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Structure of the RAINS 7.0 Energy and Emissions Database

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IIASA Working Paper

WP-93-067

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Preface

The Regional Acidification Information and Simulation (RAINS) model has been developed as a tool to assess alternative strategies for reducing acid deposition. In the last years the model has been implemented for Europe, and it has been used to support international negotiations within the framework of the UN/ECE Convention on Long-range Transboundary Air Pollution.

Only recently, acidification has been recognized as a potential problem also for the rapidly growing economies in South-East Asia. To explore this potential threat and to design countermeasures at an early stage the RAINS model is now being implemented also for this region. Consequently, data base structures and software have been revised to make the RAINS model a universal tool applicable to any region in the world, provided sufficient data are available.

This paper gives a detailed description of the revised data base structure of the energy and emissions module of the new model version (RAINS 7.0) and provides data collection tables to facilitate the preparation of model input data.

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STRUCTURE OF THE
RAINS 7.0
ENERGY- AND EMISSIONS DATABASE

Imrich Bertok, Janusz Cofala, Zbigniew Klimont, Wolfgang Schöpp, Markus Amann

INTRODUCTION

This paper describes the structure of the input data for the energy and emissions (ENEM) module of the new version of the Regional Acidification Information and Simulation (RAINS) model. This version is called further RAINS 7.0 and will be applied both to Europe and to South-East Asia. The paper defines the types of data to be collected and the formats in which the collected data must be specified.

The paper is divided into three sections.

Section 1: Database Overview
This section provides an overview of the whole of the energy and emissions (ENEM) database.

Section 2: Data Collection Tables
This section presents tables for all energy and emissions data to be collected. A sample table along with a detailed explanation of the specific data required for each table is given. Also, the procedures for filling out the table are given. Included in the explanation is a prioritization of what data are most important, and suggestions on what to do if data are not available.

Section 3: DBASE File Structure
This section specifies the exact format of the dBase files needed for direct input into the ENEM module.

It must be emphasized that **all sources of data (references, officials interviewed, etc.) and all methodologies used should be recorded and reported along with the data collected for each table in this paper. It is imperative that all data sources be well documented.**

Examples of structural data from Section 2.1, like country and region names, and the estimates of the amount of data that needs to be collected (as presented in Section 3), are for the Asian implementation of the RAINS model.

1. DATABASE OVERVIEW

The ENEM module of the RAINS 7.0 requires two types of temporal data:

1. historical (i.e., for the 1990 baseyear),
2. future (including 'official energy pathway')

In addition, the ENEM module requires two types of spacial data:

1. area source,
2. large point source.

Area sources are defined as non-point sources and small point sources for which individual data can not be collected. A large point source (LPS) is any emission source at a fixed location for which individual data are collected.

The definition of large point source is study-specific. It depends on data availability in the specific situation as well as on the aim of the study. However, because of problems with data storage and handling, the total number of LPS in any RAINS implementation should not exceed 200. Thus it is recommend that a large point source is defined as an emitting complex with:

- total electric output capacity greater than or equal to 500 MW_{el} (electric power plants), or
- total thermal input capacity greater than or equal to 1500 MW_{th} (industrial plants), or
- annual SO_2 emissions greater than 20,000 metric tons, or
- annual NO_x emissions greater than 5000 metric tons.

Emission calculations are predominantly energy-based. However, non-energy emissions are also considered. Non-energy emissions include process emissions from such sources as pulp and paper mills, smelters, refineries, cement plants, etc. Energy-based emissions are calculated on the basis of energy consumption, fuel characteristics, and applied emission control technologies.

The above temporal and spacial data should be organized hierarchically into the following three levels:

1. world region (e.g., Asia)
2. country
3. sub-national region.

Energy consumption should be estimated for the sub-national regions. For small countries sub-national regions are not distinguished and energy consumption should be estimated for a country as a whole.

The input data to ENEM, as described in detail in Section 2, are divided into the following subsections.

1. Structural Data

This section specifies the fuel types, sectors, control technologies, year and time period codes, and energy pathway[1)] name designations that are used in all subsequent tables. Except for the energy pathway designations, all tables in this section are fixed and do not require user input. Essentially the tables in this section define the structure of the database.

2. Fuel Characteristics

This section specifies the fuel characteristics (calorific value, sulfur content, and sulfur retained in ash) needed to calculate emissions from area sources.

3. National/Regional Energy Consumption

This section specifies total (area and large point source) energy consumption by sector and fuel type at the national or regional level. The sectors included are:

1. fuel conversion
2. power/district heating plants
3. domestic (residential, commercial, agricultural)
4. industrial
5. transportation.

4. Industrial Process Emissions

This section specifies data needed to estimate process emissions. To estimate process emissions two types of data are required: 1) the activity level (i.e., annual input or output to a given industrial process), and 2) an emission factor for the process. For accurate emission estimates, country or region-specific emission factors are desirable, but if data are not available a default set of values is provided (Table 2.3.3).

5. Emission Controls on Existing Plants

This section specifies fuel consumption in existing boilers equipped with emission controls for SO_x and NO_x. The purpose of this section is to get an estimate of the degree of emission controls in a given country and region. All sources (area and point) on which controls were installed before or during the 1990 base year are to be included. Controls for large point sources are also specified in Table 2.6.8. If the totals for all point sources are subtracted from the data in this section, the difference represents controls on those sources (called area

[1)]Scenarios of energy demand are called further 'energy pathways'. The term 'scenario' is used to describe a set of emission control measures.

sources) for which specific data could not be collected.

6. Large Point Sources (LPS)

This section specifies data necessary to estimate emissions from large point sources. As stated above a large point source (LPS) is any emission source at a fixed location for which individual data are collected.

A large point source is defined as an emitting complex with:

- total electric output capacity greater than or equal to 500 MW_{el} (electric power plants), or
- total thermal input capacity greater than or equal to 1500 MW_{th} (industrial plants), or
- annual SO_2 emissions greater than 20,000 metric tons, or
- annual NO_x emissions greater than 5000 metric tons.

Because the large point source dataset is the rather complicated, the examples of tables with data for LPS are shown in the Appendix 1. Two LPS have been described, namely a power plant (of autoproducer) and an integrated steel mill. Historic data in the examples are based on characteristics of two French LPS stored in the CORINAIR'85 emission inventory database[2)]. Data on expansion plans and future operation regime up-to the year 2020 are illustrative only.

[2)]This database has been made available to IIASA by the CITEPA, Paris.

2. DATA COLLECTION TABLES

2.1 STRUCTURAL DATA

Table 2.1.1 Country Names and Abbreviations

File Name: COUNTRY.DBF

This table lists the country names and abbreviations used in the ENEM module. The country abbreviations (COU_ABB) are used in almost all data collection tables. For instance, the COUNTRY table lists the name and abbreviation of the 23 countries included in the RAINS-ASIA definition of Asia. Note that there is an additional record (#19) which is used to specify the international sea lanes in Asia.

	COUNTRY	COU_ABB
1	BANGLADESH	BANG
2	BHUTAN	BHUT
3	BRUNEI	BRUN
4	MYANMAR	MYAN
5	CAMBODIA	CAMB
6	CHINA	CHIN
7	HONG KONG	HONG
8	INDIA	INDI
9	INDONESIA	INDO
10	JAPAN	JAPA
11	KOREA, NORTH	KORN
12	KOREA, SOUTH	KORS
13	LAOS	LAOS
14	MALAYSIA	MALA
15	MONGOLIA	MONG
16	NEPAL	NEPA
17	PAKISTAN	PAKI
18	PHILIPPINES	PHIL
19	SEA LANES	SEAL
20	SINGAPORE	SING
21	SRI LANKA	SRIL
22	TAIWAN	TAIW
23	THAILAND	THAI
24	VIETNAM	VIET

Table 2.1.2 Region Names and Abbreviations

File Name: REGIONS.DBF

This table lists the sub-national region names and abbreviations used in the ENEM module. The region abbreviations (REG_ABB) are used in almost all data collection tables. The REGION table, which is presented below, lists the name and abbreviation of the 95 sub-national regions included in RAINS-ASIA. A region is a subdivision of a country which includes one or more administrative districts or provinces within the country. In some cases, for small countries, the region is the whole country.

	COU_ABB	REGION	REG_ABB
1	BANG	DHAKA	DHAK
2	BANG	REST OF COUNTRY	REST
3	BHUT	WHOLE COUNTRY	WHOL
4	BRUN	WHOLE COUNTRY	WHOL
5	BURM	WHOLE COUNTRY	WHOL
6	CAMB	WHOLE COUNTRY	WHOL
7	CHIN	NE PLAIN:HEILONGJIANG-JILIN-LIAONING	NEPL
8	CHIN	SHENYANG	SHEN
9	CHIN	HEBEI-HENAN-ANHUI	HEHE
10	CHIN	BEIJING	BEIJ
11	CHIN	TIANJIN	TIAN
12	CHIN	SHANDONG	SHND
13	CHIN	SHANXI	SHNX
14	CHIN	TAIYUAN	TAIY
15	CHIN	SHAANXI-GANSU	SHGA
16	CHIN	INNER MONGOLIA:NEI MONGOL-NINGXIA	IMON
17	CHIN	HUBEI	HUBE
18	CHIN	WUHAN	WUHA
19	CHIN	HUNAN	HUNA
20	CHIN	JIANGXI	JINX
21	CHIN	JIANGSU	JINU
22	CHIN	SHANGHAI	SHAN
23	CHIN	ZHEJIANG	ZHEJ
24	CHIN	FUJIAN	FUJI
25	CHIN	GUANGDONG-HAINAN	GUAH
26	CHIN	GUANGZHOU	GUAZ
27	CHIN	GUANGXI	GUAX
28	CHIN	SICHUAN	SICH
29	CHIN	CHONGQING	CHON
30	CHIN	GUIZHOU	GUIZ
31	CHIN	GUIYANG	GUIY
32	CHIN	YUNNAN	YUNN
33	CHIN	WEST: TIBET-QINGHAI-XINJIANG UYGUR	WEST
34	HONG	WHOLE COUNTRY	WHOL
35	INDI	W.HIMALAYAS:JAMMU-KASHMIR-HIMACHAL PRADESH	WHIM
36	INDI	PUNJAB-CHANDIGARH	PUNJ
37	INDI	HARYANA	HARY
38	INDI	DELHI	DELH
39	INDI	RAJASTHAN	RAJA
40	INDI	GUJARAT	GUJA
41	INDI	UTTAR PRADESH	UTPR
42	INDI	MADHYA PRADESH	MAPR
43	INDI	BIHAR	BIHA
44	INDI	WEST BENGAL	BENG
45	INDI	CALCUTTA	CALC
46	INDI	E.HIMALAYAS: ASSAM-NE HIGHLAND	EHIM
47	INDI	ORISSA	ORIS
48	INDI	MAHARASHTRA-DADRA-NAGAR HAVELI-DAMAN-DIU	MAHA

49	INDI	BOMBAY	BOMB
50	INDI	ANDRA PRADESH	ANPR
51	INDI	KARNATAKA-GOA	KARN
52	INDI	MADRAS	MADR
53	INDI	TAMIL NADU-PONDICHERRY	TAMI
54	INDI	KERALA	KERA
55	INDO	SUMATRA	SUMA
56	INDO	JAVA	JAVA
57	INDO	JAKARTA	JAKA
58	INDO	REST OF COUNTRY	REST
59	JAPA	HOKKAIDO-TOHOKU	HOTO
60	JAPA	KANTO-CHUBU	KACH
61	JAPA	TOKYO-KANAGAWA	TOKA
62	JAPA	KINKI-KYOTO-CHUGOKU	KKCH
63	JAPA	OSAKA	OSAK
64	JAPA	SHIKOKU-KYUSHU-OKINAWA	SKOK
65	KORN	WHOLE COUNTRY	WHOL
66	KORS	NORTH	NORT
67	KORS	SEOUL-INCHON	SEOI
68	KORS	SOUTH	SOUT
69	KORS	PUSAN	PUSA
70	LAOS	WHOLE COUNTRY	WHOL
71	MALA	PENINSULAR MALAYSIA	PENM
72	MALA	KUALA LUMPUR	KUAL
73	MALA	SARAWAK-SABAH	SASA
74	MONG	WHOLE COUNTRY	WHOL
75	NEPA	WHOLE COUNTRY	WHOL
76	PAKI	PUNJAB	PUNJ
77	PAKI	LAHORE	LAHO
78	PAKI	SIND	SIND
79	PAKI	KARACHI	KARA
80	PAKI	NW FRONTIER PROVINCE-BALUCHISTAN	NWBA
81	PHIL	LUZON	LUZO
82	PHIL	METRO MANILA	MANI
83	PHIL	BICOL-VISAYAS-MINDANAO	BVMI
84	SEAL	SEA LANES	SEAL
85	SING	WHOLE COUNTRY	WHOL
86	SRIL	WHOLE COUNTRY	WHOL
87	TAIW	WHOLE COUNTRY	WHOL
88	THAI	N HIGHLANDS	NHIG
89	THAI	NE PLATEAU	NEPL
90	THAI	CENTRAL VALLEY	CVAL
91	THAI	BANGKOK METROPOLITAN REGION	BANG
92	THAI	S PENINSULA	SPEN
93	VIET	NORTH: RED RIVER DELTA-HANOI	NORT
94	VIET	SOUTH: MEKONG RIVER DELTA-HO CHI MINH CITY	SOUT

Table 2.1.3 Longitude and Latitude of Grid Cells

File Name: GRID_REG.DBF

This table/database file contains the longitude and latitude, and the region number (the record number from the REGIONS.DBF file) associated with every grid cell in the entire modelling area. For RAINS-ASIA there are approximately 6,000 grid cells in all. The longitude and latitude numbers reference the *lower left-hand corner* of a one degree by one degree grid cell. Thus, the grid cell (90,23) refers to the intersection of the 90 degree longtitude and the 23 degree latitude lines which correspond to the southwest (lower left-hand) corner of this grid cell. This file is pre-defined. The example below only shows the first few records of this huge file. Note that a value of 0 denotes that the grid cell is either in an ocean, or a country (such as Afghanistan) which is not included in the RAINS-ASIA model's definition of Asia.

Sample from GRID_REG file:

Record#	LONGITUDE	LATITUDE	Region# (=record number from REGIONS.DBF file)
1	90	20	0
2	90	21	0
3	90	22	2
4	90	23	1
5	90	24	2
6	90	25	46
7	90	26	46
8	90	27	3
9	90	28	33
10	90	29	33
11	90	30	33

Table 2.1.4 Fuel Types

File Name: FUELS.DBF

This table lists the fuel types used in the ENEM module. The table specifies the fuel name and the fuel abbreviation code. The fuel code is used in subsequent tables.

Fuel	Fuel Code FUEL_ABB
Brown coal/lignite, low sulfur	BC1
Brown coal/lignite, high sulfur	BC2
Hard coal, low sulfur	HC1
Hard coal, medium sulfur	HC2
Hard coal, high sulfur	HC3
Derived coal (coke, briquettes)	DC
Other solids, low sulphur[3]	OS1
Other solids, high sulphur[4]	OS2
Heavy fuel oil	HF
Medium distillates (diesel oil, light fuel oil)	MD
Light fractions (gasoline, kerosene, naphtas, LPG)	LF
Natural Gas	GAS
Renewables[5]	REN
Hydro	HYD
Nuclear	NUC
Electricity	ELE
Heat (steam and hot water)	HT

[3] The two 'other solids' categories are flexible. They can be used to represent different fuel types in different countries. Other solids includes such fuels as wood, plant residue, charcoal, animal waste, garbage (for incineration), etc. In countries like India or Bangladesh OS1 could be used for wood and vegetal waste combustion and OS2 for dung. In a country like Japan OS1 might represent all biomass and OS2 incinerated garbage. The choice of how to partition other solids is left up to the data collector, but the categorization chosen must be clearly specified!

[4] See above footnote.

[5] Includes solar, small-scale hydro, wind, geothermal, etc. Does not include biomass; this is included in OS1 or OS2.

