Environmental Product Declaration

according to ISO 14025 and EN 15804

This declaration is for:

WasteBasedBricks from 100% Waste

Provided by:

StoneCycling

program operator

Stichting MRPI®

publisher

Stichting MRPI®

www.mrpi.nl

MRPI® registration

1.1.00470.2023

date of first issue

17-11-2023

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17-11-2028

COMPANY INFORMATION

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MRPI® REGISTRATION

1.1.00470.2023

DATE OF ISSUE

17-11-2023

EXPIRY DATE

17-11-2028

PRODUCT

WasteBasedBricks from 100% Waste

DECLARED UNIT/FUNCTIONAL UNIT

1 piece (1 waalformaat = 1.9 kg)

DESCRIPTION OF PRODUCT

The WasteBasedBrick is made from 100% recycled materials coming from construction, demolition and industrial waste streams. It can be used for facades, wall- and floor cladding and is produced at Zilverschoon Randwijk, Netherlands.

VISUAL PRODUCT

MORE INFORMATION

www.stonecycling.com/wastebasedbricks/

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Anne Kees Jeeninga, Advieslab v.o.f..**
The LCA study has been done by **Bob Roijen, SGS INTRON.**
The certificate is based on an LCA-dossier according to ISO14025 and EN15804+A2/Bepalingsmethode. It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2/Bepalingsmethode. Declaration of SVHC that are listed on the 'Candidate List of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

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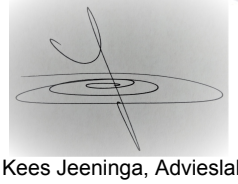
ir. J-P den Hollander, Managing director MRPI®

DEMONSTRATION OF VERIFICATION
CEN standard EN15804 serves as the core PCR[a]
Independent verification of the declaration and data, according to EN ISO 14025:2010: internal: external: X
Third party verifier:  Anne Kees Jeeninga, Advieslab v.o.f.
[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

The study is performed on the most optimal product, the WasteBasedBrick® Impact. WasteBasedBricks® are unique and produced from 100% secondary materials. The following process steps take place sequentially.

1- Mold preparation, the production of wooden molds used to form the bricks. The material and energy consumption for this process step has been inventoried and included in the LCA calculations.

2- Preparation of the 100% waste-based recipe, unitising the waste clay from the factory itself and mixing it with secondary materials such as waste from the ceramic industry.

3- Forming, the bricks are formed using the previously produced molds. Molding sand is used for this, which has been dried at the supplier's. The extraction, drying and shaping of the sand is included in the LCA calculations.

4- Drying, the green bricks are dried. Up to and including this production step, all “production waste” / rejects can be added again at the beginning of the production process.

5- Stacking, the dried bricks are stacked on hulos in the oven.

6- Baking, the bricks are baked. This uses natural gas and electricity. The firing curve is optimised for the 100% waste based recipe.

7- Packing, the bricks are prepared for delivery.

It's noteworthy that WasteBasedBricks® boast an exceptional service life, often surpassing the lifespan of the structures they are used to build. This durability further underscores StoneCycling’s commitment to sustainability and long-term environmental responsibility.

COMPONENT > 1% of total mass	[%]
Waste Clay	-
Waste material 1 (mineral based)	-
Waste material 2 (mineral based)	-

