Monitoring Plan

The proposed portfolio of projects is reducing the CO_2 emissions due to an improvement of the thermal and electrical energy efficiency, which will lead to a reduction of CO_2 specific emissions per tone of cement produced (baseline – project).

The monitoring of these reductions will be done on an annual basis, using the data taken from the Annual Technical Report.

The project-supplier will be in charge of collection of all the necessary key data in order to calculate the related CO_2 emissions reductions.

The Annual Technical Report (ATR) is, according with the company international procedure, completed as accurately as possible up to 30th of January of the following year.

The data are synthetic, cumulated for the whole year from the analytical data collected from the production reports throughout the corresponding year.

Alesd cement plant implemented ISO 9002:1994 and has a certification available up to the end of 2003

Campulung cement plant is now in the phase of pre-audit for obtaining ISO 9002:1994, the final audit is scheduled one month later.

At Holcim (Romania) level, an integrated implementation of ISO 9001:2000, ISO 14001: 1996 and ISO 18001:1999 is foreseen to take place up to the end of 2003

The specific CO2 emissions corresponding to each project will be done by using the same formulas and same formats as the ones used in the Baseline Study for calculation of the baseline and project specific emissions (see annexes C2 and C4).

Then the reductions in the specific CO_2 emissions per tone of cement will be calculated for each project by subtraction of the project figures from the baseline corresponding figures. (see annex C5 for detailed calculations)

By multiplying the obtained specific emission reductions per tone of cement with the actual cement production volume, for the individual case of each plant, the total emission reduction resulted for each project is obtained.

Further on, by addition of these latest figures, the total emission reduction obtained due to the portfolio of projects implementation is calculated.

Therefore, the established **Baseline will be fixed from the point of view of the specific CO_2 emissions per tone of cement** (see annexes C1 and C3) and the monitoring of the emission reductions will be based on the determination of the emission reductions per tone of cement produced, which will be multiplied by the actual annual production to get the **total annual emission reductions in the project period** (see annex C5).

This approach diminishes the effects, which an eventual **unpredictable** variation of the market demand might have over the CO_2 emission reduction transferred between Romania and The Netherlands and it allows the sustainable development of the company in an environment with an increasing market demand.

After the Project implementation (starting with 2004), the heat and electricity specific consumptions, as well as the clinker factor and the cement production volume should be closely monitored during the project period in order to calculate and report the output of the Project in terms of greenhouse gases reduction.

Due to the fact that the market price of the fuels has a strong impact on the percentage of their usage, in order to reduce the **unpredictable risks** of this JI projects portfolio, the same usage assumptions (as percentage used coal, heavy fuel oil and natural gas, but also as fuel specific emissions) used for baselines and corresponding projects emission calculations, will also be used for monitoring and reporting of the emission reduction resulted from the projects implementation, for ERUPT purposes.

In case a different fuel mix will be used during the projects period, the emission calculations will be corrected **by using the same mix usage** as in the baselines as it can be seen in the Annexes C2 and C4.

The following paragraphs briefly explain how the related analytical data are collected and further processed.

A. The database for the production reports – Alesd Cement Plant

1. Extracted and crushed limestone and marl production

The quarry and crushing shops are **daily** filling up reports where there are recorded the crushers working hours and the daily production volume, calculated as follows:

Production (tones) = average capacity of BELAZ lorry * no. of lorries * no of trips/lorry

The average capacity per lorry is determined once or twice per month, by weighting in the presence of a committee.

The production is then cumulated monthly and annually, and the annual obtained quantity is recorded in the ATR.

2. Raw meal production

There are daily exploitation sheets for filled up for each raw mill. In this sheets there are recorded the quantities (m) of limestone, marl and pyrite that are fed into the mill, weighted by the SCHENK weigh feeders.

The laboratory is analyzing and recording the daily average humidity (U) for each raw meal component.

Based on the quantities recorded on the exploitation sheets and on the determined humidity, it is calculated the raw meal production volume:

$$\text{Production (tones)} = m_{limestone}\,(t) * [100 - U_l\,(\%)]/100 + m_{marl}\,(t) * [100 - U_m\,(\%)]/100 + m_{pyrite}\,(t) * [100 - U_p(\%)]/100$$

There is also measured, once per shift the raw meal stock from the homogenization and depositing silos (bumper stock for few hours), and the data are recorded in the exploitation sheets.

