

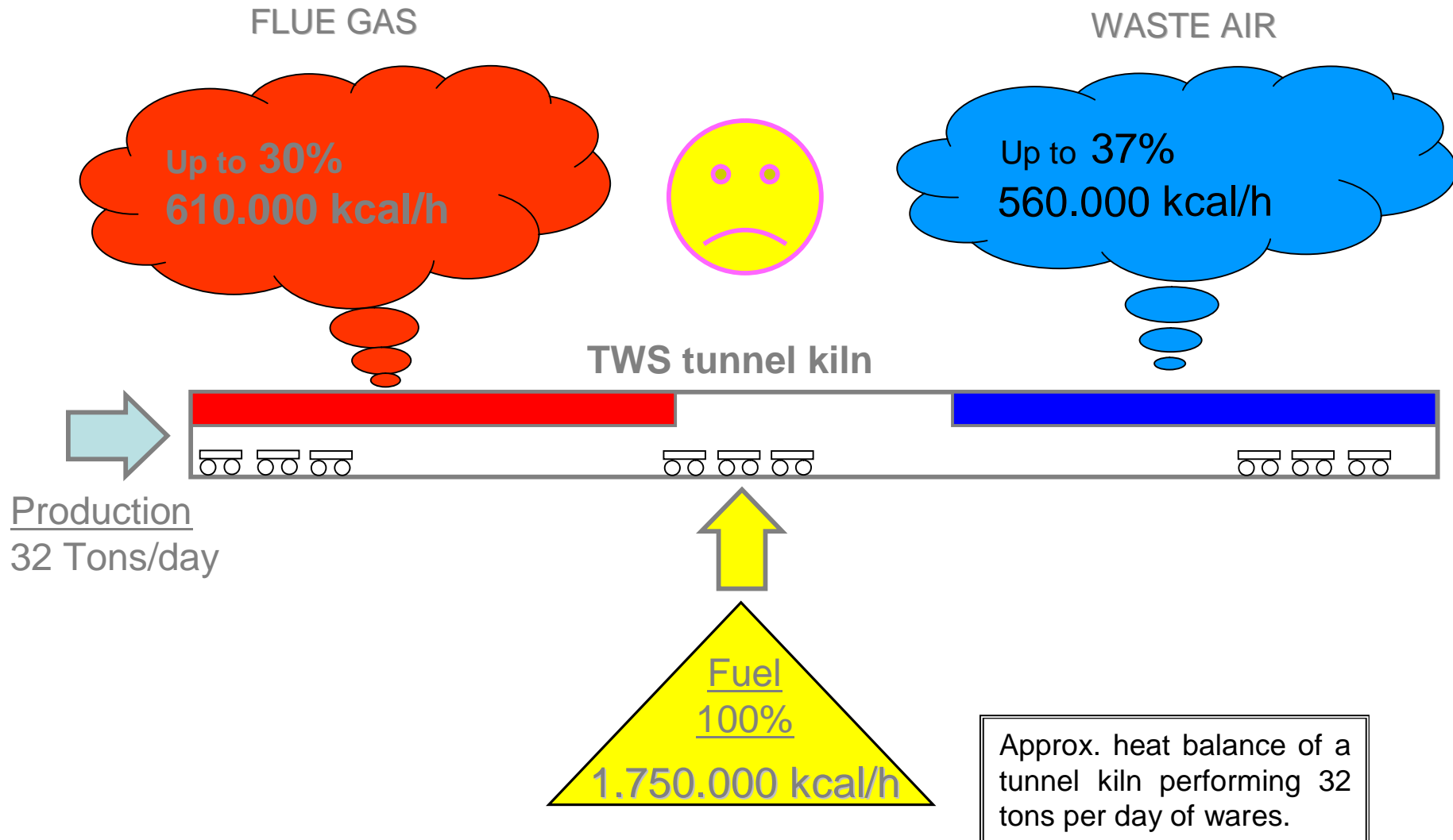
# Energy Saving Strategy for Tunnel & Shuttle Kilns SANITARY WARE

