Process-integrated quality assurance of Solid Recovered Fuels

ecra - european cement research academy

Seminar „Alternative Fuels: Quality and Environmental Control“

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Agenda

- Introduction
- Definition of Solid Recovered Fuels
- Advantages by using qualified SRF
- Guarantee by quality assurance
- Conclusion

Introduction

- The Gütegemeinschaft Sekundärbrennstoffe and Recyclingholz e. V. (BGS)
  - BGS e. V. was established in 1999 to promote the production and use of Solid Recovered Fuels (SRF).
  - Bodies of the association are the meeting of members, the managing-committee and the quality committee.
  - In these bodies manufacturers and users of SRF as well as other interested persons are represented.

Introduction

- **The goal:** Verify and confirm a high quality of SRF by displaying the **RAL quality label** to reduce CO_2 emissions and saving fossil fuels!
- **The way:**
  - Deliberate production of SRF as well as a **closed system of quality assurance.**
  - High quality standards in particular with the regard of **low heavy metals guiding values.**
  - Strict regulation for **sampling and analyze SRF** lay down in specific guidelines.
  - **Qualification of laboratories** by round robin tests carried out annually.
  - **European Standardization**

Quality Assurance of Solid Solid Recovered Fuels

Definition of SRF

Solid Recovered Fuels

- Quality assured SRF e. g. RAL-GZ-724 brand name SBS®
- Production-specific commercial waste or high calorific fractions from municipal solid waste
- Higher depth of treatment
- **Co-incineration**

High Calorific Fraction

- E. g. high calorific fraction from MBT
- Lower depth of treatment
- kein Gegenstand der Güte- und Prüfbestimmungen nach RAL 724
- Lower calorific value
- **Mono-incineration**

Advantages by using qualified SRF

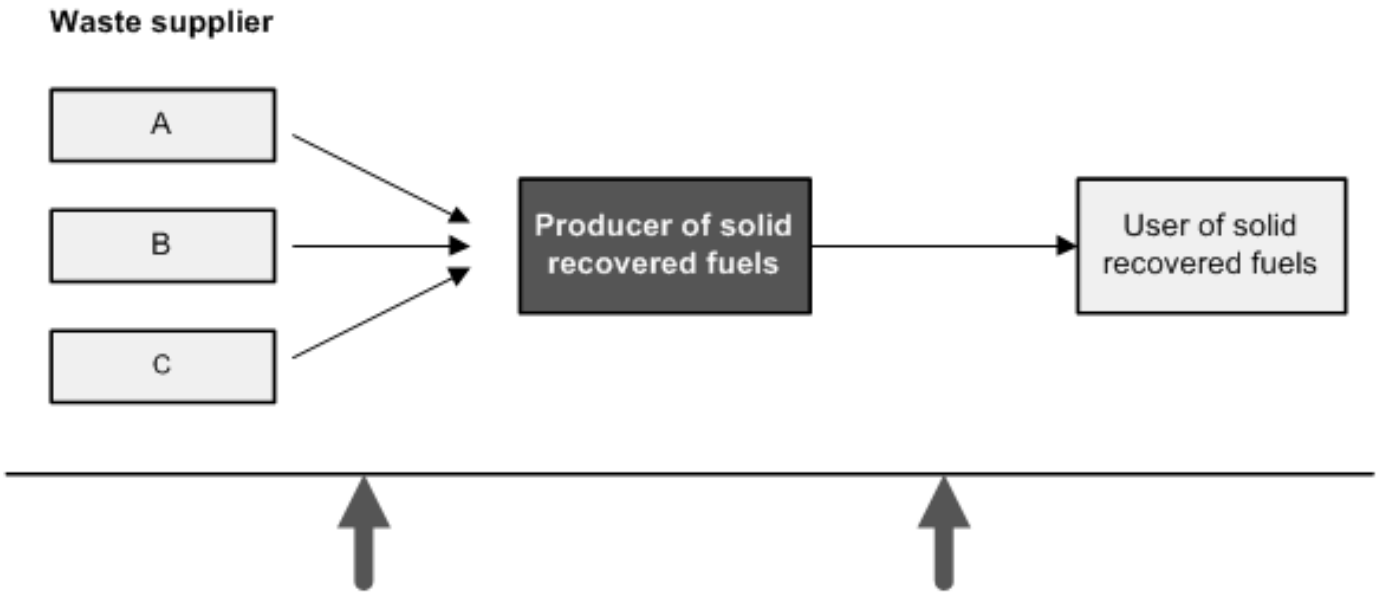
- RAL quality assurance supplies the evidence for:
  - **Constant** as well as **continuous** high quality!
  - **No accumulation of pollutions** regard of low heavy metals guiding values!
  - Established quality assurance - in most cases it´s a part of official authorisation
  - Reproducible and accepted methods for the determination of calorific value and the **biogenic content!**
  - Regulated relationship between producer and users of SRF by **transparent and comparable analysis** results!
  - **CEN** conformity!

