

European Topic Centre on Air Emission

**RECOMMENDATIONS FOR REVISED DATA
SYSTEM FOR AIR EMISSION INVENTORIES**

By

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INTRODUCTION

The Topic Centre for Air Emission Inventory (ETC/AEM) of the European Environment Agency (EEA) is in charge to prepare the European air emission inventory system accordingly to the multi-annual work programme for 1994-1999 projects SA1 (Air emissions-general approach and assessment) and SA2 (Air emissions inventories '90 and '94).

In a first step, the ETC/AEM has produced a report on the review of CORINAIR 90 and proposals for air emissions '94 which points out short term requests as well as medium or long term needs.

The present paper deals with the logical continuation of ETC/AEM tasks which consists to provide recommendations for revised data model.

1 - CURRENT CORINAIR 90 SYSTEM

The current CORINAIR 90 system is a conspicuous milestone on the road of Air Emission Inventories in Europe.

It results of developments in the frame of the CORINE programme. A first generation was provided to compile the EC emission inventory for 1985 (CORINAIR 85) and the current second generation used for CORINAIR 90 emission inventory now under responsibility of the EEA (1).

1.1 - The four dimensions

The CORINAIR system is based on the four dimensional aspects which need to be specified according to objectives of each inventory.

- Substances

CORINAIR 90 dealing mainly with acidification, photochemistry and greenhouse effects, the selected substances have been SO₂, NO_x, NMVOC, CH₄, CO, CO₂, N₂O and NH₃.

The split of some substances in different species (i.e. VOC's) had been identified as a relevant need but not considered as a priority.

- Emitters

More than 240 emitting activities are defined in the Selected Nomenclature for Air Pollution (SNAP). Emitters correspond to relevant combinations of SNAP activity + fuel (for energy related activities) + supplementary rubric (optional).

Fuels are defined in NAPFUE and rubrics are free for more split by producers of inventories.

Main emitters are classified as Large Point Sources (LPS) according to specifications to be adapted with inventory objective. Individual information is collected for LPS.

Remaining emitters are classified as Area Sources (AS) for which activity rates and emission factors are requested.

The general formula used is :

$$E = \sum [A_{i,f,r} \times EF_{i,f,r,p}]$$

where E is the total emission for a pollutant p

A_{i,f,r} is a representative value of the activity i

EF_{i,f,r,p} is the emission factor assigned to activity i fuel f, rubric r and pollutant p.

For LPS, emissions are determined either from direct emission estimations (measurement, balance, or from calculation by the mean of emission factors).

- Géographical resolution

CORINAIR 90 is based on administrative territorial units defined by EUROSTAT (NUTS levels 0 to III or equivalent for non EU countries) because statistics are generally more available at this scale than at any grid square. Moreover, this resolution fits fairly well with modelers needs in Europe.

Nevertheless, a lot of air emission inventory requests deal mainly with the national level only.

A special allocation procedure involving socio economical data (e.g. population, area, employment, number of houses, ...) is provided to perform activity rate estimation at territorial units levels for which the requested data are not available.

- Time

There is interest for high time resolution (e.g. modelization of photochemistry) but such figures can be more easily produced from an annual basis which fits with most of mains uses of air emission inventories.

1.2 - Processing overview

The CORINAIR 90 system is described in figure 1 and includes the following steps :

- National/producer level definitions/specifications for source categories, fuels, territorial units, pollutants, LPS, surrogate data, units, ...
- Collection of data (activity rates, emission factors, fuel characteristics, LPS information, comments, surrogate data, ...)
- Data treatment (allocation procedure, emission calculation, checking)
- Each national database is examined by the CORINAIR Technical Unit for checking on consistency and completeness. Analysis of emission factors discrepancies enables to detect irrelevant figures and to help to increase their relevancy.
- All validated national databases are transfered to the EEA ORACLE System and constitute the centralized CORINAIR database
- Outputs such as reports, maps, databases, ...are produced

It is to be noticed that bottom-up and top-down approaches are used respectively for large point sources and area sources allocation.

Practically, two approaches are used (cf figure 2) :

- One for countries who export data from their national specific system to CORINAIR database (Dbase format). When the national system does not cover all data requests, the CORINAIR software may be used for completion of the database.
- Other countries use the CORINAIR software to achieve their CORINAIR emission inventories.

Figure 1 - Structure of CORINAIR 90 system

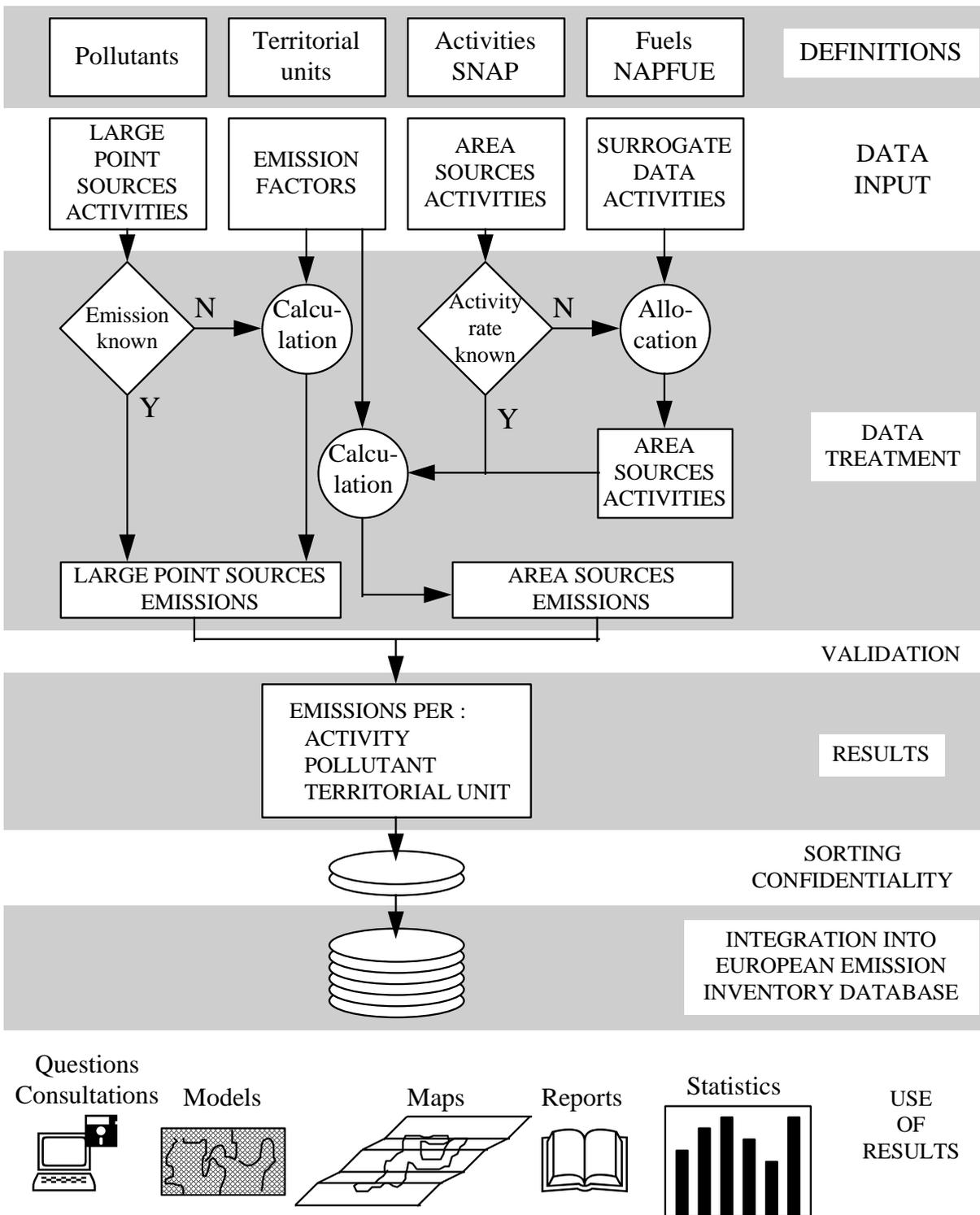
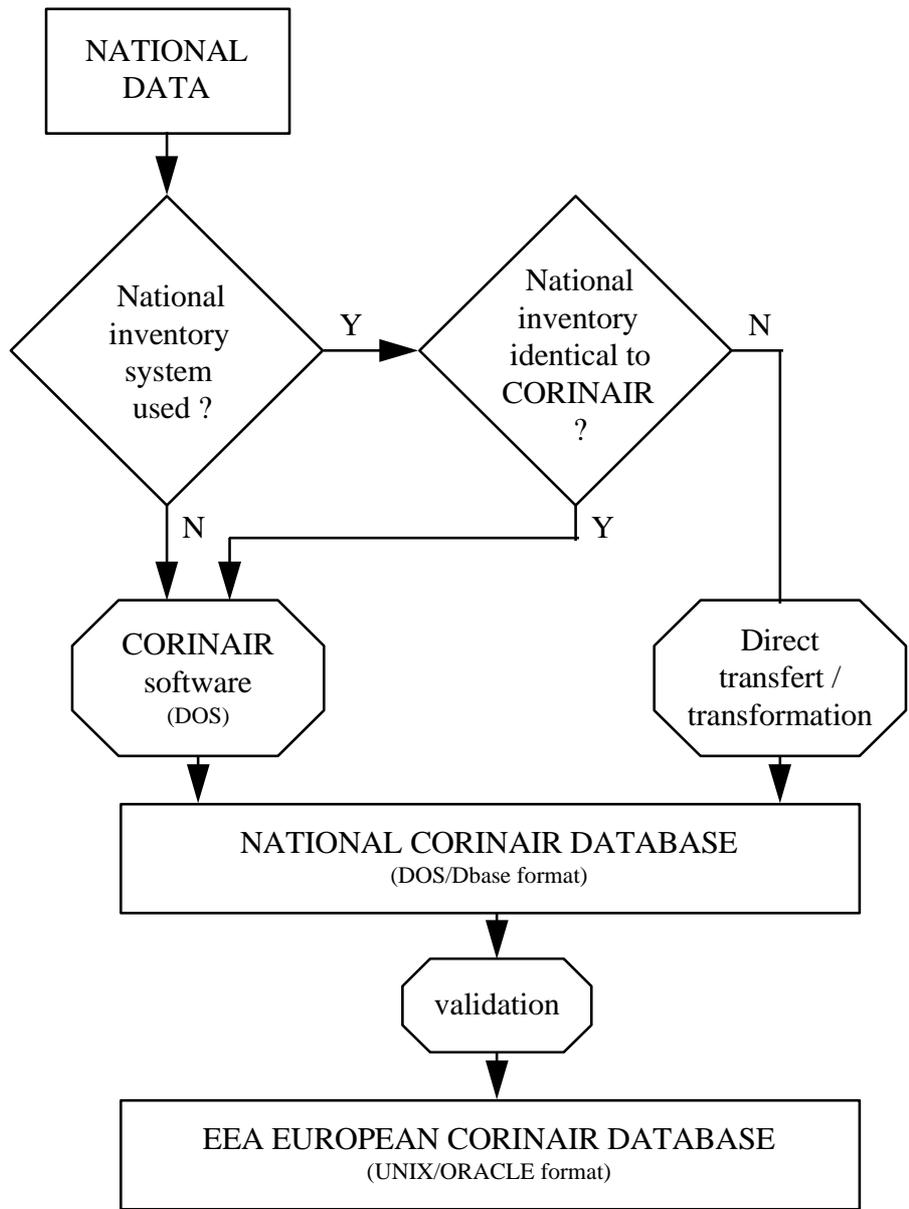


Figure 2 : Approaches for achieving CORINAIR 90 inventory



1.3 - Tools of CORINAIR 90 system

Different tools have been developed to reach objectives of CORINAIR 90 inventory :

- set of common definitions and specifications (SNAP, NAPFUE, pollutants, LPS),
- Handbook of Emission Factors in order to help producers of emission inventories. This handbook is changed in a more structured Guidebook which will be available in mid 1995 (EMEP/CORINAIR Guidebook),
- software allowing to store, to manage inventory data and to provide emission estimations by each producer (2),
- validation routines for various checkings,
- routines for data transfer from DOS/Dbase platform to UNIX/ORACLE platform, due to some differences in data dictionaries (2) (3) and difference of platforms,
- CORINAIR/IPCC interface,
- procedure for allocating emissions from administrative territorial units to EMEP grid.

1.4 - Data in CORINAIR 90 system

Data are classified according to the following understanding (4)

Essential. This is the most important information that must be included in any inventory produced by the EEA.

Desirable. These data items should be included but their priority is lower. These are items that will become available on a longer time frame. For example, the full documentation of an inventory is required but can be published after the results become available.

Useful. Some items of data would be useful to have but are not necessary to the overall project. For example, all the details of a power plants boilers are not needed at the European level and so this data would be useful but not essential or desirable.