## Introduction

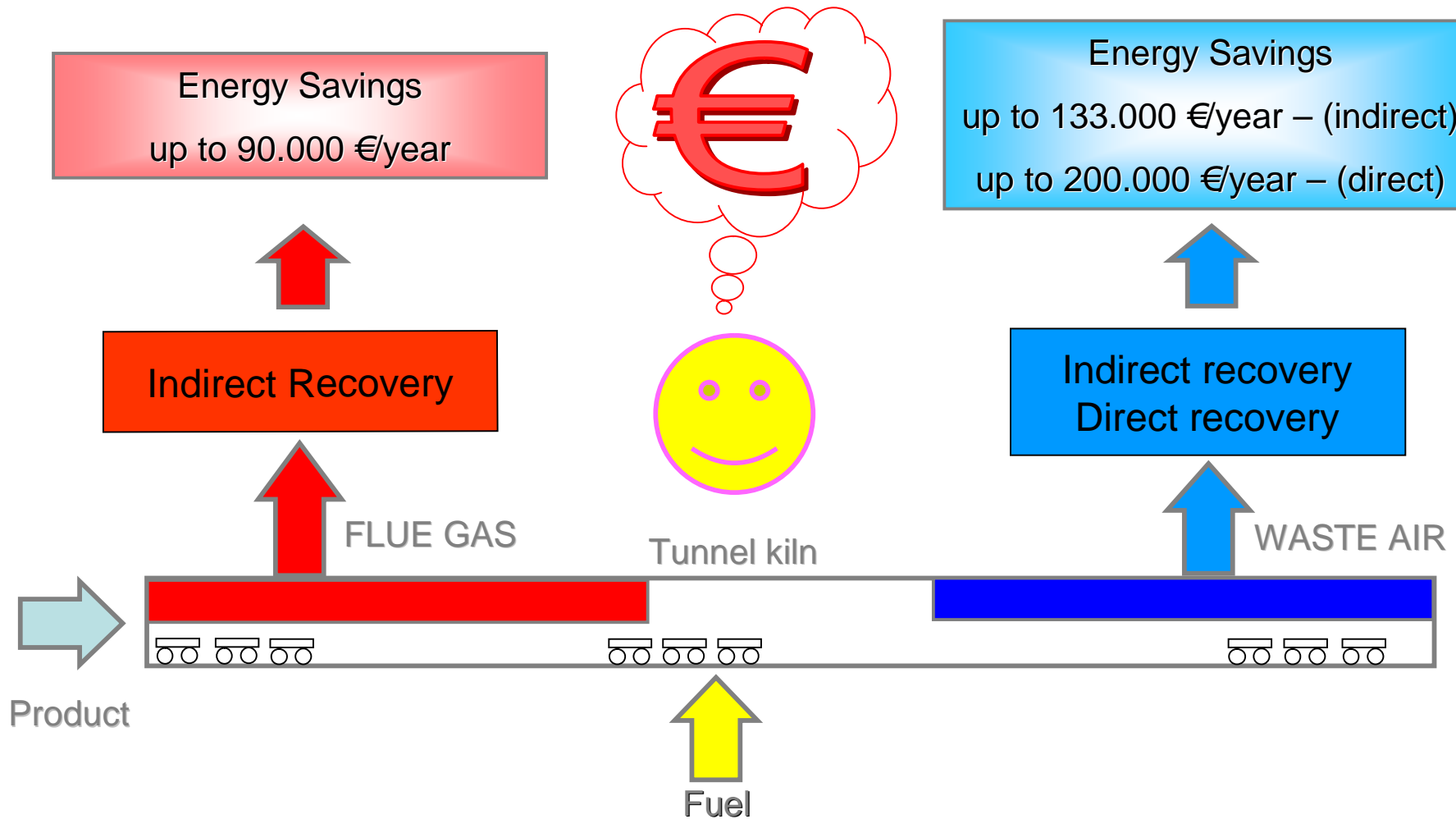
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- The application of the Kyoto protocol and the effects of the recent energy crisis, have highlighted just how important it is to save energy and thus raise machine efficiency to achieve a **reduction of machine running costs**. For this reason, Riedhammer EMS strategy has **many high-tech solution** just to increase its own machines efficiency.
- Saving energy means also reduction of CO<sub>2</sub> emissions, consequently reduction of penalties for CO<sub>2</sub> emission.
- Tunnel and Shuttle kiln for the production of ceramic wares, are thermo-machines that consume large amount of energy as much they lose large quantity of it in the atmosphere.
- It becomes fundamental **to place investments to recover the largest amount of lost heat through the chimneys** and re-use it inside the plant whether in process uses or in air-conditioning factory plant.
- The whole solutions in the following explanation are **applicable in new kiln plants**, while for existents kiln plants it needs an evaluation case by case.

