

Environmental Product Declaration

Oil Country Tubular Goods OCTG



BASED ON:

PCR 2012:01
version 2.2
Construction products
and construction services

EN 15804:2014

ISO 14025

CERTIFICATION N°:

S-P-01064

DATE OF REVISION:

2018/10/19 - rev 2

ISSUE DATE:

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VALID UNTIL:

2022/09/14



General information

EPD® REFERENCES

EPD OWNER: TENARIS SA, 29 AVENUE DE LA PORTE-NEUVE, L2227 - LUXEMBOURG

PROGRAMME: THE INTERNATIONAL EPD® SYSTEM, www.environdec.com

PROGRAMME OPERATOR: EPD international AB, box 210 60, SE-100 31 Stockholm, Sweden

INDEPENDENT VERIFICATION

EPD document valid worldwide, according to sales market conditions

CEN standard EN 15804 served as the core PCR (PCR 2012:01, Construction products and Construction services, Version 2.2, 2017-05-30)

PCR review was conducted by: The Technical Committee of the International EPD® System. Chair: Filippo Sessa
Contact via info@environdec.com

Independent verification of the declaration and data, according to EN ISO 14025 : 2010

Third party verifier: ICMQ SpA, via De Castilia, 10 20124 Milano (www.icmq.it)

EPD process certification
(Internal)

EPD verification
(External)

Accredited by: Accredia

Environmental declarations published within the same product category, though originating from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804.

CONTACTS

Tenaris Corporate is available to release an Environmental Product Declaration for one specific product if requested by the customer.

For additional information about this EPD® and about Tenaris activities please contact:
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Technical support to TenarisDalmine was provided by Life Cycle Engineering, Italy.
(info@lcengineering.eu), www.lcengineering.eu).



Tenaris Group

Tenaris is a leading supplier of tubes and related services for world energy industry and other industrial applications worldwide.

The mission is to deliver value to customers through product development, manufacturing excellence and supply chain management.

A global leader around the world is committed to continuous improvement by

sharing knowledge across a single global organization. All of manufacturing facilities share a unified global quality policy and have QHSE Policy, ISO 9001, ISO 14001 and OHSAS 18001 certifications.

Tenaris has an annual production capacity of 6 million tons of steel tubes.

The four Tenaris plants involved in this EPD® are:

TAMSA MEXICO

Production capacity
1 230 000 tons of seamless steel tubes.

Main features
1 steel shop, 3 rolling mills.

Certifications
ISO 9001, ISO 14001 and OHSAS 18001:2007

SIDERCA ARGENTINA

Production capacity
900 000 tons of seamless tubes.

Main features
DRI production, 1 steel shop, 2 rolling mills.

Certifications
ISO 9001, ISO 14001 and OHSAS 18001:2007

DALMINE ITALY

Production capacity
950 000 tons of finished products.

Main features
1 steel shop, 2 rolling mills

Certifications
ISO EN 9001, ISO EN 14001, OHSAS 18001 and ISO EN 50001 for energy efficiency

