THE IMPORTANCE OF THE CIRCULAR ECONOMY IN CEMENT INDUSTRY

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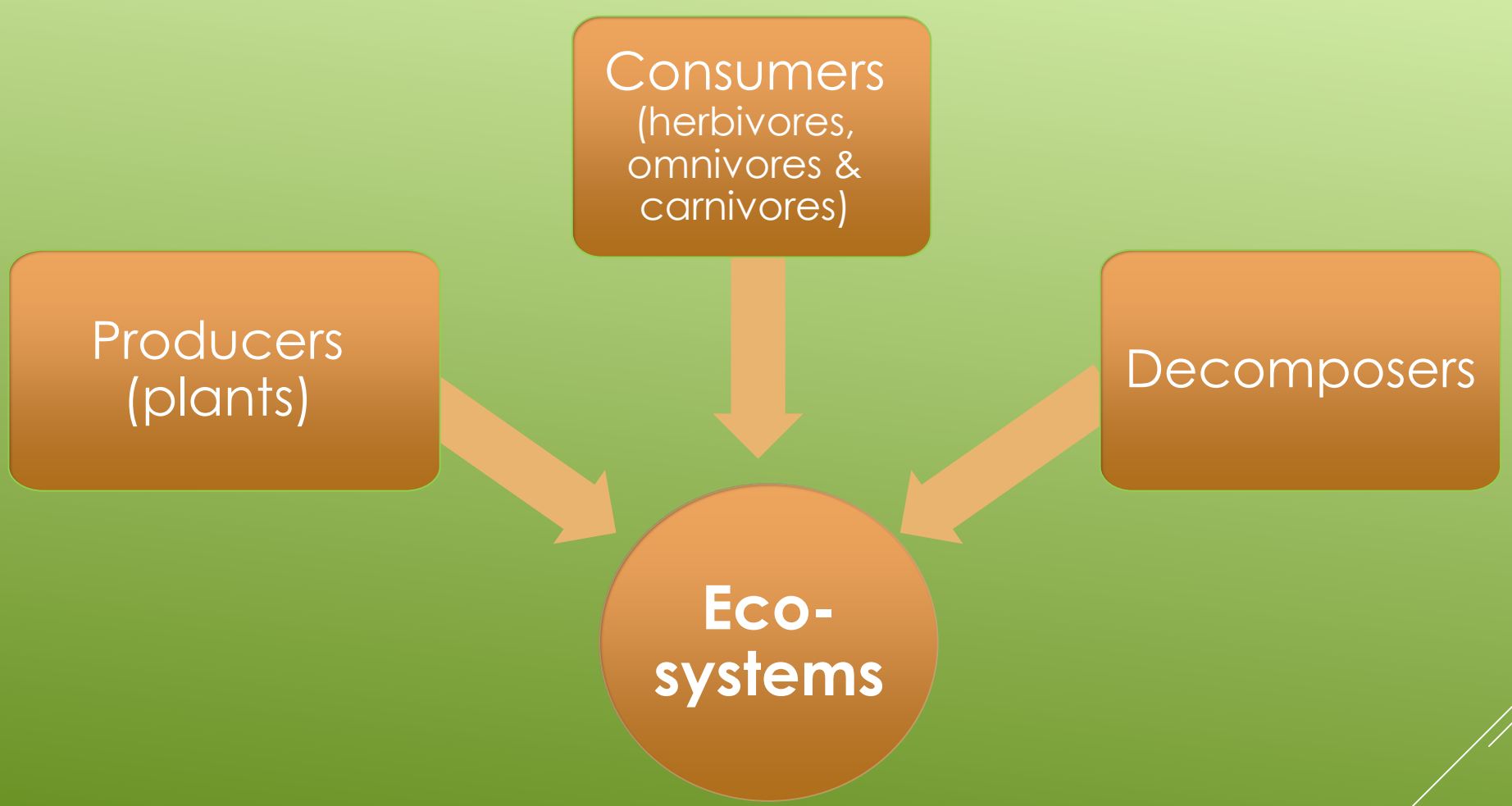
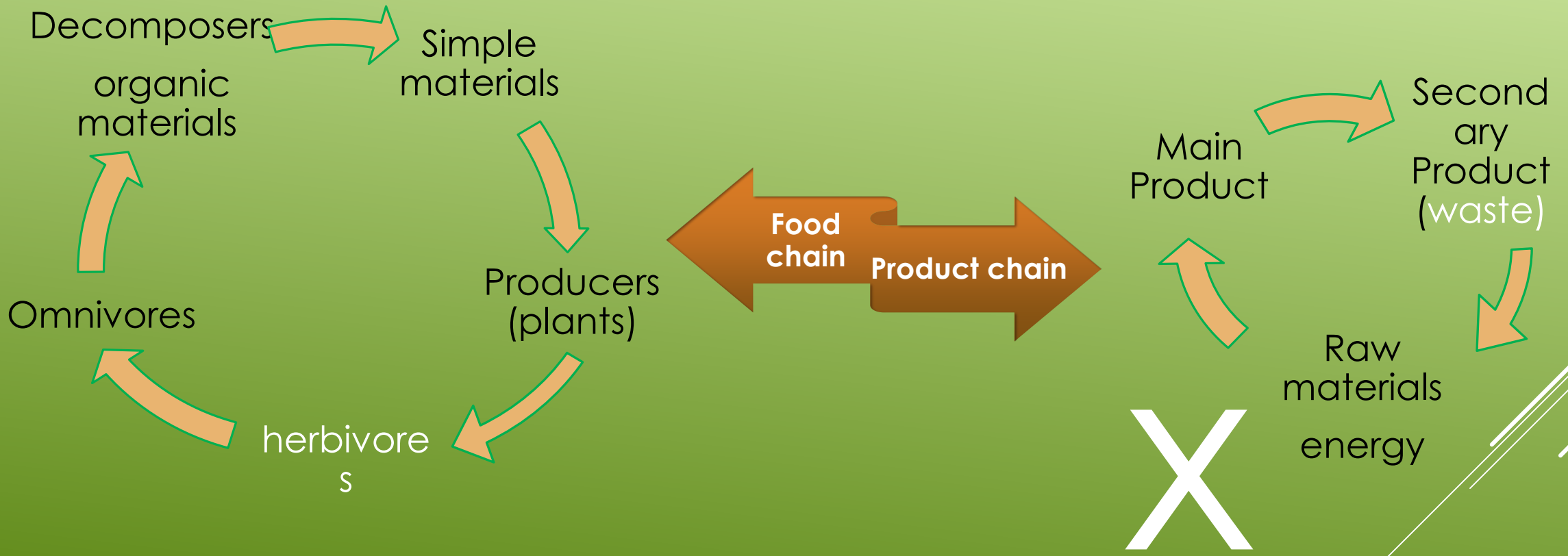

