Cement Plant Odra – Case Study
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GHG Inventory and MRV of Industrial Emissions Workshop, Tbilisi, 27-28 March 2017
Cement Plant Odra – Case Study Location
Cement Plant Odra – Case Study

Location

Cement Plant Odra is located in the city of Opole in very close proximity to apartment districts.
Cement Plant Odra – Case Study

Panorama from heat exchangers tower
Cement Plant Odra – Case Study History

- 1872  Beginning of cement manufacturing
- 1899  Cement plant with 3 shaft furnaces
- 1911  New cement plant „Opole – Port” was built using wet technology – 3 rotary kilns with daily capacity 250 tonnes
Cement Plant Odra – Case Study History

- 1938  Annual cement production reached 200,000 tonnes
- 1947  Decision to rebuild the cement plant which was destroyed during the II World War (1939 – 1945)
- 1948 – 1951  Construction period. The biggest project within cement industry at that time
- 1951  Commissioning of 2 rotary kilns
- 1952  Commissioning of the kilns 3 and 4
Cement Plant Odra – Case Study History

• 1960s  Further modernisation and capacity building
• 1975  Annual record production volume was reached – 895,000 tonnes
• 1970s  New modern, high capacity cement plants were commissioned (Kujawy – 1972, Małogoszcz – 1974, Ożarów and Górażdże – 1977) putting Cement Plant Odra into severe competition challenge
• 1980s  Sustainable drop of production
• 1989  Independent international report prepared for the Polish government with recommendation to shut down Cement Plant Odra
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Raw materials deposit
Cement Plant Odra – Case Study History

- 1992 Foreign investor highly evaluates the potential of raw materials deposit – unique composition of all raw materials needed for clinker or portland cement production
- 1992 Organizational transformation from „state enterprise” onto joint stock company with 100% shares yet possessed by the State
- 1993 Miebach (Germany) acquired majority stake in the Company – Privatisation agreement included investor’s commitment to run a modernization program – new era for Cement Plant Odra begins
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History

• 1993 – 1999 Implementation of complex modernisation program
  • Modernisation of the Kiln 1 – Wet technology was replaced by dry method of cement production
  • Daily production capacity reached 1,200 tonnes of clinker
  • Sound reduction of CO$_2$ and industrial emissions (dust, SO$_2$, NOx) followed the modernisation – Cement Plant Odra becomes environment friendly company
  • Automatic modern control and steering system for the cement production line
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State-of-the-art production control system
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History

• 1999 Municipal solid waste sorting plant built in Opole (first such project in Poland) producing „BRAM” (Brennstoff aus Mull) – alternative fuel from flammable part of municipal waste

• 2006! Comissioning of the plant – 7-year delay caused mainly due to:
  • Legal regulations concerning environment protection did not entirely cover such type of installation
  • Local community obstacles against „waste in the neighbourhood”

• 2003 – 2008 Finding market niche and achieving leadership position in „Cement with additives”
  • One of the world biggest slag cement manufacturer
  • 35-40% share of cements with additives in total cement production compared to 25% country average
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• 2004 Implementation of Integrated Management System according to ISO 9001 (Quality management) and ISO 14001 (Environmental management)

• 2008 Implementation of Microsoft Dynamics AX – state-of-the-art IT facility supporting management systems

• 2011 100th Anniversary of the Cement Plant Odra
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• 2013 Implementation of EMAS – voluntary Eco-Management and Audit Scheme
• 2015 Commissioning of installation supplying alternative fuel to rotary kiln
• 2015 Commissioning of:
  • Separator installation for cement mills 1 – 4
  • Installation for drying and grinding blast furnace slag using a vertical roller-plate grinding mill
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Environment protection related projects

- **2004** Replacement of fabric filters in cement mills with new generation filters
  - Sound reduction of dust emission
  - Meeting regulatory requirements

- **2006** New cement dispatch terminal
  - Fully automatic process – zero menpower
  - Acceleration of loading process
  - Reduction of dust emission

- **2006** Replacement of compressors with modern equipment
  - Reduction of electric energy
  - Compressed air cost reduction
  - Reduction of noise
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Environment protection related projects