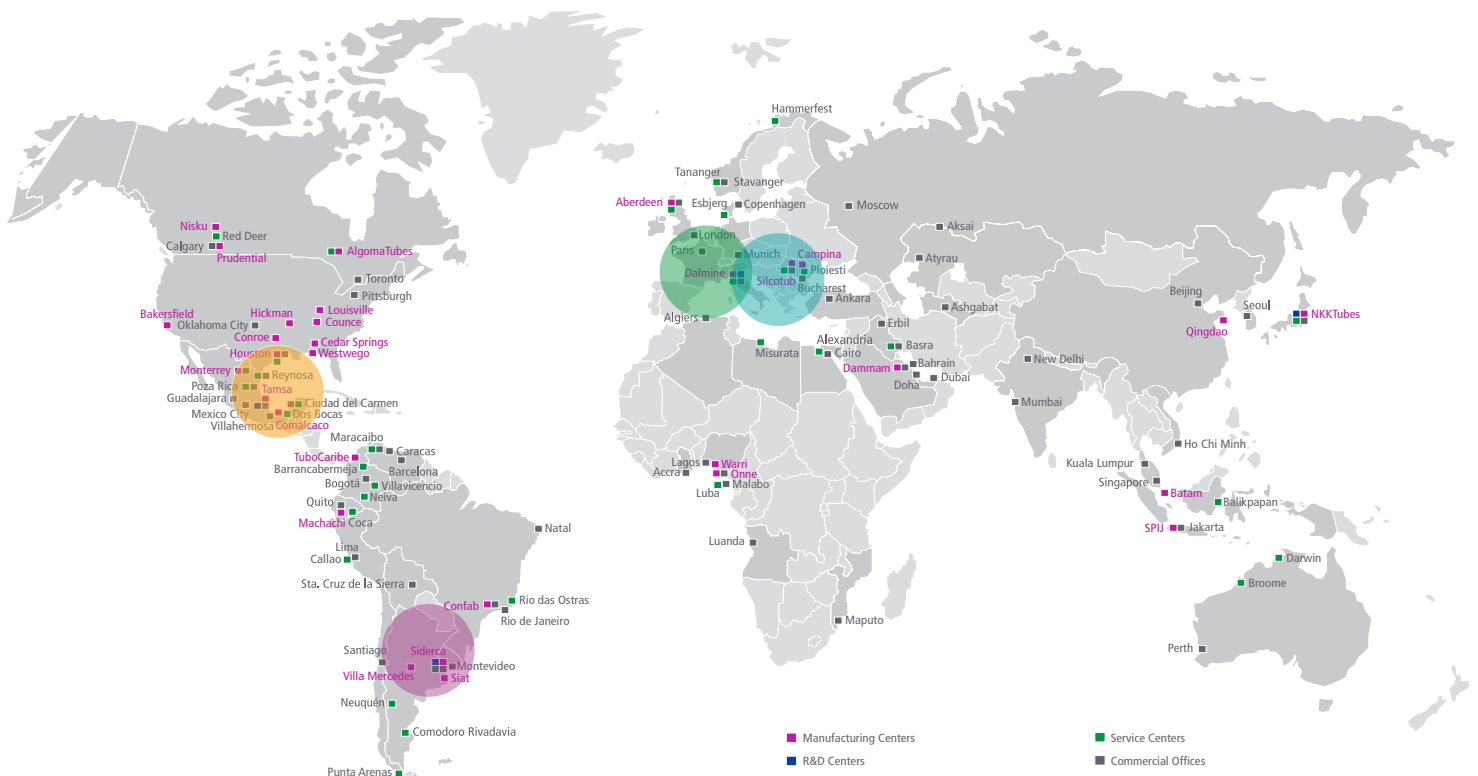
SILCOTUB ROMANIA

Production capacity
180 000 tons of seamless tubes.

Main features
1 steel shop, 1 rolling mill.

Certifications
ISO 9001, ISO 14001 and OHSAS 18001:2007

Seamless steel tubes for energy industry, the automotive sector and for industrial applications



Grouping Criteria

This EPD is representative for Tenaris OCTG products. Primary data come from 4 different production sites and cover a wide range of outside diameters.

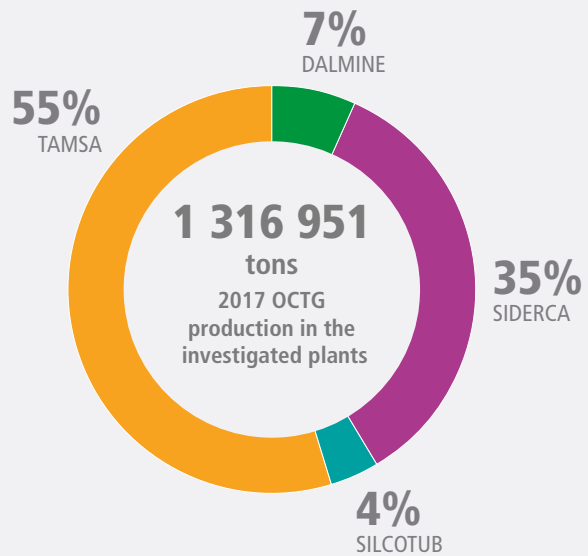
Life Cycle Inventory was produced for each of the reference products. Grouping of inventories for each plant has been done

