

ENVIRONMENTAL PRODUCT DECLARATION

This EPD is in accordance with ISO 14025 and EN 15804.

Owner of the declaration:	Beer Sten AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-4061-3090-EN
Issue date:	19.12.2022
Valid to:	19.12.2027

BeerEcoSten® India - The Colourful Selection

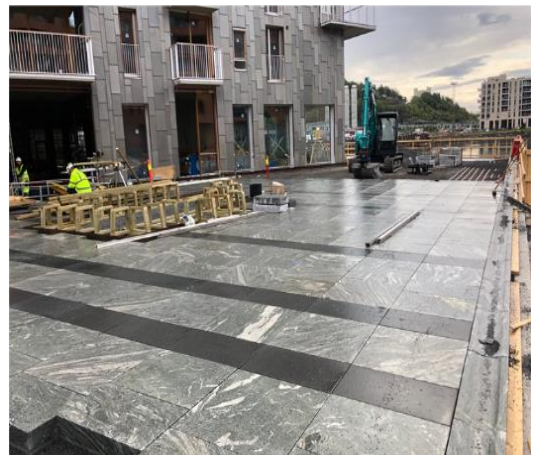
BeerEcoSten® Kuppam Grey
BeerEcoSten® Kuppam Black
BeerEcoSten® Gneis Green
BeerEcoSten® Mint Grey
BeerEcoSten® Desert Brown
BeerEcoSten® Grape Red

BEER STEN AS

Etabl ★ 1879

Beer Sten AS

www.epd-norge.no



General information

Product

BeerEcoSten® Kuppam Grey
 BeerEcoSten® Kuppam Black
 BeerEcoSten® Gneis Green
 BeerEcoSten® Mint Grey
 BeerEcoSten® Desert Brown
 BeerEcoSten® Grape Red

Program holder

Næringslivets Stiftelse for Miljødeklarasjoner
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Declaration number

NEPD-4061-3090-EN

This declaration is based on Product Category Rules:

EN 15804:2012+A1:2013 v.1.0 (24.11.2013).
 NPCR Part A v.1.0 for Construction products and services (07.04.2017).
 NPCR 018 v.1.0 Part B for natural stone products, aggregates and fillers
 (20.05.2020).

Statements:

The owner of the declaration shall be liable for the underlying information and evidence.

EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Declared unit:

Declared unit with option:

Functional unit:

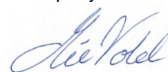
1 tonne of BeerEcoSten® India installed in roads/pavements/parking lots/city squares/driveways/gardens/parks etc.

Verification:

Independent verification of the declaration and data, according to ISO14025:2010

internal external

Third party verifier:



Mie Vold - LCA.no AS
 (Independent verifier approved by EPD Norway)

Owner of the declaration

EPD owner: Beer Sten AS
 Contact person: Monica Midtun Sander
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 e-mail: monica@beersten.no
 Address: Habornveien 56
 1630 Gamle Fredrikstad

Manufacturer

One manufacturer was declared, here named as: India
 Can be provided upon request.

Place of production:

India

Management system:

Organisation no:

952 440 330

Issue date

19.12.2022

Valid to

19.12.2027

Year of study:

2021

Comparability:

EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context. EPDs from other programmes than EPD-Norway may not be comparable.

The EPD has been worked out by:

Simon A. Saxegård




Approved



Håkon Hauan
 Managing Director of EPD-Norway

Product

Product description:

BeerEcoSten® India is a product group of stone products with different colors of natural stone. The product group includes paving, wallstones, elements and curbs in an infinite variety of sizes. During installation it is only curb stones that requires adhesive concrete. A specific installation scenario (A5) is described for curb stones because these require additional B30 concrete.

Technical data:

Density of product: 2.6 t/m³

Product specifications are tested in accordance to standards:
 NS-EN 1926 (Compressive strength).
 NS-EN 12372 (Bending tensile strength).
 NS-EN 13755 (Water absorption).

