Key features of PM emission inventory system in the NIS

Preliminary report on national contribution "in-kind" of the Republic of Belarus into EMEP for 2005

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6th JOINT UNECE Task Force & EIONET meeting
on Emission Inventories and Projections

19-21 October 2005, Rovaniemi, Finland

Project title:

Research for PM Emission Inventory Improvement in the NIS (on an Example of Belarus)

Goal:

•Assessment of PM emissions inventory system in the NIS and detection of possibilities of its improvement in view of CLRTAP requirements.

Tasks:

• Emissions reporting system analysis;

• Data on PM emissions collection and analysis;

• Investigation of selected activities for improvement of PM emissions factors and methodological approaches to emissions inventory.

Structure of the report

- Emission inventory methodology in Belarus in view of PM;
- Reporting formats;
- PM emissions data and trends;
- Ways forward for improvement of PM emission inventory.

Rationale

Main features of PM and other pollutants emission inventory have the same basis in almost all NIS countries because they were inherited from the USSR.

Legislation and methodology of the emissions inventory in Belarus

The basis of air quality legislation in Belarus is Law on Atmospheric Air Protection (08.05.1997).
State emissions inventory system in Belarus is based on annual statistical reporting of the enterprises. This system was founded in 70th of the last century and last 20 years have not changed greatly.

According to the Regulation on state accounting of harmful impacts on the atmospheric air (approved 12.08.1982), enterprises and organizations lead primary accounting of composition and volumes of harmful substances; detect the composition and polluting substances emitted into the ambient air and their volumes in accordance with existing guidelines; report in accordance with existing guidelines their emissions.

State Emission Inventory in Belarus

Primary reporting forms are summarized by regional offices of the Ministry on Statistics and Analysis.

Main office of the Ministry on Statistics and Analysis generalize reports of the regional offices and produce annual report on air protection in the split of regions, branches of economy, cities and ministries.

Data on emissions in annual reports include:

- data on annual emissions of main pollutants (SO_2, CO, NO_x, hydrocarbons and VOC); and
- specific pollutants (more than 80).

Data on emissions of the main pollutants are given divided into emissions from fuel combustion and emissions from technological and other processes.

Additional information in the annual report is: number of reported enterprises, number of sources of emission, level of abatement etc.

Particulate is given as total (TSP) and splitted by chemical composition (for instance, by SiO_2 content).

Annual emissions reporting system summarizes data from more than 2000 enterprises; it is assumed that they represent about 95% of total emission.

Specific features of national emission inventory system which cause difficulties for UNECE emissions reporting

•Emissions in national statistics are summarized according to branches classification scheme (so-called OKONH) which is not coincide with SNAP and NFR classification schemes. Additional information is necessary for distribution of emission.

•Mobile sources emissions are not reported. They are estimated by the consumption of fuel on the national and region levels.

•From the list of pollutants for mobile sources only SO_2, NO_x, VOC, benzo(a)pyrene, dust, and Pb are accounted. Tyre and break wear, as well as road abrasion are not considered.

•Domestic sources (for instance, heating) are not taken into account.

PM emission estimation methodology

PM emission is estimated by facility according to state standards (GOST, Rules…) and sector guidelines.

Emission reporting formats

As it was stated earlier, primary emission reporting unit is facility, and primary reporting document is the annual statistical form №2-oc (air). The latest version of it was issued in 1997.

Main features of the Air Emission Reporting Form №2-oc (air)

This form is filled on the basis of primary emission records of emission sources (ПОД-1, ПОД-2, ПОД-3) which were approved in 1996.

The form №2-oc (air) consists of informative part which include data on enterprise, and following 5 chapters:

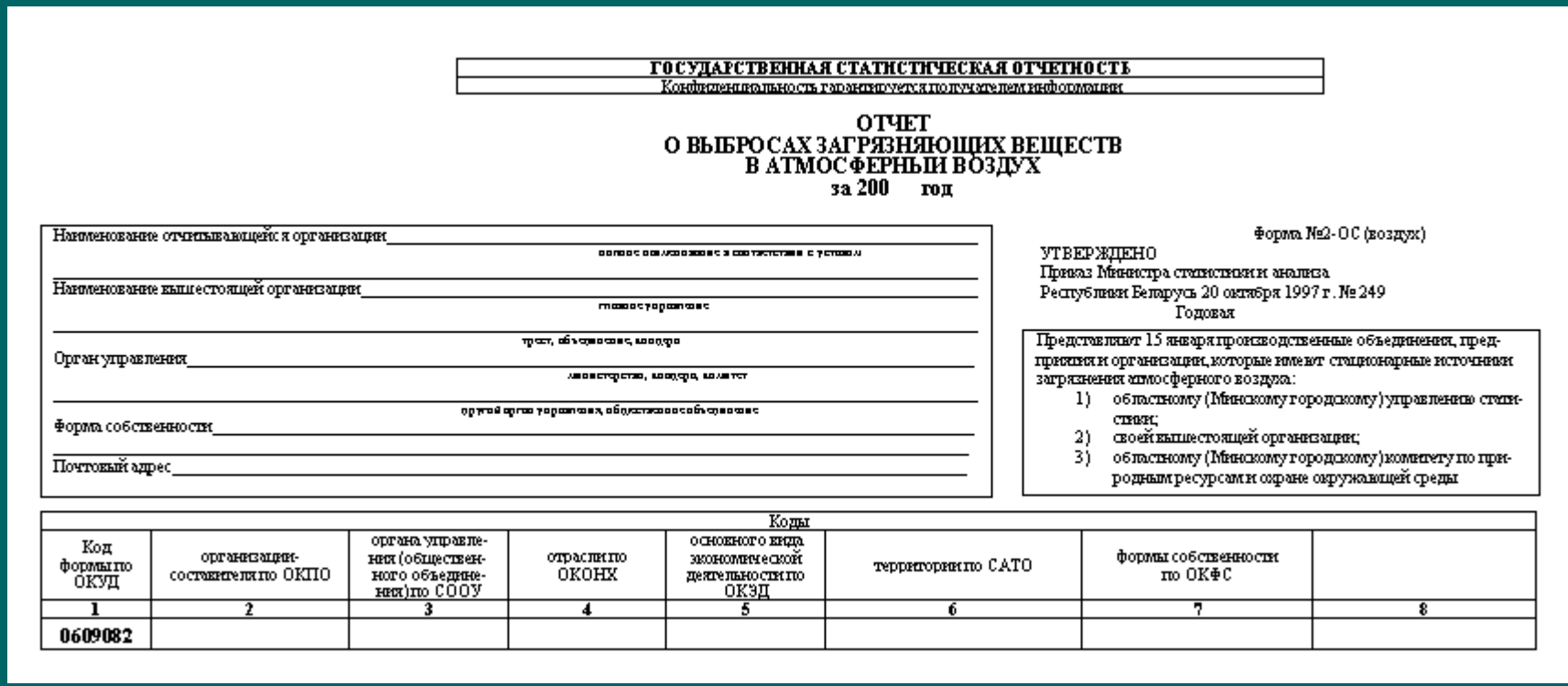
1. Air emissions of polluting substances, their abatement and utilization;
2. Air emissions of specific pollutants;
3. Sources of air emissions;
4. Fulfillment of measures on pollutants air emissions reduction;
5. Reference data.

The informative part of the reporting form includes following information on enterprise:

- Name of enterprise;
- Name of parent organization;
- Operating control;
- Pattern of ownership;
- Address;
- Some codes (for main economic activity, for branches of economy etc).

First page of atmospheric air emission reporting form №2-oc (air)

Data on enterprise



ГОСУДАРСТВЕННАЯ СТАТИСТИЧЕСКАЯ ОТЧЕТНОСТЬ
Конфиденциальность гарантируется получателем информации

ОТЧЕТ
О ВЫБРОСАХ ЗАГРЯЗНЯЮЩИХ ВЕЩЕСТВ
В АТМОСФЕРНЫЙ ВОЗДУХ
за 200 год

Наименование отчитывающейся организации _____
полное наименование в соответствии с уставом
_____
Наименование вышестоящей организации _____
полное наименование
_____
трест, объединение, концерн
Орган управления _____
министерство, концерн, комитет
_____
другой орган управления, общественное объединение
Форма собственности _____
_____
Почтовый адрес _____

Форма №2-ОС (воздух)
УТВЕРЖДЕНО
Приказ Министра статистики и анализа
Республики Беларусь 20 октября 1997 г. № 249
Годовая

Представляют 15 января производственные объединения, предприятия и организации, которые имеют стационарные источники загрязнения атмосферного воздуха:
1) областному (Минскому городскому) управлению статистики;
2) своей вышестоящей организации;
3) областному (Минскому городскому) комитету по природным ресурсам и охране окружающей среды

Коды							
Код формы по ОКУД	организации-составителя по ОКПО	органа управления (общественного объединения) по СООУ	отрасли по ОКОНХ	основного вида экономической деятельности по ОКЭД	территории по САТО	формы собственности по ОКФС	
1	2	3	4	5	6	7	8
0609082							

First chapter of the reporting form includes data on emissions of:

- solid substances (PM);
- gaseous and liquid substances;
- SO_2, CO, NO_x (as NO_2), hydrocarbons (excluding VOC), VOC, and other gaseous and liquid.

