PM abatement technologies applied in EECCA countries: study and analysis

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Rationale:

1. IAM results are aimed at redistribution of abatement costs between sectors/countries, assessment of attainability of Gothenburg Protocol emission limits so uncertainties in IAM estimates (using GAINS and other models) affect policy.

2. Level of uncertainty of IAM estimates is different by region and for EECCA region is low.

3. Increase of emission/costs/impact assessment accuracy/reliabilty is necessary.

4. Current IAM parametrisation is made using basically WE technologies data/BAT; limited data for EECCA.

Goal of study:

- PM abatement techniques applicable in EECCA assessment for IAM models parametrization of PM in view of EECCA (on an example of Belarus).

Tasks:

:

- collection and analysis of data on PM control equipment production in EECCA;
- analysis of real and projected PM abatement efficiency;
- investment costs coefficients calculation.

Methodology:

- abatement equipment market study (analysis of costs of offers);
- facilities data study on abatement levels (actual and projected);
- calculation of investment costs coefficient (Cif).

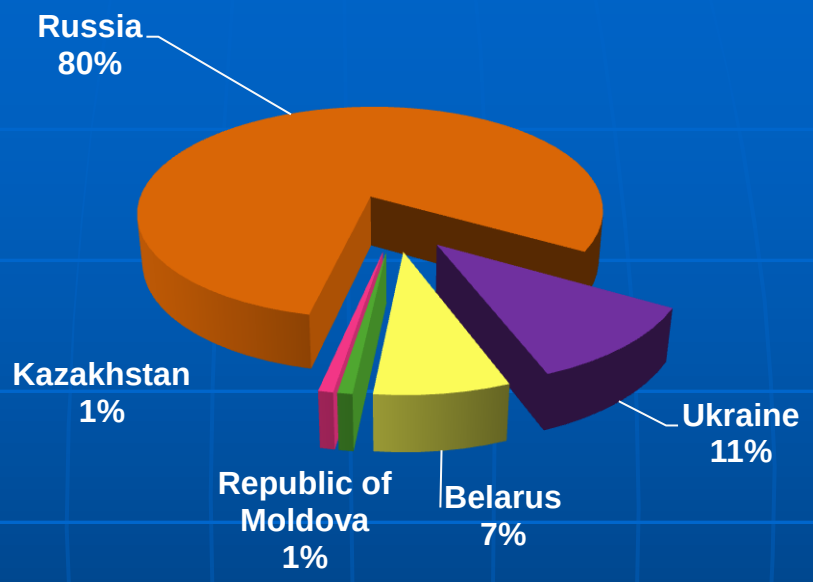
Region:

Belarus (PM control equipment in operation and at market); Russian Federation, the Ukraine (equipment market only).

Results:

Min/max abatement efficiencies and average investment coefficients per group of equipment and technology/sector.

Distribution of emission control equipment manufacturers in EECCA



Small-scale production and implementation of projects under the order

Since 1925

Over 150 manufacturers

Greatest PM emission control equipment manufacturers in EECCA

Russia

- FINGO ENGINEERING, CJSC *(all types)*
- «Folter», SPE *(cyclones, filters)*
- IRIMEX, JSC *(all types)*
- "Giprogazoochistka" OJSC *(all types)*
- «Rankom-Energo», EPC *(filters, electrostatic precipitators)*
- STC «Zenith», Ltd. *(cyclones, scrubbers)*
- «SPA «Talnakh», JSC *(cyclones, scrubbers, filters)*
- «Siberian association of energy engineering», Ltd. *(cyclones)*
- «ALYUMATEK», GC *(all types)*

Belarus

- «BELKOTLOMASH», SPE LLC *(cyclones)*
- «Belenergoremnaladka», JSC *(filters, electrostatic precipitators)*

Ukraine

- «Berdichev Machine Building Plant «Progress», TH *(cyclones, filters, electrostatic precipitators)*
- ARTEMOVSKIY MASHINOSTRAITELINYY PLANT«PROMMASH», Ltd. *(cyclones)*
- «Gas Cleaning Equipment Plant» Ltd. *(cyclones, scrubbers, filters)*

PM control equipment standards

USSR

GOST 12.2.043-80. Dust equipment. Classification

GOST 25199-82. (CMEA Standard 2145-80) Dust equipment. Terms and definitions.