Product specification

Declared stone types	Water absorption		Flexural strength		Compressive strenght		Mineral composition
		%		Mpa		Mpa	
BeerEcoSten® Kuppam Grey	0,20	%	21,6	Mpa	279	Mpa	Quartz, feldspar, biotite, amphibole, epidot, hematite
BeerEcoSten® Kuppam Black	0,00	%	36,3	Mpa	316	Mpa	Feldspar, clinopyroxene, bitotie, olivine, magnetite
BeerEcoSten® Gneis Green	0,10	%	22,5	Mpa	314	Mpa	Quartz, feldspar, biotite, epidot
BeerEcoSten® Desert Brown	0,20	%	16,3	Mpa	304	Mpa	Quartz, feldspar, biotite, chlorite
BeerEcoSten® Mint Grey	0,20	%	25,4	Mpa	299	Mpa	Quartz, feldspar, biotite, magnetite
BeerEcoSten® Grape Red	0,10	%	27,2	Mpa	333	Mpa	Quartz, feldspar, biotite / chlorite, zirkon

Use and application:

- Elements and wallstones
- Curb stone
- Pavers
- Setts/cubes
- Steps

All products are licensed for road use according to strength and property parameters.

Market: Norway

Reference service life:

>60 years.

Average data:

This EPD declares natural stone products, from six types of materials, in various shapes, sizes and surfaces. The manufacturing data collected represent an average of all variations.

A test was performed to investigate variations in the amount of saw dust from variations in saw blade thicknesses for cutting. It was found less than 10% variations in amounts of saw dust for the smallest stones cut (10x10x10) across the range of saw blade thicknesses.

Similarly, flaming contributed with less than 10% variation for all stone sizes. Data were normalised per tonne stone product sold from manufacturer. Cut wastages, flaming, administrative consumables, and waste management are averaged accordingly.

LCA: Calculation rules

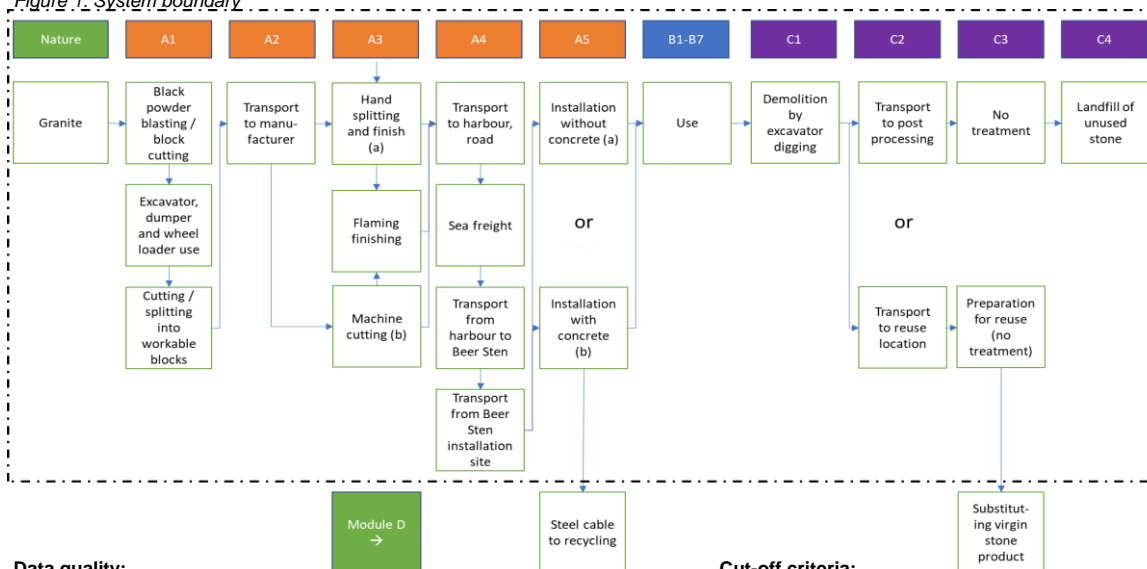
Functional unit

1 tonne of BeerEcoSten® India installed in roads/pavements/parking lots/city squares/driveways/gardens/parks etc.

System boundary:

The system boundary includes the whole life cycle of BeerEcoSten® India installed, used, and handled after end-of-useful-life in Norway.

Figure 1: System boundary



Data quality:

Data quality: Good quality. Data based on information directly from manufacturer and Beer Sten AS. Transport based on information from distribution actors.

