# 6th CEWEP Congress

## 6 – 7 September 2012

Würzburg

Fuels from waste

SRF development

ERFO

# ERFO

- European Recovered Fuel Organisation
- A non profit association
- Purpose
  - Represent European companies which produce fuels prepared from non-hazardous waste
  - Promote the use of such recovered fuels within the frame of sustainable development
  - Help establish high quality standards for such fuels at European level
- Members from: BE, NL, DE, ES, FR, UK, IT, FI, IE, SW

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# ERFO'S INVOLVEMENT

- SRF standardisation work within CEN / TC 343
- Participation in R&D programs
  - Pre-normative research on sampling, sample preparation and determination of biomass content
  - QUOVADIS : validation of Technical Specifications, Quality Management system and perspectives in new EU countries
- Participation in debates, works and lobbying activities related to SRF
- Main contribution to the SRF chapter of the BREF Waste Treatment and preparing already a contribution for the BREF WT review

# CEN WORKS

# To situate SRF (Solid Recovered Fuel)

| | | | | |
|---|---|---|---|---|
| **Category of substitution fuel** | **Solid Bio-fuels** | **Solid Recovered Fuel (SRF)** | **Hazardous waste fuels** | **Specific fuels** |
| **Waste for this preparation** | **Non treated wood** | **I&CW and MSW** | **Hazardous waste : solvents, waste oil, soiled packaging…** | **Animal meal, tyres , …** |

Solid Recovered Fuel (SRF) is, a "solid fuel prepared from non-hazardous waste to be utilised for energy recovery in incineration or co-incineration plants, and meeting the classification and the specification requirements laid down in EN15359

The wording **SRF** has only to be used in this context

The specific characteristic of SRF= proof of the compliance with classification and specification requirements

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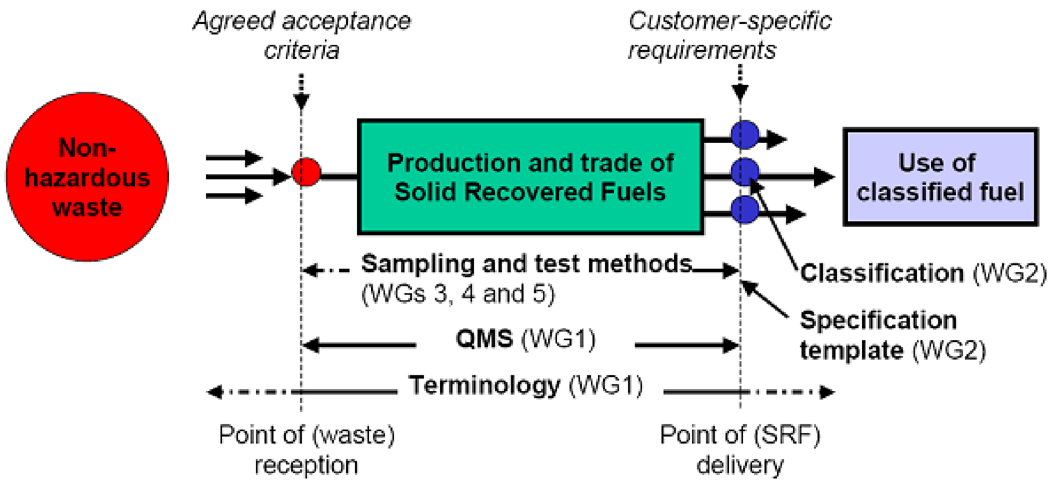
# The standard ! ?

- The efforts of CEN delivered rather a clear framework than a set of specifications
  - Detailed procedures for sampling, analysis and physical tests
  - Classification SRF according to key properties NCV, Hg, Cl
  - A framework, with broad interval's, for classifying SRF
  - Upgrade TS's into EN's



# The requirements of EN15359

- ➔ SRF shall be classified and specified in accordance with the schemes of EN15359
- ➔ SRF shall meet the quality requirements according to the compliance rules of EN15359
- ➔ Within EN15359 another 13 referenced documents are indispensable for its application (example : sampling, analysis, …)
- ➔ Proof of accordance with the classification scheme in 12 month period
- ➔ A producer shall give a declaration of conformity
- ➔ A QMS must be applied
- ➔ Statistical evaluation of the results of analyses

# Classification of SRF

| Classification characteristic | Statistical measure | Unit | Classes | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| Net calorific value (NCV) | Mean | MJ/kg (ar) | ≥ 25 | ≥ 20 | ≥ 15 | ≥ 10 | ≥ 3 |

| Classification characteristic | Statistical measure | Unit | Classes | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| Chlorine (Cl) | Mean | % (d) | ≤ 0,2 | ≤ 0,6 | ≤ 1,0 | ≤ 1,5 | ≤ 3 |

| Classification characteristic | Statistical measure | Unit | Classes | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 |
| Mercury (Hg) | Median<br>80th percentile | mg/MJ (ar)<br>mg/MJ (ar) | ≤ 0,02<br>≤ 0,04 | ≤ 0,03<br>≤ 0,06 | ≤ 0,08<br>≤ 0,16 | ≤ 0,15<br>≤ 0,30 | ≤ 0,50<br>≤ 1,00 |

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# Specifications : what and why?