• 2007 Central control room – Simens PC 7 system
  • Constant monitoring of the process from one place
  • Prediction of breakdowns
  • Improvement of work efficiency and safety
• 2008 Replacement of clinker cooler with IKN modern clinker cooling equipment
  • Lowering clinker temperature to appropriate level
  • Rotary kiln efficiency improvement
  • Stabilizing of clinker burning process
• 2009 Refurbishment of buildings, roads, parking areas and production halls
  • Dust emission reduction
  • Safety of work upgrade
  • Public relations – company image improvement
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Environment protection related projects

• 2009  Replacement of electrofilter serving the slag drying room with modern fiber filter
  • Dust emission reduction

• 2010  Covering the clinker and the slag storage hall
  • Dust emission reduction

• 2011  Replacement of electrofilter serving the rotary kiln with efficient modern fiber filter
  • Meeting EU requirements concerning dust emission limits
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Environment protection related projects

• 2012 Change of raw materials transport – replacement of narrow-gauge railway track with enclosed conveyor belt system and building intermediate preblanding storageland
  • Reduction of diesel oil used for transportation

• 2012 Modernisation of cement mills filters by increase of the filtering surface
  • Improvement of effectiveness of exhaust gases treatment

• 2012 Modernisation of high voltage distribution station by equipment replacement and implementation of energy management system
  • Reduction of electric energy consumption
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Environment protection related projects

- **2013** Watering system for raw materials storage land
  - Reduction of dust during piling the stone on the prism
- **2015** Installation dosing alternative fuel to the rotary kiln
  - CO\textsubscript{2} reduction
  - SO\textsubscript{2}, NO\textsubscript{x} and dust reduction
- **2015** Dynamic separators for cement mills 1 – 4
  - Reduction of electric energy consumption
  - Quality improvement
- **2015** Installation for drying and grinding blust furnace slag with a vertical roller-plate grinding mill
  - Reduction of hard coal usage (CO\textsubscript{2}, SO\textsubscript{2}, NO\textsubscript{x} reduction)
  - Waste heat recovery
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Environment protection related actions

• Shut down of the old sewage treatment station and building a new modern station linked with the city sewage treatment system
• Sound protection screens for all noisy pieces of equipment
• New Komatsu excavators for raw material quarry, which entirely eliminated blasting with related noise and seismic vibrations
• Use of 350,000 tonnes/annum of secondary raw materials (blast furnace slag, fly ashes, reagypsum)
• Use of alternative fuels
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Production process
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Industrial emissions

Cement production in 2012 – 2015
[th Mg/annum]

- 2012: 877
- 2013: 858
- 2014: 974
- 2015: 954
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Industrial emissions

Total energy (electric energy + heat) in 2012 – 2015

[Energy in GJ/annum]

- 2012: 1712 GJ/annum
- 2013: 1740 GJ/annum
- 2014: 1943 GJ/annum
- 2015: 1902 GJ/annum

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Industrial emissions

Total energy used for 1 tonne of cement in 2012 – 2015
[GJ/annum]

- 1950 GJ/annum for 2012
- 2030 GJ/annum for 2013
- 1995 GJ/annum for 2014
- 1902 GJ/annum for 2015

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Industrial emissions

CO₂ emissions in 2012 – 2015
[th Mg/annum]

<table>
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<th>Year</th>
<th>CO₂ emissions</th>
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<tr>
<td>2015</td>
<td>341</td>
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Industrial emissions

Real emissions in 2012 – 2015 compared to permissible limits [Mg/year]

- Dust emission decreases
- CO emission increase – due to production increase

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Industrial emissions

Secondary raw materials used in 2012 – 2015
[th Mg/annum]

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount (th Mg/annum)</th>
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</thead>
<tbody>
<tr>
<td>2012</td>
<td>289</td>
</tr>
<tr>
<td>2013</td>
<td>262</td>
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<td>2014</td>
<td>294</td>
</tr>
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<td>2015</td>
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Permissible limit: 1227

Secondary raw materials used

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Industrial emissions

Secondary raw materials mix in 2012 – 2015
[th Mg/annum]

- Total
- Waste gypsum
- Fly ash
- Slag
- Ferrous dust
- Other
- Alternative fuel
Modernisation in 2017 – 2018

- NOx reduction from clinker burning installation
  - Selective Non-Cathalytic Reduction (SNCR)
  - Current parameter – 0.9021 kg/Mg clinker
  - Target – 0.8640 kg/Mg clinker
History of Cement Plant Odra proves that success can be achieved as a result of:

– Gift from the nature
– Reliable investor
– Committed people
– Hard work
– Shot of luck

„Next 100 years for future generations”
How to contact ClimaEast

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