



Identifier

# ALF-CEMIND PROJECT IN ROMANIA

Background and results

SSA TREN/05/FP6/EN/S07.54356/020118



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# IMPLEMENTATION STEPS - Steering committee

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- Formation of a steering committee which followed and guided the course of the project in Romania

The Romanian steering committee was composed by representatives of:

- > Cement producers present in Romania
- > CIROM - Employers' Organisation in Cement Industry and other Mineral Products for Construction in Romania
- > Ceprochim
- > Ministry of Economy and Trade
- > Ministry of Environment and Water
- > National Guard for Environment
- > ARCE – National Agency for Energy Conservation



# IMPLEMENTATION STEPS - Workshop

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- A workshop has been organized in Bacau, on November, 23rd 2006

It was organized together with ARCE and was called “Energy management for industry”

- > It permitted to have a bigger audience and to be situated near a cement plant

Three presentations were done in the framework of the Alf-cemind project:

- > Project description
- > Quick view on the actual situation in Europe regarding the use of alternative fuels and alternative raw materials as well as their existing potential – prepared by Mr. Victor van Heekeren
- > “Secondary Fuel Utilisation in the Cement Process – Influences on Process and Equipment Technical Solutions” done by Mr. Andreas Hand, from KHD Humboldt Wedag



# IMPLEMENTATION STEPS – Report and Study

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- In January 2007, the report “Review of the cement industry in Romania” has been concluded
  
- In November 2007, a prefeasibility study to promote the use of alternative fuels and raw materials has been performed for the Câmpulung cement plant (Holcim)





Identifier

# REVIEW OF THE CEMENT INDUSTRY IN ROMANIA

Background and results



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# REVIEW OF THE CEMENT INDUSTRY IN ROMANIA (1)

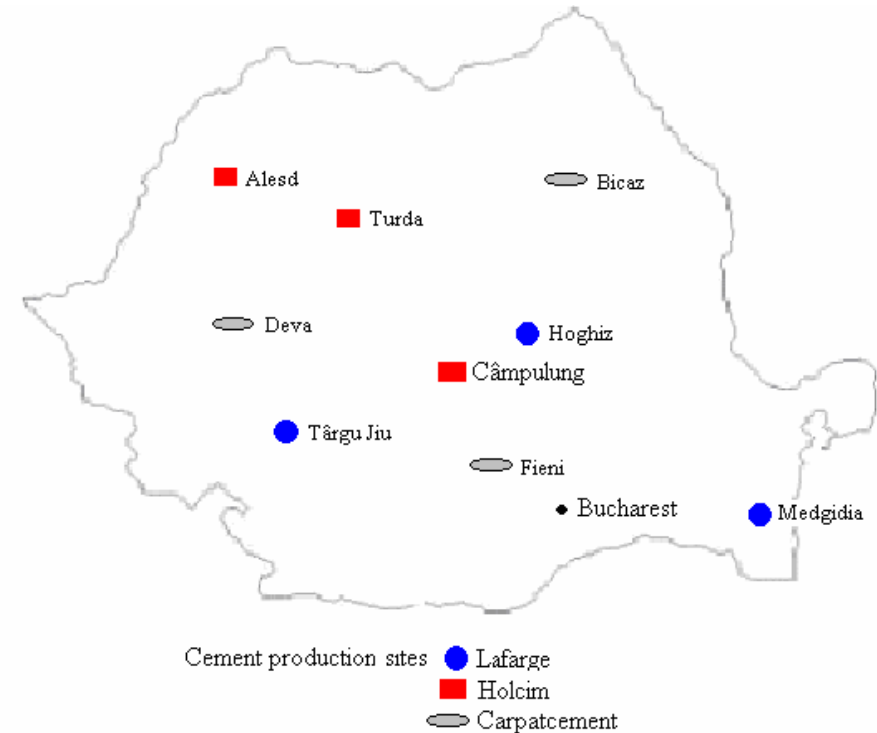
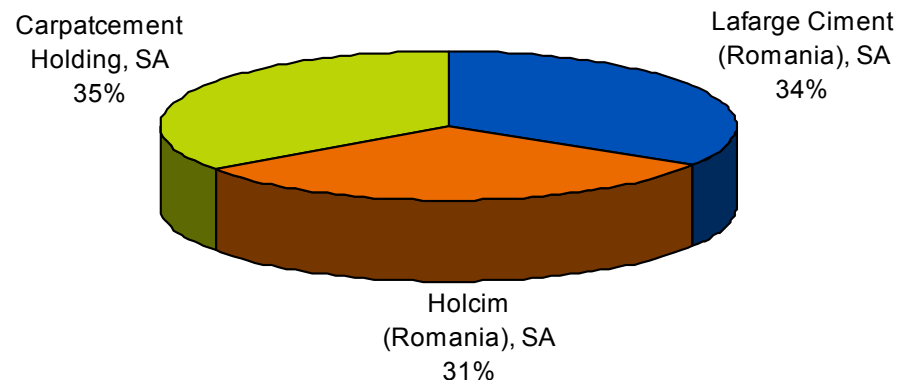
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- There are only 3 cement producers in Romania:
  - ⌘ Carpacement Holding SA
  - ⌘ Holcim (Romania) SA
  - ⌘ Lafarge Ciment (Romania) SA
- They are:
  - ⌘ the main cement players in the world
  - ⌘ very experienced regarding the use of alternative fuels and alternative raw materials
  - ⌘ beneficiaries of their groups' support regarding technologies and research



