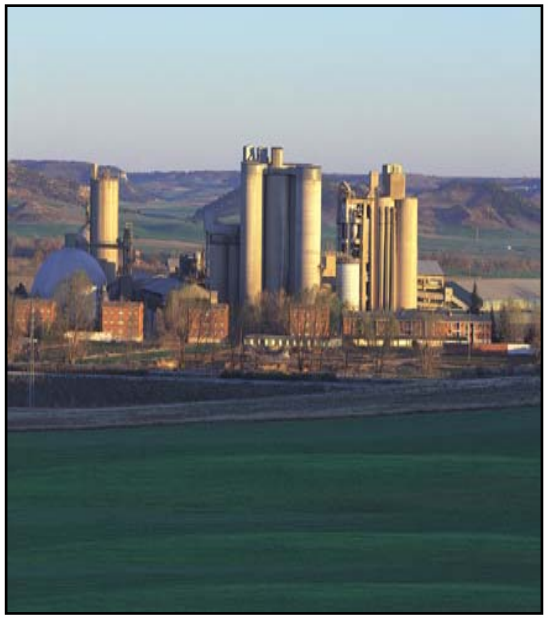
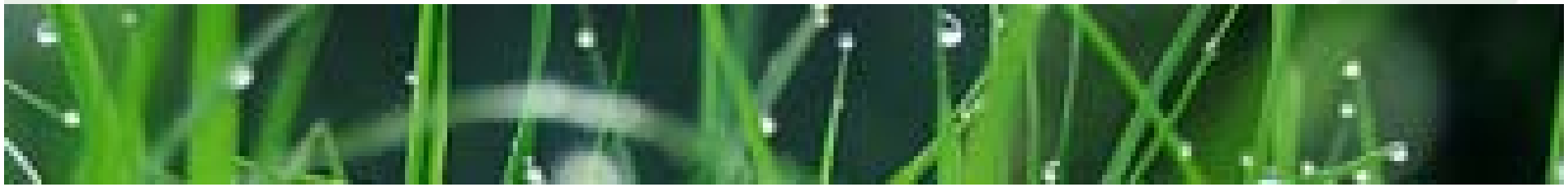
SUSTAINABILITY OF CEMENT INDUSTRY



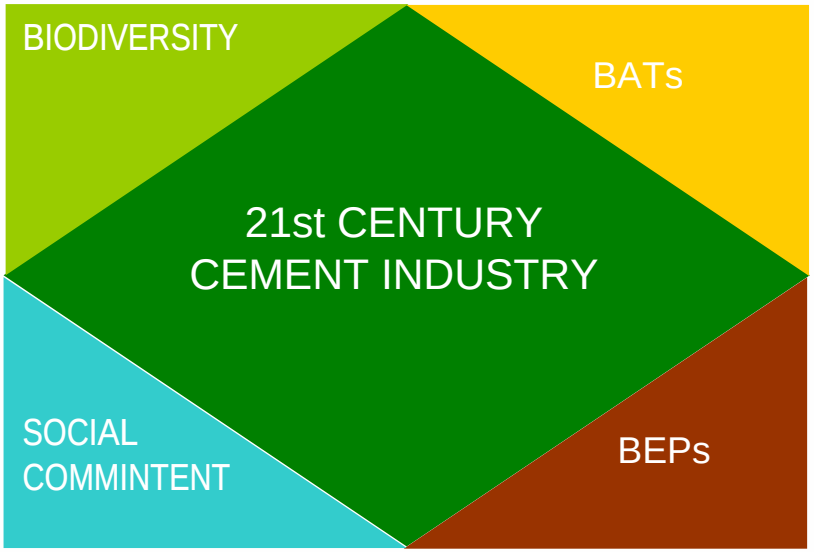
FOUR CORNERSTONES FOR THE CEMENT INDUSTRY OF THE 21st CENTURY

Pedro Mora Peris

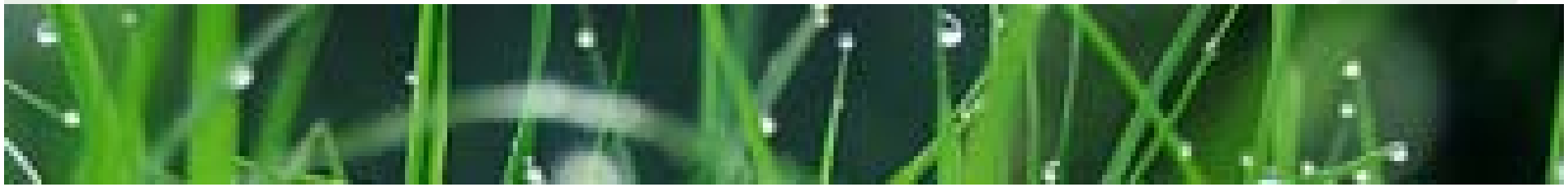
Technical Director of OFICEMEN



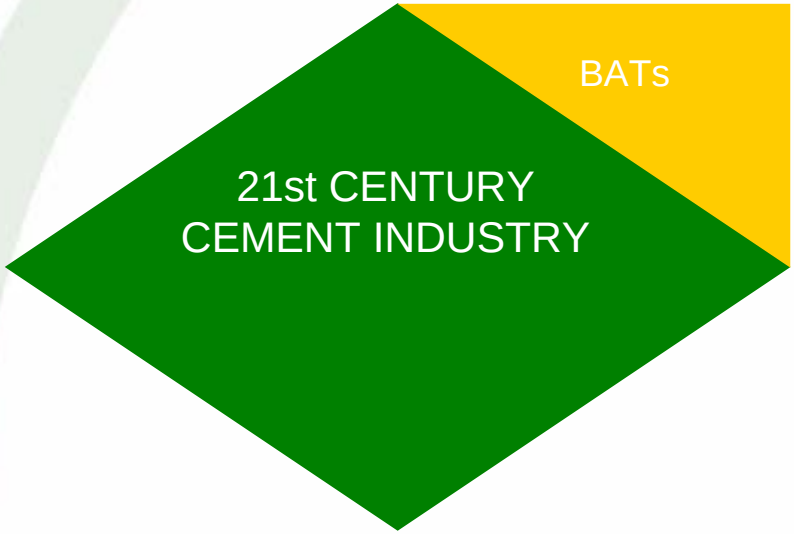
1. NEW CHALLENGES



Sustainability is multidisciplinary



2. BEST AVAILABLE TECHNIQUES (BATs)



2.1. What is BTAs?

2.2. Bat: primary measures

2.3. Thermic energy

2.4. Electric energy

2.5. Emissions

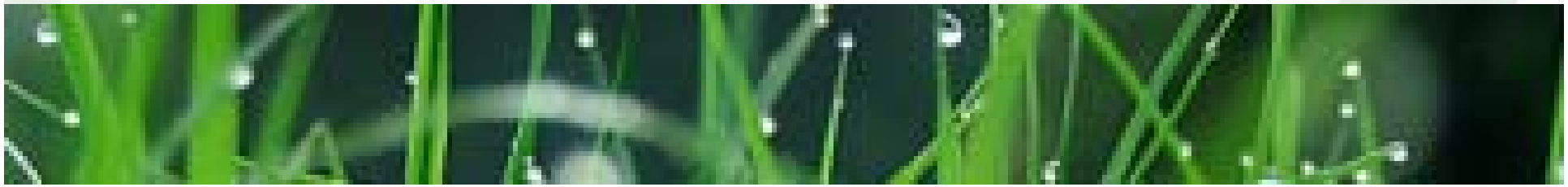
2.6. Spanish voluntary agreement

2. BEST AVAILABLE TECHNIQUES (BATs)

2.1. WHAT IS BATs?

DEFINED IN ART 2 (12) OF IPPC DIRECTIVE

- "Most effective and advanced stage in the development of activities and their methods of operation.."
- .."indicate the practical suitability of the techniques for providing basis for Emission Limit Values".
- …"to prevent/reduce the impact on the environment as a whole".
- TECHNIQUES: technology+ plant design, building, maintenance, operation, decomission.
- AVAILABLE: developed in economical and technical viable conditions.
- BEST: Most effective in level of protection of environmet as a whole.



2. BEST AVAILABLE TECHNIQUES (BATs)

2.2. BAT: PRIMARY MEASURES

- Environmental Management System (ISO 14.000)
- Process control and optimisation
- Selection and control of substances entering the kiln

- Monitoring:
  - Process parameters
  - Continous monitoring: Dust, NOx, SOx, CO
  - Continous or periodic monitoring: HCl, HF, TOC
  - Periodic monitoring: D/F, metals

2. BEST AVAILABLE TECHNIQUES (BATs)

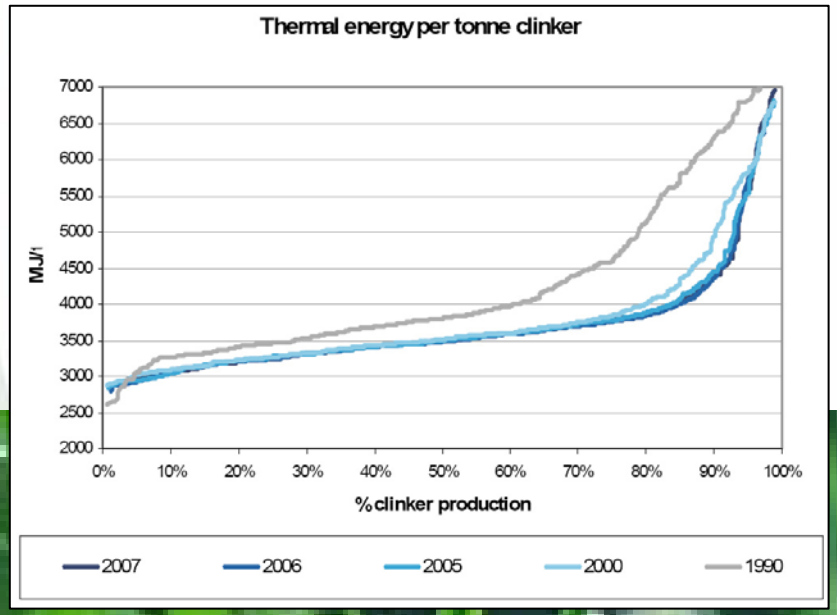
2.3. THERMIC ENERGY

KILN FUEL EFFICIENCY

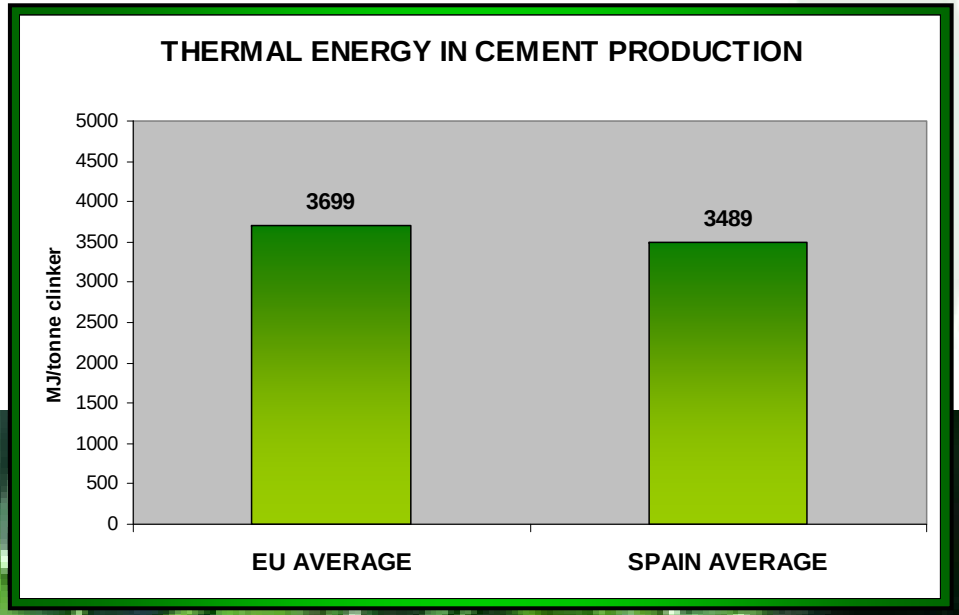
- DRY PROCESS
- HEAT EXCHANGER
- PRECALCINER