Consumers
(herbivores, omnivores & carnivores)
Producers (plants)
Decomposers
Eco-systems


Decomposers
organic materials
Simple materials
Producers (plants)
herbivores
Omnivores
Food chain
Product chain
Main Product
Secondary Product (waste)
Raw materials
energy

Industrial revolution

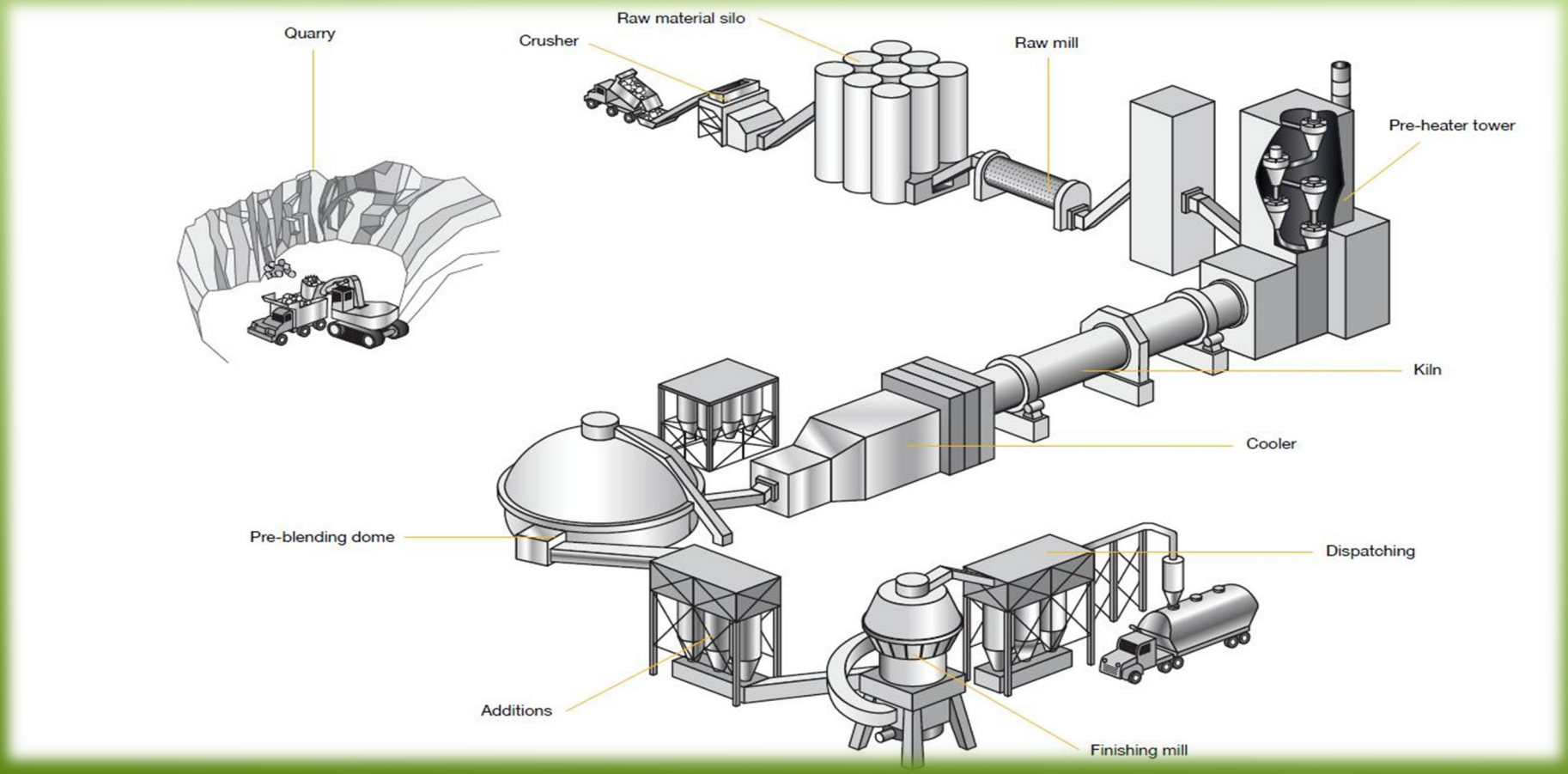
overpopulation