The daily data are monthly and annualy cummulated and reported in the ATR

3. The clinker production

The raw meal quantity processed by the kilns is measured by SCHENK weight feeders and it is recorded in the exploitation sheets of the kiln.

Once per month it is determined the raw meal/clinker factor, by weighting also the clinker produced by the kiln in 24 hours.

$$\text{Factor}_{\text{raw meal/clinker}} = \text{raw meal consumption (t)} / \text{clinker produced quantity (t)}$$

The clinker production is then calculated daily as follows:

$$\text{Clinker Production (t)} = \text{raw meal consumption (t)} / \text{Factor}_{\text{raw meal/clinker}}$$

The daily data are monthly and annualy cummulated and reported in the ATR

4. The cement production

On the exploitation sheet of the cement mill there are recorded the consumed quantities of each component that enters in the cement composition

These quantities (m) are weighted by the SCHENK weight feeders separately for each component and automatically recorded by a process computer.

The laboratory determines and daily records the humidity (U) of each component fed into the cement mill.

The cement production volume is calculated as follows:

$$\text{Cement production} = m_{clinker}(t) * [100 - U_{cl}(\%)]/100 + \sum\{m_{MIC}(t) * [100 - - U_{MIC}(\%)]/100\} + m_{gipsum} * [100 - U_g(\%)]/100$$

The daily data are monthly and annualy cummulated and reported in the ATR.

These annual cummulated data will be taken into consideration for the cement production volumes used in the further calculation of CO_2 emissions in case of both Baseline and Project for Alesd Cement Plant (Annexes C1 and respectively C2).

The clinker factor is then calculated as follows:

$$\text{Factor}_{\text{clinkerl/cement}} = \text{clinker consumption (t)} / \text{cement produced quantity (t)}$$

The clinker factor can be calculated as often at request, but for ATR the production specific clinker factor is using the annualy cumulated clinker consumption and cement production quantities.

These annual average obtained data will be taken into consideration for the clinker factors used in the calculation of CO_2 emissions in case of Alesd Project (Annex C2).

5. The specific heat consumption

The daily consumption for each fuel is recorded in the exploitation sheet of each corresponding equipment, measured by weighting or by flow-meters (depending of the fuel type).

The laboratory is analyzing and recording 3 times per week the inferior calorific value of the fuel and the water and sulfur content.

On the bases of the annually cumulated consumed fuel quantities, of the inferior calorific value ($Q_{inf.}$) of each fuel it is calculated the total heat produced and consumed for the clinker production. Further on, by dividing the total heat at the annually cumulated clinker produced quantity, the specific heat consumption per tone of clinker for the kiln is calculated as follows:

Specific heat consumption ($MJ/t_{clinker}$) = [$\sum$ (m_{fuel}(t) * $Q_{inf.}$($kcal/t_{fuel}$) * 4,1868] / $m_{clinker\ (t)}$

These annual average obtained data will be taken into consideration for the specific heat consumption per tone of clinker used in the calculation of CO_2 emissions in case of Alesd Project (Annexes C2).

6. Electricity specific consumption

There is an electronic device METS_MD connected with a PC which records the daily (monthly, annually) consumption of electrical energy for each cost center, in KWh/ cost center.

On the bases of the consumption of energy and the production quantity it is calculated the specific energy consumption per tone of product (KWh/t).

For ATR the cumulated annual figures are taken into calculation.

These annual average obtained data will be taken into consideration for the specific electricity consumption per tone of cement produced, which is further used in the calculation of CO_2 emissions in case of Alesd Project (Annex C2).

There is also daily recorded the delivered quantities per type of cement, the cumulated figures for each month or for the year can be also calculated.

B. The database for the production reports – Campulung Cement Plant

1. Extracted and crushed limestone and lime production

The quarry and crushing shops are **daily** filling up reports where there are recorded the crushers working hours and the daily production volume, calculated as follows:

Production (tones) = average capacity of BELAZ lorry * no. of lorries * no of trips/lorry

The average capacity per lorry is determined once or twice per month, by weighting in the presence of a comittee.