Data for these groups of pollutants (except hydrocarbons, VOC and other gaseous and liquid) is divided into:

- emission from fuel combustion for electrical energy and heat;
- emission from technological and other process.

First chapter of atmospheric air emission reporting form №2-oc (air)

Air emissions of polluting substances, their abatement and utilization

Раздел 1. Выбросы загрязняющих веществ в атмосферу, их очистка и утилизация

Код по ОКЕИ: тонна - 168

№ строки	Код загрязняющего вещества *)	Загрязняющие вещества	Выбрасывается без очистки (с тремя знаками после запятой)		Поступило на очистные сооружения загрязняющих веществ – всего	Из поступивших на очистку – уловлено и обезврежено		Всего выброшено в атмосферу загрязняющих веществ	
			всего	в том числе от организованных источников загрязнения		всего	из них утилизировано	за отчетный год	за предыдущий год
А	1	Б	2	3	4	5	6	7	8
101	0001	Всего (104 + 107)							
102		в том числе от: сжигания топлива							
103		технологических и других процессов							
104	0002	Твердые							
105		в том числе от: сжигания топлива							
106		технологических и других процессов							
107	0004	Газообразные и жидкие (110 + 113 + 116 + 119 + 120 + 121)							
108		в том числе от: сжигания топлива							
109		технологических и других процессов							
110	330	Сернистый ангидрид (SO_2)							
111		в том числе от: сжигания топлива							
112		технологических и других процессов							
113	337	Окись углерода							
114		в том числе от: сжигания топлива							
115		технологических и других процессов							
116	301	Окислы азота (в пересчете на NO_2)							
117		в том числе от: сжигания топлива							
118		технологических и других процессов							
119	401	Углеводороды (без ЛОС)							
120	0006	Летучие органические соединения (ЛОС)							
121	0005	Прочие газообразные и жидкие							

Second chapter includes data on emissions of specific pollutants (all excluding SO_2, CO and NO_2).

In the first place the pollutants which listed in the Annex to the Instruction on form filling are shown.

Now this Annex includes 81 pollutant.

Together with annual emissions in this chapter annual emission limits by pollutants are shown.

List of priority solid substances (PM)

Pollutant	Code
Vanadium pentaoxide	110
Cadmium oxide (as cadmium)	133
Manganese and compounds (as manganese dioxide)	143
Copper oxide (as copper)	146
Nickel	183
Lead and compounds (except lead tetraethyl as lead)	184
Chromium hexavalent (as chromium trioxide)	203
Arsenic (nonorganic compounds)	325
Carbon	328
Selenium dioxide	329
Benzo(a)pyrene	703
Phthalic anhydride (vapor, aerosol)	1508
Polyethylene terephthalate	1544

List of priority solid substances (PM) (continuation)

Pollutant	Code
Protein of dust of protein vitaminous concentrate	2602
Epoxy powder paint	2731
Activated resin flux	2753
Oil ash of heat power plant (as vanadium)	2904
Desiccant dust	2906
Nonorganic dust containing more than 70 % of silicon dioxide	2907
Feed mill dust (as a protein)	2911
Bone flour dust (as a protein)	2912
Glass fiber dust	2915
Fiberglass plastic dust	2916
Cotton dust	2917
Cement production dust (with calcium oxide contents about 60 %)	2918
Capron dust	2919
Coal ash of heat power plant (with calcium oxide contents 35–40 %)	2926

Advantages and drawbacks of the reporting form №2-oc (air)

– Stability of the reporting format for a long period of time;

– A lot of information on emission accounted at enterprises can be found..

– Hard to incorporate into international inventories

– Difficult to modify

– Not easy to get.

