

Determination of sectoral emission factors for small combustion installations

in Germany

Expected results of a research
project



F. Pfeiffer; M. Struschka; Prof. Dr. G. Baumbach
Institute for Process Engineering and power
Plant Technology, University Stuttgart:

„Determination of average emission factors for
the presentment of the future development of
emissions from combustion units in
households and the small consumer sector“

- previous report from 2000



Aim of the study

- n Improvement of data for several reporting obligations
- n Source category 1.A.4 (a, b, c)
 - n Small & medium combustion installations
 - n Residential (households, mobile sources)
 - n Small consumer sector
 - n Armed forces

Determination of emission factors

- n Differentiation
 - n design and type of construction
 - n operation mode
 - n range of nominal heat output (permitted and not permitted instal.)
 - n year of manufacture

Determination of emission factors

- n Differentiation of energy sources
 - n Light fuel oil
 - n Heavy fuel oil
 - n Gaseous fuels
 - n Coke from hard coal, hard coal briquettes
 - n Brown coal briquettes from different areas
 - n Untreated wood, wood materials, pellets, wood scraps and straw

Determination of the structure of installed combustion units in Germany

- n data from chimney sweeps (survey in selected chimney sweep districts)
- n extensive literature analysis
- n emission measurement from test stands
- n field investigations

Flue gas components for calculation of sectoral emission factors

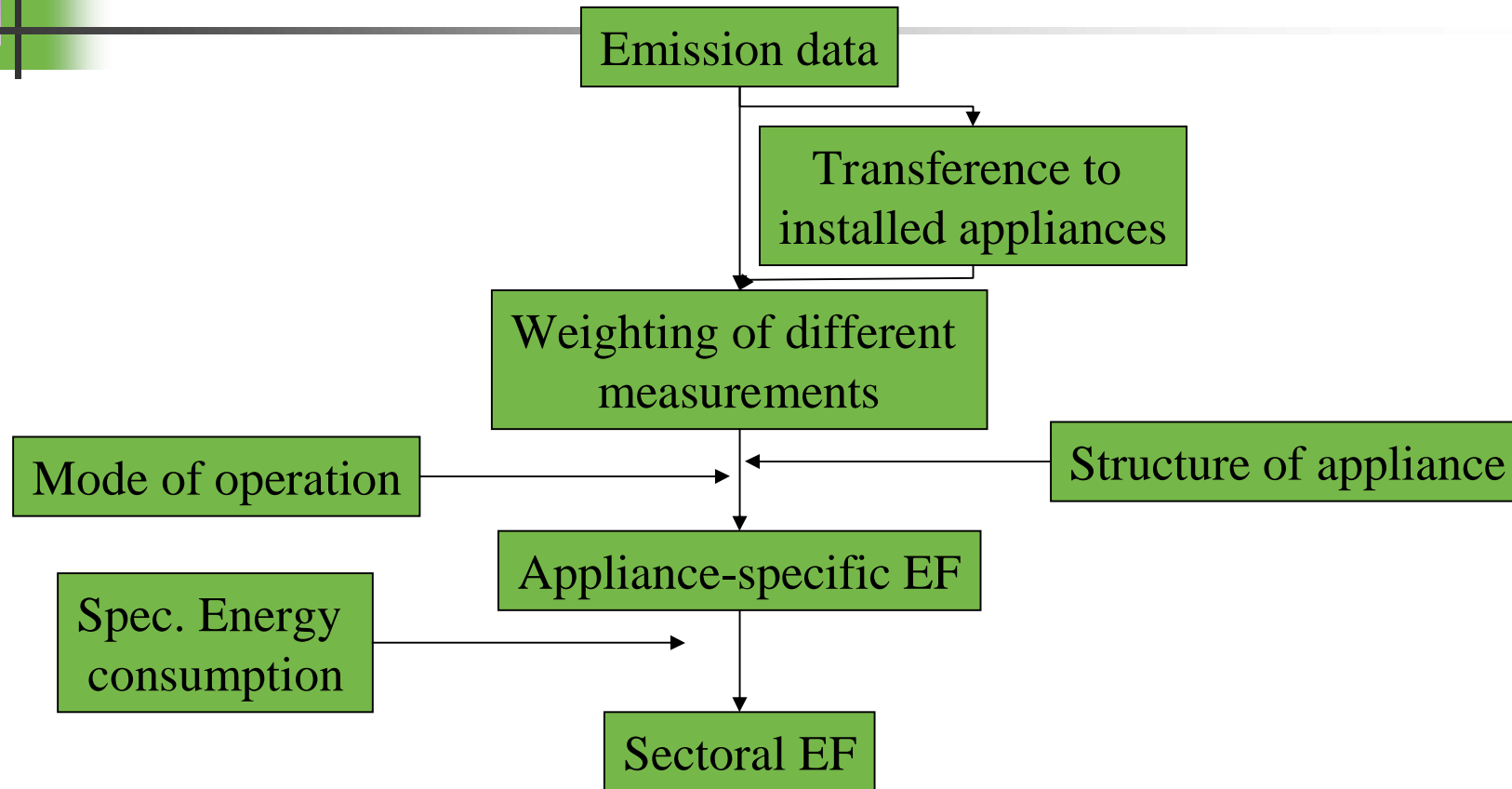
- n CO₂, CO, VOC, CH₄, NMVOC
- n Benzene
- n Particulate matter (biggest share PM 2.5)
- n SO₂, NO_x (as NO₂), N₂O, HCl,
- n Heavy metals: As, Cd, Cr, Cu, Hg, Ni, Pb, V, Zn
- n Polychlorinated dioxines and furanes (PCDD/PCDF)
- n Polycyclic aromatic hydrocarbons



Results

- n Determination of appliance-specific emission factors taking into account the mode of operation and the age structure
- n Determination of the stock of firing appliances in Germany
- n Determination of average nominal heat output and of construction types installed in selected areas
- n Determination of the appliance-specific energy consumption (framework: energy balance supplemented by other results)

Calculation of sectoral emission factors with the proportionate energy consumption and the appliance-specific emission factors



Uncertainties

- n Estimation of uncertainties by expert judgement
- n Sources of error:
 - n Uncertainties in estimating transfer factors (systematic differences between test-bench and field measurements);
 - n Uncertainties resulting from having too little emissions data;
 - n Uncertainties resulting from use of different measuring procedures;
 - n Uncertainties in the plant data used (overall group structure in terms of type, age and performance and fuel consumption)
 - n Measuring errors in determination of pollutant concentrations;
- n Differentiation between systems with gaseous or liquid and systems with solid fuels

When?

n March 2007

Thank you for your attention!