Purposes of use
- Air filter for forced ventilation
- Dust collector for emission

Types and subtypes
- Dry
  - Gravitational/inertial/filtration/electrostatic
- Wet
  - Gravitational/filtration/electrostatic

Dust abatement efficiency for particles of different size groups (I-V)

Belarus

«Rules of operation for gas treatment facilities»

- General types
- Inefficiency criteria

PM control equipment features and specific condition

Cyclone

Dry

Inertial

Design features

Angles
Diameters
Ratio between the elements

Specific conditions

Abrasive dust
Danger of explosion
Working outdoors

Scrubber

Wet

Inertial

Design features

Angles
Diameters
Ratio between the elements

Specific conditions

Abrasive dust
Danger of explosion
Working outdoors
Solvents

Filter

Dry

Filtration

Design features

Regeneration
Materials

Specific conditions

Abrasive dust
Danger of explosion
Working outdoors

Electrostatic precipitator

Dry

Electrostatic

Design features

Number of fields
Placement
(horizontal/vertical)

Specific conditions

Danger of explosion
Working outdoors
Productivity

Perfomances and costs range for main types of abatement equipment

Cyclones
Performance: up to 400 thousand m^3 / h,
cost ranges: up to 220 thousand US$

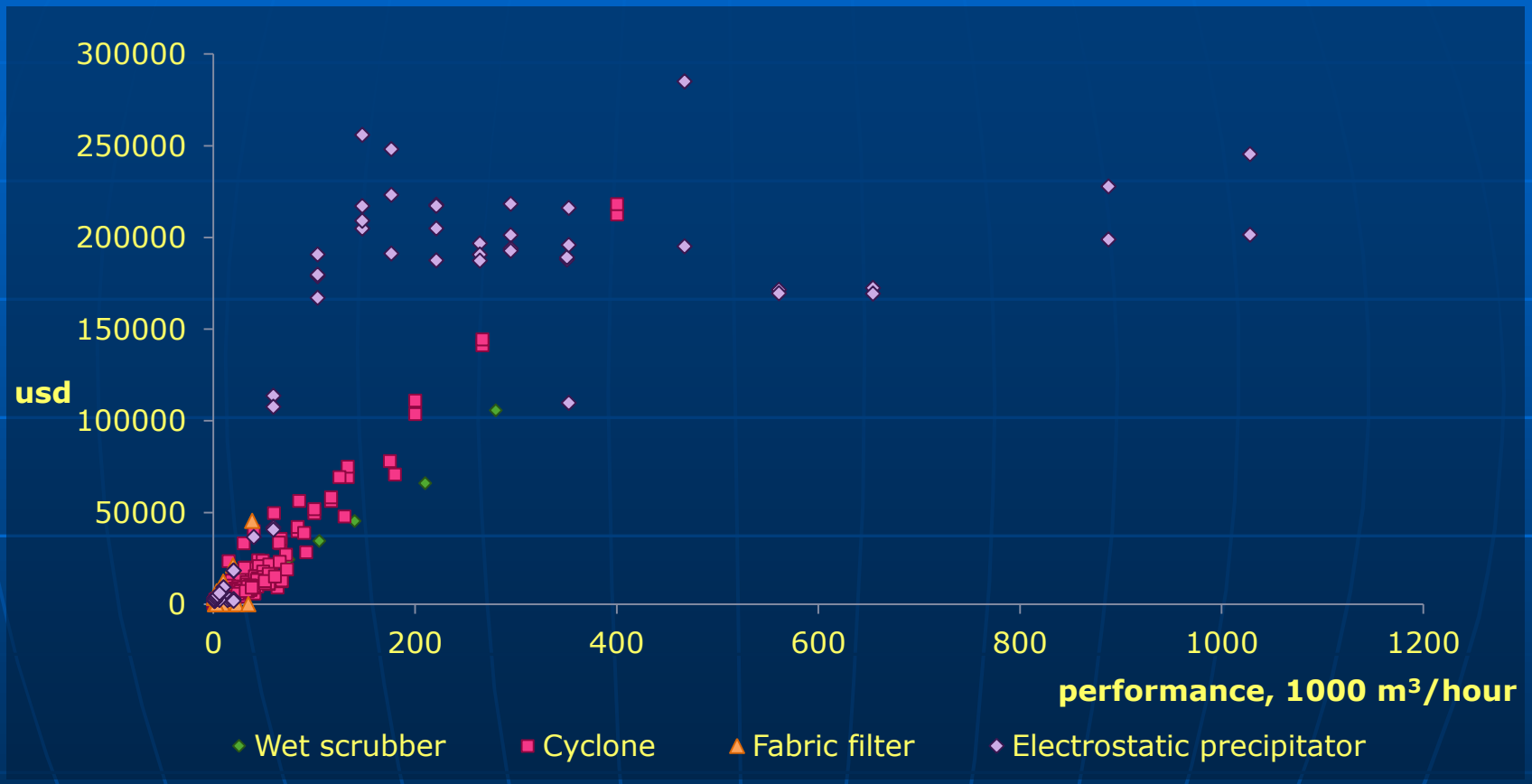
Wet scrubbers
performance: up to 280 thousand m^3 / h,
cost ranges: up to 105 thousand US$