2900 – 3200 MJ/clinker tonne

SITUATION WORLD WIDE



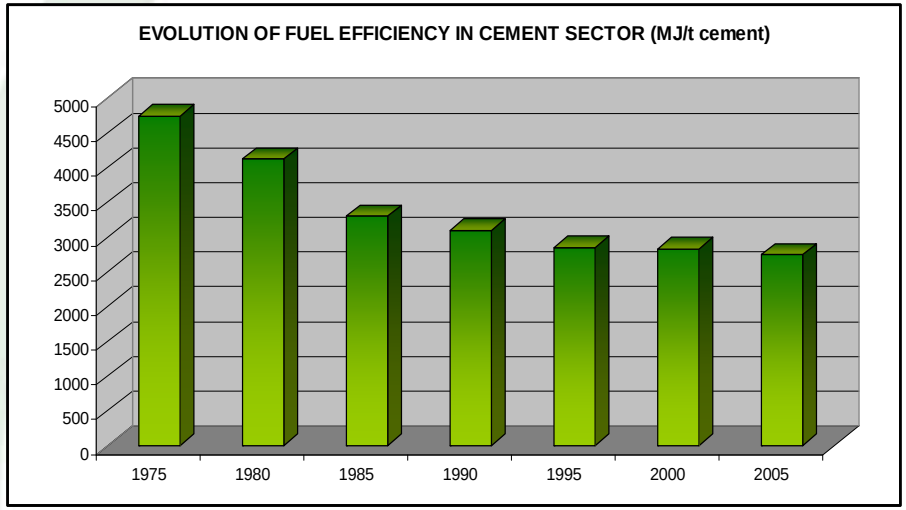
SITUATION IN SPAIN AND EUROPE

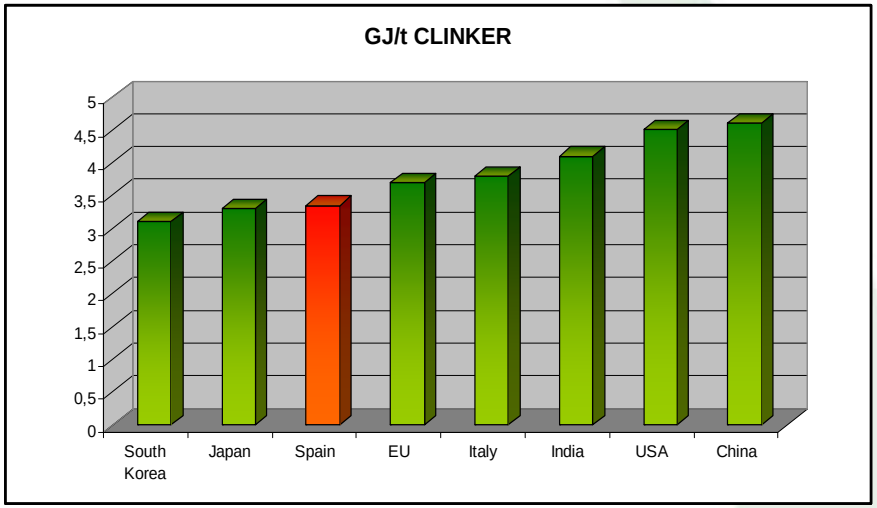


2. BEST AVAILABLE TECHNIQUES (BATs)

2.3. THERMIC ENERGY

SPANISH KILN FUEL EFFICENCY





40 % of fuel reduction since 1975

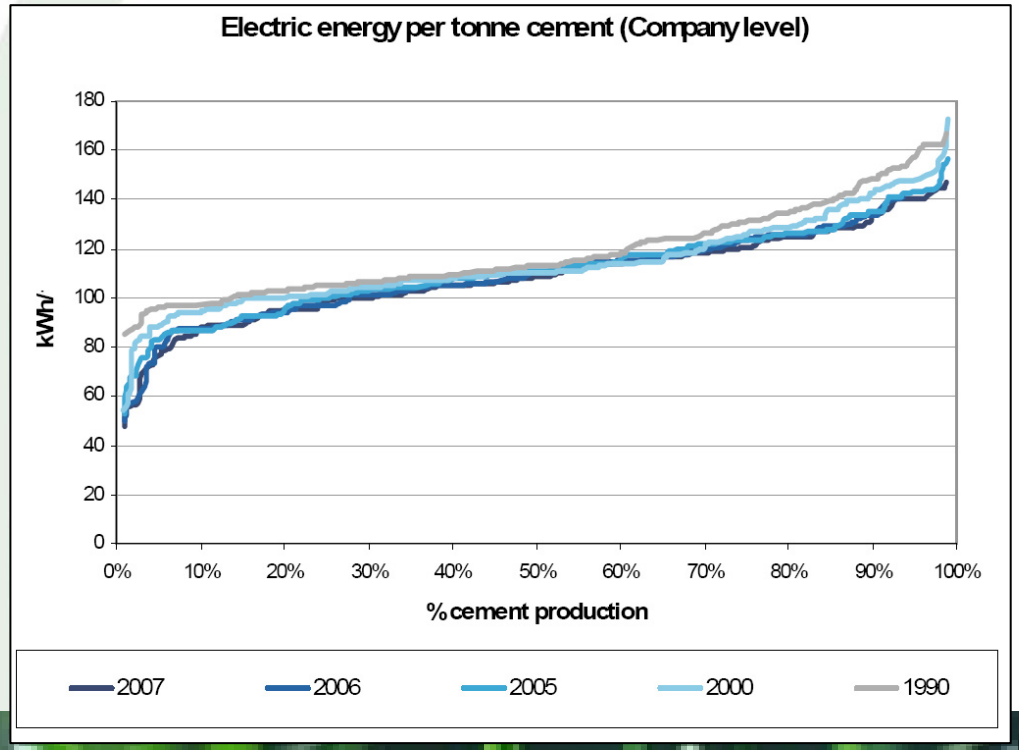
4% more efficient than European average

Only South Korea and Japan are more efficient

2. BEST AVAILABLE TECHNIQUES (BATs)

2.4. ELECTRIC ENERGY

ELECTRICITY CONSUMPTION WORLDWIDE



1. 7% reduction since 1990
2. Indirect emission of CO_2
3. Key issue: price of electricity

2. BEST AVAILABLE TECHNIQUES (BATs)

2.5. EMISSIONS

LESS EMISSIONS

LOW NOx BURNER + COMBUSTION WITH DIFFERENT STAGES + SELECTIVE NON-CATALYTIC REDUCTION	PRIMARY MEASURES + ABSORBENTS IN DRY PROCESSES	ELECTROSTATIC FILTERS + SLEEVE FILTERS

NOx

500 - 800 mg/Nm^3

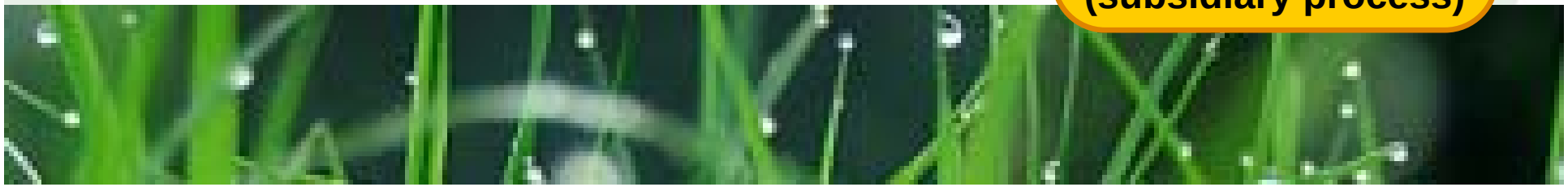
SOx

200 - 400 mg/Nm^3

Particles

30-50 mg/Nm^3 (Kilns and coolers)

10-30 mg/Nm^3 (subsidiary process)