Table 2.1.5 Energy/Emissions Sectors

File Name: SECTOR.DBF

This table lists the sectors and subsectors used in the ENEM module. The table specifies the sector name and sector abbreviation code. The sector codes are used in subsequent tables. Most of the emissions in each sector are due to energy consumption, but some are due to non-energy uses. Five (5) major sectors are defined:

1. fuel conversion
2. power/district heating plants
3. domestic
4. transportation
5. industrial.

The fuel conversion sector includes refineries, coke plants, gasification plants, etc. It does not include fuel consumed in the production of electricity or heat in power plants. This is included in the power plant/district heat sector. However, power plant/district heat own use, and transmission and distribution losses, are included in this sector.

The domestic sector includes energy consumption in the residential, commercial and agricultural subsectors.

Sector Subsector	Sector Code SEC_ABB
Fuel Conversion	**CON**
Combustion	CON_COMB
Losses[6]	CON_LOSS
Centralized (public) Power & District Heating Plants	**PP**
Existing wet bottom	PP_EX_WB
Existing other	PP_EX_OTH
New	PP_NEW
Domestic	**DOM**
Transportation	**TRA**
Road transport	TRA_RD
Cars, motorcycles and light duty trucks	TRA_RD_LD
2 stroke	TRA_RD_LD2
4 stroke	TRA_RD_LD4
Heavy duty vehicles (trucks, buses, etc.)	TRA_RD_HD
Other transportation (rail, inland water and coastal zone)	TRA_OTHER
Industry	**IN**
Combustion in boilers for electricity and heat only	IN_BO
Other industrial combustion (furnaces)	IN_OC
Process emissions	IN_PR
Oil refineries	IN_PR_REF
Coke plants	IN_PR_COKE
Sinter plants	IN_PR_SINT
Pig iron (blast furnaces)	IN_PR_PIGI
Non-ferrous metal smelters	IN_PR_NFME
Sulfuric acid plants	IN_PR_SUAC
Nitric acid plants	IN_PR_NIAC
Cement and lime plants	IN_PR_CELI
Pulp mills	IN_PR_PULP
Non-energy use	**NONEN**

[6]Includes own use of electricity and heat by energy producing industries.

Tables 2.1.6 and 2.1.7 Control Technologies

Table 2.1.6 lists the SO_2, and Table 2.1.7 the NO_X, emission control technologies considered in the ENEM module along with their abbreviation codes. The technology codes are used in subsequent tables.

Table 2.1.6 SO_2 Emission Control Technologies

File Name: COTECSO2.DBF

Type of control	SO2 Technology Code TECH_ABB
Low Sulfur Fuels:	LSFUEL
Low sulphur coal	LSCO
Low sulphur coke	LSCK
Low sulphur fuel oil	LSHF
Low sulphur medium distillates - stage 1 (0.3%S)	LSMD1
Low sulphur medium distillates - stage 2 (0.05%S)	LSMD2
Flue Gas Desulfurization (FGD):	
Limestone injection	LINJ
Wet flue gas desulfurization	WFGD
Regenerative flue gas desulfurization	RFGD
Process/Technology emissions:	
Stage 1 control (50% efficiency)	SO2PR1
Stage 2 control (70% efficiency)	SO2PR2
Stage 3 control (80% efficiency)	SO2PR3

Table 2.1.7 NO_x Emission Control Technologies

File Name: COTECNOX.DBF

Type of control	NOX Technology Code TECH_ABB
Boilers and Industrial Combustion:	
Combustion modification	CM
Selective catalytic reduction	SCR
Process/Technology Emissions:	
Stage 1 control (40% efficiency)	NOXPR1
Stage 2 control (60% efficiency)	NOXPR2
Stage 3 control (80% efficiency)	NOXPR3
Transport:	
Gasoline cars (4-stroke):	
Combustion modification - Europe Norm	CMEU
Catalytic converters (US Norm 91)	CCUS91
Diesel passenger cars:	
Combustion modification	CMDC
Heavy duty diesel vehicles	
Combustion modification (US Norm 85)	CMUS85
Combustion modification (US Norm 93)	CMUS93
Ships	
Selective catalytic reduction (SCR)	SCRSH

Tables 2.1.8 and 2.1.9 Historical/Future Time Periods

Table 2.1.8 lists the years and year codes used in the ENEM module, and table 2.1.9 lists the time intervals and time interval codes used. The year and time interval codes are used in subsequent tables.

Table 2.1.8 Year Codes

File Name: YEAR.DBF

YEAR	YEAR_CODE	YEAR_ID
HISTORICAL		
1990	Y1990	0
FUTURE		
2000	Y2000	1
2010	Y2010	2
2020	Y2020	3

Table 2.1.9 Time periods

File Name: PERIOD.DBF

Time Period	Period Code PER_CODE	From YEAR_FROM	To YEAR_UNTIL
HISTORICAL			
Pre 1971	PRE71	1951	1970
1971-1980	P7180	1971	1980
1981-1990	P8190	1981	1990
FUTURE			
1991-2000	P9100	1991	2000
2001-2010	P0110	2001	2010
2011-2020	P1120	2011	2020

Table 2.1.10 Energy Pathway Designation

File Name: ENEPATH.DBF

This table shows the format used to define various energy pathways. A given pathway is named and given an abbreviation and number code. The code is used in subsequent tables. Of all the structural data for the ENEM module, this is the only table to be input by the data collectors or modelers. Data collectors or modelers choose the energy pathway name, abbreviation and ID number.

Energy Pathway Number ENEPATH_ID	Energy Pathway Name ENEPATH_NAME	Energy Pathway Abbreviation ENEPATH_ABB

2.2 FUEL CHARACTERISTICS

National level fuel characteristics data (calorific value, sulfur content, sulfur retained in ash) are to be collected. However, if possible, they should be collected by region. Regional data are preferable to national average values when such data are available. The fuel characteristics are necessary to calculate emissions from area sources. The calorific value and sulfur content are to be specified for all fuels, and sulfur retained in the ash for the solid fuels.

Because emissions from SO_2 from solid fuels are highly dependent on fuel quality, solid fuels may be disaggregated into two brown coal (lignite) types, three hard coal types, and two other (solid) fuel types, e.g., low sulfur biomass, sulfur-rich oil shale, dung, etc. The distinctions are of special importance for countries which are large coal producers (such as China) where quality varies significantly by mining region. The data collector must determine the category breakdowns, and must record the basis of the breakdown. For some countries it may be sufficient to specify a single 'typical' or 'average' coal type.

The 'other solids' fuel categories are especially important for developing countries where, for instance, sulfur emissions for dung or wood can be significant. As one example, the burning of dung is a large source of sulfur emissions in India.

Table 2.2.1 Lower/Net Calorific Value (GJ/metric ton)

File Name: CALVAL.DBF

Required: one table per region

This table specifies the lower or net calorific value in gigajoules per metric ton of fuel. Fuel humidity as supplied to furnaces is assumed. Since the sulfur content of each fuel is specified in percentage by weight, also calorific value of gas should be specified per metric ton.

Codes		Fuel Code FUEL_ABB	Fuel Conversion CON_COMB	Power Plant PP	Domestic DOM	Transport TRA	Industrial Boiler IN_BO	Industrial Other IN_OC
Countries COU_ABB	Region REG_ABB							
		BC1						
		BC2						
		HC1						
		HC2						
		HC3						
		DC						
		OS1						
		OS2						
		HF						
		MD						
		LF						
		GAS						

Table 2.2.2 Sulfur Content (%)

File Name: SCONT.DBF

Required: one table per region

This table specifies the percent sulfur contained in the various fuels for each of the specified sectors. Fuel humidity as supplied to the furnaces is assumed.

Codes		Fuel Code FUEL_ABB	Fuel Conversion CON_COMB	Power Plant PP	Domestic DOM	Transport TRA	Industrial Boiler IN_BO	Industrial Other IN_OC
Countries COU_ABB	Region REG_ABB							
		BC1						
		BC2						
		HC1						
		HC2						
		HC3						
		DC						
		OS1						
		OS2						
		HF						
		MD						
		LF						
		GAS						

Table 2.2.3 Sulfur Retained in Ash (fraction[7])

File Name: SINASH.DBF

Required: one table per region

This table specifies the fraction of sulfur retained in the ash during combustion of various solid fuels. The retention of sulfur in the ash is caused by the alkaline component of the fuel, which remains in the ash and neutralizes sulfur. For instance, if 30 % of sulfur is retained in the ash, then 0.30 should be input to the appropriate field in the file.

Codes		Fuel Code FUEL_ABB	Fuel Conversion CON_COMB	Power Plant PP	Domestic DOM	Transport TRA	Industrial Boiler IN_BO	Industrial Other IN_OC
Countries COU_ABB	Region REG_ABB							
		BC1						
		BC2						
		HC1						
		HC2						
		HC3						
		DC						
		OS1						
		OS2						

[7]Percent of total sulfur retained/100.

Table 2.2.4 Sulfur content of low sulfur fuels (%)

File Name: LSFUELPA.DBF

Required: This table not to be altered by data collectors.

This table specifies the sulfur content of low sulfur fuels which can be used in the development of emission control strategies. Because low sulfur fuels can be traded internationally, it has been assumed that sulfur content of low sulfur fuels is the same for all countries and regions.

Fuel Code FUEL_ABB	Technology code TECH_ABB	Fuel Conversion CON_COMB	Power Plant PP	Domestic DOM	Transport TRA	Industrial Boiler IN_BO	Industrial Other IN_OC
HC1	LSCO	0.60	0.60	0.60	0.60	0.60	0.60
HC2	LSCO	0.60	0.60	0.60	0.60	0.60	0.60
HC3	LSCO	0.60	0.60	0.60	0.60	0.60	0.60
DC	LSCK	0.60	0.60	0.60	0.60	0.60	0.60
HF	LSHF	0.60	0.60	0.60	0.60	0.60	0.60
MD	LSMD1	0.30	0.30	0.30	0.30	0.30	0.30
MD	LSMD2	0.05	0.05	0.05	0.05	0.05	0.05

2.3 NATIONAL/REGIONAL ENERGY CONSUMPTION

Table 2.3.1 Energy Consumption in Fuel Conversion and Industrial Sectors (PJ)

File Name: ENCON_xx.DBF

Required: one table per region per year per energy pathway

This table contains energy and non-energy consumption data in petajoules for the fuel conversion and the industrial sectors. The table records the combined energy consumption for area and large point sources in the fuel conversion and industrial sectors. The data must be disaggregated to sub-national regions, as presented in Table 2.1.2. Separately collected 'Large Point Source ' energy consumption will later be subtracted from these aggregate values to determine the area source contribution alone. The table is divided into energy consumption for the energy conversion and industrial sectors, and non-energy fuel consumption (i.e., the use of fuels as feedstocks). Each of these divisions is discussed below.

This table should record energy use for stationary sources only. Mobile source energy use should be reported in Table 2.3.3 (Energy Consumption in the Domestic and Transportation Sectors).

The last two characters "xx" of the database name represent an energy pathway number as specified in the ENEPATH_ID in Table 2.1.10 (Energy Pathway Designation).

Codes			Fuel Code FUEL_ABB	Fuel Conversion (CON)			Industry (IN)			Non-energy use NONEN
Country COU_ABB	Region REG_ABB	YEAR		CON_COMB	CON_LOSS	Sum	IN_BO	IN_OC	Sum	
			BC1							
			BC2							
			HC1							
			HC2							
			HC3							
			DC							
			OS1							
			OS2							
			HF							
			MD							
			LF							
			GAS							
			REN							
			ELE	xxxxx						
			HT	xxxxx						
			Sum							

xxxxx - combination of fuel/sector not possible

Each of the fuel conversion, industry and non-energy use columns are explained on the next page.

Fuel Conversion Sector

The fuel conversion sector includes refineries, coke and briquette works, gasification plants, etc. It does not include 'energy' conversion in central power plants or district heating plants. This in covered in Table2. 4.2 (Energy Consumption in Power Plant/District Heat Sector). Energy consumption in the fuel conversion sector is divided into three categories: 1) combustion in the conversion process itself, 2) combustion in boilers belonging to the fuel conversion sector for their own-use generation of electricity and heat, and 3) distribution and transmission losses for a given fuel product. The reason for these distinctions is that the emission factors and control strategies (technologies) are different for each category. Consumption due to conversion process combustion is recorded in the CON_COMB column. It includes only the energy consumed in the fuel conversion process; not the energy content of the input material (e.g., crude oil to refineries, coal to gasification plants), and not the energy content in the final fuel product (e.g., gasoline from refineries, gas from coal gasification plants). Fuel consumption due to boiler combustion for own-use electricity and heat is recorded in the IN_BO column. (Note that the fuel input energy is recorded as a positive number and the electricity or heat output energy is recorded as a negative number in the IN_BO column.) Transmission and distribution losses of the final output fuel product are recorded in the CON_LOSS column.

If it is not possible to distinguish what proportions of the total fuel consumed in the fuel conversion sector are used in process combustion and in boiler combustion, then the combined total should be reported in the CON_COMB column. The method of treating energy consumption in the fuel conversion sector should be reported in the comments.

Industrial Sector

The industrial sector includes energy consumption by manufacturing industries. Similar to the fuel conversion sector, energy consumption in the industrial sector is divided into two categories: 1) combustion in the industrial process itself (industrial furnace combustion), and 2) combustion in boilers belonging to the industrial sector for their own-use generation of electricity and heat. The reason for the distinction is again that the emission factors and control strategies (technologies) are different for each category. Consumption due to industrial process combustion is recorded in the IN_OC column. Fuel consumption due to boiler combustion for own-use electricity and heat is recorded in the IN_BO column. (Note that the fuel input energy is recorded as a positive number and the electricity or heat output energy is recorded as a negative number in the IN_BO column.) Electricity and heat will also be purchased from outside sources by the industrial sector. Total consumption of electricity and heat (i.e., that produced for own use and purchased from outside sources) should be recorded in the IN_OC column, and should not be confused with own-use generation of electricity and heat which is recorded in the IN_BO column.

If it is not possible to split fuel consumption into a process or furnace and a boiler fraction, then the combined consumption should be recorded in the IN_OC column. The method of treating energy consumption in the industrial sector should be reported in the comments.

CON_LOSS Column

The data to be included in the CON_LOSS column need more explanation. It contains not only:

1) transmission and distribution losses for fuels produced by the fuel conversion sector,
2) own-use of electricity and heat by the fuel conversion sector, and
3) own-use of electricity and heat by the industrial autoproducers of electricity and heat,

but also

4) own-use of electricity and heat by centralized power plants and district heating plants, and
5) electricity and heat transmission and distribution losses.

Such definition is usually adopted in aggregated international energy statistics.

Non-energy Use

Non-energy use is reported in the last column, NONEN. This category includes the consumption of lubricants, heavy oil fractions like asphalt for road construction (asphalt can be reported as heavy fuel oil), and fuel used as chemical feedstock.

Summations

The 'sum' columns and rows may be used to calculate the total fuel consumptions. The sums can be used to check the consistency of input data. However, these numbers are not input into the RAINS 7.0 database. Thus, these cells have been shaded.

Table 2.3.2 Energy Consumption in Power Plant/District Heat Sector (PJ)

File Name: ENCPP_xx.DBF

Required: one table per region per year per energy pathway

This table contains energy consumption data in petajoules for centralized public power plants and district heating plants. Also these data should be provided for each sub-national region, as presented in Table 2.1.2. Aggregated energy consumption by all power sources, including large point sources, should be included in the table. Separately collected energy consumption for 'Large Point Sources' (LPS) will be subtracted from the data in this table, and the remainder will be treated as area sources within the region being considered.

While energy consumption (fuel input) is recorded as a positive number, gross output of electricity and heat should be recorded as a negative number indicating production rather than consumption.