Fabric filters
performance: up to 40 thousand m^3 / h,
cost ranges: up to 45 thousand US$

Electrostatic precipitator
Performance: up to 1020 thousand m^3 / h,
cost ranges: up to 285 thousand US$

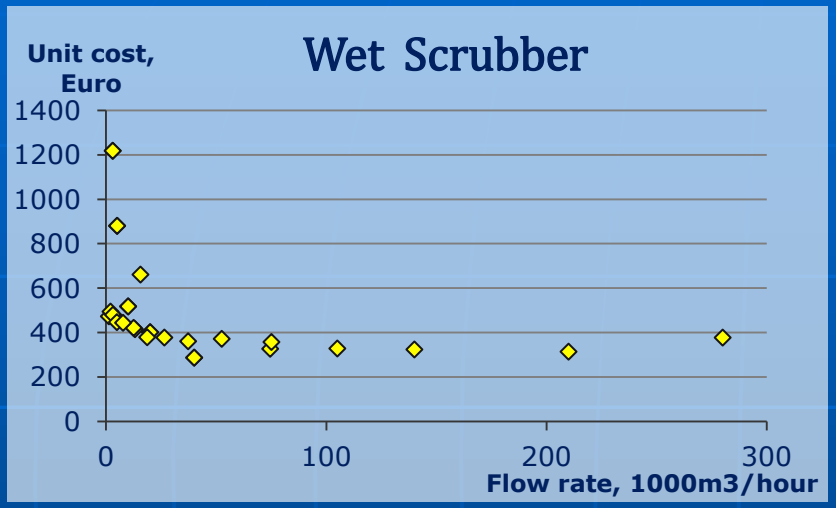
PM control equipment analysis

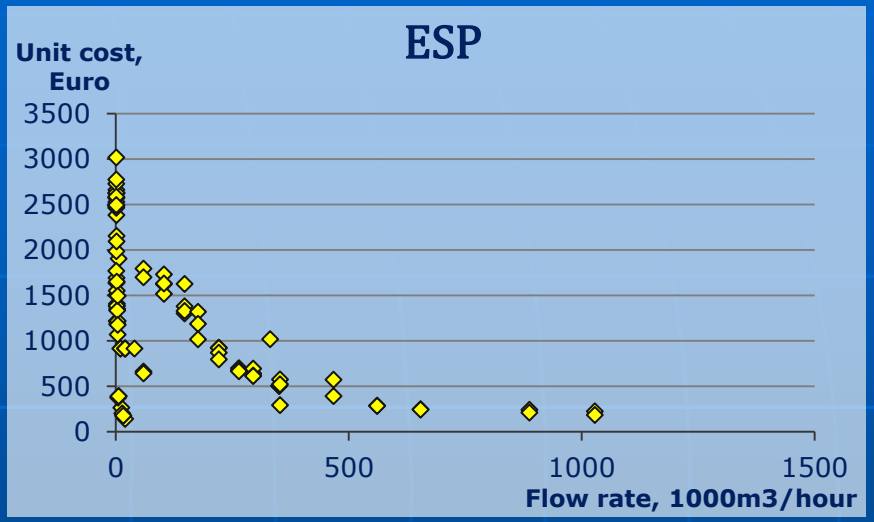
Correlation between capacity and cost of PM abatement equipment by type