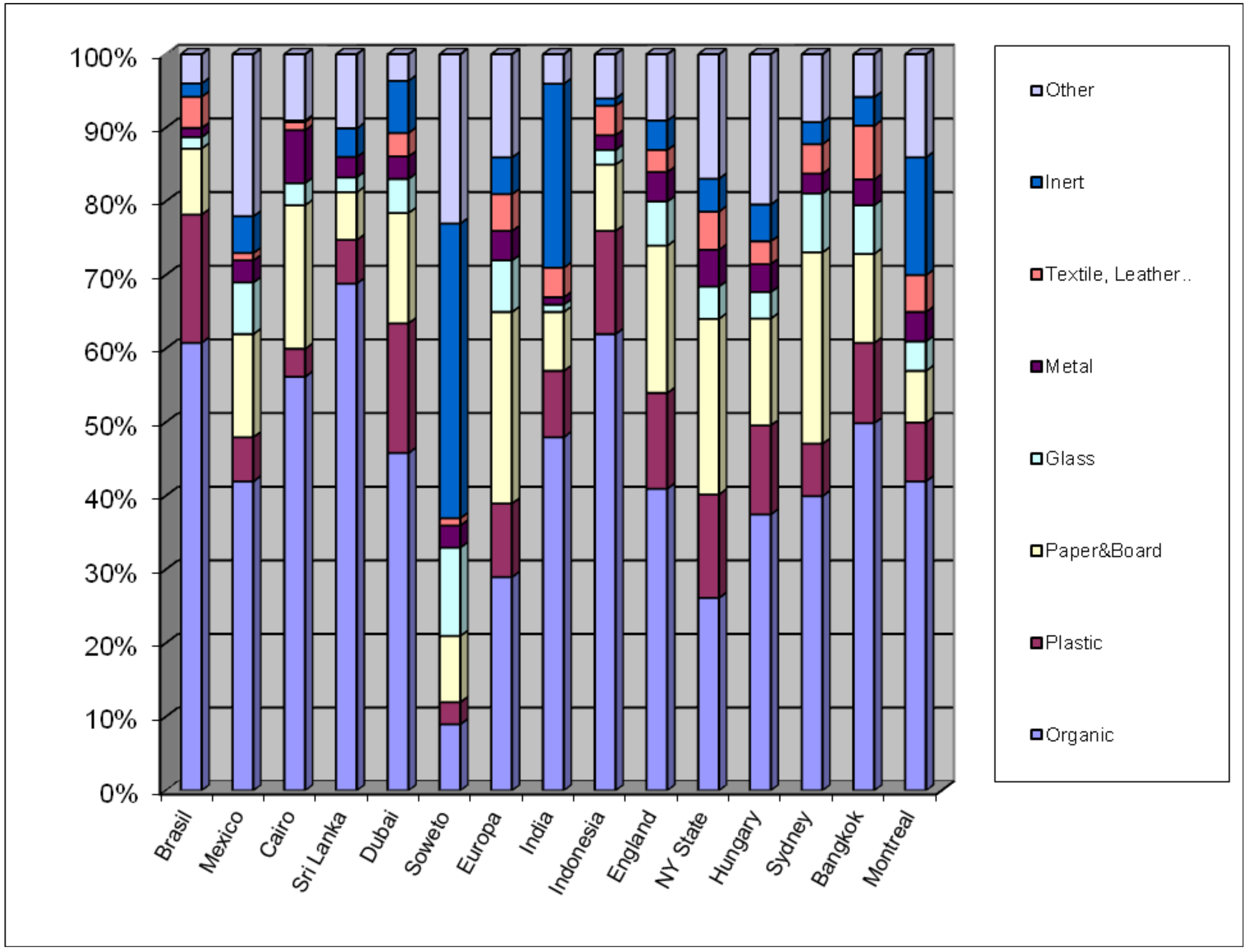
- Class and origin (obligatory)
- Composition
- Physical parameters (obligatory: ash, moisture, particle form and size, calorific value)
- Chemical parameters (obligatory: chlorine and main heavy metals)
- Biomass content

In order to

- ✓ achieve a quality approach of alternative fuels
- ✓ win confidence and trust for buyers and authorities
- ✓ have accountable CO2 reductions

# Market items

# Background: waste composition




- Worldwide
  - Waste composition differs
  - Common : high biogenic content
- Europe
  - Banning of some fractions from landfill
  - Increased trans-boundary shipments to energy plants

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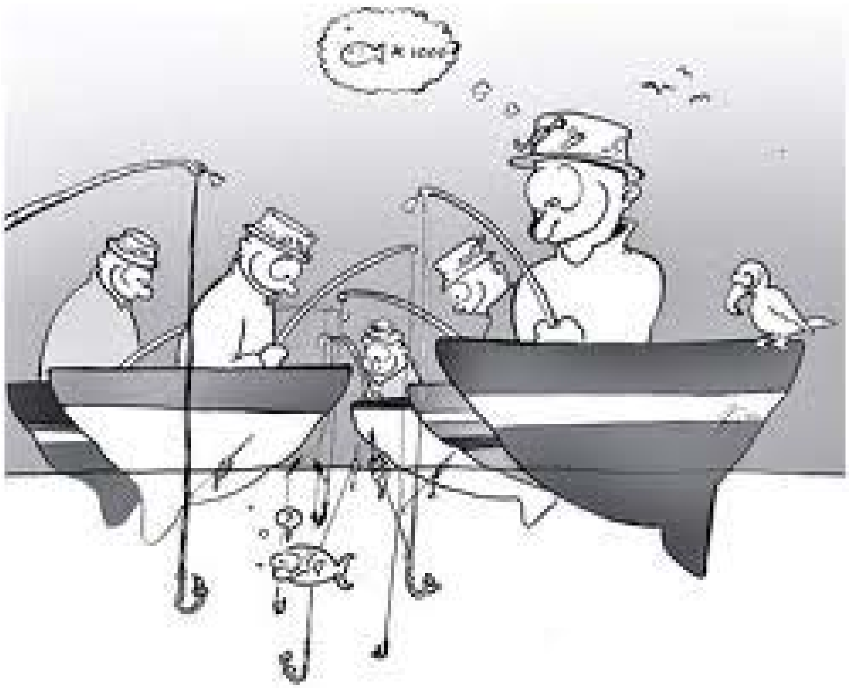
# Market



- Are CEWEP and ERFO – members really fishing from the same pond??
- Do they have common interests?
- Are there points of disagreement?