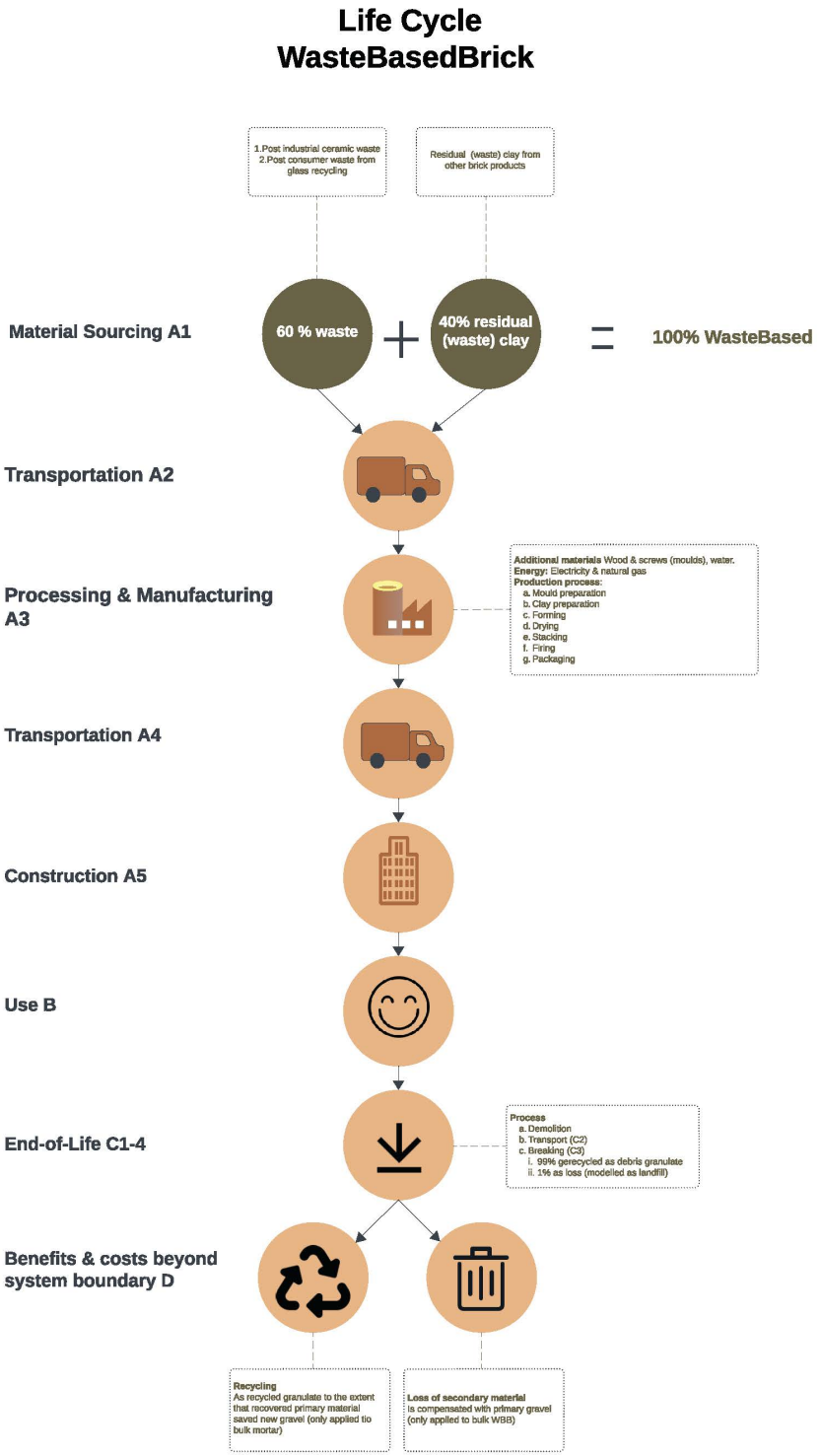
SCOPE AND TYPE

WasteBasedBricks® are produced in Heteren, the Netherlands. The waste treatment scenario used for this EPD is based on the Dutch waste treatment scenario.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

X = Modules Assessed

ND = Not Declared



LCA process diagram according to EN 15804 (7.2.1)

REPRESENTATIVENESS

The bricks in this study are produced in Heteren, the Neterlands by Zilverschoon Randwijk.

