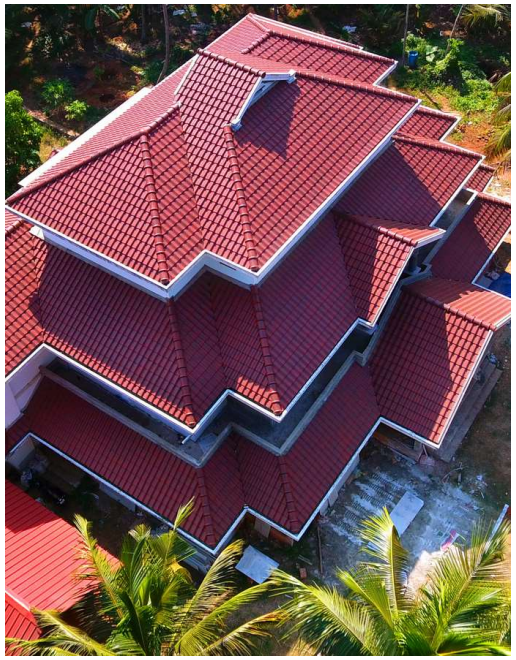


wienerberger

CII National Award for Environmental Best Practices - 2024

Wienerberger India Private Limited

Kunigal Plant, Karnataka

Presented BY:

- **Jagadeesha D J**
  Senior General manager- Kunigal Operations
- **Neethan Pereira**
  Deputy Manager - Process

wienerberger

- 100% subsidiary of Wienerberger AG, global leader in clay building solutions
- Presence over a decade in the Indian market offering solutions for single family homes, high-rise residential constructions, education & hospitality, and commercial buildings
- Largest, state-of-the-art automated production facility in India
- The share of renewable electricity from green sources such as solar & wind exceeds 95%
- The first large-scale brick kiln in India to adopt natural gas for the firing process

Wienerberger India Kunigal Plant

Monnanda Appaiah
Managing Director

wienerberger

Products Manufactured in Wienerberger India Kunigal Plant

POROTHERM HP 200

POROTHERM HP 150

POROTHERM HP 100

POROTHERM VP 100

POROTHERM VP 200

POROTHERM VP 150

POROTHERM FB 200 And fb150

wienerberger

Wienerberger AG

wienerberger is a leading international provider of innovative, ecological solutions for the entire building envelope, in the fields of new build and renovations, as well as infrastructure in water and energy management.

- Founded in 1819. Headquarter is in Vienna (Austria).
- Since more than 200 years improving people's quality of lives
- 19,000 employees
- 200 production sites in 27 countries
- #1 in brick production worldwide and in clay roof tile production in Europe
- Produces roof, wall, and facade solutions at 149 sites in Europe, and operates as a local partner in 23 countries
- Our products and solutions make energy-efficient, healthy, climate-friendly, and affordable living possible worldwide

wienerberger

Project title :

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

Category :

Climate Change Mitigation

Name of Organization :

Wienerberger India Private Limited

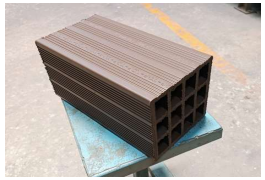
Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Manufacturing process of perforated clay bricks