Database data based on Ecoinvent 3.8, where no data are more than 10 years old.

LCA software: SimaPro 9.4.0.2

Year of average data from manufacturer: 2019.

Allocation:

The allocation is performed in accordance with the provisions of ISO 14025. Incoming energy and water, and waste production in-house is allocated equally among all products manufactured from Beer Sten's Indian manufacturer. Grid-electricity, cutting machinery, blades and buildings are fully allocated to the industrial machine cutting process as the hand-split/cut stones are traditionally manufactured. All other inventory inputs and outputs are allocated equally between the two manufacturing processes (A3). Forestry associated to clearing of land area has been excluded because it has an economic value, as described in NPCR 018.

Cut-off criteria:

All major raw materials and all the essential energy flows are included. The production processes for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

LCA: Scenarios and additional technical information

The following information describes the scenarios in the different modules of the EPD.

Transport from production place to assembly/user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	55 %	>32 EURO 4	250	0,022106 l/tkm	5,5
Boat Chennai - Colombo	60 %	15000 DWT container ship	1093	0,0031 l/tkm	3,4
Boat Colombo - Bremerhaven	60 %	15000 DWT container ship	12890	0,0025 l/tkm	31,6
Boat Bremerhaven - Fredrikstad	60 %	15000 DWT container ship	1027	0,0025 l/tkm	2,6
Truck	55 %	>32 EURO 6, B7 fuel	90	0,022106 l/tkm	2,0

Stones are transported from the quarries / manufacturing site to Chennai harbor (250km) before they are shipped to Bremerhaven via Colombo for transshipment. Sea vessel sizes have been adjusted according to information from EPD owner. Fuel consumption is based on Smith et al. (2014).

Assembly (A4) Intermediate storage

	Unit	Value
Beer Sten AS' sales and storage operation	t	1

Activities at Beer Sten AS are included as storage activity during the transport phase A4. Impacts associated with the storage are yearly activities and direct emissions divided on the annual sales of all natural stones.

Assembly (A5a) Stone installment

	Unit	Value
Excavator in operation	min/t	2

Assembly (A5b) Curb stone installment with concrete

	Unit	Value
Excavator in operation	min/t	2
Concrete B30 (NEPD-2327-1071-NO)	m ³ /t	0,0007

Use phase (B1-B7)

No activity necessary to achieve the function of the declared unit. Natural stones are products which need no maintenance, washing or other activities to fulfill their intended use throughout their reference service life.

End of Life (C1, C3, C4)

Natural stone products can be reused. No national statistics on the life cycle scenario of natural stones are available, so a conservative approach was selected in accordance with NPCR 018. The end-of-life treatments typical for natural stone products are either direct reuse (80%), i.e., reuse as raw material to new stone produce, or reuse as raw material to gravel/sand production (10%) or as inert landfill (10%).

C1 Demolition

	Unit	Value
Excavator in operation	min/t	10

The demolition phase is assumed to be mainly performed by hand, but with aid of machinery, like an excavator, in the process.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck	36 %	16-32t EURO 5	50	0,043287 l/tkm	2,2

C3 Waste treatment

	Unit	Value
Rock crushing, for landfill	t	0,1
Rock crushing, as recycling	t	0,1
Sorting for reuse (no activity)	t	0,8

C4 Disposal

	Unit	Value
Inert waste, landfill	t	0,1

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Natural stone, reused at site or nearby	t	0,8
Crushed stone, recycled to road constructions etc.	t	0,1

Natural stone products can in most cases be reused directly for refurbishment or new installations. Beer Sten describes that about 10% will be landfilled/long time stored (>3 years) as inert gravel, leaving 90% to be reused either as natural stones (80%) or downcycled to gravel (10%). Crushing to gravel is included as the waste management process.

Additional technical information

The stones will maintain the same technical properties as described for the declared functional unit when reused or recycled.

LCA: Results

The results present the environmental and resource impacts, as well as delivered outputs, connected to the functional unit as described in EN 15804+A1.