# Challenges due to changing waste policy prioritising waste reduction and recycling

- Common
  - Claim the thermal treatment of the burnable residuals after recycling
  - Impact on combustion behaviour, emissions, ash …
  - Transborder shipments
  - Communication on energy recovery
  - Strict and consistent implementation of the Landfill Directive with respect towards timing and milestones to be reached by all MS in conformity with individual objectives fixed in the Directive
  - Increase of efficiency of thermal processes (i.e. CHP, heating and cooling)

Market available for both, but mutual influence

- Capacity / overcapacity
- Pricing level : long term < > spot market

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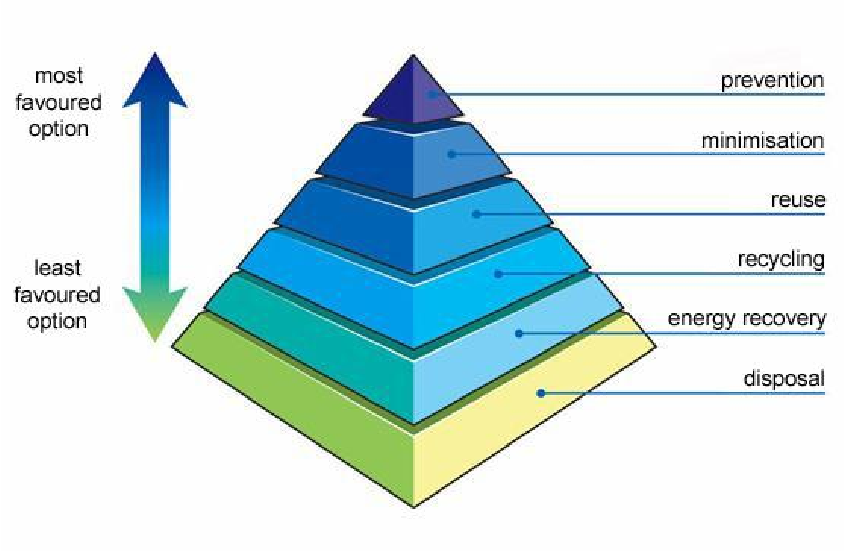
# SRF market seen from the waste side

- Less disposal, more recycling
  - Landfill Directive
  - Waste Framework Directive



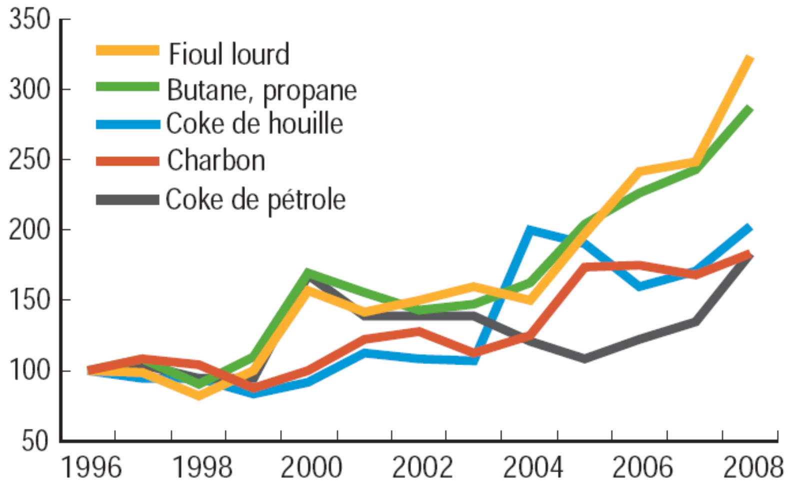

- Reduction of the emissions of greenhouse gases
  - Reduction of land-filling biodegradable fractions
  - Positive contribution the 20/20/20 objectives

# SRF in relation with energy

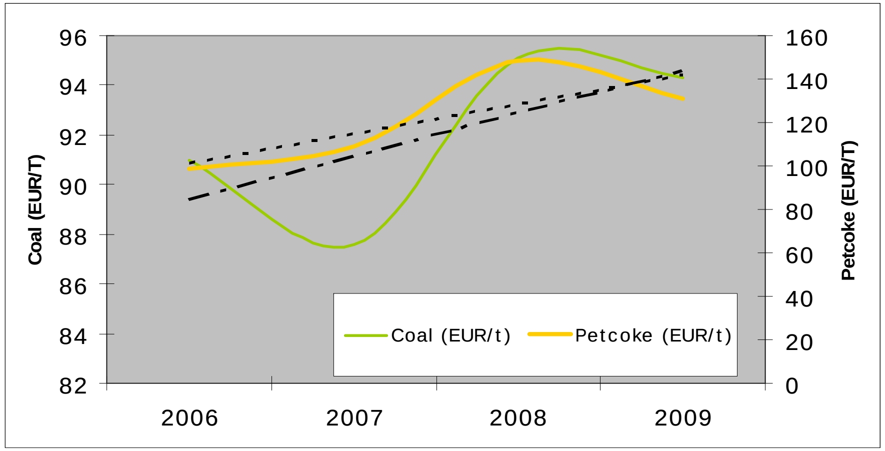
- Rise of the impact of the energy cost in industrial production
- Heavy price variations
- General trend : increasing prices

Average price of combustibles used in industry

Indices, base 100 en 1996




Champ : industrie manufacturière hors IAA.
*Source : Insee - EACEI.*




Fase out of nuclear power ➔ price increase per kilowatt hour. Could be 20% (private consumer)
Lot of uncertainties : fossil fuel price, emissions allowance and CO2 value, acceptance by citizens

# Potential, Quantities, Percentages

- The most mentioned secondary fuel potential is a total amount of 70 Mt in EU 27; coming from municipal, industrial , and demolition & construction sources and including plastics, paper, cardboard, textiles, wood, high calorific fraction from MBT
- About 12 Mt was energy recovered or 17%, fluctuating between 2 and 35%
- Even regional differences, within a member state, can be observed
- The processing took place in energy intensive industries; like cement, paper, metal, power plants and chemical industries
- Best in class are : Denmark, Germany, Netherlands, Sweden
- The countries with lower rates are : Bulgaria, Greece, Romania,

- Source : Prognos, EU Atlas Secondary Raw Materials, Eurostat

# Historical drivers to development of secondary fuels

- Not every country had the same drivers and the same history
  - D : Landfill ban and resource strategy (TASI, KrW/AbfG), Energy crisis and energy price development, necessity to substitute expensive fossil fuels (1995)
  - UK : political choice, difficulties to obtain a permit for a EfW, landfill taxes
  - I : legislation allowing a product status (withdrawn)
  - B : demand of cement plants (1997)
  - SP : political choice, demand of cement plants, difficulties on the promotion of incineration
- Common economic factors
  - Price of primary fuels (petroleum coke included)
  - Availability or lack of alternatives at a certain moment :