2. BEST AVAILABLE TECHNIQUES (BATs)

2.5. EMISSIONS BAT & BATAEL

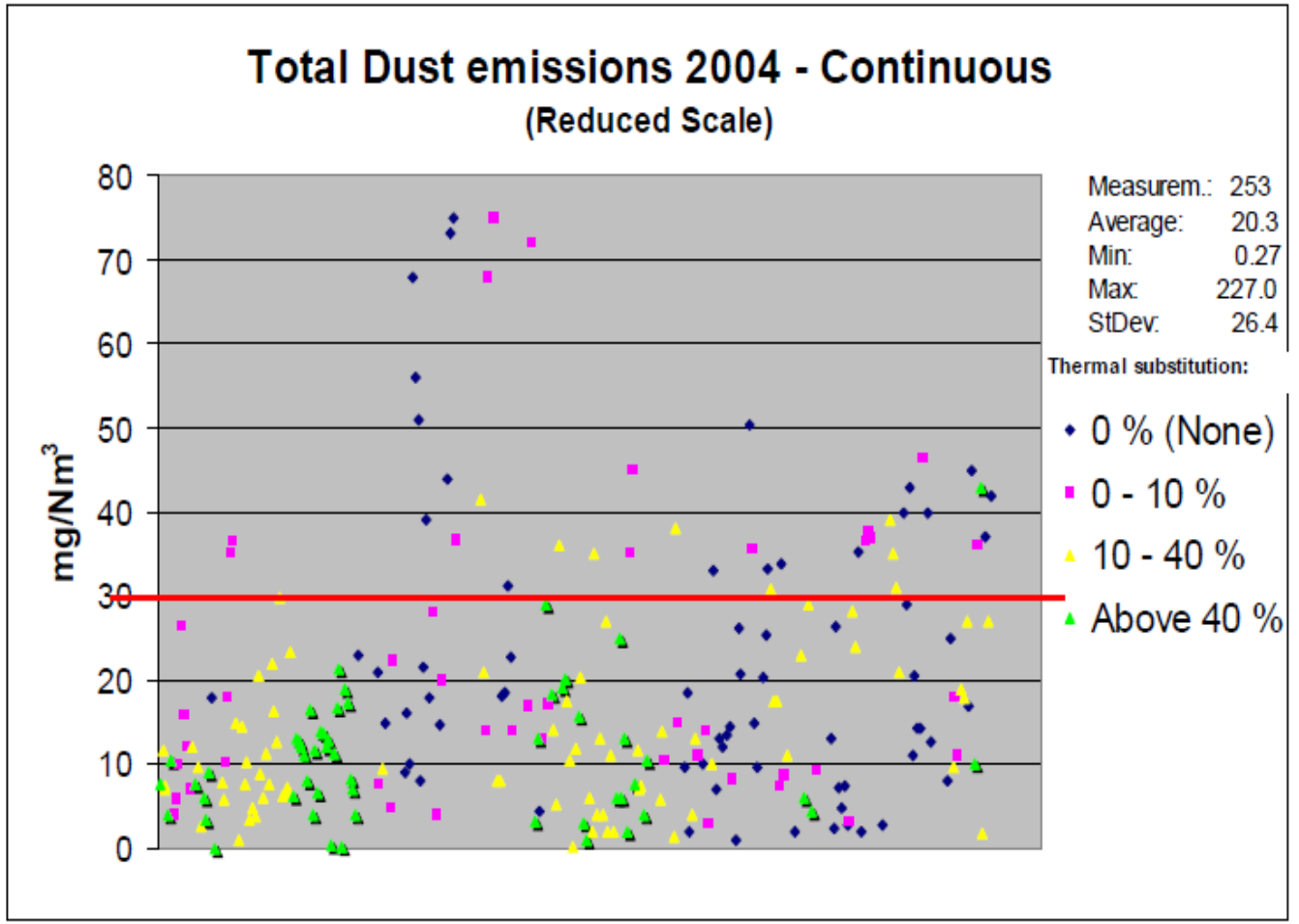
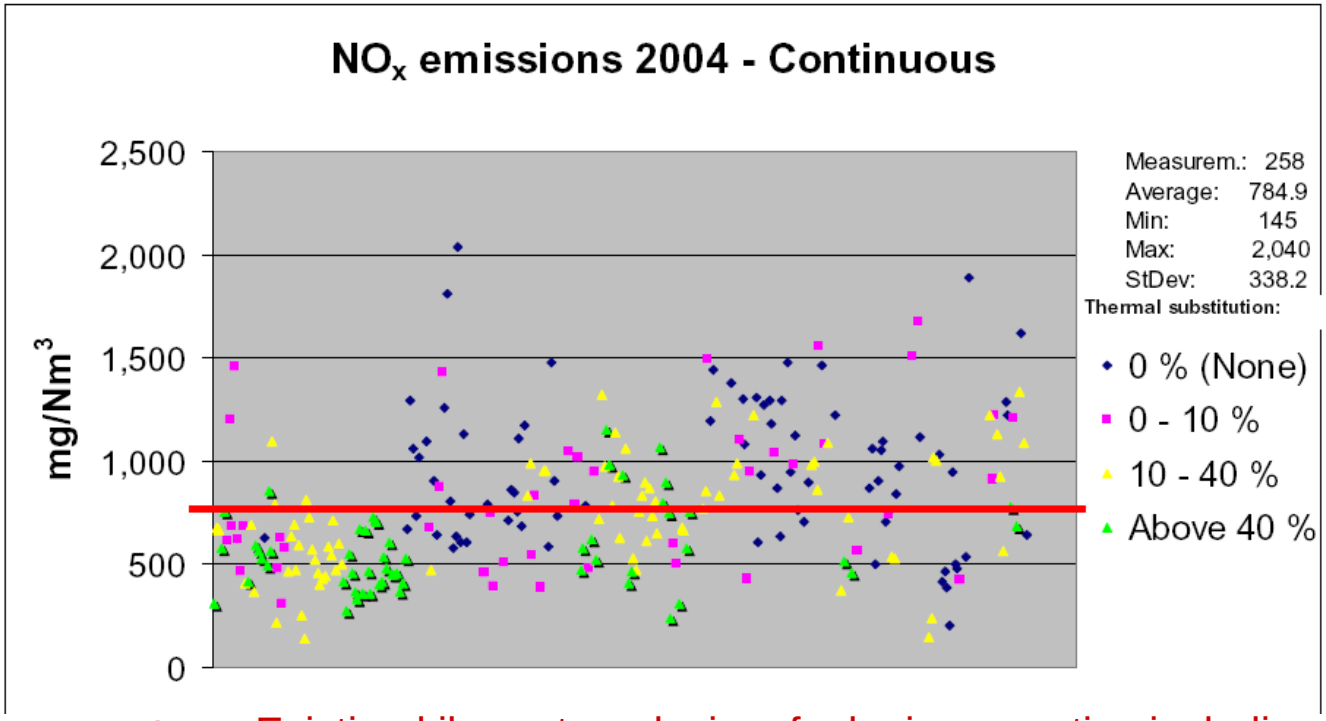


Figure 23: Values from continuous dust measurements in the clean gas of 253 rotary kilns. 8 measurements

2. BEST AVAILABLE TECHNIQUES (BATs)

2.5. EMISSIONS

BATAEL: NOx



Initial Level <1000
450
200

Initial Level >1000
500
200

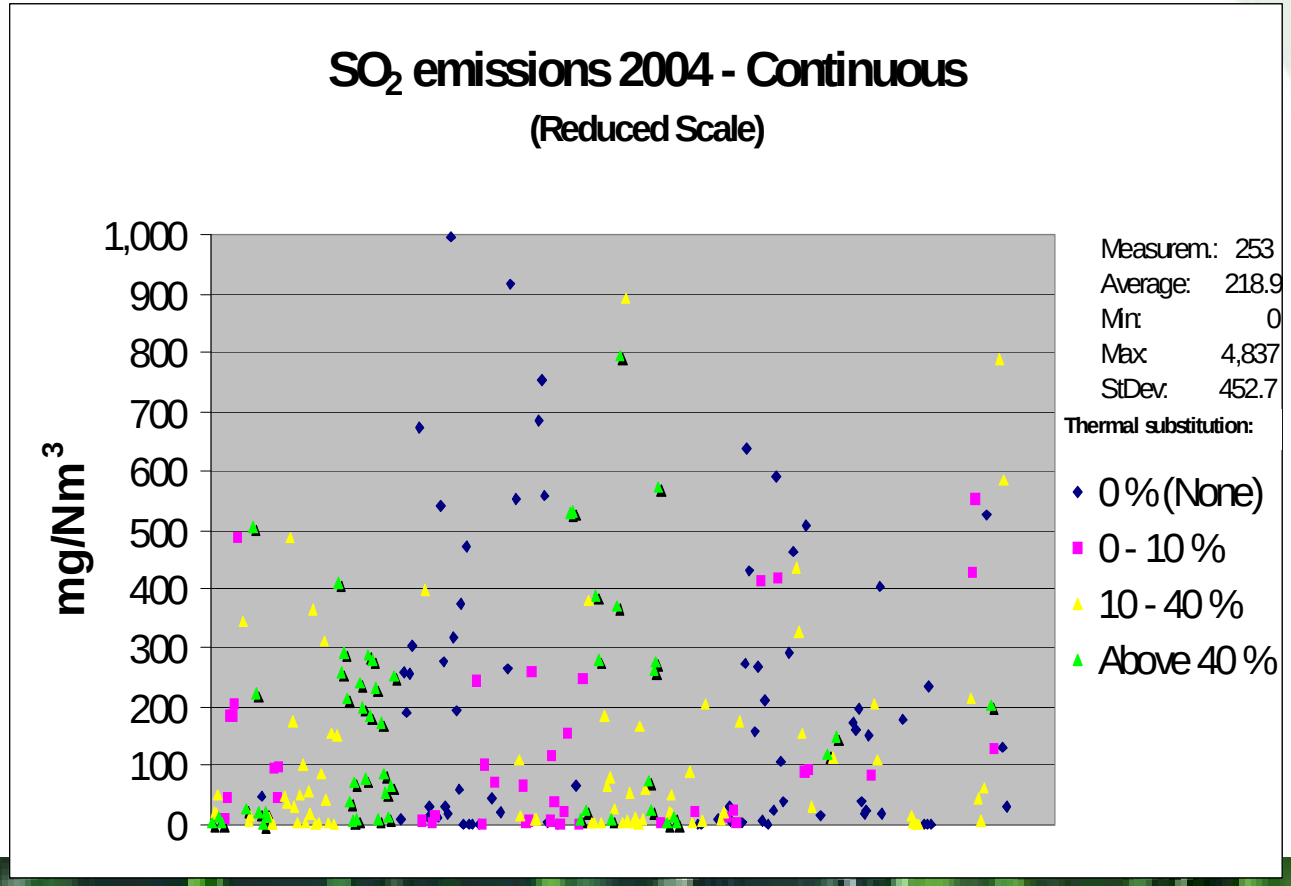
Lepol & long
800
400

-**NOTE:** "Existing kiln system design, fuel mix properties including waste, raw material burnability can influence the ability to be in the range…"

2. BEST AVAILABLE TECHNIQUES (BATs)

2.5. EMISSIONS

BAT & BATAEL: SOx



2. BEST AVAILABLE TECHNIQUES (BATs)

2.6. SPANISH CEMENT SECTOR VOLUNTARY AGREEMENT

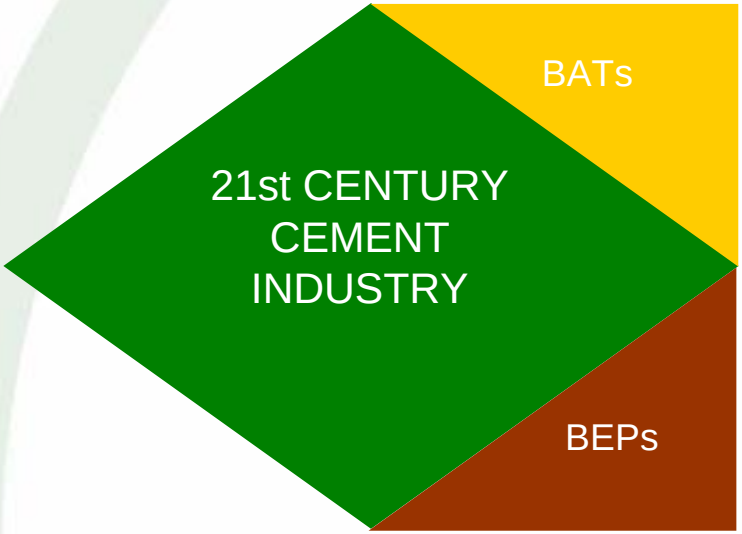
MINISTERY OF ENVIROMENT
+
OFICEMEN
+
AUTONOMOUS COMMUNITIES
+
CEMENT COMPANIES

Investment of 600 M€ in enviromental measures (2000-2007)

