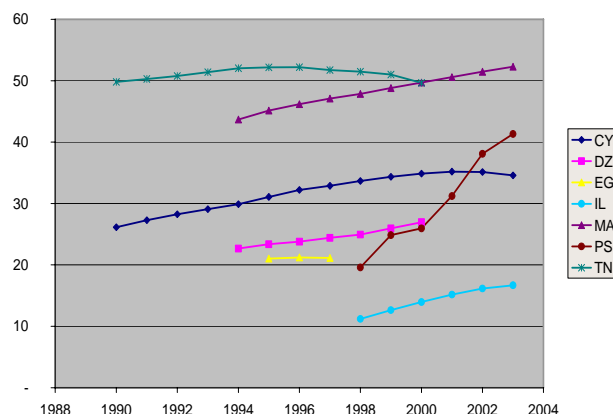
Diesel fuel decreases emissions of traditional pollutants (CO, CO₂, SO₂, NO_x) but releases high concentrations of particles categorized according to size (PM 10, PM 2.5). These particles jeopardize health and cause respiratory and cardiovascular diseases. And yet, in the MPCs, the use of diesel fueled vehicles is more and more frequent.

Available data show that in all MPCs, the number of diesel fueled vehicles has significantly grown with the exception of Tunisia where the use of diesel has been levelled (albeit at the extremely high level of 50% of the total fleet). In Morocco, for instance, since 2001, the fleet is predominantly diesel powered (52% in 2003). In the Palestinian Authority, the use of diesel fuel has grown from 20 to 42% between 1998 and 2003, and from 11 to 17% in Israel for the same period.

In countries where recent (2003) data is available, Israel (17%) and Cyprus (35%) show the lowest rates for diesel. Both countries show a high penetration rate for unleaded fuel, due to imports of vehicles under European and/or American standards.

The use of diesel increases particle emissions and concentrations are becoming significant in many Mediterranean cities.

Graph 7: Share of diesel in vehicle fleets (in %)



Sources: Mediterranean National Statistics Offices

➤ ESSENTIAL INFORMATION – METHODOLOGICAL NOTES

General Information:

The policy of the European Union towards the Mediterranean region is applied according to the framework of the Euro-Mediterranean Partnership (known as the Barcelona Process) created after the 1995 Barcelona Conference.

In the field of statistics, European Union Member States and Mediterranean partners have been able to intensify relations through MEDSTAT, the regional statistics cooperation program. Mediterranean Partner Countries (MPC) include Algeria (DZ), Egypt (EG), Israel (IL), Jordan (JO), Lebanon (LB), Morocco (MA), Palestinian Authority (PS), Syria (SY), Tunisia (TN) and Turkey (TR). Because the project is on-going, Cyprus (CY) and Malta (MT) are still included within the MPCs.

This program is funded by the European Commission (MEDA Funds). Eurostat is in charge of technical monitoring to support Statistics Offices in Mediterranean Partner Countries in the development of their Statistics Information Systems.

To facilitate environmental statistics management, a regional database was developed and is used by the Mediterranean National Statistics Institutes. The database can manage metadata and footnotes, essential to environmental statistics. Data is collected through the joint Eurostat/OECD questionnaire, modified and adapted to the Mediterranean context.

This issue of «Statistics in Focus» is dedicated to one of the three priority issues, air pollutant emissions, of the second phase of the MEDSTAT-Environment sub-program, which covers as well biodiversity statistics and sustainable development indicators. The Plan Bleu is in charge of the implementation of the project for the period 2003 - 2006.

Definitions:

Greenhouse gas (GHG)

These are gases, present in the atmosphere in trace quantities, which, due to their infrared absorption capacity, modify the global radiative and thermal balance. Main gases include: CO₂ (nearly 80% of emissions responsible for climate change), CH₄, N₂O, halogenated hydrocarbons, SF₆.

CO₂ = carbon dioxide

Most CO₂ emissions are produced by fossil fuel combustion (heat treatment plants or automobile vehicles).