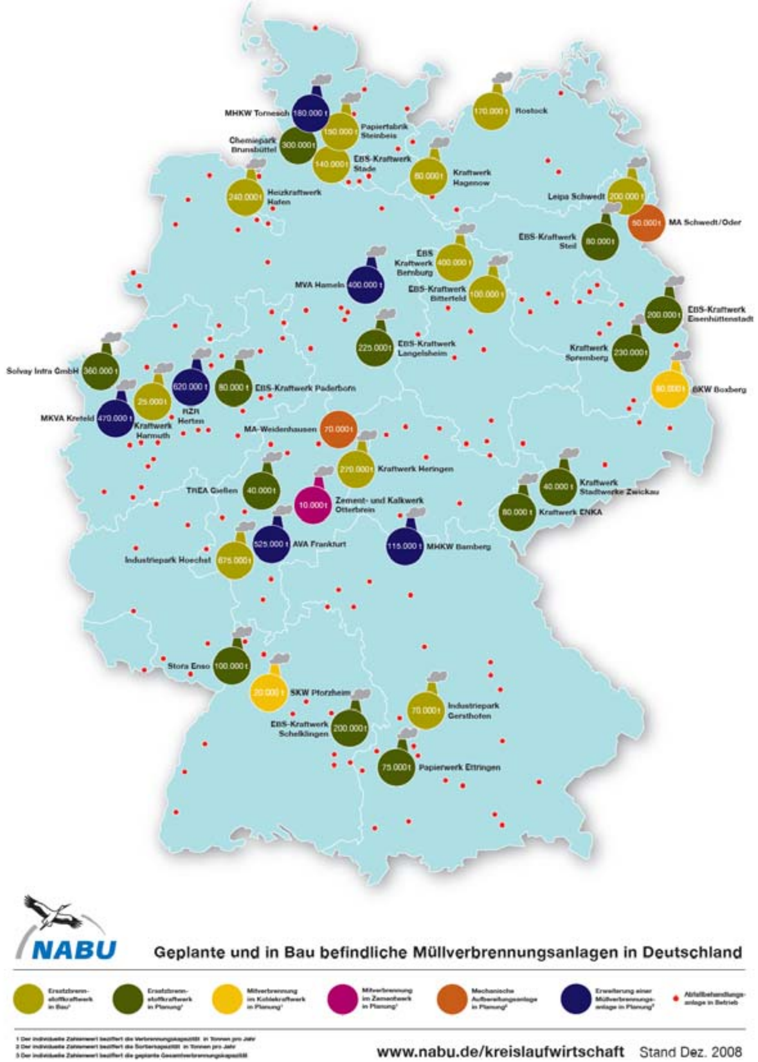
  tyres, meat & bone meal, hazardous waste…..

# Germany

- Important contribution to the expansion and the maturation of this treatment way

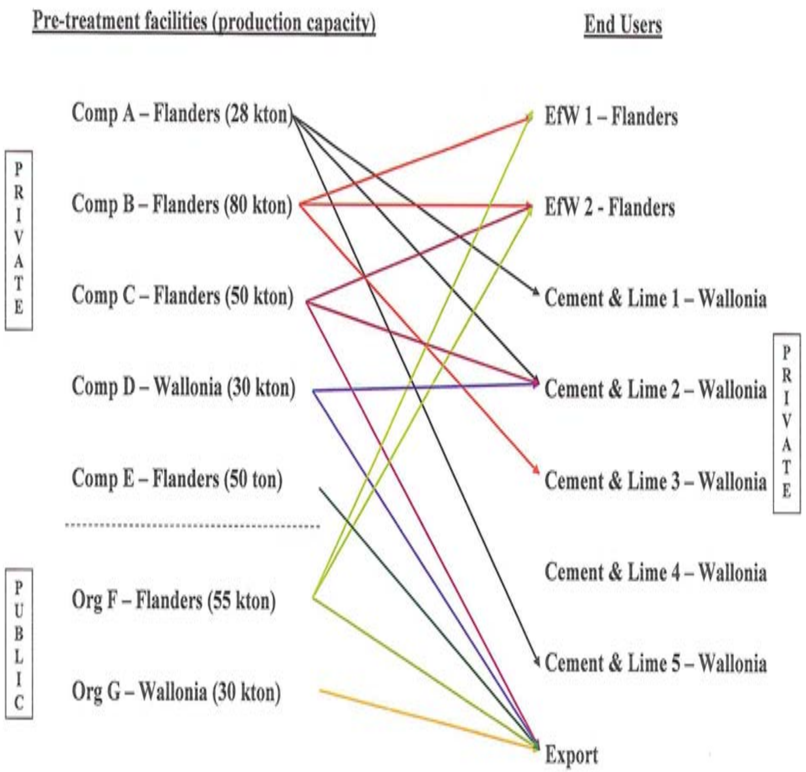
- Influence of the energy market and the necessity of increased efficiencies on the waste market has been underestimated
  - planning of MSWI-capacities ! ?
  - overcapacities of MSWI ! !

- Increasing competition between all types of installations for energetic valorisation: MSWI, dedicated incinerators, co-incineration
  - Spot market price of new and existing MSWI is limiting the production of SRF
  - Often positive prices




Source : Prognos, *Der Abfallmarkt in Deutschland und Perspektiven bis 2020*, 2009

# Typical Belgium




- Typical capacity = 40 kt per treatment line
- Multi-outlet in function of the produced quality
- Public and privat organisations active in production

- Classic end users
  - Cement plants
  - Lime plants
  - EfW installation
  - Export

# Northern Europe

- The overcapacity in certain countries in Northern Europe is compensated by imports from neighbouring countries; like Norway was and United Kingdom still is
  - Resolution not expected soon as Sweden is still building new capacities (for district heating !!)
  - Overcapacity in Sweden could reach 2 Mton in a few years
  - Need to consider other types of waste or materials
- New players : Estonia and Lithuania
- Focus on Poland : flowing slides

# France

- Moderate increase of SRF production (200 kT/y)
  - Use other substitution fuels
  - Low willingness to pay co-incinerators
  - Priority given by the public bodies to the organic valorisation of MSW
  - Gradual increase of the environmental taxes don't lead to a drastic switch in the way of treatment wastes, although MBT is winning in importance.
  - No big SRF – plants.
  - Price close to 0 EUR/t

# Spain

- Gradual increase of SRF production

- Cement industry is the most important / only destination for SRF in Spain.
  - 31 of the 36 cement plants of the Spanish cement association had in 2010 permits for the use of alternative fuels (including SRF) with a consumption of 608.000t. (342 kT SRF and end of life tyres)

- The “Instituto para la Sostenibilidad de los residuos” estimates the potential SRF consumption in Spain is 5 Mt. This quantity includes cement industries, and other industrial sectors.

