CBR Cement

Historic actor
in energy recovery

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Introduction of CBR, 100 % subsidiary of HeidelbergCement Group




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HeidelbergCement: history and development

1873	Foundation
1977	Lehigh, USA
1989	Central and Eastern Europe
1993	CBR
1995/96	China, Turkey
1999	Scancem
2001	Indocement, Indonesia
2002/03	Market leader in Romania, Ukraine, Germany
2005/06	Kazakhstan, India, Georgia
2007	Hanson
2010	Democratic Republic Congo
2011	Inauguration of TulaCement plant in Russia
2012	Expansion in central India & Africa
2015	Sale of building products North America & UK

Quality and reliability for the past 140 years

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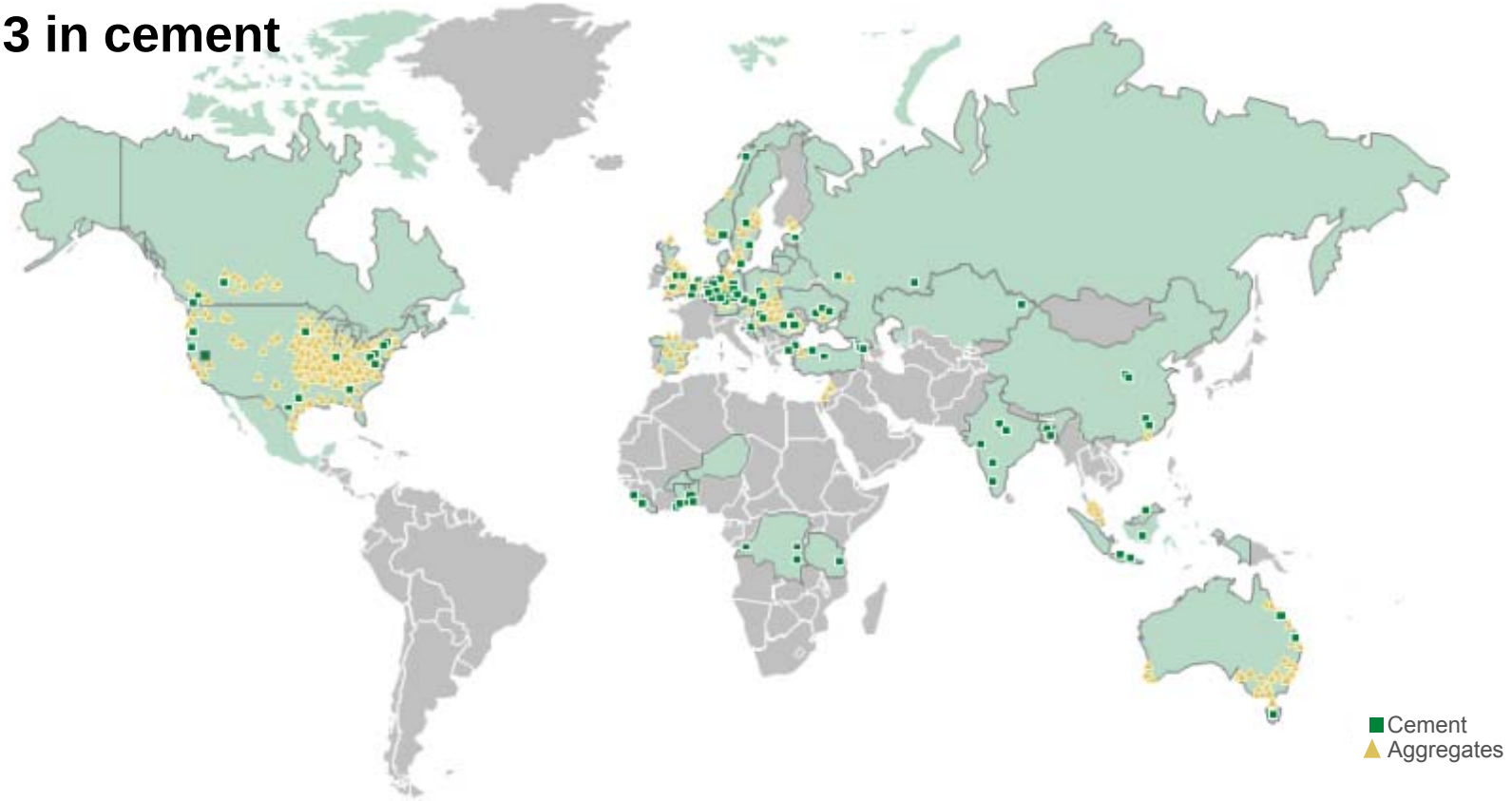
HeidelbergCement in the world

- N° 1 in aggregates
- N° 2 in ready mixed concrete
- N° 3 in cement



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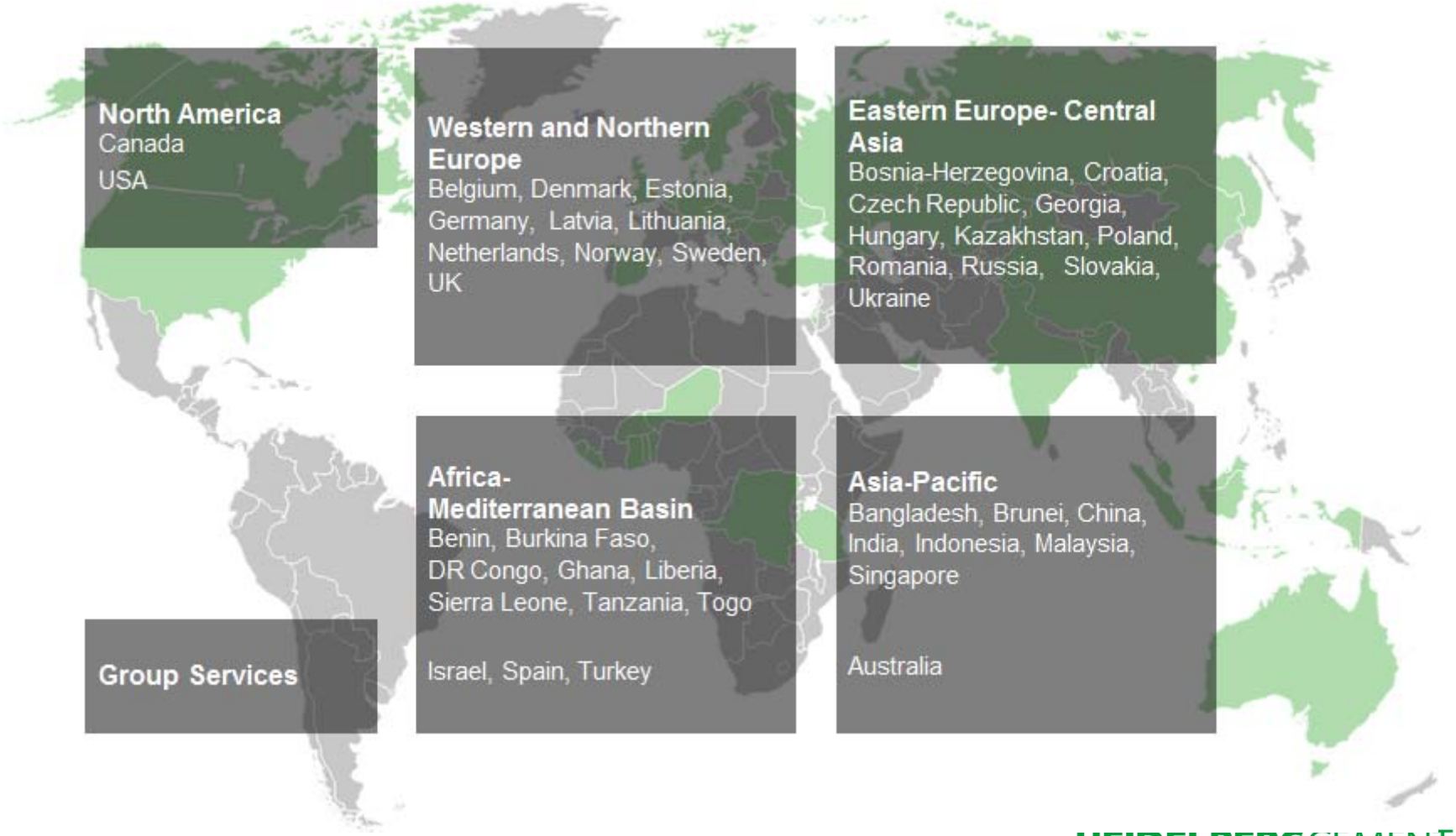
HeidelbergCement in the world