Assimilation of experience of other countries in emission reporting and in particularly of PM

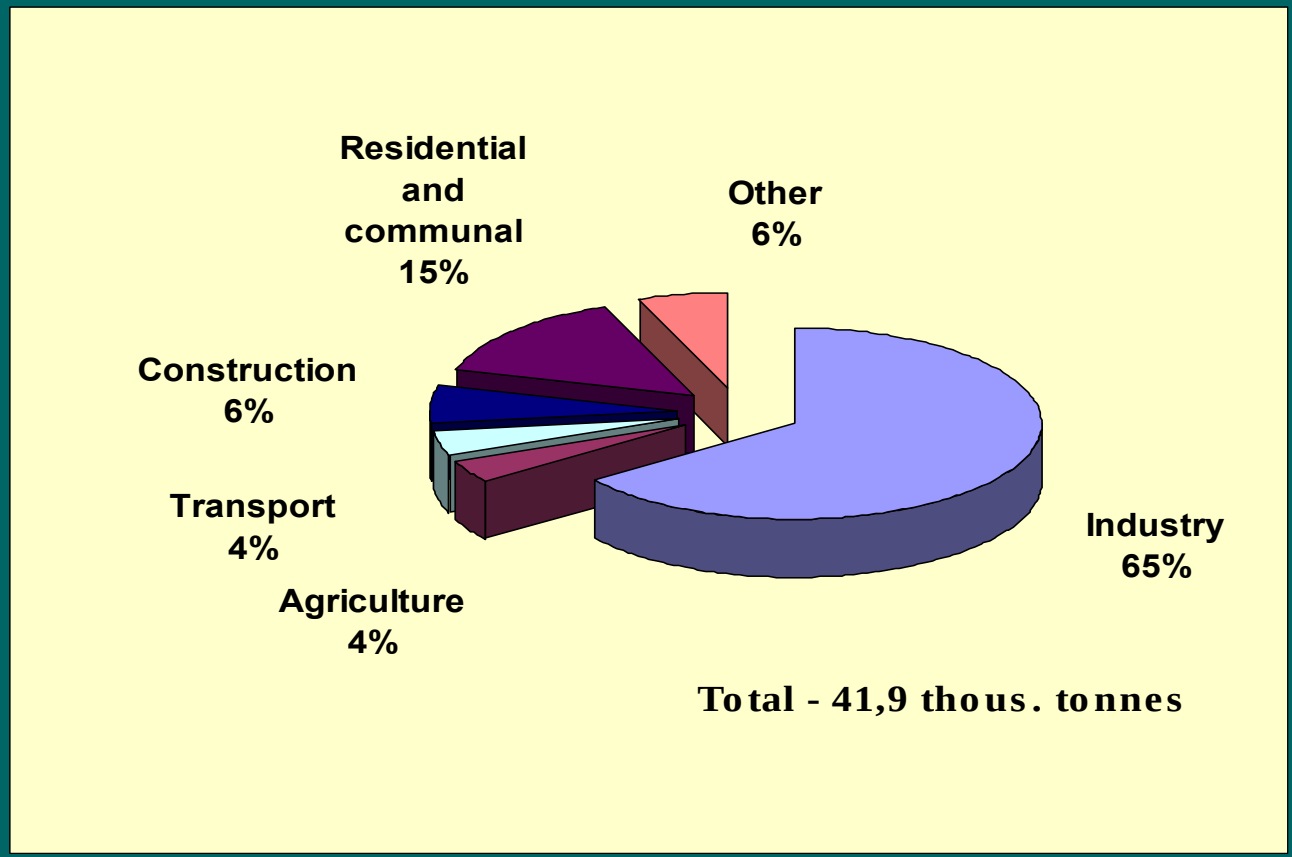
With the matter of the existing reporting form improvement international and national experience of other countries was analyzed.

With this purpose requests to almost all European countries were sent. Formats from Estonia, France, Lithuania, Norway, Sweden, many other countries were obtained. Thanks to all !

It is not possible to discuss all obtained material now. I would like to stress only that in the most of forms PM emissions are reported as totals and PM10, in some countries – also PM2.5. Emission limits for reporting are sometimes shown: for instance in Canada such limit is 0.5 tones/year, in Australia – 400 tones/year.

PM inventory statistics

Some examples of data on the latest PM emissions statistics in Belarus (2003-2004) are shown below.