ENVIRONMENTAL IMPACT per functional unit or declared unit (indicators A1)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
ADPE	kg Sb eq.	7.45 E-8	4.54 E-7	5.81 E-7	1.11 E-6	3.25 E-8	3.10 E-7	8.28 E-9	8.70 E-10	3.77 E-9
ADPF	MJ	6.67 E-2	2.69 E-1	7.93 E+0	8.27 E+0	2.92 E-1	1.84 E-1	3.94 E-2	2.66 E-3	9.44 E-4
GWP	kg CO2 eq.	5.63 E-3	1.74 E-2	4.90 E-1	5.13 E-1	2.10 E-2	1.19 E-2	2.90 E-3	9.33 E-5	7.40 E-5
ODP	kg CFC11 eq.	4.64 E-10	3.23 E-9	6.16 E-8	6.52 E-8	3.63 E-9	2.21 E-9	3.18 E-10	3.11 E-11	6.45 E-12
POCP	kg ethene eq.	3.71 E-6	1.04 E-5	7.69 E-5	9.10 E-5	2.14 E-5	7.14 E-6	1.66 E-6	9.94 E-8	5.47 E-8
AP	kg SO2 eq.	3.91 E-5	7.49 E-5	3.74 E-4	4.88 E-4	1.58 E-4	5.12 E-5	1.34 E-5	6.82 E-7	4.20 E-7
EP	kg (PO4)3- eq.	4.48 E-6	1.50 E-5	4.90 E-5	6.84 E-5	3.59 E-5	1.02 E-5	2.99 E-6	1.32 E-7	6.85 E-8

Toxicity indicators for Dutch market

HTP	kg DCB eq.	2.13 E-3	7.45 E-3	5.26 E-2	6.22 E-2	7.77 E-3	5.09 E-3	6.90 E-4	4.22 E-5	3.43 E-5
FAETP	kg DCB eq.	4.11 E-5	2.18 E-4	4.83 E-4	7.42 E-4	1.08 E-4	1.49 E-4	1.19 E-5	1.00 E-6	5.31 E-7
MAETP	kg DCB eq.	1.74 E-1	7.79 E-1	4.67 E+0	5.62 E+0	3.76 E-1	5.33 E-1	4.48 E-2	3.58 E-3	2.21 E-3
TETP	kg DCB eq.	1.03 E-5	2.64 E-5	4.34 E-4	4.71 E-4	1.28 E-5	1.80 E-5	8.47 E-6	1.06 E-7	1.78 E-7
ECI	Euro	7.03 E-4	2.10 E-3	3.25 E-2	3.53 E-2	2.81 E-3	1.44 E-3	3.00 E-4	1.32 E-5	9.52 E-6
ADPF	kg Sb. eq.	3.73 E-5	1.28 E-4	4.28 E-3	4.45 E-3	1.38 E-4	8.74 E-5	2.05 E-5	1.27 E-6	5.00 E-7