Group areas and countries



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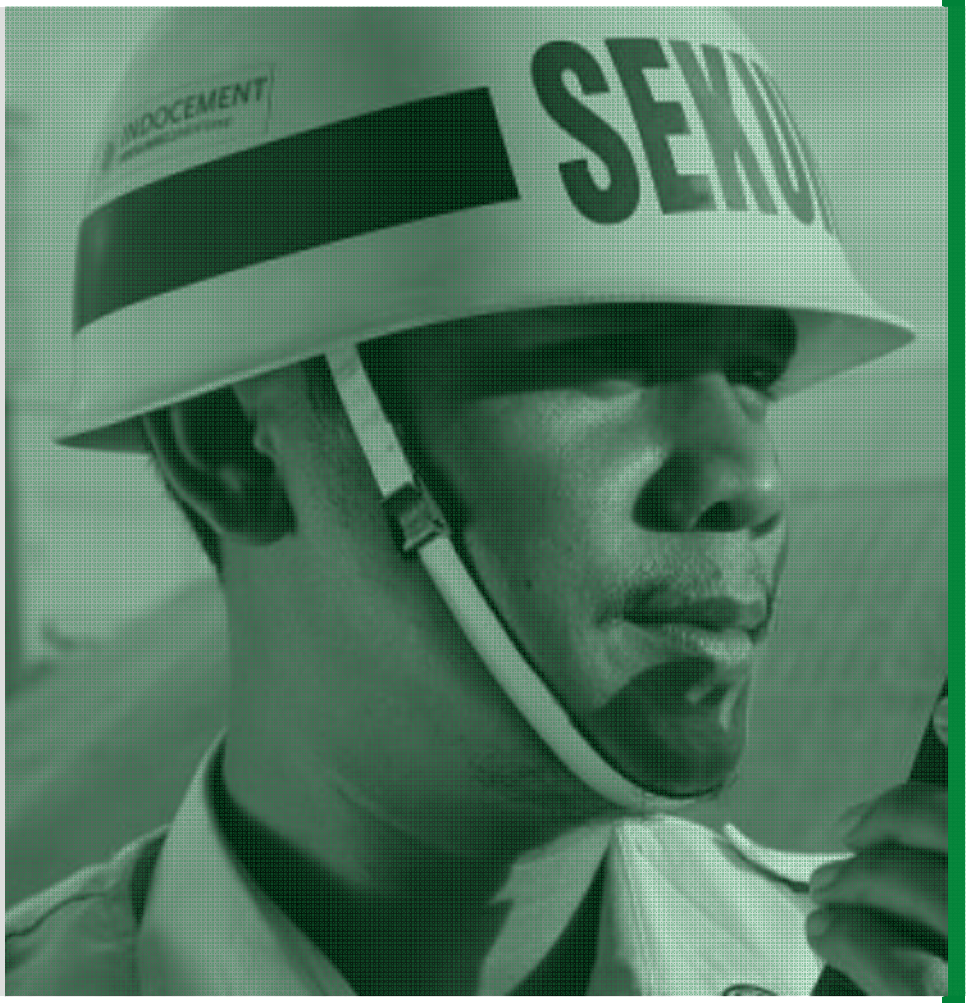
HeidelbergCement : key figures

- **44.900 employees**
- **Core business**
  - Aggregates
  - Cement
  - Downstream activities: ready-mixed concrete and asphalt
- **2.300 production plants in 40 countries**
  - 500 production sites for sand, gravel, and crushed rock
  - 102 cement and grinding plants
  - 1.300 ready-mixed concrete plants
  - 110 asphalt plants
- **Cement capacity: 128 mio t**
- **Aggregates reserves: 19 bn t**



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HeidelbergCement : strategy

- Centered on the cement market and on the "cement“ activity.
- Aggregates and concrete activities support the cement operations.
- Management focused on the effectiveness and "cost leadership“.
- Performance culture.
- Group focused on the customers and employees.
- External growth in developing countries.
- Innovation and technology development.




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Potential recovery in the cement industry