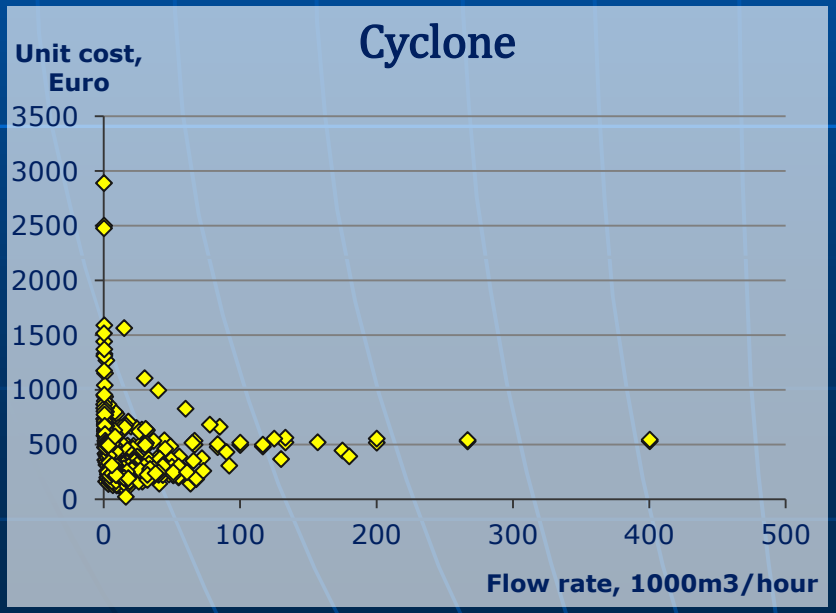


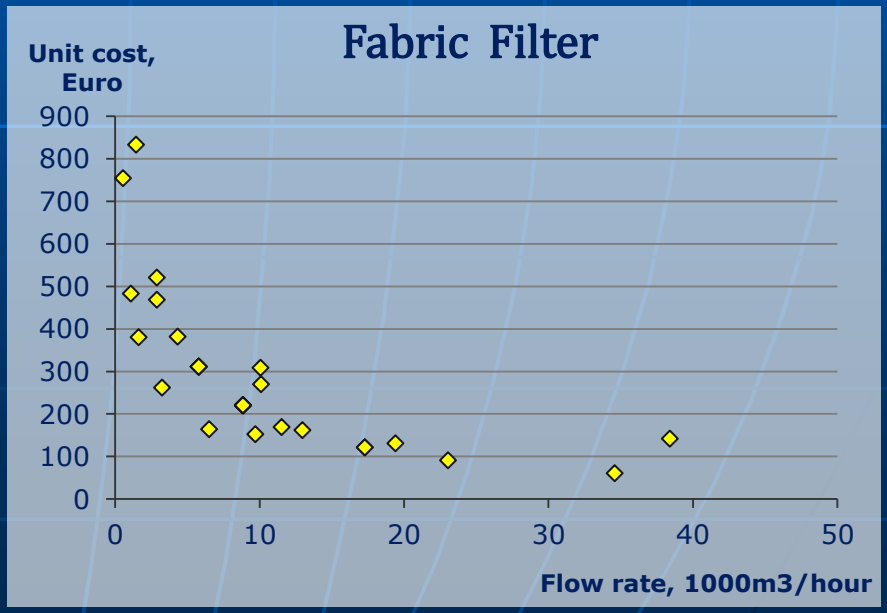
Data on more than 700 models of control equipment from EECCA countries were compiled into database including: capacity, weight, efficiency, cost parameters etc.