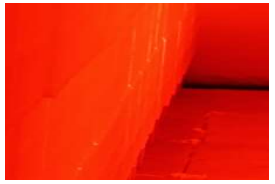
Clay preparation

Forming

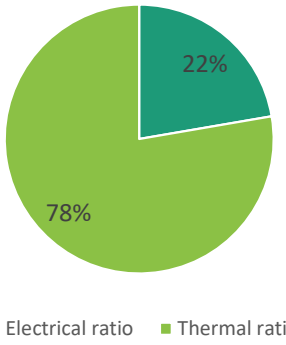


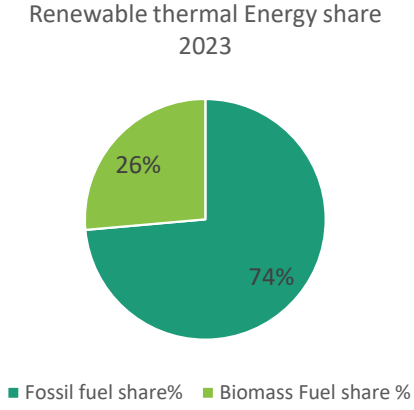
Dryers

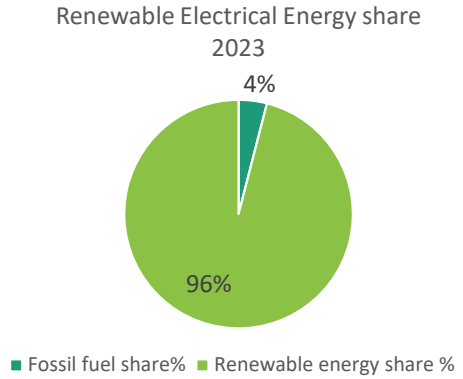
Kiln (Firing)

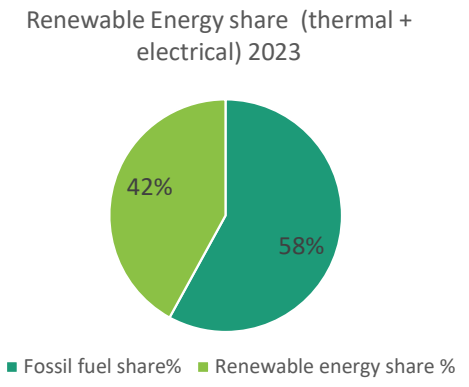


De-hacking and palletizing





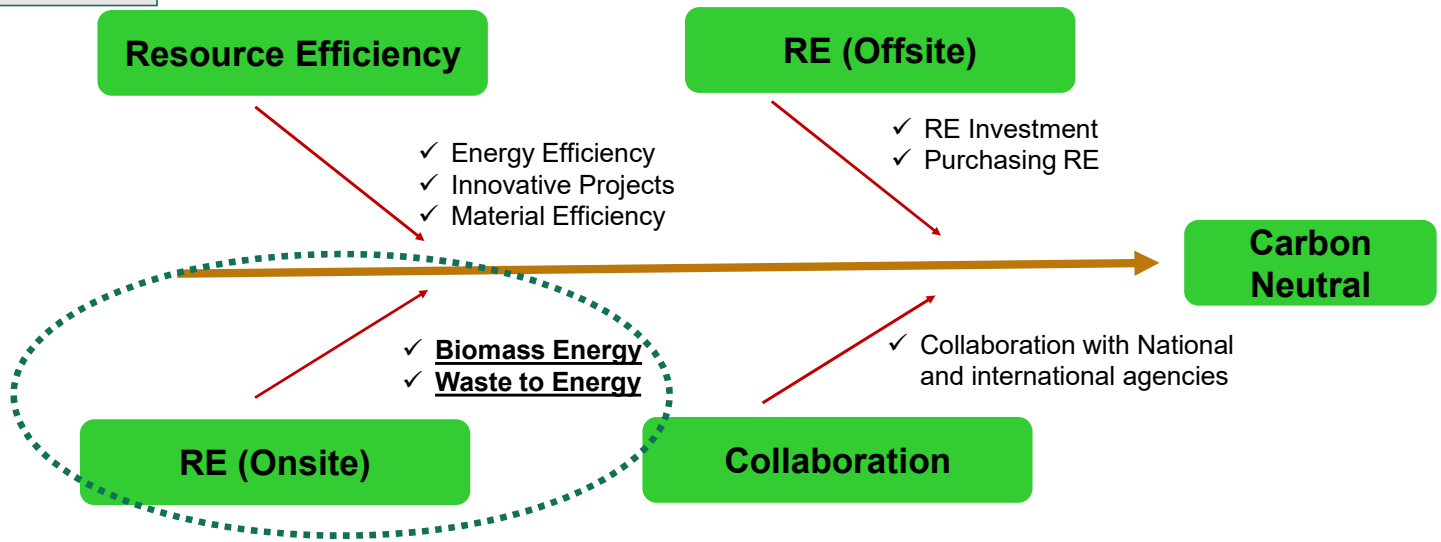




Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Trigger of the project



Background of the project

- We are consuming around 45% of the thermal energy for the drying during the manufacturing process.
- The energy which is recovered during cooling of the products in the kiln is not sufficient to cater the energy demand from the dryers. So, we need to use gas to supply the heat to dryers.
- As a step towards the sustainability and reducing the carbon footprint during our manufacturing process we have installed combustion chamber to generate hot air for the dryers.

