



SMARTREC KB TOOL MANUAL

version: alpha

1 Introduction

This document describes how to use the alpha release of the public version of the Smartrec KB tool. Currently, the software includes the computation of the energy in exhaust flue gas, yearly wasted heat, smartrec primary energy saving and payback period.

2 Energy in exhaust flue gas

This section shows how to compute the energy in exhaust flue gas. Please follow the steps below:

1. In the KB page, click on the **ENERGY IN EXHAUST FLUE GAS** tab to view the related form and provide the following three inputs:
 - a) Recycled Aluminium Processing capacity of plant (Ton/ day).
 - b) No. of cycle (Cycle/day).
 - c) Heating Efficiency of Tilting Rotary Furnace (%).

The screenshot shows the Smartrec KB tool interface. At the top, there is a navigation bar with 'KB' and 'Account' (with a dropdown arrow). Below this is a 'Home' section. The main content area features a tabbed interface with four tabs: 'ENERGY IN EXHAUST FLUE GAS', 'YEARLY WASTED HEAT', 'SMARTREC PRIMARY ENERGY SAVING', and 'PAYBACK PERIOD'. The 'ENERGY IN EXHAUST FLUE GAS' tab is selected and highlighted with a red circle '1'. Below the tabs, there are three input fields, each with a red circle indicating the step number: '2' for 'Recycled Aluminium Processing capacity of plant (Ton/ day)' with the value '20', '3' for 'No. of cycle (Cycle/day)' with the value '4', and '4' for 'Heating Efficiency of Tilting Rotary Furnace (%)' with the value '50'. A 'Calculate' button is located at the bottom right of the form, highlighted with a red circle '5'. Below the form, there is a yellow warning box with an information icon and the text: 'Smartrec KB tool (alpha version) This tool is underdevelopment, we are continuously improving.'

To test the system, users can provide the input shown in the form above.

2. Click on the calculate button at the right-bottom corner to visualise the result. For the inputs provided above, users will view the result shown in the form below.

Home

ENERGY IN EXHAUST FLUE GAS	YEARLY WASTED HEAT	SMARTREC PRIMARY ENERGY SAVING	PAYBACK PERIOD
9,210,240.00 KJ			
TOTAL ENERGY IN EXHAUST FLUE GAS			
Recycled Aluminium Processing capacity of plant (Ton/ day)			
<input type="text" value="20"/>			
No. of cycle (Cycle/day)			
<input type="text" value="4"/>			
Heating Efficiency of Tilting Rotary Furnace (%)			
<input type="text" value="50"/>			
<input type="button" value="Calculate"/>			

i Smartrec KB tool (alpha version)
This tool is underdevelopment, we are continuously improving.

3 Yearly wasted heat

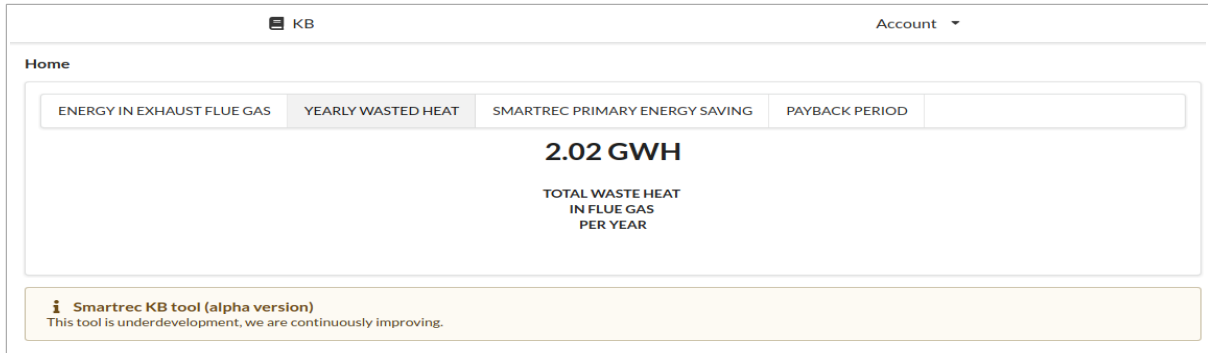
This section depicts how to calculate waste heat in flue gas.

1. In the KB page, click on the **ENERGY IN EXHAUST FLUE GAS** tab to view the related form and provide the following three inputs:
 - a) Recycled Aluminium Processing capacity of plant (Ton/ day).
 - b) No. of cycle (Cycle/day).
 - c) Heating Efficiency of Tilting Rotary Furnace (%).

ENERGY IN EXHAUST FLUE GAS	YEARLY WASTED HEAT	SMARTREC PRIMARY ENERGY SAVING	PAYBACK PERIOD
Recycled Aluminium Processing capacity of plant (Ton/ day)			
<input type="text" value="20"/>			
No. of cycle (Cycle/day)			
<input type="text" value="4"/>			
Heating Efficiency of Tilting Rotary Furnace (%)			
<input type="text" value="50"/>			
<input type="button" value="Calculate"/>			

i Smartrec KB tool (alpha version)
This tool is underdevelopment, we are continuously improving.

- Sample inputs can be provided as shown in the form above.
2. Click on the calculate button
 3. click on the **YEARLY WASTED HEAT** tab to view the result. For the sample inputs shown above, users will find the result shown in the form below.