DEFINITION/REFERENCE DATA

| | | |
|--------------------------------|-----|---|
| Pollutant | F | essential |
| SNAP | F | essential |
| NAPFUE | F | essential |
| Fuel characteristics | N | useful (depending on producers) |
| Annex rubric | N | desirable |
| Elementary area activity | N | essential |
| PoActivity group | F | essential |
| Territorial unit | F/N | essential |
| Surrogate data | N | essential or not used (depending on approach) |
| Control device | F | useful |
| Estimation method | F | useful |
| Unit | F | essential |
| Mass unit conversion | F | essential (data system) |
| Comment, source of information | N | desirable |
| Surrogate relations | N | essential or not used (depending on approach) |

F = forefilled

N = not forefilled

COLLECTED OR ESTIMATED DATA

GENERAL

- data quality indicators desirable
- comments and sources of information desirable
- confidentiality indicators essential

AREA SOURCES

- activity unit essential
- emission factor essential
- activity rate essential
- activity unit ratio between reference unit and used unit essential
- surrogate data rate essential when allocation procedure is used

LARGE POINT SOURCES (LPS)

- identification data (LPS code, T.U., coordinates...) essential
- estimation method, efficiency of control device useful possibly desirable for some users
- emission rate essential when emissions are directly known (measurements, ...)
- activity rate and unit essential when use of emission factors or for some outputs (IPCC); desirable in other cases
- emission factor essential when use of emission factors otherwise not used
- fuel consumption essential for some outputs (IPCC) and calculation facilities ; otherwise desirable
- basic fuel emission factor essential for some outputs (IPCC) and calculation facilities ; otherwise desirable
- fuel LHV essential for some outputs (IPCC) and calculation facilities ; otherwise desirable
- Stacks characteristics (height, flow rate, ...) useful, possibly desirable for some users
- other characteristics (nominal capacity, starting year, working time) useful
- LCP Directive data (plant statute [existing/new], corrected thermal capacity ...) essential for some outputs (LCPD)

OUTPUT DATA

The system enables outputs of following kinds of data :

- reference definition data
- data collected
- data estimated by software process (activity rates estimated by the use of surrogate data)
- emissions processed by the software which are obviously essential

2 - GOALS AND INVENTORY BACKGROUND

The aim is to produce a methodology and a system allowing to satisfy all European needs on air emissions inventories.

At present, the following has been identified as major activities and legal instruments requiring air emissions reporting :

- EEA needs of the Workprogramme.
- UNECE Long Range Transboundary Air Pollution Convention.
- EMEP model.
- PARCOM and HELCOM.
- EU CO2 monitoring mechanism.
- EU Large Combustion Plant Directive.
- EU VOC Directive (to be confirmed).
- UN Framework Convention on Climate Change.
- and eventually other needs relating to economical, modelling, national and local considerations, air quality, integrated emission inventory, ...

Most of these requests include different specifications in term of substances, source sectors, geographical coverage and resolution, temporal aspects. Generally a short delay is requested for reporting (6 to 12 months).

To overcome the current mismatch between political and technical time constraints the ETC/AEM recommends to consider progressive steps which correspond to the following groups of data (4) :

- Group 1 :** (within six months) provisional estimations of national total emissions for a first batch of pollutants (i.e. CO2) relating to the previous year.
- Group 2 :** (within six next months) estimations of national level emissions by relevant source sectors of requested pollutants.
- Group 3 :** (within the second year) final data of national level emissions by relevant detailed source sectors of all pollutants in turn.
- Group 4 :** (within the second year but every 4 years) spatially disaggregated emissions at level NUTS III or equivalent.

As far as objective, reliable and comparable information is requested, the system has to be aware of completeness, consistency and transparency of data.

There is a clear similarity between these criteria and the concept developed within the CORINAIR project since 1986. The EEA has also inherited of the CORINAIR system developed in coordination with UNECE.

That is why recommendations are based on the gains from the CORINAIR experience (inventories of 1985 and 1990) and take into account specificities deriving from requests described above, especially those not included or partially included in CORINAIR 90.

Among the new items to be considered, the main ones :

- Facilities to speed up inventory achievement, and management of different inventory stages (national level inventory every year and detailed inventory, as CORINAIR 85 and 90, with a convergence process). Therefore, the system will enable to satisfy time delay of international requests on air emission inventories. This item deals especially with key questions on data model or processing of the system and should take into account the various national specificities.
- PARCOM and HELCOM : adaptation to achieve emission inventories for heavy metals and persistent organic compounds.
- IPCC : adaptation to get a more complete and relevant compatibility.
- Energy balance : in relation with IPCC needs and other demands as well as for a better quality of inventories.
- EMEP and LCPD : improvements for better management of information requested.
- Integrated Emission Inventories : first reflexions.
- EU VOC directive : data requested (if specifications are made available in due time).
- Software facilities : introduction of default emission factors, more relevant database/operator interfaces, windows version, network version, other improvements.
- Data dictionary and platform : use of a single data dictionary as well for individual CORINAIR databases as the centralized EEA database whatever the platforms could be (e.g. PC/DOS - xbase and UNIX/ORACLE).
- General usability of data : selected actions should contribute to increase the possible range of applications by facilitating the ease of access and the ease of use. Among these actions are met kind and structure of information, creation of specific outputs as well as non technical actions (concertation producers-users, harmonization of methods, ...).

3 - GENERAL CONSIDERATIONS ON REVISED DATA MODEL

This chapter presents a general reflection on air emission inventories corresponding to existing, short, medium or long development terms.

3.1 - Substances

Substances for which emission estimations must be provided derive from those concerned by requests listed in section 1.

USER

DESIGNATION POLLUTANTS

| | |
|--------------------|---|
| UNECE/EMEP | SO ₂ , NO _x , NMVOC, CH ₄ , CO, NH ₃ |
| PARCOM-ATMOS | HEAVY METALS As Arsenic Cd Cadmium Cr Chromium Cu Copper Hg Mercury Ni Nickel Pb Lead Se Selenium Zn Zinc |
| POPs | HCH hexachlorocyclohexane PCP pentachlorophenol HCB hexachlorobenzene TCM tetrachloromethane TRI trichloroethylene PER tetrachloroethylene TCB trichlorobenzene TCE trichloroethane DIOX dioxins and furans PAH Polycyclic Aromatic Hydrocarbons |
| IPCC | NO _x , NMVOC, CH ₄ , CO, CO ₂ , N ₂ O and to be defined more precisely (SO _x , HFCs, PFCs, SF ₆) |
| EU LCPD | SO ₂ , NO _x |
| EU CO ₂ | CO ₂ |

3.2 - Emission generating activities (for long term development)

The reflection is based on a similar concept which has been used for the ACCOR nomenclature developed in the spirit of integrated emission inventory.

The concept of activity is based on four complementary components.

Any source of pollutant can be expressed as :

belonging to one **economical sector** specified by **operations**, using **machines/technologies** generally involving **commodities** (e.g. products/fuels).

Each of these four components may be more or less split as shown on figure 3.

This approach which includes potentially elements to satisfy a lot of needs, can be implemented practically by different ways to be examined further in details. Nevertheless in front of the increase of information to handle, it will be necessary to prioritize some of them.

Moreover, changes in emission generating activities need to be :

- agreed on a common basis which fits as far as possible with all national specificities and practices,
- in accordance with available data. When absolutely necessary, it should be recommended to make available some information,
- aware of different requests which imply to consider the minimum common level of details, that is always more detailed than any of individual requests.

Consequently, it is recommended to introduce changes in emission generating activities definition and structure cautiously and progressively.

As basis for further consideration, there is the following formal proposal from the expert panel on projection.

$$E = \sum_{i,j,k} [A_{i,j,k} \cdot [\sum_l F_{j,k,l} \cdot P_{i,j,k,l}]]$$

with E total emission for one pollutant
 A activity rate
 F emission factor
 P fraction of sector, activity, fuel and technology
 i economic sector
 j source type
 k fuel type
 l technology type (including control device)

3.3 - Types of sources

Emission generating activities can be split in different source types :

- Large point sources (LPS) which correspond to actual or potential large emitters.

Such sources must be investigated on an individual basis in order to :

- . satisfy some requests (e.g. Large Combustion Plant Directive, modellers, ...)
- . increase the accuracy of inventories.

The definition of LPS is provided in section 4.2.3 and annex 3.

It is to be noticed that some LPS are sometimes extended sources (e.g. international airports).

- Medium or small point sources which correspond to other point sources generally investigated on an extended geographical scale.
- Extended area sources (landfill, swamps, rice cultivation, ...).
- Mobile sources which can be split in :
 - . linear sources (highways, main roads, inland traffic, air or marine traffic, etc...)

. "Brownian" sources (urban/local traffic).

Data model of these types of sources :

Large point sources are treated on an individual basis.

Sometimes medium sources need to be treated individually (e.g. some Large Combustion Plants) but generally medium and minor sources are aggregated with extended area sources and "Brownian" mobile sources within so called area sources relating to more or less extended geographical zones.

Linear sources have not been considered specifically in CORINAIR until now but included in area sources.

While LPS emission are estimated either generally from specific data (measurements, mass balance, specific emission factor, ...) or sometimes with general emission factor, area source emissions are generally estimated from average emission factors.

3.4 - Spatial and time resolution

The spatial resolution depends on the goals previously defined and differs considerably when interest focuses on local air pollution or deals with national figures.

With regard to needs expressed in section 1, the national level is mainly requested. Nevertheless, EMEP needs data by a 50 x 50 km grid squares. Most countries provide also periodically figures spatially disaggregated.

As previously demonstrated in CORINAIR, statistical data are generally available at administrative territorial units levels and moreover estimations on this pragmatical basis are of interest. These data can be allocated to various cells (i.e. EMEP but also GEIA, LOTOS, ...) by using relevant keys.

It is recommended to maintain the geographical resolution based on territorial units defined by Eurostat NUTS level III. They correspond fairly well to needs expressed by different users (e.g. modelling groups) at the European scale and constitute a manageable harmonious combination of about 1300 units for EU-15 and 1800 units for 28 countries providing CORINAIR 90 data.

Both levels (national and spatially disaggregated) will be considered. The spatially disaggregated data being provided periodically only in accordance with EMEP periodicity (at this time every four years).

With regard of all international requests described in chapter 1 emission need to be estimated every years at national level.

3.5 - Energy balance

It is recommended to include national energy balance facilities (which was not included in previous CORINAIR 90 system) :

- to improve the consistency of the emission estimates
- to facilitate the achievement of inventories
- to speed up CO₂ emission estimation
- to get a better compatibility with IPCC format and to facilitate the CORINAIR/IPCC conversion.

The energy balance can be made for more or less detailed fuel types according to available statistics. It is to be noticed that international statistics (e.g. EUROSTAT) are available for a large number of (European) countries on a consistent basis by more than 20 different fossil fuel types.

Moreover, a split by main economical sectors should be requested.

3.6 - Overview of air emission inventory model

The air emission inventory model is based on the relevant arrangement of different specific modules which have to fit with different kinds of needs/qualities :

- annual national level data
- periodical spatial level data
- individual large point source data
- transparency
- quality assurance.

Each module includes all or some of the following elements :

- data management procedures
- calculation procedures
- functions insuring convergence or split of data.