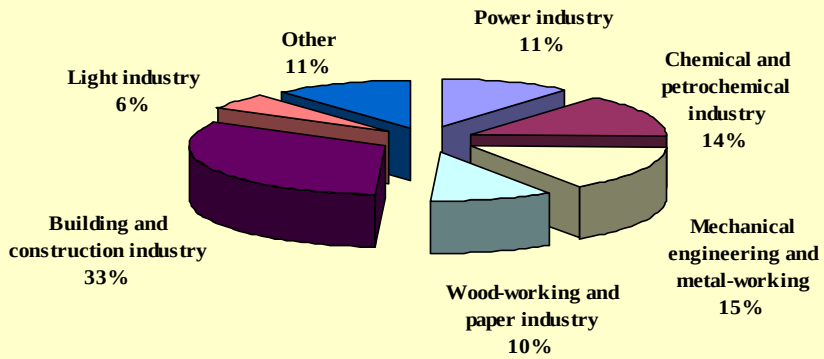


PM emissions in Belarus by sectors of economy

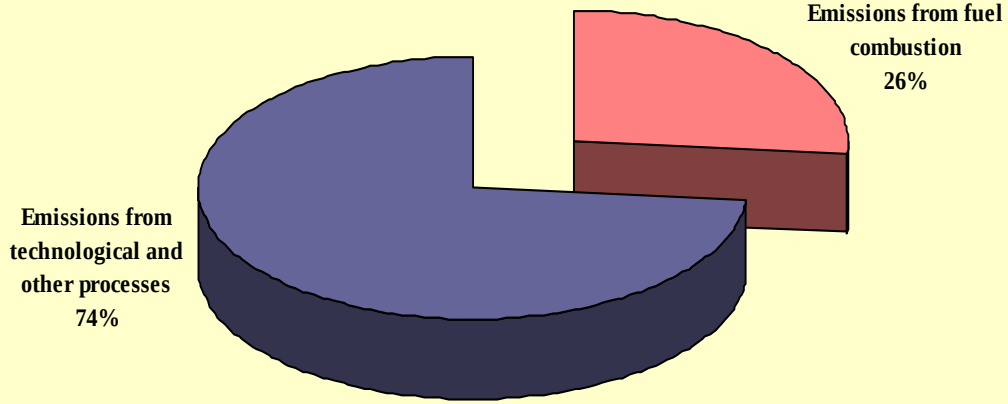
PM emissions in Belarus in 2003 by statistical data

Source	Emissions, th.tones
Total	**68,585**
Total stationary	***42,285***
Industry, total	*27,512*
Power industry	0,135
Fuel industry	3,017
Ferrous metallurgy	0,509
Chemical industry and petrochemical industry	3,919
Engineering industry and metal-working	4,200
Woodworking industry	2,831
Building and construction industry, including	8,912
Cement industry	3,914
Glass and whiteware industry	0,421
Light industry	1,534
Food industry	0,898
Microbiological industry	0,100
Flour-and-cereals industry	0,942
Other industries	0,094
Agriculture	*1,594*
Transport and intercommunication	*1,799*
Construction	*2,678*
Housing and communal services	*6,252*
Other sectors of the national economy	*2,450*
Mobile sources	***26,300***

