6.3.9.1 AFR Classification

Purpose

The classification of fuels has to consider two different purposes and thus two different points of view. The distinction according to the LafargeHolcim AFR business view / LHARP standardization is represented by the following four categories:

- Traditional raw materials
- Alternative raw materials
- Traditional fuels
- Alternative fuels

The 4 categories are required for proper accounting of LafargeHolcim's activities related to pre-processing and co-processing.

In order to account for the CO_2 emissions, a second classification is needed that distinguishes fossil fuels from biomass fuels. The fossil fuels must be segregated into traditional fossil fuels like coal or fuel oil, and alternative fossil fuels like waste oil, used solvents or engineered fuel derived from municipal solid waste, while biomass is always regarded as alternative fuel.

The distinction fossil/biomass is an additional criterion and does not replace the distinction of the traditional/alternative classification.

Definition Traditional / Alternative Materials

Traditional materials are gained from mining activities and primary refinement like mineral processing or oil refining comprising e.g. all kinds of coal or oil but also petcoke which is the final distillation residue from crude oil. A common characteristic of traditional materials is that they have to be mined or purchased from primary supplying industries.

Alternative materials were originally produced for any different purpose and already finalized their first service life, became obsolete before getting into service, or do not fulfill any standard or market requirement preventing sale into the designated service life. Depending on the need to dispose of these materials and on local legal definitions, these materials may also be defined as waste.

AFRs are derived from waste streams, either non-hazardous or hazardous, and are used to substitute traditional fuels and raw materials for energy and / or material recovery. All AFRs are inputs to the clinker production. Materials entering the process at a later stage are not considered AFR (e.g. artificial gypsum used in cement grinding), but Mineral Components (MIC) (Alternative Raw Material only if used as a raw material in the kiln process). Fuels that are used for drying purposes are accounted for separately and are distinguished the same way.

Definition Fossil (Traditional) / Biomass Fuels

Fossil fuels are defined by the International Panel for Climate Changes (IPCC) and the Guidelines for National Greenhouse Gas Inventories (GNGGI). For our industry the following fuels are considered as being traditional (see 'Fossil Fuels'):

1.	**Liquid Fuels:**	Fuel oils (heavy), fuel oils (light, including diesel), other petroleum (including petrol)
2.	**Solid Fuels:**	Coal, petcoke, lignite and lower grades of the same fuel
3.	**Gaseous Fuels:**	Natural gas
4.	**Pasty Fuels:**	not applicable

For the calculation of CO_2–emissions, lower grades of the same fuel as per the IPCC chart are still considered fossil (e.g. low grade coal). Nevertheless, residues (sludges, secondary products, dusts, etc.) from the fuel's production have to be considered alternative material or waste for accounting in co-processing.

Note that some industrial sectors (mainly the petroleum and petrochemical industries) are often trying to upgrade their wastes / production residues into by-products. (Their aim is to decrease the amount of waste they have to declare and to decrease the treatment costs as by-products). A low grade fuel may not be classified as “alternative” just because, for example, the calorific value is lower than the one of a reference coal. In such a case, reasoning would be required, specifically proofing the waste property of the fuel.

Biomass fuels are derived from the short term life cycle of organic plants (e.g. rice husk, straw, wood chips, biofuel/-diesel from plant oil) or livestock (e.g. animal meal) or treatment of the biomass part of municipal garbage or sewage (e.g. methane from the anaerobic natural decay process). They are regarded as CO2–neutral, since their carbon content has been taken from atmospheric CO_2 recently.

Definition Alternative Fuel /Alternative Raw Material

The Group AFR policy stipulates 3 classes of AFR (waste recovery):

- Alternative fuels for wastes with more than 8 MJ
- Alternative raw materials for wastes contributing to clinker production with a mineral fraction mass higher than 50 % of its total.
- Alternative fuels and raw material for wastes which have both, heat value and a useful mineral fraction.

and one class of disposal:

- Waste materials that are co-processed (disposed) as a service to society without adding value to the process, except a financial benefit (see "AFR accept or refuse flowchart.ppt").

LHARP only permits a substance to be booked into either fuel or raw materials.

Therefore, the 4 generic classes of the AFR policy are condensed into 2 simplified classes for accounting purposes. As the definition for AR is the simplest, it is the lead definition:

Alternative Raw Materials (AR):
Wastes with a mineral mass fraction contributing* to clinker production higher than 50%.

(*) Ash > 50 mass % of total mass (as delivered) and ($CaO + SiO_2 + Al_2O_3 + Fe_2O_3 + SO_3$) > 80 mass % of ash.

Alternative Fuels (AF): All other AFR's

PSCS-Classification of AFRs

A three level Product Classification System with standardized wording (see AFR Classification (overview)) applies.

For Alternative Fuels (AF), the classification into 'families' ensures consistent categorization and data entering. For Alternative Raw Materials (AR) no further classification than the following is required. The main classification principles are:

- Within the family **Alternative Raw Materials (AR)**, several classes are established to collect more detailed information on the usage of AR. All major ARs have their own class, and the rest are classified according to the contribution to clinker production, e.g. aluminous corrective, iron corrective, etc.
- **Alternative Fuels (AF)** are first split according to their physical aspects into several families. Inside such a family all major AFs have their own class, and the rest are classified in a class named "others". This classification ensures that approximately 90% of all AFs used within the Group can directly be allocated to a class.

Another useful resource is the raw material list (see AR help list.doc). It shows on the AR side which materials are alternative and which are traditional, as well as a definition of the material composition to be booked into an AR class.

Printable version and Source files

- AFR Classification.xls
- AFR accept or refuse flowchart.ppt
- AR help list.doc
- Fossil fuels.pdf