- The Renewable Energy Plan 2011-2020, approved at the end of 2011, includes as objectives of renewable energy from SRF in 2020, 113 GWh electric energy and 350 Ktep thermal energy.

# Focus on Poland

A few examples for SRF-production :

II. REMONDIS, Dąbrowa Górnicza
Cap : 120 kt/a input

I. Sita Starol & Radom
Cap : 230 kt input/a & ca. 70 kt SRF/a

# What was achieved in Poland ?

***Polish cement industry***

- **12 cement plants in Poland , 20 cement kilns**

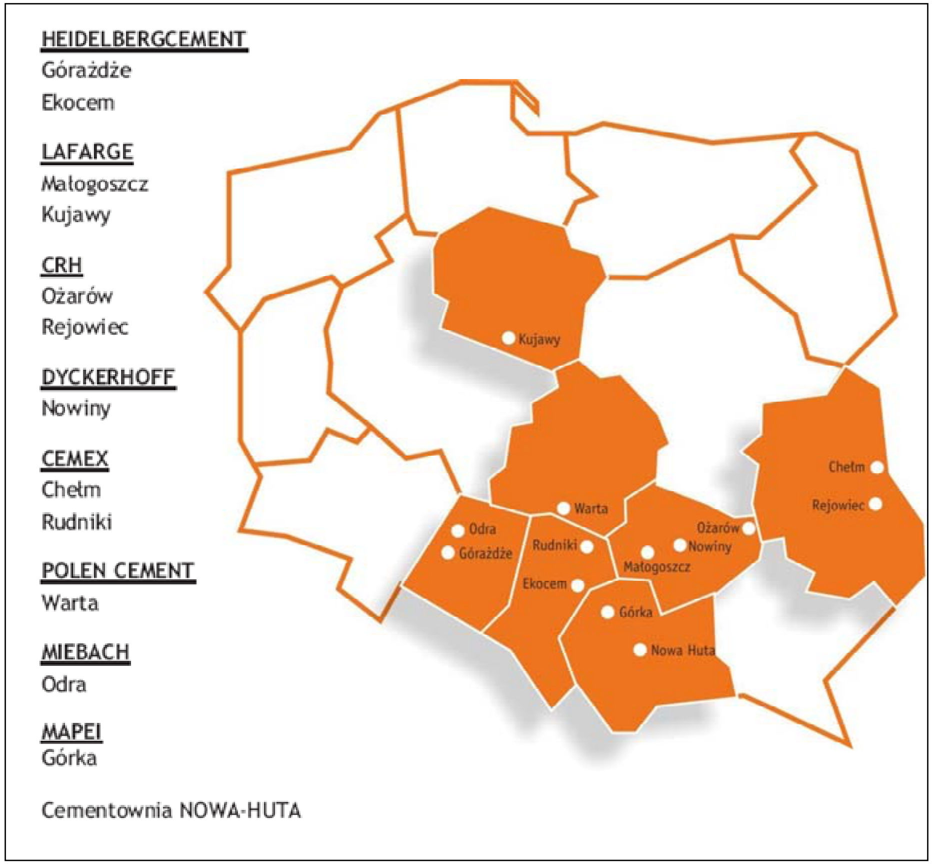
  production capacity = 20 Mtons/y

  production in 2010 = 15,5 Mtons/y
- **Investments realized since 1990** = 1,500 M€
- **Conclusions :** Polish cement plants have big

  production capacities, modern production

  tools and which invested a lot in co-processing

  alternative fuels




***End users in Poland***

- End users are mainly **cement industry**
- Co-processing of alternative fuels in 2010 was 900 K tons
- **District heating networks** (very popular) : not yet
- **Energy consuming industries** (paper mills, etc) : not yet