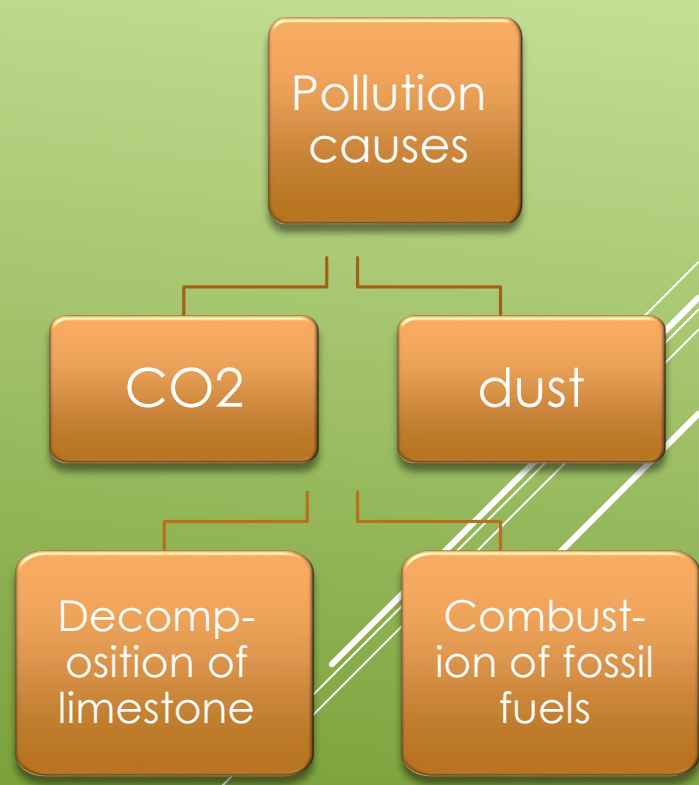
-Tremendous demand for resources

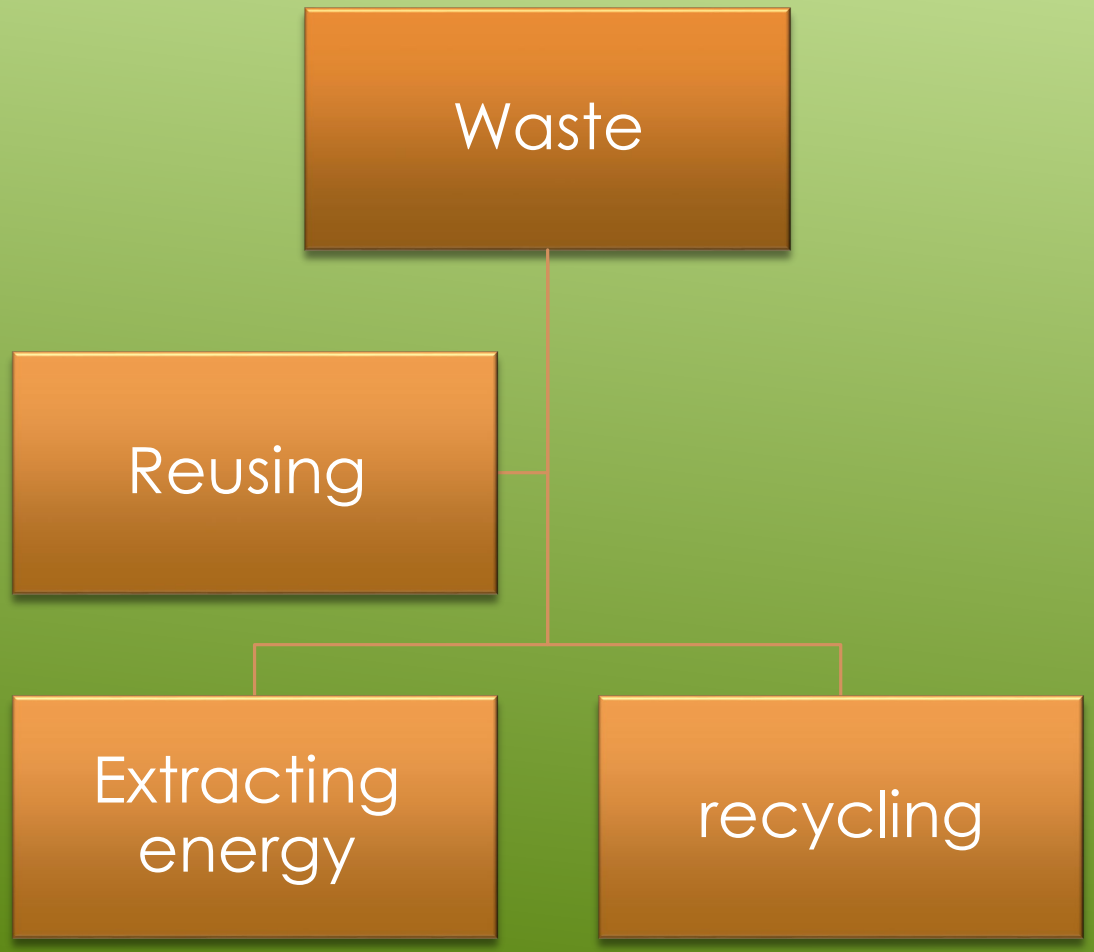
Tremendous - production of waste

An inexhaustible mine

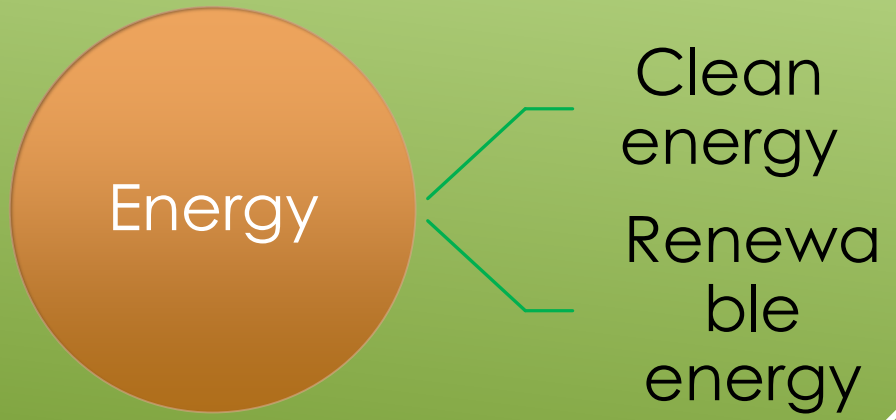
Endless landfill


Quarry
Crusher
Raw material silo
Raw mill
Pre-heater tower
Kiln
Cooler
Pre-blending dome
Dispatching
Additions
Finishing mill