Codes			Fuel Code FUEL_ABB	Existing power plants PP_EX		New power plants PP_NEW	Total power plant sector TOTAL_PP
Country COU_ABB	Region REG_ABB	YEAR		Wet bottom PP_EX_WB	Other PP_EX_OTH		
			BC1	xxxxx			
			BC2	xxxxx			
			HC1				
			HC2				
			HC3				
			DC	xxxxx			
			OS1	xxxxx			
			OS2	xxxxx			
			HF	xxxxx			
			MD	xxxxx			
			LF	xxxxx			
			GAS	xxxxx			
			REN	xxxxx	xxxxx	xxxxx	
			HYD	xxxxx	xxxxx	xxxxx	
			NUC	xxxxx	xxxxx	xxxxx	
			ELE	xxxxx	xxxxx	xxxxx	
			HT	xxxxx	xxxxx	xxxxx	
			Sum				

xxxxx - combination of fuel/sector not possible, or only aggregated data necessary.

This table is explained in more detail on the next page.

Power Plant Own-Use, Energy and Transmission and Distribution Losses

This table records fuel consumption and energy (electricity and heat) production at centralized energy producing units, however, own-use by the units and transmission and distribution losses of electricity and heat are not recorded in this table. They are recorded in the CON_LOSS column of Table 2.3.1 (Energy Consumption in Fuel Conversion and Industrial Sectors).

New and Existing Plants

Because emission control costs differ for new and existing plants, fuel consumption should be distinguished according to whether the plant is new or existing. 'Existing' means any source which came on-line on or before 1990. 'New' means any source which came/comes on-line after 1990. In existing plants which consume hard coal, the hard coal consumption should be disaggregated according to boiler type -- wet bottom boiler or other boiler (dry bottom or grate).

Energy Consumption by Non-Fossil Fuel Facilities

Energy consumption/production by non-fossil fuel facilities (e.g., wind, geothermal, hydro, nuclear, etc.) are treated in aggregate only. Energy consumption by these facilities should be reported on a 'primary fuel equivalent' basis in accordance with the convention adopted in United Nations statistics, i.e., 1 PJ of electricity produced = 2.6 PJ of primary energy consumed, which is equivalent to electricity generation from fossil fuels with 38 percent efficiency.

Table 2.3.3 Energy Consumption in the Domestic and Transportation Sectors (PJ)

File Name: ENCDT_xx.DBF

Required: one table per region per year per energy pathway

This table reports energy consumption in petajoules for the domestic and transportation sectors. It is required that regional data be provided to the RAINS 7.0.

The transport sector is divided into two subsectors:

1) road
2) other.

The road subsector is further divided into light duty and heavy duty subsectors, data for which is recorded in Table 2.3.4 (Liquid Fuel Consumption in the Road Subsector), but it is only the combined total for these two road subsectors that is recorded in this table. The 'other' subsector includes rail, and inland and coastal water transportation. International sea transportation is estimated and reported separately. Air transportation is not included because of its low emissions.

The consumption of gasoline and diesel oil by vehicles (cars, trucks, tractors, off-road vehicles, etc.) should be reported in the transportation sector no matter in which sector the consumption is accounted for in national statistics.

Codes			Fuel Code FUEL_ ABB	Domestic DOM	Transportation TRA		
Country COU_ABB	Region REG_ABB	YEAR			Road TRA_RD	Other TRA_OTHER	Sum
			BC1		xxxx	xxxx	xxxx
			BC2		xxxx	xxxx	xxxx
			HC1				
			HC2				
			HC3				
			DC				
			OS1		xxxxxx		
			OS2		xxxxxx		
			HF				
			MD		[8]		
			LF		[9]		
			GAS				
			REN				
			ELE				
			HT				
			Sum				

xxxxx - combination of fuel/sector not possible.

[8] Input data from Table 2.3.4.

[9] Input data from Table 2.3.4.

Table 2.3.4 Liquid Fuel Consumption in the Road Subsector (PJ)

File Name: ENCLF_xx.DBF (totals to be inserted into ENCDT file)

Required: one table per region per year per energy pathway

This table breaks fuel use in the road subsector into two major categories: light duty (motorcycle, car, light truck, etc) and heavy duty vehicles; and further divides the light duty category into 2- and 4-stroke engine types. The totals of medium distillates and light fractions from this table are input into Table 2.3.3 (Energy Consumption in the Domestic and Transportation Sectors).

Codes			Fuel Code FUEL_ABB	Cars, motorcycles and light duty trucks LD		Heavy duty vehicles TRA_RD_HD	TOTAL road transport TRA_RD
Country COU_ABB	Region REG_ABB	YEAR		2-stroke TRA_RD_LD2	4-stroke TRA_RD_LD4		
			MD	xxxxx			[10]
			LF				[11]

xxxxx - combination of fuel/sector not possible

[10] Total to be inserted into Table 2.3.3.

[11] Total to be inserted into Table 2.3.3.

2.4 INDUSTRIAL PROCESS EMISSIONS

Table 2.4.1 Activity Levels (million metric tons/year)

File Name: PEMAL_xx.DBF

Required: one table for each region for each energy pathway

This table specifies the historic (1990) and future activity levels of various industrial processes which contribute to SO_2 and NO_x emissions. The following industrial processes (and activity units) are considered:

1. oil refining (oil input to refinery)
2. coke manufacture (coke output)
3. sintering (sinter output)
4. pig iron manufacture (pig iron output)
5. non-ferrous metal smelting (copper, lead, zinc output)
6. sulfuric acid manufacture (100% acid output)
7. nitric acid manufacture (100% acid output)
8. cement and lime manufacture (cement/lime output)
9. pulp and paper manufacture (air-dried unbleached pulp output).

Codes			Oil Refineries IN_PR_ REF	Coke plants IN_PR_ COKE	Sinter plants IN_PR_ SINT	Pig iron (blast furnaces) IN_PR_PIGI	Non-ferrous metals IN_PR_ NFME	Sulfuric acid plants IN_PR_SUAC	Nitric acid plants IN_PR_ NIAC	Cement and lime plants IN_PR_CELI	Pulp mills IN_PR_PULP
Country COU_ABB	Region REG_ABB	YEAR									
		1990									
		2000									
		2010									
		2020									

Table 2.4.2 Process Emission Factors (kg/metric ton)

File Name: PREMFAC.DBF

Required: one table per country (or if possible, per region)

The process emission factor is defined as the difference between actual emissions per ton of activity and hypothetical emissions that would have been generated if the fuel used in the activity has been combusted. Thus, the process emission factor is positive if emissions are greater than the amount that would be generated by fuel combustion alone, and negative if emissions are less than the amount that would be generated by fuel combustion alone.

For some products (e.g., non-ferrous metals, sinter, sulfuric acid) it is positive because emissions originate from the material processed in addition to the fuel combusted in the processing activity. Thus, for example, the sinter plant process emission factor accounts for the sulphur which is emitted from iron ore over and above the emissions due to the fuel combusted during the processing. Since the fuel combusted is already accounted for in Table 2.3.1 (Energy Consumption in the Fuel Conversion and Industrial Sectors), the positive process emission factor is used to calculate the excess emissions.

For other products (e.g., pig iron, cement) the process emission factor is negative because sulphur contained in the fuel is retained in the processed material to a greater extent than during 'ordinary' combustion. Thus, for example, the pig iron process emission factor accounts for the sulphur in the coke that is retained in the slag and the pig iron; and the cement process emission factor accounts for the sulfur retained in the cement clinker. Again, since the fuel combusted is already accounted for in Table 2.3.1 (Energy Consumption in the Fuel Conversion and Industrial Sectors), the negative process emission factor is used to calculate the reduced emissions.

Codes		EMIS_ FACT	Oil refineries IN_PR_ REF	Coke plants IN_PR_ COKE	Sinter plants IN_PR_ SINT	Pig iron (blast furnaces) IN_PR_PIGI	Non-ferrous metals IN_PR_ NFME	Sulfuric acid plants IN_PR_SUAC	Nitric acid plants IN_PR_ NIAC	Cement and lime plants IN_PR_CELI	Pulp mills IN_PR_PULP
Country COU_ABB	Region REG_ABB										
		SO2									
		NOx									

Table 2.4.3 Default Process Emission Factors (kg/metric ton)

File Name: DPEF.DBF

Required: <u>This table not to be altered by data collectors.</u>

Because process emission factors are often difficult to estimate or obtain, default emission factors are provided in Table 2.4.4 below. These default values are based on data used for the European CORINAIR Inventory.[12] These values represent typical production processes in Western Europe. For individual plants the factors may be in the range of -50% to +100% of the average values due to differences in technology, quality of raw material, maintenance procedures, etc.

Emission Factor EMIS_FACT	Oil refineries IN_PR_ REF	Coke plants IN_PR_ COKE	Sinter plants IN_PR_ SINT	Pig iron (blast furnaces) IN_PR_PIGI	Non-ferrous metals IN_PR_ NFME	Sulfuric acid plants IN_PR_SUAC	Nitric acid plants IN_PR_ NIAC	Cement and lime plants IN_PR_CELI	Pulp mills IN_PR_PULP
SO2	+0.9	+0.7	+1.0	-9.0	+80	+10	0	-3.3	+8.0
NOx	+0.1	0	0	-2.8	0	0	+7.0	+1.1	0

[12] Bouscaren, M.R., et al. 1991. CORINAIR Inventory: Default Emissions Factors Handbook (2nd ed.). Paris: CITEPA.

2.5 EMISSION CONTROLS IN EXISTING PLANTS

Table 2.5.1 Energy Consumption in Existing Boilers with Controls in 1990 (PJ)

File Name: INEMCTR.DBF [Initial (Base Year) Emission Controls file]

Required: one table for each region in which controls exist in the base year

This table records energy consumption in petajoules for all existing boilers equipped with flue gas desulfurization (FGD), or other controls, in the base year (1990). This applies to controls that were installed during the base year or at any time before the base year. The data in this table will be used to estimate controlled emissions from area sources. Energy consumption information for large point sources (LPS), which is specified in Table 2.6.8 (Emission Controls on Existing Capacities), will be subtracted from the data in this table to derive area source emissions. If no information on controls is available then assume there are no controls, and thus, no data need be entered in this table.

Codes		Fuel Code	Sector Code	Technology Code	Initial Controls (Energy Consumption in Base Year)
Country COU_ABB	Region REG_ABB	FUEL_ ABB	SEC_ABB	TECH_ABB	INCTR

2.6 LARGE POINT SOURCES

A large point source (LPS) is any emission source at a fixed location for which individual data are collected.

The definition of large point source is study-specific. It depends on data availability in the specific situation as well as on the aim of the study. However, because of problems with data storage and handling, the total number of LPS in any RAINS implementation should not exceed 200. Thus it is recommend that a large point source is defined as an emitting complex with:

- total electric output capacity greater than or equal to 500 MW_{el} (electric power plants), or
- total thermal input capacity greater than or equal to 1500 MW_{th} (industrial plants), or
- annual SO_2 emissions greater than 20,000 metric tons, or
- annual NO_x emissions greater than 5000 metric tons.

At a given location many LPS in the industrial and fuel conversion sectors can be separated into two separate facilities within a single complex:

1) a process source, and
2) a power/heating plant source.

The process sources include production lines and technological furnaces (process combustion furnaces). The power/heating plant sources include boiler houses which generate electricity and/or low temperature heat (steam or hot water) for the complex.
Because fuel consumption patterns and emission control options for these two distinct facilities differ, data should be collected separately for each part. This distinction between process and power is the same as used in the national/regional energy consumption data (Table 2.3.1).

Large Point Source (LPS) Data Collection Tables

Data to be collected for LPS are divided into two sets:

1) energy pathway-independent (past/present), and
2) energy pathway-dependent (future).

On the following page is a list of all the LPS tables.

The energy pathway-independent (past/present) data to be collected includes:

Table 2.6.1 LPS Base Parameters

Table 2.6.2 Existing LPS Capacity in Base Year

Table 2.6.3 LPS Fuel Characteristics

Table 2.6.4 Energy Input for Existing LPS in Base Year

Table 2.6.5 Energy Output and Own-Use for Existing LPS in Base Year

Table 2.6.6 Activity Levels and Emission Factors for Products Causing Process Emissions in Existing Process LPS

Table 2.6.7 Activity Levels and Emission Factors for Products Causing Process Emissions in New Process LPS

Table 2.6.8 Emission Controls on Existing Capacities

The energy pathway-dependent (future) data includes:

Table 2.6.9 New LPS Capacities

Table 2.6.10 Energy Input Patterns for Existing Boilers

Table 2.6.11 Energy Output/Own-Use Patterns for Existing Boilers

Table 2.6.12 Energy Input Patterns for New Boilers

Table 2.6.13 Energy Output/Own-Use Patterns for New Boilers

Table 2.6.14 Capacity Factors for Existing LPS

Table 2.6.15 Capacity Factors for New LPS

Energy Pathway-Independent Data for LPS

Table 2.6.1 Large Point Source Base Parameters

File Name: LPS.DBF

Required: one table (file) which includes all LPS (existing, under construction or planned) for a given country; one row (record) per LPS

This table records basic large point source parameters for all sources for which specific data is collected.

	Parameter	Code	Units	Notes
1	Country code	COU_ABB	---	Country abbreviation taken from the COUNTRY.DBF file (Table 2.1.1)
2	Region code	REG_ABB	---	Region abbreviation taken from the REGIONS.DBF file (Table 2.1.2)
3	City	CITY	---	Name of the city closest to the LPS
4	Plant name	PLANT_NAME	---	Name of the plant
5	Longitude	LONGITUDE	degrees	Specify to 100ths of degree, not minutes/seconds; + for east, - for west
6	Latitude	LATITUDE	degrees	Specify to 100ths of degree, not minutes/seconds; + for north, - for south
7	LPS ID code[13)]	LPS_ID	---	6 character field;
8	Description of power plant/boiler house	PP_BO_DESC	---	A brief characterization of the plant; 130 character field; include # of units in base year, boiler type, etc.
9	- Plant type code - existing boilers	SEC_ABB1E	---	Specify the code for the plant type. Codes are: PP_EX_WB, PP_EX_OTH, IN_BO
10	- Plant type code - new boilers	SEC_ABB1N	---	Specify the code for the plant type. Codes are: PP_NEW, IN_BO
11	- Technical lifetime	LIFETIME1	years	Expected lifetime of the power plant
12	Description of process/technology	IN_PR_DESC	---	A brief characterization of the plant; 130 character field; include process type, # of units in base year, etc.
13	- Sector code	SEC_ABB2	---	Specify the code for the process sector. Codes are: CON_COMB (fuel conversion) or IN_OC (industrial)

13) Any combination of six characters (letters or numbers) as chosen by the data collector to specify the point source.

	Parameter	Code	Units	Notes
14	- Activity unit	AC_UNIT2		Specify the unit and the name of the main product which characterize the process activity of the source, e.g., million metric tons of raw steel/year
15	- Technical lifetime	LIFETIME2	years	Expected lifetime of the process plant
	Uncontrolled emission factors for process/technology part of LPS: (if no data available then these emission factors should be calculated from fuel consumption data and regional emission factors)			
16	- SO2 existing capacities	EFPTEXSO2	kg/[AC_UNIT2/10^6]	
17	- SO2 new capacities	EFPTNEWSO2	kg/[AC_UNIT2/10^6]	
18	- NOx existing capacities	EFPTEXNOX	kg/[AC_UNIT2/10^6]	
19	- NOx new capacities	EFPTNEWNOX	kg/[AC_UNIT2/10^6]	
	Stack and exhaust gases data:			
	Power plant/boiler house:			
20	- Stack height	PP_STACKHE	m	
21	- Flue gas volume	PP_FG_VOL	$m^3/GJ_{th\ inp}$	Assume normal conditions (0^0C, 1 bar)
22	- Flue gas velocity	PP_FG_VEL	m/s	Assume normal conditions (0^0C, 1 bar)
23	- Flue gas temperature	PP_FG_TEMP	^0C	
	Process/technology:			
24	- Stack height	PT_STACKHE	m	
25	- Flue gas volume	PT_FG_VOL	$m^3/GJ_{th\ inp}$	Assume normal conditions (0^0C, 1 bar)
26	- Flue gas velocity	PT_FG_VEL	m/s	Assume normal conditions (0^0C, 1 bar)
27	- Flue gas temperature	PT_FG_TEMP	^0C	

Table 2.6.2 Existing LPS Capacity in Base Year

File Name: LPSEXCAP.DBF

Required: one table per country

Codes			Period of commission (age class) PER_CODE	Power plant/boiler house				Process/technology		
Country COU_ABB	Region REG_ABB	Source LPS_ID		$MW_{th\ inp}$		$MW_{el\ out}$ PPMW_ELOUT	$MW_{heat\ out}$ PPMW_HOUT	$MW_{th\ inp}$		Prod. activity [AC_UNIT2]/a PT_PRO_ACT
				Unit PPMW_UTHIN	Total PPMW_THINP			Unit PTMW_UTHIN	Total PTMW_THINP	
			PRE71							
			P7180							
			P8190							

This table is explained in more detail on the next page.