General demands for Solid Recovered Fuels used in mono- or co-incineration plants:

- a predefined calorific value and a low chlorine content
- a defined grain size and bulk density
- few impurities
- low heavy metal component (especially for co-incineration)
- the availability of sufficient quantities of the right quality
- Determination of the biomass content

Guarantee by quality assurance

RAL-GZ 724



Documentation

Inspection visit by a third party (environmental expert/contract party)
Recognition of the disposal company as well as quality and environmental management

Guarantee by quality assurance

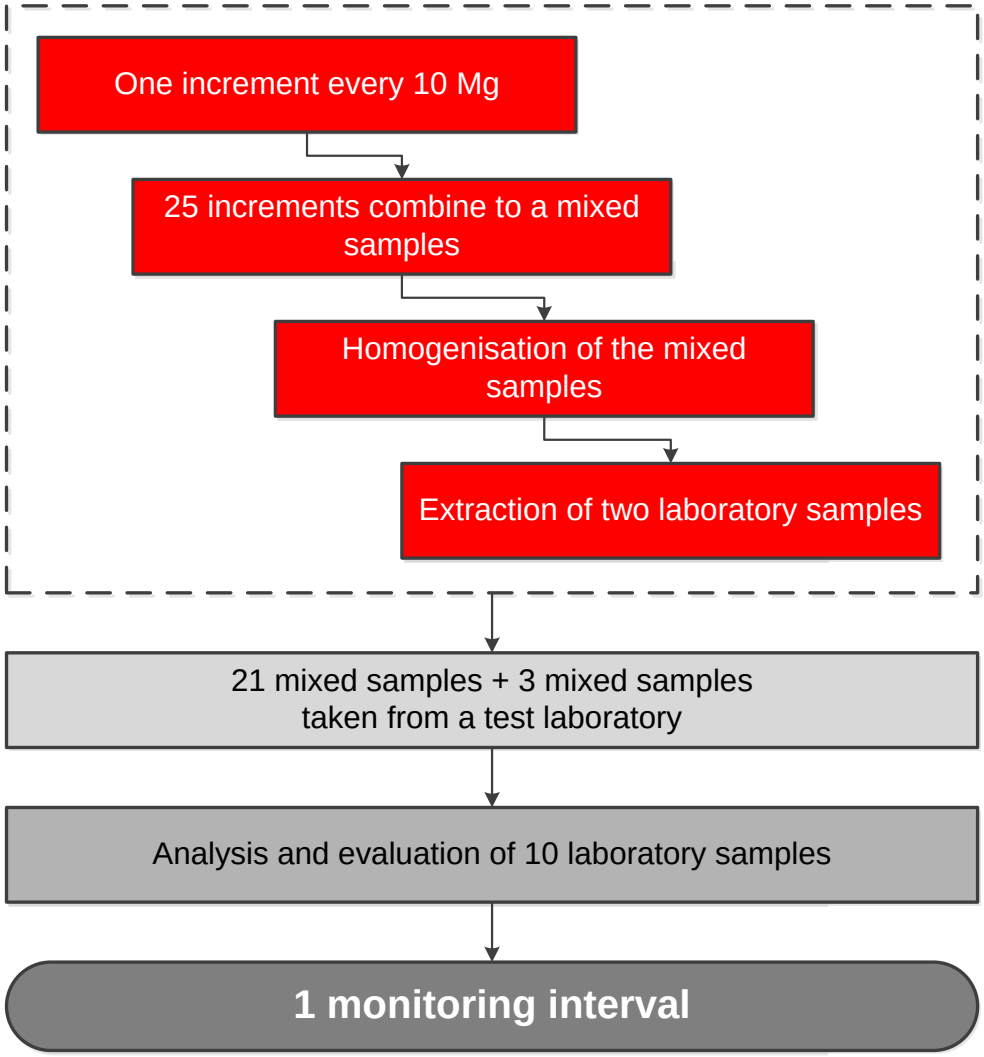
Parts of RAL-GZ 724

- Recognition procedure and monitoring procedure
- Self monitoring and independent supervision
- Input monitoring
- Quality requirements
- Sampling
- Sample treatment and analysis
- Statistical evaluation of data

➡ **Award / revocation of the quality label RAL-GZ 724**

Guarantee by quality assurance

Sampling and analysis – RAL-GZ 724



- **At least 2 per year**

Guarantee by quality assurance

Quality requirements – RAL- GZ 724

- calorific value instead of the mass as reference for heavy metal guidance value since 2012
- Copper only needs be documented due to difficulty by chemical analysis

Parameter	Heavy metal concentrations	
	Median [mg/MJ DS]	"80.-Percentile" [mg/MJ DS]
Cadmium	0,25	0,56
Mercury	0,038	0,075
Thallium	0,063	0,13
Arsenic	0,31	0,81
Cobalt	0,38	0,75
Nickel	5,0	10
Antimony	3,1	7,5
Lead	12	25
Chromium	7,8	16
Copper	-	-
Manganese	16	31
Vanadium	0,63	1,6
Tin	1,9	4,4

- Documentation of the **calorific value**, the **moisture content**, the **ash content** and the **chlorine content**