Pollution causes
CO2
dust
Decomp-osition of limestone
Combust-ion of fossil fuels



Energy •
Waste •



Waste energy Fuel..

- Scrap tires
- RDF (Refuse-derived fuel)

According to United States Environmental Protection Agency, in 2003,

130 million scrap tires were used as fuel (about 45% of all generated)

Tires produce the same amount of energy as oil and 25% more energy than coal

Area of comparison	RDF	Municipal raw waste
Thermal content	3-4 kg/calorie	1.5-2.5 kg/calorie
Humidity	5-10%	40-60%
Storing	Less volume/possible storing	Big volume/ long storing is not possible
Transportation	Possible	Long distance transportation isn't possible
Efficiency	35%	15%
Production	540° C	30-200° C

Waste

- Utilizing waste as raw materials
- Utilizing waste materials as alternatives to some additional substances


Sludge
Combusting in blazers to extract energy
Drying and converting it into fertilizers
Raw material in cement manufacturing process

comparison of chemical composition between cement and sludge:

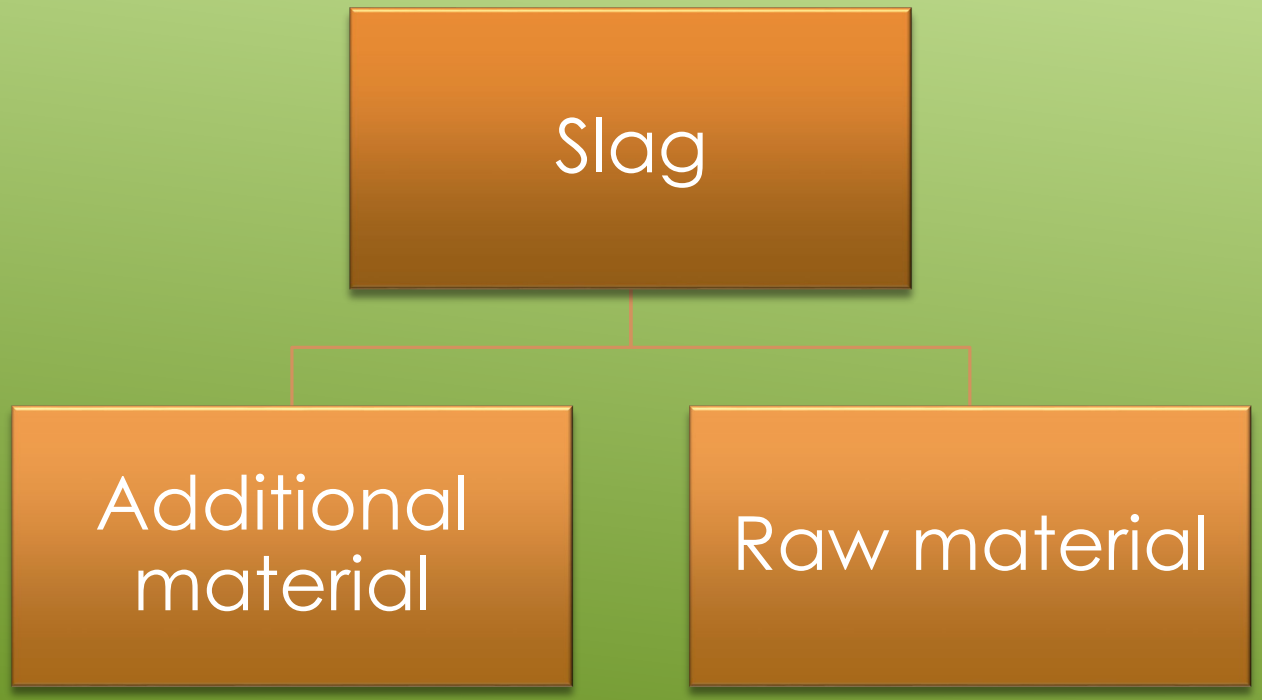
element	sludge	clay
Sio2	56%	78%
Al2O3	28%	16%
Fe2O3	8%	5%
K2O	8%	0.7%
The rest		0.3%