KB Account

Home

ENERGY IN EXHAUST FLUE GAS YEARLY WASTED HEAT **SMARTREC PRIMARY ENERGY SAVING** PAYBACK PERIOD

2.02 GWH

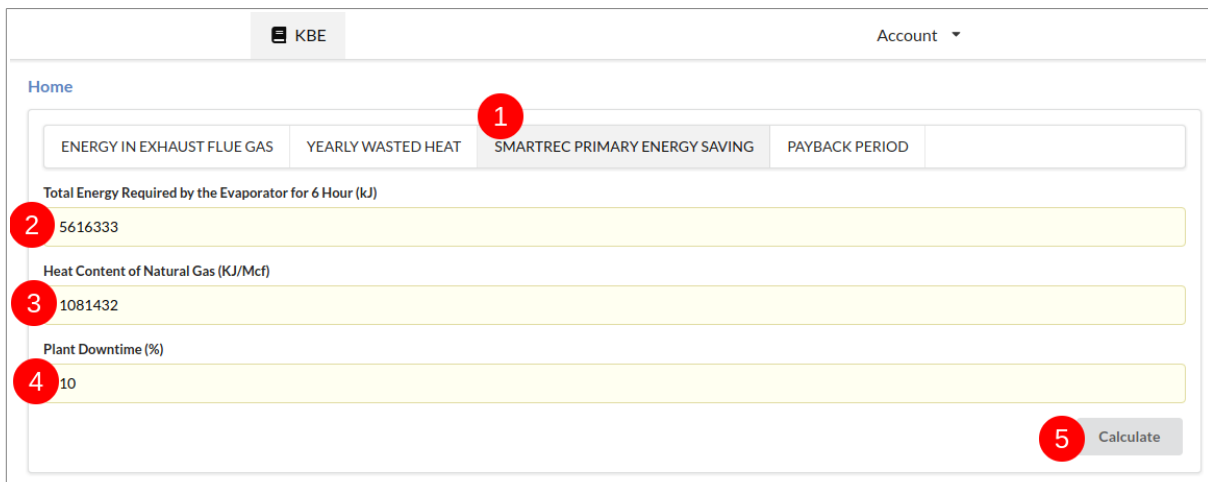
TOTAL WASTE HEAT IN FLUE GAS PER YEAR

i Smartrec KB tool (alpha version)
This tool is underdevelopment, we are continuously improving.

4 Smartrec primary energy saving

This section describes how to predict the Smartrec primary energy saving.

1. In the KB page, click on the **SMARTREC PRIMARY ENERGY SAVING** tab to view the related form and provide the following inputs:
 - a) Total Energy Required by the Evaporator for 6 Hour (kJ).
 - b) Heat Content of Natural Gas (KJ/Mcf).
 - c) Plant Downtime (%).



KBE Account

Home

ENERGY IN EXHAUST FLUE GAS YEARLY WASTED HEAT **1 SMARTREC PRIMARY ENERGY SAVING** PAYBACK PERIOD

Total Energy Required by the Evaporator for 6 Hour (kJ)

2 5616333

Heat Content of Natural Gas (KJ/Mcf)

3 1081432

Plant Downtime (%)

4 10

5 Calculate

In order to test the software, users can input the values shown above.

2. Click on the calculate button to show the computed result. Upon providing the values shown above, user will see the result shown in the form below.

KB Account

Home

ENERGY IN EXHAUST FLUE GAS YEARLY WASTED HEAT SMARTREC PRIMARY ENERGY SAVING PAYBACK PERIOD

214.38 TON

CO2 EMISSION

Total Energy Required by the Evaporator for 6 Hour (kJ)

5616333

Plant Downtime (%)

10

Calculate

i Smartrec KB tool (alpha version)
This tool is underdevelopment, we are continuously improving.

5 Payback period

1. In the KB page, click on the **PAYBACK PERIOD** tab to view the related form and input values for the following parameters:
 - a) Average Salt Cake Produced as By-Product Per Cycle (Kg).
 - b) Natural Gas Saving for TES Per Year (Mcf).
 - c) Natural Gas Saving for WHR Facilities Per Year (Mcf).

KB Account

Home

ENERGY IN EXHAUST FLUE GAS YEARLY WASTED HEAT SMARTREC PRIMARY ENERGY SAVING PAYBACK PERIOD

Average Salt Cake Produced as By-Product Per Cycle (Kg)

2683

Natural Gas Saving for TES Per Year (Mcf)

3568

Natural Gas Saving for WHR Facilities Per Year (Mcf)

6715

Calculate

i Smartrec KB tool (alpha version)
This tool is underdevelopment, we are continuously improving.

2. Upon filling in values of the parameters, click on the calculate button. Following the click, users will be shown the result below the bar where the tabs are located. If users choose to input the values shown above, they will see the results shown in the form below.

KB Account

Home

ENERGY IN EXHAUST FLUE GAS YEARLY WASTED HEAT SMARTREC PRIMARY ENERGY SAVING PAYBACK PERIOD

4.90 YEAR

SIMPLE PAYBACK PERIOD

Average Salt Cake Produced as By-Product Per Cycle (Kg)

2683

Natural Gas Saving for TES Per Year (Mcf)

3568

Natural Gas Saving for WHR Facilities Per Year (Mcf)

6715

Calculate

i Smartrec KB tool (alpha version)
This tool is underdevelopment, we are continuously improving.

6 Conclusion

This document described how to use the first release of the knowledge-based software tool. The tool will be continuously updated until the end of the project and beyond.