System boundaries (X=included, MND=module not declared, MNR=module not relevant)

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Environmental impact

Parameter	Unit	A1-A3a	A1-A3b	A4	A5a	A5b	B1-B7	C1	C2	C3	C4	D
GWP	kg CO2 -eqv	7,51E+00	5,64E+01	1,83E+02	2,41E+00	2,57E+00	0,00E+00	1,09E+01	8,23E+00	5,86E-03	6,68E-01	-9,6E+01
ODP	kg CFC11-eqv	1,3E-06	1,4E-06	3,0E-05	4,0E-07	4,1E-07	0,0E+00	2,0E-06	1,5E-06	2,9E-10	2,1E-07	-1,6E-05
POCP	kg C2H4 -eqv	2,3E-03	9,6E-03	9,3E-02	4,0E-04	1,1E-03	0,0E+00	1,7E-03	1,1E-03	1,9E-06	1,5E-04	-1,7E-02
AP	kg SO2 -eqv	4,4E-02	2,4E-01	2,7E+00	8,4E-03	8,8E-03	0,0E+00	3,8E-02	2,6E-02	2,1E-05	4,9E-03	-6,6E-01
EP	kg PO4-eqv	1,2E-02	1,2E-01	3,9E-01	3,5E-03	3,5E-03	0,0E+00	8,4E-03	5,8E-03	9,8E-06	1,1E-03	-1,8E-01
ADPM	kg Sb-eqv	2,9E-05	2,1E-04	4,8E-04	3,9E-06	4,0E-06	0,0E+00	1,2E-05	2,9E-05	1,2E-07	9,8E-07	-3,7E-04
ADPE	MJ	1,2E+02	6,8E+02	2,4E+03	3,3E+01	3,4E+01	0,0E+00	1,6E+02	1,2E+02	5,5E-02	1,7E+01	-1,3E+03

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

Resource use

Parameter	Unit	A1-A3a	A1-A3b	A4	A5a	A5b	B1-B7	C1	C2	C3	C4	D
RPEE	MJ	1,74E+02	7,63E+01	3,75E+01	5,35E-01	5,35E-01	0,00E+00	1,31E+00	1,78E+00	5,56E-01	3,85E-01	-1,35E+03
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	1,74E+02	7,63E+01	3,75E+01	5,35E-01	5,35E-01	0,00E+00	1,31E+00	1,78E+00	5,56E-01	3,85E-01	-1,35E+03
NRPE	MJ	1,27E+02	7,14E+02	2,48E+03	3,37E+01	3,37E+01	0,00E+00	1,58E+02	1,26E+02	9,01E-02	1,72E+01	-2,60E+03
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	1,27E+02	7,14E+02	2,48E+03	3,37E+01	3,37E+01	0,00E+00	1,58E+02	1,26E+02	9,01E-02	1,72E+01	-2,60E+03
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,49E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,28E-04
NRSF	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,62E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	kg	1,27E+02	7,14E+02	2,48E+03	3,37E+01	3,37E+01	0,00E+00	1,58E+02	1,26E+02	9,01E-02	1,72E+01	-2,60E+03

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE 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; W Use of net fresh water

End of life - Waste

Parameter	Unit	A1-A3a	A1-A3b	A4	A5a	A5b	B1-B7	C1	C2	C3	C4	D
HW	kg	1,98E+02	4,89E-04	3,83E-03	9,21E-05	9,21E-05	0,00E+00	4,30E-04	3,28E-04	2,52E-07	2,47E-05	-3,36E-03
NHW	kg	2,04E+02	4,39E+02	7,66E+01	7,71E-01	7,71E-01	0,00E+00	2,30E+00	7,27E+00	8,16E-03	2,00E+02	-1,82E+01
RW	kg	7,00E-04	1,09E-03	1,64E-02	2,23E-04	2,23E-04	0,00E+00	1,07E-03	8,50E-04	6,59E-07	1,17E-04	-2,76E-02