Variability of unit costs of abatement depending on type of equipment

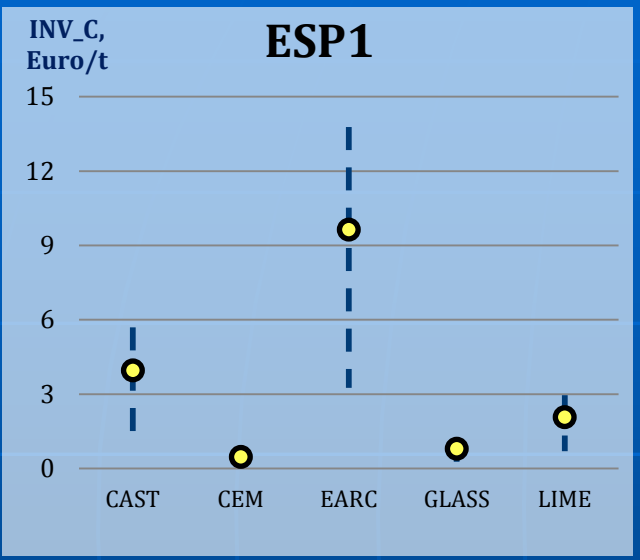


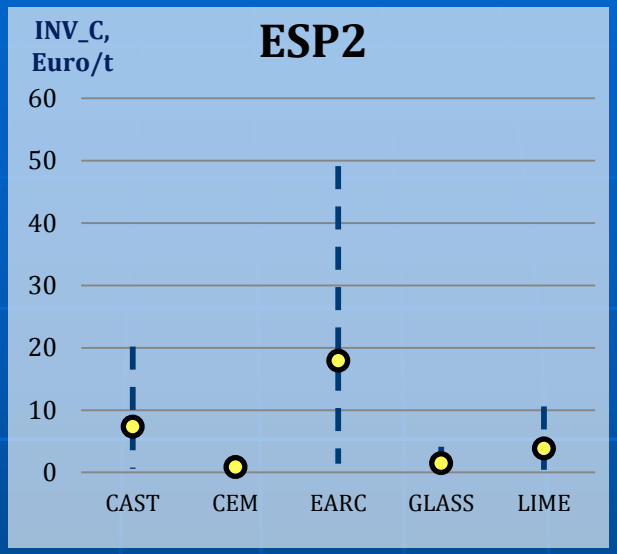


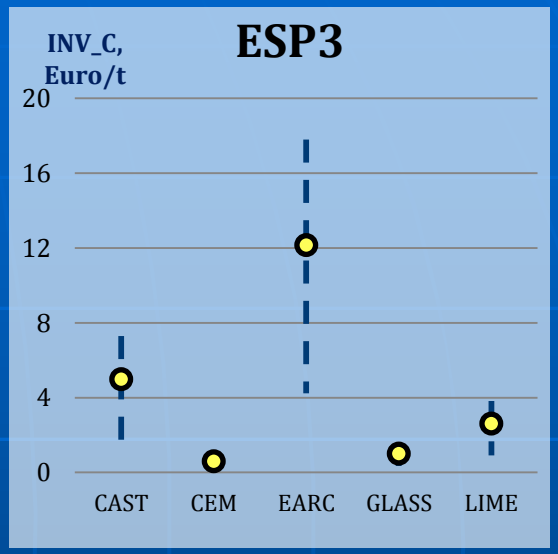


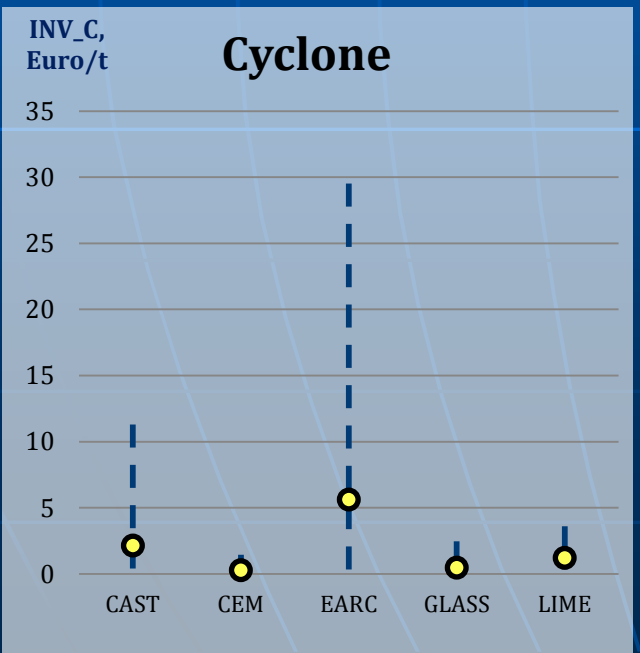


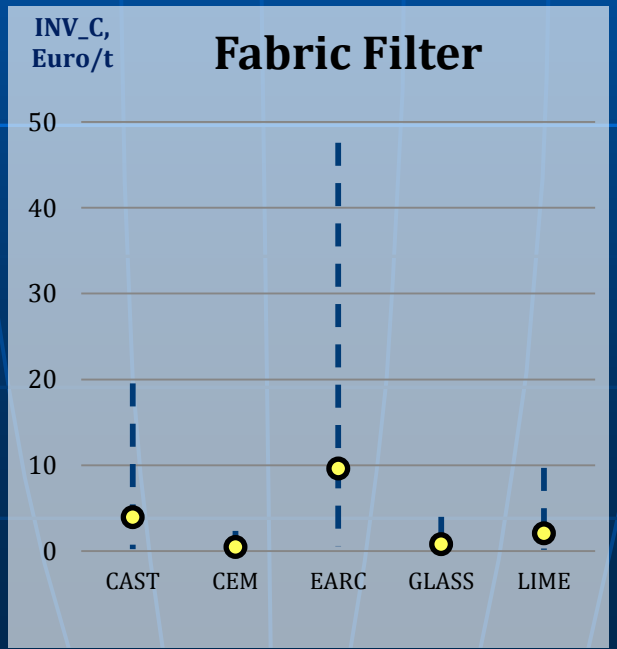
Comparative investment costs coefficient ci^f variability by type of control equipment

