Recent Developments in Small Scale Combustion (SSC) Devices

Conclusions
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Electrostatic Precipitator ESP for residential wood combustion

Development in Switzerland by EMPA (Swiss Federal Institute of Material Sciences and Technology)

see: www.minipab.ch

1. Small Scale Combustion is important today for two reasons:
   It has a high contribution
   a) to the global energy demand but
   b) also to the air pollution, mainly PM

2. Small Scale Combustion is increasing
Where are we going?

2 Examples of new developments:
Example 1: 1-stage combustion with flame quenching...

Example 2: 2-stage combustion for log wood is possible!

Equipment for analysis of particle size distribution from 15 nm to 40 microns by Verenum (SMPS and OPC)

Prototype stove with two-stage combustion achieving < 50 mg/m³ during start-up and < 15 mg/m³ during stationary period, TIBA Holzfeuerungen AG Bubendorf (Switzerland)
Conclusions (1)

1. Relevant improvements have been achieved during the past 10 years:
   – Control systems
   – Pellet combustion
   – Particle removal
   ...

2. Good combustion systems with high efficiency and low emissions are available

Conclusions (2)

BUT:

1. Hugh differences between technologies and countries

2. a) Log wood is under estimated
   b) Log wood is more difficult (batch !)

   gap between developments and relevance
Where should we go?

Outlook/Target for SSC:

→ Implementation of SSC

1. To increase biomass share as energy source by additional SSC

2. To replace existing low quality systems by improved systems (this enables a) a relevant increase of useful energy with the same amount of currently used wood and b) a huge reduction of air pollution)
Outlook/Target for SSC:

→ Implementation of SSC

But with high requirements, i.e., ONLY high quality SSC with

1. High quality SSC systems → Certification test, Quality labels & Quality assurance
2. Correct operation → Information, technical measures, periodic control (and consequences, i.e., penalty for illegal incineration)

Fuel is very important: Example of hard wood which is dry outside

But wet inside → w > 25%
Memory-Effect for PCDD/F (Hypothesis)

![Graph showing PCDD/F levels vs Cl-content fuel]

[Fastenaekels 2003]

**Outlook/Target for SSC:**

\[\text{\rightarrow Implementation of SSC}\]

But with high requirements, i.e., **ONLY** high quality SSC with

1. **High quality SSC systems** \[\rightarrow\] **Certification test, Quality labels & Quality assurance**
2. **Correct operation** \[\rightarrow\] **Information, technical measures, periodic control**
3. **Optimum fuel** \[\rightarrow\] **Fuel standardization**