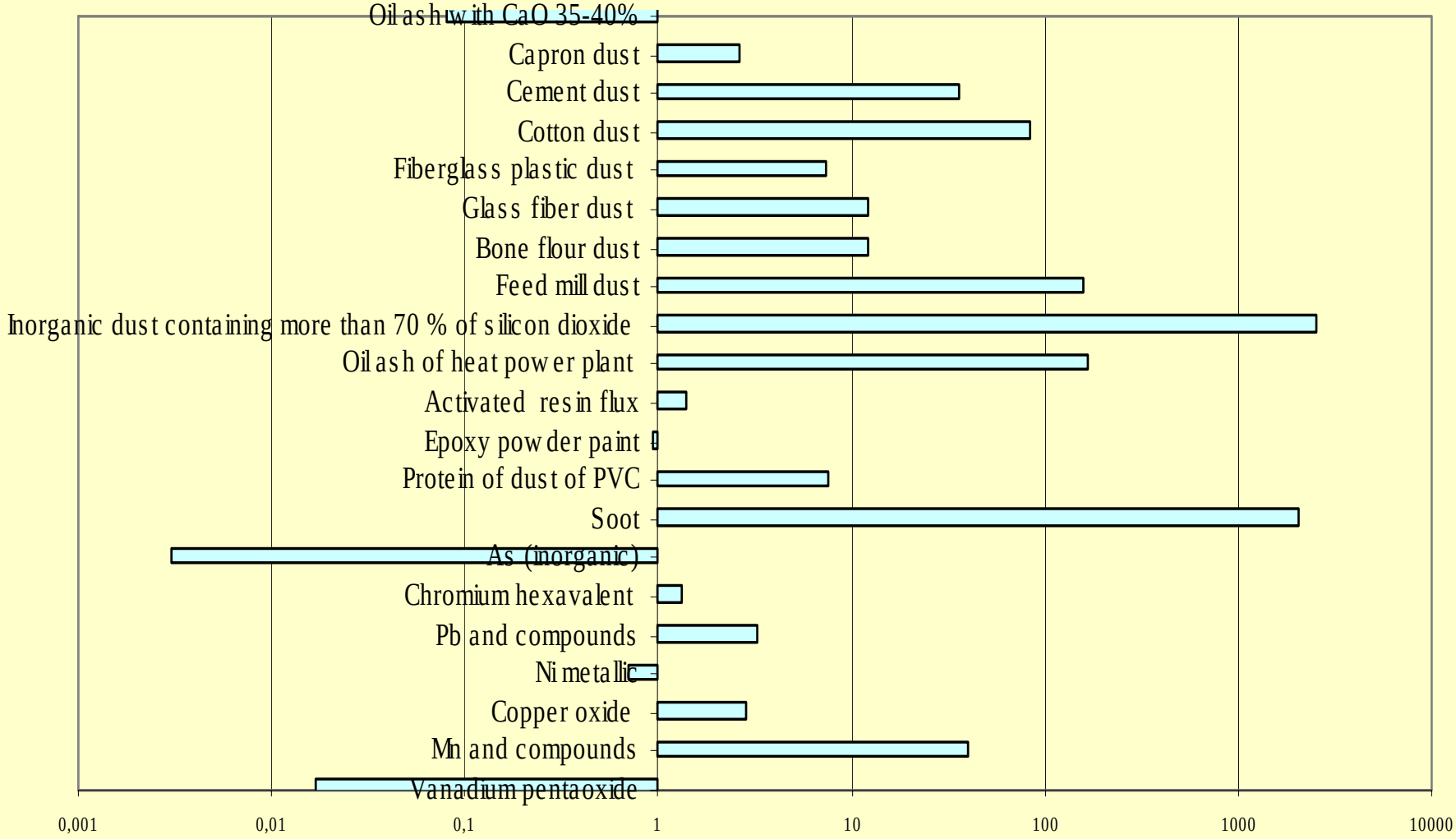
PM emissions in Belarus by industry sectors