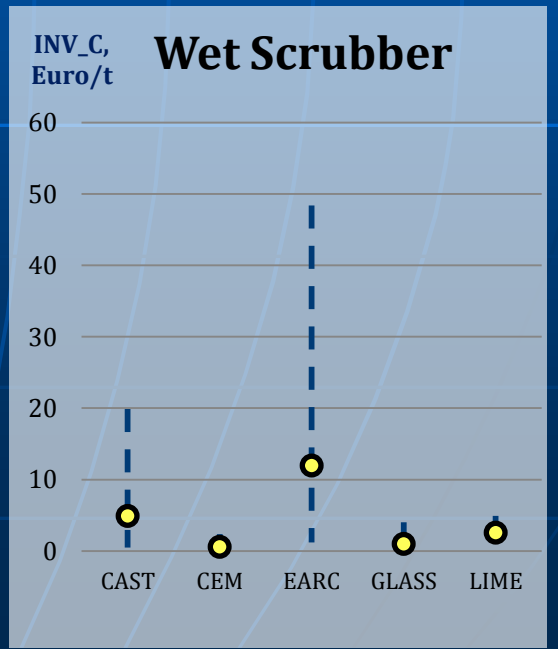




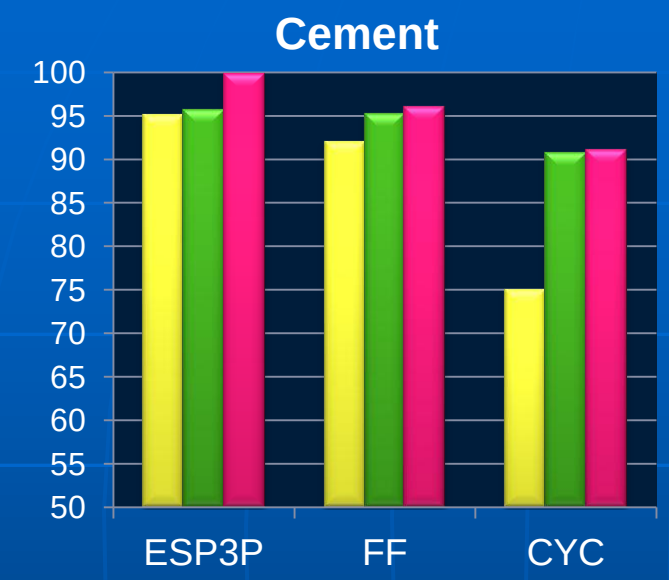


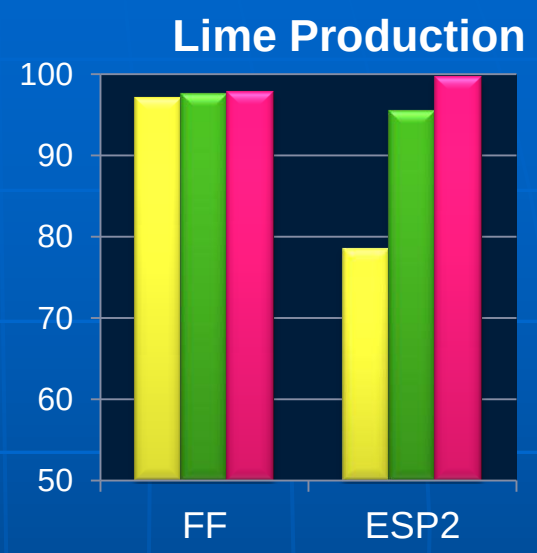


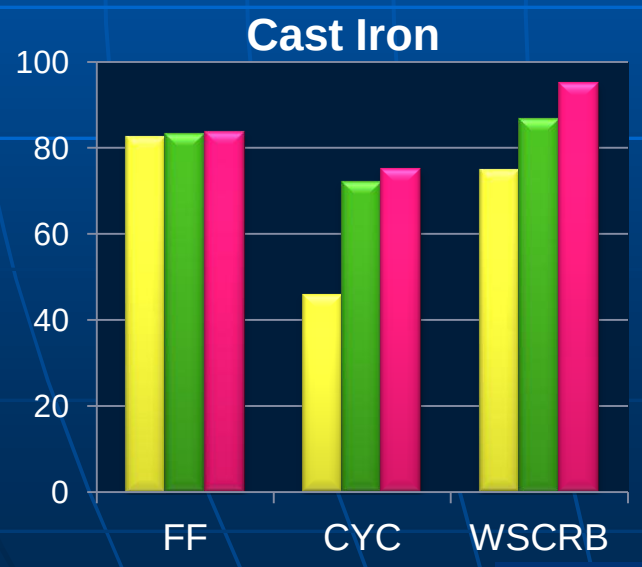


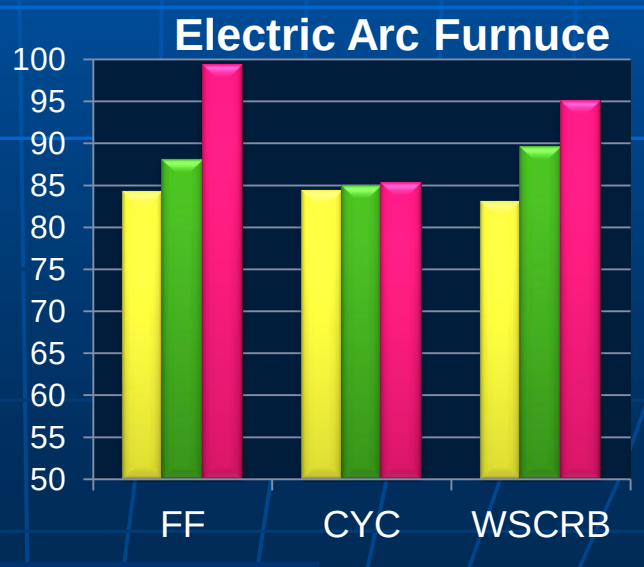


Abatement efficiency variability by type of control equipment









min mean max

Types of PM equipment abatement efficiency

Nominal

Maximum for type/subtype

New equipment

Taken from manufacturers offers

Projected

Calculated for specific operation conditions

New equipment

Taken from equipment Installation projects