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Objective:
To switch over from nonrenewable energy source to renewable energy source

Uniqueness of the project:
Its new application in the brick manufacturing process in the whole of India, this is the only Installation!

Milestones:

2013 – Biomass combustion chamber is installed to supply hot air to dryers

2021 – Switch over from Biomass briquets to cashewnut shells

2022 – Utilization of exhaust of combustion chamber (Flue gas) to the kiln usage of 95% of energy input

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

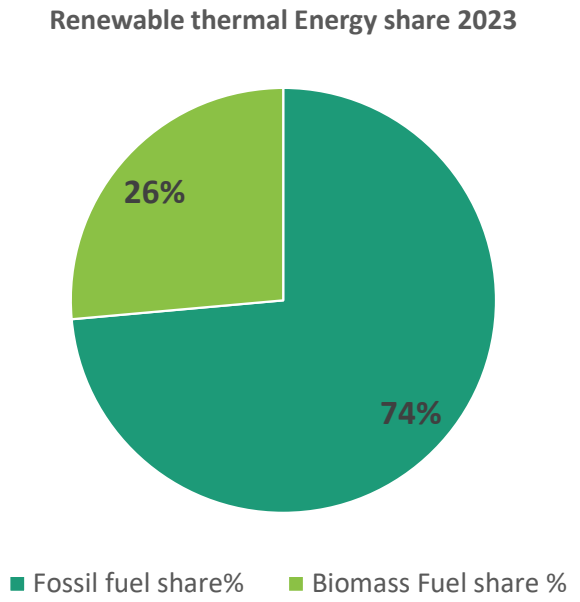
wienerberger

Tangible Benefits of combustion chamber - By replacing Biomass in place of Natural Gas

Cost / Kw energy generated : we saved ₹ 3.2 /kW

Total cost / annum: we are saving ₹ 130 lakhs / year.

Total CO_2 Reduction: we saved 920 tons CO_2/ year.



Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Biomass source changing from Biomass briquettes to Cashew nutshell.

Groundnut Husk + Coffee Husk + Saw dust = Biomass Briquett

Cashewnut Shell - ready to use

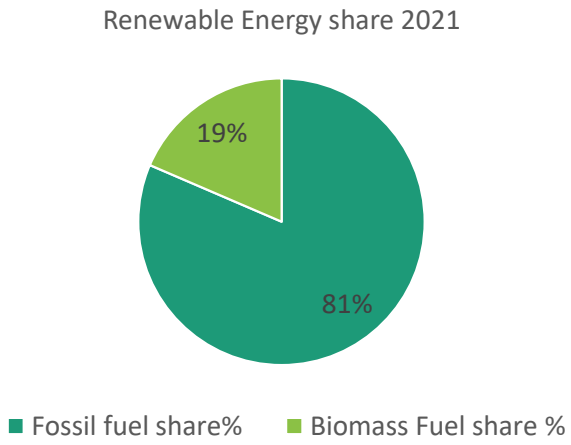
- We have been utilizing biomass briquettes with a calorific value of approximately 3,600 kcal/kg and an ash content exceeding 5% till 2021 to supply heat our dryers.
- Biomass Briquettess have got higher moisture content
- However, the high ash content necessitates daily stoppages for combustion chamber cleaning, during which energy is substituted by natural gas.
- To enhance efficiency and productivity, we were actively seeking a new biomass fuel option that offers a higher calorific value and lower ash content, thereby minimizing operational interruptions and reducing reliance on supplementary energy sources like natural gas.