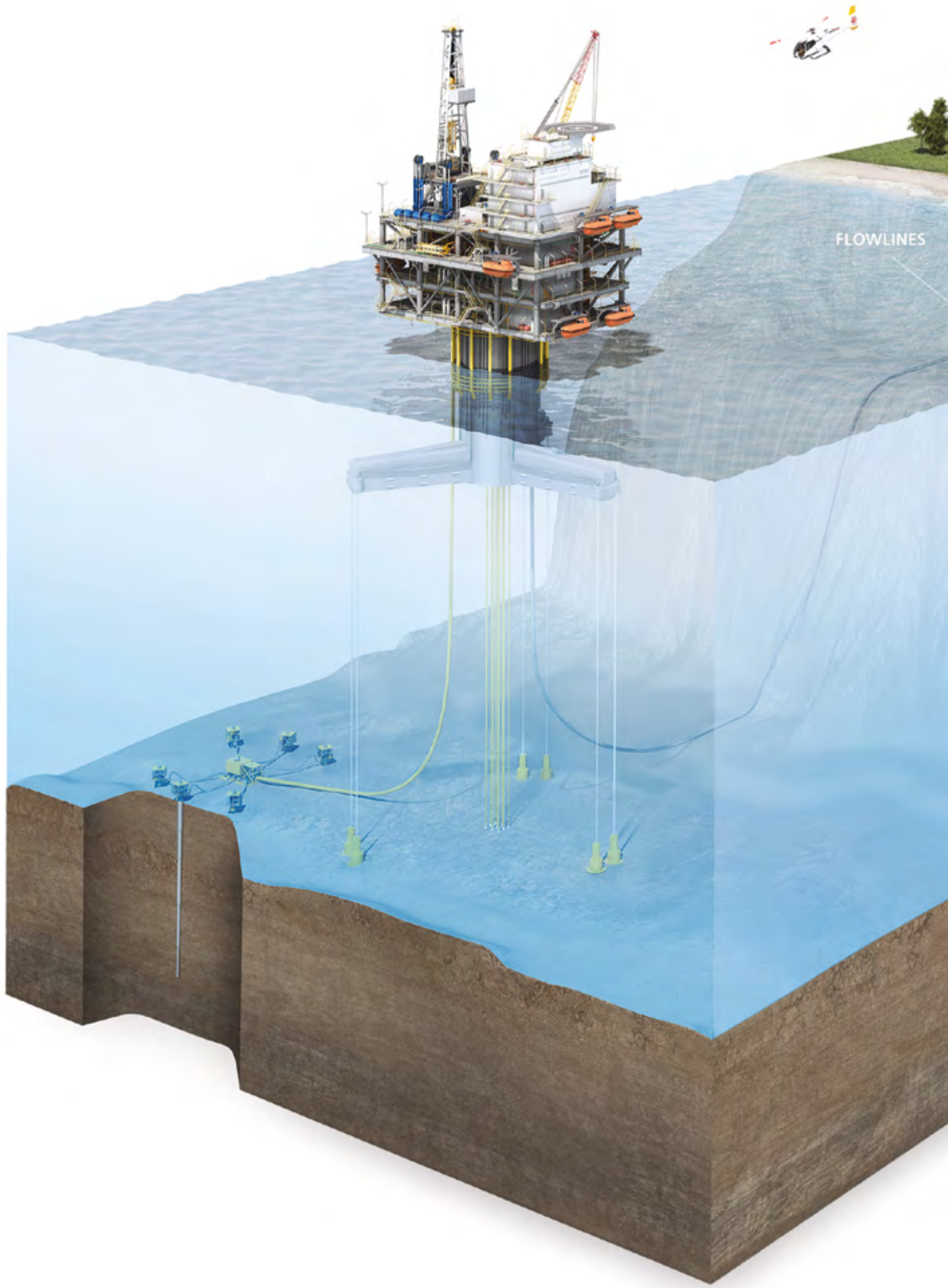
according to the share of each reference on the total OCTG plant production.