This table records capacities for existing large point sources in the base year (1990). The RAINS 7.0 distinguishes three categories of existing capacities, according to the period of commission (age class): prior to 1971 (PER_CODE = PRE71), between 1971 and 1980 (PER_CODE = P7180) and between 1981 and 1990 (PER_CODE = P8190). For each LPS the number of records to be filled-in depends on the number of periods in which capacities have been put into operation. Usually a large point source is a complex, i.e., it consists of several units (power generation sets, boilers or furnaces) at one location. The units have been usually put into operation in different years. The units should be aggregated according to the period of commission (age class) and the data characteristic to the whole class should be reported in the table. The following total capacities should be reported for each age class (PER_CODE):

For power plant/boiler house:
- thermal input capacity
- electric output capacity
- heat output capacity (if relevant).

For process/technology part of the complex:
- thermal input capacity of furnaces
- annual nominal production level of the main product (e.g., million t raw steel/a).

Besides total thermal capacities, for each age class the average unit thermal capacities for boilers and process furnaces should also be reported. The unit capacities are necessary for control costs calculations and should be computed through dividing of total capacities by the number of units for each age class. For instance, if three power generation units with total thermal capacity of 2100 $MW_{th\ inp}$ have been commissioned between 1981 and 1990 (PER_CODE = P8190) then for PER_CODE = P8190 PPMW_UTHIN = 700 $MW_{th\ inp}$ and PPMW_THINP = 2100 $MW_{th\ inp}$.

Table 2.6.3 LPS Fuel Characteristics

File Name: LPSFUECH.DBF

Required: one table per country

Codes			Fuel code FUEL_ABB	Lower calorific value (GJ/t)		Sulphur content (%)		Sulphur retained in ash (fraction[14])	
Country COU_ABB	Region REG_ABB	Source LPS_ID		Power/heat plant BO_CAL_VAL	Process/ technology PT_CAL_VAL	Power/heat plant BO_S_CONT	Process/technology PT_S_CONT	Power/heat plant BO_S_INASH	Process/ technology PT_S_INASH

This table records the fuel characteristics (heat value, sulfur content and sulfur retained in ash) for power plant and process emission sources. Similar to Table 2.2.1 (Lower/Net Calorific Value) for area sources, this table records the lower or net calorific heat value for point sources. The calorific value is expressed in gigajoules per metric ton of fuel. Similar to Table 2.2.2 (Sulfur Content) for area sources, this table records the percent sulfur contained in the fuels used by the large point sources. Fuel humidity as supplied to the furnace is assumed. Similar to Table 2.2.3 (Sulfur Retained in Ash) for area sources, this table records the fraction of sulfur retained in the ash after combustion of solid fuels used by the large point source.

If specific data are not available for a given large point source then regional data from Section 2.2 (Fuel Characteristics) can be used. They should be input to the database by the data collector.

[14] %sulfur retained/100.

Tables 2.6.4 and 2.6.5 Energy Input and Output Patterns for Existing LPS in the Base Year

The following two tables record the energy input, and energy output and own-use patterns, for existing LPS in the base year (1990). The patterns are recorded as fractions. Energy input patterns for power plants (PPIN) specify the fraction of total annual thermal input to a given power plant which is provided by each fuel type used by the power plant. The total of all fractions for a given power plant must add up to 1.00. Thus, for example, if a combined cycle power plant over a one-year period burns 30% oil and 70% gas it should be recorded as HF = 0.30 and GAS = 0.70; where the fuel code for oil is HF (heavy fuel oil) and for natural gas is GAS, and PPIN is 0.30 and 0.70, respectively.

Energy input patterns for process furnaces (PTIN) are recorded somewhat differently than power plants. For process furnaces the energy input for each fuel type per unit activity is specified. Thus, for example, if the furnaces in an integrated steel mill use both coke and pulverized coal then the fraction that is the annual gigajoules of coke (DC, derived coal) used to produce the annual raw steel output in millions of metric tons, and the fraction that is annual gigajoules of coal (HC1, assuming low sulfur hard coal) used to produce the annual raw steel output, are both recorded. These fractions are the PTIN for that large point source.

Similar to the above methods for energy inputs, in Table 2.6.5 the energy outputs and own-use patterns for existing large point sources in the base year are recorded as PPOUT and PPOWN for power plants, and PTOUT and PTOWN for process emission sources. Energy output patterns for power plants (PPOUT and PPOWN) specify the ratio of total annual output or own-use to total thermal input for each fuel type used by the power plant. Thus, these fractions will not add up to 1.0. For process sources PTOUT and PTOWN specify the ratio of total annual output or own-use to the annual production output.

Table 2.6.4 Energy Input Patterns for Existing LPS in Base Year
File Name: LPSEEXIN.DBF

Required: one table per country

Codes			Fuel code FUEL_ABB	Power/heat plant $GJ_{in}/GJ_{el,inp}$ PPIN	Process/technology, GJ_{in}/[AC_UNIT2/10^6] PTIN
Country COU_ABB	Region REG_ABB	Source LPS_ID			

Table 2.6.5 Energy Output and Own-Use Patterns for Existing LPS in Base Year
File Name: LPSEEXOO.DBF

Required: one table per country

Codes			Fuel code FUEL_ABB	Power/heat plant $GJ_{out}/GJ_{el,inp}$		Process/technology, GJ_{out}/[AC_UNIT2/10^6]	
Country COU_ABB	Region REG_ABB	Source LPS_ID		Energy Output PPOUT	Own-Use PPOWN	Energy Output PTOUT	Own-Use PTOWN

Tables 2.6.6 and 2.6.7 Activity Levels and Emission Factors for Products Causing Process Emissions in Existing and New Process LPS

The following two tables record the activity/production levels of a given process and the emission factors associated with that process for existing and new large point sources. For a definition of the process emission factor see Table 2.4.2 (Process Emission Factors). For a list of the types of activity units used for the various process emission sources also see Table 2.4.1.

The production levels should be reported in tons per ton of the main product produced in the given LPS[15]. For instance, if in the steel mill with annual output of 5 million t raw steel an annual output of coke is 1.5 million tons and the output of pig iron is 3 million tons, then for the records SEC_ABB = IN_PR_COKE and IN_PR_PIGI values in the field PRODUCTION should be 0.3 (tons coke per ton of raw steel) and 0.6 (tons pig iron per ton of raw steel) respectively.

Also source-specific process emission factors should be specified. If such emission factors are not available, then default or region-specific factors will be used.

Note that process emissions are included in the aggregated emission factors for the LPS (fields EFPTEXSO2 and EFPTNEWSO2 in the database LPS.DBF). Values of production of products causing process emissions and plant-specific process emission factors for each product are necessary in order to adjust regional data on process emissions. Lack of such adjustment would have caused double accounting.

[15] The name of this 'main' product for the source is specified in the field AC_UNIT2 in the database LPS.DBF.

Table 2.6.6 Activity Levels and Emission Factors for Products Causing Process Emissions in Existing Process LPS

File Name: LPSEXPEF.DBF

Required: one table per country

Codes			Sector code SEC_ABB	Production (t/[AC_UNIT2/10^6])	Process emission factor (kg/t)	
Country COU_ABB	Region REG_ABB	Source LPS_ID		PRODUCTION	SO_2 PREMFA_SO2	NO_x PREMFA_NOX

Table 2.6.7 Activity Levels and Emission Factors for Products Causing Process Emissions in New Process LPS

File Name: LPSNEPEF.DBF

Required: one table per country

Codes			Sector code SEC_ABB	Production (t/[AC_UNIT2/10^6])	Process emission factor (kg/t)	
Country COU_ABB	Region REG_ABB	Source LPS_ID		PRODUCTION	SO_2 PREMFA_SO2	NO_x PREMFA_NOX

Note: Process emission factors refer to tons crude oil input, all others refer to tons of output.

Table 2.6.8 Emission Controls on Existing Capacities (%)

File Name: LPS_ECEX.DBF

Required: one table per country

Codes			Sector code SEC_ABB	Technology Code TECH_ABB	% Capacities controlled in 1990		
Country COU_ABB	Region REG_ABB	Source LPS_ID			PRE71	P7180	P8190

This table records the percent of a source's 1990 capacity which is controlled. It distinguishes three given age classes -- pre-1971, 1971-1980, 1981-1990. For each age class the percent of a source's installed capacity that is controlled is recorded. In other words, for a given point source the percent controlled on all boilers installed before 1971 is recorded in the PRE71 column; the percent controlled on all boilers installed between 1971 and 1980 is recorded in the P7180 column; and the percent controlled on all boilers installed between 1981 and 1990 is recorded in the P8190 column. For each the type of control technology is also specified.

Note: if more than one control technology is used in the same period at the same source (i.e., different units within a complex installed, say, between 1971-80 are controlled by different technologies) then using the same LPS_ID code each technology can be listed as a separate line (record).

Table 2.6.9 New LPS Capacities

File Name: LPSCAPxx.DBF

Required: one table per energy pathway per region

Codes			Period of commission PER_CODE	Power plant/boiler house				Process/technology		
Country COU_ABB	Region REG_ABB	Source LPS_ID		$MW_{th\ inp}$		$MW_{el\ out}$ PPMW_ELOUT	$MW_{heat\ out}$ PPMW_HOUT	$MW_{th\ inp}$		Prod. activity [AC_UNIT2]/a PT_PRO_ACT
				Unit PPMW_UTHIN	Total PPMW_THINP			Unit PTMW_UTHIN	Total PTMW_THINP	

This table records new capacities for all large point sources, i.e., those capacities which come on-line after 1990. Capacity information should be recorded for power plant and process LPS. Information required includes the period of commission, the thermal input capacity and electric/heat output capacity for power plants, and thermal input capacity and production activity level for process (furnace) part of LPS. Besides total capacities installed in each period, the average unit thermal capacities (i.e., of single boiler or furnace) should also be reported. For details see explanations to Table 2.6.2.

The following period codes (PER_CODE) should be used:
- P9100 if capacity comes on line between 1991 and 2000
- P0110 if capacity comes on line between 2001 and 2010
- P1120 if capacity comes on line between 2011 and 2020.

Tables 2.6.10 and 2.6.11 Fuel Switching on Existing Boilers

The following two tables record the changes in energy patterns due to fuel switching for existing boilers. The information in these tables is similar to the power/heat plant portion of Tables 2.6.4 and 2.6.5 (Energy Input for Existing LPS in Base Year and Energy Output and Own-Use for Existing LPS in Base Year). Tables 2.6.10 and 2.6.11 track the energy input/output pattern changes for those large point sources contained in Tables 2.6.4 and 2.6.5 which undergo fuel switching.

The fuel(s) switched to (FUEL_ABB), the year of the switch (YEAR), and the fractions of total inputs or outputs for each fuel (PPIN, PPOUT and PPOWN) are recorded on the tables below for each relevant point source. Note that the YEAR parameter can only have the values 2000, 2010 and/or 2020. Whatever the specific year of the fuel switch, the data collector must select one of these years in which to designate the fuel switch. The PPIN, PPOUT, PPOWN fractions are determined in the same manner as explained in Tables 2.6.4 and 2.6.5.

Note that for the input patterns in Table 2.6.10 the PPIN ratio is *fuel input* to *thermal input*, and that for the output patterns in Table 2.6.11 the PPOUT and PPOWN ratios are *energy or own-use output* to *thermal input*.

Table 2.6.10 Energy Input Patterns for <u>Existing</u> Boilers
File Name: LPSEIExx.DBF

Required: one table per energy pathway per region

Codes			Fuel code FUEL_ABB	Year of fuel switch	Fuel input ($GJ_{in}/GJ_{a\ inp}$) PPIN
Country COU_ABB	Region REG_ABB	Source LPS_ID		YEAR	

Table 2.6.11 Energy Output/Own-Use Patterns for <u>Existing</u> Boilers
File Name: LPSEOExx.DBF

Required: one table per energy pathway per country

Codes			Fuel code FUEL_ABB	Year of fuel switch	Energy output ($GJ_{out}/GJ_{a\ inp}$) PPOUT	Own-Use ($GJ_{out}/GJ_{a\ inp}$) PPOWN
Country COU_ABB	Region REG_ABB	Source LPS_ID		YEAR		

Tables 2.6.12 and 2.6.13 Energy Input/Output Patterns for New Capacities

The following two tables record the energy patterns for new capacities installed within each LPS. The information in these tables is similar to Tables 2.6.4 and 2.6.5 (Energy Input for Existing LPS in Base Year, and, Energy Output and Own-Use for Existing LPS in Base Year). Note that the information whether the capacity comes on line and in which period is stored in Table 2.6.9 (New LPS Capacities). The fuel(s) used (FUEL_ABB), and the fractions of total inputs or outputs for each fuel (PPIN, PPOUT and PPOWN; and PTIN, PTOUT and PTOWN) for all new LPS are recorded on the tables below. The PPIN, PPOUT, PPOWN, PTIN, PTOUT, PTOWN fractions are determined in the same manner as explained in Tables 2.6.4 and 2.6.5.

For process/technology furnaces energy input and output patterns are assumed to be constant over time. For power plants (boilers) it is possible to specify different patterns for different commission periods. For instance, capacities commissioned between YEAR_FROM = 1991 and YEAR_UNTIL = 2000 might be coal fired and those commissioned between YEAR_FROM = 2001 and YEAR_UNTIL = 2020 might be gas combined cycle units. Note that if the 'Time period' in Tables 2.6.12 and 2.6.13 covers the whole planning horizon (i.e., YEAR_FROM = 1991, YEAR_UNTIL = 2020) then all new boiler capacities have the same energy input and output patterns.

Note that for the input patterns in Table 2.6.12 the PPIN and PTIN ratios are *fuel input* to *thermal input or production output*, and that for the output patterns in Table 2.6.13 the PPOUT and PPOWN, and PTOUT and PTOWN ratios are *energy or own-use output* to *thermal input or production output*.

Table 2.6.12 Energy Input Patterns for New Capacities
File Name: LPSEINxx.DBF
Required: one table per energy pathway per region

Codes			Fuel code FUEL_ABB	Process/technology (GJ_{in}/[AC_UNIT2/10^6])	Time period		Power/heat plant ($GJ_{in}/GJ_{e\ imp}$)
Country COU_ABB	Region REG_ABB	Source LPS_ID		PTIN	YEAR_FROM	YEAR_UNTIL	PPIN

Table 2.6.13 Energy Output/Own-Use Patterns for New Capacities
File Name: LPSEONxx.DBF
Required: one table per energy pathway per country

Codes			Fuel code FUEL_ABB	Process/technology (GJ_{out}/[AC_UNIT2/10^6])		Time period		Power/heat plant ($GJ_{out}/GJ_{e\ imp}$)	
Country COU_ABB	Region REG_ABB	Source LPS_ID		Energy output PTOUT	Own-Use PTOWN	YEAR_FROM	YEAR_UNTIL	Energy output PPOUT	Own-Use PPOWN

Tables 2.6.14 and 2.6.15 Capacity Factors for Existing and New LPS

The following two tables record the changing capacity factors for existing and new point sources. They are used to track the gradual phasing out and de-commissioning of sources. (Note that it is possible that the capacity factor for a source may increase, but this will not be common.)