Investment of 1000 M€ in BATs technologies

SUSTAINABLE PRODUCTION
+
ECONOMIC FEASIBILITY

3. BEST ENVIRONMENTAL PRACTICES (BEPs)

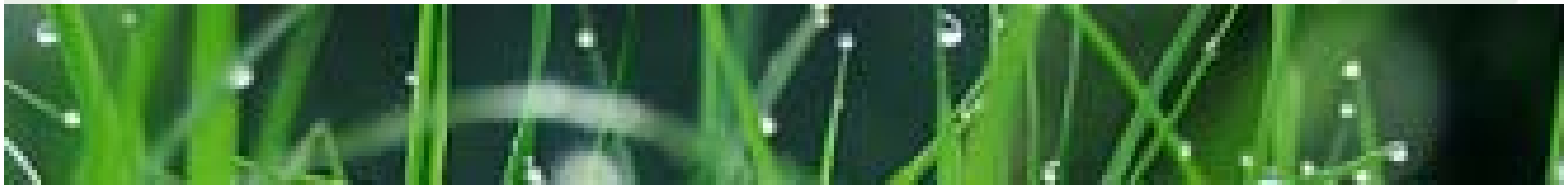


3.1. Sustainable use of resources

- **Recycling: Reduction of clinker-cement ratio**
- **Valorisation**

3.2. Sectorial agreements

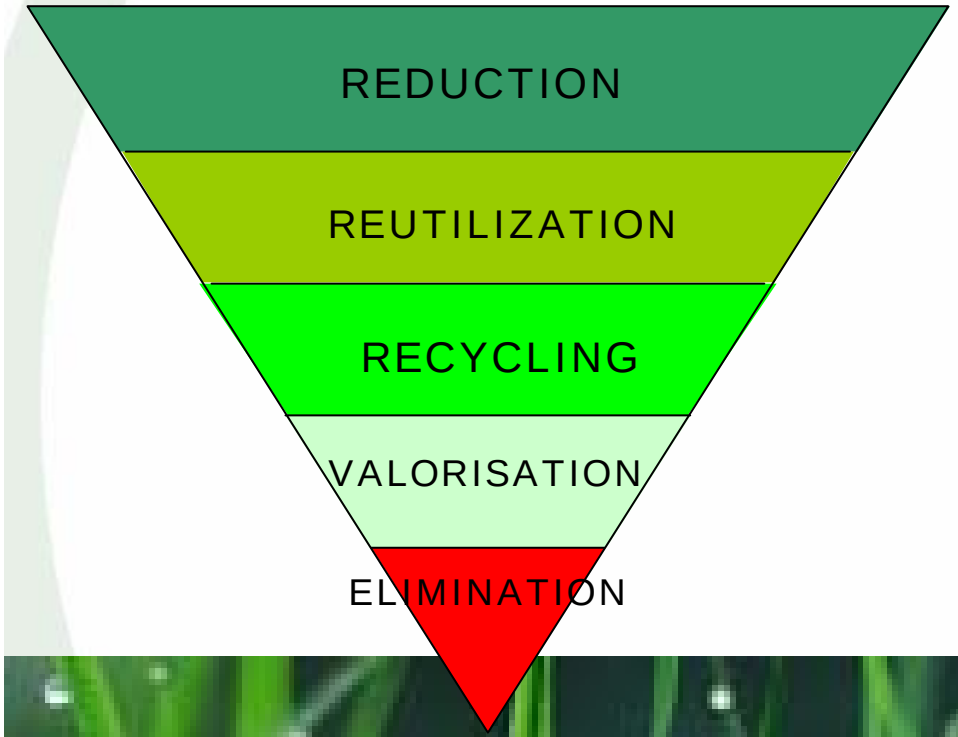
3.3. Enviromental management systems

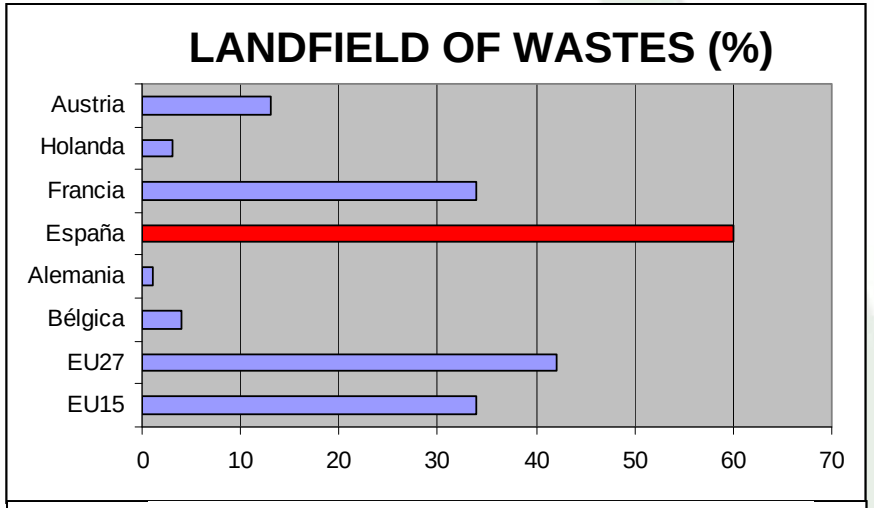


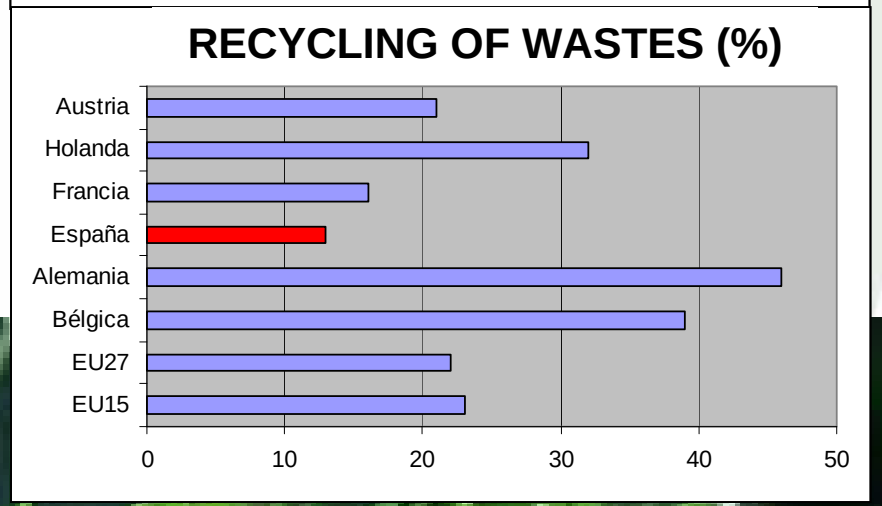
3. BEST ENVIROMENTAL PRACTICES (BEPs)