Guarantee by quality assurance

Statistical **evaluation** of data

- SRF represent considerable deviations ins spite of pre-treatment
- Waste analysis should never consider individual values and compare them with the guidance value
- RAL-GZ 724:
  - Evaluation based on 10 samples
  - Calculation of median value and 80th percentile value and compared to the guidance value
  - Distribution free values

Guarantee by quality assurance

Determination of biomass content

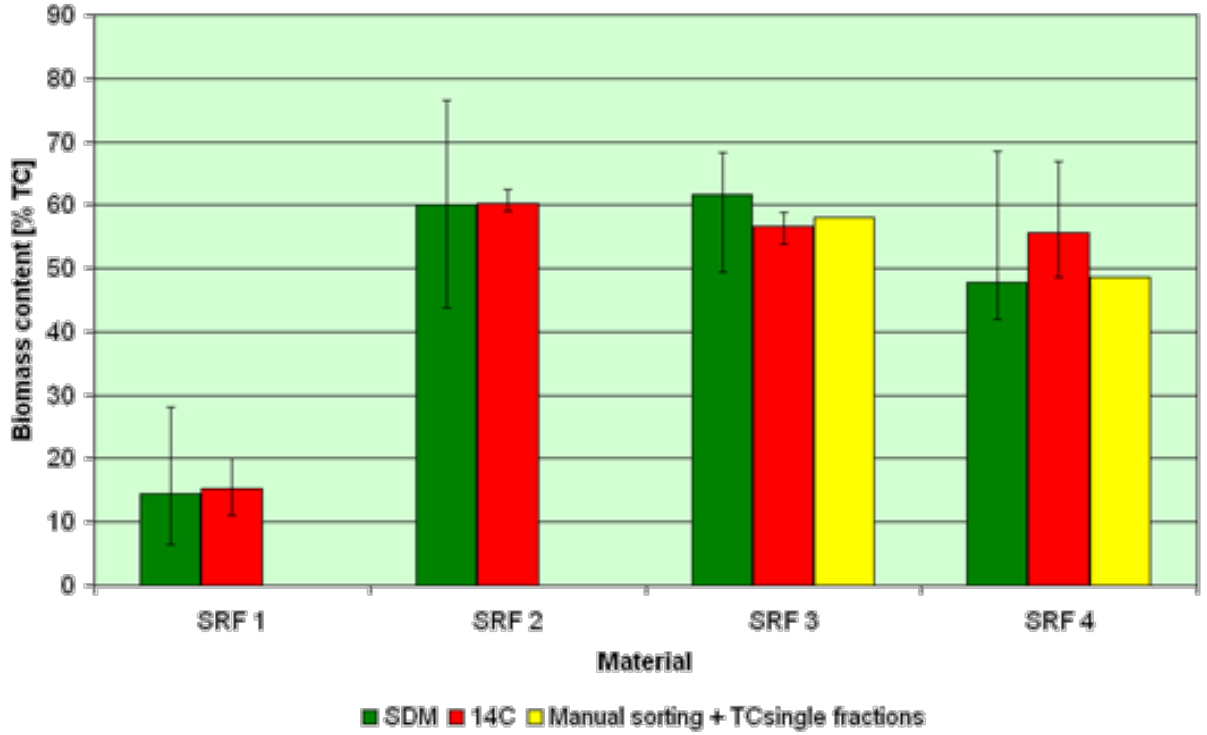
- In the context of emission trading the biomass content must be determined!
- Comparison of different methods in the framework of CEN standardization

Manual Sorting Analysis	Selective digestion method	^{14}C-method
• Ingredients sorted into the fractions: biogenic, non-biogenic, inert • Biomass content is calculated by dry mass • Not applicable for SRF < 10 mm	• Selective digestion with nitric acid and hydrogen peroxid • Biomass content can be related to the weigt, carbon content and energy	• Based on the knowledge that the share of ^{14}C in a living organism is largly constant • The concentration of ^{14}C isotope defines the ratio of renewable non-renewable energy sources

Guarantee by quality assurance

Determination of the biomass content

Validation



SRF 1: SRF from commercial wastes

SRF 2: SRF from the high calorific fraction of household wastes

SRF 3: SRF reassembled out of used materials

SRF 4: SRF reassembled out of new material

Guarantee by quality assurance

Determination of the biomass content

- Manual sorting analysis for SRF with a particle size of more than 10 mm is suitable, but very time-consuming.
- While validation 14C-method causes significantly higher costs and waiting periods between sampling and results.
- Actually the Selective dissolution is still sufficiently comprehensible, manageable and applicable.
- The BGS e. V. adopted a test method including the selective dissolution to determine the biomass content from the work in CEN/TC 343

  ➡ Approved by DEHst (German Emissions Trading Authority)

Conclusion

- Steadly **increasing** utilisation of Solid Recovered Fuels...
- Permanent **availability** and **constant quality** for efficient utilisation...
- Technical requirements of the co-incineration plant in particular the feeding system and the firing technology...
- Immission control...
- Emission trading...

...requires the utilisation of qualified SRF!

Thank you for your attention!

For further information, please visit the website:
www.bgs-ev.de

BGS e.V.

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