As far as the geographical resolution of the inventory is on one hand the national level and on the other hand a finer territorial unit (e.g. NUTS level III), two different approaches are used :

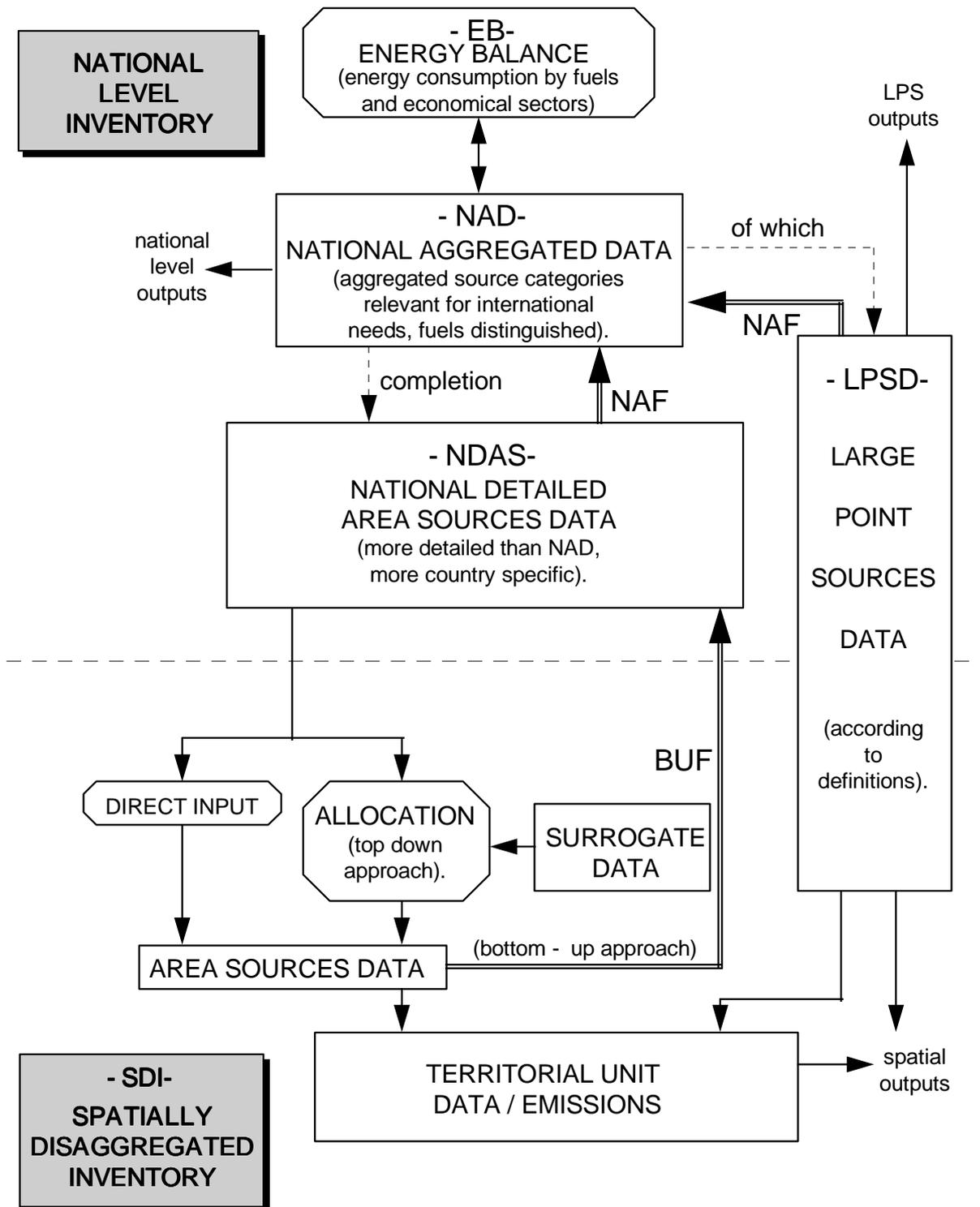
- some national systems or source activities only have data at national level which must be spatially allocated using surrogate data (top-down approach),
- other national systems provide data (activity, emission factors, point source data) on a local basis which can be aggregated up to national level (bottom-up approach).

Generally, both approaches are mixed and the air emission model must allow to use them.

3.6.1 - Description of components

The description of the model is given below, the figure 4 presents the corresponding flowsheet which is very useful to have a complete overview especially concerning the links between the different modules. Application is described in section 3.6.2.

Figure 4: Overview flowsheet of air emission inventory model.



National aggregated data (NAD) (not existing in CORINAIR 90)

Function of NAD :

to store aggregated data (activity rates, fuel/energy consumption, emission factors and emissions) at national level by source categories.

It is generally easier and quicker to use global figures than area and individual large point sources figures, to provide national estimations ; namely, aggregated source level instead of area and

large point sources levels. Nevertheless, a detailed approach must be also practicable for national estimation.

Relation with other components : with energy balance (EB)
 with national detailed area sources (NDAS)
 with large point sources data (LPSD)

The relevant source categories considered here correspond to "emission generating activities" (discussed in section 3.2). They are based on a more or less detailed level of each of the four components of emission generating activities, in such a way that all international needs may be satisfied. These "emission generating activities" have attached aggregated emission factors for calculating the emissions.

For energy related activities the fuel component is necessary (e.g. NAPFUE or equivalent). The fuel split has to be at least the same or possibly more detailed than the energy statistics fuel split considered in EB. In the same way the sector activity split in NAD has to be the same or to be more detailed than the sector split used for energy statistics in EB.

NAD module enables to provide national estimations for UNECE, IPCC, PARCOM/HELCOM, ...

EMEP and LCPD needs cannot be satisfied at this stage.

Energy balance (EB) (not existing in CORINAIR 90)

Function of EB : to carry out an energy balance between energy statistic and energy input in the system.
 to store possibly national energy statistics by fuel types and economical sectors.

Relation with other components : with national aggregated data module (NAD).

The energy taken into account in NAD can be easily compared with reference national energy consumption.

Large Point Sources data (LPSD) (existing in CORINAIR 90)

Function of LPSD : to store specific data relating to sources considered individually.

Relation with other components : - with national aggregated data (NAD) as detail level
 - with national detailed area sources (NDAS) as complementary information
 - with spatially disaggregated inventory (SDI) as one of its components

LPSD module constitutes a module oriented for requests such as LCPD, EMEP, ...

LPS have to be arbitrarily defined according to objectives of inventories (e.g. cf LPS definition of CORINAIR 90) (4).

LPSD deals with a lot of parameters concerning the identification and the location of plants. Specific information such as activity rates, capacities, energy consumption, processes, controls, emissions, working time, exhausting characteristics are generally collected.

National detailed area sources data (NDAS) (existing in CORINAIR 90)

Function of NDAS : to store area activity rates, energy consumption, area emission factors of emission generating activities according to the detailed source category split selected by the national expert. The provision of these data instead of direct emission input allows transparency.

Relation with other components : - with national aggregated data (NAD) by the way of national aggregation function (NAF) in combination with LPSD
- with spatially disaggregated area sources data either via allocation procedures (top-down approach) or via bottom up function (BUF) (bottom-up approach).

NDAS and LPSD constitute the national level detailed reference inventory.

National aggregation function (NAF) (not existing in CORINAIR 90)

NAF function : to get a national set of national aggregated data by aggregating source categories data from national area sources and large point sources.

Relation with other components : - with national detailed area sources data (NDAS) and large point sources data (LPSD) as input,
- with national aggregated data (NAD) as output.

NAF is part of NDAS module.

Spatially disaggregated inventory (SDI) (existing in CORINAIR 90)

Function : to provide emission estimations by pollutants, territorial units and emission generating activities.
to store area sources data (activity rates, energy consumption, emission factors, surrogate data).
It proposes the allocation procedure which allows to estimate unknown activity rates from an upper level by using socio-economical parameters.
It includes large point sources data (LPSD) as complementary component.

Relation with other components : - with national detailed area sources data as a breakdown (top-down approach) and via bottom-up function (BUF) (bottom-up approach).

SDI allows to satisfy requests from modellers (e.g. EMEP).

Bottom-up function (BUF) : spatial aggregation (existing in CORINAIR 90 but available separately of software)

Function : to provide national detailed area data from sub-national levels

Relation with other components : - with area sources data
- with national detailed area data (NDAS).

BUF is part of SDI module.

3.6.2 - Implementation of the revised data model

3.6.2.1 - General overview

Pragmatically, as shown by figure 5, national CORINAIR inventory can be achieved according to national preferences as follows :

- by using the CORINAIR software (e.g. when one country is using the CORINAIR System as its national system).
- by transferring data within the CORINAIR database.

In this case, there is two alternatives to provide NAD figures :

- * to transfer directly area sources data and LPS data. Therefore, national aggregated data will be obtained automatically by using the CORINAIR System.
- * to transfer directly national data into NAD module of EEA/CORINAIR database.

Regarding CORINAIR 90 System, this scheme included a supplementary intermediate step : transfer of DOS/CORINAIR databases into ORACLE/centralized CORINAIR database (including data dictionary transformation).

In order to avoid such an intermediate step, it is proposed to have only one single data dictionary to be used by individual CORINAIR databases and by the centralized EEA database.

Due to the use of one single data dictionary, CORINAIR databases under different platforms are equivalent by using existing ODBC drivers. Each inventory producer may be free to chose his most convenient platform.

3.6.2.2 - Dynamic process

The data model is designed for a dynamic application as presented in figure 6.

NAD of the previous year (N-1) are duplicated. Major data available for the year N are taken into account (activity rates, energy consumption). Emission factors are assumed relevant as well for the year N-1 as the year N as far as there is no major changes in the source categories structures. Corrections have to be made when major changes are identified.

This process allows to provide estimations in due time.

It can be refined progressively according to specificity's and willingness of each country.

When detailed data (NDAS and LPSD) are available (possibly the year after), the NAF procedure aggregates these data (i.e. calculates national aggregated emission factors) and replaces the preliminary and provisional NAD data with them.

It is also possible to consider an alternative way, which consists in introducing only data into NDAS and LPSD, then to aggregate them in NAD with NAF.

Periodically (e.g. every 4 years), the spatial disaggregated inventory is achieved within two years after the reference year.

3.6.2.3 - Detailed implementation for one current year

The figure 4 shows the flowsheet of the model application.

National aggregated data (NAD) are available :

- either from direct data input by duplication of NAD from the previous year and progressive replacement with data specific to the current year.
- or from detailed data (NDAS and LPSD) aggregated by using the NAF function.

The first approach needs very few time and reporting of preliminary emission estimations can be performed within six/twelve months. Moreover, data can be progressively completed and more accurate estimations provided some months later.

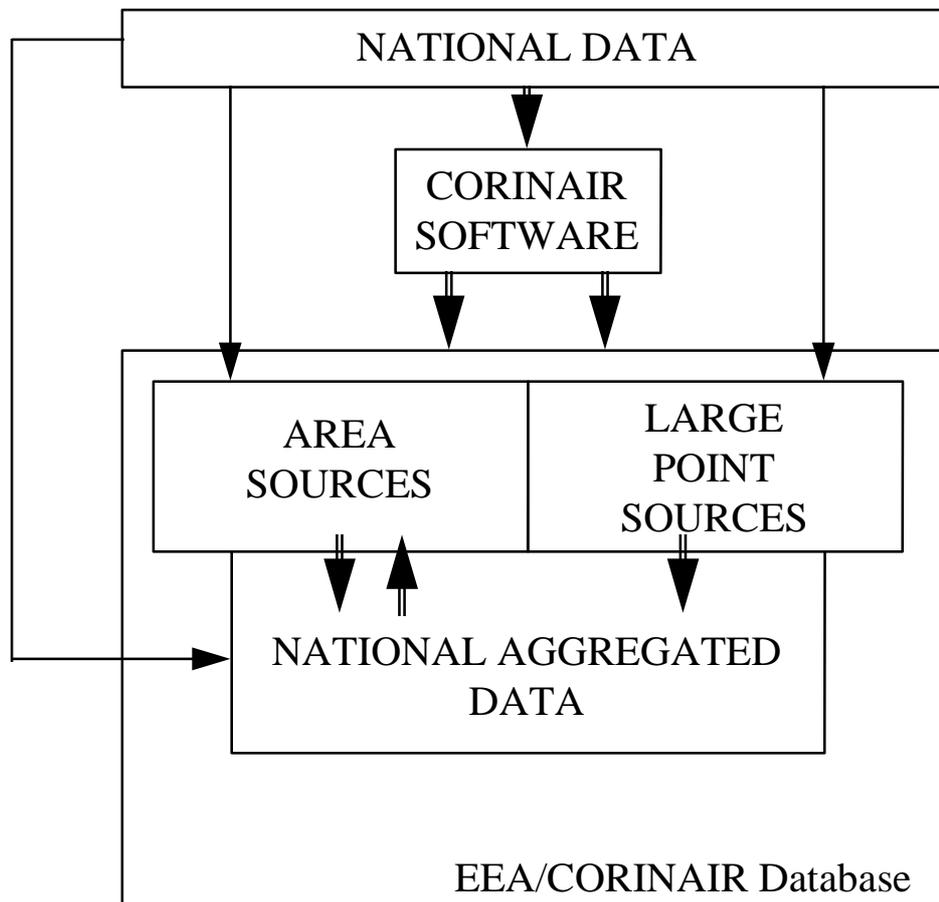
Due to the very high contribution of energy related sources considering some pollutants, it is essential that inventories take into account relevant energy figures. Especially, energy data input in NAD have to be well

balanced with national energy statistics in EB module. It provides feed-back information to refine energy related data within the inventory.

Large Point Sources data have to be introduced as complementary information :

- every year when specific requests has to be complied from this inventory (e.g. LCPD inventory). In such a case the LPSD module is partially filled in for relevant combustion plants only.
- when national detailed data have to be considered or when a spatially disaggregated inventory has to be performed.