Capacity factor is defined as the annual operating hours at 100% load divided by the number of hours in a year, 8760. Thus, the equation is: (ANNUAL OPERATING HOUR/8760).

There are three (3) categories of existing power plants and process plants depending on when the plant came on-line: pre-1971 (PP_PRE71 or PT_PRE71), 1971-1980 (PP_P7180 or PT_P7180), 1981-1990 (PP_P8190 or PT_P8190). For each such existing plant the capacity factor as it is in the base year (1990), and as it is expected to be in the years 2000, 2010 and 2020 are to be recorded.

In Table 2.6.15 the parameter AYEAR refers to the number of years <u>after</u> commissioning.

Table 2.6.14 Capacity Factors for Existing LPS (fraction)
File Name: LPSCFExx.DBF
Required: one table per energy pathway per region

Codes			YEAR	Power/heat plant Capacity Factor			Process/technology Capacity Factor		
Country COU_ABB	Region REG_ABB	Source LPS_ID		PP_PRE71	PP_P7180	PP_P8190	PT_PRE71	PT_7180	PT_8190
			1990						
			2000						
			2010						
			2020						

Table 2.6.15 Capacity Factors for New LPS (fraction)
File Name: LPSCFNxx.DBF
Required: one table per energy pathway per region

Codes			Years AYEAR	Power/heat plant Capacity Factor NEW_PP	Process/ technology Capacity Factor NEW_PT
Country COU_ABB	Region REG_ABB	Source LPS_ID			
			10		
			20		
			30		
			40		

3. DBASE FILE STRUCTURE

Section 3 describes the format of the RAINS 7.0 energy and emissions database files. The databases are designed as relational databases in standard DBASE format to allow easy data handling -- data input and data modification capabilities -- for the user as well as for convenient access by program libraries (e.g., Code-base C library). The names of countries/regions and the estimates of the number of databases and input values are valid for the RAINS-Asia version of the model.

The database structure is explained in the following subsections:

3.1 Asian Database Directory Hierarchy

This subsection explains the three-level (Asia, country, region) hierarchy used to organize the entire Asian database set, and presents tables for each directory level that lists each file within the directory and the reference table in the text that explains the file.

3.2 Introduction to Data Preparation

This subsection gives a general idea of the amount of data that needs to be collected for Asia and for each country, and describes a simple DBASE routine that can be used to initialize the country, region and year fields for any file.

3.3 DBASE File Structure for Data Collection Tables

In this subsection the exact DBASE format for each collected database is specified. The databases to be collected are explained in detail in Section 2 of the paper. In this subsection the DBASE format is presented by means of a table and an example. The DBASE files are divided into four (4) categories:

1. Area Source Energy Pathway-Independent Databases
2. Area Source Energy Pathway-Dependent Databases
3. Point Source Energy Pathway-Independent Databases
4. Point Source Energy Pathway-Dependent Databases.

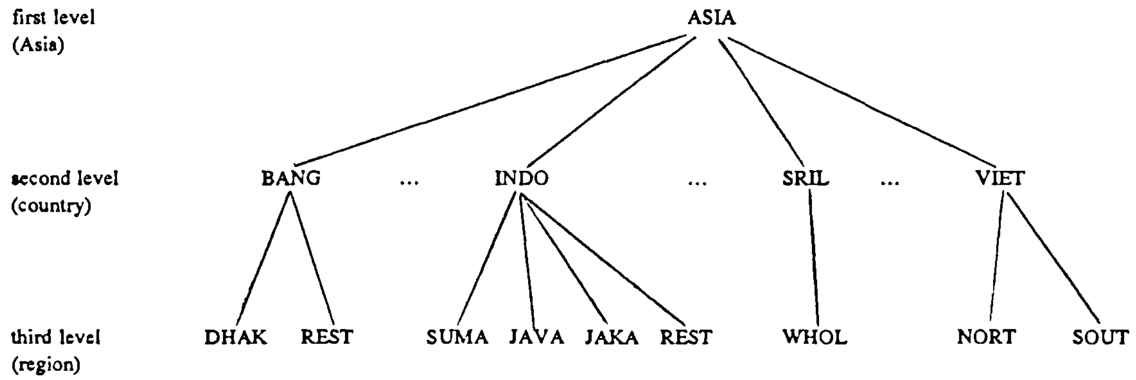
3.1 Asian Database Directory Hierarchy

The ENEM databases are organzed as a three-level hierarchy: Asia, country, and region. The first level (ASIA) contains Asia-wide data. The files in this level hold pre-defined values common to the entire Asian area. The files included in the ASIA level are listed in Table 3.1.1 (ASIA Directory Contents).

The second level (country) contains national level data for each country in Asia. The country-level files are large point source files. The files included in the COUNTRY level are listed in Table 3.1.2 (COUNTRY Subdirectory Contents).

The third level (sub-national region) contains regional level data within each country in Asia. Energy pathway-dependent data is entered at the regional level. The region-level files are socio-economic, area source or large point source files. The files included in the REGION level are listed in Table 3.1.3 (REGION Subdirectory Contents).

The hierarchical structure of the database is illustrated below:



The databases/files contained in each of the directory levels is listed below.

Table 3.1.1 ASIA Directory Contents

The following table lists the databases within the ASIA directory. Along with the name of the database, the reference table in the text which explains the database, and the number of files within each database are also given below.

Database Name	Reference Table	DBASE Format Table	Number of Files in RAINS-ASIA
COUNTRY	2.1.1		1
REGIONS	2.1.2		1
GRID_REG	2.1.3		1
FUELS	2.1.4		1
SECTOR	2.1.5		1
COTECSO2	2.1.6		1
COTECNOX	2.1.7		1
YEAR	2.1.8		1
PERIOD	2.1.9		1
ENE_PATH	2.1.10	3.3.1	1
DPEF	2.4.3		1
LSFUELPA	2.2.4		1
			12

All of the above databases are pre-defined. Only the energy pathway database (ENE_PATH) is specified by the data collectors.

Table 3.1.2 COUNTRY Subdirectory Contents

The following table lists the country-level databases within each COUNTRY subdirectory. Along with the name of the database, the reference table in the text explaining the database, and the number of files within each database are also given. Each country within Asia is given a separate subdirectory. Therefore there are a total of 23 subdirectories, one for each country. Each country subdirectory contains a total of eight (8) large point source (LPS) files -- as listed below. The country-level files contain only energy pathway-*independent* data.

Database Name	Collection Table	DBASE Format Table	Number of Files in RAINS-ASIA
LPS	2.6.1	3.3.12	23
LPSEXCAP	2.6.2	3.3.13	23
LPSFUECH	2.6.3	3.3.14	23
LPSEEXIN	2.6.4	3.3.15	23
LPSEEXOO	2.6.5	3.3.16	23
LPSEXPEF	2.6.6	3.3.17	23
LPSNEPEF	2.6.7	3.3.18	23
LPS_ECEX	2.6.8	3.3.19	23
			184

Table 3.1.3 REGION Subdirectory Contents

The following table lists the region-level databases within each REGION subdirectory. Along with the name of the database, the reference table in the text explaining the database, and the number of files within each database are given. Each region within each country is given a separate subdirectory. Since a total of 95 regions have been chosen within the Asian area, there are a total of 95 region subdirectories. Each region subdirectory contains a total of 17 files -- five (5) scenario-independent, and twelve (12) scenario-dependent files -- as listed below.

Database Name	Collection Table	DBASE Format Table	Number of Files in RAINS-ASIA
Energy Pathway Independent:			
CALVAL	2.2.1	3.3.2	95
SCONT	2.2.2	3.3.3	95
SINASH	2.2.3	3.3.4	95
INEMCTR	2.5.1	3.3.5	95
PREMFAC	2.4.3	3.3.6	95
Energy Pathway Dependent:			('N' denotes the number of scenarios)
ENCON_xx	2.3.1	3.3.7	95*N
ENCPP_xx	2.3.2	3.3.8	95*N
ENCDT_xx	2.3.3	3.3.9	95*N
ENCLF_xx	2.3.4	3.3.10	95*N
PREMAL_xx	2.4.2	3.3.11	95*N
LPSCAPxx	2.6.9	3.3.20	95*N
LPSEIExx	2.6.10	3.3.21	95*N
LPSEOExx	2.6.11	3.3.22	95*N
LPSEINxx	2.6.12	3.3.23	95*N
LPSEONxx	2.6.13	3.3.24	95*N
LPSCFExx	2.6.14	3.3.25	95*N
LPSCFNxx	2.6.14	3.3.26	95*N
Grand TOTAL			475 + 1140*N

3.2 INTRODUCTION to DATA PREPARATION

1. Amount of Data

In total for area sources for one energy pathway for all of Asia, there will be about 1,100 files containing about 200,000 input values. Of this total about one-third are simple country, region, year, fuel, etc. codes. In addition, about one-third will have input values of zero. The remaining one-third of the input values will be actual raw data points. This ratio of one-third codes, one-third zeros and one-third raw data holds for individual countries as well as for the total Asian database.

For large point sources for one energy pathway for all of Asia, there will be about 850 files containing about 60,000 input values (assuming three fuel types and about 200 LPS). Again, the above one-third, one-third, one-third breakdown of input types roughly holds.

2. Data Preparation

The databases are designed in the standard DBASE format. It is strongly recommended that these databases be created using standard DBASE routines. Repetitive data can be assigned to corresponding fields in a record using the simple FOXPRO (DBASE) program shown below. The following example illustrates how to initialize the country, region and year fields which appear in most databases.

```
USE ENCPP_01.DBF
DO WHILE .NOT.EOF()
        REPLACE COU_ABB WITH 'BANG'
        REPLACE REG_ABB WITH 'DHAK'
        REPLACE YEAR WITH 1990
        SKIP
ENDDO
```

This short program initializes the COU_ABB country field, the REG_ABB region field, and the YEAR field in the ENCPP_01.DBF database.

3.3 DBASE FILE STRUCTURE for DATA COLLECTION TABLES

In this section the exact format of all DBASE files that are to be filled in by the data collectors are described. For each file a table shows the file structure -- field names, field types, field widths and decimal point, if any -- that are used to create one record within the file. Following the table an example of the full file (or partial file if it is a large one) is also given. A value of -1 denotes that for a given record the field is not relevant. For instance, for a large point source (LPS) which is a public power plant , fields which specify parameters for process part of LPS will have values -1.

AREA SOURCE ENERGY PATHWAY-INDEPENDENT DATABASES

3.3.1 ENEPATH.DBF (Energy Pathway Designation, see Table 2.1.10)

Database Structure: \ASIA\ENEPATH.DBF
Number of Records: depends on number of scenarios created

Field	Field Name	Type	Width	Decimal
1	ENE_PATH	Character	2	
2	ENE_NAME	Character	40	
3	ENE_ABB	Character	8	

Sample of ENEPATH.DBF file:

Record#	ENE_ID	ENE_NAME	ENE_ABB
1	01	Official Energy Data - 1992	OED-92
2	02	Base Case	BASE
3	03	Low Emission	LOWEMISS

3.3.2 CALVAL.DBF (Lower/Net Calorific Value, see Table 2.2.1)

Database Structure: \ASIA\COUN\REGI\CALVAL.DBF
Number of Records: 12 (one for each fuel type) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	FUEL_ABB	Character	3	
4	CON_COMB	Numeric	5	1
5	PP	Numeric	5	1
6	DOM	Numeric	5	1
7	TRA	Numeric	5	1
8	IN_BO	Numeric	5	1
9	IN_OC	Numeric	5	1

Record#	COU_ABB	REG_ABB	FUEL_ABB	CON_COMB	PP	DOM	TRA	IN_BO	IN_OC
1	COUN	REGI	BC1	6.7	6.7	15.9	0.0	6.7	6.7
2	COUN	REGI	BC2	15.9	15.9	.0	0.0	15.9	15.9
3	COUN	REGI	HC1	24.0	24.0	26.0	26.0	24.0	24.0
4	COUN	REGI	HC2	23.0	23.0	25.0	0.0	23.0	23.0
5	COUN	REGI	HC3	22.0	22.0	.0	0.0	22.0	22.0
6	COUN	REGI	DC	27.5	27.5	27.5	27.5	27.5	27.5
7	COUN	REGI	OS1	8.0	8.0	8.0	8.0	8.0	8.0
8	COUN	REGI	OS2	8.5	8.5	.0	0.0	8.5	8.5
9	COUN	REGI	HF	40.0	40.0	41.5	41.5	40.0	40.0
10	COUN	REGI	MD	42.5	42.5	42.5	42.5	42.5	42.5
11	COUN	REGI	LF	42.0	42.0	42.0	42.0	42.0	42.0
12	COUN	REGI	GAS	48.0	48.0	48.0	48.0	48.0	48.0

3.3.3 SCONT.DBF (Sulfur Content, see Table 2.2.2)

Database Structure: \ASIA\COUN\REGI\SCONT.DBF
Number of Records: 12 (one for each fuel type) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	FUEL_ABB	Character	3	
4	CON_COMB	Numeric	5	2
5	PP	Numeric	5	2
6	DOM	Numeric	5	2
7	TRA	Numeric	5	2
8	IN_BO	Numeric	5	2
9	IN_OC	Numeric	5	2

Record#	COU_ABB	REG_ABB	FUEL_ABB	CON_COMB	PP	DOM	TRA	IN_BO	IN_OC
1	COUN	REGI	BC1	1.30	1.30	1.30	.00	1.30	1.30
2	COUN	REGI	BC2	4.40	4.40	.00	.00	4.40	4.40
3	COUN	REGI	HC1	.65	.65	.65	.65	.65	0.65
4	COUN	REGI	HC2	.85	.85	.85	.00	.85	0.85
5	COUN	REGI	HC3	1.20	1.20	.00	.00	1.20	1.20
6	COUN	REGI	DC	.90	.90	.90	.90	.90	0.90
7	COUN	REGI	OS1	.00	.00	.00	.00	.00	0.00
8	COUN	REGI	OS2	2.50	2.50	.00	.00	2.50	2.50
9	COUN	REGI	HF	3.50	3.10	1.50	1.50	2.50	2.50
10	COUN	REGI	MD	.50	.50	.50	.50	.50	0.50
11	COUN	REGI	LF	.00	.00	.00	.00	.00	0.00
12	COUN	REGI	GAS	.00	.00	.00	.00	.00	0.00

3.3.4 SINASH.DBF (Sulfur Retained in Ash, see Table 2.2.3)

Database Structure: \ASIA\COUN\REGI\SINASH.DBF
Number of Records: 8 (one for each solid fuel type) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	FUEL_ABB	Character	3	
4	CON_COMB	Numeric	3	2
5	PP	Numeric	3	2
6	DOM	Numeric	3	2
7	TRA	Numeric	3	2
8	IN_BO	Numeric	3	2
9	IN_OC	Numeric	3	2

Record#	COU_ABB	REG_ABB	FUEL_ABB	CON_COMB	PP	DOM	TRA	IN_BO	IN_OC
1	COUN	REGI	BC1	.20	.20	.20	.00	.20	.20
2	COUN	REGI	BC2	.35	.35	.00	.00	.35	.35
3	COUN	REGI	HC1	.05	.05	.10	.05	.05	.05
4	COUN	REGI	HC2	.05	.05	.10	.00	.05	.05
5	COUN	REGI	HC3	.05	.05	.00	.00	.05	.05
6	COUN	REGI	DC	.05	.05	.10	.05	.05	.05
7	COUN	REGI	OS1	.00	.00	.00	.00	.00	.00
8	COUN	REGI	OS2	.00	.00	.00	.00	.00	.00

3.3.5 INEMCTR.DBF (Initial (Base Year) Emission Controls, see Table 2.5.1)

Database Structure: \ASIA\COUN\REGI\INEMCTR.DBF
Number of Records: depends on whether controls exist in a region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	FUEL_ABB	Character	3	
4	SEC_ABB	Character	9	
5	TECH_ABB	Character	7	
6	INCTR	Numeric	5	

```
Record#  COU_ABB  REG_ABB  FUEL_ABB  SEC_ABB   TECH_ABB  INCTR
      1  COUN     REGI     BC2       IN_BO     LINJ         17
      2  COUN     REGI     HF        IN_BO     WFGD          4
```

3.3.6 **PREMFAC.DBF** (Process Emission Factors, see Table 2.4.2)

Database Structure: \ASIA\COUN\REGI\PREMFAC.DBF
Number of Records: 2 (one each for SO2 and NOX) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	EMIS_FACT	Character	3	
4	IN_PR_REF	Numeric	5	1
5	IN_PR_COKE	Numeric	5	1
6	IN_PR_SINT	Numeric	5	1
7	IN_PR_PIGI	Numeric	5	1
8	IN_PR_NFME	Numeric	5	1
9	IN_PR_SUAC	Numeric	5	1
10	IN_PR_NIAC	Numeric	5	1
11	IN_PR_CELI	Numeric	5	1
12	IN_PR_PULP	Numeric	5	1

```
Record# COU_ABB REG_ABB EMIS_FACT IN_PR_REF IN_PR_COKE IN_PR_SINT IN_PR_PIGI IN_PR_NFME IN_PR_SUAC
1       COUN    REGI    SO2       0.9       0.7        1.0        -9.0       80.0       10.0
2       COUN    REGI    NOx       0.1       0.0        0.0        -2.8        0.0        0.0

IN_PR_NIAC IN_PR_CELI IN_PR_PULP
0.0         -3.3      8.0
7.0          1.1      0.0
```

Note: The last two characters of the database names ("xx") represent the energy pathway number.