SO₂ = sulphur dioxide

Most SO₂ emissions stem from the use of sulphur fossil fuels (coke, lignite, petrol ore, heavy diesel, domestic fuel, diesel).

NO_x = nitrogen oxides

Nitrogen oxides (NO_x) mean nitric oxide and nitrogen dioxide, expressed as nitrogen dioxide. These are produced by the combustion of fossil fuels and in industrial processes, such as nitric acid production, fertilizer production and surface treatments. Nitrogen oxides also play a role in the formation of photo-chemical oxidants and indirectly increase the impact of greenhouse gases.

N₂O = nitrous oxide

N₂O emissions essentially result from the use of fertilizers in agriculture and from incomplete combustions in industrial or energetic processes.

CH₄ = methane

United Nations Framework Convention on Climate Change (UNFCCC)

Since 1992, under this UN Convention, experts and decision-makers can work together to reduce greenhouse gas emissions.

Convention on Long-Range, Transboundary Air Pollution (CLRTAP)

Created in 1979, within an enlarged Europe, this convention measures and prevents acidification and eutrophication. It includes the EMEP programme (Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air pollutants in

Europe), whose main objective is to regularly provide Governments and subsidiary bodies under the LRTAP Convention with qualified scientific information to support the development and further evaluation of the international protocols on emission reductions negotiated within the Convention.

(http://www.emep.int/emep_description.html)

Methodology applied in Mediterranean countries to assess pollutant emissions:

Most countries use the methodology recommended by the Intergovernmental Panel on Climate Change (IPCC) of the Climate Convention and apply the 1996 version of the IPCC methodological guide (www.ipcc.ch). Under article 5 of the Kyoto Protocol, all countries party to the protocol must, by 2007, have developed national systems for an inventory of emissions and removals. The Protocol does not clearly specify the definition of a national system, but in practice covers 3 elements:

- An institutional framework (the organization or organizations in charge of preparing the inventory, presentations to political decision-makers, available financial and human resources, regulatory framework, harmonization between IPCC inventory and potential national inventories prepared with other methods, etc...);

- The description of the inventory development process and relevant data collection;

- The description of inventory assessment procedures.

The IPCC methodology enables comparison of country-to-country results and is updated every 5 years. This signifies that MPCs will need to quickly examine emission factors and relevant models, to remain compliant with Climate Convention commitments. Most MPCs establish greenhouse gas inventories directly derived from the energy balance and do not include CO₂ emissions stemming from changes in land use (forestry in particular) or N₂O and CH₄ emissions from agriculture and waste dumps.

The air pollutant emissions data provided by the MPCs are reported according to the Common Reporting Format (CRF). The CRF categorizes gas emissions in 6 areas: energy, industry processes, solvents, agriculture, land use (net balance between sources and sinks) and waste. The energy sector (main pollutant sector for most of the MPCs) refers to energy industries (mainly production of electricity), manufacturing industries, transport and other energy sectors not otherwise specified.

State of the Kyoto Protocol Accession/Ratification by the MPC

DZ	CY	EG	IL	JO	MT	MA	SY	TN
02/2005	07/1999	01/2005	03/2004	01/2003	11/2001	01/2002	01/2006	01/2003

Data Sources:

CY: Statistical Service of Cyprus;

DZ: Office National des Statistiques

EG: Central Administration for Public Mobilization and Statistics

IL: Central Bureau of Statistics

LB: Administration Centrale de la Statistique

JO: Department of Statistics;

MA: Direction de la Statistique

MT: National Statistics Office

PS: Palestinian Central Bureau of Statistics

SY: Central Bureau of Statistics

TN: Institut National de la Statistique;

TR: State Institute of Statistics

EU 23 : Belgium, Czech Republic, Denmark, Germany, Estonia, Greece, Spain, France, Ireland, Italy, Latvia, Lithuania, Luxembourg, Hungary, Netherlands, Austria, Poland, Portugal, Slovenia, Slovakia, Finland, Sweden, United Kingdom.

Further information:

Data:

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