Figure 5 : Data Collection Process of Air Emission Inventory



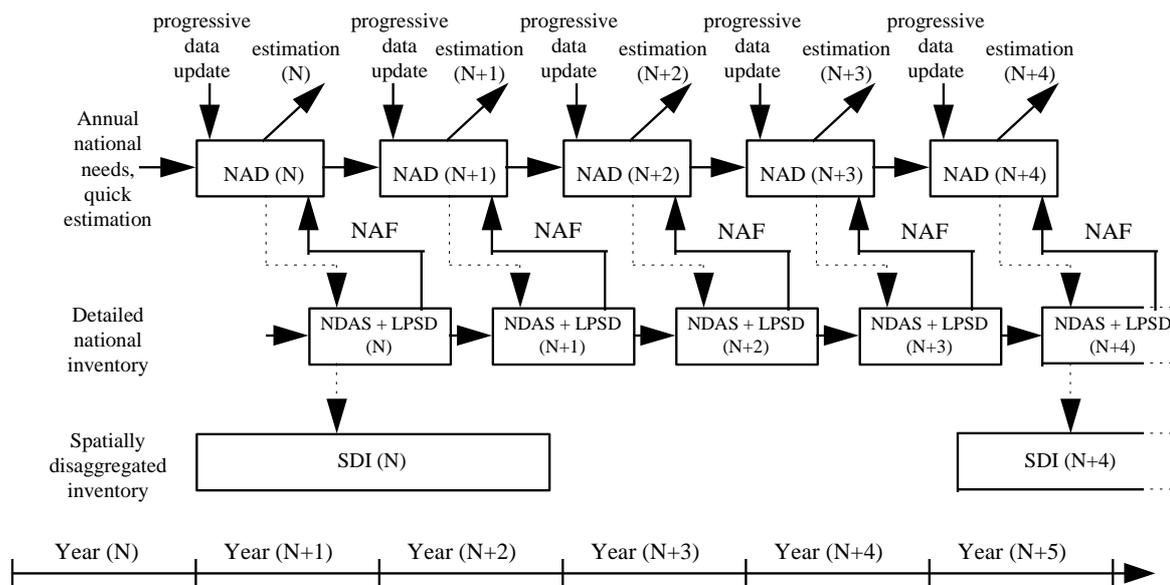
⇒ Use of CORINAIR system

→ Direct data transfer into EEA/CORINAIR Database

Figure 6 : Implementation of the data model over a four years cycle : possible scenario.

Constraint : National aggregated data (NAD) every year for annual needs.

Assumptions : - Detailed inventory at national level (NDAS + LPSD) every year.
 - Spatially disaggregated inventory (SDI) every four years.



Keys :

- NAD : National Aggregated Data
- NDAS : National Detailed Area Sources data
- LPSD : Large Point Sources Data
- SDI : Spatially Disaggregated Inventory
- NAF \rightarrow : National Aggregation Function.
- $\cdots \rightarrow$: completion relation

The inventory producer can start without considering LPS data and, if necessary, will fill in progressively LPS figures which are necessary in further steps.

Reference specifications have to be available to define LPS.

Periodically (e.g. every 1 to 4 years) the NAD (National Aggregated Data) must be considered in more details to establish update reference by specifying area sources and large point sources. The latter is already known at least partially and can be completed according to CORINAIR definitions and national wishes. Therefore, national detailed area sources (NDAS) must be provided.

More detailed means here to split, when relevant some source sectors considered in NAD, in order to appreciate finest details (i.e. differences of technologies). Example, cement production as a whole in NAD can be split in dry, wet or semi-wet processes.

Alternatively to the previous process, it may be possible to input NDAS and LPSD data annually and to use the NAD module as an output for the annual needs.

In spite of fusion of AS + LPS data and possible more detailed split of information, there is a closed link between NDAS and NAD. Three situations are existing for emission generating activity.

| AS | LPS | COMMENT |
|-----|-----|---|
| Yes | No | For most activities : NDAS=NAD for others NDAS includes more details |
| Yes | Yes | Specific area data in NDAS (i.e. emission factors are necessary) |
| No | Yes | No area sources in NDAS |

The convergence process : National Aggregated Function (NAF) is used to build or to update NAD.

From the national reference inventory (NDAS + LPSD) data are aggregated according to the format considered in NAD. Especially **aggregated emission factors are calculated**.

NDAS and LPSD constitute the national reference inventory. From these detailed data NAD can be built or updated (aggregation) when necessary. The finest structure of information (i.e. emission factors) referring to one reference year N can be used automatically for the preliminary estimation of the year N + 1, possibly N + 2, ...

Periodically, a spatial disaggregated inventory (SDI) has to be achieved. In such a case NDAS activity rates must be distributed over different territorial units (TU). Either activity rates are known at some levels and directly introduced, or activity rates are allocated according to surrogate data and procedures defined by each expert.

When necessary TU specific emission factors can be attached to some activity rates, so weighted emission factors must be generated at intermediate levels (cf. bottom-up function).

LPSD are already available for any territorial unit.

The bottom-up function (BUF), which is a spatial aggregation function, is to be used in both following cases : activity rates aggregation and emission factors aggregation.

- when activity rates are known, at sub-national levels, BUF aggregates activity rates at upper TU levels.
- when TU specific area emission factors are introduced BUF is used for calculation of weighted emission factors at upper TU levels.

Example : When it is assumed by one expert that all data are known at level NUTS III, it is possible to calculate automatically activity rates and weighted emission factors for upper levels.

4 - SHORT TERM CONSIDERATIONS OF A REVISED SYSTEM FOR CORINAIR 94

The Chapter 4 presents a proposal for CORINAIR 94 inventory corresponding to short term needs. This proposal is a pragmatological approach compatible with time schedule of ETC/AEM.

The differences between the CORINAIR 90 system and the data model described in the third section of this document are :

- implementation of energy balances (EB)
- introduction of a national aggregated data level (NAD)
- compatibility with international requests (e.g. IPCC, ...) with potential outputs
- software improvement for facilitating inventory achievement (e.g. default emission factors, ...)

4.1 - Software development

Priorities must be defined in order to provide to national experts an operating tool by the end of 1995 as planned. Supplementary short term improvement development could take place on first part of 1996.

Then the tasks that are in term of priority essential relate to first priority tasks (priority A) to be absolutely developed by end 1995, and the tasks that are desirable/useful relate to second priority tasks (priority B) to be developed by end 1995 as far as possible or during the first part of 1996.

4.1.1 - Methodological plan

Due to a relatively short delay for providing the revised system for CORINAIR 94 and due to priorities, some important issues cannot take place in short term development ; it is the case of :

- Only one single data dictionary as well for the centralized EEA UNIX/ORACLE database than for the national individual PC/DOS databases.

That would avoid to have two data dictionaries for the same data and would avoid therefore the need of a specific transfer process from one to the other ; but it would require an important amount of work (structure and data management to review) which can be carried out simultaneously with other developments such as full windows version.

- Extension of the concept relating to emission generating activities (e.g. ACCOR approach or equivalent).

It would enable to manage as well the economic aspect as technology aspects (useful for projection needs for example).

Such a modification needs first further methodological developments especially concerning harmonization and completion of the UNECE/CORINAIR Guidebook. So, it is recommended in this short development, to mainly adapt/extend the existing CORINAIR 90 System to meet the new identified needs described in section 2 and to converge to the data model proposed for longer term (cf. figures 4 and 5, sections 4.1.4.1 and 4.2.2).

In a modular approach (which presents generally many advantages), the existing CORINAIR 90 system is to be identified as the main module of the revised system '94 (corresponding to NDAS, LPSD and SDI elements).

Then two new modules have to be developed :

- the energy balance module (including energy statistics input as reference),

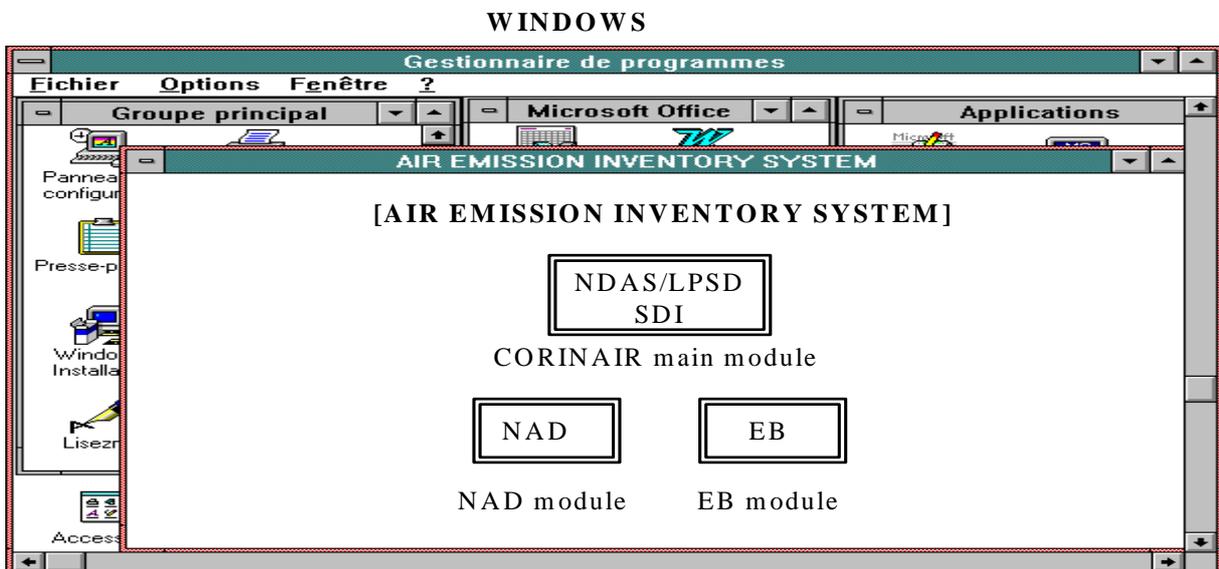
- the NAD (national aggregated data) module for national annual needs (cf section 4.1.4.1).

4.1.2 - Windows consideration

Some CORINAIR experts have expressed the wish to work with a WINDOWS version of CORINAIR software. Due to the powerful WINDOWS environment compared to the basic DOS environment, for longer term a full WINDOWS version of the air emission system is to be considered. But in the short term view, it is not an essential priority, taken into account that this task would represent an urge development which could be made in the same time as other long term options of development.

So the main module will remain on DOS version for its adaptation/extension but (advantage of modular approach) the two new EB and NAD modules can be developed directly on WINDOWS version without additional or duplicate efforts. This proposal requires that all the national experts who wish to fully use the revised 94' system, have WINDOWS available on their PC.

Then the revised 94' system will be a package of three modules to be included in a WINDOWS group as "CORINAIR/EUROPEAN AIR EMISSION SYSTEM". The main DOS module (NDAS/LPSD/SDI), and two new WINDOWS modules.



In longer term, the main DOS module should move to WINDOWS modules (cf above longer term options).

4.1.3 - Tasks on inventory specifications [priority A]

- the new requested pollutants (heavy metals, POPs) have to be managed in the revised system. That means the need to complete/modify the SNAP 90 to take into account the new pollutants (cf annex 1).
- a best compatibility with IPCC requires to adjust the SNAP 90 (cf annex 1).

4.1.4 - Tasks on data model [priority A]

The first priority is to provide a system which may satisfy the different international requests on air emission inventory in due time. For that, the revised system for CORINAIR 94 have to be organized closely as the

general model presented in chapter 3 (cf figure 4) which optimizes the tailored process for the different possible needs.

Practically, the CORINAIR 90 system already includes the following elements : SDI, NDAS and LPSD (cf figure 4 and chapter 3).

The basic new elements to be introduced are :

- the energy balance module (EB).
- the aggregated national level (NAD) (aggregated data instead of area source data and LPS data), and the NAF function (national aggregation function which enables to build the NAD from the detailed inventory).

4.1.4.1 - NAD Module

The National Aggregated Data module is output oriented to be tailored to the annual national timely needs.

This module may be used as well as input module or/and a module of output data from aggregation of the more detailed and accurate NDAS and LPSD data (cf sections 3.6.1 and 3.6.2).

The aggregation function (NAF) has to be considered as an import procedure to be developed in the main CORINAIR module.

For revised 94' system, the level of aggregation of source categories must allow the compatibility with the recognized national needs : PARCOM/HELCOM, UNECE, IPCC, EU CO2.

To be able to satisfy all these needs, it is recommended to choose as source categories for the NAD module relevant combinations of SNAP activities with fuel types (NAPFUE). More precisely the NAD module aggregates :

- in one hand, two different types of sources (AS and LPS),
- in the other hand, rubrics (generally) and specific fuels. For flexibility consideration and other potential needs, the rubric may be possibly not aggregated.

To be able to satisfy economic aspect needs (e.g. projection purposes, results of emissions per economic sectors ...) as well as energy balance needs, the NAD module have to include a list of economic sectors (based on EUROSTAT statistics) and distribution of source activities into these economic sectors (cf list of economic sectors in annex 5).

For speeding up provisional national annual inventory, it is recommended to include in the NAD module a facility function : an EB extrapolation function which enable to extrapolate from NAD year (N-1) to NAD year (N) by the use of energy statistics in EB year (N). This extrapolation relates only to activity rates and energy consumption activities.

4.1.4.2 - EB Module (cf section 3.6.1)

This energy balance module is verification/validation oriented. It gives the possibility to make the balance with national energy consumption by fuels and at least by main economic sectors defined in international energy statistics (e.g. EUROSTAT) :

- by fuel and by economic sectors,
- by fuel for all economic sectors as a whole,
- by economic sector for all fuels together,
- for total energy consumption (all fuels and sectors as a whole).