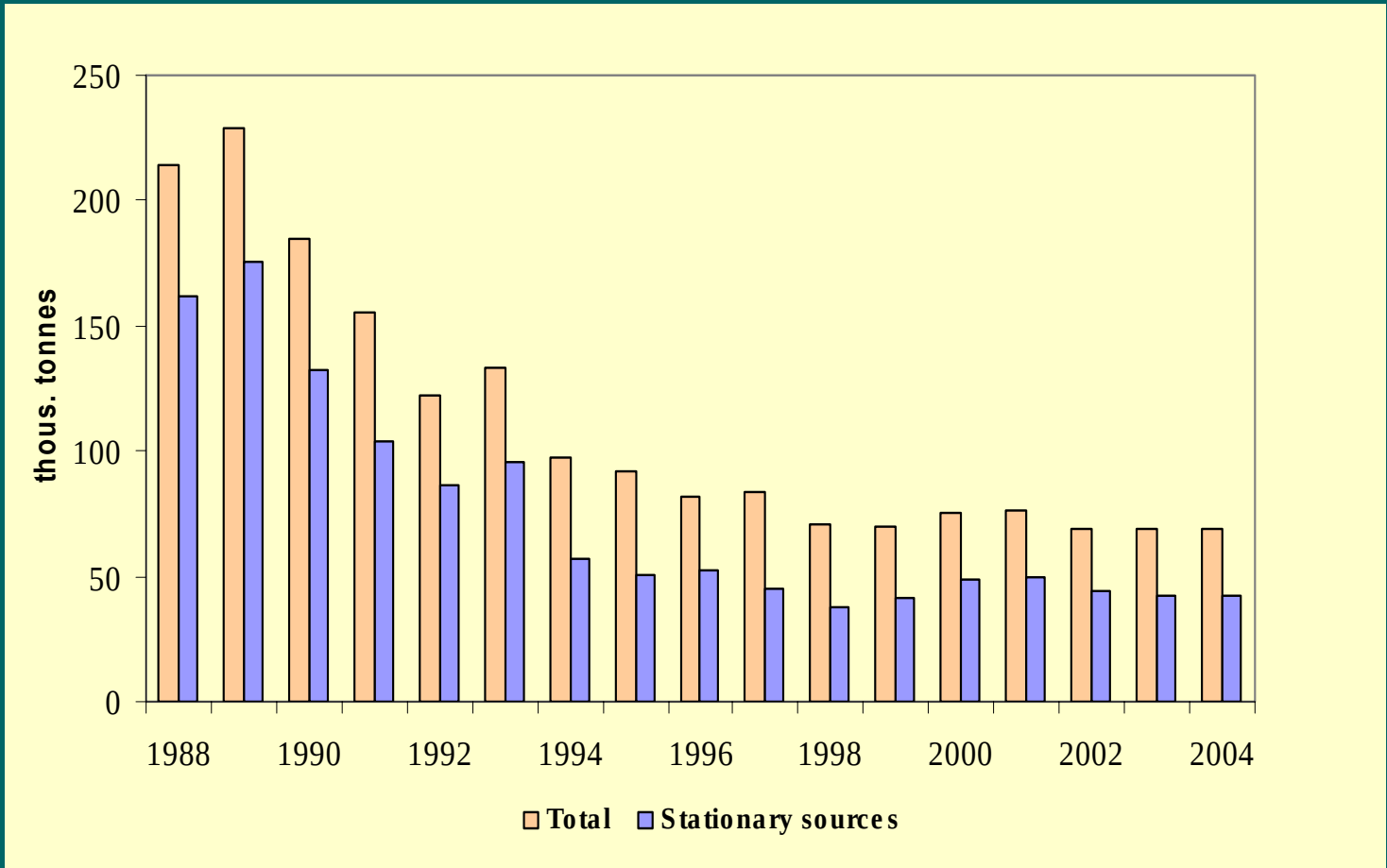
PM emissions in Belarus by type of process