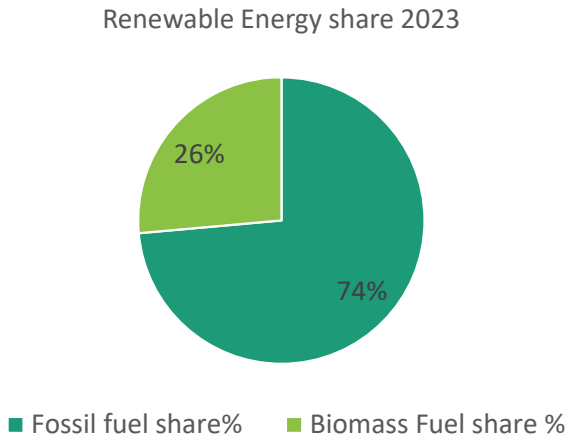
Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Comparison biomass briquets to cashew nut shells

Parameter	Biomass briquettes	Cashew nut shells	Benefit of cashew nut shells
General size	90 * 100 mm	20 * 30 mm	No need to crush before using
Calorific value	3430 ± 5% Kcal / Kg.	4800 ± 5% Kcal / Kg.	Higher energy output
Volatiles	65 – 85%	65 -75%	5% less volatiles
Ash	5 – 8%	< 1%	Less waste to discard, Good for environment
Moisture	6 -10%	4 – 6%	Better efficiency





Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Tangible benefits of cashew nut shells

Cost / Kw energy generated : By replacing biomass briquetts with cashewnut shells we saved ₹ 0.34 / kW.

Total cost / annum: By replacing biomass briquetts with cashewnut shells we saved ₹ 17.85 lakhs / year.

Efficiency: We achieved up to 80% efficiency. Whereas standard efficiency is 75% max.

Electrical energy: 12,500 kW/ year by not using crushers

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

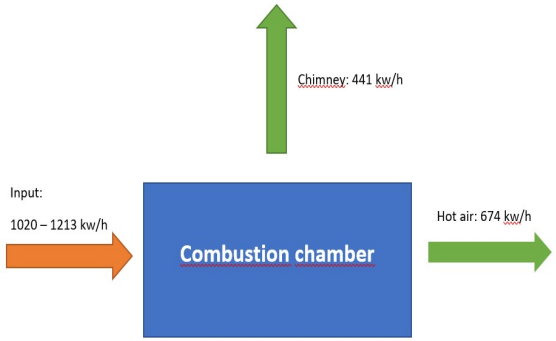
wienerberger

Recovery of Combustion Chamber Exhaust (flue gas)

Strategy:

The goal of this proposed installation is to recover the energy in the exhaust of the combustion chamber to the Rapid cooling zone @ 180°C.

Combustion chamber exhaust will be diverted to rapid cooling fan by installing new ducts. Tapping will be done at the exhaust chimney of combustion chamber. An additional settlement chamber will be installed in the ducts to reduce the dust going to the kiln



Investment for whole installation: 8,82,000 ₹

Before

combustion chamber

Total kW wasted per hour	**440**	**kW**
Total kW wasted per year	**716,857**	**kW**

After

Benefits:

Total kW savings per hour (measured)	305	kW
Total kW savings per day	6,100	kW
Total kW savings per year (calculated)	**5,37,643**	**kW/year**
CO_2 saving/year	**210**	**Tons CO_2/year**

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Intangible benefits of using Biomass as renewable energy source

Abundant Availability: Cashew nut shells are a byproduct of the cashew nut processing industry. They are abundant and readily available in regions where cashew nuts are processed.

Low Cost : Since cashew nut shells are typically considered waste or byproducts, they may be available at low cost, reducing fuel procurement expenses.

Potential Higher Calorific Value: Cashew nut shells have the potential for a high calorific value, depending on factors such as moisture content and processing methods.

Local Sourcing: Using cashew nut shells as fuel promotes local sourcing and utilization of agricultural waste, contributing to regional economic development.