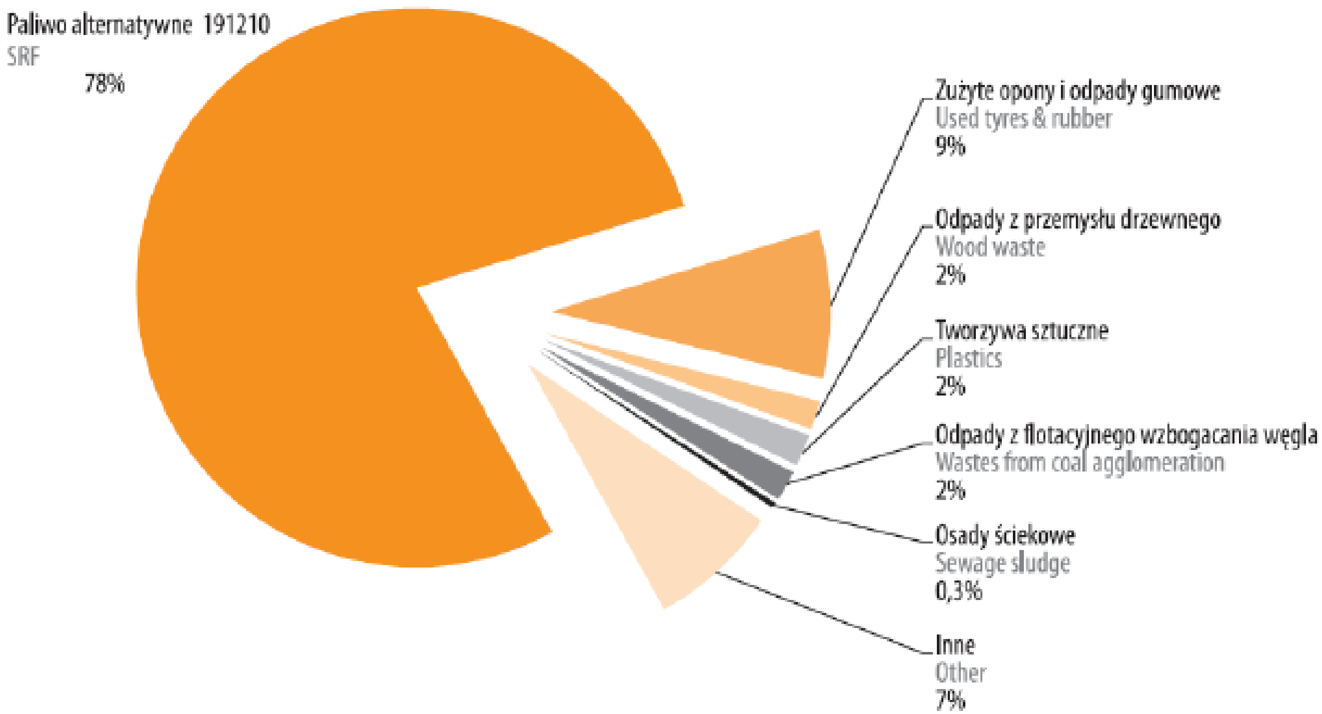
Source : Sita Polska

# What was achieved in Poland ?

| *Type of fuels* | | *Tons X 1.000* |
|---|---|---|
| Coal | | 864 |
| Fuel from waste, including: | | 752 |
| | Alternative fuel 191210 | 589 |
| | Used tyres & rubber | 65 |
| | Plastic | 14 |
| | Wood waste | 12 |
| | Waste from coal agglomeration | 13 |
| | Sewage sludge | 2 |
| | Others | 57 |

## *Type of fuels burned in cement kilns in 2009*

### *Composition in % of all kinds of fuels from wastes in 2009*




Source : Sita Polska

# Expected trends in Poland

- ***Energy substitution rates***
- In 2010 average energy substitution rate of fossil fuels by alternative fuels in Poland = 45% (coming from zero in 2000)
- Expected average energy substitution rate in 2013 = 70%
- Next challenge : lower the $CO_2$/t of clinker

- ***Prices of alternative fuels*** -> will increase…. **Why ?**
- **Increased demand** : cement industry will increase demand for alternative fuels due to $CO_2$ constraints and because prices of fossil fuels (coal, pet coke, gas,…) will increase as well
- **Deficit of alternative fuels in Poland** (demand superior or equal to offer)

  This deficit may increase in 2012-2013 when Germany and other countries will reduce their export of alternative fuels to Poland

Source : Sita Polska

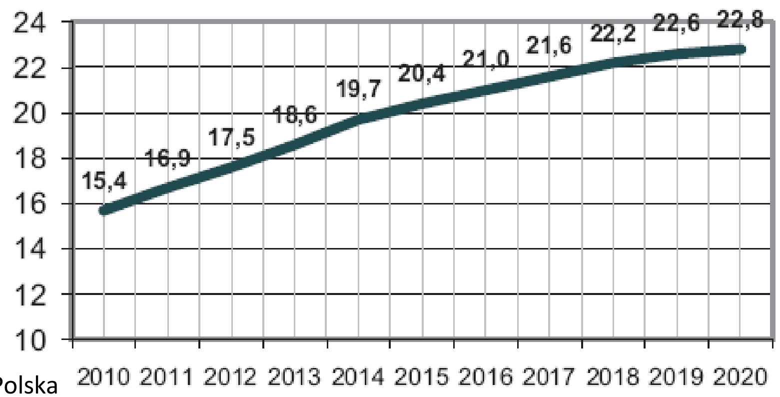
# Expected trends in Poland

- **Expected new alternative fuel consumers**

Industries and urban heating networks will start burning alternative fuels after 2013

- **Expected increase of cement production in Poland**

Demand for alternative fuels will increase, as cement production will increase from 16,0 Mtons in 2011 to 20,4 in 2015 and 22,8 Mtons in 2020




Source : Sita Polska

# Worldwide cement

| Worldwide Energy Mix (in %) | Heidelberg | Lafarge | Holcim | Cemex |
|---|---|---|---|---|
| Coal | 64,3 | 45,1 | 63 | 25,3 |
| Pet coke | 8,2 | 19,4 | 18 | 45 |
| Natural gas | 4,9 | 16,7 | 6 | 0,6 |
| Fuel oil | 2,1 | 7,2 | 1 | 8,8 |
| Alternative fuels | **16** | **7,6** | **9** | **15,7** |
| Biomass | **4,5** | **4** | **3** | **4,6** |

| Alternative fuels (in %) | Heidelberg | Lafarge | Holcim | Cemex |
|---|---|---|---|---|
| Solid waste | 22,7 | 33,07 | | 61 |
| Tyres | 16,1 | 19,71 | | 16 |
| Liquid waste | 8,6 | 22,09 | | |
| MBM | 7,1 | | | 4 |
| Agri waste & wood | 6,6 | | | 14 |
| Biomass | 5,1 | 25,13 | | 5 |
| Other | 33,8 | | | |

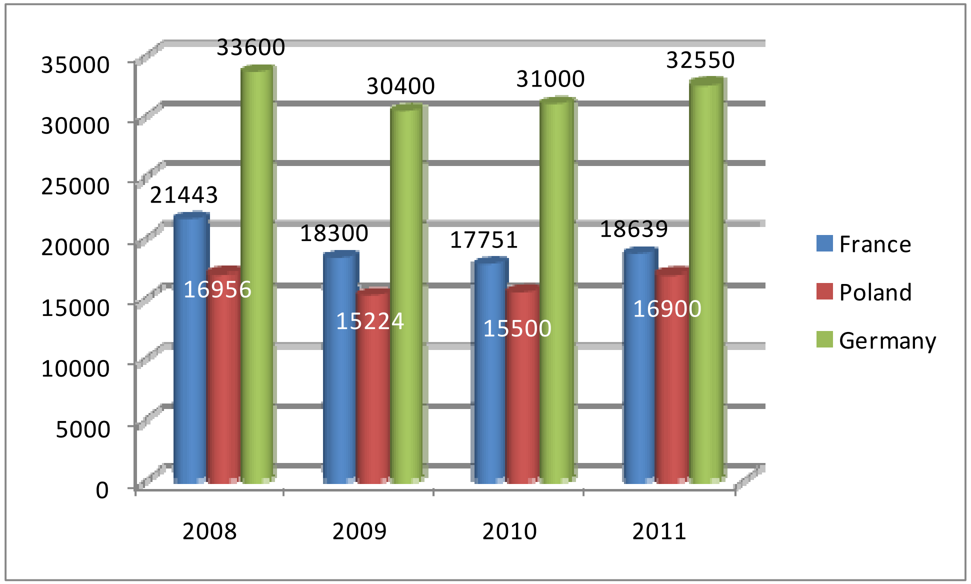
| | Heidelberg | Lafarge | Holcim | Cemex |
|---|---|---|---|---|
| Ambition | alt.fuels rate at 30% and biomass fuels rate at 9% in 2020 | use 50% of non-fossil fuels by 2020 | | alt. fuels rate target at 35% by 2015 |