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	3.39 E-3	1.76 E-2	4.96 E-1	5.17 E-1	2.12 E-2	1.20 E-2	2.95 E-3	9.53 E-5	7.62 E-5
GWP-fossil	kg CO2 eq.	5.71 E-3	1.75 E-2	4.96 E-1	5.19 E-1	2.12 E-2	1.20 E-2	2.94 E-3	9.50 E-5	7.57 E-5
GWP-biogenic	kg CO2 eq.	-2.33 E-3	1.07 E-5	1.83 E-4	-2.14 E-3	5.90 E-6	7.27 E-6	1.70 E-5	1.88 E-7	3.49 E-7
GWP-luluc	kg CO2 eq.	4.98 E-6	6.21 E-6	2.64 E-5	3.76 E-5	1.67 E-6	4.25 E-6	5.59 E-7	2.65 E-8	8.14 E-8
ODP	kg CFC11 eq.	5.60 E-10	4.04 E-9	6.99 E-8	7.45 E-8	4.58 E-9	2.76 E-9	3.81 E-10	3.91 E-11	7.56 E-12
AP	mol H+ eq.	4.81 E-5	1.00 E-4	4.73 E-4	6.21 E-4	2.22 E-4	6.84 E-5	1.84 E-5	9.02 E-7	5.48 E-7
EP-freshwater	kg PO4 eq.	2.18 E-7	1.44 E-7	1.08 E-6	1.44 E-6	7.72 E-8	9.90 E-8	9.15 E-8	1.07 E-9	2.80 E-9
EP-marine	kg N eq.	9.20 E-6	3.58 E-5	1.26 E-4	1.71 E-4	9.79 E-5	2.45 E-5	7.33 E-6	3.10 E-7	1.57 E-7
EP-terrestrial	mol N eq.	1.09 E-4	3.94 E-4	1.39 E-3	1.90 E-3	1.07 E-3	2.70 E-4	8.14 E-5	3.42 E-6	1.82 E-6
POCP	kg NMVOC eq.	2.99 E-5	1.13 E-4	4.71 E-4	6.13 E-4	2.95 E-4	7.71 E-5	2.21 E-5	9.94 E-7	5.02 E-7
ADP-minerals & metals	kg Sb eq.	7.45 E-8	4.54 E-7	5.81 E-7	1.11 E-6	3.25 E-8	3.10 E-7	8.28 E-9	8.70 E-10	3.77 E-9
ADP-fossil	MJ, net calorific value	6.67 E-2	2.69 E-1	7.93 E+0	8.27 E+0	2.92 E-1	1.84 E-1	3.94 E-2	2.66 E-3	9.44 E-4
WDP	m3 world eq. deprived	2.00 E-2	8.27 E-4	4.01 E-3	2.48 E-2	3.91 E-4	5.66 E-4	1.79 E-4	1.19 E-4	1.09 E-3

GWP-total = Global Warming Potential total
GWP-fossil = Global Warming Potential fossil fuels
GWP-biogenic = Global Warming Potential biogenic
GWP-luluc = Global Warming Potential land use and land use change
ODP = Depletion potential of the stratospheric ozone layer
AP = Acidification Potential, Accumulated Exceedence
EP-freshwater = Eutrophication Potential, fraction of nutrients reaching freshwater end compartment
EP-marine = Eutrophication Potential, fraction of nutrients reaching marine end compartment
EP-terrestrial = Eutrophication Potential, Accumulated Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	6.91 E-10	1.58 E-9	2.34 E-9	4.61 E-9	5.87 E-9	1.08 E-9	4.06 E-10	1.75 E-11	9.40 E-12
IRP	kBq U235 eq.	2.05 E-4	1.18 E-3	3.62 E-3	5.00 E-3	1.25 E-3	8.05 E-4	1.25 E-4	1.09 E-5	3.81 E-6
ETP-fw	CTUe	1.33 E-1	2.19 E-1	8.92 E-1	1.24 E+0	1.76 E-1	1.50 E-1	3.20 E-2	1.72 E-3	1.52 E-3
HTP-c	CTUh	5.94 E-12	7.79 E-12	5.74 E-11	7.11 E-11	6.15 E-12	5.32 E-12	7.59 E-13	3.98 E-14	5.63 E-14
HTP-nc	CTUh	8.31 E-11	2.61 E-10	9.48 E-10	1.29 E-9	1.51 E-10	1.78 E-10	2.14 E-11	1.23 E-12	1.59 E-12
SQP	---	3.32 E-1	2.30 E-1	1.52 E-1	7.14 E-1	3.72 E-2	1.58 E-1	6.58 E-3	5.57 E-3	1.22 E-3

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]

- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer [2]