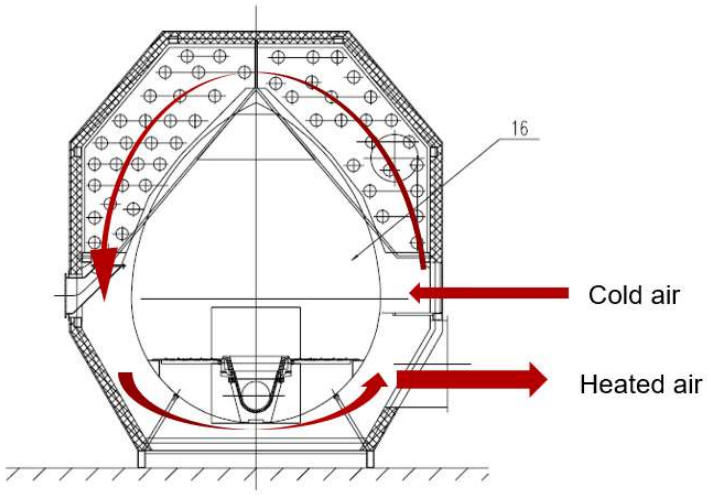
Reduction of Waste: Utilizing cashew nut shells as fuel helps in waste management by repurposing a byproduct that might otherwise be discarded.

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

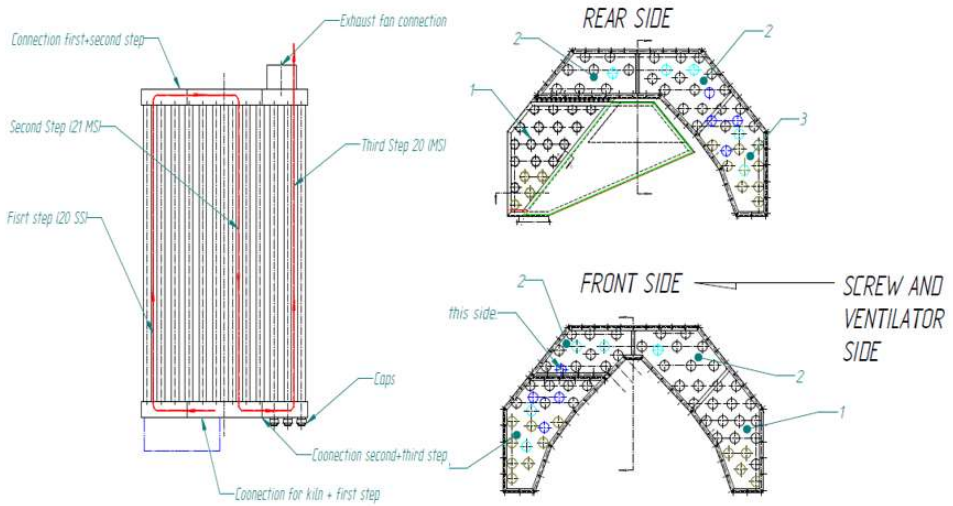
wienerberger

Replicability in other industries

Any Manufacturer who requires Hot air for the process applications can install the Biomass combustion chamber (Air to air)



Flow of hot air



Flow of Combustion air

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

CHALLENGES FACED

Problems with achieving the 100% performance in the early days of operation, quickly corrected.

Damage to the internal shell due to improper operation. SOPs are prepared to ensure this doesn't occur again

The operator must adjust Fuel feeding adjustment while he switch from Biomass briquetts to Cashewnut shells, or vice versa. (Note down the parameters to reduce the trail and errors)

Biomass is procured from a distance of 350 km.