3.3.7 ENCON_xx.DBF (Energy Consumption in Fuel Conversion and Industrial Sectors, see Table 2.3.1)

Database Structure: \ASIA\COUN\REGI\ENCON_xx.DBF
Number of Records: 60 (15 for each year) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	YEAR	Numeric	4	
4	FUEL_ABB	Character	3	
5	CON_COMB	Numeric	5	
6	CON_LOSS	Numeric	5	
7	IN_BO	Numeric	5	
8	IN_OC	Numeric	5	
9	NONEN	Numeric	5	

Record#	COU_ABB	REG_ABB	YEAR	FUEL_ABB	CON_COMB	CON_LOSS	IN_BO	IN_OC	NONEN
1	COUN	REGI	1990	BC1	0	0	0	0	0
2	COUN	REGI	1990	BC2	0	0	25	0	0
3	COUN	REGI	1990	HC1	6	3	240	129	0
4	COUN	REGI	1990	HC2	0	0	0	0	0
5	COUN	REGI	1990	HC3	0	0	0	0	0
6	COUN	REGI	1990	DC	0	12	0	244	0
7	COUN	REGI	1990	OS1	0	0	0	0	0
8	COUN	REGI	1990	OS2	0	0	17	0	0
9	COUN	REGI	1990	HF	82	64	13	180	479
10	COUN	REGI	1990	MD	0	0	0	107	0
11	COUN	REGI	1990	LF	0	0	0	164	9
12	COUN	REGI	1990	GAS	62	25	90	369	94
13	COUN	REGI	1990	REN	0	0	0	0	0
14	COUN	REGI	1990	ELE	0	196	-86	349	0
15	COUN	REGI	1990	HT	0	0	0	0	0
16	COUN	REGI	2000	BC1	0	0	0	0	0
17	COUN	REGI	2000	BC2	0	0	0	0	0
18	COUN	REGI	2000	HC1	6	3	240	76	0
.									
.									
.									
60	COUN	REGI	2020	HT	0	0	0	0	0

3.3.8 ENCPP_xx.DBF (Energy Consumption in Power Plant/District Heat Sector, see Table 2.3.2)

Database Structure: \ASIA\COUN\REGI\ENCPP_xx.DBF
Number of Records: 68 (17 for each year) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	YEAR	Numeric	4	
4	FUEL_ABB	Character	3	
5	PP_EX_WB	Numeric	5	
6	PP_EX_OTH	Numeric	5	
7	PP_NEW	Numeric	5	
8	TOTAL_PP	Numeric	5	

Record#	COU_ABB	REG_ABB	YEAR	FUEL_ABB	PP_EX_WB	PP_EX_OTH	PP_NEW	TOTAL_PP	
1	COUN	REGI	1990	BC1	0	6	0	6	
2	COUN	REGI	1990	BC2	0	0	0	0	
3	COUN	REGI	1990	HC1	0	32	0	32	
4	COUN	REGI	1990	HC2	0	119	0	119	
5	COUN	REGI	1990	HC3	0	24	0	24	
6	COUN	REGI	1990	DC	0	0	0	0	
7	COUN	REGI	1990	OS1	0	0	0	0	
8	COUN	REGI	1990	OS2	0	0	0	0	
9	COUN	REGI	1990	HF	0	66	0	66	
10	COUN	REGI	1990	MD	0	1	0	1	
11	COUN	REGI	1990	LF	0	0	0	0	
12	COUN	REGI	1990	GAS	0	23	0	23	
13	COUN	REGI	1990	REN	0	0	0	0	
14	COUN	REGI	1990	HYD	0	0	0	601	
15	COUN	REGI	1990	NUC	0	0	0	2095	
16	COUN	REGI	1990	ELE	0	0	0	-1153	
17	COUN	REGI	1990	HT	0	0	0	0	
18	COUN	REGI	2000	BC1	0	0	0	0	
.									
.									
.									
68	COUN	REGI	2020	HT	0	0	0	0	0

3.3.9 ENCDT_xx.DBF (Energy Consumption in Domestic and Transportation Sectors, see Table 2.3.3)

Database Structure: \ASIA\COUN\REGI\ENCDT_xx.DBF
Number of Records: 60 (15 for each year) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	YEAR	Numeric	4	
4	FUEL_ABB	Character	3	
5	DOM	Numeric	5	
8	TRA_RD	Numeric	5	
9	TRA_OTHER	Numeric	5	

Record#	COU_ABB	REG_ABB	YEAR	FUEL_ABB	DOM	TRA_RD	TRA_OTHER
1	COUN	REGI	1990	BC1	0	0	0
2	COUN	REGI	1990	BC2	0	0	0
3	COUN	REGI	1990	HC1	0	0	0
4	COUN	REGI	1990	HC2	63	0	0
5	COUN	REGI	1990	HC3	0	0	0
6	COUN	REGI	1990	DC	51	0	0
7	COUN	REGI	1990	OS1	0	0	0
8	COUN	REGI	1990	OS2	0	0	0
9	COUN	REGI	1990	HF	72	0	0
10	COUN	REGI	1990	MD	758	497	24
11	COUN	REGI	1990	LF	129	970	0
12	COUN	REGI	1990	GAS	405	0	0
13	COUN	REGI	1990	REN	0	0	0
14	COUN	REGI	1990	ELE	521	0	27
15	COUN	REGI	1990	HT	0	0	0
16	COUN	REGI	2000	BC1	0	0	0
17	COUN	REGI	2000	BC2	0	0	0
18	COUN	REGI	2000	HC1	0	0	0
.							
.							
60	COUN	REGI	2020	HT	0	0	0

3.3.10 ENCLF_xx.DBF (Liquid fuel Consumption in Road Subsector, see Table 2.3.4)

Database Structure: \ASIA\COUN\REGI\ENCLF_xx.DBF
Number of Records: 8 (2 for each year) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	YEAR	Numeric	4	
4	FUEL_ABB	Character	3	
5	TRA_RD_LD2	Numeric	5	
6	TRA_RD_LD4	Numeric	5	
7	TRA_RD_HD	Numeric	5	

Record#	COU_ABB	REG_ABB	YEAR	FUEL_ABB	TRA_RD_LD2	TRA_RD_LD4	TRA_RD_HD
1	COUN	REGI	1990	MD	0	43	454
2	COUN	REGI	1990	LF	0	970	0
3	COUN	REGI	2000	MD	0	52	511
4	COUN	REGI	2000	LF	0	681	0
.							
.							
.							
8	COUN	REGI	2020	MD	0	65	633

3.3.11 PEMAL_xx.DBF (Process Emission Activity Levels, see Table 2.4.1)

Database Structure: \ASIA\COUN\REGI\PEMAL_xx.DBF
Number of Records: 4 (one for each year) per region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	YEAR	Numeric	4	
4	IN_PR_REF	Numeric	6	2
5	IN_PR_COKE	Numeric	6	2
6	IN_PR_SINT	Numeric	6	2
7	IN_PR_PIGI	Numeric	6	2
8	IN_PR_NFME	Numeric	6	2
9	IN_PR_SUAC	Numeric	6	2
10	IN_PR_NIAC	Numeric	6	2
11	IN_PR_CELI	Numeric	6	2
12	IN_PR_PULP	Numeric	6	2

Record#	COU_ABB	REG_ABB	YEAR	IN_PR_REF	IN_PR_COKE	IN_PR_SINT	IN_PR_PIGI	IN_PR_NFME	IN_PR_SUAC	IN_PR_NIAC
1	COUN	REGI	1990	75.00	8.00	20.00	11.50	.42	4.30	2.70
2	COUN	REGI	2000	58.00	7.50	20.00	11.00	.45	4.50	3.00

IN_PR_CELI	IN_PR_PULP
22.00	1.30
20.00	1.50

3.3.12 LPS.DBF (LPS Base Parameters, see Table 2.6.1)

Database Structure: \ASIA\COUN\LPS.DBF
Number of Records: equal to number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	CITY	Character	20	
4	PLANT_NAME	Character	40	
5	LONGITUDE	Numeric	7	2
6	LATITUDE	Numeric	7	2
7	LPS_ID	Character	9	
8	PP_BO_DESC	Character	130	
9	SEC_ABB1E	Character	10	
10	SEC_ABB1N	Character	10	
11	LIFETIME1	Numeric	2	
12	IN_PR_DESC	Character	130	
13	SEC_ABB2	Character	10	
14	AC_UNIT2	Character	20	
15	LIFETIME2	Numeric	2	
16	EFPTEXSO2	Numeric	6	2
17	EFPTNEWSO2	Numeric	6	2
18	EFPTEXNOX	Numeric	6	2
19	EFPTNEWNOX	Numeric	6	2
20	PP_STACKHE	Numeric	3	
21	PP_FG_VOL	Numeric	4	
22	PP_FG_VEL	Numeric	4	1
23	PP_FG_TEMP	Numeric	3	
24	PT_STACKHE	Numeric	3	
25	PT_FG_VOL	Numeric	4	
26	PT_FG_VEL	Numeric	4	1
27	PT_FG_TEMP	Numeric	3	

Record#	COU_ABB	REG_ABB	PLANT_NAME	CITY	LONGITUDE	LATITUDE
1	COUN	REGI	Gardanne	Gardanne	5.50	43.50
2	COUN	REGI	Steel mill	None	4.90	43.45

LPS_ID	PP_BO_DESC
BCPP01	Lignite fired power plant operated by autoproducer. 2 units - 250 and 600 MWel.
STML01	Ind. heating pl. gas/oil, 3 boilers in 1990

SEC_ABB1E	SEC_ABB1N	LIFETIME1
IN_BO	IN_BO	35
IN_BO	IN_BO	30

IN_PR_DESC
None
Int. steel plant, coke pl.+blast furnaces + oxygen converters + rolling mills

SEC_ABB2	AC_UNIT2	LIFETIME2	EFPTEXSO2	EFPTNEWSO2	EFPTEXNOX	EFPTNEWNOX
None	None	-1	-1.00	-1.00	-1.00	-1.00
IN_OC	10^6 t steel/a	30	2.70	2.50	3.90	3.60

PP_STACKHE	PP_FG_VOL	PP_FG_VEL	PP_FG_TEMP	PT_STACKHE	PT_FG_VOL	PT_FG_VEL	PT_FG_TEMP
210	390	20.0	140	-1	-1	-1.0	-1
60	320	9.7	170	115	350	6.0	210

3.3.13 LPSEXCAP.DBF (Existing LPS Capacity in Base Year, see Table 2.6.2)

Database Structure: \ASIA\COUN\LPSEXCAP.DBF
Number of Records: depends on number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	PER_CODE	Numeric	4	
5	PPMW_UTHIN	Numeric	4	
6	PPMW_THINP	Numeric	4	
7	PPMW_ELOUT	Numeric	4	
8	PPMW_HOUT	Numeric	4	
9	PTMW_UTHIN	Numeric	4	
10	PPMW_THINP	Numeric	4	
11	PT_PRO_ACT	Numeric	6	2

Record#	COU_ABB	REG_ABB	LPS_ID	PER_CODE	PPMW_UTHIN	PPMW_THINP	PPMW_ELOUT	PPMW_HOUT	PTMW_UTHIN	PTMW_THINP
1	COUN	REGI	BCPP01	P7180	690	690	250	-1	-1	-1
2	COUN	REGI	BCPP01	P8190	1560	1560	600	-1	-1	-1
3	COUN	REGI	STML01	P7180	125	375	20	300	250	502

PT_PRO_ACT
-1.00
-1.00
4.60

3.3.14 LPSFUECH.DBF (LPS Fuel Characteristics, see Table 2.6.3)

Database Structure: \ASIA\COUN\LPSFUECH.DBF
Number of Records: depends on number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	FUEL_ABB	Character	3	
5	BO_CAL_VAL	Numeric	5	1
6	PT_CAL_VAL	Numeric	5	1
7	BO_S_CONT	Numeric	5	2
8	PT_S_CONT	Numeric	5	2
9	BO_S_INASH	Numeric	4	2
10	PT_S_INASH	Numeric	4	2
11	EMFAC_BO	Numeric	6	4
12	EMFAC_PT	Numeric	6	4
13	LPS_REMEFB	Numeric	5	1

Record#	COU_ABB	REG_ABB	LPS_ID	FUEL_ABB	BO_CAL_VAL	PT_CAL_VAL	BO_S_CONT	PT_S_CONT	BO_S_INASH	PT_S_INASH	EMFAC_BO	EMFAC_PT	LPS_REMEFB
1	COUN	REGI	BCPP01	BC2	15.9	-1.0	4.40	-1.00	.35	-1.0	3.5975	0.0000	0.0
2	COUN	REGI	BCPP01	HF	40.0	-1.0	2.50	-1.00	0.00	-1.0	1.2500	0.0000	76.0
3	COUN	REGI	BCPP01	GAS	45.0	-1.0	0.00	0.00	0.00	-.10	0.0000	0.0000	0.0
4	COUN	REGI	STML01	DC	-1.0	29.0	-1.00	.70	0.00	0.00	0.0000	0.4828	0.0
5	COUN	REGI	STML01	HF	40.0	40.0	2.76	2.76	0.00	0.00	1.3800	1.3800	78.3
6	COUN	REGI	STML01	GAS	2.9	4.5	.00	.12	0.00	0.00	0.0000	0.5424	0.0

Note that three last fields of this database store values of emission factors (EMFAC_BO, EMFAC_PT) as well as control efficiencies of low sulphur fuels use in boilers (LPS_REMEFB). They are calculated from the characteristic fuel parameters and need not be input by data collectors.