$

€

To produce 1 ton of cement:

Substance	Weight (in kg)
Limestone	1150
Clay	340
Sand	80
Iron	25
Dry sludge	25


Slag
Additional material
Raw material

the environmental and economical efficiency of using slag from Hamah Iron plant as addition in cement industry:

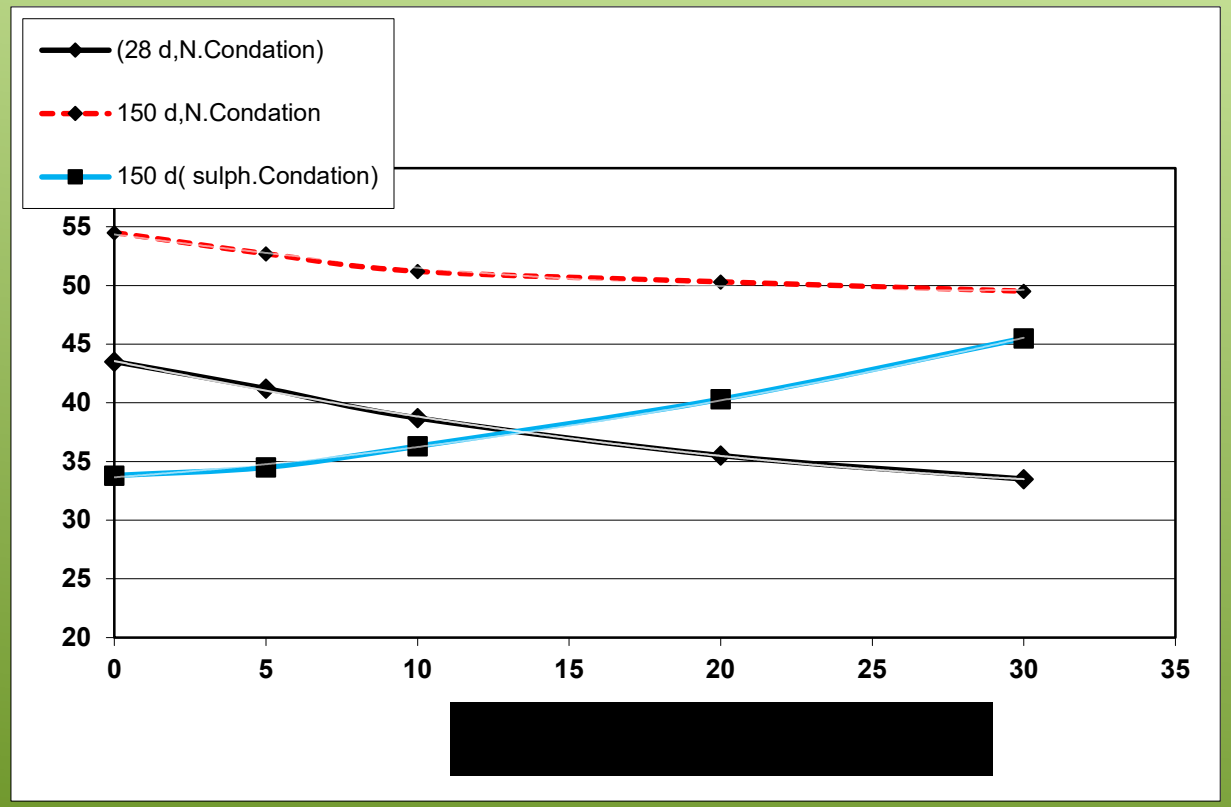
Environmen-tal costs

- transportation
- Pollution because of waste
- Reduce Carbon costs
- Materials maintenance