KEY LEARNINGS FROM PROJECT IMPLEMENTATION

Fuel procurement should be one of the highest priorities, Maintaining adequate fuel supply to ensure the availability throughout the year

Design a biomass plant thinking you know what your fuel is going to be. Design in flexibility of fuels in your capital equipment

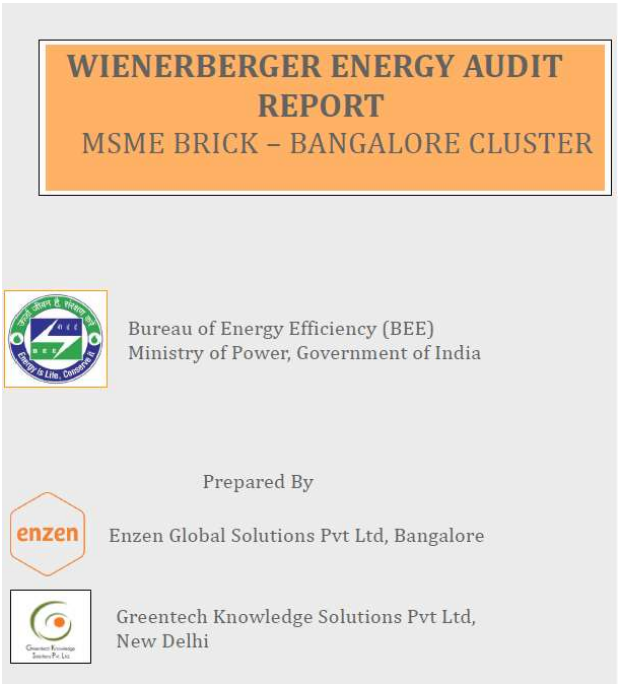
No significant problems have been reported during the last few years has been operating. Technically, the operation is successful.

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

National benchmark

1. Onsite Renewable energy – Thermal (Biomass hot air generator)
2. Offsite renewable energy – electrical (RE- purchased)
3. Natural gas as a fuel for firing the bricks (above the standards) Coal is the approved fuel in India for brick industry
4. Availability of the products throughout the year independent of the season



Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

National benchmark

Table 10: Estimation of baseline of specific manufacturing energy

S. No.	Type of Brick Product & Production Technology	Average SEC of production Technology (MJ/kg)	Initiation Phase (12 months, till 2020)	Average Specific Manufacturing Energy (MJ/m³) [A]	Estimated Market Share (%) [B]
1	Solid burnt clay brick – Clamp Kiln	2.0	1600	3200	25.0 %
2	Solid burnt clay brick - FCBTK	1.3	1600	2100	64.9 %
3	Solid burnt clay brick – Zigzag Kiln	1.125	1600	1800	10.0 %
4	Burnt perforated clay brick (around 25% perforation) – Zigzag Kiln	1.175	1350	1600	0.02 %
5	Burnt hollow clay block (around 60% perforation) – Tunnel Kiln	1.6	800	1300	0.08 %

National Baseline = ∑ (Ai x Bi) = 2344 = 2350 MJ/m³ (approx.)

Number of bricks in one line of car	384	Nos
Number of lines of bricks stacked per car	3	lines
Number of bricks per car	1152	Nos
Number of bricks for 24 hrs	41472	Nos
Number of bricks per hour	1728	Nos
Weight of bricks produced per day	447898	kg/day
Weight of bricks produced per hour	18662	kg/hr
Actual Specific energy consumption:		
Gross Calorific value of PNG used	9880	kcal/scm
Gross Calorific value of PNG used	13000	kcal/kg
Heat through PNG	3068563	kcal/hr
Heat through Cashew shell	1141000	kcal/hr
Heat through rice husk	539675	kcal/hr
Heat through coal ash	1729728	kcal/hr
Specific energy consumption	1.4532	MJ/kg

Page # 63 of the document (BEE) → **Market Transformation towards Energy Efficiency in Brick Sector**

Wienerberger SEC is lesser than the Baseline.