Emission of specific solid substances



Trends of PM emissions in Belarus

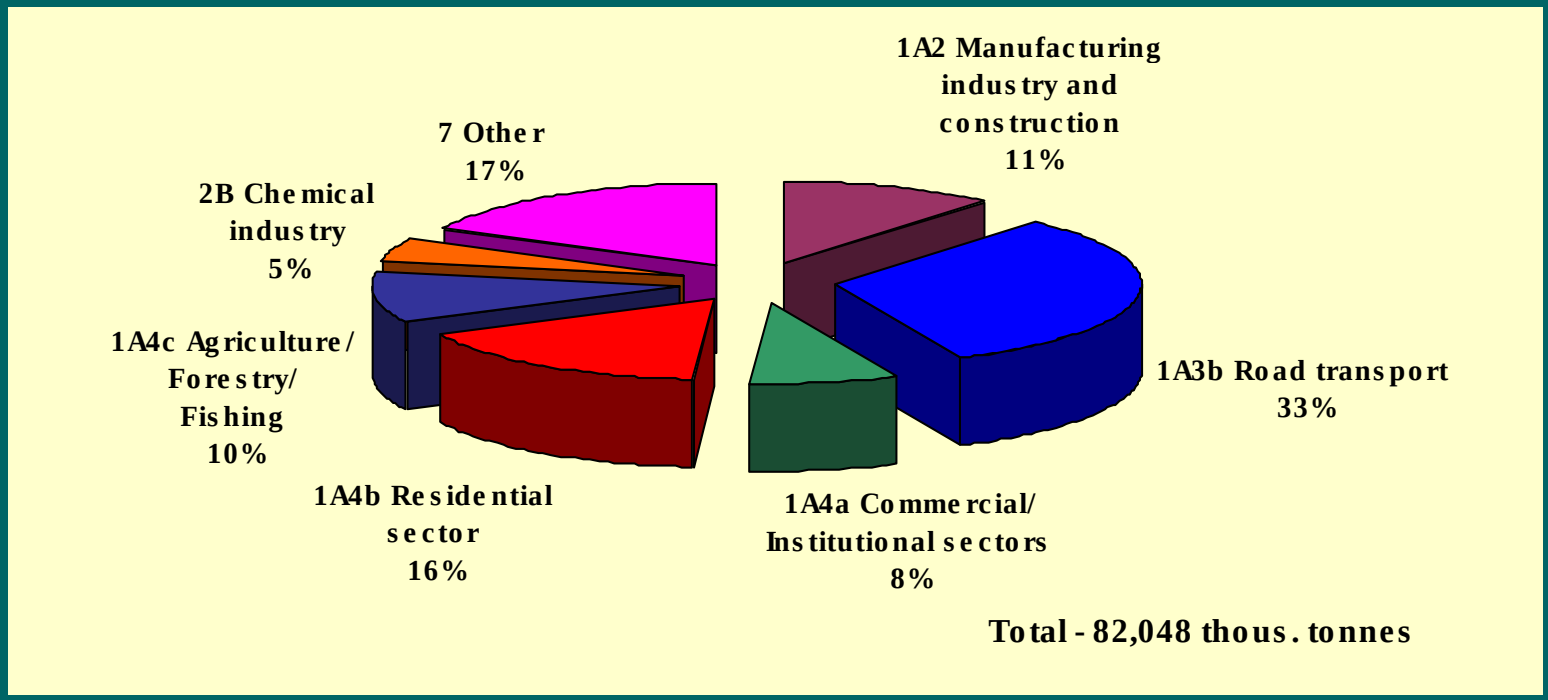


From experience of PM reporting to EMEP

Methodology:

- distribution of statistical data on emissions by SNAP and NFR;
- calculation of emissions for unaccounted sources.

Dust emissions in Belarus by NFR



Conclusions from analysis of PM statistics

Positive features of inventory and reporting system:

– There are a lot of data on PM emissions from stationary sources: total, by sectors, by cities etc. in the NIS.

– The time series are rather long (about 30 years).

– Data are distributed by emissions from combustion and from technological processes.

– Data on solid substances emissions are given by the type of dust (in priority list – about 30 – 1/3 of total).

Negative features:

– There is no sound description what belong to “solid substances”; every enterprise summarizes this category according its point of view.

– There is no data on size distribution of emitted particulate.

– The data by facility are hardly available.

– There is no direct relation of PM inventory and PM monitoring in ambient air.

– A lot of sources are not inventoried.

PM in the Guidebook

PM emissions from the following sources are characterized in the Guidebook to the date:

- cement production;
- mineral wool production;
- paper production;
- reheating furnaces steel and iron;
- electric furnace steel plant;
- lime production;
- asphalt concrete plant;
- glass production.

- bricks and tiles production;
- asphalt roofing materials production;
- pig iron tapping;
- road paving with asphalt;
- incineration of hospital and domestic wastes;
- mobile sources.

Guidebook now do not give sound basis for PM emission inventory.

Ways forward for improvement of methodological basis of PM emissions inventory in Belarus to meet EMEP requirements

Priorities:

- size-specific emissions;
- not accounted sources.

Possible ways of methodology improvement:

- to issue guidelines which makes possible to estimate size distribution of PM emissions, calculated by ordinary way.
- to issue guidelines which allows to estimate all PM fractions including TSP (like CEPMEIP).

This approaches can be tested on a model sector, for instance energy production.

Thanks to all experts for assistance and provision with emission reporting formats !

Programme elements for the project

on national contribution "in-kind" of the Republic of Belarus into EMEP for 2006

Title:

Further Research for PM Emissions Inventory Improvement in the NIS (on an Example of Belarus).

Goals:

- Improvement of the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook chapters regarding particulate matter (PM) emission in view of NIS countries technological specificity
- Methodological basis for Improvement of PM emission inventory in the NIS

Tasks:

- Assessment of completeness and reliability of data on PM emissions, detection of weak spots of PM emissions inventory reporting, and determination of priorities of its improvement in view of CLRTAP requirements.
- Testing of applicability of emission factors on PM available from the Atmospheric Emission Inventory Guidebook and other data sources (CEPMEIP, RAINS) for emissions data improvement, especially for assessment of PM10 and PM2.5 emissions.

Planned results:

- List of priorities of PM emission inventory improvement and proposals for its improvement in view of CLRTAP requirements.
- Additions to the Atmospheric Emission Inventory Guidebook for its improvement in view of PM emission inventory system in the NIS.

Budget:

About 950 US$ (as Belarusian contribution to EMEP according to assessment scale).

Proposals

on national contribution "in-kind" of the Republic of Belarus into EMEP for 2007

Project:

Update of Electrical Equipment chapter of the Atmospheric Emission Inventory Guidebook

Goals:

- Further improvement and supplement of POPs emissions data reported to EMEP from Belarus.
- Further improvement of the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook chapters in view of PCB emission
- Promotion of the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook methodology usage in the NIS countries