3.1. SUSTAINABLE USE OF RESOURCES

DIRECTIVE 2008/98/CE

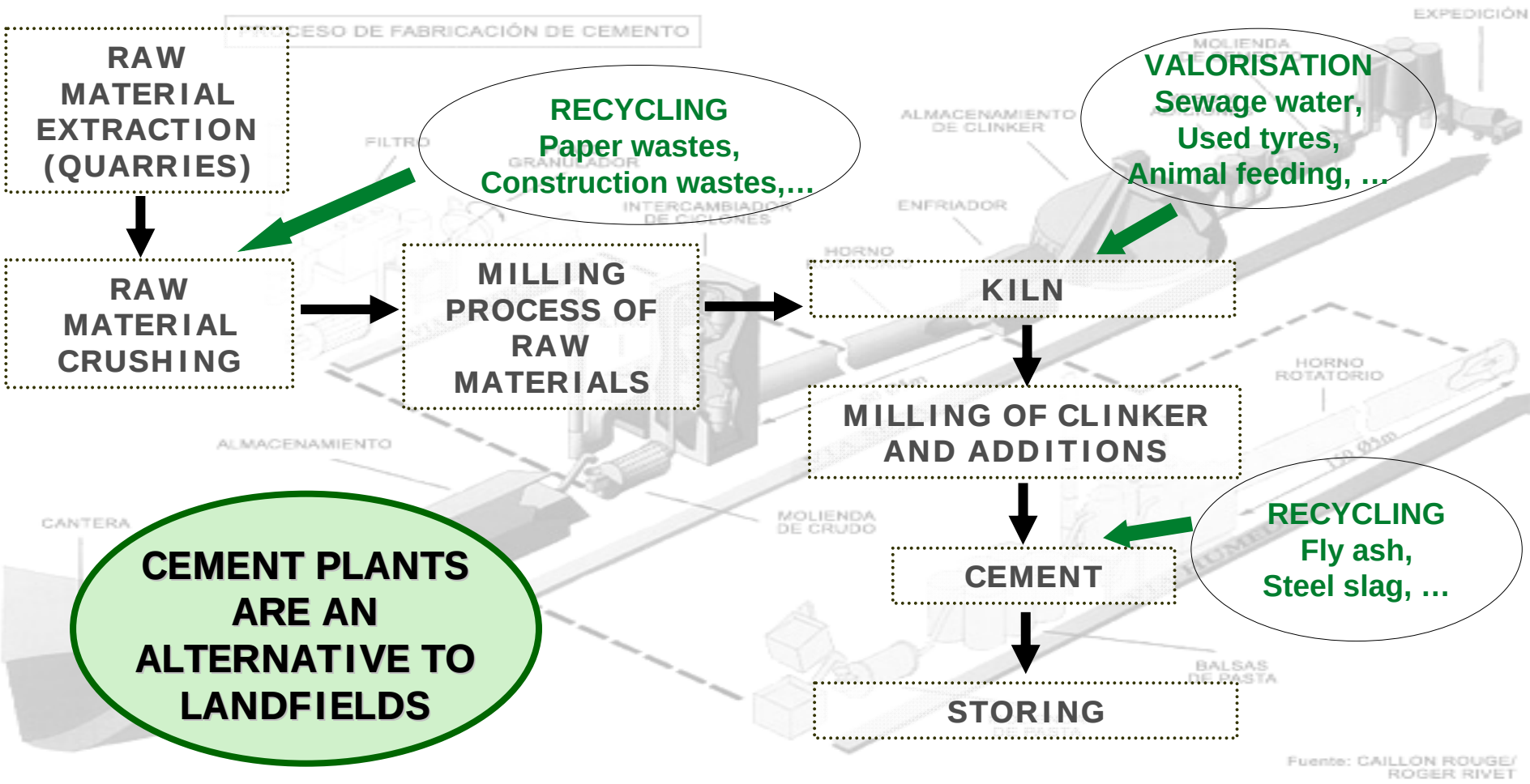






3. BEST ENVIRONMENTAL PRACTICES (BEPs)

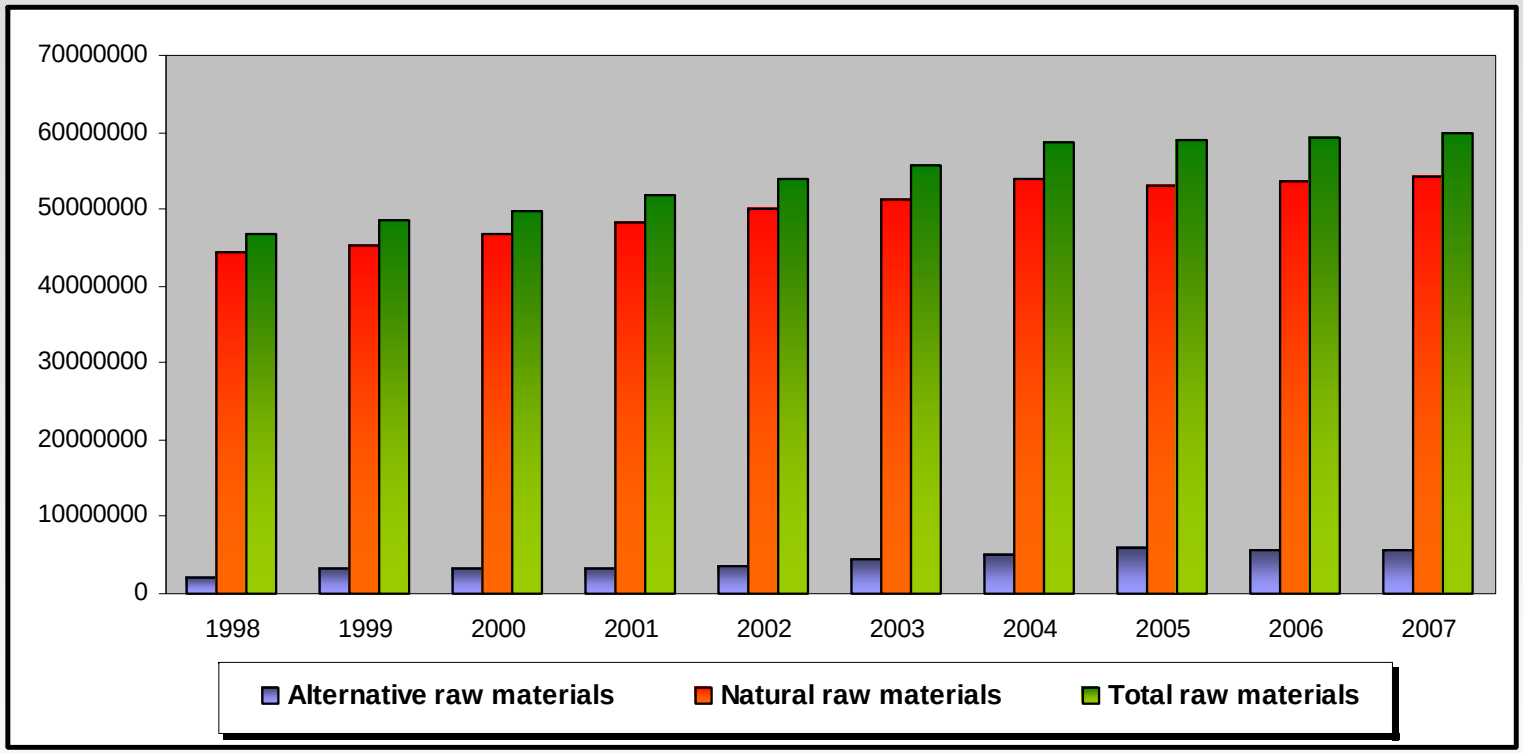
3.1. SUSTAINABLE USE OF RESOURCES



3. BEST ENVIRONMENTAL PRACTICES (BEPs)

3.1. SUSTAINABLE USE OF RESOURCES

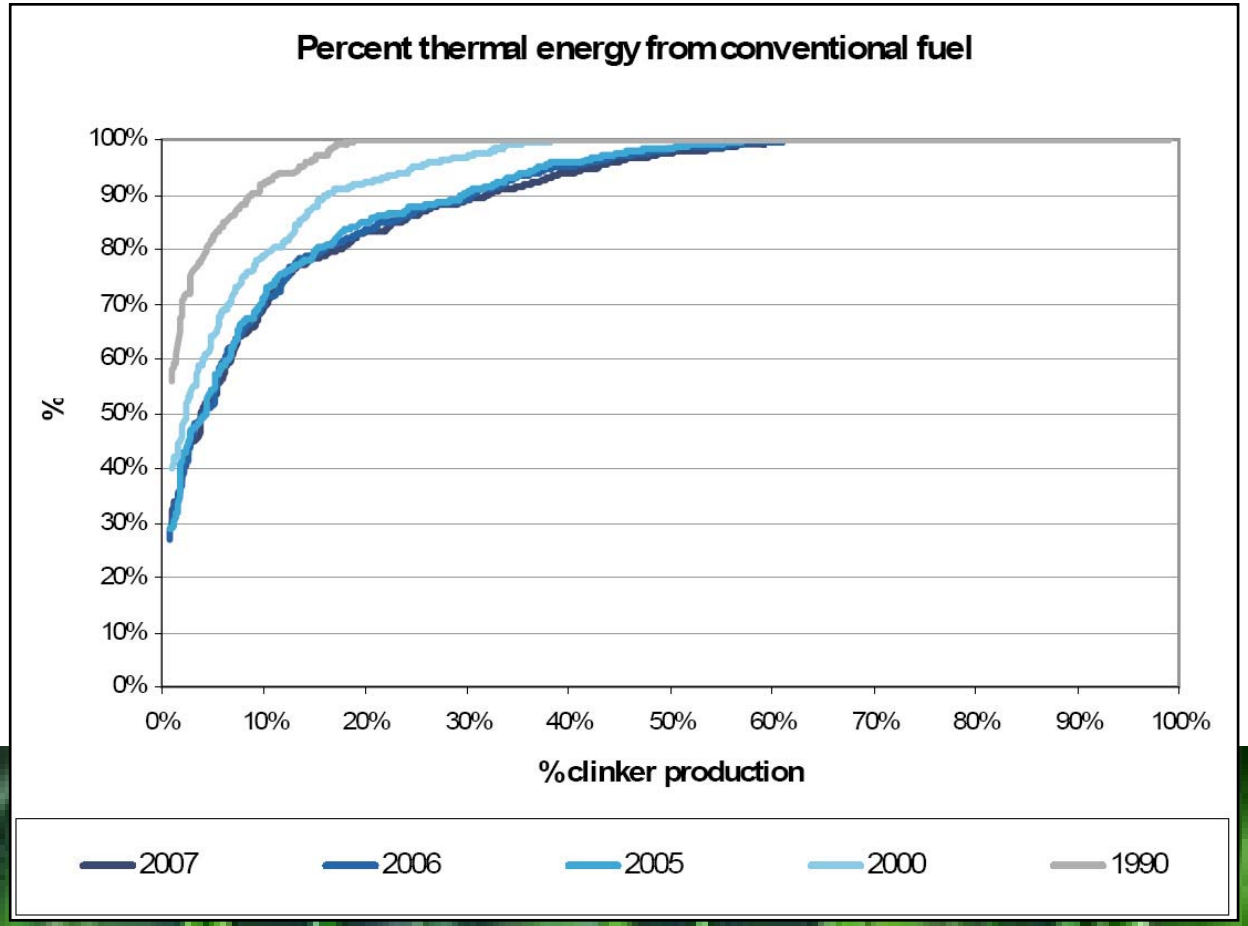
SPANISH RAW MATERIAL RECYCLING IN CEMENT PLANTS