It is recommended to make the balance with the NAD module only, because it is pragmatically and theoretically sufficient. Other energy balance extensions could be introduced in longer term.

4.1.4.3 - Data dictionary and platform aspects for the new modules

It is proposed to develop, these two new modules for PC/WINDOWS environment with dbase format table to have direct table compatibility with the existing main module (N.B. : nowadays difference of database formats is no longer a real problem due to the availability of ODBC drivers).

Concerning data dictionary aspect for NAD module :

- some tables are common with the main CORINAIR module (SNAP, RUBRIC, NAPFUE).
- the others tables are specific to this new module :
 - . comments
 - . definition of emitting source categories (activities)
 - . activity rates
 - . emission factors and emissions.

Concerning data dictionary aspect for EB module, the specific tables relate to the storage of the national energy consumption at different level of split defined in section 4.1.4.

Additional tables will be necessary to take into account, in the balance, the fuel consumption from industrial processes relating to non-energy use .

4.1.5 - Tasks on the existing main module

4.1.5.1 - Priority A

The existing CORINAIR 90 System represents the main module of the revised 94'system (corresponding to NDAS, LPSD and SDI elements). It needs to be adapted/improved to fit the general data model and to satisfy new needs. Practically, such an adaptation/improvement represents a simple extension or light modifications in term of data dictionary. They are :

- Additional function to fit the general data model : NAF - national aggregation function. This new function is to be considered as an export function from this main module into the NAD module. It requires, for performing a fully successful exportation, that all relevant data are available in the NDAS and LPSD components (e.g. the fuel consumption and fuel emission factors for the LPS data).
- Inclusion, as far as possible, of default emission factors from UNECE guidebook for speed-up the inventory achievement. In term of data dictionary, it requires one additional table to store the guidebook emission factors (values or range of values).
- Improvements of data handling/input facilities :
 - . call of default emission factors when available
 - . Bottom-up function (BUF) to aggregate spatially data. This function represents a complementary function to the existing top-down function (allocation function with surrogate data). It enables to speed-up the spatial inventory (SDI) and to avoid inconsistency between NUTS levels (cf. section 3.6.1).
 - . Improvements pointed out from CORINAIR 90 questionnaire and, more widely, to suggestions and comments from experts :
 - * Additional field in LPS identification table to flag whether the point source is under LPS CORINAIR criteria or not. That enables to store and sort point sources for other needs than EMEP need, keeping the possibility to identify specifically EMEP point sources.
 - * Edition of aggregated emission results without need of an intermediate "data build/emission calculation" step (direct query).

- * Compatibility with share configuration.

4.1.5.2 - Priority B

Other improvements should be introduced :

- * Error messages and checking messages to be optimized.
- * Backup/restore option to improve (with possible use of compression process).
- * Alternate data entry screen (option of tabular entry screen as alternative to existing form type entry screen).
- * Improvements for data editions/reports.
- * Other miscellaneous improvements.

4.1.6 - Tasks on output facilities (priority B)

One main requirement for the revised system is to build the European air emission inventory system being able to satisfy all possible needs (international needs and more specific needs). Such needs could be more quickly and efficiently performed with specific outputs developed around the system :

- First it is to be noticed that the outputs do not belong to the data model of the air emission system itself.
- Are the outputs to be developed by the users or centrally ? In any case, for identified international output needs, it is recommended that the EEA ETC/AEM provides facilities for such outputs.
- Then, a second question arises : where output developments have to be available ? At national individual CORINAIR System level or at centralized EEA database level ? This question would need feedback from national experts. But, on principle, at least the outputs which are necessary or quite useful to the responsible national expert should be available, as far as possible, at the national CORINAIR database level. Finally, to avoid duplicate efforts, some output developments may be available only at national CORINAIR level and some others may be available only at EEA centralized level ; some output developments may also be done at both levels because necessary or useful at these two levels.

It is not the aim of this report to clearly share the output developments between the two levels (since output possibilities do not belong formally to the database of the system).

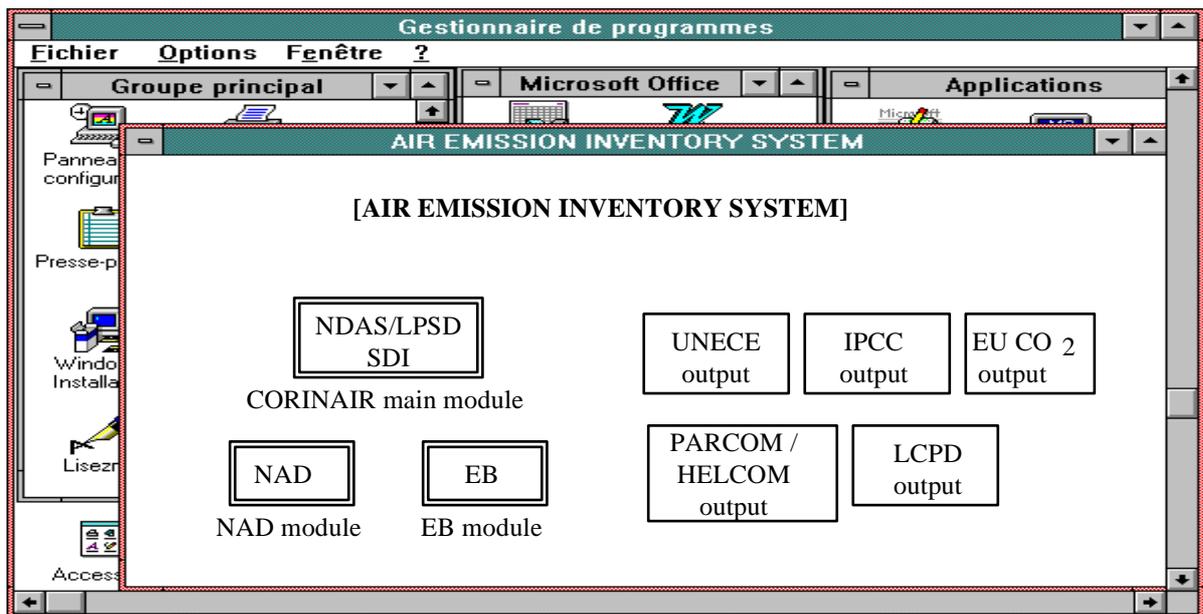
Nevertheless, in the frame of software development and as extended features, some output facilities, at national database level, may be considered, such as outputs for :

- UNECE
- IPCC
- PARCOM-HELCOM
- EU-CO₂
- LCPD

As for the new modules NAD and EB, these outputs may be developed directly for WINDOWS as separate modules.

Then the final package to be installed on WINDOWS will be extended with these output modules.

WINDOWS



4.1.7 - Summary

Tasks for CORINAIR 94 revised system

Priority A (by end 1995)

- specifications for CORINAIR 94
- EB WINDOWS module
- NAD WINDOWS module
- Adaptation/improvements in main DOS module (NDSA/LPSD/SDI) :
 - . NAF (national aggregation functions)
 - . inclusion of default emission factors
 - . bottom-up function
 - . share configuration compatibility
 - . other miscellaneous improvements

Priority B (during first part of 1996)

- Improvements in main DOS module (NADS/LPSD/SDI) :
 - . Error and checking messages optimization
 - . Improvement of Backup/Restore option
 - . Alternate data entry screen
 - . Improvements for data editions
 - . Other miscellaneous improvements.
- Reporting facilities with output WINDOWS modules :
 - . UNECE
 - . IPCC
 - . PARCOM-HELCOM
 - . EU - CO2
 - . LCPD

The main benefits of the proposed revision for CORINAIR 94 is the fact the revised system will be able to satisfy the detailed spatial inventory and also the annual needs within a single coherent system ; and that can be done with a maximum compatibility with CORINAIR 90 data model (structural extension rather than actual structural modifications of CORINAIR 90 data model).

Another not negligible benefit of this short term proposal is to avoid serious revision of national transfer procedures which have been developed by some countries to transfer their specific national inventories into the CORINAIR 90 format.

At last, because of the compatibility with CORINAIR 90 data model, it is possible to propose with the revised system an updating procedure for using the 90' data as basis for 94' inventory. Nevertheless, due to some revisions of the SNAP and rubric approach, some additional information will be needed (e.g. residential, commercial and institutional sectors split in two different sectors).

The main issues for the revised system 94' are taken into account :

- management of different stages in inventory achievement for satisfying annual needs, and spatial needs.
- convergence process between the different inventory stages and energy balance for a coherent system.
- facilities to speed-up the inventory achievement.

4.2 - Specifications

4.2.1 - Pollutants

It is suggested to consider for the next CORINAIR 94 inventory all the pollutants in turn for international requests listed in section 3.1 excepted HFCs, PFCs and SF6 for which clear and complete data guidelines are not yet available.

All pollutants will be considered "at source" conditions.

- 8 pollutants already covered in CORINAIR 90
 - SO_x = SO₂ + SO₃ as SO₂
 - NO_x = NO + NO₂ as NO₂
 - NM VOC = all volatile organic compounds except CH₄ as rough VOC
(definition of volatile should be completed)
 - CH₄ as CH₄
 - CO as CO
 - CO₂ as ultimate CO₂ (format requested at international and European levels)
 - N₂O as N₂O
 - NH₃ as NH₃
- Heavy metals
 - As : Arsenic and derived solid or gaseous compounds as As
 - Cd : Cadmium and derived solid or gaseous compounds as Cd
 - Cr : Chromium and derived solid or gaseous compounds as Cr
 - Cu : Copper and derived solid or gaseous compounds as Cu
 - Hg : Mercury and derived solid or gaseous compounds as Hg
 - Ni : Nickel and derived solid or gaseous compounds as Ni
 - Pb : Lead and derived solid or gaseous compounds as Pb
 - Se : Selenium and derived solid or gaseous compounds as Se
 - Zn : Zinc and derived solid or gaseous compounds as Zn

- Persistent organic pollutants (*)
 - HCH hexachlorocyclohexane as HCH
 - PCP pentachlorophenol as PCP
 - HCB hexachlorobenzene as HCB
 - TCM tetrachloromethane as TCM
 - TRI trichloroethylene as TRI
 - PER tetrachloroethylene as PER
 - TCB trichlorobenzene as TCB
 - TCE trichloroethane as TCE
 - DIOX dioxins and furans as Teq
 - PAH polycyclic aromatic hydrocarbons as total PAH

4.2.2 - Source sector split

A nomenclature such as ACCOR needs to be developed and refined with a large concertation between experts of different fields (air, economy, industry, ...).

Due to deadline for CORINAIR 94 it is proposed to refine only CORINAIR 90 nomenclatures (SNAP and NAPFUE) (***) with the following goals :

- to introduce supplementary activities because of heavy metals and persistent organic pollutants described in section 4.2.1.
- to adapt or to add some items for better compatibility with IPCC format.
- to update these nomenclatures according to suggestions from CORINAIR experts (addition, modification, deletion).
- to consider a more systematic approach for the use of "rubric" (currently a mixture of economical sector and technology). Economical sectors will be considered separately outside of rubric and technology will be more normalized.

Concerning the rubric, a predefined set of possible technology split will have to be prepared on the basis of what have been used in different national CORINAIR 90 inventories. It will be possible for experts to add supplementary items when necessary.

Concerning the economic aspect, for short term, it is recommended to have the possibility to link, in the NAD module, any emitting activity (SNAP x FUEL x RUBRIC) with economic sectors. That enable to be compatible with the long term consideration (see section 3.2).

The new SNAP (Selected Nomenclature for Air Pollution) will be so called SNAP 94. It includes always three levels. The first level is constituted of 11 groups harmonized with UNECE source sectors.

The draft of SNAP 94 is presented in annex 1. It should be circulated to all experts for comments.

Similarly the updated NAPFUE (Nomenclature for Air Pollution of FUELS) will be so called NAPFUE 94. It is presented in annex 2.

4.2.3 - Large Point Sources

Large Point Sources are defined according to arbitrary criteria allowing to select main individual emitters.

(*) Persistent organic pollutants are semi-volatile persistent organic compounds with bio-accumulation potential. They include compounds which have vapour pressures between 10^{-6} and 10^{-1} Pa (5).

(**) It is to be noticed that SNAP, NAPFUE and RUBRIC form a provisional compromise of ACCOR type components for air emissions.

These criteria are based on :

- Large Combustion Plant Directive request
- EMEP requests
- needs for quality of inventories.

Practically, these criteria are classified as follows :

- criteria independent of emissions (thermal capacity, type of activity, size of installation, ... or a mixture of some of them)
- criteria dependent of emissions (plant emitting more than a quantity X of a pollutant Y).

From the experience of CORINAIR 90, only few modifications are proposed.

The LPS specifications are listed in annex 3.

4.2.4 - Territorial units

As planned, with the different steps defined by ETC/AEM the inventory will be performed as well for national level as for sub national spatially disaggregated levels.