# REVIEW OF THE CEMENT INDUSTRY IN ROMANIA (2)

- The geographic repartition of cement production sites are relatively homogeneous



- The cement market is quite balanced

# REVIEW OF THE CEMENT INDUSTRY IN ROMANIA (3)

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- At company level, the certificate for the implementation of the integrated quality management system (ISO 9001:2000), environment protection (SR EN ISO 14001: 2005), health and security at work (OHSAS 18001:2004) had been obtained
- The Romanian cement producers are already using alternative fuels and raw materials.
  - ⌘ 2006: 5.5% at national level
  - ⌘ used tyres are the most used alternative fuels in Romania
  - ⌘ used by all the cement producers.



# REVIEW OF THE CEMENT INDUSTRY IN ROMANIA (4)

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- Mainly due to delays in infrastructure investment and thanks to a sustained economic development, it is foreseen that the Romanian cement market will grow up with, at least, 10% per year, for the next 5 years.
- Regarding potential of alternative fuels – waste - for the Romanian cement industry, it can be considered as significant, and due to a sustained economic development, this potential is growing
- **BUT**, sanitation sector is not fully developed in Romania and it is difficult to collect the needed waste to be processed in the cement production



# REVIEW OF THE CEMENT INDUSTRY IN ROMANIA (5)

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- Alternative fuels presenting a good potential for the cement industry are:
  - > used tyres and waste rubber
  - > wood waste
  - > waste from the petroleum industry
  - > sorted municipal (or similar) waste
- Alternative raw materials presenting a good potential for the cement industry are:
  - > slag furnace
  - > fly ash from thermal power plants
  - > foundry sand



# REVIEW OF THE CEMENT INDUSTRY IN ROMANIA (6)

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- The main conclusions regarding the Romanian cement market and the use of alternative fuels and raw materials are:
  - ⌘ Romania is not “virgin” regarding the use of alternative fuels and alternative raw materials
  - ⌘ A real interest to use new and efficient technologies using alternative fuels and alternative raw materials exist at industrial and administration levels
  - ⌘ The future of the use of alternative fuels and raw materials by the Romanian cement industry mainly depends of the ability of the Romanian stakeholders to join their competences in order to solve the lack of a full waste management process, i.e. the collection, the sorting, the transport and the recovery of the waste