3. BEST ENVIRONMENTAL PRACTICES (BEPs)

3.1. SUSTAINABLE USE OF RESOURCES

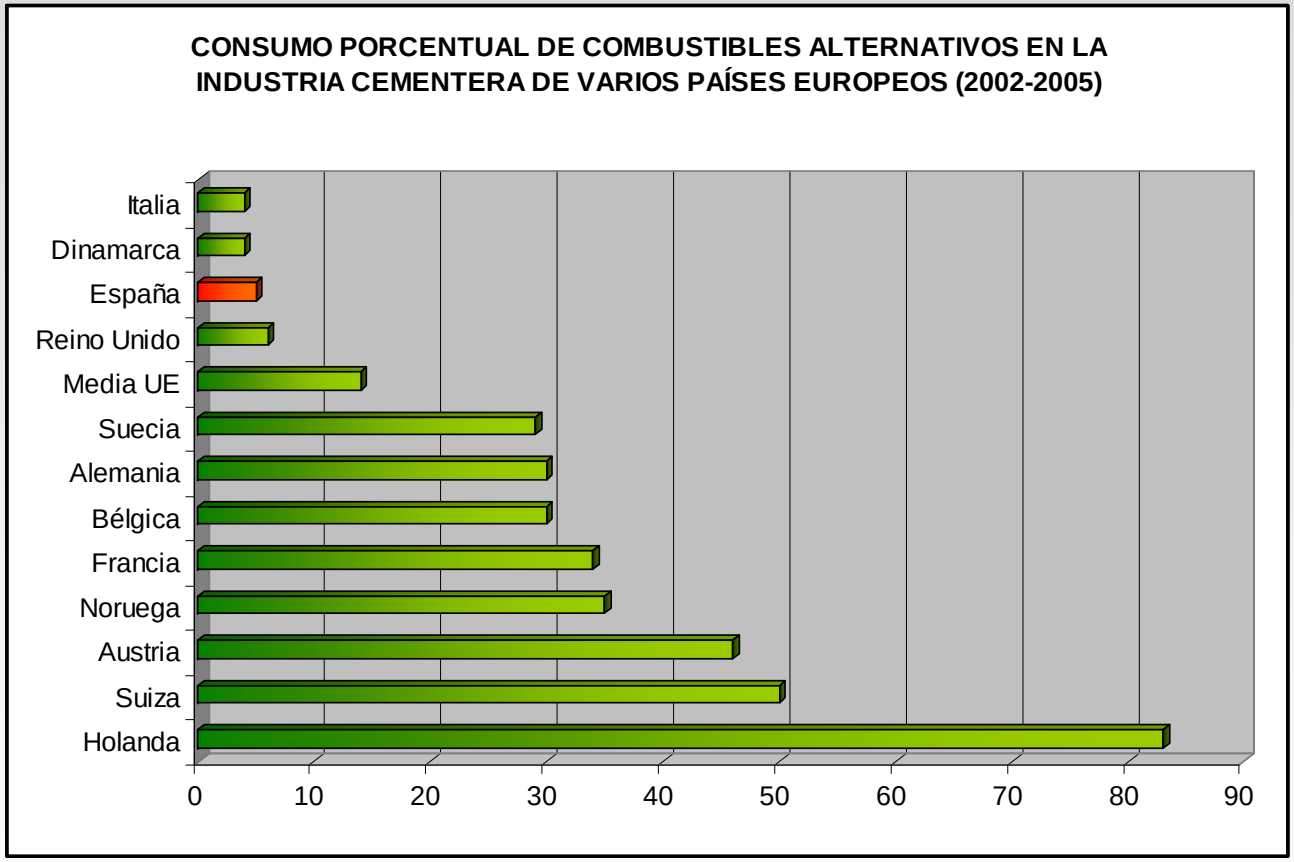
ENERGY VALORISATION WORLDWIDE



3. BEST ENVIRONMENTAL PRACTICES (BEPs)

3.1. SUSTAINABLE USE OF RESOURCES

ENERGY VALORISATION IN EUROPE



3. BEST ENVIRONMENTAL PRACTICES (BEPs)

3.1. SUSTAINABLE USE OF RESOURCES

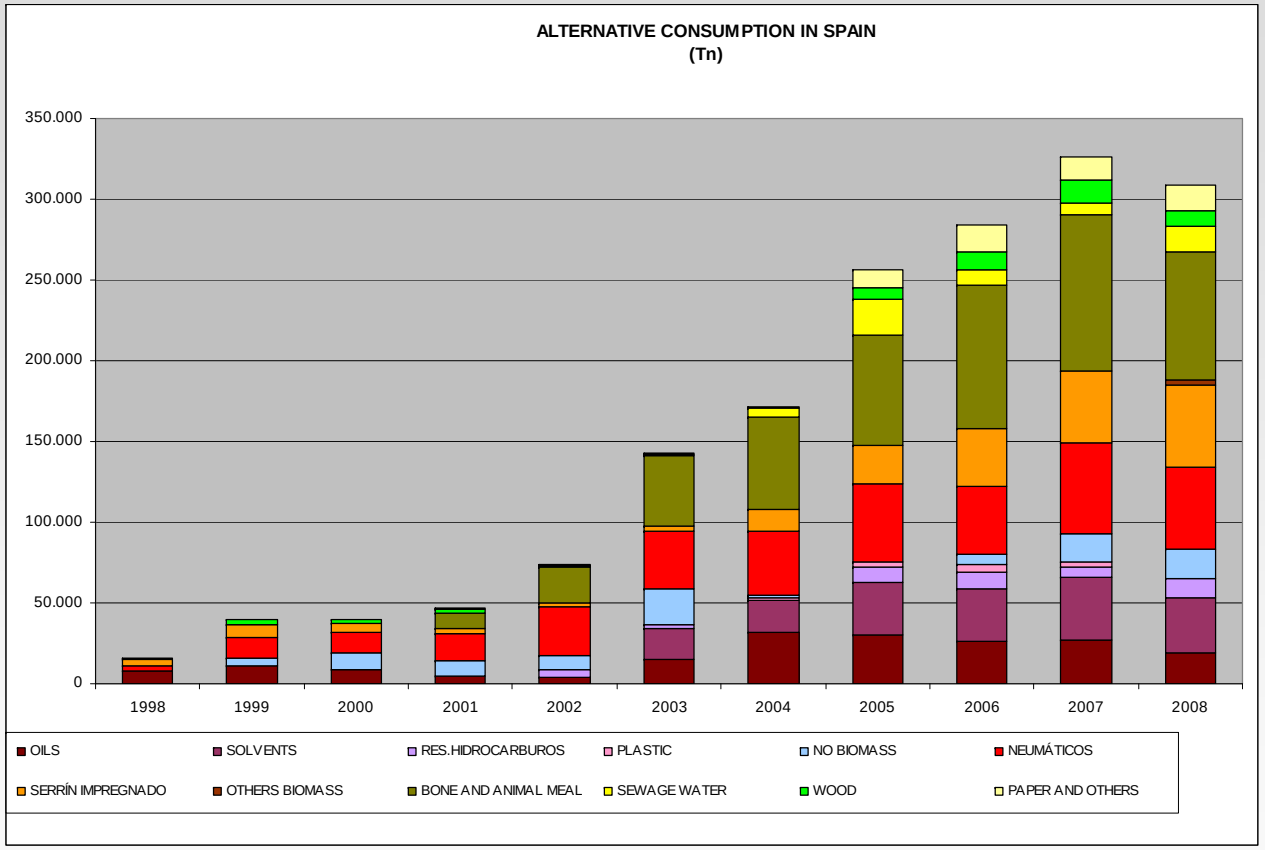
ENERGY VALORISATION IN EUROPE

TREND IN GERMAN UTILIZATION OF WASTES AS ALTERNATIVE FUELS

3. BEST ENVIRONMENTAL PRACTICES (BEPs)

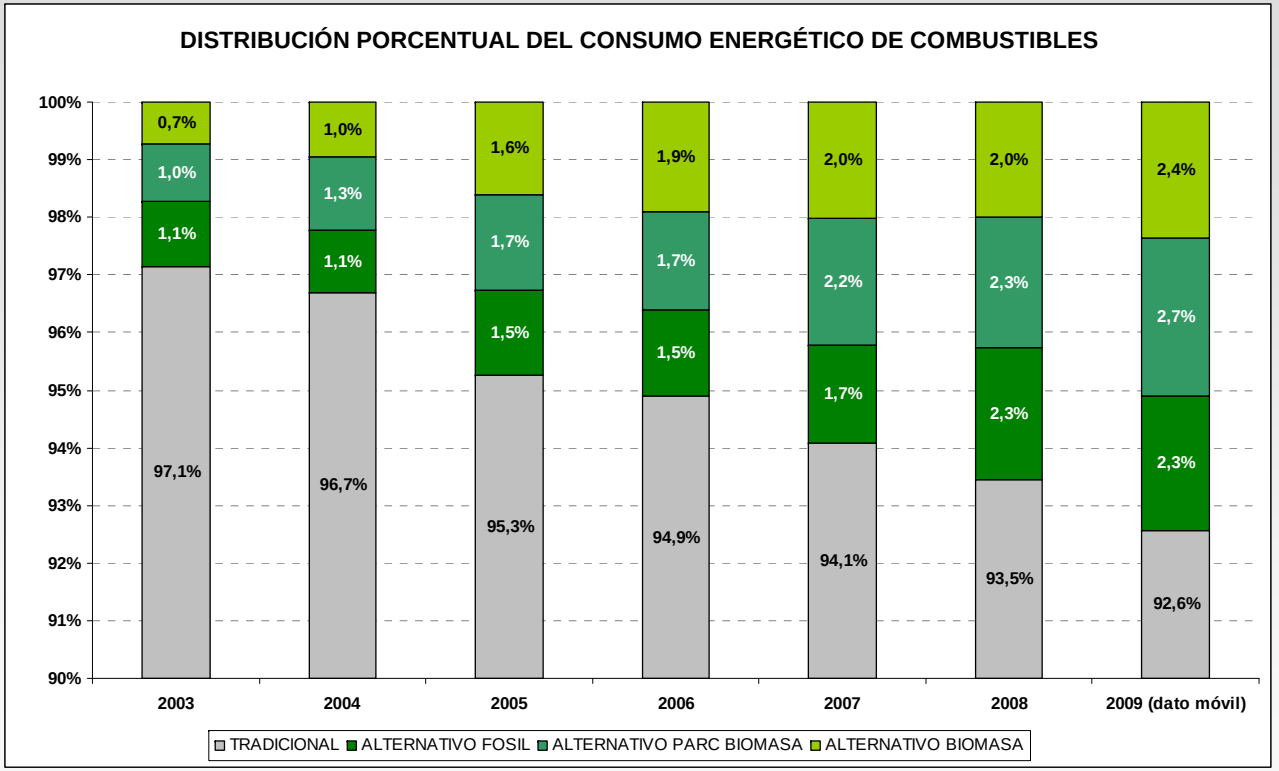
3.1. SUSTAINABLE USE OF RESOURCES

ENERGY VALORISATION IN SPAIN



3. BEST ENVIRONMENTAL PRACTICES (BEPs)

3.1. SUSTAINABLE USE OF RESOURCES



3. BEST ENVIRONMENTAL PRACTICES (BEPs)

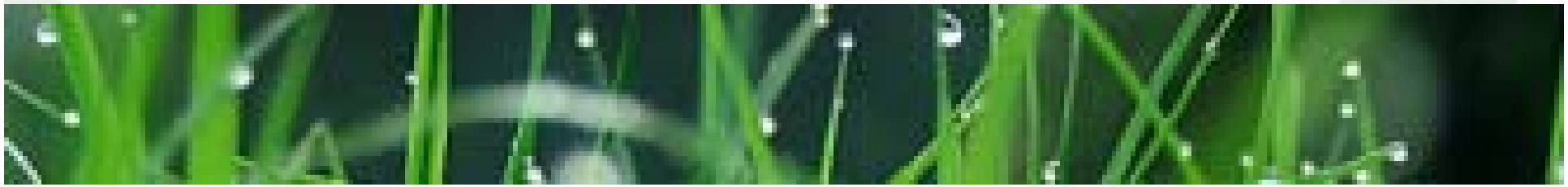
3.1. SUSTAINABLE USE OF RESOURCES

ENERGY VALORISATION IN SPAIN

SPANISH GOAL

REACHING SUBSTITUTION RATIO OF OTHER EUROPEAN COUNTRIES

PRESENT	NEAR FUTURE	LONG TERM
350.000 tonnes	700.000 tonnes	2.000.000 tonnes
9 %	17 %	50 %



3. BEST ENVIROMENTAL PRACTICES (BEPs)

3.2. SECTORIAL AGREEMENTS

- Recycling of the materials from vehicles and domestic appliances

FER SIGRAUTO

- Replacement clinker raw materials normally by black slags from blast furnaces

UNESID
Unión de Empresas Siderúrgicas

- Plastics as fuel in cement plants

cicloplast

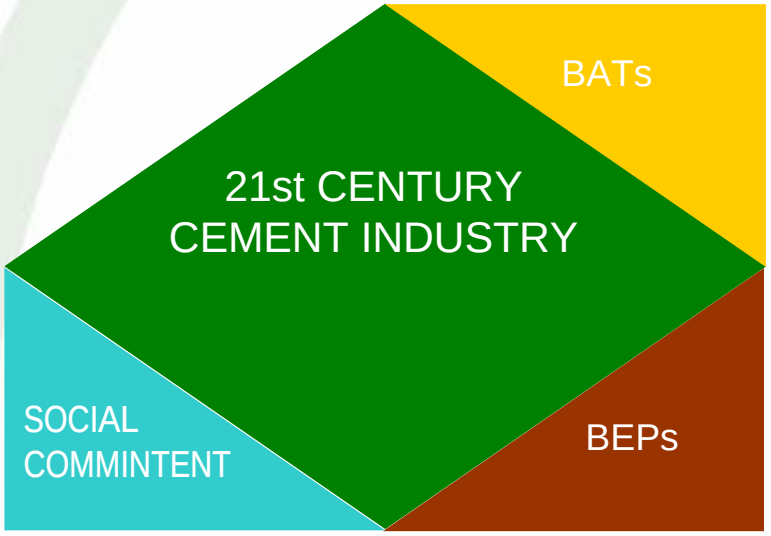
3. BEST ENVIRONMENTAL PRACTICES (BEPs)

3.3. ENVIRONMENTAL MANAGEMENT SYSTEMS

"An environmental management system is a cyclical process of planning, implementation, review and improvement of the procedures and actions carried out by an organization to perform its activities while ensuring achievement of its environmental targets".

ISO 14001	**WORLD WIDE**	**100% OF SPANISH PLANTS**
EMAS	**EUROPEAN UNION**	**25% OF SPANISH PLANTS**

4. SOCIAL COMMITMENT



4.1. Framework agreement with Trade Union

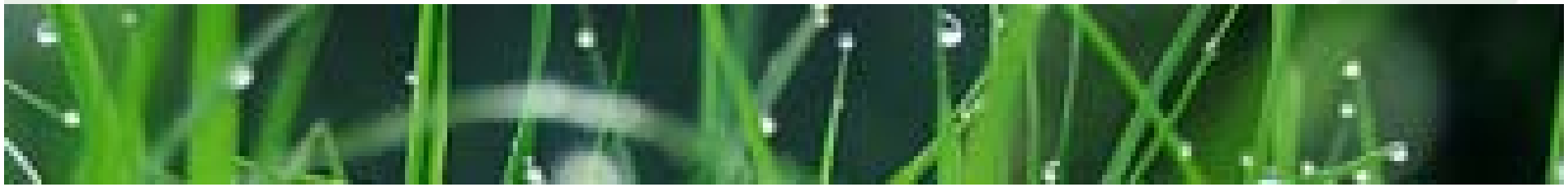
4.2. CEMA Foundation

4.3. Health and safety at work

4.4. Product safety

4.5. Professional training

4.6. Sectorial studies



4. SOCIAL COMMITMENT

4.1. FRAMEWORK AGREEMENT WITH TRADE UNION

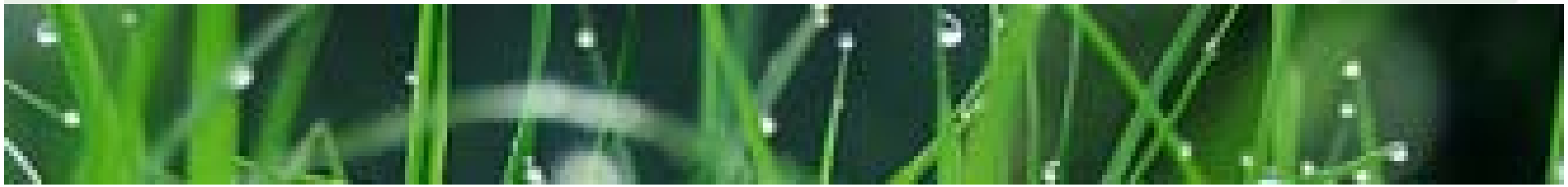
November 2004: “Agreement for promotion energy in the Spanish cement industry"

CAUSE:

- Make compatible economic and social progress with respect to the environment and health and safety of workers
- New legislative framework: IPPC directive and directive envelope emission trading
- Risk of industrial relocation by the requirements arising from the Kyoto Protocol
- Potential the sector in terms of energy recovery as an effective measure in the fight against climate change

RESULTS:

- **Objectives of improving the environmental performance** cement factories
- **Efficiency policy energy and replacement of fossil fuels by alternative**
- Contribution to compliance **the Kyoto Protocol**
- **Prevention of Labor risks**



4. SOCIAL COMMITMENT

4.2. CEMA: LABOUR FOUNDATION OF CEMENT AND ENVIROMENTAL FOUNDATION

Fundación CEMA
Fundación Laboral del Cemento y el Medio Ambiente

oficemen
Agrupación de fabricantes de cemento de España

CCOO
fecoma

UGT MCA
F. de Industria

AIMS

1. Social and economic developing, friendly with enviroment and natural resources
2. Diffusion of health and safety measures of cement industry
3. Research, development and innovation
4. Promotion of professional training