Economic benefit

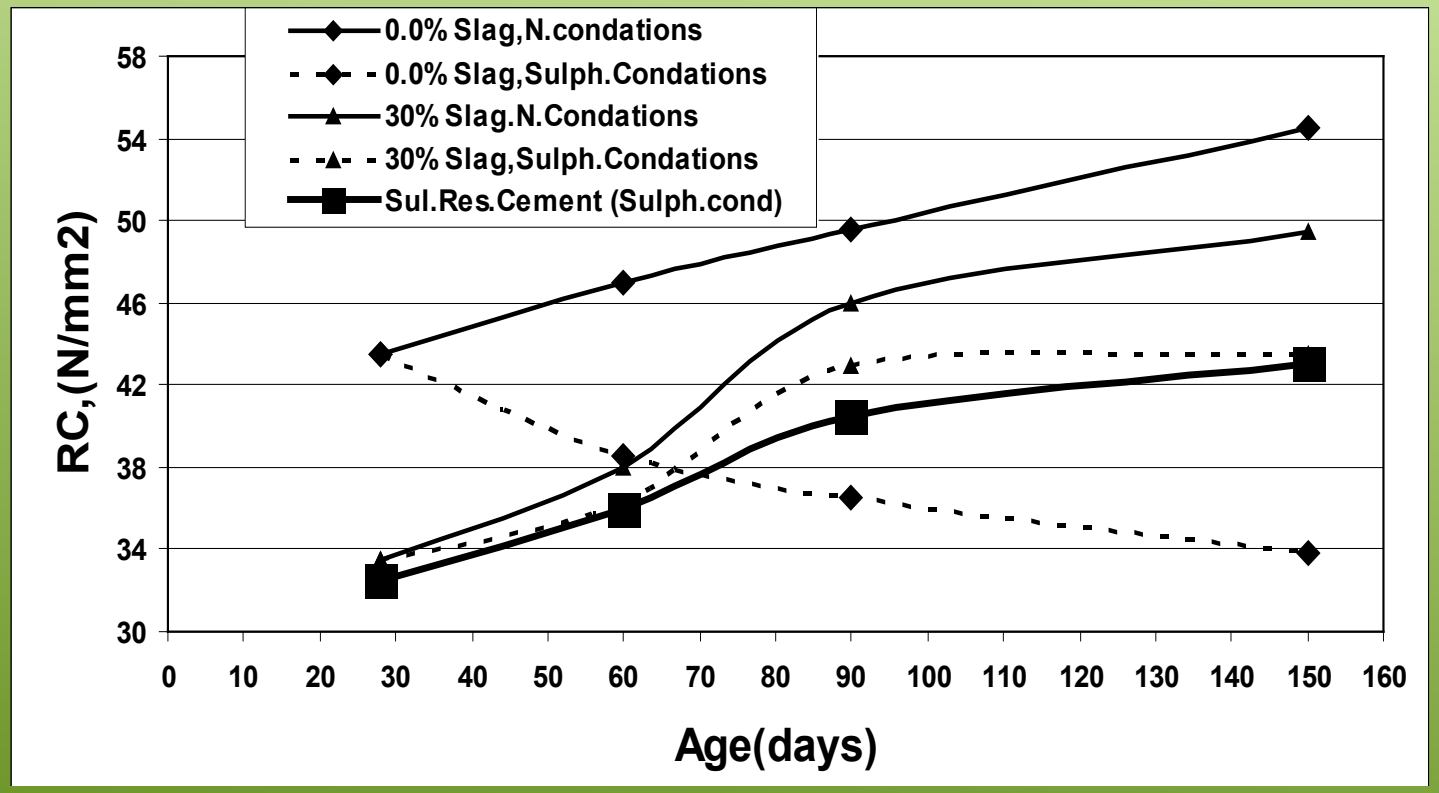
- Waste treatment
- Free slag
- New product

Compressive strength due to slag percentage in 2 different conditions:



*Observing the previous figure we conclude that the more percentage of added slag to the sample is, the less compressed strength the samples have. Unlike the samples preserved in sulfuric Conditions, its compressed strength is directly proportional with added slag percentage.

Compressive strength due to slag 30% in different and several time periods:



*the sample with 30% added slag behaves as Anti-sulfate cement and matches its standard properties. As we can observe, it starts with low compressive strengths and it increases by time. Especially long periods of time.

Cement

- Green industry
- an important receptor for waste in its several kinds
- ambassadors

Scientific research

- Reinforce the connection between the universities and the society
- Reinforce the circular economy concept
- Environmental and economical efficiency

Institutionally

- Scientific research department
- Training and internships
- Vision and policy

Thanks for your attention