The four levels breakdown will be maintained. It is based on NUTS classification (Nomenclature of statistical Territorial Units) defined by Eurostat.

| | |
|------------------|---|
| Level O | Country level |
| Level I, II, III | Regional levels ; some levels do not exist in some countries. |

The annex 4 provides the NUTS nomenclatures updated March 1992 (EC-12) and May 1993 (other countries). When not yet existing the NUTS nomenclature has been replaced with the nomenclature of territorial units defined by national experts for CORINAIR 90.

There is possible slight differences between this NUTS version and the reality. So, please check its relevancy. Eurostat is preparing a new NUTS version for EU-15.

4.2.5 - Time resolution

CORINAIR 94 should represent the first element of a continuous time series based on a yearly emission inventory.

All data will be reported on the full year 1994 without distinction of finest temporal resolution.

Nevertheless, some sources (e.g. road traffic, biogenic emissions, ...) consider some time related data (e.g. monthly temperature, biomass factors, ...).

4.2.6 - Energy balance

National energy data used as reference will be provided with the format available in international organizations such as EUROSTAT.

Therefore, energy data should be provided accordingly with one of the fuel split presented in annex 2, and with economical sector split which will differentiate at least :

- Energy transformation and distribution
- Industry
- Transports
- Commercial/Institutional/Residential
- Agriculture/Forestry/Fishing

- Other.

More detailed energy data will be input in NAD module and other modules (NDAS and LPSD) ;

NDAS and LPSD > NAD > EB in term of detail level of information

When considering energy related activities for which estimations of emissions are not based on energy consumption (e.g. based on production) a supplementary information is requested at national level :

- ratios amount of energy/activity unit
- fuel split contribution.

The energy balance module will treat the relevant information and will provide balances according to the detail defined in EB. Feed back adjustments will be probably necessary in NAD to get well balanced energy consumption.

GLOSSARY

| | |
|--------------|---|
| ACCOR | Nomenclature of emitting activities in CORINE |
| AS | Area Source |
| BUF | Bottom-Up Function |
| CORINAIR | Acronym for air emission inventory initially developed in the frame of the CORINE programme |
| Dbase | Database system |
| EB | Energy Balance |
| EEA | European Environment Agency |
| EMEP | European Monitoring and Evaluation Programme of Long Range Transmission of Air Pollutants |
| ETC/AEM | European Topic Center on Air Emission |
| EU | European Union |
| EUROSTAT | Statistical Office of the European Communities |
| GEIA | Global Emissions Inventory Activity |
| HELCOM | Helsinki Commission |
| HFC | Hydrofluorocarbons |
| IPCC | Intergovernmental Panel on Climate Change |
| LCPD | Large Combustion Plan Directive |
| LHV | Low Heat Value |
| LOTOS | Dutch-German project on photochemical pollution |
| LPS | Large Point Source |
| LPSD | Large Point Source Data |
| LTO | Landing and Take Off |
| NAD | National Aggregated Data |
| NAF | National Aggregation Function |
| NAPFUE | Nomenclature for Air Pollution of FUELS |
| NDAS | National Detailed Area Sources |
| NMVOC | Non Methane Volatile Organic Compound |
| NUTS | Nomenclature of Statistical Territorial Units |
| ODBC | Open DataBase Connectivity |
| ORACLE | Database system |
| PARCOM/ATMOS | Paris Commission - Working group on atmospheric input |
| PFC | Perfluorocarbons |
| POPs | Persistent Organic Pollutants |
| RUBRIC | In CORINAIR System, additional item to SNAP and NAPFUE to define elementary emitting activities |
| SDI | Spatially Disaggregated Inventory |
| SNAP | Selected Nomenclature for Air Pollution |
| UNECE | United Nations Economic Commission for Europe |
| UNIX | Computer operating system |
| WINDOWS | Computer graphic interface |

REFERENCES

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 - Technical annexes - volumes 1 and 2European Commission 1995

- (2) CORINAIR SOFTWARE
Instructions for use - Version 5.13
CITEPA - September 1992

- (3) IMPLEMENTATION OF CORINAIR INVENTORY UNDER THE RDBMS ORACLE
AED - June 1994

- (4) Review of CORINAIR 90
Proposal for Air Emissions 94
European Topic Center on Air Emissions - March 1995
European Environment Agency Topic Report 1995/1, Document EEA/049/95

- (5) Methodologies for the estimation of persistent organic pollutants to the atmosphere
Project TOCOEN - March 1993

ANNEX 1

SNAP 94

This annex includes three documents :

- SNAP 94
- Correspondence between SNAP 94 and IPCC source categories
- Correspondence between SNAP 94 and SNAP 90

Please download these documents as separate PDF-files:

[Annex 1a](#)

[Annex 1b](#)

[Annex 1c](#)

ANNEX 2

NAPFUE 94

Please download this document as a separate PDF-file:

[Annex 2](#)

ANNEX 3

LARGE POINT SOURCES SPECIFICATIONS FOR CORINAIR 94

Plants for which at least one of the following criteria is respected have to be considered as Large Point Sources in the CORINAIR 94 inventory and specific data are requested.

| Criteria N° | Definition |
|-------------|---|
| 1 | Combustion plant with a thermal capacity ≥ 300 MW The thermal capacity considered here is the maximum of energy possibly consumed during one time unit (here MJ/s) what ever the actual use of the plant is. |
| 2 | Any refinery Each of the main plants included will be treated as separate parts of the refinery. Combustion plants within a refinery will be considered as part of a LPS what ever the thermal capacity is. |
| 3 | Workshops included in integrated steel plant with a production capacity ≥ 3.106 Mg of steel/year. Each main workshop or type of process will be treated as a part of the whole steel plant. Combustion plants too what ever the thermal capacity is. |
| 4 | Any sulphuric acid plant |
| 5 | Any nitric acid plant |
| 6 | Paper pulp production plant when the capacity is $\geq 100\ 000$ Mg/year of paper pulp. Combustion plants will be treated as subparts of the whole paper pulp plant what ever the thermal capacity is. |
| 7 | Painting car plants when the capacity is $\geq 100\ 000$ passenger cars/year or equivalent when only pieces of cars are painted. If other plants on the same industrial site has to be included in LPS (e.g. combustion plants), it will be considered only one LPS including several parts (e.g. one part for car painting and a second part dealing with combustion plant). |
| 8 | International airport when the amount of LTO cycles is $\geq 100\ 000$ /year. One LTO cycle = one landing and one taking off. |

ANNEX 4

NOMENCLATURE OF TERRITORIAL UNITS

For EU Member states, it is recommended to use territorial units defined by EUROSTAT (cf. NUTS levels 0 to HI).

Concerning non EU countries, the available list of territorial units provided by EUROSTAT is to be used as far as it reflects the actual situation. When not relevant, territorial units defined in CORINAIR 90 can be used including possible modifications when necessary (cf. attached list in this annex).

Please download this document as a separate PDF-file:

[Annex 4a](#)
[Annex 4b](#)
[Annex 4p3](#)



eurostat

**LIST OF
ADMINISTRATIVE REGIONS
FOR EUROPEAN COUNTRIES
OUTSIDE THE COMMUNITY**

VERSION 2.1
MAY 1993

INTRODUCTION and BASIC PRINCIPLES

This list of Administrative Regions for European countries, which are not members states of the European Community, was established by the GISCO (Geographical Information System of the Commission of the E.C.) at the Statistical Office of the European Communities, Eurostat, on demand of several Commission services, so as to provide a single, uniform breakdown of administrative regions and their codification.

WARNING

This list of administrative regions of European countries not being member of the European Community can in no way be seen as an extension of the Nomenclature of Territorial Units for Statistics (NUTS) which is maintained by Eurostat for the purpose of collecting regional statistics in the European Community.

For the EFTA member states an extension of the NUTS is actually being developed in collaboration with the EFTA Countries and is expected to be finalised by the beginning of 1993.

Through the framework of the GISCO project Eurostat also intends to compile a digital map containing the associated regional boundaries of this list on a scale which allows thematic cartography of regional statistics based on the proposed coding system.

Similarly it intends to compile a table containing basic statistics on administrative area and number of inhabitants for the regions included in the list.

The proposed list was developed according to the following principles :

- a) This list is based on institutional breakdowns exclusively.

This list presents the administrative regions as they are defined by the national authorities. This concerns a type of normative regions which are the expression of a political status. The limbs of the regions are fixed according to the responsibilities allocated to territorial units. Most of the statistics available will be based on these regions currently in force in the countries concerned.

b) This list does not favour regional units of another character as e.g. functional regions or planning regions.

Therefore this list should not be regarded as an extension of the existing Nomenclature of Territorial Units for Statistics (NUTS) also established by Eurostat. To maintain consistency on regional detail or size on the same hierarchical level this type of non-normative regions was sometimes introduced in the NUTS nomenclature.

c) A hierarchical classification is used.

The list proposed subdivides each country into a whole number of level 1 regions. If relevant these regions are in turn subdivided into a whole number of level 2 regions.

Since the number of countries concerned and possibly their regional classification exceeds 35 entries, it is proposed to use a 2-digit code for each of the hierarchical levels. The first level, being the national level is in principle based on the ISO coding system.

Version 1. 1 includes :

- *Proper ISO 4217 coding*
- *National subdivisions for GE, BY, RU, UA and BG*
- *Inclusion of new Eastern European Countries*
- *Correction of spelling errors*

Version 2. 0 includes :

- *Correction of spelling errors*
- *Subdivisions for former Czechoslovakia into CE and, SV*
- *Makedonia (MK) separated from Yugoslavia*

Version 2. 1 includes :

- *Correction of spelling errors*
- *Changing codes according to new interim list of ISO codes (114193):*
 - *BH changed into BA*
 - *CE changed into CZ*
 - *SV changed into SK*

TABLE 1: COUNTRY NAME OF NON EC MEMBER STATES

| 150 CODE 3166 4217 | In national language En langue nationale | In English | En français |
|-------------------------------|---|------------------------------|--------------------------|
| AD | Andorra | Andorra | Andorre |
| AL | Shqipëria | Albania | Aibani'e |
| AM | Armenija/Hajastan | Armenia | A~nie |
| AT | Osterreich | Austria | Atftriche |
| AZ | Azerbaydzhan | Azerbaijan | Azerbaidjan |
| BA | Bosna i Hercegovina | Bosnia and Herzegovina | Bosnie et Hercegovine |
| BG | Balgarija | Bulgaria | Buigade |
| BY | Belarusija/Belorusija | Belarus | B6Jarus |
| CH | Schweiz/Suisse/Svizzera | Switzerland | Suisse |
| CY | Cyprus | Cyprus | Cypre |
| CZ | Ceska Republika | Czech Federal Republic | Etat Tchibque |
| EE | Eesti/Estonija | Estonia | Estonie |
| FI | Suomi/Finland | Finland | Finlande |
| FO | Faeroerne | Faeroe Islands | lies F6roe |
| GE | Georgia | Georgia | @orgie |
| HR | Hrvatska | Croatia | Croatie |
| HU | Magyarország | Hungary | Hongrie |
| IS | Island | Iceland | Islande |
| KZ | Kazakhstan | Kazakhstan | Kazakhstan |
| LI | Liechtenstein | Liechtenstein | Liechtenstein |
| IT | Lituva/Litva | Lithuania | Lettonie |
| LV | Latvija | Latvia | Lituanie |
| MC | Monaco | Monaco | Monaco |
| MD | Moldova | Moldova | Moldavie |
| MK | Makedonija | Macedonia | Mac6doine |
| MT | Malta | Malta | Matte |
| NO | Norge | Norway | Norve'ge |
| PL | Polska | Poland | Pologne |
| RO | Romania | Romania | Roumanie |
| RU | Rossija | Russia | Russie |
| SE | Sverige | Sweden | Su6de |
| SI | Slovenija | Slovenia | SIOV6nie |
| SJ | Svaibard & Jan Mayen | Svaibard & Jan Mayen Islands | Svaibard & ale Jan Mayen |
| SK | Slovenska Republika | Slovak Federal Republic | Etat Sic |
| SM | San Marino | San Marino | San Marine |
| TR | Türkiye | Turkey | Turquie |
| UA | Ukraina/Ukrainian | Ukraine | Ukraine |
| VA | Citt6 del Vaticano | Holy See | Citt6 du Vatican |
| YU | Jugoslavija | Yugoslavia | 1 Yougoslavie |