4. SOCIAL COMMITMENT

4.3. HEALTH AND SAFETY AT WORK

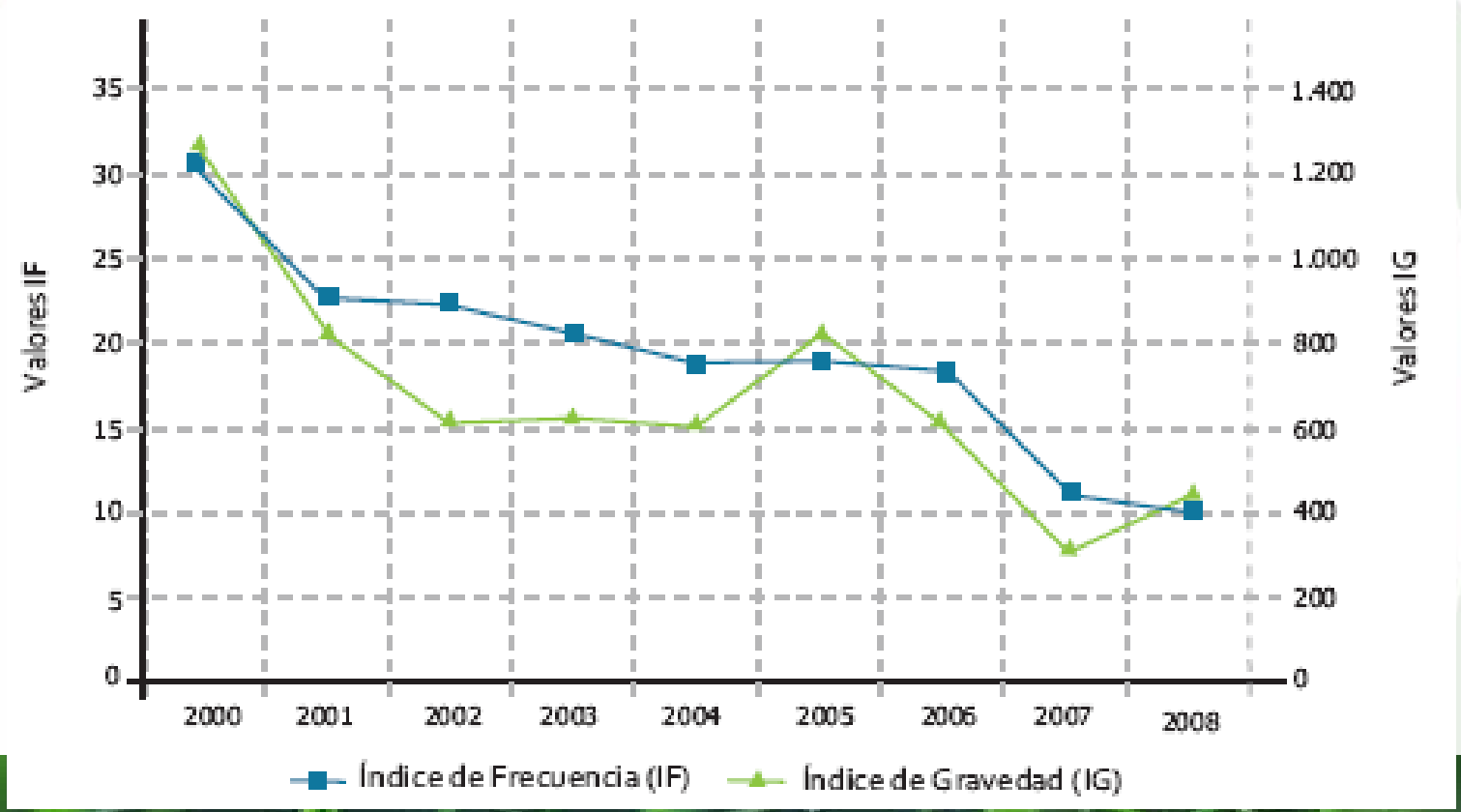
HEALTH AND SAFETY POLICY OF SPANISH CEMENT INDUSTRY

- Procedures based on continuous improvement.
- Safety is an important branch of business management.
- Every accident is avoidable. The aim is reaching “zero” accidents.
- Control systems to verify the fulfillment of safety procedures.

4. SOCIAL COMMITMENT

4.3. HEALTH AND SAFETY AT WORK

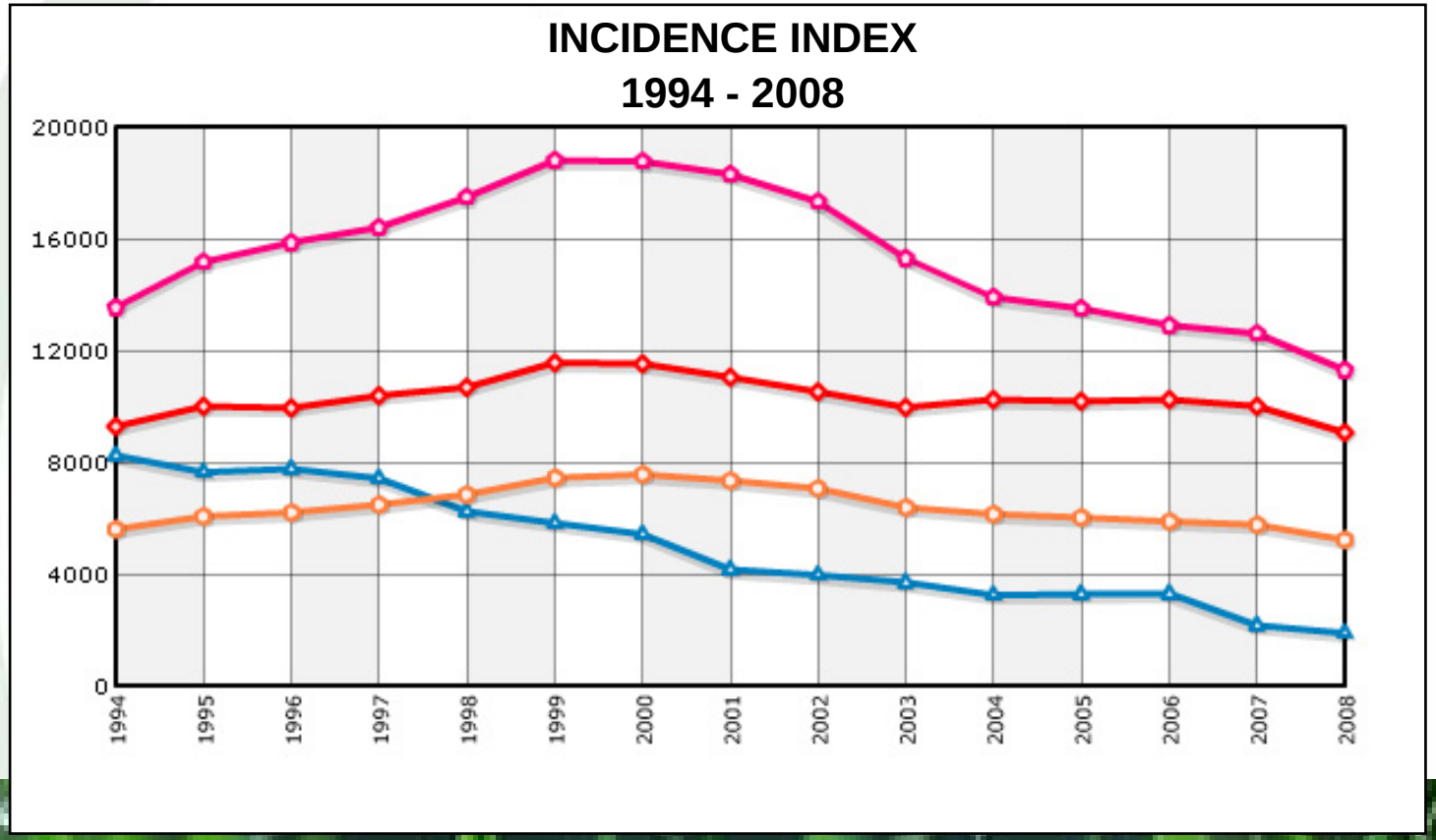
GLOBAL CEMENT INDUSTRY ACHIEVEMENTS



4. SOCIAL COMMITMENT

4.3. HEALTH AND SAFETY AT WORK

SPANISH CEMENT INDUSTRY ACHIEVEMENTS



4. SOCIAL COMMITMENT

4.3. HEALTH AND SAFETY AT WORK

CLINKER AND CEMENT SAFETY CHARACTERISTICS FILE

- ✓ Product identification
- ✓ Hazard determination
- ✓ Information of its components
- ✓ First aid in case of accident
- ✓ Measures against accidental spillings
- ✓ Handling and storing
- ✓ Controls of personal protection
- ✓ Physical and chemical features
- ✓ Toxic information
- ✓ Other information

4. SOCIAL COMMITMENT

4.4. PRODUCT SAFETY

LABELLING

CEMENTO

(Superficie mínima del cuadro de la X debe ser un 10% del cuadro de la etiqueta)

Xi irritante

Nombre de la empresa:

XXXXXXXX

Dirección:

XXXXXXXX

Teléfono de contacto:

9999999999

IDENTIFICACÓN DE LOS PELIGROS

- R36/37/38 Irrita los ojos y las vías respiratorias
- R43 Posibilidad de sensibilización en contacto con la piel.

CONSEJOS DE PRUDENCIA

- S2 Manténgase fuera del alcance de los niños
- S22 No respirar el polvo
- S24/25 Evítese el contacto con los ojos y la piel
- S26 En caso de contacto con los ojos, lávense inmediata y abundantemente con agua y acúdase a un médico
- S36/37/39 Úsense indumentaria y guantes adecuados y protección para los ojos/cara
- S46 En caso de ingestión, acúdase inmediatamente al médico y muéstrele la etiqueta o el envase.

OTRAS INFORMACIONES:

El cemento contiene, cuando es necesario, reductor de Cr (VI), lo que determina un contenido de Cr (VI) soluble en agua inferior a 0,0002 %, verificado según la norma UNE EN 196-10:2008 para garantizar el cumplimiento de la Directiva Euro-pea 2003/53/CE transpuesta en la OM PRE/1954/2004 .

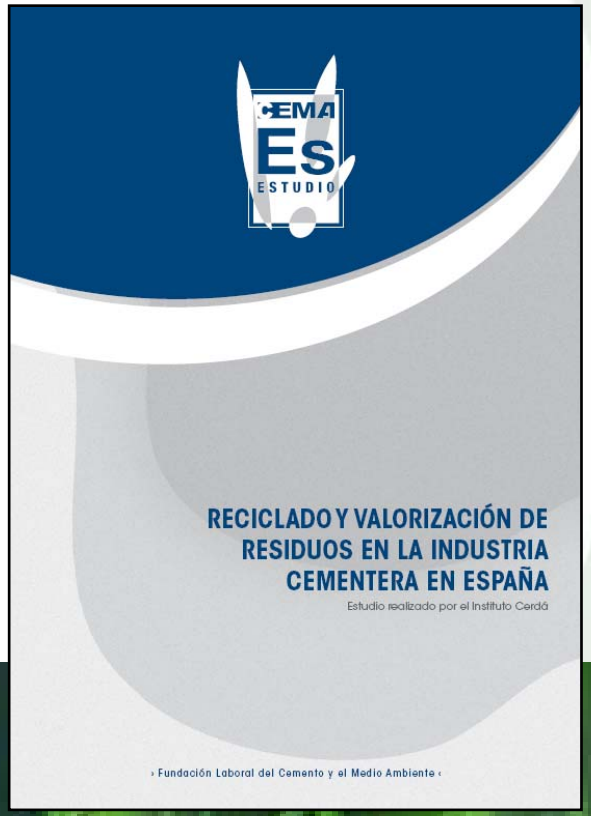
"El contacto del cemento húmedo, el hormigón o el mortero fresco con la piel, puede causar irritación, dermatitis o quemaduras"