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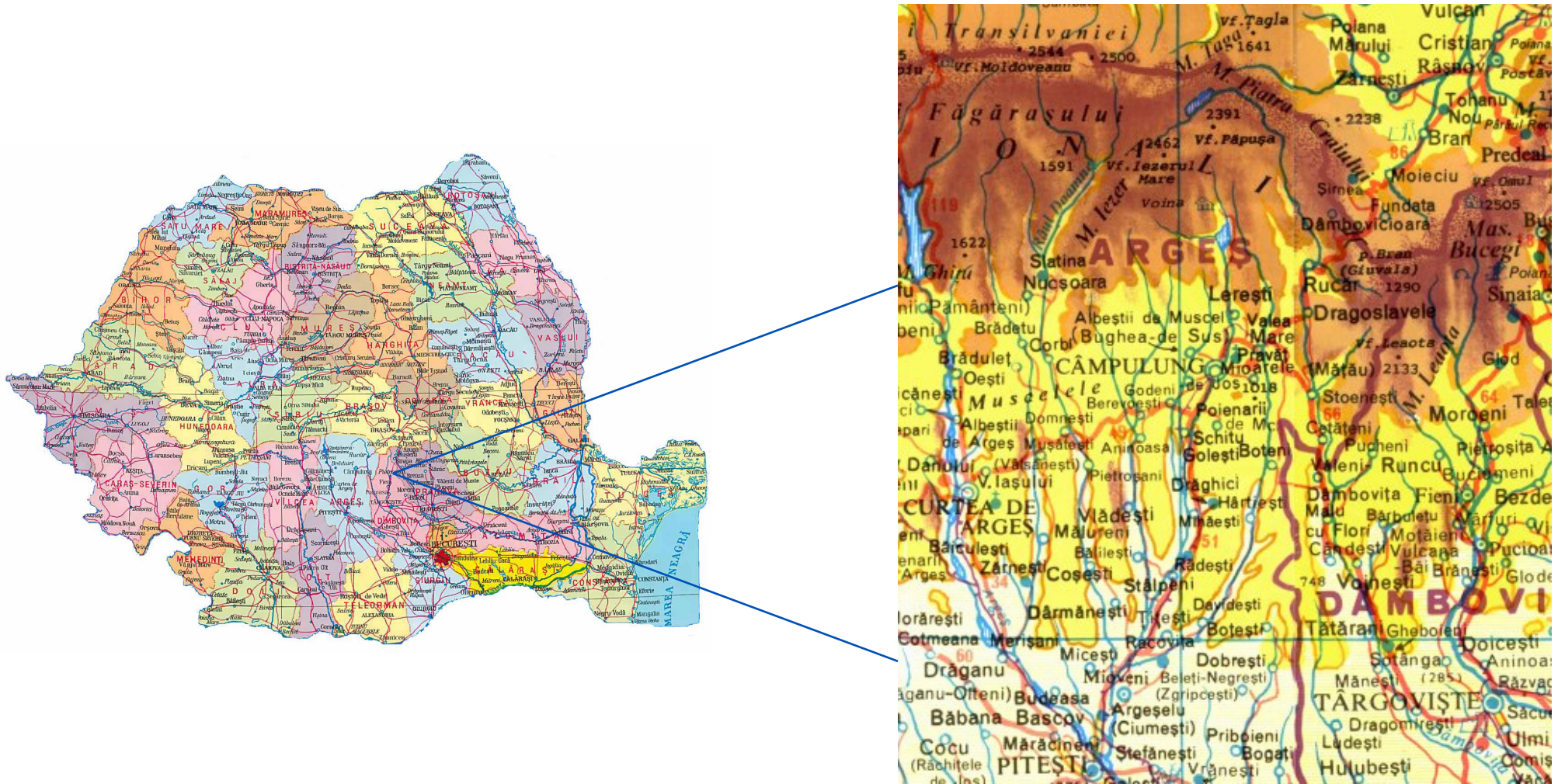
# PREFEASIBILITY STUDY

Câmpulung cement plant - Holcim (Romania) SA  
Hypothesis and results



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# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (1)



# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (2)

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- Main figures of the Câmpulung cement plant:
  - ⌘ Dry process cement plant
  - ⌘ Production of 1 million tons of cement per year
  - ⌘ Consumption of 2,8 million GJ for producing the necessary clinker in 3 kilns x 850 t clinker/day
  - ⌘ Main conventional fuels are coal and petcoke - about 80,000 tons per year
  - ⌘ 2 000 tons per year of waste are co-processed
  - ⌘ Since its acquisition in 1999 by Holcim, a number of modernization projects have been developed



# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (3)

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- The Câmpulung cement plant is authorized to co-process more than 100 types of wastes out of which:
  - > petroleum waste (from waste oil and their emulsions, up to sludges, tars and impregnated soils)
  - > rubber (including whole used tires)
  - > plastic, paper, leather, textile and wood (including sawdust), as such or impregnated/ contaminated with various substances, resulted from industrial sources or from the sorting of household waste
- In this context, due to the location of the cement plant, the pre-feasibility study focused on the **opportunity to use sawdust as alternative fuel**



# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (4)