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

Best Kaizen for Sustainability, Gold Award 2024

Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

International Recognition

- **Achieved highest reduction of Scop1 CO_2 emissions in the Block Category plants (57 plants) in 2022**

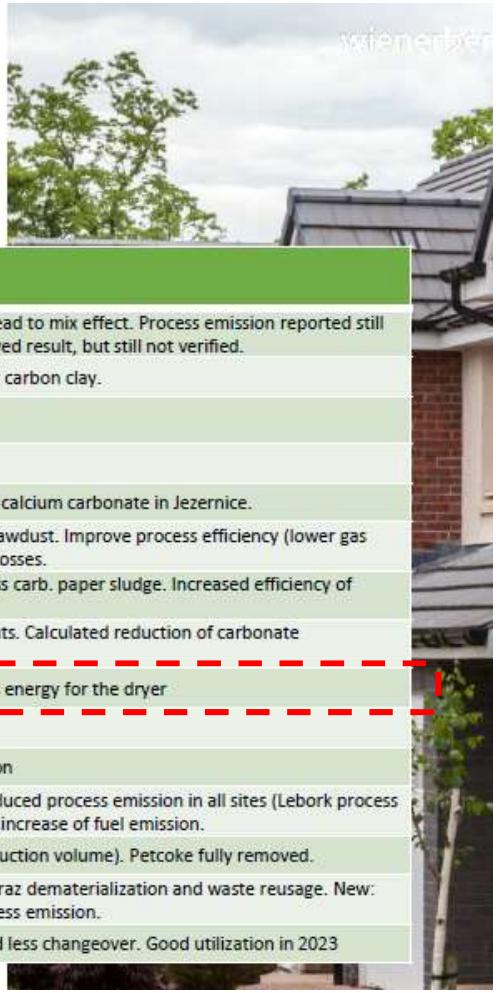
Utilization of Renewable Energy - Thermal for Bricks Manufacturing.

wienerberger

International Recognition

DECARBONISATION ACHIEVEMENT 2023 FY – **CLAY BLOCK, SCOPE1 EMISSION**

ALL COUNTRIES MAKING SIGNIFICANT CONTRIBUTIONS TO SCOPE1 IMPROVEMENT



KPI Scope1 (kgCO2/TNF)

TNF Vol% vs 2022: -43.0%

	2020 FY	2021 FY	2022 FY	2023 FY	Dev% vs 2020	Remark
Austria	247	223	234	243	-1,8%	Uttendorf with carbon footprint shut down for major rebuild lead to mix effect. Process emission reported still based on PY verification. Actual lab measures promised improved result, but still not verified.
Belgium	260	243	244	234	-9,4%	Exchange from black shiste to paper sludge and usage of lower carbon clay.
Bulgaria	170	160	156	141	-15,5%	Remove petcoke and good utilization in 2023
Croatia	106	79	76	83	-20,7%	Petcoke removed, very low process intensity
Czech Republic	221	205	182	169	-20,6%	Further mixture optimization in 2023 with notable variation of calcium carbonate in Jezernice.
France	169	159	159	155	-8,2%	Changed mixture to low emission clays and increase share of sawdust. Improve process efficiency (lower gas consumption); Dryer isolation in Achenium to reduce thermal losses.
Germany	245	260	254	222	-8,7%	Dematerialization - increase void pattern. Reduce/switch to less carb. paper sludge. Increased efficiency of drying/firing process.
Hungary	181	154	144	140	-20,2%	Petcoke elimination and sawdust increase in mixture in all plants. Calculated reduction of carbonate decomposition in clay by lowering firing temperature
India	151	82	75	70	-54,1%	Increase share of bagasse and increase biomass share usage as energy for the dryer
Italy	302	284	269	255	-15,2%	Mixture optimization due petcoke & blacksand removal
Netherlands	789	822	859	850	7,8%	Production volume drop by -56%, no change in process emission
Poland	180	175	162	173	-3,0%	Less Scope1 emission due product development of Klima+. Reduced process emission in all sites (Lebork process emission overrated in 2023, due technical issues.) balanced by increase of fuel emission.
Romania	135	132	122	123	-7,8%	Site mix effect advantage in 2023 (Berca, Triteni with less production volume). Petcoke fully removed.
Slovakia	189	168	156	153	-17,3%	Petcoke, coal and paper sludge removed from mixture. In Boleraz dematerialization and waste reusage. New: quarterly clay analyze lead to calculative improvement of process emission.
Slovenia	113	106	88	84	-24,5%	Petcoke elimination, improvements in production planning and less changeover. Good utilization in 2023

wienerberger

Thank You