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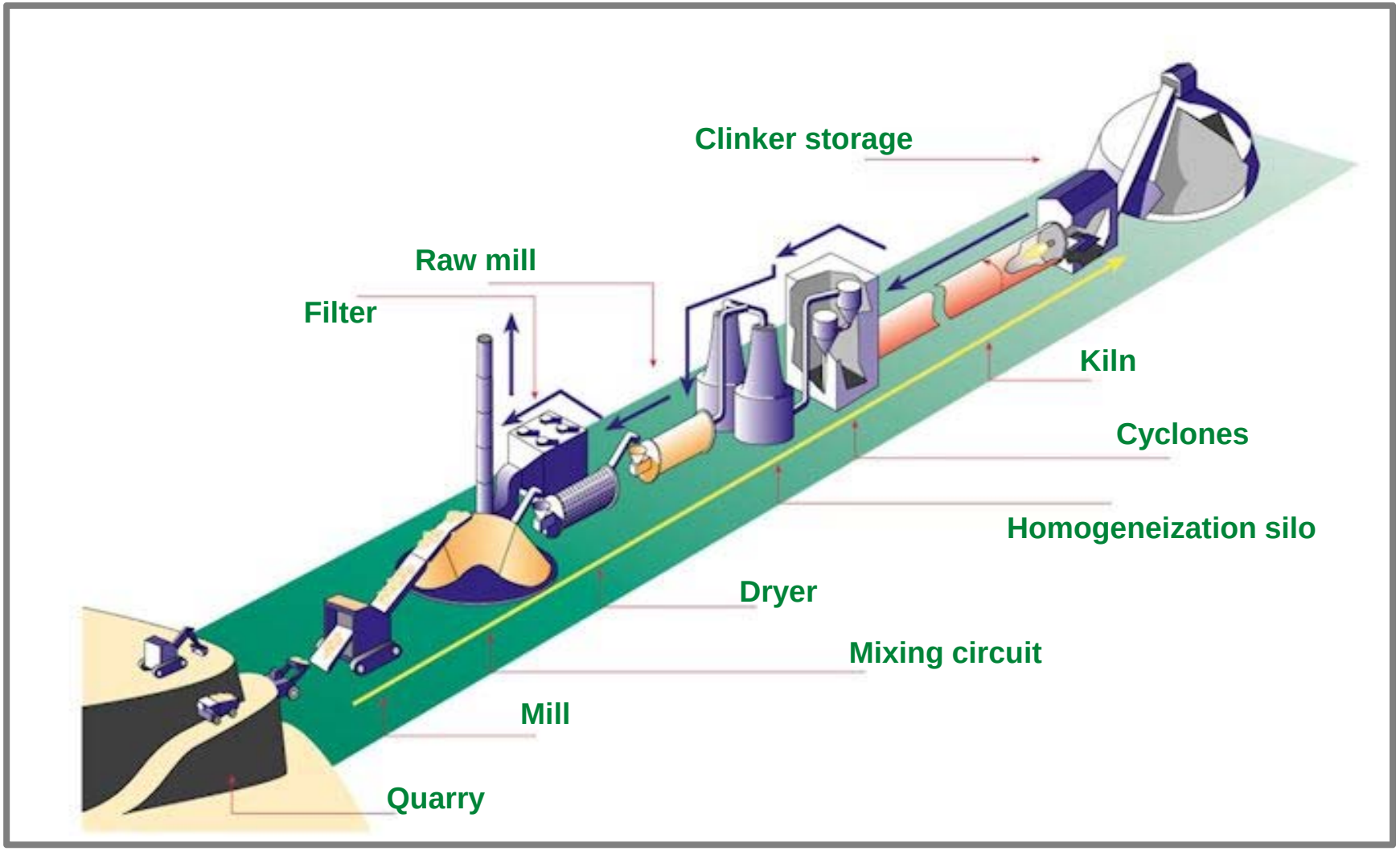
CBR : Clinker production



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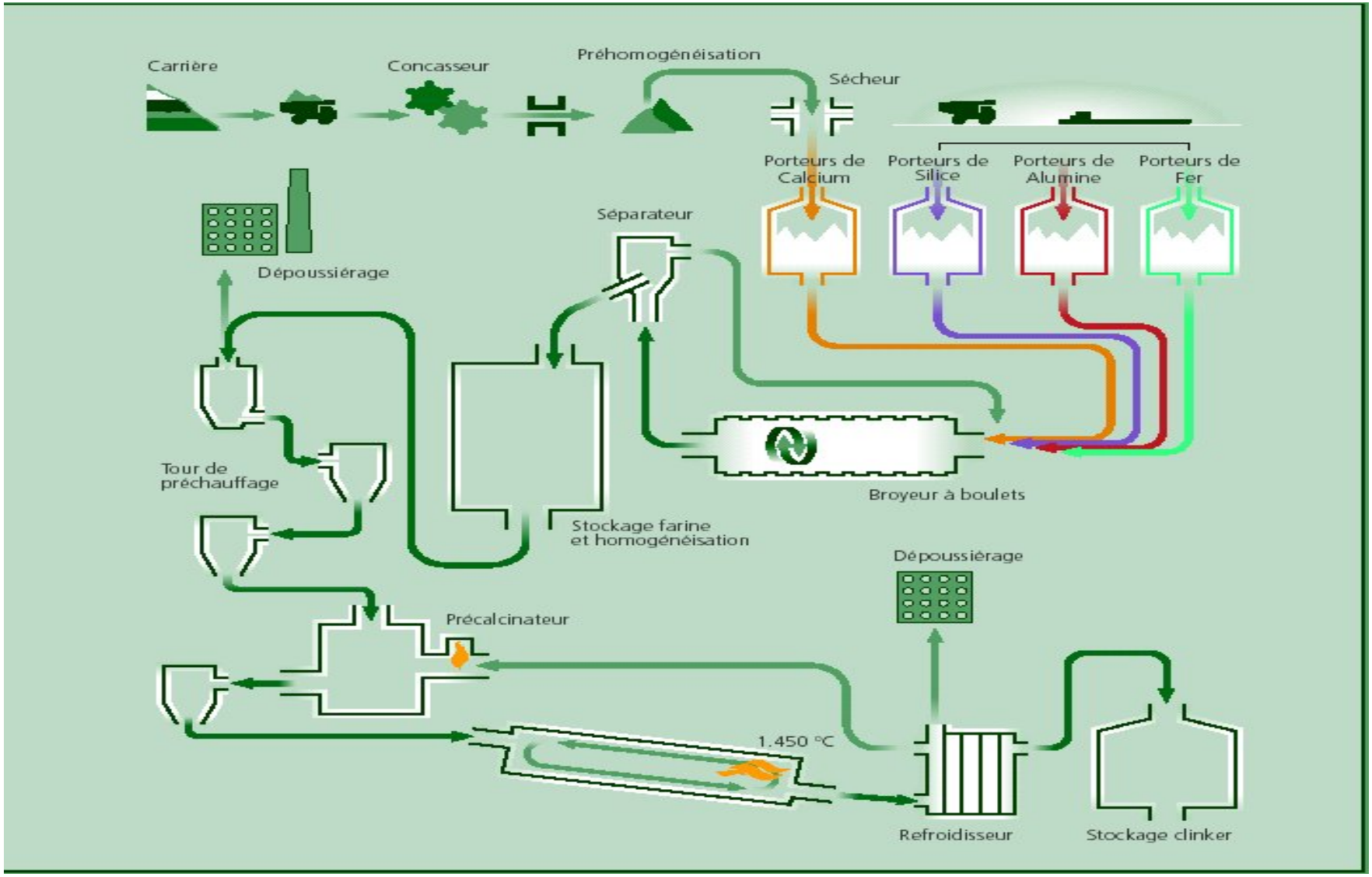
Clinker production



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Clinker production

- **CHEMISTRY** Example
  - CaO +/- 67 %
  - SiO2 +/- 21 %
  - Al2O3 +/- 5 %
  - Fe2O3 +/- 3 %

  1 ton of clinker requires 1.6 tons of raw material

- **ENERGY CONSUMPTION**
  - **Dry process kiln : ~ 3,5 GJ/T clinker**
  - **Wet process kiln : ~ 6 GJ/T clinker**

To produce annualy 1,25 million tons of clinker the Lixhe kiln uses 105,000 tons of oil equivalent or heating more than 20.000 homes.