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- **Sawdust market study** for an area of 50km around Câmpulung Muşcel cement plant, Argeş county had been concluded based on surveys
- The main conclusions are:
  - ⌘ **An important amount of sawdust is available:**
    - > Substitution rate up to 51% of coal or 23% of total fuel
  - ⌘ **For most of the wood processing companies of the region, sawdust represents a waste and they are interested to sell it**
  - ⌘ **Very few wood processing companies have a contract in order to sell out sawdust**



# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (5)

- Scenarios for PFS:
    - ⌘ **Scenario 0:** use of the actual technology, substitution rate up to 10%, investment just for the sawdust transport and treatment within the plant
    - ⌘ **Scenario 1:** replacement of the main kiln burner and
      - > S1.1. - 23% conventional fuel replacement, corresponding to the verified sawdust potential in the area
      - > S1.2. - substitution rate up to 30% corresponding to the technology manufacturer data, if there would be the necessary sawdust
    - ⌘ **Scenario 2:** replacement of the main kiln burner + calciner
      - > S2.1.- 23% conventional fuel replacement, corresponding to the verified potential sawdust
      - > S2.2. - substitution rate up to 45% corresponding to the technology manufacturer data, if there would be the necessary sawdust
- ⇒ 5 scenarios had been taking into account depending of the technology and the amount of available sawdust

# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (6)

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- Technical & economical hypothesis:
  - ⌘ biomass:
    - > 50% moisture content; 18 GJ/t for 15% moisture content; from 1 760 tones up to 7 950 tones per month; 20 euro/tonne of sawdust; 0,75 euro/km for a 50km roundtrip
  - ⌘ coal
    - > 40 000 tons/year; LHV of 25 GJ/t; Price of 61 euro/tonne
  - ⌘ Petcoke
    - > 40 000 tons/year; LHV of 31 GJ/t; Price of 20 euro/tonne
  - ⌘ Green certificates
    - > Green certificate had been allocated for the non-use of conventional fuels

# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (7)

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- Economical results

- ⌘ Only the solution with a substitution rate of 45% was economically sustainable (Pay-back period: 9 years; IRR: 17%)

BUT this solution require a high amount of sawdust!

- ⌘ 2 other analyses have been performed on the price of sawdust

- > If the sawdust is acquired for free, solution with a substitution rate of 30% is economically sustainable (Pay-back period: 6 years; IRR: 24%)

- > If the concept of “polluter-payer” is applied – 15 euro/ton of sawdust – only the solution using the actual technology is not economically sustainable



# PREFEASIBILITY STUDY – Câmpulung cement plant Holcim (Romania) SA (8)

	NPV [10 <sup>3</sup> euro]	IRR [%/year]	DPB [year]	BCR
Solution 0 – 10%	-33,05	NA	>20	0,25
Solution 1 – 23%	-18,82	NA	>20	0,55
Solution 1 – 30%	-11,05	NA	>20	0,73
Solution 2 – 23%	-17,32	NA	>20	0,55
Solution 2 – 45%	2,17	17%	8,96	1,06

Basic analysis

	NPV [10 <sup>3</sup> euro]	IRR [%/year]	DPB [year]	BCR
Solution 0 – 10%	-27,69	NA	>20	0,28
Solution 1 – 23%	-7,65	NA	>20	0,75
Solution 1 – 30%	3,75	24%	5,99	1,14
Solution 2 – 23%	-7,08	NA	>20	0,75
Solution 2 – 45%	22,51	63%	3,05	2,22

“Free sawdust” analysis

	NPV [10 <sup>3</sup> euro]	IRR [%/year]	DPB [year]	BCR
Solution 0 – 10%	-23,68	NA	>20	0,31
Solution 1 – 23%	0,73	12%	12,77	1,03
Solution 1 – 30%	14,84	57%	2,61	1,98
Solution 2 – 23%	0,59	11%	13,87	1,03
Solution 2 – 45%	37,76	84%	2,64	12,59

“Polluter-payer” analysis

# CONCLUSION

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- Technologies to use alternative fuels and raw materials already exist in Romania

Using new technologies - 45% of the conventional fuels can be replaced by alternative fuels

- All the stakeholders show interest to developed this solution, i.e. to co-processed waste in the cement plants
- The potential is there! Most of the waste is laying in landfill, without recovery
- Stakeholders should work together in order to developed an integrated management process at the Romanian level



# CONCLUSION



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# THANK YOU FOR YOUR ATTENTION

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