TABLE 2: NATIONAL ADMINISTRATIVE DIVISIONS AND REGIONAL SUB-DIVISIONS

| LEVEL 1 | | LEVEL 2 | |
|---------|---------------------------------|---------|----------------------|
| AL | Rhethet (Provinces) | 26 | |
| AT | Bundesidnder | 9 | |
| BG | Oblasts | 91 | okrag (Provinces) 28 |
| BY | Oblasts (Region) | 61 | |
| CH | Cantons | 261 | |
| CZ | Kraj (Regions) | 81 | |
| FJ | L(Jdni (Provinces) | 121 | |
| HU | Comftias (Counties) | 20 | |
| NO | Fyiker (Counties) | 19 | |
| PL | 1V0-fvodie (Provinces/counties) | 49 | |
| RO | 1Judet (Counties) | 41 | |
| RU | IASSR (auton. republics) | 16, | |
| | Oblasts (atfton. regions) | 5 | |
| | Oknig (auton. areas) | 10 | |
| | Kray (territories) | 6 | |
| | Oblast (regions) | 49 | |
| SE | 1 Ldn (Counties) | 24 | |
| SK | Kraj (Regions) | 4 | |
| TR | (Regions) | 8 | (Provinces) 69 |
| UA | Oblasts (Regions) | 25 | |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES**ARRGCD Adm. Region name**AD AndorraAL ShqiperiaALO1 BeratAL02 LDibCsrAL03 Durr@sAL04 EibasanAL05 FierAL06 GjirokastcsrAL07 GramshAL08 KoionjdAL09 Kor@dALIO KrujCnALI 1 KukessAL12 Le"AL13 UbrazhdAL14 LushnjbAL15 MatAL16 MirditCnA117 PearmetAL18 PogradecAL19 PukibAL20 SarandCaAL21 ShkodCzrAL22 SkraparAL23 TepelenesAL24 TiranclAL25 Tropo@AL26 -.V16reAM ArmeniaAT OsterreichAT01 --BurgeniandAT02 K6rntenAT03 Nieder6sterreichAT04 Ober6sterreichAT05 SatzburgAT06 SteiermarkAM7 TirolAT08 VoraribergAT09 WienAZ AzerbaydzhanBA Bosna i HercegovinaBG BaigarijaBGO1 jburgasBGOIOI Burgas

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| ARRGCD | Adm. Region name |
|---------------|--------------------------------|
| <u>BGO201</u> | <u>Haskovo</u> |
| <u>BGO202</u> | <u>Kardzaii</u> |
| <u>BGO203</u> | <u>Stara Zagora</u> |
| <u>BGO3</u> | <u>Lovec</u> |
| <u>BGO301</u> | <u>Gabrovo</u> |
| <u>BGO302</u> | <u>Lovec</u> |
| <u>BGO303</u> | <u>Reven</u> |
| <u>BGO304</u> | <u>Veliko Tarnovo</u> |
| <u>BGO4</u> | <u>Mihajlovgrad</u> |
| <u>BGO401</u> | <u>Mihajlovgrad</u> |
| <u>BGO402</u> | <u>Vidin</u> |
| <u>BGO403</u> | <u>Vraca</u> |
| <u>BGO5</u> | <u>Plovdiv</u> |
| <u>BGO501</u> | <u>Pazardzjik</u> |
| <u>BGO502</u> | <u>Plovdiv</u> |
| <u>BGO503</u> | <u>Jsmoijan</u> |
| <u>BGO6</u> | <u>Razgrad</u> |
| <u>BGO601</u> | <u>Razgrad</u> |
| <u>BGO602</u> | <u>Ruse</u> |
| <u>BGO603</u> | <u>Silistra</u> |
| <u>BGO604</u> | <u>Targoviste</u> |
| <u>BGO7</u> | <u>Sofija - city</u> |
| <u>BGO8</u> | <u>Grad Sofija (mun.)</u> |
| <u>BGO801</u> | <u>Blagoevgrad</u> |
| <u>B@02</u> | <u>Kjustendil</u> |
| <u>BGO803</u> | <u>PerQik</u> |
| <u>BGO804</u> | <u>Sofija</u> |
| <u>BGO9</u> | <u>Varna</u> |
| <u>BGO901</u> | <u>Sumen</u> |
| <u>BGO902</u> | <u>Tolbuhin</u> |
| <u>BGO903</u> | <u>Varna</u> |
| | |
| <u>BY</u> | <u>Belarusija/Belorussija</u> |
| <u>BY01</u> | <u>Brest</u> |
| <u>BY02</u> | <u>Grodno</u> |
| <u>BY03</u> | <u>Gomel</u> |
| <u>BY04</u> | <u>Minsk</u> |
| <u>BY05</u> | <u>Mogilev</u> |
| <u>BY06</u> | <u>Vftebsk</u> |
| | |
| <u>CH</u> | <u>Schweiz/Suisse/Svizzera</u> |
| <u>CH01</u> | <u>Aargau</u> |
| <u>CH02</u> | <u>Apperizeii Ausserrhoden</u> |
| <u>CH03</u> | <u>Appenzeli Innerrhoden</u> |
| <u>CH04</u> | <u>Base@Landschaft</u> |
| <u>CH05</u> | <u>Base@Stadt</u> |
| <u>CH06</u> | <u>Bern/Berne</u> |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| ARRGCD | Adm. Region name |
|---------------|---------------------------------------|
| <u>CH07</u> | <u>Fribourg/Freiburg</u> |
| <u>CH08</u> | <u>igeneave</u> |
| <u>CH09</u> | <u>I Glarus</u> |
| <u>CH10</u> | <u>iGraubOnden/Grisons</u> |
| <u>CH11</u> | <u>@Jura</u> |
| <u>CH12</u> | <u>!Luzern</u> |
| <u>CH13</u> | <u>Neuchdtel</u> |
| <u>CH14</u> | <u>Nidwaiden</u> |
| <u>CH15</u> | <u>1Obwaiden</u> |
| <u>CH16</u> | <u>!Sankt Gallen</u> |
| <u>CH17</u> | <u>Schafthausen</u> |
| <u>CH18</u> | <u>Schwyz</u> |
| <u>CH19</u> | <u>Solothurn</u> |
| <u>CH20</u> | <u>!Thurgau</u> |
| <u>CH21</u> | <u>Ticino/Tessin</u> |
| <u>CH22</u> | <u>Uri</u> |
| <u>CH23</u> | <u>Vatais/Wallis</u> |
| <u>CH24</u> | <u>Vaud/Waadt</u> |
| <u>CH25</u> | <u>Zug</u> |
| <u>CH26</u> | <u>IZCjrich</u> |
| <u>CY</u> | <u>Cyprus</u> |
| <u>CZ</u> | <u>Ceska Republika</u> |
| <u>CZ01</u> | <u>Praha</u> |
| <u>CZ02</u> | <u>1 Jihocesky kraj</u> |
| <u>CZ03</u> | <u>Jihomoravsky kraj</u> |
| <u>CZ04</u> | <u>Severocesky kraj</u> |
| <u>CZ05</u> | <u>Severomoravsky kraj</u> |
| <u>CZ06</u> | <u>Stredocesky kraj</u> |
| <u>CZ07</u> | <u>Vychodocesky kr@l</u> |
| <u>CZ08</u> | <u>Zapadocesky kraj</u> |
| <u>EE</u> | <u>Eesti/Estonija</u> |
| <u>FI</u> | <u>Suomi/Finiand</u> |
| <u>F101</u> | <u>Ahvenanmaa/Aland</u> |
| <u>F102</u> | <u>H6meen/Tavastehus</u> |
| <u>F103</u> | <u>Keski-Suomen/Mellersta Finland</u> |
| <u>F104</u> | <u>Kuopion/Kuopio</u> |
| <u>F105</u> | <u>Kymen/Kymmene</u> |
| <u>F106</u> | <u>Lapin/Lapland</u> |
| <u>F107</u> | <u>Mikkelin/S:t Michel</u> |
| <u>F108</u> | <u>Oulun/Uleaborg</u> |
| <u>F109</u> | <u>Pohjois-Kaoaian/Norra Karelen</u> |
| <u>F110</u> | <u>Turun-Porin/Abo-Bj6rneborg</u> |
| <u>F111</u> | <u>Uudenmaan/Nyland</u> |
| <u>F112</u> | <u>Vaasan/Vasa</u> |
| <u>FO</u> | <u>Faeroerne</u> |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| ARRGCD | Adm. Region name |
|---------------|-------------------------|
| GE | Georoia |
| GEOI | Abhkciz ASSR |
| GEO'Z | Adzhar ASSR |
| GE03 | Georgia |
| GE04 | Yugo-Osetin NO |
| HR | H rvatska |
| HU | Magyarország |
| HUO 1 | Baranya |
| HUO2 | Bacs-Kiskun |
| HUO3 | Mk6s |
| HUO4 | Borsod-Abau@zempi6n |
| HUO5 | Budapest |
| HUO6 | ICsongrad |
| HUO7 | Fej6r |
| HUO8 | Gy6r-Moson-Sopron |
| HUO9 | Hajdu-Bihar |
| HU10 | Heves |
| HU11 | Jasz-Nagykun-Szojok |
| HU12 | Komaro@Esztergom |
| HU13 | Nograd |
| HU 14 | Pest |
| HU15 | Somogy |
| HU16 | Szaboics-Szatmar-Bereg |
| HU17 | Toina |
| HU18 | Vas |
| HU19 | lveszprc-m |
| HU20 | 1Zaia |
| Is | Island |
| KZ | Kazakhstan |
| U | Uechtenstein |
| LT | Uetuva/@a |
| iv | |
| MC | Monaco |
| MD | Moidova |
| MK | makedoni-ia |
| MT | Malta |
| INO | i Norge |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| ARRGCD | Adm. Region name |
|---------------|-------------------------|
| <u>N001</u> | <u>IAust-Agder</u> |
| <u>N002</u> | <u>Buskerud</u> |
| <u>N003</u> | <u>Finnmark</u> |
| <u>N004</u> | <u>Hedmdrk</u> |
| <u>N005</u> | <u>Hordaland</u> |
| <u>N006</u> | <u>Moere og Rorndal</u> |
| <u>N007</u> | <u>ordiand</u> |
| <u>N008</u> | <u>Nord-Troendelag</u> |
| <u>N009</u> | <u>lOppland</u> |
| <u>N010</u> | <u>Oslo og Akershus</u> |
| <u>NO1 1</u> | <u>Oestfold</u> |
| <u>NO12</u> | <u>Rogaiand</u> |
| <u>N013</u> | <u>Sogn og Fjordane</u> |
| <u>N014</u> | <u>iSoer-Troendetag</u> |
| <u>N015</u> | <u>@Telemark</u> |
| <u>NO16</u> | <u>Trom</u> |
| <u>NO17</u> | <u>Vest-Agder</u> |
| <u>NO18</u> | <u>Vestfold</u> |
| | |
| <u>PL</u> | <u>Poiska</u> |
| <u>PLO 1</u> | <u>Bialskopodiaskie</u> |
| <u>PLO2</u> | <u>Bialostockie</u> |
| <u>PLO3</u> | <u>Bieiskie</u> |
| <u>PLO4</u> | <u>Bydgoskie</u> |
| <u>PLO5</u> | <u>Cheimskie</u> |
| <u>PLO6</u> | <u>Ciechanowskie</u> |
| <u>PLO7</u> | <u>Czestochowskie</u> |
| <u>PLO8</u> | <u>Elbiaskie</u> |
| <u>PLO9</u> | <u>Gdanskie</u> |
| <u>PL10</u> | <u>Gorzowskie</u> |
| <u>PLI I</u> | <u>Jeleniogorskie</u> |
| <u>PL12</u> | <u>Kaliskie</u> |
| <u>PL13</u> | <u>Katowickie</u> |
| <u>PL14</u> | <u>Kieieckje</u> |
| <u>PL15</u> | <u>Koninskie</u> |
| <u>PL16</u> | <u>Koszalinskie</u> |
| <u>PL17</u> | <u>lkrakowskie</u> |
| <u>PL18</u> | <u>Krosnienskie</u> |
| <u>PL19</u> | <u>Legnickie</u> |
| <u>PL20</u> | <u>Leszczynskie</u> |
| <u>PL21</u> | <u>Locizkie</u> |
| <u>PL22</u> | <u>Lorreynskie</u> |
| <u>P123</u> | <u>Lubelskie</u> |
| <u>PL24</u> | <u>Nowosadeckie</u> |
| <u>PL25</u> | <u>Olsztynskie</u> |
| <u>PL26</u> | <u>Opoiskie</u> |
| <u>PL27</u> | <u>Ostroleckie</u> |
| <u>PL28</u> | <u>Piiskje</u> |
| <u>PL29</u> | <u>Piotrkowskie</u> |
| <u>PL30</u> | <u>Plockie</u> |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| ARRGCD | Adm. Region name |
|---------------|-------------------------|
| PL31 | Poznanskie |
| PL32 | Przemyskie |
| PL33 | Radomskie |
| PL34 | Rzeszowskie |
| PL35 | Siedleckie |
| PL36 | Sieradzkie |
| PL37 | Skierniewickie |
| PL38 | Islupskie |
| PL39 | Suwaiskie |
| PL40 | Szczecinskie |
| PL41 | Tarnobrzeskie |
| P142 | Tarnowskie |
| PL43 | Torunskie |
| PL44 | Walbrzyskie |
| PL45 | Warszawskie |
| PL46 | Wlodziawskie |
| PL47 | Wrociawskie |
| PL48 | 1Za ojskie |
| PL49 | Zielonogorskie |
| RO | Romania |
| R001 | Aiba |
| R002 | Arad |
| R003 | Arges |
| R004 | Bacau |
| R005 | Bihor |
| R006 | Bistrita-Nasaud |
| R007 | otosani |
| R008 | Brasov |
| R009 | Braila |
| R010 | Bucuresti |
| R011 | Buzau |
| RO12 | Caras-Severin |
| R013 | Calarasi |
| RO14 | ciuj |
| R015 | Constanta |
| R016 | Covasna |
| R017 | Dimbovita |
| R018 | Doij |
| 0019 | Galati |
| R020 | Giurgiu |
| R021 | Gorj |
| R022 | Harghita |
| R023 | |
| R024 | |
| R025 | |
| R026 | |
| R027 | |
| RO28 | Mures |
| IRO29 | Neamt |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON E.C MEMBER STATES