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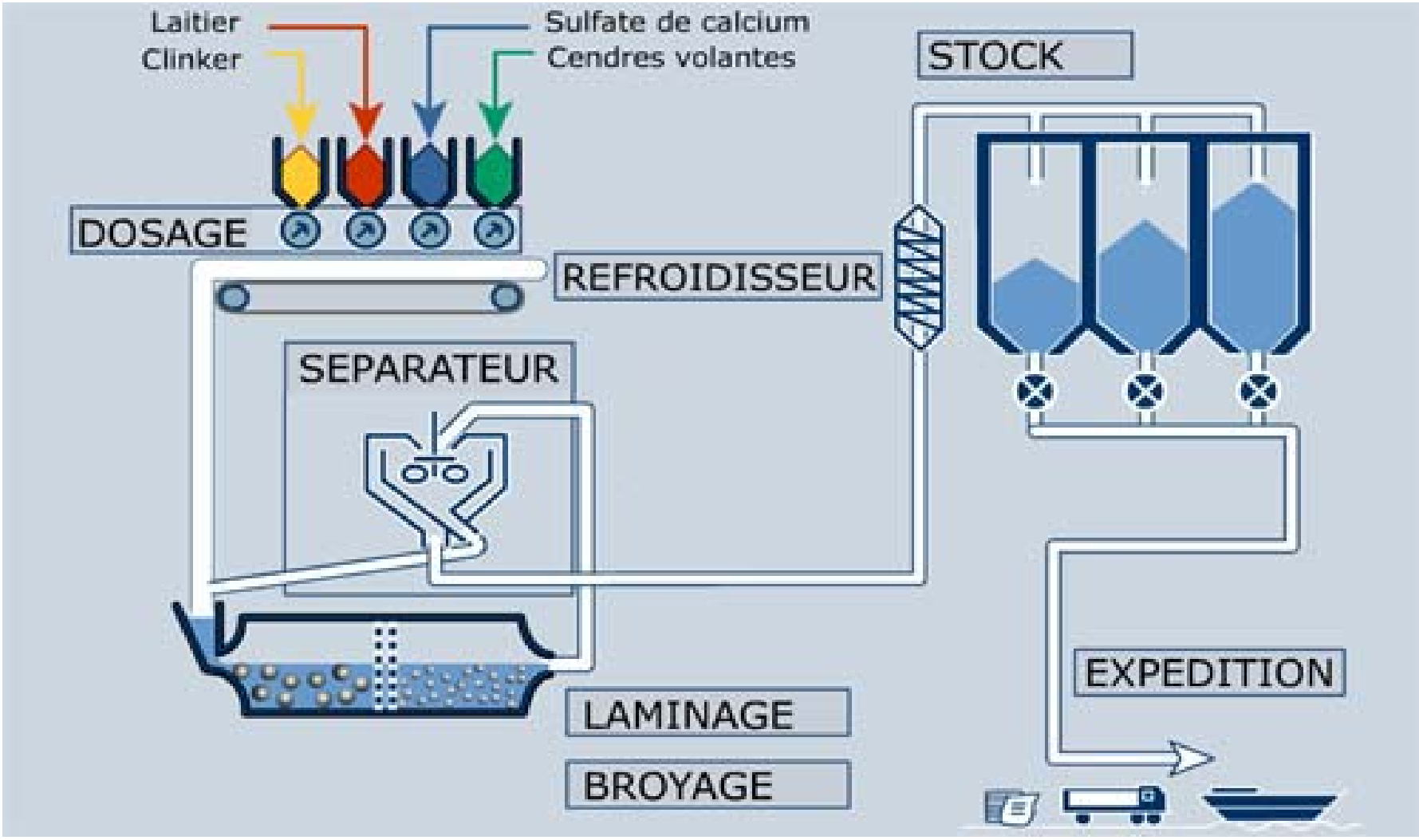
Cement production



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Mineral substitution

- **In the cement :**
  - Clinker substitution by substances whose reactivity is activated in the presence of clinker :
    - Fly ash from powerstations
    - Blastfurnace slag
  - Replacement of natural gypsum by waste gypsum from industrial process. Example : phosphates industry (Prayon)

Portland cement

- 91% clinker
- 6 % natural gypsum
- 3% various fillers

Average CBR Lixhe

- 60% clinker
- 27% slag
- 4 % fly ash
- 5,5% waste gypsum
- 0,5% natural gypsum
- 3% various fillers

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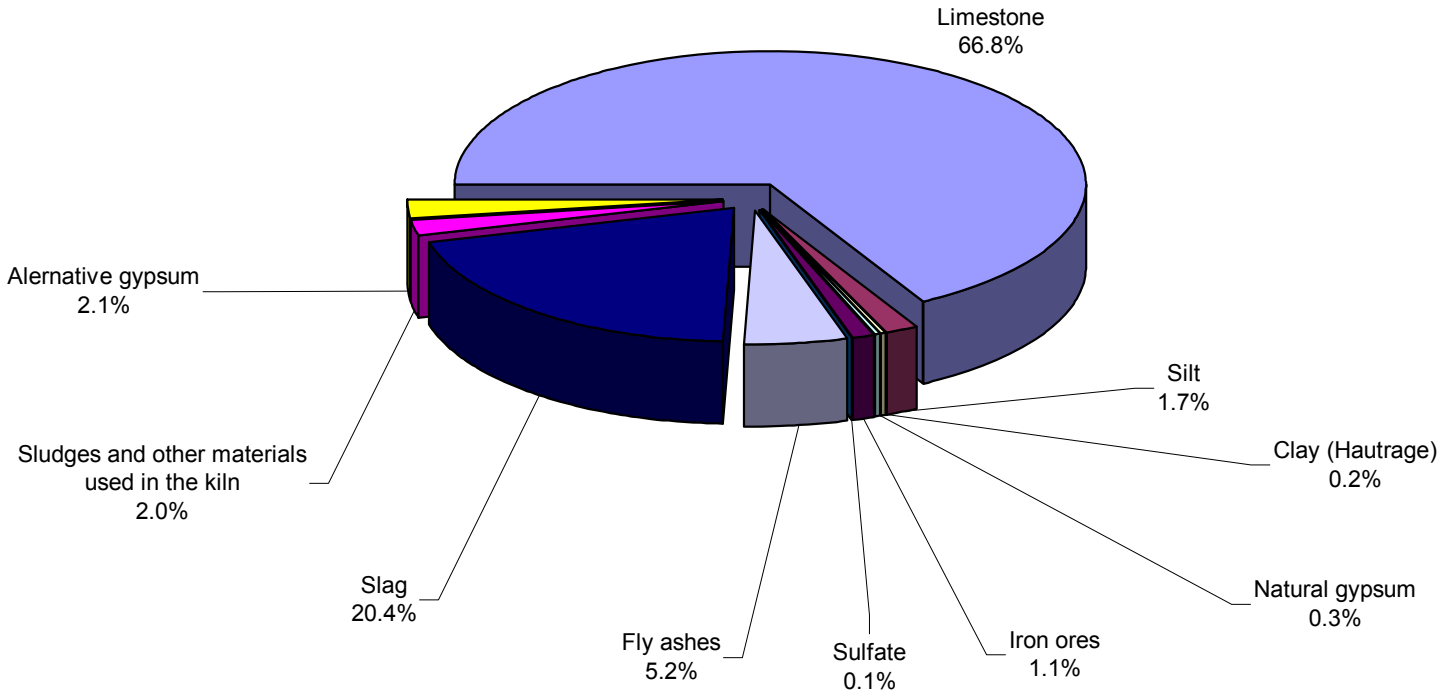
Mineral substitution