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

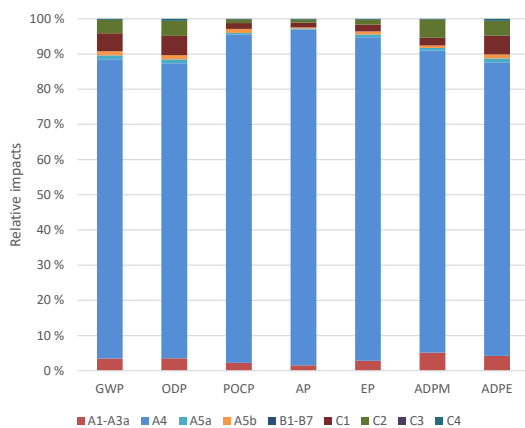
End of life - Output flow

Parameter	Unit	A1-A3a	A1-A3b	A4	A5a	A5b	B1-B7	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,00E-01	0,00E+00	0,00E+00
MR	kg	0,00E+00	0,00E+00	0,00E+00	3,37E-01	3,37E-01	0,00E+00	0,00E+00	0,00E+00	1,00E-01	0,00E+00	0,00E+00
MER	kg	1,24E-03	1,24E-03	8,66E-01	2,89E-01	2,89E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	1,69E-02	1,69E-02	1,20E+00	1,11E-01	1,11E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	3,46E-02	3,46E-02	2,47E+00	1,37E-01	2,34E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

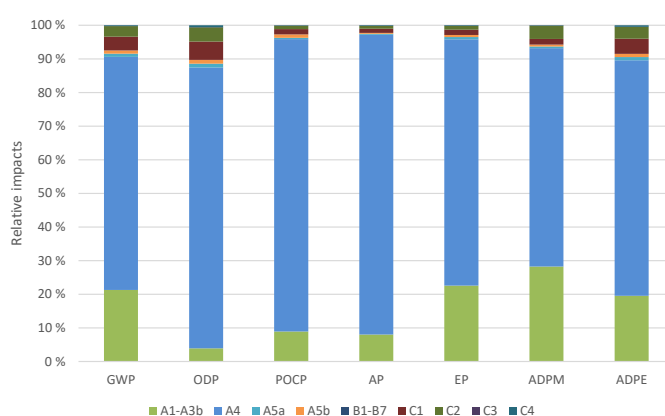
Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009

Hand cut/split (A1-A3a)



Impacts associated with hand cut/split stone from India mainly occur as part of the transport from production to installment site. Impacts associated with extraction and manufacturing is very low in comparison to industrial cut for most impact categories.

Industrial cut/split (A1-A3b)



Impacts associated with industrial cut/split stone from India mainly occur during transport to installment from manufacturing site. The impact from manufacturing is of greater importance for industrial cut/split stone than for hand cut.

Additional Norwegian requirements

Greenhouse gas emission from the use of electricity in the manufacturing phase

National production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

Data source	Amount	Unit
Econinvent v3.8 Electricity, medium voltage (IN - Southern mix) market for Cut-off, U	1387,8	g CO2-eqv/kWh

Dangerous substances

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskitfen, Annex III), see table.

Name	CAS no.	Amount

Indoor environment


The product meets the requirements for low emissions.
No tests have been carried out on the product concerning indoor climate because the usage is intended for outdoor applications and installation.

Carbon footprint

Calculations connected to climate change and global warming potential (GWP) include greenhouse gas emissions from fossil sources and land use change connected to the extraction of natural stones, but does not include calculations of biogenic emissions of CO₂.

Bibliography

ISO 14025:2010	<i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>
ISO 14044:2006	<i>Environmental management - Life cycle assessment - Requirements and guidelines</i>
Ecoinvent v.3.8	Swiss Centre of Life Cycle Inventories. www.ecoinvent.ch
EN 15804:2012+A1:2013 v.1.0	<i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products (24.11.2013).</i>
ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
NEPD-2327-1071-NO	<i>NEPD-2327-1071-NO, 1002 B30 M60 22mm</i>
NS-EN 1926:2006	<i>Natural stone test methods Determination of uniaxial compressive strength</i>
NS-EN 12372	Natural stone test methods - Determination of flexural strength under concentrated load
NS-EN 13755	Natural stone test methods - Determination of water absorption at atmospheric pressure
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Smith et al. 2014	<i>Third IMO GHG Study 2014; International Maritime Organization (IMO) London, UK, April 2015; Smith, T. W. P.; Jalkanen, J. P.; Anderson, B. A.; Corbett, J. J.; Faber, J.; Hanayama,</i>
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