4. SOCIAL COMMITMENT

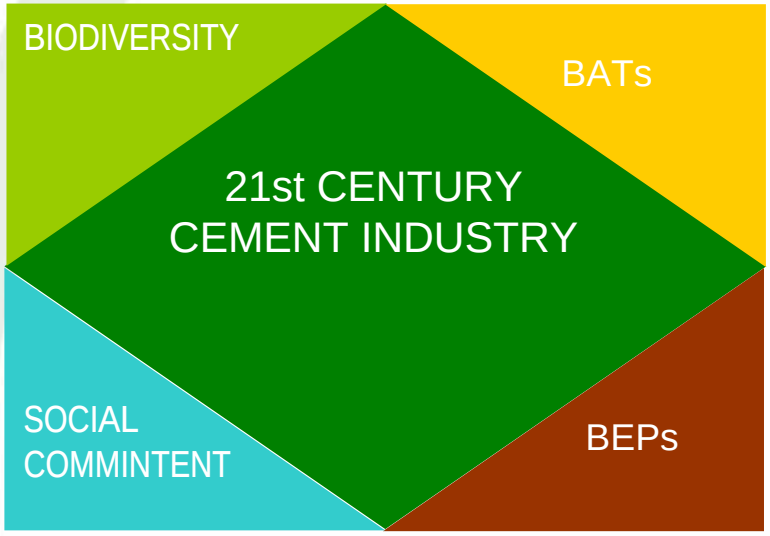
4.6. SECTORIAL STUDIES

DIOXINS AND FURANS

RECYCLING AND VALORISATION OF INDUSTRIAL WASTES IN CEMENT PLANTS



5. BIODIVERSITY IN QUARRIED LAND



5.1. Holistic systems for biodiversity management

5.2. Restoration of quarried land

5.3. Programmes to promote biodiversity

5. BIODIVERSITY IN QUARRIED LAND

5.1. HOLISTIC SYSTEMS FOR BIODIVERSITY MANAGEMENT

SPECIFIC METHODOLOGY

EVALUATION TOOLS

BIODIVERSITY INDEX

PROGRAMMES TO BOOST LOCAL SPECIES OF PLANTS AND ANIMALS

5. BIODIVERSITY IN QUARRIED LAND

5.1. HOLISTIC SYSTEMS FOR BIODIVERSITY MANAGEMENT

FALCO PROJECT BY OFICEMEN: FALCON RESETTLING IN ABANDONED QUARRIES

5. BIODIVERSITY IN QUARRIED LAND

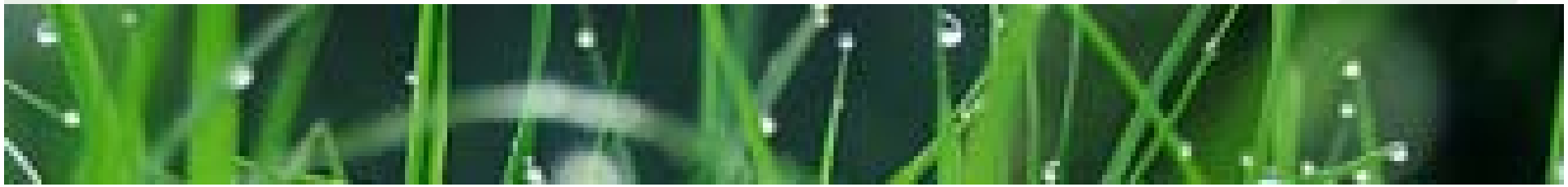
5.2. Restoration of quarried land

- **Recovery natural environment:**
  - **Treatment of slopes.**
  - **Landscape integration.**
  - **Transplantation of cork oaks.**

Cantera de Los Arenales
Mijas

Córdoba

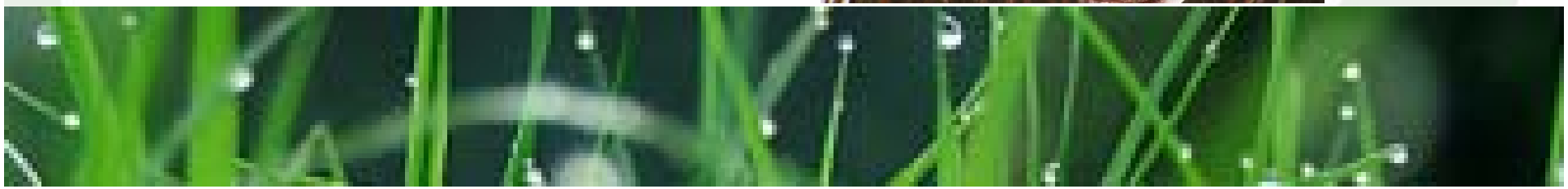
Espiel



5. BIODIVERSITY IN QUARRIED LAND

5.3. Programmes to promote biodiversity

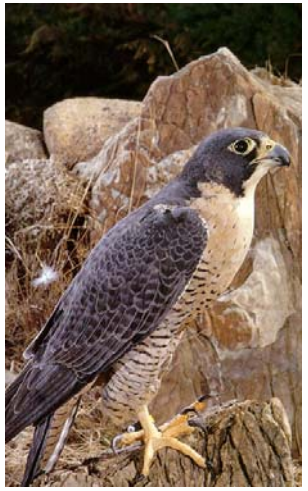
- **Recreation of Humedal**
  - **Recovery of ecosystems in regression.**
  - **Refuge for Bird migratory.**
  - **Observatories of birds.**



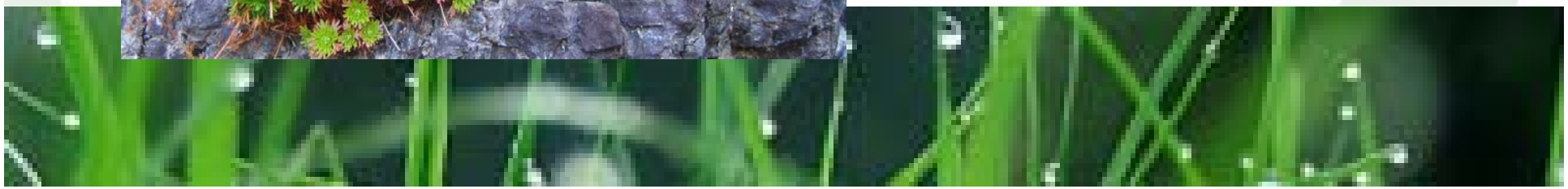
5. BIODIVERSITY IN QUARRIED LAND

5.3. Programmes to promote biodiversity

- **Rocky slopes:**
  - **Natural revegetation.**
  - **Original copses attract birds which disperse seeds.**
  - **High biodiversity of flora and fauna.**



✓ Necessary for the conservation of raptors and rupícola flora..



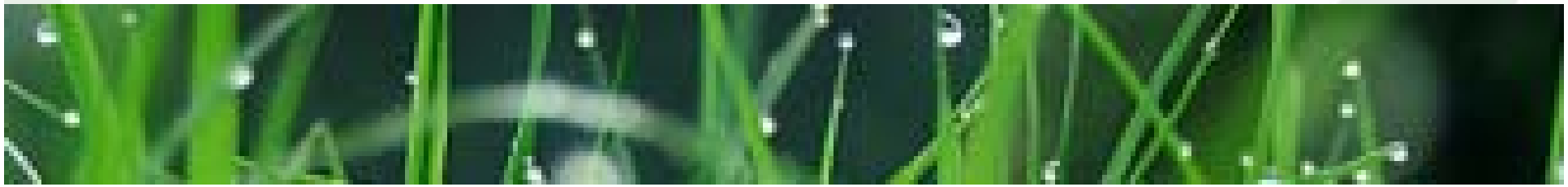
5. BIODIVERSITY IN QUARRIED LAND

5.3. Programmes to promote biodiversity

Cement plant of Lafarge in Villaluenga de la Sagra (Toledo)

BOOSTING BIODIVERSITY BY MEANS OF BEES

Native species recovery

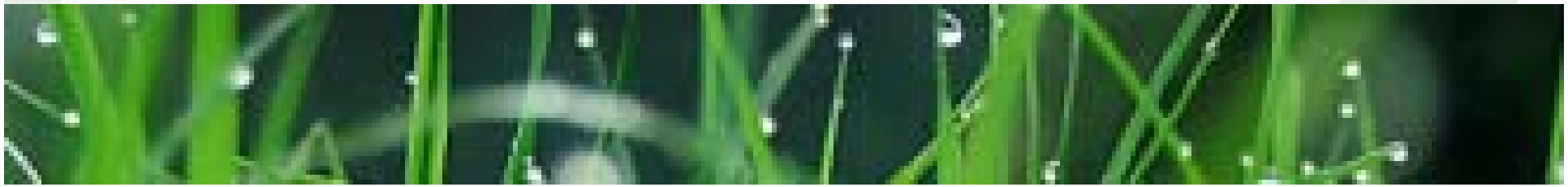


5. BIODIVERSITY IN QUARRIED LAND

5.3. Programmes to promote biodiversity

QUARRIES RESTORATION TO PROMOTE BIODIVERSITY

Orange trees in Alicante



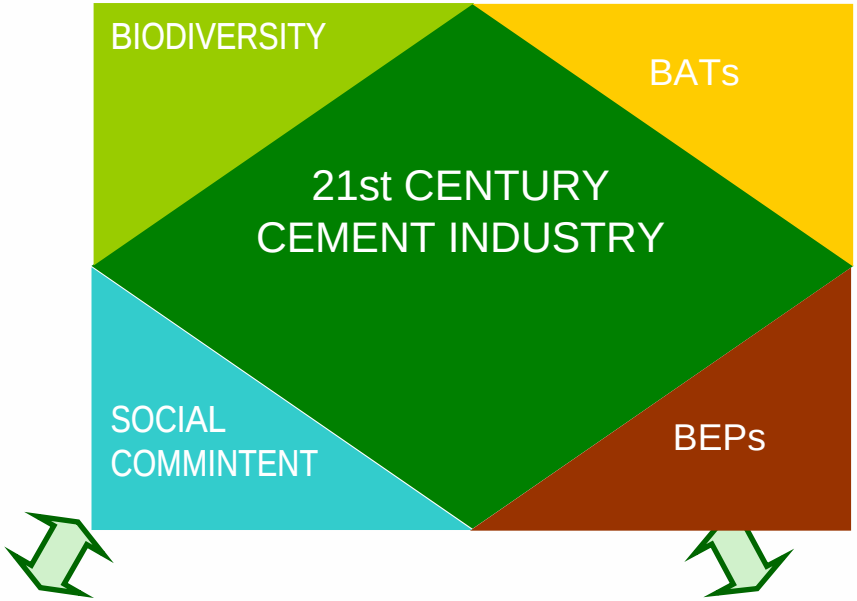
5. BIODIVERSITY IN QUARRIED LAND

5.3. Programmes to promote biodiversity

QUARRIES RESTORATION TO PROMOTE BIODIVERSITY

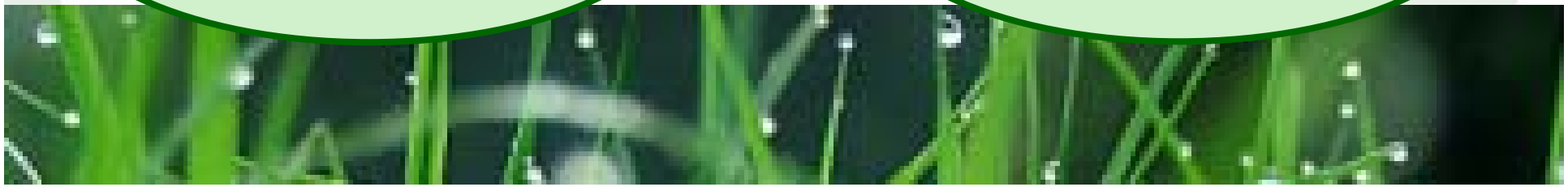
Local flowers in Yepes

6. CONCLUSIONS



Enable cement producer to manufacture a competitive product in a cost effective and sustainable manner

Optimise the value of the product for cement customer



THANKS FOR YOUR ATTENTION!

Pedro Mora Peris