3.3.15 LPSEEXIN.DBF (Energy Input for Existing LPS in Base Year, see Table 2.6.4)

Database Structure: \ASIA\COUN\LPSEEXIN.DBF
Number of Records: depends on number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	FUEL_ABB	Character	3	
5	PTIN	Numeric	6	3
6	PPIN	Numeric	6	3

Record#	COU_ABB	REG_ABB	LPS_ID	FUEL_ABB	PTIN	PPIN
1	COUN	REGI	BCPP01	BC2	-1.000	0.956
2	COUN	REGI	BCPP01	HF	-1.000	0.044
3	COUN	REGI	STML01	DC	8.900	-1.000
4	COUN	REGI	STML01	HF	0.050	0.885
5	COUN	REGI	STML01	GAS	2.190	0.115
6	COUN	REGI	STML01	ELE	2.900	-1.000
7	COUN	REGI	STML01	HT	1.700	-1.000

3.3.16 LPSEEXOO.DBF (Energy Output and Own-Use for Existing LPS in Base Year, see Table 2.6.5)

Database Structure: \ASIA\COUN\LPSEEXOO.DBF
Number of Records: depends on number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	FUEL_ABB	Character	3	
5	PTOUT	Numeric	6	3
6	PTOWN	Numeric	6	3
7	PPOUT	Numeric	6	3
8	PPOWN	Numeric	6	3

Record#	COU_ABB	REG_ABB	LPS_ID	FUEL_ABB	PTOUT	PTOWN	PPOUT	PPOWN
1	COUN	REGI	BCPP01	ELE	-1.000	-1.000	0.370	0.026
2	COUN	REGI	STML01	GAS	3.000	2.000	-1.000	-1.000
3	COUN	REGI	STML01	ELE	-1.000	-1.000	0.050	0.008
4	COUN	REGI	STML01	HT	-1.000	-1.000	0.800	-1.000

3.3.17 **LPSEXPEF.DBF** (Activity Levels and Emission Factors for Products Causing Process Emissions in Existing Process Emission LPS, see Table 2.6.6)

Database Structure: \ASIA\COUN\LPSEXPEF.DBF
Number of Records: depends on number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	SEC_ABB	Character	10	
5	PRODUCTION	Numeric	4	2
6	PREMFA_SO2	Numeric	5	2
7	PREMFA_NOX	Numeric	5	2

```
Record# COU_ABB REG_ABB LPS_ID SEC_ABB    PRODUCTION PREMFA_SO2 PREMFA_NOX
      1 COUN    REGI    STML01 IN_PR_COKE        .48        .00       2.50
      2 COUN    REGI    STML01 IN_PR_SINT       1.49        .34       1.20
      3 COUN    REGI    STML01 IN_PR_PIGI       0.60      -7.00       0.00
```

3.3.18 **LPSNEPEF.DBF** (Activity Levels and Emission Factors for Products Causing Process Emissions in New Process Emission LPS, see Table 2.6.7)

Database Structure: \ASIA\COUN\LPSNEPEF.DBF
Number of Records: depends on number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	SEC_ABB	Character	10	
5	PRODUCTION	Numeric	4	2
6	PREMFA_SO2	Numeric	5	2
7	PREMFA_NOX	Numeric	5	2

```
Record# COU_ABB REG_ABB LPS_ID SEC_ABB    PRODUCTION PREMFA_SO2 PREMFA_NOX
      1 COUN    REGI    STML01 IN_PR_COKE        .40        .00       2.00
      2 COUN    REGI    STML01 IN_PR_SINT       1.40        .34       1.00
      3 COUN    REGI    STML01 IN_PR_PIGI       0.60      -7.00       0.00
```

3.3.19 LPS_ECEX.DBF (Emission Controls on Existing Capacities, see Table 2.6.8)

Database Structure: \ASIA\COUN\LPS_ECEX.DBF
Number of Records: depends on number of LPS in the country

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	SEC_ABB	Character	10	
5	TECH_ABB	Character	6	
6	PRE71	Numeric	3	
7	P7180	Numeric	3	
8	P8190	Numeric	3	

```
Record# COU_ABB REG_ABB LPS_ID SEC_ABB    TECH_ABB PRE71 P7180 P8190
      1 COUN    REGI    BCPP01 IN_BO      LINJ        -1    -1   100
      2 COUN    REGI    STML01 IN_BO      WFGD        -1    50    -1
```

POINT SOURCE ENERGY PATHWAY-DEPENDENT DATABASES

Note: The last two characters of the database names ("xx") represent the energy pathway number.

3.3.20 LPSCAPxx.DBF (New LPS Capacities, see Table 2.6.9)

Database Structure: \ASIA\COUN\REGI\LPSCAPxx.DBF
Number of Records: depends on number of LPS in the region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	PER_CODE	Numeric	4	
5	PPMW_UTHIN	Numeric	4	
6	PPMW_THINP	Numeric	4	
7	PPMW_ELOUT	Numeric	4	
8	PPMW_HOUT	Numeric	4	
9	PTMW_UTHIN	Numeric	4	
10	PTMW_THINP	Numeric	4	
11	PT_PRO_ACT	Numeric	6	2

```
Record# COU_ABB REG_ABB LPS_ID PER_CODE PPMW_UTHIN PPMW_THINP PPMW_ELOUT PPMW_HOUT PTMW_UTHIN PTMW_THINP
      1 COUN    REGI    BCPP01 P0110          1300       1300        500        -1         -1         -1
      2 COUN    REGI    STML01 P0110           145        430         60       300        250        500
      3 COUN    REGI    STML01 P9100           170        500         50       350        200        200

 PT_PRO_ACT
      -1.00
       5.00
       2.00
```

3.3.21 LPSEIExx.DBF (Energy Input Patterns for Existing Boilers, see Table 2.6.10)

Database Structure: \ASIA\COUN\REGI\LPSEIExx.DBF
Number of Records: depends on number of LPS in the region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	FUEL_ABB	Character	3	
5	YEAR	Numeric	4	
6	PPIN	Numeric	6	3

```
Record# COU_ABB REG_ABB LPS_ID FUEL_ABB YEAR   PPIN
      1 COUN    REGI    BCPP01 BC2      2000  1.000
      2 COUN    REGI    STML01 GAS      2000  1.000
```

3.3.22 LPSEOExx.DBF (Energy Output/Own-Use Patterns for Existing Boilers, see Table 2.6.11)

Database Structure: \ASIA\COUN\REGI\LPSEOExx.DBF
Number of Records: depends on number of LPS in the region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	FUEL_ABB	Character	3	
5	YEAR	Numeric	4	
6	PPOUT	Numeric	6	3
7	PPOWN	Numeric	6	3

Record#	COU_ABB	REG_ABB	LPS_ID	FUEL_ABB	YEAR	PPOUT	PPOWN
1	COUN	REGI	BCPP01	ELE	2000	0.370	0.026
2	COUN	REGI	STML01	ELE	2000	0.060	0.007
3	COUN	REGI	STML01	HT	2000	0.780	-1.000

3.3.23 LPSEINxx.DBF (Energy Input Patterns for New Boilers, see Table 2.6.12)

Database Structure: \ASIA\COUN\REGI\LPSEINxx.DBF
Number of Records: depends on number of LPS in the region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	FUEL_ABB	Character	3	
5	PTIN	Numeric	6	3
6	YEAR_FROM	Numeric	4	
7	YEAR_UNTIL	Numeric	4	
8	PPIN	Numeric	6	3

Record#	COU_ABB	REG_ABB	LPS_ID	FUEL_ABB	PTIN	YEAR_FROM	YEAR_UNTIL	PPIN
1	COUN	REGI	BCPP01	BC2	-1.000	2011	2020	0.900
2	COUN	REGI	BCPP01	GAS	-1.000	2011	2020	0.100
3	COUN	REGI	STML01	DC	8.200	-1	-1	-1.000
4	COUN	REGI	STML01	HF	-1.000	1991	2000	1.000
5	COUN	REGI	STML01	GAS	2.000	2001	2020	1.000
6	COUN	REGI	STML01	ELE	2.600	-1	-1	-1.000
7	COUN	REGI	STML01	HT	1.500	-1	-1	-1.000

3.3.24 LPSEONxx.DBF (Energy Output/Own-Use Patterns for New Boilers, see Table 2.6.13)

Database Structure: \ASIA\COUN\REGI\LPSEONxx.DBF
Number of Records: depends on number of LPS in the region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	FUEL_ABB	Character	3	
5	PTOUT	Numeric	6	3
6	PTOWN	Numeric	6	3
7	YEAR_FROM	Numeric	4	
8	YEAR_UNTIL	Numeric	4	
8	PPOUT	Numeric	6	3
10	PPOWN	Numeric	6	3

Record#	COU_ABB	REG_ABB	LPS_ID	FUEL_ABB	PTOUT	PTOWN	YEAR_FROM	YEAR_UNTIL	PPOUT	PPOWN
1	COUN	REGI	BCPP01	ELE	-1.000	-1.000	2011	2020	0.370	0.025
2	COUN	REGI	STMLO1	ELE	-1.000	-1.000	2001	2020	0.140	0.010
3	COUN	REGI	STMLO1	HT	-1.000	-1.000	2001	2020	0.700	-1.000
4	COUN	REGI	STMLO1	ELE	-1.000	-1.000	1991	2000	0.100	0.012
5	COUN	REGI	STMLO1	HT	-1.000	-1.000	1991	2000	0.680	-1.000
6	COUN	REGI	STMLO1	GAS	2.500	2.000	-1	-1	-1.000	-1.000

3.3.25 LPSCFExx.DBF (Capacity Factors for Existing LPS, see Table 2.6.14)

Database Structure: \ASIA\COUN\REGI\LPSCFExx.DBF
Number of Records: depends on number of LPS in the region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	YEAR	Character	4	
5	PP_PRE71	Numeric	5	2
6	PP_P7180	Numeric	5	2
7	PP_P8190	Numeric	5	2
8	PT_PRE71	Numeric	5	2
9	PT_P7180	Numeric	5	2
10	PT_P8190	Numeric	5	2

Record#	COU_ABB	REG_ABB	LPS_ID	YEAR	PP_PRE71	PP_P7180	PP_P8190	PT_PRE71	PT_P7180	PT_P8190
1	COUN	REGI	BCPP01	1990	0.00	0.41	0.35	0.00	0.00	0.00
2	COUN	REGI	BCPP01	2000	0.00	0.30	0.35	0.00	0.00	0.00
3	COUN	REGI	BCPP01	2010	0.00	0.00	0.20	0.00	0.00	0.00
4	COUN	REGI	BCPP01	2020	0.00	0.00	0.10	0.00	0.00	0.00
5	COUN	REGI	STML01	1990	0.00	0.72	0.00	0.00	0.90	0.00
6	COUN	REGI	STML01	2000	0.00	0.64	0.00	0.00	0.80	0.00
7	COUN	REGI	STML01	2010	0.00	0.24	0.00	0.00	0.30	0.00
8	COUN	REGI	STML01	2020	0.00	0.00	0.00	0.00	0.00	0.00

3.3.26 **LPSCFNxx.DBF** (Capacity Factors for New LPS, see Table 2.6.15)

Database Structure: \ASIA\COUN\REGI\LPSCFNxx.DBF
Number of Records: depends on number of LPS in the region

Field	Field Name	Type	Width	Decimal
1	COU_ABB	Character	4	
2	REG_ABB	Character	4	
3	LPS_ID	Character	9	
4	AYEAR	Numeric	2	
5	NEW_PP	Numeric	5	2
6	NEW_PT	Numeric	5	2

Record#	COU_ABB	REG_ABB	LPS_ID	AYEAR	NEW_PP	NEW_PT
1	COUN	REGI	BCPP01	10	0.40	-1.00
2	COUN	REGI	BCPP01	20	0.40	-1.00
3	COUN	REGI	BCPP01	30	0.10	-1.00
4	COUN	REGI	BCPP01	40	0.00	-1.00
5	COUN	REGI	STML01	10	0.70	0.90
6	COUN	REGI	STML01	20	0.60	0.80
7	COUN	REGI	STML01	30	0.30	0.60
8	COUN	REGI	STML01	40	0.00	0.00

Appendix 1

Examples of data for large point sources (LPS)

A Power plant

Energy Pathway-Independent Data

Table 2.6.1: Large Point Source Base Parameters (LPS.DBF)

Parameter	Code	Unit	Value
Country code	COU_ABB	---	FRAN
Region code	REG_ABB	---	WHOL
City	CITY	---	Gardanne
Plant name	PLANT_NAME	---	Power plant Gardanne
Longitude	LONGITUDE	degrees	5.50
Latitude	LATITUDE	degrees	43.50
LPS ID code	LPS_ID	---	BCPP01
Description of power plant/boiler house	PP_BO_DESC	---	Lignite fired power plant operated by Charbonage de France (autoproducer). 2 units - 250 and 600 MW_{el}
- Plant type code - existing boilers	SEC_ABB1E	---	IN_BO
- Plant type code - new boilers	SEC_ABB1N	---	IN_BO
- Technical lifetime	LIFETIME1	years	35
Description of process/technology	IN_PR_DESC	---	---
- Sector code	SEC_ABB2	---	
- Activity unit	AC_UNIT2	---	
- Technical lifetime	LIFETIME2	years	
Uncontrolled emission factors for process/technology part of LPS:			
- SO2 existing capacities	EFPTEXSO2	kg/[AC_UNIT2/10^6]	
- SO2 new capacities	EFPTNEWSO2	kg/[AC_UNIT2/10^6]	
- NOx existing capacities	EFPTEXNOX	kg/[AC_UNIT2/10^6]	
- NOx new capacities	EFPTNEWNOX	kg/[AC_UNIT2/10^6]	

Parameter	Code	Unit	Value
Stack and exhaust gases data:			
Power plant/boiler house:	---	---	---
- Stack height	PP_STACKHE	m	210
- Flue gas volume	PP_FG_VOL	$m^3/GJ_{th\ inp}$	390
- Flue gas velocity	PP_FG_VEL	m/s	20
- Flue gas temperature	PP_FG_TEMP	^0C	140
Process/technology	---	---	---
- Stack height	PT_STACKHE	m	
- Flue gas volume	PT_FG_VOL	$m^3/GJ_{th\ inp}$	
- Flue gas velocity	PT_FG_VEL	m/s	
- Flue gas temperature	PT_FG_TEMP	^0C	

Comments/explanations:

Characterization developed on a basis of historical data from CORINAIR'85 emission inventory database. Data on future expansion plans and operation regimes up-to the year 2020 are illustrative only and have not been checked with any official expansion plans. Therefore they have been shown in italics.Format of data collection tables and table numbers are identical with those in Section 2. Tables with information not relevant to the given source/plant have been skipped.

Table 2.6.2 Existing LPS Capacity in Base Year (LPSEXCAP.DBF)

Codes			Period of commission (age class) PER_CODE	Power plant/boiler house				Process/technology		
				$MW_{th\ inp}$		$MW_{el\ out}$ PPMW_ELOUT	$MW_{heat\ out}$ PPMW_HOUT	$MW_{th\ inp}$		Prod. activity [AC_UNIT2]/a PT_PRO_ACT
Country COU_ABB	Region REG_ABB	Source LPS_ID		Unit PPMW_UTHIN	Total PPMW_THINP			Unit PTMW_UTHIN	Total PTMW_THINP	
FRAN	WHOL	BCPP01	P7180	690	690	250				
			P8190	1560	1560	600				

Table 2.6.3. LPS Fuel Characteristics (LPSFUECH.DBF)

Codes			Fuel code FUEL_ABB	Lower calorific value, GJ/t		Sulphur content, %		Sulphur retained in ash, (fraction)	
Country COU_ABB	Region REG_ABB	Source LPS_ID		Power/heat plant BO_CAL_VAL	Process/ technology PT_CAL_VAL	Power/heat plant BO_S_CONT	Process/technology PT_S_CONT	Power/heat plant BO_S_INASH	Process/ technology PT_S_INASH
FRAN	WHOL	BCPP01	BC2	15.9		4.40		0.35	
			HF	40.0		2.50		0.00	
			GAS	45.0		0.00		0.00	

Table 2.6.4 Energy Input Patterns for Existing LPS in Base Year (LPSEEXIN.DBF)

Codes			Fuel code FUEL_ABB	Process/technology, GJ/[ACT_UNIT2/10^6] PTIN	Power/heat plant, $GJ/GJ_{th\ inp}$ PPIN
Country COU_ABB	Region REG_ABB	Source LPS_ID			
FRAN	WHOL	BCPP01	BC2		.956
			HF		.044

Table 2.6.5 Energy Output and Own-Use Patterns for Existing LPS in Base Year (LPSEEXOO.DBF)

Codes			Fuel code FUEL_ABB	Process/technology, GJ/[AC_UNIT2/10^6]		Power/heat plant, $GJ/GJ_{th\ inp}$	
Country COU_ABB	Region REG_ABB	Source LPS_ID		En. outputs PTOUT	Own use PTOWN	En. outputs PPOUT	Own use PPOWN
FRAN	WHOL	BCPP01	ELE			0.370	.026

Table 2.6.8 Emission Controls on Existing Capacities (LPSCEX.DBF)

Codes			Sector code SEC_ABB	Technology code TECH_ABB	% capacities controlled in 1990		
Country COU_ABB	Region REG_ABB	Source LPS_ID			PRE71	P7180	P8190
FRAN	WHOL	BCPP01	IN_BO	LINJ			100

Comments/explanations:

Dry flue gas desulfurization (limestone injection) installed on unit 2. Efficiency ~40%.