- **In the clinker**

  - Substitution of Al, Fe, Si sources by secondary raw materials :
    - Steel residues (Fe, Si) : steel sludge
    - Fly ash (Si, Al) (Hena terril)
    - Slag (Si, Ca, Al)
    - Dewatered sludge (Al)
    - Polluted soils (Al)
    - Fiberglasses (Si)
    - Sand (Si)
    - …

CBR in figures

- Distribution of alternative raw materials



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RECYBEL : HENA TERRIL

- Recybel : partnership 49 % Electrabel / 25,5 % Italcementi / 25,5 % HeidelbergCement
- Mission : extract and emptying an old stock of fly ash from the thermal plant of Electrabel in Awirs
- Capacity : 1,9 Mio T of wet fly ash
- Deliveries based on 13 years (2017 → 2029)
  1.415 kT for CBR + 885 kT for CCB
- Participation in the valorisation of an old terril and environmental solution for the region.
- Decrease of the market availabilities → ideal partnership to compensate this lack.

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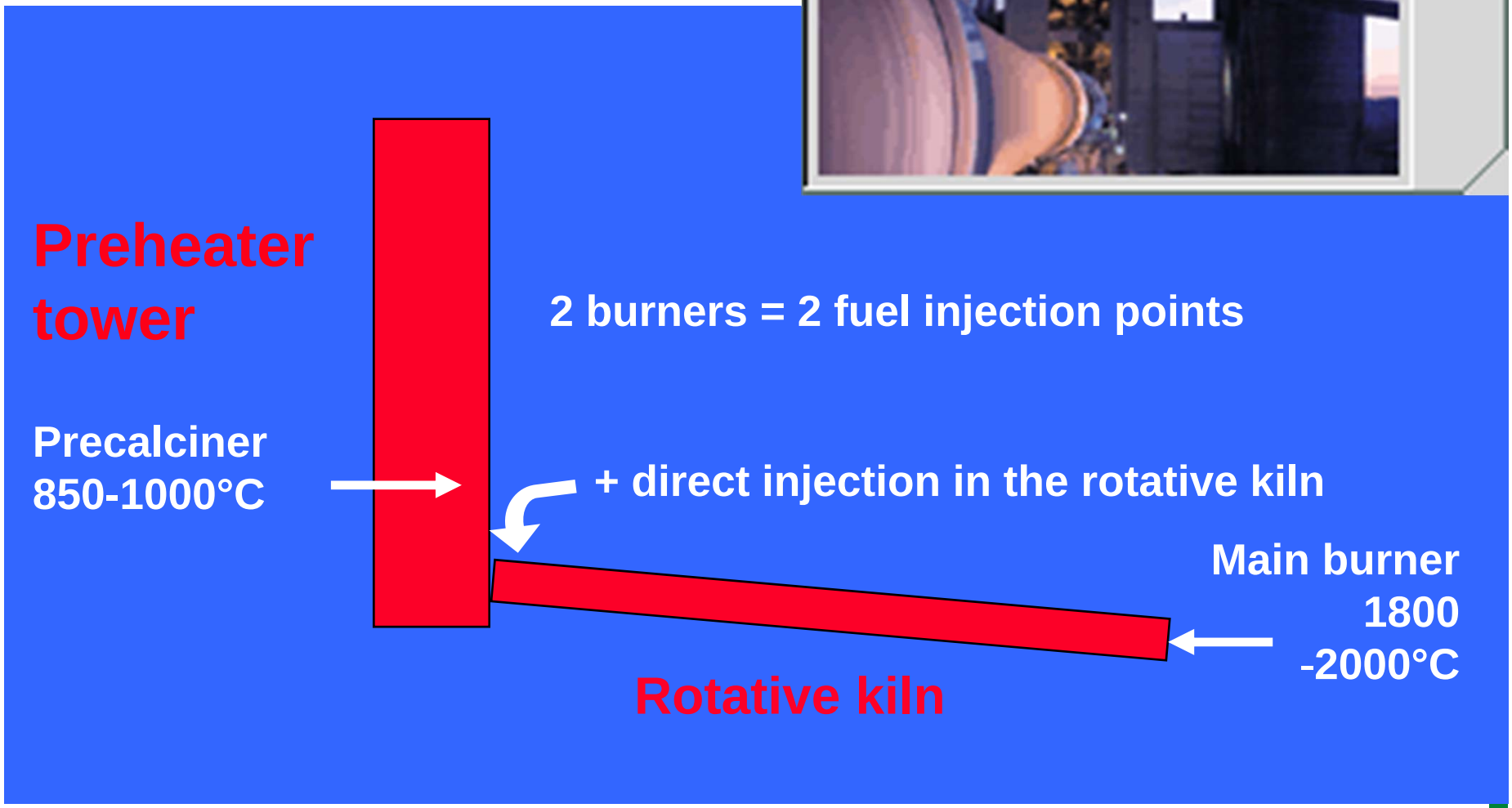
The kiln



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Secondary fuels

Process characteristics :

- **High temperature**
- **Oxidizing conditions**
  - Necessary for the clinker production
- **Long residence time**
- **No waste, no ashes !**
  - Ashes participate at the clinker formation

Secondary fuels

Main burner	Precalciner	Rotary kiln inlet
• Fine solif fuel (<10mm) or liquid • High calorific value ⇒Impregnated saw dust ⇒Animal meal ⇒Solvents – oil ⇒Fine plastics ⇒…	• Coarser fuel OK (<40mm) • Lower calorific value OK ⇒ Impregnated saw dust ⇒ Filtration earth ⇒ Plastics, RDF ⇒ Polluted soils ⇒ Dried sewage sludge ⇒ Paper sludge ⇒ Seeds, meals ⇒ …	• Bulky fuel possible ⇒ Whole tyres • Pumping pasty products ⇒ Sewage sludge