| ARRGCD | Adm. Region name |
|---------------|-------------------------------|
| <u>R030</u> | <u>Olt</u> |
| <u>R031</u> | <u>Prahova</u> |
| R032 | <u>Satu Mare</u> |
| <u>R033</u> | <u>Salaj</u> |
| <u>R034</u> | <u>Sibiu</u> |
| R035 | <u>Suceava</u> |
| R036 | !Teiorman |
| R037 | itimis |
| R038 | @Tuicea |
| R039 | Vasiui |
| R040 | Viicea |
| R041 | Vrancea |
| RU | Rossija |
| RUOJ01 | Arkhangel'sk obl. |
| RUO102 | Karelian ASSR |
| RUO103 | Komi ASSR |
| RUOJ04 | Murmansk obl. |
| RUOJ05 | Nenets AO |
| RUO106 | Vologda obl, |
| RUO201 | Leningrad obl, |
| RUO202 | Novgorod obl. |
| RUO203 | Pskov obl. |
| RUO301 | Bryansk obl. |
| RUO302 | Ivanovo obl. |
| RUO303 | Kalinin obl. |
| U0304 | Kaliningrad obl. |
| RUO305 | Kaluga obt. |
| RUO306 | Kostroma obl. |
| RUO307 | Moscow obl. |
| U0308 | Orel obl. |
| U0309 | Ryazan obl. |
| RUO3 10 | bl. |
| RUO311 | Tula obt. |
| RUO312 | Viadimir obl. |
| RUO313 | Yoroslavi'obl. |
| RUO401 | Beigorod obl. |
| RUO402 | Kursk obl. |
| RUO403 | Upetsk obl. |
| RUO404 | Tambov obl. |
| RUO405 | Voronesh o 1. |
| RUO501 | _ @dyg2y AO |
| RUO502 | -Chechen |
| RUO503 | Dagestan ASSR |
| RUO504 | - Kabardino-Balkar ASSR |
| <u>RUO505</u> | <u>Karachayevo-Cherkes AO</u> |
| <u>RUO506</u> | Krasnodar <u>kray</u> |
| <u>RUO507</u> | <u>Rostov obl.</u> |
| <u>RUO508</u> | <u>Severo-Osetin ASSR</u> |
| <u>RUO509</u> | tavropol <u>kray</u> |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| ARRGCD | Adm. Reg. name |
|---------------|-----------------------|
| RUO601 | Astrakhan obl. |
| RUO602 | Bashkir ASSR |
| RUO603 | Kaimyk ASSR |
| RUO604 | Kuybyshev obl. |
| RUO605 | Penza obl. |
| RUO606 | Saratov obl. |
| RUO607 | Tatar ASSR |
| RUO608 | Ui'yanovsk obl. |
| RUO609 | IVoigograd obl. |
| RUO701 | Chuvash ASSR |
| RUO702 | Gor'kiy obl. |
| RUO703 | Kirov obl. |
| RUO704 | Mary ASSR |
| RUO705 | Mardva ASSR |
| RUO801 | Cheyabinsk obl. |
| RUO802 | Kom@Permyak NO |
| RUO803 | Kurgan obl. |
| RUO804 | Orenburg obl. |
| RUO805 | Perm obl. |
| RUO806 | Sverdfowsk obl. |
| RUO807 | Udmurt ASSR |
| SE | Sverige |
| SEO I | Atvsborg |
| SE02 | Biekinqe |
| SE03 | G6tebora och B6hus |
| SE04 | Gdvieborg |
| SE05 | Gotland |
| SE06 | Hai!pod |
| SE07 | JdmTland |
| SE08 | J6nk6ping |
| SE09 | Kainiar |
| SE10 | Kopparberg |
| SE] 1 | Kdstianstad |
| SE]2 | Kronoberg |
| SE13 | Maim6hus |
| SE14 | Norrbotten |
| SE15 | Orebro |
| SE16 | |
| SE17 | Skaraborg |
| SE18 | S6dermaniond |
| SE]9 | Stockholm |
| SE20 | Uppsala |
| SE21 | V(irmiand |
| SE22 | V6sterbotten |
| SE23 | V6sternorriand |
| SE24 | V6stmaniand |
| SL | Slovenija |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| ARRGCD | Adm. Region name |
|-----------------|-----------------------------------|
| <u>SJ</u> | <u>i Svaibard & Jan Mayen</u> |
| <u>SK</u> | <u>'Slovenska Republika</u> |
| <u>SKO I</u> | <u>BratislaVa</u> |
| <u>SK02</u> | <u>@Stredoslovensky kraj</u> |
| <u>SK03</u> | <u>Vychodoslovenski kraj</u> |
| <u>SK04</u> | <u>@Zapadoslovensky kraj</u> |
| <u>SM</u> | <u>:San Marino</u> |
| <u>TR</u> | <u>TOrkiye</u> |
| <u>TRO1</u> | <u>@Trakya</u> |
| <u>TRO101</u> | <u>Canakkale</u> |
| <u>TRO 1 02</u> | <u>Edirne</u> |
| <u>TRO103</u> | <u>I Istanbul</u> |
| <u>TRO104</u> | <u>@K rklareli</u> |
| <u>TRO105</u> | <u>Tekirdag</u> |
| <u>TRO2</u> | <u>Karadeniz Kiyisi</u> |
| <u>TRO201</u> | <u>@!Artvin</u> |
| <u>TRO202</u> | <u>Bolu</u> |
| <u>TRO203</u> | <u>Giresun</u> |
| <u>TRO204</u> | <u>Kastamonu</u> |
| <u>TRO205</u> | <u>!Ordu.</u> |
| <u>TRO206</u> | <u>I Rtze</u> |
| <u>TRO207</u> | <u>!Sakarya</u> |
| <u>TRO208</u> | <u>Sarmun</u> |
| <u>TRO209</u> | <u>Sinop</u> |
| <u>TRO2 I 0</u> | <u>:Trabzon</u> |
| <u>TRO211</u> | <u>@Zonguidak</u> |
| <u>TRO3</u> | <u>'Marmara Ve Ege Kiyiari</u> |
| <u>TRO301</u> | <u>@Aydin</u> |
| <u>TRO302</u> | <u>Balikesir</u> |
| <u>TRO303</u> | <u>Bursa</u> |
| <u>TRO304</u> | <u>Canakkale an13u,</u> |
| <u>mm</u> | <u>ir</u> |
| <u>fl~7</u> | <u>Kocaeli</u> |
| <u>TRO308</u> | <u>Manisa</u> |
| <u>TRO309</u> | <u>Mugla</u> |
| <u>TRO4</u> | <u>Akdeniz K"i</u> |
| <u>TRO401</u> | <u>Adana</u> |
| <u>TRO402</u> | <u>Antaiya</u> |
| <u>fl~</u> | <u>Hatay</u> |
| <u>TRO404</u> | <u>ices</u> |
| <u>TRO5</u> | <u>Bati Anadoiu</u> |
| <u>TRO501</u> | <u>Afyonkarahisar</u> |
| <u>TRO502</u> | <u>Bilecik</u> |
| <u>TRO503</u> | <u>Burdur</u> |
| <u>TRO504</u> | <u>Denizli</u> |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC. MEMBER STATES

| ARRGCD | Adm. Region name |
|----------------|-----------------------------|
| <u>TRO506</u> | <u>Isparto</u> |
| <u>TRO507</u> | <u>@K0tahya</u> |
| <u>TRO508</u> | <u>iusak</u> |
| <u>TRO6</u> | <u>I lc Anadoiu</u> |
| <u>TRO601</u> | <u>1Adiyaman</u> |
| <u>TRO602</u> | <u>1Amasya</u> |
| <u>TRO603</u> | <u>lankara</u> |
| <u>TRO604</u> | <u>1 Cankid</u> |
| <u>TRO605</u> | <u>icorum</u> |
| <u>TRO606</u> | <u>Kayseri</u> |
| <u>TRO607</u> | <u>Kirsehir</u> |
| <u>TRO608</u> | <u>Konya</u> |
| <u>TRO609</u> | <u>Malatya</u> |
| <u>TRO610</u> | <u>Kahramanmaras</u> |
| <u>@II</u> | <u>Nevsehir</u> |
| <u>TRO612</u> | <u>Nigde</u> |
| <u>TRO613</u> | <u>Slvas</u> |
| <u>TRO614</u> | <u>1Tokat</u> |
| <u>TRO615</u> | <u>Yozgat</u> |
| <u>TRO7</u> | <u>--G0neydogu Anadoiu</u> |
| <u>TRO701</u> | <u>Gazjantep</u> |
| <u>TRO702</u> | <u>Mardin</u> |
| <u>TRO703</u> | <u>Saniiurfa</u> |
| <u>TRO8</u> | <u>Dogu Anadolu</u> |
| <u>TRO801</u> | <u>Agd</u> |
| <u>TRO802</u> | <u>Bing61</u> |
| <u>TRO803</u> | <u>Bifiis</u> |
| <u>TRO804</u> | <u>Diyarbakir Elazig</u> |
| <u>TRO806</u> | <u>Erzincon</u> |
| <u>TRO807</u> | <u>Erzurum</u> |
| <u>TRO808</u> | <u>G0mOshane</u> |
| <u>TRO809</u> | <u>Hakkad</u> |
| <u>TRO810</u> | <u>Kars</u> |
| <u>TRO811</u> | <u>Mus</u> |
| <u>TRO812</u> | <u>Siirt</u> |
| <u>TRO813</u> | <u>Tunceli</u> |
| <u>TRO814</u> | <u>Van</u> |
| <u>UA</u> | <u>Ukrajina/Ukraiana</u> |
| <u>UAO101</u> | <u>Cherkassy obl.</u> |
| <u>UAO102</u> | <u>Chernigov obl.</u> |
| <u>UAO103</u> | <u>Chemovtsy obl.</u> |
| <u>UAO104</u> | <u>1vano-Frankovsk obt.</u> |
| <u>UAO105</u> | <u>Khmei'nitsky obl.</u> |
| <u>UAO106</u> | <u>Kiyev</u> |
| <u>UAO107</u> | <u>Uvov obl.</u> |
| <u>UAO108</u> | <u>Rovno obl.</u> |
| <u>UAO109</u> | <u>Ternopol obl.</u> |
| <u>UAO1 10</u> | <u>Vinnitsa obl.</u> |

TABLE 3: LIST OF ADMINISTRATIVE REGIONS OF NON EC MEMBER STATES

| <u>ARRGCD</u> | <u>iadm. Region name</u> |
|-----------------|------------------------------|
| <u>UAOI 1 1</u> | <u>lvolyn'obl.</u> |
| <u>UAO 1 12</u> | <u>lZakarpatskaya obl.</u> |
| <u>UAO 1 13</u> | <u>Zhitomir obl.</u> |
| <u>UAO201</u> | <u>Kherson obl.</u> |
| <u>UAO202</u> | <u>Krym obt.</u> |
| <u>UAO203</u> | <u>inikolayev obl.</u> |
| <u>UAO204</u> | <u>l Odessa obi '</u> |
| <u>UAO301</u> | <u>l Dnepropetrovsk obl.</u> |
| <u>UAO302</u> | <u>i Donetsk obt.</u> |
| <u>UAO303</u> | <u>Kharkov obl.</u> |
| <u>UAO304</u> | <u>Kirovgrad obl.</u> |
| <u>UAO305</u> | <u>Poftava obl.</u> |
| <u>UAO306</u> | <u>L.Sumy obl.</u> |
| <u>UAO307</u> | <u>!Voroshiloygrad obl.</u> |
| <u>UAO308</u> | <u>izaporozh'ye obl.</u> |
| <u>VA</u> | <u>Citta dei Vatacano</u> |
| <u>YU</u> | <u>ilugoslavija</u> |
| <u>Yuol</u> | <u>lCrna Gora</u> |
| <u>YUO2</u> | <u>LSrbija</u> |
| <u>YUO201</u> | <u>I Srbija</u> |
| <u>YUO202</u> | <u>lkosovo</u> |
| <u>YUO203</u> | <u>Vojvodina</u> |