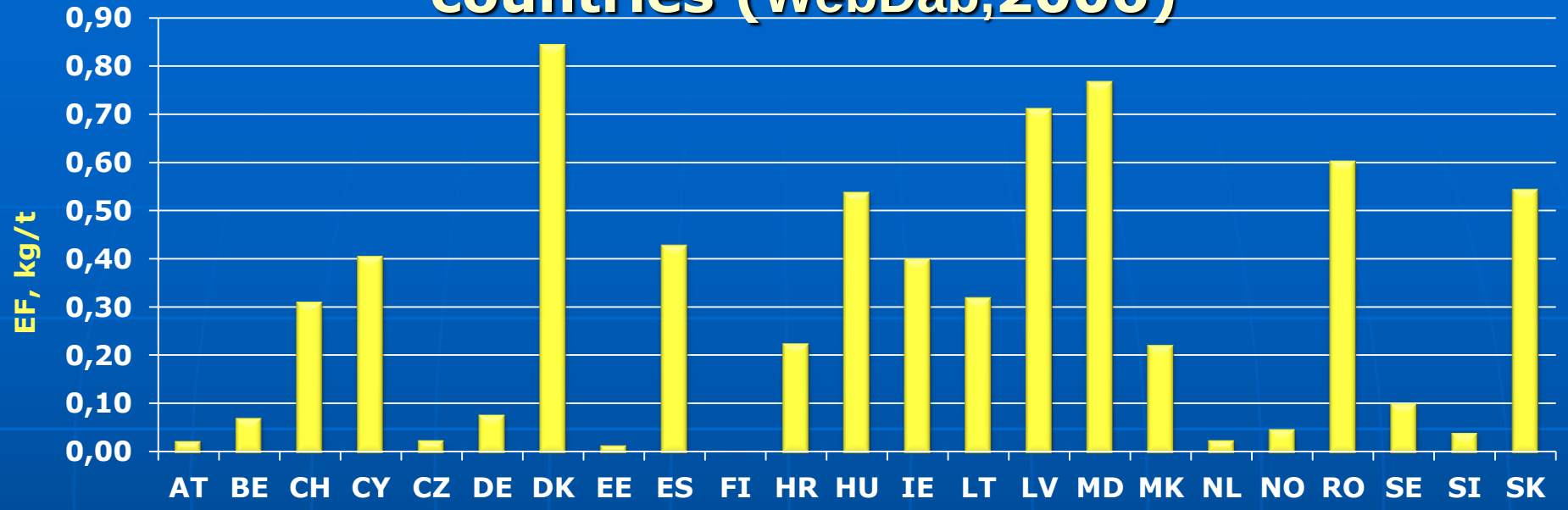
Real

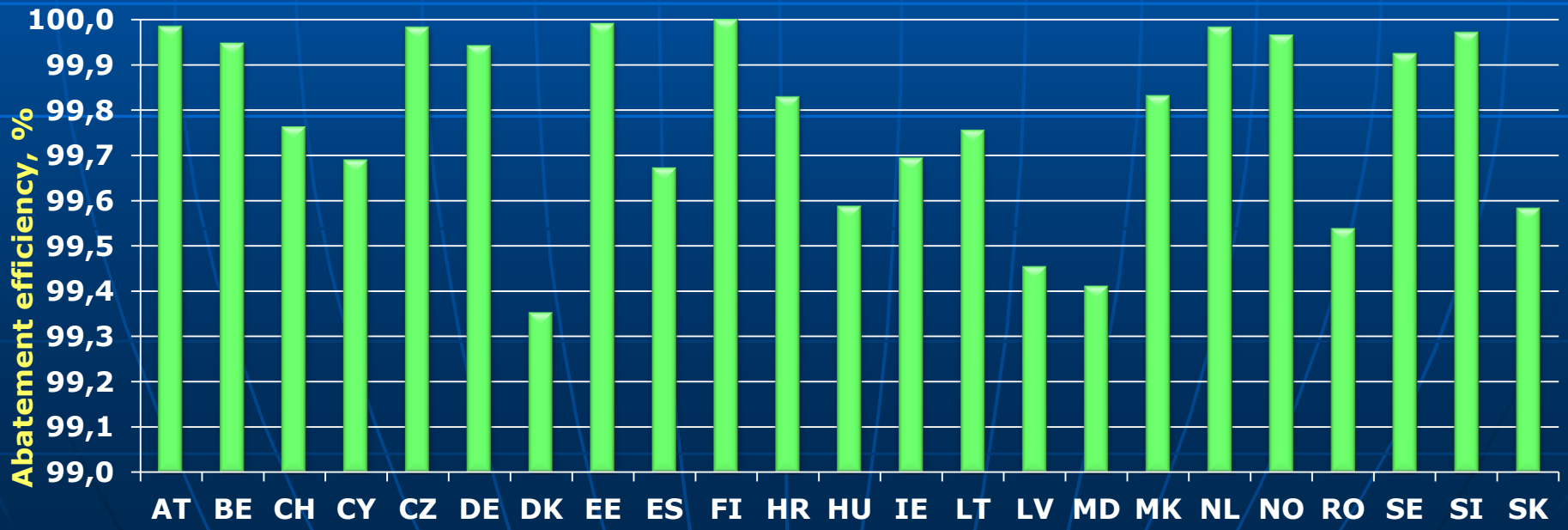
Estimated for the exploited control equipment

Operated: up to 15-20 years

Taken from equipment documentation

Derived TSP EFs and PM abatement efficiency by countries (WebDab,2006)





Conclusions:

- significant variability of PM control equipment characteristics produced in EECCA (efficiency, performance, design etc) detected;
- variability of control equipment investment cost parameters; not normal distribution (bias of means);
- lack of unified methodology for the calculation of investment cost parameters for IAM;
- different measures of PM abatement efficiency: nominal, projected, real; all can be used in IAM;
- possible application of different types of abatement efficiencies results in increase of uncertainties of emission/costs IAM assessments.

Further steps:

- preparation of analytical paper on PM abatement equipment in EECCA (on an example of Belarus);

- assessment of uncertainties of emission/costs estimation possible impact onto policy.

Thank you for your attention!