EPD[®] result is the average of the 4 plants weighted on the total OCTG production from each one for year 2017:

TAMSA	SIDERCA
7"	5 1/2"
9 5/8"	
DALMINE	SILCOTUB
20"	2 7/8"

Table reports the investigated diameters which compose the data sample





FLOWLINES



ONSHORE LINEPIPE

OCTG Product Family

Tenaris supplies a full range of high quality casing and tubing, drill pipe, premium connections, pipe accessories, sucker rods and coiled tubing for use in all types of oil and gas drilling and well completion activities.

Products are accompanied with services, based on expertise in material selection and pipe handling.

Tenaris products for oil and gas drilling operations include:

CASING & TUBING

Tenaris boasts a complete line of proprietary and API steel grades for more demanding exploration and production applications, including chrome, alloy and high-alloy steels.

PREMIUM CONNECTIONS

TenarisHydril offers proven products designed for the most challenging operations. Blue[®], Wedge Series 500[™] and Wedge Series 600[™] connections, along with Dopeless[®] option, are renowned for their excellence and ability to perform in unconventional well profiles. Also, with new TenarisXP[™] Series, Tenaris combines enhanced performance with API compatibility.

DRILL PIPE

Tenaris provides high quality drill pipe and a proprietary DSTJ[™] double shoulder and Wedge tool joints for a wide variety of well profiles. Tenaris also provides corrosion-resistant and high-strength steel grades for non-conventional drilling operations.

COILED TUBING

Tenaris is a leading manufacturer of coiled tubing for downhole applications, producing continuous coiled tubing at lengths suitable for the most challenging downhole environments.

OIL TOOLS

Tenaris produces a wide range of hot-rolled and cold-drawn seamless tubes in different steel grades for a wide variety of applications. Tenaris also provides perforating guns, to prepare oil and gas wells for production using explosive charges.

ACCESSORIES

To support TenarisHydril premium connections offer, Tenaris supplies a wide range of tubular accessories, non-tubular accessories and devices for E&P operations.

Scope and type of EPD®

The approach used in this EPD is “Cradle to gate with options” one

TABLE OF MODULES																
PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the 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	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

SOFTWARE: SimaPro ver. 8.5.2.0

MAIN DATABASE: Ecoinvent 2.2

REPORT LCA: Life Cycle Assessment applied to OCTG steel products for EPD® purposes

GEOGRAPHICAL SCOPE OF THE EPD: World according to sales market conditions type of EPD®:

Representative corporate average of OCTG produced in 4 different manufacturing sites

CAPTION

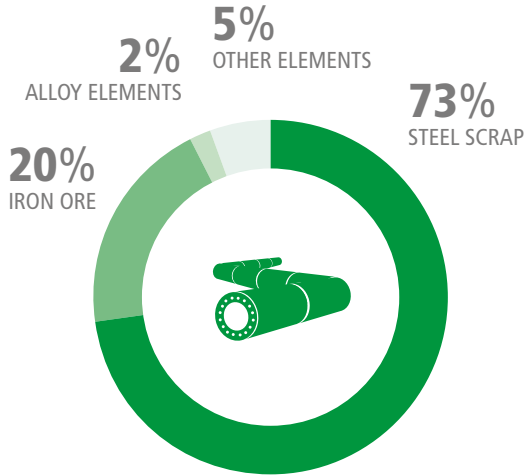
MND = Module Not Declared



Detailed product description

INFORMATION	DESCRIPTION
PRODUCT IDENTIFICATION	OCTG steel products
PRODUCT FEATURES	OD range from 2 7/8 to 20 "
PRODUCT PROPERTIES	Steel grades and pipe properties according to main international standards (DNV OS F101, API 5L, ISO 3183) and customer requirements
FINISHING	API and PREMIUM finishing treatment
MANUFACTURING PLANT	Dalmine - Siderca - Silcotub - Tamsa

PRODUCT COMPOSITION



General Manufacturing Specification

STEEL SHOP

Furnaces in steel shop are loaded mostly by pre-selected scrap, pig iron, hot briquetted iron and direct reduced iron depending on the mill. Metallic charge is melted by an electric arc and by the use of chemical energy coming from natural gas, coal and oxygen. Once the slag has been removed the liquid steel at a temperature of around 1650°C is poured into the ladle. In the ladle furnace argon bubbling, addition of ferroalloys and temperature recovering operations are carried out.