## Environmental Lost Heat (Loss of Energy)



## Saving ranges


**Remarks:**

all data must to be considered approx. and depend on the single case under examination.

All the economic savings estimation are based on a reference medum cost of gas in Europe 0,35€/m3n

**E M S**

**Energy Management System**

## What's about EMS ?

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**EMS is a complete package of technical solutions to improve kiln efficiency and to reduce the total plant energy consumption.**

**Are you interested?**

Please contact us: [mail@riedhammer.de](mailto:mail@riedhammer.de)

# Examples for Technical Solutions

## Heat Exchanger (Indirect Recovery)

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Conversion of waste energy discharged from the kiln, in usable energy suitable for other thermo-devices inside the ceramic plant.

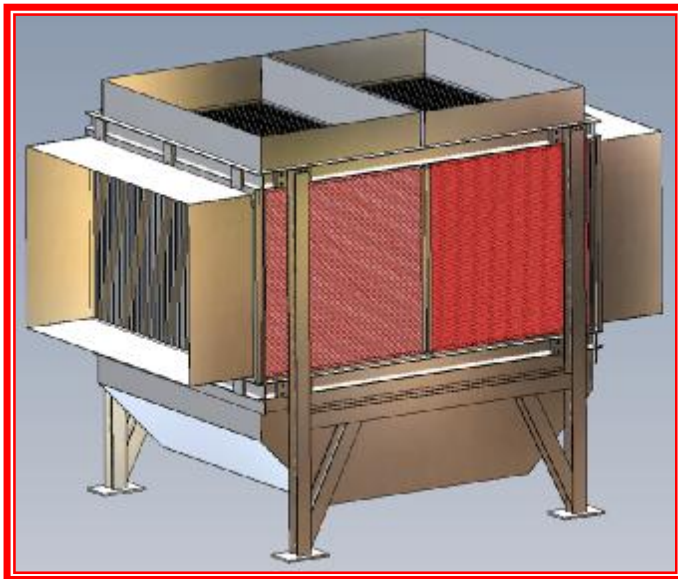


Plate type heat exchanger (Flue Gas / Air)

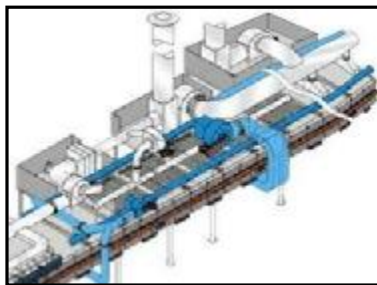


Shell and tube heat exchanger (Flue Gas / Water)



## Direct Recovery

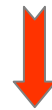
Distribution of Warm Air toward the different consumers, strewn in the ceramic plant, by a smart distribution system.



Source



**Smart Distribution System**



Consumers



Mould dryer



Air treatment unit



Green ware dryer



Casting bench

## Direct Recovery

The smart distribution system allows the safe connection between tunnel kiln and users, without interfering with the pressure stability inside the kiln channel. It is equipped with a regulation architecture to guarantee stable feeding at the downstream consumers, whether in periodic or continuous functioning.

