The Valorisation of SRF In Cement Kilns

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Transformation of Waste into Energy
Hot End of a Rotary Kiln
The average needs for 1 ton of Clinker =

- 200kg Coal
- 1,600kg of raw meal:
  - Limestone \(\text{CaCO}_3\)
  - Iron oxide \(\text{Fe}_2\text{O}_3\)
  - Silica \(\text{SiO}_2\)
  - Bauxite \(\text{Al}_2\text{O}_3\)
- 100 kwh electricity to grind clinker
- Worldwide cement production in 2007 was 2.77 billion tonnes and will rise to 3.4 billion tonnes in 2015.
Waste is growing worldwide in line with an increasing population.
Waste..... Still a problem

- Vast majority of waste still being land filled, dumped or burned illegally.
- Causing contamination of soil, water resources and atmosphere
- Consequences – deterioration in health of the population
- Solution – Cement Industry important contributor to Waste Management
Co-processing of waste, recognised as a Recovery operation under EU Legislation
Advantages co-processing in a cement kiln

A + B = B

incinerator + Cement kiln = Cement kiln + Alt. fuel
HeidelbergCement applied waste materials for clinker

North America
- Tyres
- Plastics
- Sewage sludge
- Waste wood
-Obsolete corn
- Waste oil
- Fly-ash

Europe
- Tyres
- Animal meal
- RDF
- Hazardous waste
- Sewage sludge
- Carbon-waste
- Waste wood
- Waste oil & solvents

Asia-Australia-Africa
- RDF
- Hazardous solids
- Sewage sludge
- Rice husks
- Waste oil

Fly-ash
Polluted soil
Foundry sand
Fly-ash
Polluted soil

Total processed waste materials @ clinker in 2009: 5,5 mio ton
AF use: HC best in class! CEMEX fast increase!

HeidelbergCement Target 2020: 30%

1. No data available for Cemex in 2009
RDF: normally, we are aiming for high calorific waste
Typical RDF Composition

- Plastics 31%
- Textiles 14%
- Paper/Cardboard 13%
- Wood Fractions 12%
- Others 30%
Germany + NL+Be*
Main burner kilns
By-pass most kilns
AF-ratio > 65%
RDF MB CALC
cv > 20 > 15 GJ
Cl- < 0,7 < 0,7%
H₂O < 15 < 25%
Size < 25 < 50mm

Poland, CZ + Hung
Mainly calciner kilns
By-pass most kilns
AF-ratio > 50%
RDF MB CALC
cv > 18 > 14 GJ
Cl- < 0,9 < 0,9%
H₂O < 15 < 25%
Size < 25 < 60mm

Romania + TR
Most main b kilns
Few by-pass kilns
AF-ratio > 10%
RDF MB CALC
cv > 18 > 13 GJ
Cl- < 1 < 1%
H₂O < 20 < 30%
Size < 25 < 60mm

UK + Scandinavia
Mainly calciner kilns
By-pass most kilns
AF-ratio > 55%
RDF MB CALC
cv > 20 > 15 GJ
Cl- < 0,7 < 0,7%
H₂O < 15 < 25%
Size < 25 < 50mm

HC different kilns in each area → other specifications
RDF use in cement kilns

Main burner:
- Fine RDF
- High cv

Calciner:
- Coarse RDF
- Moderate cv

By-pass (Cl-)
ID-fan (moisture)
Elements that do influence value/burden of RDF

Cost avoidance
- Primary fuel costs
- CO₂ reductions

Value RDF
- Other alternative wastes
  - Heat value
  - Ash-content
  - Cl-content
  - Moisture content
  - Other elements (S, Hg, Cr)

Operation costs
- Depreciation storage + feeding
- Impact clinker production
- Shorter lifetime of lining
- Emission + process control
- Quality control + reporting
- Stakeholder management
Thank You for your Attention

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