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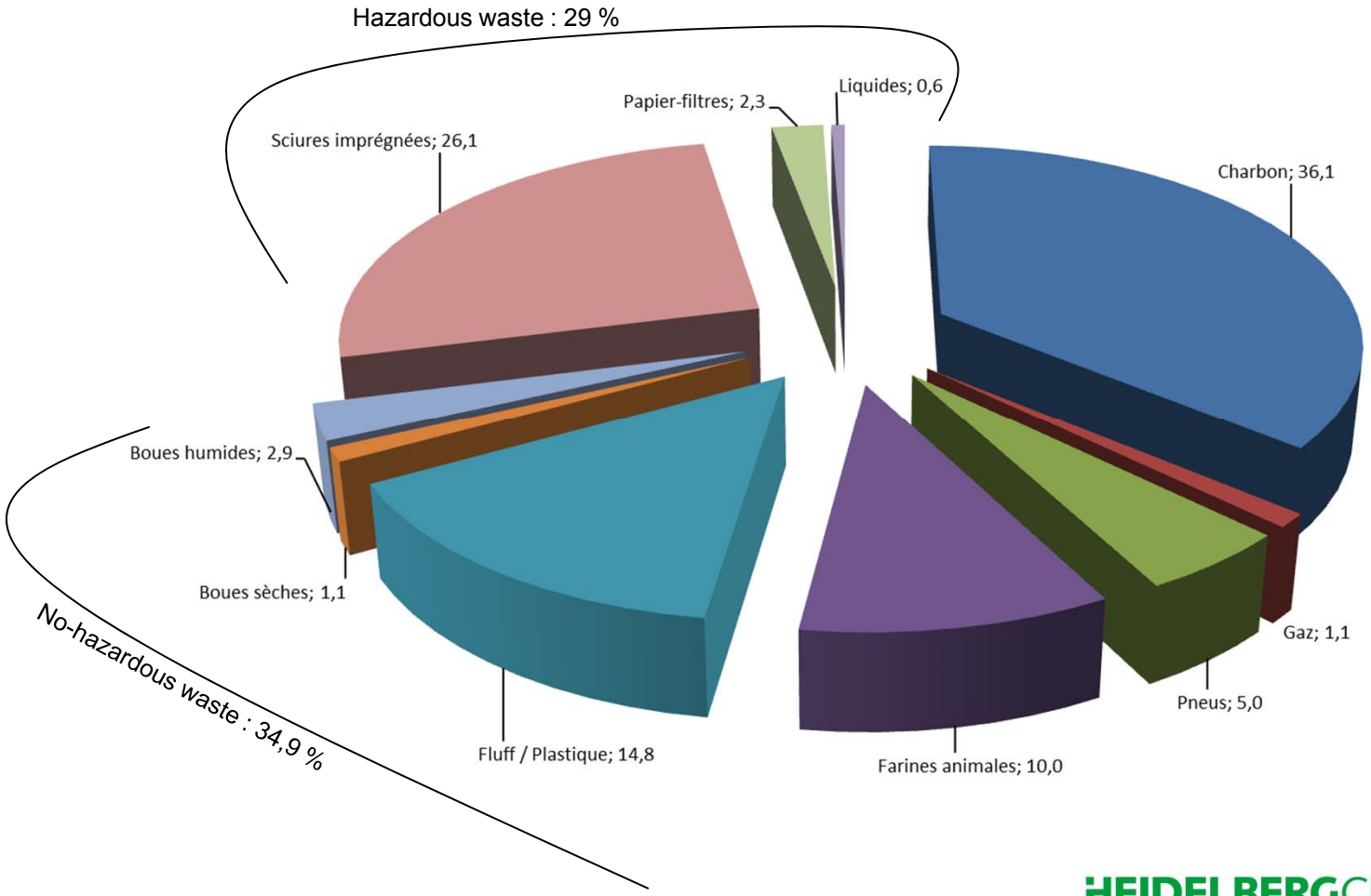
CBR in figures

- Fuels consumptions (in %)



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Recyfuel

- **Platform treating hazardous industrial waste in order to produce a secondary fuel used by the cement industry.**
- **Partnership 50/50 SITA/CBR.**
- **3 end products :**
  - Resofuel 100.000 t/year
  - Plastic 18.000 t/year
  - Metals 7.000 t/year
- **85.000 t of hazardous waste treated each year.**
- **2,5 t Resofuel = 1 t coal**

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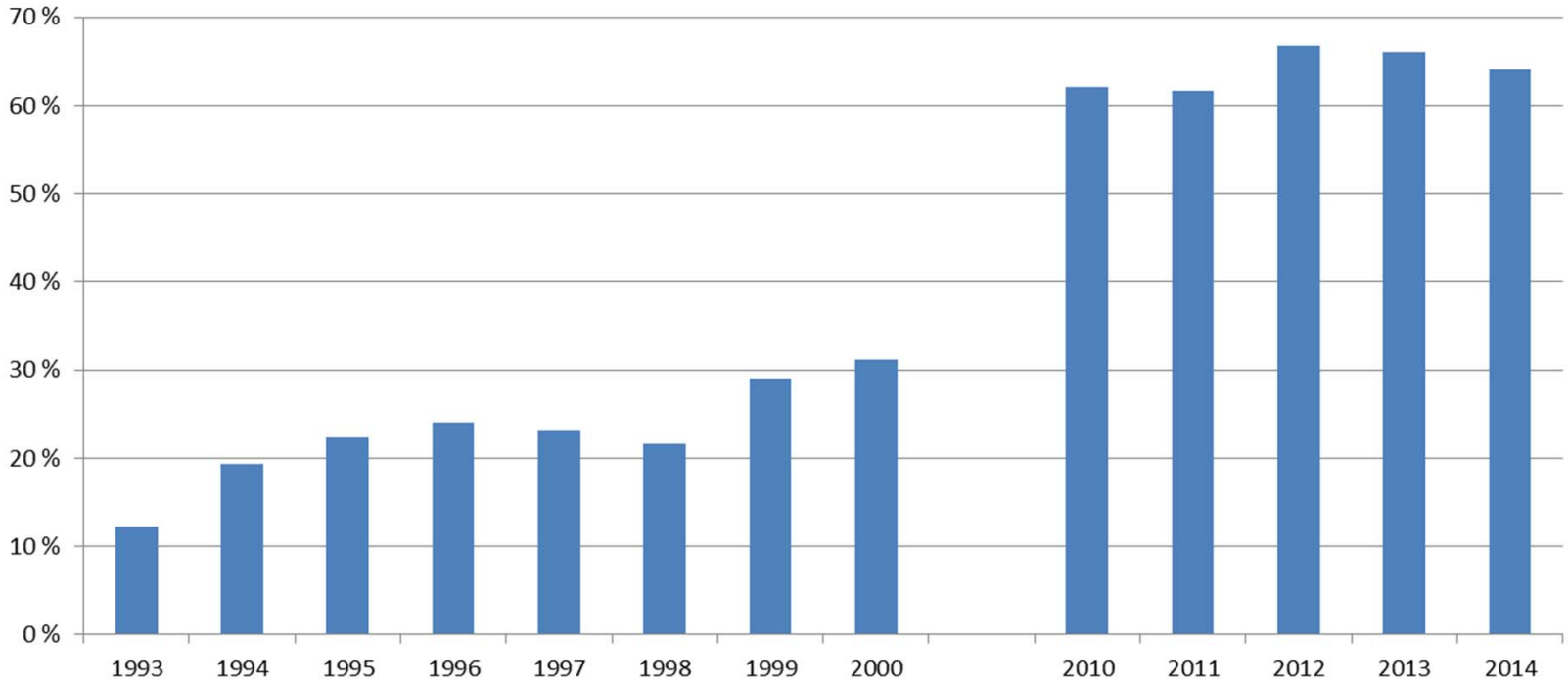
Secondary fuels

