

### 6.3.7.3 Thermal Substitution Rate (TSR) [%]

#### Description

Thermal substitution rate (TSR) corresponds to the relation of thermal energy consumption of alternative fuels to the total amount of thermal energy consumption in the kiln system.

#### Reference to Process

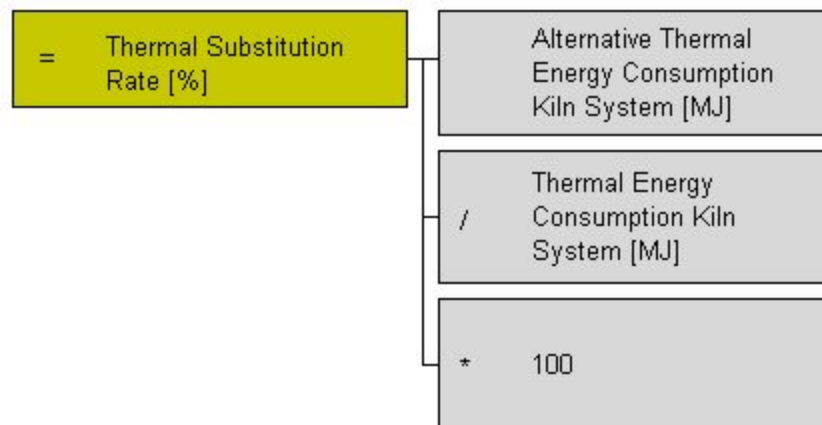
This indicator refers to:

- Main cost center 'Clinker Production' excluding pre-process cost centers
- Product sub-segment Clinker and Cement

#### Purpose

To measure the degree of substitution of traditional by alternative fuels, based on thermal energy consumption in the kiln system.

#### Calculation



$$\text{Thermal Substitution Rate (TSR) [\%]} = \frac{\text{Alternative Energy Consumption Kiln System}}{\text{Thermal Energy Consumption Kiln System}} \times 100$$

‘Alternative thermal energy consumption kiln system’ is the quantity of thermal energy consumed from alternative fuels (see below) in the kiln system; both biomass and fossil part of AF energy are included.

‘Thermal energy consumption kiln system’ is the quantity of thermal energy consumed from traditional and alternative fuels in the kiln system.

The net calorific value has to be determined for all fuels . It can be determined in own laboratory, by third parties, by literature reference or consider the one specified on the invoice. If measured, it has to be measured after preparation (at the burner pipe or entrance of the kiln and not at the plant gate).

## Comments and Examples

**TIS data normalization code:** ICS Code 400+TSR+FUEL

	<b>Alternative Thermal Energy Consumption [MJ] (000) Kiln Systems</b>	<b>Total Thermal Energy Consumption [MJ] (000) Kiln Systems</b>	<b>Thermal Substitution Rate (TSR) [%]</b>	
Kiln 1	59'199	297'995	= 59'199 / 297'995	= 19.9 %
Kiln 2	18'045	134'097	= 18'045 / 134'097	= 13.5 %
<b>Total Plant</b>	<b>77'244</b>	<b>432'092</b>	= 77'244 / 432'092	= <b>17.9 %</b>

Fuels to prepare the fuels and raw materials for the kiln are not included in this indicator. The following tables reflect the international IPCC norms (Intergovernmental Panel for Climate Change) and are also aligned with the World Business Council of Sustainable Development (WBCSD). Bitumen, if consumed as fuel, is considered in the calculation.

Note:

For the purpose of the calculation of [EGAV AF CPP and EGAV AF HGG](#) TSR CPP and TSR HGG are computed with the same generic principle (Alternative thermal energy / Total

thermal energy consumed in a specific area of activity). For these, the references to the process are:

- for TSR CPP is the pre-process cost center 'Power generation';
- for TSR HGG are all drying activities in the cement plant (e.g. pre-process and main cost centers).

The alternative fuels / thermal energy consumed in CPP and HGG is NOT included in TSR kiln, which is only reported in SAP FC. TSR CPP and TSR HGG shall be maintained in the local systems.

#### Classification of Fuels

Definitions used in CO <sub>2</sub> Emissions	
Type	Category
	<b>Traditional fossil fuels</b>
1	coal + anthracite + waste coal
2	petrol coke
3	(ultra) heavy fuel, bitumen
4	diesel oil
5	natural gas (dry)
6	oil shale
6a	lignite
7	gasoline
	<b>Alternative fossil fuels</b>
8	waste oil
9	tyres
10	plastics
11	solvents
12	impregnated saw dust
12a	mixed industrial waste
13	other fossil based wastes
	<b>Alternative biomass fuels</b>
14	dried sewage sludge
15	wood, non impregnated saw dust
16	paper, carton, diaper waste
17	animal meal
18	animal bone meal
19	animal fat
20	agricultural, organic, charcoal
21	other biomass

#### PSCS Classification of Fuels

[AFR Classification.xls](#)

## Reporting Requirements

- The indicator is reported in SAP FC.