Continuous casting transforms liquid steel into round section solid bars for subsequent rolling. All production processes in the steel shop are controlled by an integrated system including the furnace power management, the furnace fumes emission, the addition of ferroalloys to reach the required chemical composition, and the control of the casting parameters until the cut-to-length of the bars.

MANDREL ROLLING

After passing through a rotary hearth furnace, the bars are transferred to the hot rolling mill in order to carry out the piercing process, thickness rolling and diameter sizing.

The piercing process transforms the hot bar into a hollow: the bar turns due to the movement of two skewed opposing rollers. As a result of the internal tension generated, a hollow is created in the center of the bar.

Lamination takes place in order to reach final dimensions in terms of length and thickness according to customer's request.

HEAT TREATMENTS

In order to obtain the required mechanical properties, heat treatment of normalizing or quenching and tempering are performed in different facilities depending on tube dimensions.

FINISHING

Pipe is finalized in finishing lines performing a combination of non destructive testing to guarantee high quality of the product. Threading technologies provide API or PREMIUM qualified products.

Coating may be applied according to customer's request.

DIRECT REDUCED IRON PRODUCTION (SIDERCA)

Direct reduction is used to produce what is called sponge iron, starting from iron ore and using natural gas as reducing agent. DRI is used as a raw material in the steel shop as a clean iron source substitute for either scrap or pig iron. Siderca plant has an internal DRI production plant patented by MIDREX® which consists of two main units:

- 1. Reformer furnace for the reducing agent manufacturing, where natural gas is converted into carbon monoxide and hydrogen with several hundreds of reformer tubes filled with nickel catalyst*
- 2. Shaft furnace, a reactor where reduction of iron pellets and lumps is produced by reaction with reducing agent gas recirculated in the process*





Environmental Performance

Detailed environmental performance (in terms of potential environmental impacts, use of resources and waste generation) is presented for the three considered phases: Upstream, Core and Downstream. Each phase is divided into sub-phases according to EN 15804

DECLARED UNIT: The declared unit is 1 tonne of fabricated OCTG delivered to final customer.

ENVIRONMENTAL IMPACTS						
POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	UPSTREAM PROCESS	CORE PROCESS		DOWNSTREAM PROCESS	TOTAL
		A1	A2	A3	A4	
GWP	kg CO ₂ eq	1 176	69	709	93	2 047
ODP	g CFC 11eq	< 1	< 1	< 1	< 1	< 1
AP	g SO ₂ eq	2 695	379	923	1 524	5 520
EP	g PO ₄ ³⁻ eq	342	62	207	150	761
POCP	g C ₂ H ₄ eq	295	9	57	47	407
ADPE	g Sb eq	2	< 0.01	< 0.01	< 0.01	2
ADPF	MJ	30 436	904	527	1 266	33 134

