TFTEI

Under the Convention on Long Range Transboundary Air Pollution

UNECE

Emission Reduction Techniques in Cement Production

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Introduction

Context and Purpose:

- Importance of reducing emissions in cement production.
- Document objectives:
  Updated techniques and cost analysis.

Scope:

- Focus on NOx, SO_2, dust, and heavy metals

Background informal technical document on techniques to reduce pollutant emissions from cement production and determination of their costs

TFTEI background informal technical document
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Prepared by Citepa (TFTEI Techno-Scientific Secretariat)
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Overview of Emission Sources

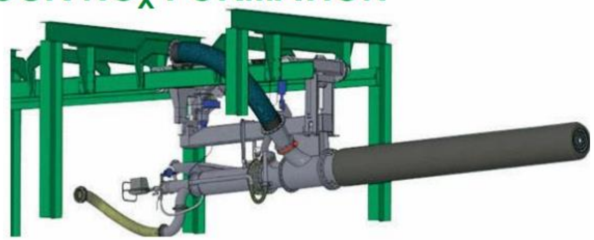
Key Pollutants:

- NOx, SO_2, dust, and heavy metals

Emission Sources:

- Raw material preparation, clinker burning, and milling

CONDITIONS THAT FAVOUR NO_X FORMATION



- The **main burner** generates a flame that can reach **2000°C** thanks to the pre-heated combustion air.
- The **excess air** (2-3%) guarantees the oxidizing conditions that are necessary for the good quality of the clinker produced.
- The combustion process in the **pre-calciner** at 900°C is also operated in excess air to avoid CO formation.

CEMBUREAU The European Cement Association

HEIDELBERG TECHNOLOGY CENTER HEIDELBERGCEMENTGroup

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ROME 20-10-2017 3rd TFTEI annual meeting

Emission limit values (ELVs) in the AGP

NOx limit values from cement plants according to annex V of the AGP

Limit values for NO_x emissions released from cement clinker production[a]

Plant type	*ELV for NO_x (mg/m^3)*
General (existing and new installations)	500
Existing lepol and long rotary kilns in which no waste is co-incinerated	800

[a] Installations for the production of cement clinker in rotary kilns with a capacity >500 Mg/day or in other furnaces with a capacity >50 Mg/day. The O_2 reference content is 10%.

Dust limit values from cement plants according to annex X of the Gothenburg Protocol

Limit values for dust emissions released from cement production[a]

	ELV for dust (mg/m^3)
Cement installations, kilns, mills and clinker coolers	20

[a] Installations for the production of cement clinker in rotary kilns with a capacity >500 Mg/day or in other furnaces with a capacity >50 Mg/day. The reference oxygen content is 10%.

1999 Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to the Convention on Long-range Transboundary Air Pollution, as amended on 4 May 2012

Best Available Techniques (BATs)

NOx Reduction:

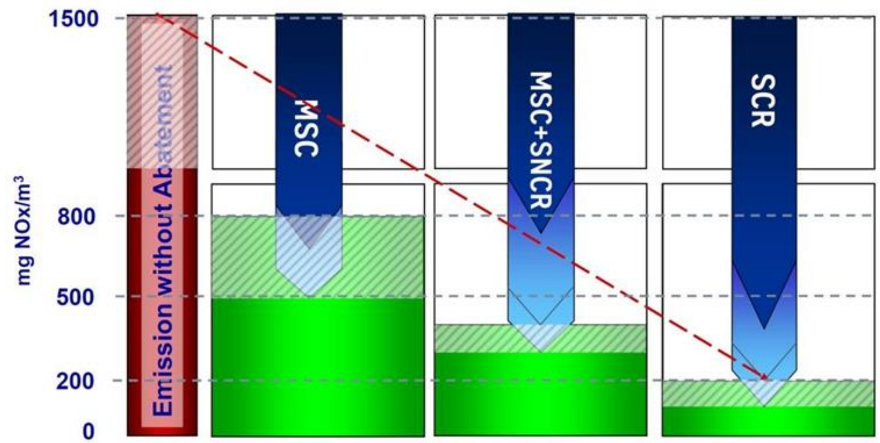
- Selective Non-Catalytic Reduction (SNCR)
- Selective Catalytic Reduction (SCR)

Dust Reduction:

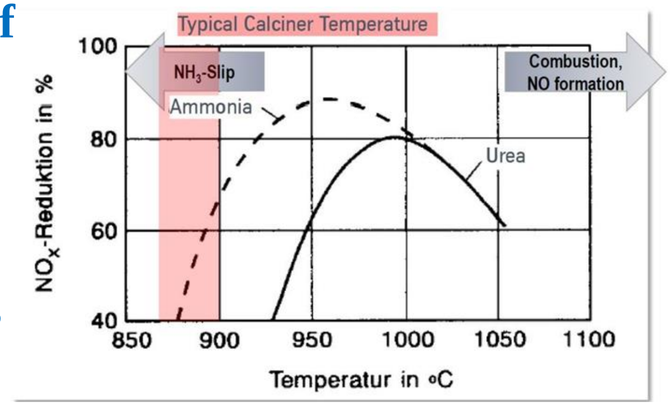
- Bag Filters (BF)

SO_2 Reduction:

- Absorbent addition
- Wet Flue Gas Desulfurization (WFGD)



Capabilities of different techniques to reduce NOx emissions in cement plants



SNCR efficiency according to the temperature

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Cost Analysis

Methodology:

- Based on a reference plant producing 3,000 t clinker/day.

Summary of Costs:

- NOx: €460–€1,250/t avoided (SNCR), €510–€1,110/t avoided (SCR).
- Dust: €0.6–€1.1/t clinker using BF.
- SO_2: €690–€1,650/t avoided using absorbents.

Abatement cost at various emission levels	NO_x [€/ton clinker]	SO_2 [€/ton clinker]
Current emission level	0,3 (0,1 – 1,7)	0,8 (0,2 – 4,7)
Upper BAT emission level	0,7 (0,1 – 2,9)	2,1 (0,2 – 6,8)
Lower BAT emission level	0,9 (0,2 – 3,7)	3,2 (1,4 – 10,7)

Key results for NOx and SO_2 abatement in the EU cement sector according to ECOFYS

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Key Findings and Impacts

Achievements:

- Updated emission limits achievable with BAT
- Significant cost efficiency improvements

Challenges:

- High initial investment for SCR and WFGD
- Balancing efficiency and cost in retrofits

Conclusions and Recommendations

Key Takeaways:

- BATs provide effective emission reductions within regulatory limits
- Detailed cost analysis supports decision-making

Recommendations:

- Adopt BATs tailored to specific plant conditions
- Regular updates to align with technological advancements
- Engage with TFTEI for further insights

Thank you very much

Questions?