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

RESOURCE USE per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	4.59 E-2	3.86 E-3	4.59 E-1	5.09 E-1	1.58 E-3	2.64 E-3	2.24 E-3	2.15 E-5	6.55 E-5
PERM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	4.59 E-2	3.86 E-3	4.59 E-1	5.09 E-1	1.58 E-3	2.64 E-3	2.24 E-3	2.15 E-5	6.55 E-5
PENRE	MJ	7.08 E-2	2.86 E-1	8.79 E+0	9.15 E+0	3.10 E-1	1.96 E-1	4.21 E-2	2.82 E-3	1.00 E-3
PENRM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	7.08 E-2	2.86 E-1	8.79 E+0	9.15 E+0	3.10 E-1	1.96 E-1	4.21 E-2	2.82 E-3	1.00 E-3
SM	kg	1.90 E+0	0.00	0.00	1.90 E+0	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m3	4.87 E-4	3.05 E-5	1.92 E-4	7.09 E-4	1.50 E-5	2.09 E-5	1.32 E-5	2.84 E-6	2.55 E-5

PERE = Use of renewable energy excluding renewable primary energy resources
PERM = Use of renewable energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials
PENRM = Use of non-renewable primary energy resources used as raw materials
PENRT = Total use of non-renewable primary energy resources
SM = Use of secondary materials
RSF = Use of renewable secondary fuels
NRSF = Use of non renewable secondary fuels
FW = Use of net fresh water

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	1.51 E-7	6.89 E-7	1.08 E-5	1.16 E-5	7.95 E-7	4.71 E-7	6.87 E-8	3.97 E-9	1.91 E-9
NHWD	kg	1.49 E-3	1.67 E-2	7.09 E-3	2.53 E-2	3.45 E-4	1.14 E-2	5.50 E-3	3.61 E-2	1.02 E-5
RWD	kg	2.71 E-7	1.83 E-6	5.23 E-6	7.34 E-6	2.03 E-6	1.25 E-6	1.77 E-7	1.75 E-8	4.13 E-9
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.00	0.00	2.85 E-2	2.85 E-2	0.00	0.00	1.79 E+0	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ETE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
BCCpr	kg C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCCpa	kg C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

Virtually no materials or processes have been excluded from the LCA. Zilverschoon Randwijk inventoried process data in 2023. Energy and material use has been calculated based on the actual recipe, the machinery used and the production rate.

Regarding the secondary materials applied in the bricks processing and transport to the production location has been allocated to the product system that produces the waste. All processes at the location of Zilverschoon Randwijk have been allocated to the production of WasteBasedBricks.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

The end of life is based on processes in the Dutch national LCA database and LCA manual.

Description	amount	unit
Demolition (C1): diesel use	5.2	l/m3 waste
Demolition (C1): excavator	0.06	hr/m3 waste
Transport to waste tratment (crusher) by truck (C2)	50	km
Crushing (C3): 0270-reC & Breken, per kg steenachtig (Dutch LCA database).	1	kg/kg waste
Loss 1% (modelled as landfill) (C4) 0240-sto&Stort beton, cellenbeton â€¦ (Dutch LCA database)	0.01	kg/kg waste

DECLARATION OF SVHC

No substances that are listed in the latest “Candidate List of Substances of Very High Concern for authorisation” are included in the product that exceed the limit for registration.

REFERENCES

•Stichting Nationale Milieudatabase, Bepalingsmethode Milieuprestatie Bouwwerken Versie 1.0 (juli 2020).

•EN 15804:2012+A2:2019, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products, 2019.

•ISO 14040:2006. Environmental management – Life cycle assessment – Principles and framework. 2006.

•ISO 14044:2006. Environmental management – Life cycle assessment – Requirements and guidelines. 2006.

•ISO 21930:2017. Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services. 2017.

• ISO 14025:2006. Environmental labels and declarations – Type III environmental declarations – Principles and procedures. 2006.

•SGS INTRON report: A135280/R20231298, July 2023

REMARKS

StoneCycling is continuously innovating their product. We’re actively working towards carbon neutral fired bricks by changing the fuel type. Read more on stonecycling.com/news/carbon-neutral-bricks/.