Energy Pathway-Dependent Data

Table 2.6.9 New LPS Capacities (LPSCAP01.DBF)

Codes			Period of commission PER_CODE	Power plant/boiler house				Process/technology		
Country COU_ABB	Region REG_ABB	Source LPS_ID		$MW_{th\ inp}$		$MW_{el\ out}$ PPMW_ELOUT	$MW_{heat\ out}$ PPMW_HOUT	$MW_{th\ inp}$		Prod. activity, [AC_UNIT2]/a PT_PRO_ACT
				Unit PPMW_UTHIN	Total PPMW_THINP			Unit PTMW_UTHIN	Total PTMW_THINP	
FRAN	WHOL	BCPP01	P0110	*1300*	*1300*	*500*				

Table 2.6.10 Energy Input Patterns for Existing Boilers (LPSEIE01.DBF)

Codes			Fuel code FUEL_ABB	Year of fuel switch	Fuel input, $GJ/GJ_{th\,inp}$ PPIN
Country COU_ABB	Region REG_ABB	Source LPS_ID		YEAR	
FRAN	WHOL	BCPP01	BC2	2000	1.00

Table 2.6.11 Energy Output/Own Use Patterns for Existing Boilers (LPSEOE01.DBF)

Codes			Fuel code FUEL_ABB	Year of fuel switch	Energy output, $GJ/GJ_{th\,inp}$ PPOUT	Own-use, $GJ/GJ_{th\,inp}$ PPOWN
Country COU_ABB	Region REG_ABB	LPS LPS_ID		YEAR		
FRAN	WHOL	BCPP01	ELE	2000	0.370	0.026

Table 2.6.12 Energy Input Patterns for New Capacities (LPSEIN01.DBF)

Codes			Fuel code FUEL_ABB	Process/technology GJ/[AC_UNIT2/10^6] PTIN	Time period		Power/heat plant, GJ/GJ$_{th\ inp}$ PPIN
Country COU_ABB	Region REG_ABB	Source LPS_ID			YEAR_FROM	YEAR_UNTIL	
FRAN	WHOL	BCPP01	BC2		2001	2020	*0.90*
			GAS		2001	2020	*0.10*

Table 2.6.13 Energy Output/Own-Use Patterns for New Capacities (LPSEON01.DBF)

Codes			Fuel code FUEL_ABB	Process/technology, GJ/[AC_UNIT2/10^6]		Time period		Power/heat plant, GJ/GJ$_{th\ inp}$	
Country COU_ABB	Region REG_ABB	Source LPS_ID		En. output PTOUT	Own use PTOWN	YEAR_FROM	YEAR_UNTIL	En. output PPOUT	Own-use PPOWN
FRAN	WHOL	BCPP01	ELE			2001	2020	*0.37*	*0.025*

Table 2.6.14 Capacity Factors for Existing Capacities (LPSCFE01.DBF)

Codes			YEAR	Power/heat plant			Process/technology		
Country COU_ABB	Region REG_ABB	LPS LPS_ID		PP_PRE71	PP_P7180	PP_P8190	PT_PRE71	PT_7180	PT_8190
FRAN	WHOL	BCPP01	1990		.41	.35			
			2000		*.30*	*.35*			
			2010		*.00*	*.35*			
			2020		*.00*	*.20*			

Table 2.6.15 Capacity factors for new capacities (LPSCFN01.DBF)

Codes			Years AYEAR	Power/heat plant NEW_PP	Process/ technology NEW_PT
Country COU_ABB	Region REG_ABB	Source LPS_ID			
FRAN	WHOL	BCPP01	10	*0.40*	
			20	*0.40*	
			30	*0.10*	
			40	*0.00*	

B Steel mill

Energy Pathway-Independent Data

Table 2.6.1 Large Point Source Base Parameters (LPS.DBF)

Parameter	Code	Unit	Value
Country code	COU_ABB	---	FRAN
Region code	REG_ABB	---	WHOL
City	CITY	---	--[1]
Plant name	PLANT_NAME	---	Steel mill
Longitude	LONGITUDE	degrees	4.90
Latitude	LATITUDE	degrees	43.45
LPS ID code	LPS_ID	---	STML01
Description of power plant/boiler house	PP_BO_DESC	---	Industrial combined heat/power plant, gas/oil fired, 3 boilers in 1985
- Plant type code - existing boilers	SEC_ABB1E	---	IN_BO
- Plant type code - new boilers	SEC_ABB1N	---	IN_BO
- Technical lifetime	LIFETIME1	years	30
Description of process/technology	IN_PR_DESC	---	Integrated steel plant, coke plant + blast furnaces + oxygen convertors + rolling mills
- Sector code	SEC_ABB2	---	IN_OC
- Activity unit	AC_UNIT2	---	10^6 tons raw steel
- Technical lifetime	LIFETIME2	years	30
Uncontrolled emission factors - process/technology:			
- SO2 existing capacities	EFPTEXSO2	kg/[AC_UNIT2/10^6]	2.69
- SO2 new capacities	EFPTNEWSO2	kg/[AC_UNIT2/10^6]	2.50
- NOx existing capacities	EFPTEXNOX	kg/[AC_UNIT2/10^6]	3.89
- NOx new capacities	EFPTNEWNOX	kg/[AC_UNIT2/10^6]	3.60

[1]In Bouches du Rhone (region MEPA130 according to CORINAIR'85). Name of the town not given in the CORINAIR.

Parameter	Code	Unit	Value
Stack and exhaust gases data:			
Power plant/boiler house:	---	---	---
- Stack height	PP_STACKHE	m	60
- Flue gas volume	PP_FG_VOL	$m^3/GJ_{th\ inp}$	320
- Flue gas velocity	PP_FG_VEL	m/s	9.7
- Flue gas temperature	PP_FG_TEMP	^0C	170
Process/technology	---	---	---
- Stack height	PT_STACKHE	m	115
- Flue gas volume	PT_FG_VOL	$m^3/GJ_{th\ inp}$	350
- Flue gas velocity	PT_FG_VEL	m/s	6.0
- Flue gas temperature	PT_FG_TEMP	^0C	210

Comments/explanations:

Characterization developed on a basis of historical data for one of the French steel mills from the CORINAIR'85 emission inventory database. This is an aggregation of several emission sources (furnaces) belonging to the same plant. The plant is an integrated steel mill with total capacity of 4.6 million tons of steel per annum. Plant consists of coke plant, blast furnaces, oxygen converters, continuous casting lines and rolling mills. An industrial power plant operates within the LPS. Capacity of that plant is 20 MW electric and 300 MW heat. Besides, electricity and heat can be purchased from power grid/ local district heating network. The surpluses of electricity and heat can be sold to these networks.

CORINAIR does not provide information on the use of non-emitting fuels (in this case coke in blast furnaces as well as electricity and heat). Consumption/production of these fuels has been estimated based on typical operation experience for a similar plant.

It has been assumed that the plant will be further expanded in two steps - 2.0 and 5.0 million tons of steel/a until the year 2010. Data on future expansion plans and operation regimes up-to the year 2020 are illustrative only and have not been checked with any official expansion plans. Therefore they have been shown in italics. Format of data collection tables and table numbers are identical with those in Section 2.

Table 2.6.2 Existing Capacities in Base Year (LPSEXCAP.DBF)

Codes			Period of commission (age class) PER_CODE	Power plant/boiler house				Process/technology		
				$MW_{th\,inp}$		$MW_{el\,out}$ PPMW_ELOUT	$MW_{heat\,out}$ PPMW_HOUT	$MW_{th\,inp}$		Prod. activity [AC_UNIT2]/a PT_PRO_ACT
Country COU_ABB	Region REG_ABB	Source LPS_ID		Unit PPMW_UTHIN	Total PPMW_THINP			Unit PTMW_UTHIN	Total PTMW_THINP	
FRAN	WHOL	STML01	P7180	125	375	20	300	250	502*)	4.6

Comments/explanations:

*) Coke use in blast furnaces not included.

Table 2.6.3 LPS Fuel Characteristics (LPSFUECH.DBF)

Codes			Fuel code FUEL_ABB	Lower calorific value, GJ/t		Sulphur content, %		Sulphur retained in ash, (fraction)	
Country COU_ABB	Region REG_ABB	Source LPS_ID		Power/heat plant BO_CAL_VAL	Process/ technology PT_CAL_VAL	Power/heat plant BO_S_CONT	Process/technology PT_S_CONT	Power/heat plant BO_S_INASH	Process/ technology PT_S_INASH
FRAN	WHOL	STML01	DC		29.0		0.70		0.00
			HF	40.0	40.0	2.76	2.76	0.00	0.00
			GAS	2.9	4.5	0.0	0.12	0.00	0.00

Table 2.6.4 Energy Input Patterns for Existing LPS in Base Year (LPSEEXIN.DBF)

Codes			Fuel code FUEL_ABB	Process/technology, GJ/[ACT_UNIT2/10^6] PTIN	Power/heat plant, $GJ/GJ_{th\ inp}$ PPIN
Country COU_ABB	Region REG_ABB	Source LPS_ID			
FRAN	WHOL	STML01	DC	8.9	
			HF	0.05	0.885
			GAS	2.19	0.115
			ELE	2.90	
			HT	1.70	

Table 2.6.5 Energy Output and Own-Use Patterns for Existing LPS in Base Year (LPSEEX00.DBF)

Codes			Fuel code FUEL_ABB	Process/technology, GJ/[AC_UNIT2/10^6]		Power/heat plant, $GJ/GJ_{th\ inp}$	
Country COU_ABB	Region REG_ABB	Source LPS_ID		En. outputs PTOUT	Own use PTOWN	En. outputs PPOUT	Own use PPOWN
FRAN	WHOL	STML01	GAS	3.00	2.00		
			ELE			0.050	.008
			HT			.800	

Table 2.6.6 Activity Levels and Emission Factors for Products Causing Process Emissions in Existing Process LPS (LPSEXPEF.DBF)

Codes			Sector code SEC_ABB	Production, t/[AC_UNIT2/10^6] PRODUCTION	Process emission factors, kg/t	
Country COU_ABB	Region REG_ABB	Source LPS_ID			SO_2 PREMFA_SO2	NO_x PREMFA_NOX
FRAN	WHOL	STMLO1	IN_PR_COKE	0.48	0.0*)	2.5
			IN_PR_SINT	1.49	+0.34	1.2

Table 2.6.7 Activity Levels and Emission Factors for Products Causing Process Emissions in New Process LPS (LPSNPEF.DBF)

Codes			Sector code SEC_ABB	Production, t/[AC_UNIT2/10^6] PRODUCTION	Process emission factors, kg/t	
Country COU_ABB	Region REG_ABB	Source LPS_ID			SO_2 PREMFA_SO2	NO_x PREMFA_NOX
FRAN	WHOL	STMLO1	IN_PR_COKE	*0.40*	*0.0**)	*2.0*
			IN_PR_SINT	*1.40*	*+0.34*	*1.0*

Comments/explanations:

*)Emissions caused by coke gas included in emissions from fuel combustion.

Table 2.6.8 Emission Controls on Existing Capacities (LPSECEX.DBF)

Codes			Sector code SEC_ABB	Technology code TECH_ABB	% Capacities controlled in 1990		
Country COU_ABB	Region REG_ABB	Source LPS_ID			PRE71	P7180	P8190
FRAN	WHOL	STML01	IN_BO	WFGD		50	

Energy Pathway-Dependent Data

Table 2.6.9 New LPS Capacities (LPSCAP01.DBF)

Codes			Period of commission PER_CODE	Power plant/boiler house				Process/technology		
Country COU_ABB	Region REG_ABB	Source LPS_ID		$MW_{th\ inp}$		$MW_{el\ out}$ PPMW_ELOUT	$MW_{heat\ out}$ PPMW_HOUT	$MW_{th\ inp}$		Prod. activity, [AC_UNIT2]/a PT_PRO_ACT
				Unit PPMW_UTHIN	Total PPMW_THINP			Unit PTMW_UTHIN	Total PTMW_THINP	
FRAN	WHOL	STML01	P9100	*170*	*500*	*50*	*350*	*200*	*200**)	*2.0*
			P0110	*145*	*430*	*60*	*300*	*250*	*500**)	*5.0*

Comments/explanations:

*) Coke use in blast furnaces not included.

Table 2.6.10 Energy Input Patterns for Existing Boilers (LPSEIE01.DBF)

Codes			Fuel code FUEL_ABB	Year of fuel switch	Fuel input, $GJ/GJ_{th\ inp}$ PPIN
Country COU_ABB	Region REG_ABB	Source LPS_ID		YEAR	
FRAN	WHOL	STML01	GAS	2000	*1.00*

Table 2.6.11 Energy Output/Own-Use Patterns for Existing Boilers (LPSOE01.DBF)

Codes			Fuel code FUEL_ABB	Year of fuel switch	Energy output, $GJ/GJ_{th\ inp}$ PPOUT	Own-use, $GJ/GJ_{th\ inp}$ PPOWN
Country COU_ABB	Region REG_ABB	Source LPS_ID		YEAR		
FRAN	WHOL	STML01	ELE	2000	0.06	0.007
			HT	2000	0.78	

Table 2.6.12 Energy Input Patterns for New Capacities (LPSEIN01.DBF)

Codes			Fuel code FUEL_ABB	Process/technology GJ/[AC_UNIT2/10^6] PTIN	Time period		Power/heat plant, $GJ/GJ_{th\,inp}$ PPIN
Country COU_ABB	Region REG_ABB	Source LPS_ID			YEAR_FROM	YEAR_UNTIL	
FRAN	WHOL	STML01	DC	*8.20*			
			HF		1991	2000	*1.00*
			GAS	*2.00*	2001	2020	*1.00*
			ELE	*2.6*			
			HT	*1.5*			

Table 2.6.13 Energy Output/Own-Use Patterns for New Capacities (LPSEON01.DBF)

Codes			Fuel code FUEL_ABB	Process/technology, GJ/[AC_UNIT2/10^6]		Time period		Power/heat plant, $GJ/GJ_{th\,inp}$	
Country COU_ABB	Region REG_ABB	Source LPS_ID		En. output PTOUT	Own use PTOWN	YEAR_FROM	YEAR_UNTIL	En. output PPOUT	Own use PPOWN
FRAN	WHOL	STML01	ELE			1991	2000	*0.10*	*0.012*
			HT			1991	2000	*0.68*	
			ELE			2001	2020	*0.14*	*0.010*
			HT			2001	2020	*0.70*	
			GAS	2.5	2.0				

Table 2.6.14 Capacity Factors for Existing LPS (LPSCFE01.DBF)

Codes			YEAR	Power/heat plant,			Process/technology,		
Country COU_ABB	Region REG_ABB	Source LPS_ID		PP_PRE71	PP_P7180	PP_P8190	PT_PRE71	PT_P7180	PT_P8190
FRAN	WHOL	STML01	1990		*0.72*			*0.90*	
			2000		*0.64*			*0.80*	
			2010		*0.24*			*0.30*	
			2020		*0.00*			*0.00*	

Table 2.6.15 Capacity Factors for New LPS (LPSCFN01.DBF)

Codes			Years AYEAR	Power/heat plant NEW_PP	Process/ technology NEW_PT
Country COU_ABB	Region REG_ABB	LPS LPS_ID			
FRAN	WHOL	STML01	10	*0.70*	*0.90*
			20	*0.60*	*0.80*
			30	*0.30*	*0.60*
			40	*0.00*	*0.00*