### Smart Distribution System

Different consumers



Mould dryer



Air treatment unit



Green ware dryer



Casting bench

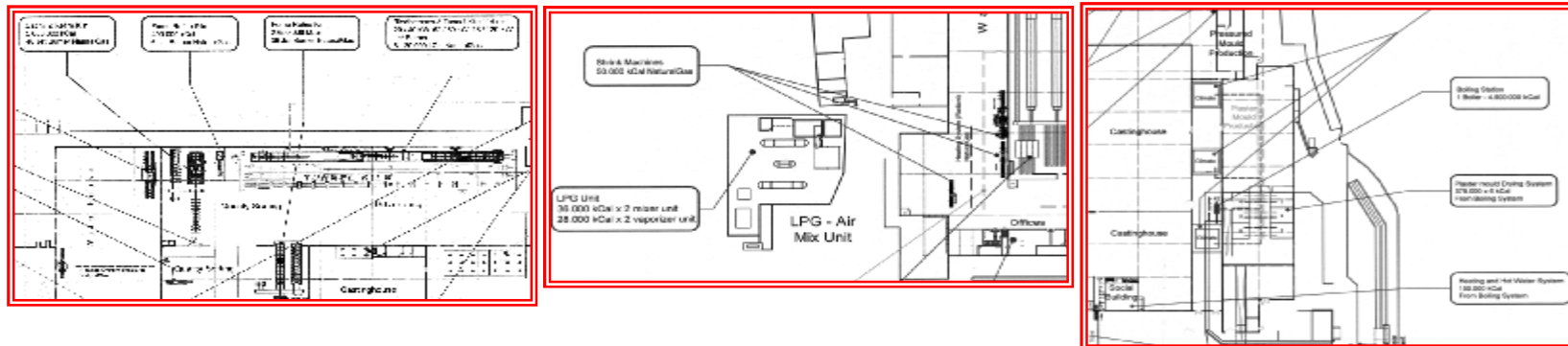
# Energy Consumers

## Energy MAP of the plant

Before to begin a plan for Energy Recovery it is fundamental to generate the

### “Energy Provider and Energy Consumers Drawing”

This document contains all necessary information of consumption and waste energy.



We can do it for you!

Please contact us: [mail@riedhammer.de](mailto:mail@riedhammer.de)

## Energy Consumers List

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- Green product driers
- Glaze driers
- Mould driers
- Preheating of Combustion Air
- Air-conditioning plant
- Production of hot water to integrate heat for centralized boiler plant
- Casting benches
- Spray driers
- Other consumers

## Data required

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### 1. Providers of Energy (normally the kilns)

- type (hot air or flue gas)
- amount (m<sup>3</sup>/h at given °C)
- Content of main pollutants
- Type of fuel (NG, LPG...)

### 2. Consumers (warm AIR or WATER consumer)

- Energy medium needed (air, flue gases)
- Range of capacity and temperature needed
- Installed power (kW)
- Consumption (kWh/yr)

# Practical Examples of Technical Solutions

## Energy saving from Heat Exchanger Installations

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Example of HEAT EXCHANGER installation, recovering energy from FLUE GAS and producing hot water @ 110°C.

Typical case of indirect recovery in a new tunnel kiln.

This can be forwarded to different hot water consumers like driers or warm air generators or directly fed to the boiling station.

<u>Possible savings in CO2 emission per year*:</u>	<u>from 500 - 700 tons</u>
<u>Possible saving of gas cost per year*:</u>	<u>up to 133.000 €</u>
<u>Return of investment*:</u>	<u>&lt; 2 years</u>



## Heat Exchanger Installations on SHUTTLE kiln

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HEAT EXCHANGER installations, may be done also in shuttle kiln, just to produce Warm Clean Air or Hot Water or Overheated Water.

The amount of recovered energy varies in accordance with the working temperature inside the shuttle kiln. The warm air / hot water produced, can be used in extra-kiln consumers and to pre-heat the air combustion of the shuttle kiln itself.

The system may be developed whether for new plants or existent plants upon feasibility study.

Possible savings in CO2 emission per year\*:                      from 150 - 250 tons

Possible saving of gas cost per year\*:                                      up to 50.000 €

Return of investment\*:    < 5 years

\* All the economic savings estimation are depending on local cost on type of upgrade

## Energy Saving from Direct Recovery of Waste Air

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Example of a DIRECT RECOVERY of hot air from the waste air channel of a tunnel kiln.

The warm air energy can be used directly.

It can be forwarded to different warm air consumers.

In case of tunnel with fibre lining, the warm air must be filtered.

<u>Possible savings in CO2 emission per year*:</u>	<u>from 600 - 1200 tons</u>
<u>Possible saving of gas cost per year*:</u>	<u>up to 200.000 €</u>
<u>Return of investment*:</u>	<u>&lt; 3 years</u>