Source : annual reports & sustainability reports

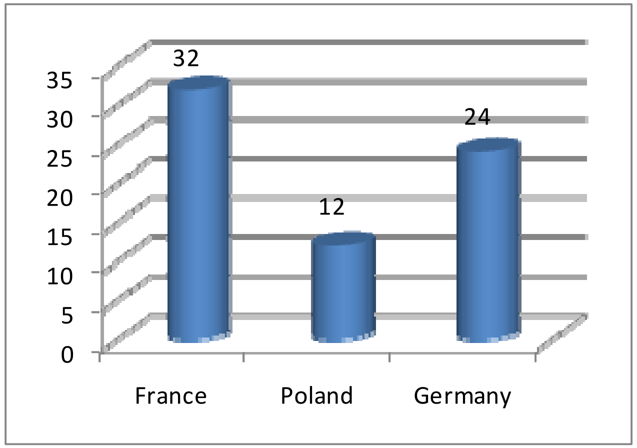
# Local specificity – Po, Fr, D

Not all countries have an equal cement industry
Not all cement kilns are the same
Not all need the same SRF quality

*Production of cement in K tons/year*




*Number of cement plants*




All need secondary fuels

Source : Sita Polska

# Developments

# Developments at the output side

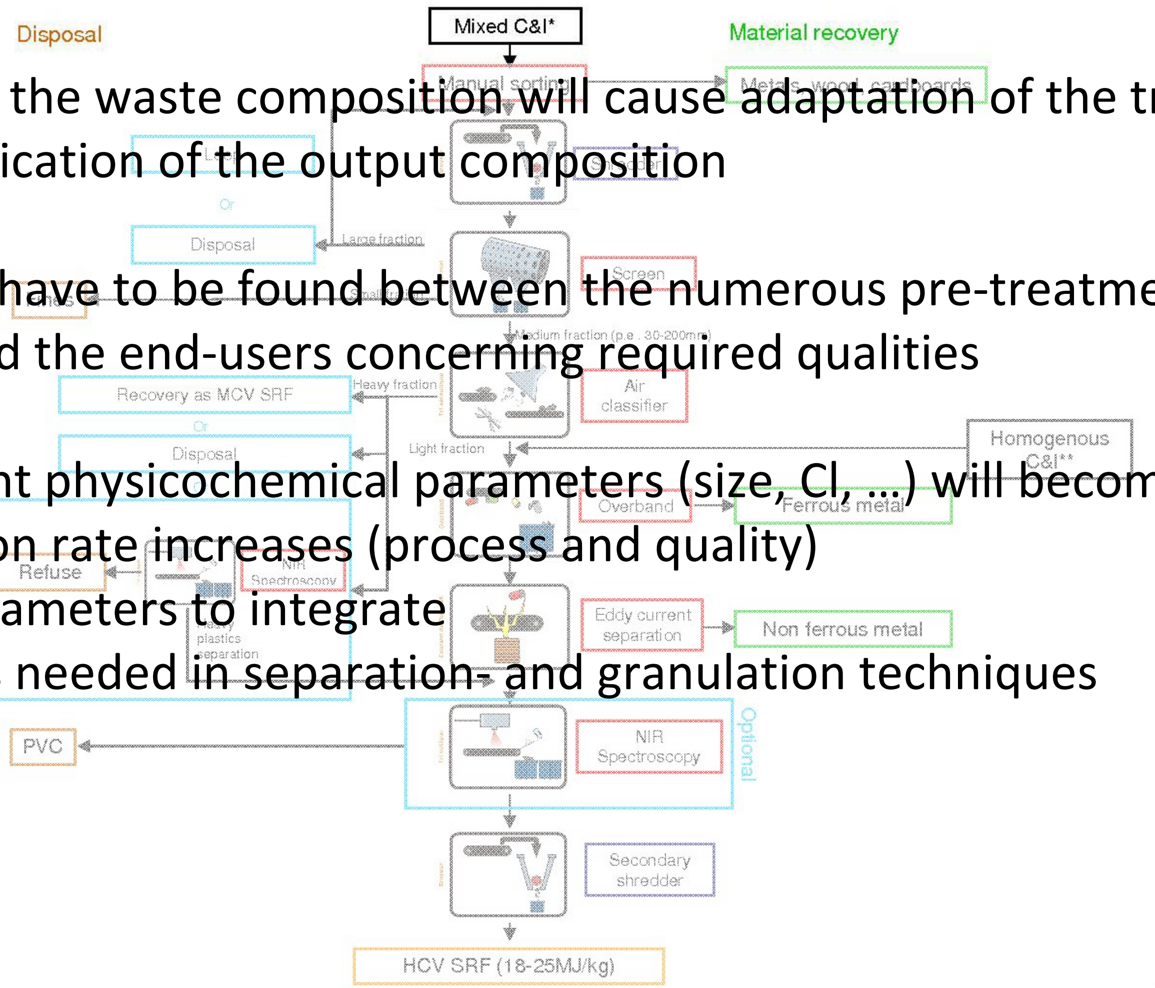
- Big power plants are looking for high quality SRF with a constant composition. The availability of high quality SRF (with low Cl-values) shall increase their consumption.
- High quality SRF can be delivered by SRF-preparation plants if they use well selected waste inputs and if their operational devices are high tech (NIR,…)
- Cement industry promotes the development of SRF to ensure quantities of their alternative fuels.
- Alternative fuels enable cement kilns to "significantly" reduce their fuel costs