Substitution rate evolution



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Resources economies

Primary fuel economy

115.000 T equivalant-coal in 2014

Natural primary raw materials economy

1.925.000 T of natural material saved in 2014

As comparison : 3.815.000 T extracted from our quarries in 2014.

Constraints and limitations for the valorization in the cement industry

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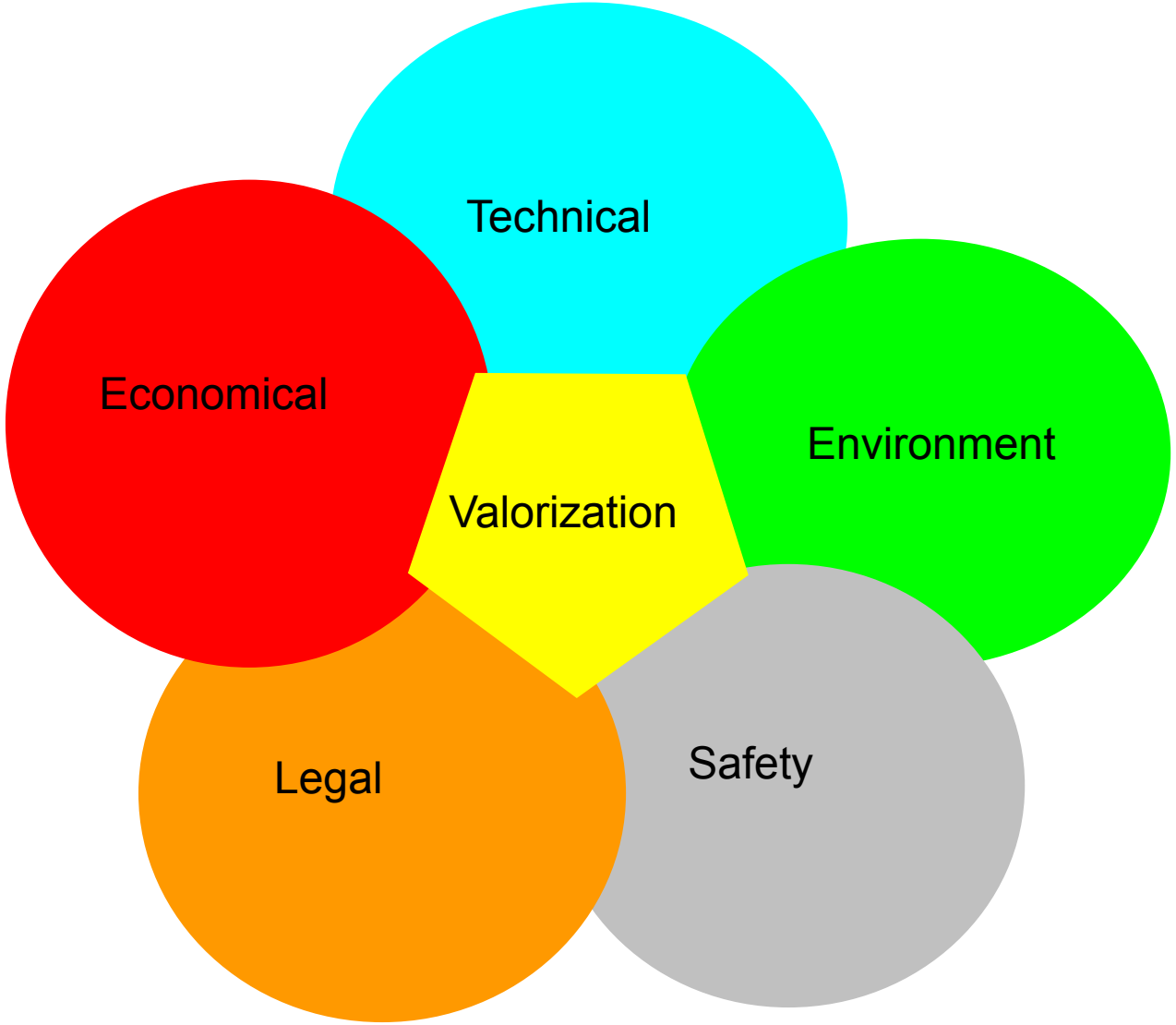
Constraints and limitations