The production is then cummulated **monthly** and **annually**, and the annual obtained quantity is recorded in the ATR

2. Raw meal production

There are daily exploitation sheets for filled up for each raw mill. In this sheets there are recorded the quantities (m) of limestone, lime, pyrite and diatomite that are fed into the mill, weighted by the SCHENK weigh feeders.

The laboratory is analyzing and recording the daily average humidity (U) for each raw meal component.

Based on the quantities recorded on the exploitation sheets and on the determined humidity, it is calculated the raw meal production volume:

Production (tones) = $m_{limestone}$ (t) * [100 – U_l (%)]/100 + m_{lime} (t) * [100 – U_{lime}(%)]/100 + $m_{diatomite}$ (t) *[100 – U_d (%)]/100 + m_{pyrite} (t) *[100- U_p(%)]/100

There is also measured, once per shift the raw meal stock from the homogenization and depositing silos (bumper stock for few hours), and the data are recorded in the exploitation sheets.

The daily data are monthly and annualy cummulated and reported in the ATR

3. The clinker production

The raw meal quantity processed by the kilns is measured by SCHENK weight feeders and it is recorded in the exploitation sheets of the kiln.

Once per month it is determined the raw meal/clinker factor, by weighting also the clinker produced by the kiln in 24 hours.

Factor $_{raw\ meal/clinker}$ = raw meal consumption (t) / clinker produced quantity (t)

The clinker production is then calculated daily as follows:

Clinker Production (t) = raw meal consumption (t) / Factor $_{raw\ meal/clinker}$

The daily data are monthly and annualy cummulated and reported in the ATR

4. The cement production

On the daily exploitation sheet of the cement mill there are recorded the consumed quantities of each component that enters in the cement composition.

These quantities (m) are obtained by weighting, separately for each component.

The laboratory determines and daily records the humidity (U) of each component fed into the cement mill.

The cement production volume is calculated as follows:

$$\text{Cement production} = m_{clinker}(t) * [100 - U_{cl}(\%)]/100 + \sum\{m_{MIC}(t) * [100 - U_{MIC}(\%)]/100\} + m_{gipsum} * [100 - U_g(\%)]/100$$

The daily data are monthly and annualy cummulated and reported in the ATR

These annual cummulated data will be taken into consideration for the cement production volumes used in the further calculation of CO_2 emissions for both Baseline and Project for Campulung Cement Plant (Annexes C3 and respectively C4).

The clinker factor is then calculated as follows:

$$\text{Factor}_{clinkerl/cement} = \text{clinker consumption (t) / cement produced quantity (t)}$$

The clinker factor can be calculated as often at request, but for ATR the production specific clinker factor is using the annualy cumulated clinker consumption and cement production quantities.

These annual average obtained data will be taken into consideration for the clinker factors used in the calculation of CO_2 emissions in case of the Campulung Project (Annex C4).

5. The fuel consumption

The daily consumption for each fuel is recorded in the exploitation sheet of each corresponding equipment, measured by weighting or by flow-meters (depending of the fuel type).

The laboratory is analyzing and recording 3 times per week the inferior calorific value of the fuel and the water and sulfur content.

On the bases of the annually cumulated consumed fuel quantities, of the inferior calorific value ($Q_{inf.}$) of each fuel it is calculated the total heat produced and consumed for the clinker production. Further on, by dividing the total heat at the annually cumulated clinker produced quantity, the specific heat consumption per tone of clinker for the kiln is calculated as follows:

$$\text{Specific heat consumption } (MJ/t_{clinker}) = [\sum (m_{fuel}(t) * Q_{inf.}(kcal/t_{fuel}) * 4{,}1868] / m_{clinker\ (t)}$$

These annual average obtained data will be taken into consideration for the specific heat consumption per tone of clinker used in the calculation of CO_2 emissions in case of Campulung Project (Annexes C4).

6. Electrical energy specific consumption

There are electrical energy meters, which are registering the daily consumption of energy for each cost center, in KWh/ cost center.

On the bases of the consumption of energy and the produced quantity it is calculated the specific energy consumption per tone of product (KWh/t).

For ATR the cumulated annual figures are taken into calculation.

These annual average obtained data will be taken into consideration for the specific electricity consumption per tone of cement produced, which is further used in the calculation of CO_2 emissions in case of Campulung Project (Annex C4).

There is also daily recorded the delivered quantities per type of cement, the cumulated figures for each month or for the year can be also calculated.