# What about traceability?

- ERFO promotes the trans-border exchange of SRF by using the TFS "green list" for certain qualities of SRF
  - Gives freedom to circulate
  - Maintains a high degree of traceability and waste flow accounting
  - Guaranties a treatment in conformity with the regulations

- Prevents
  - Burning in installations without an adequate flue gas cleaning system
  - Risk of unwanted disposal, certainly in case of negative prices

# Progress necessary




- Modification the waste composition will cause adaptation of the treatment tools or modification of the output composition

- Agreements have to be found between the numerous pre-treatment companies and the end-users concerning required qualities

- The important physicochemical parameters (size, Cl, …) will become critical if the substitution rate increases (process and quality)
  - New parameters to integrate
  - Progress needed in separation- and granulation techniques

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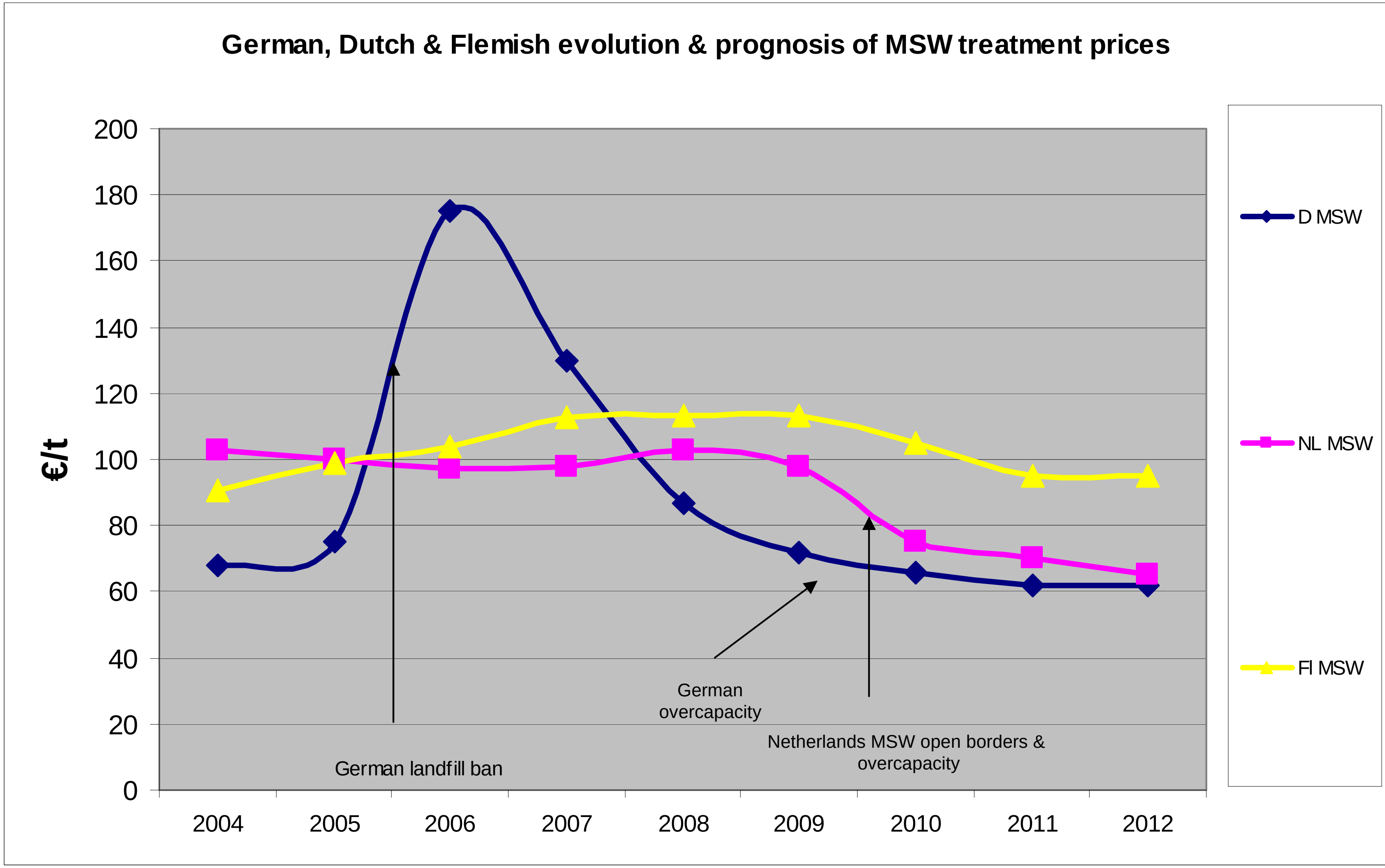
# Influence of local legislation & politics



# Influences on SRF

- Last years the EfW gate fees crashed
- SRF – platforms were increasingly by-passed and some were mothballed
- If the EfW gate fee is taken as the reference (spot market) the economics become questionable
- SRF pre-treatment cost can rise to 50 – 70 €/t < > EfW gate fee
- Ways out : pre-treatment plant optimisation, quality improvement, synergies between pre-treatment and final users
- Need for a transparent reflection about the energy and $CO_2$-value with regard to the pricing system for SRF

➢ *We, CEWEP and ERFO, are both better served with a normal price level !*

# Conclusions

- A sector with potential, under the following conditions
  - A more balanced economy between pre-treatment facilities and co-incinerators, leading to positive prices. SRFs calorific and biogenic content has to be valorised
  - Avoid overcapacities of thermal treatment facilities (EfW + MBT/Co-incineration), especially in the NMS
  - Maintaining a regulatory framework as waste, coupled with an enrolment of some SRF on the Green List.
  - Positive development of energy prices and $CO_2$-credit-cost
  - High standards of preparation to ensure health and safety
  - Technological progress to explore high substitution rates

# To end

- Sources :
  - FNADE, *Combustibles Solides de Récupération (CSR), Les enjeux de la filière, les travaux et positions de la FNADE*, 2010
  - FNADE – ADEME, *Caractérisation des combustibles solides de récupération*, 2010
  - ADEME - AJI-Europe, *Etat de l'art de la valorisation énergétique des déchets non dangereux en cimenteries*, 2009

- Questions ?

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