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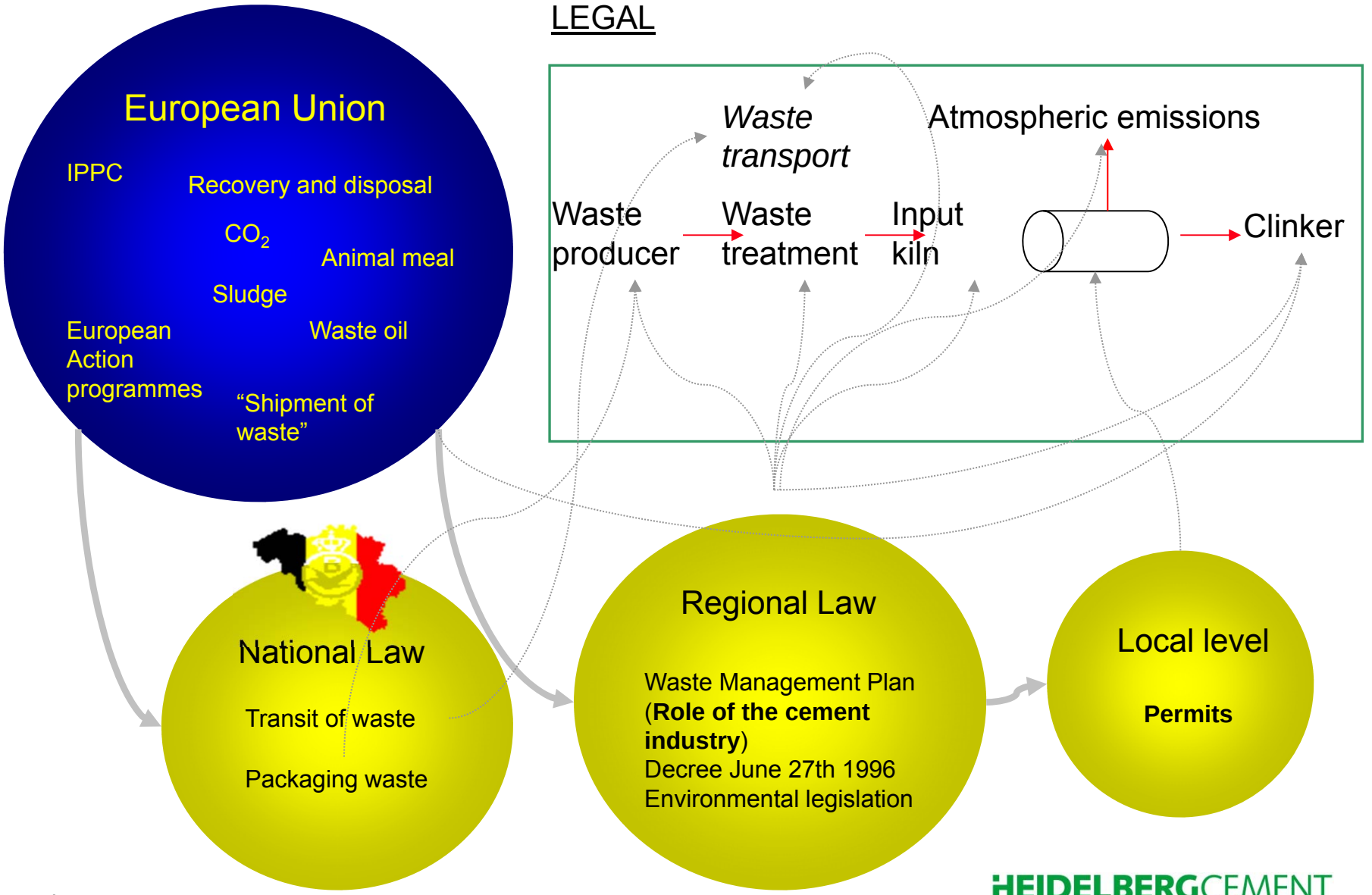
Constraints and limitations



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Constraints and limitations

Technical	Environmental	Safety
• Handling / logistics • Process : ✓ Example : Cl and S poison the kiln • Quality of the product clinker - cement ✓ Example : P disrupts cement plug => use of animal meal limited	• Air emissions ✓ Volatils heavy metals (Hg, Cd, Tl,…) ✓ Hydrocarbons in the mineral materials • Heavy metals in the cement • Permit	• Toxicity – risks for the workers • Risks for the facilities (ex.: corrosive products) • Flash-point • Reactive products (self-igniting, etc) • …

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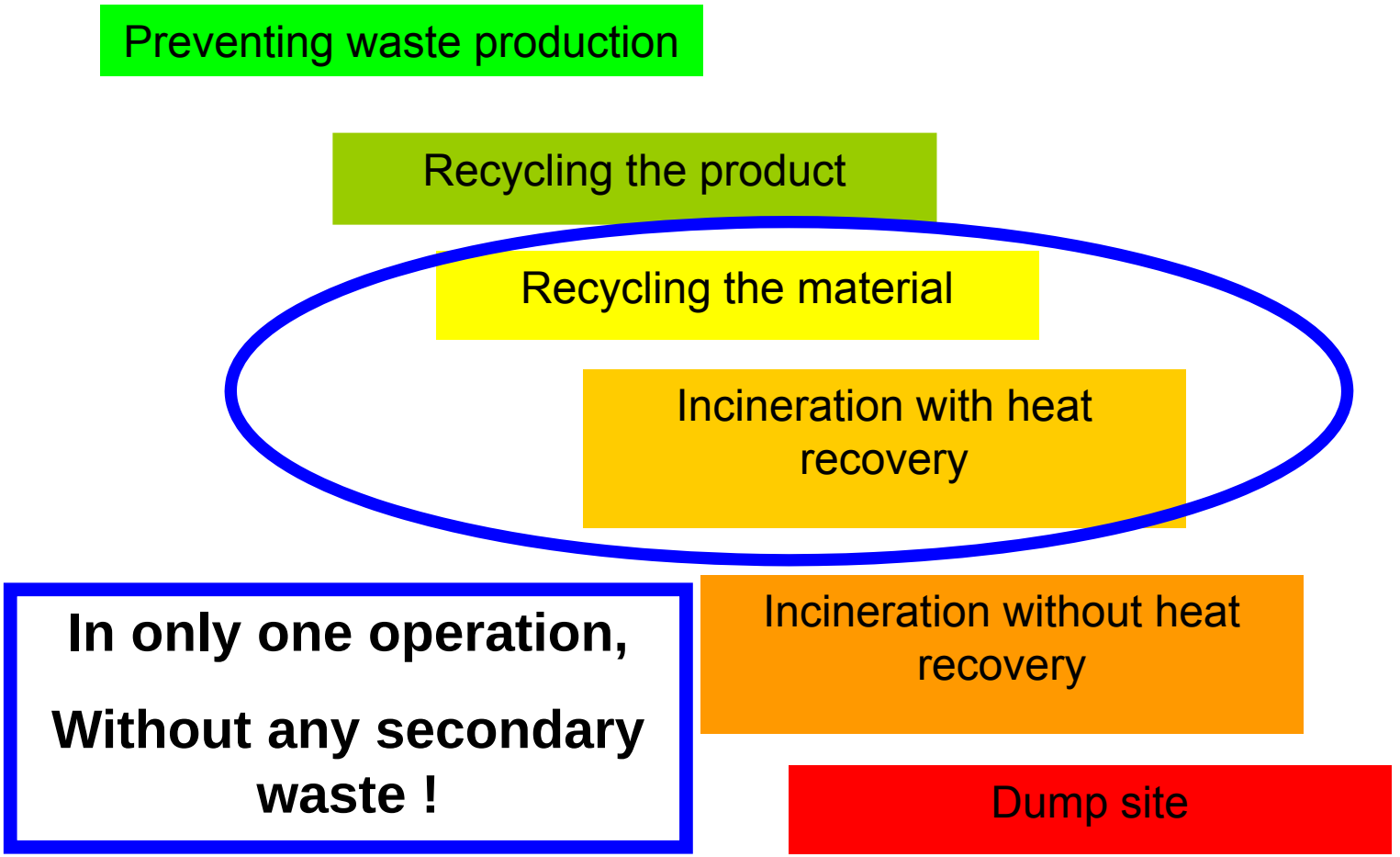
Constraints and limitations

- **Economic**
  - The operation must be profitable
  - Competition between the several wastes
  - Proposed price fixed by a penalties system following he various constraints.

The costs reduction provided by the valorization allows us to remain competitive on a worldwide market.

Lansink scale



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ANY QUESTIONS ?

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