GWP Global warming potential

ODP Depletion potential of the stratospheric ozone layer

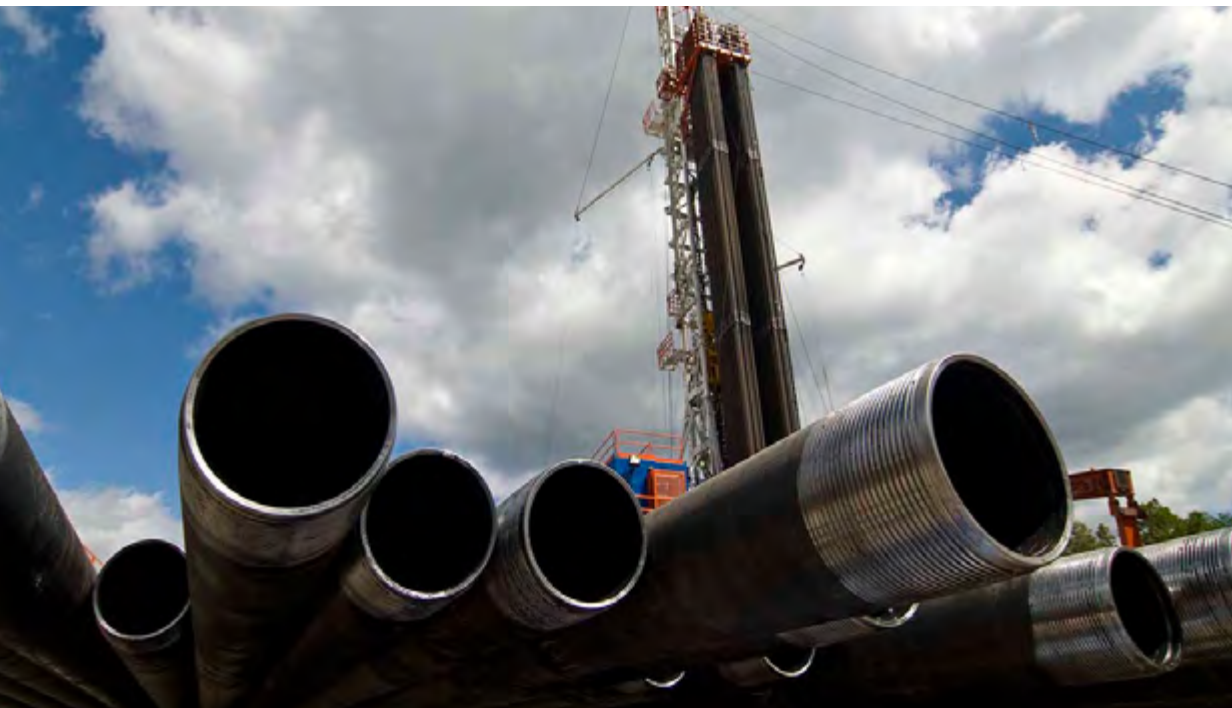
AP Acidification potential of land and water

EP Eutrophication potential

POCP Formation potential of tropospheric ozone photochemical oxidants

ADPE Abiotic depletion potential for non-fossil resources

ADPF Abiotic depletion potential for fossil resources



RESOURCE USE PER DECLARED UNIT

USE OF RENEWABLE MATERIAL RESOURCES	UNITS / D.U.	UPSTREAM PROCESS	CORE PROCESS		DOWNSTREAM PROCESS	TOTAL
		A1	A2	A3	A4	
PERE	MJ	314	1	35	15	366
PERM	MJ	0	0	0	0	0
PERT	MJ	314	1	35	15	366
PENRE	MJ	31 086	913	744	1 361	34 103
PENRM	MJ	314	0	0	0	314
PENRT	MJ	31 399	913	744	1 361	34 417
SM	kg	862	0	0	0	862
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m ³	4.6	0.5	3.7	0.2	9.0

PERE Use of renewable primary energy excluding renewable primary energy resources used as raw materials

PERM Use of renewable primary energy resources used as raw materials

PERT Total use of renewable primary energy resources

PENRE Use of non-renewable primary energy excluding non-renewable primary 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 raw 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 DECLARED UNIT

WASTE GENERATION AND TREATMENT	UNITS / D.U.	UPSTREAM PROCESS	CORE PROCESS		DOWNSTREAM PROCESS	TOTAL
		A1	A2	A3	A4	
HWD	kg	0	0	17	0	17
NHWD	kg	0	0	7	0	7
RWD	kg	0	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	0	0	351	0	351
MER	kg	0	0	11	0	11
EEE	kg	0	0	0	0	0
EET	kg	0	0	0	0	0

HWD Hazardous waste disposed

NHWD Non-hazardous waste disposed

RWD Radioactive waste disposed

CRU Components for re-use

MFR Materials for recycling

MER Materials for energy recovery

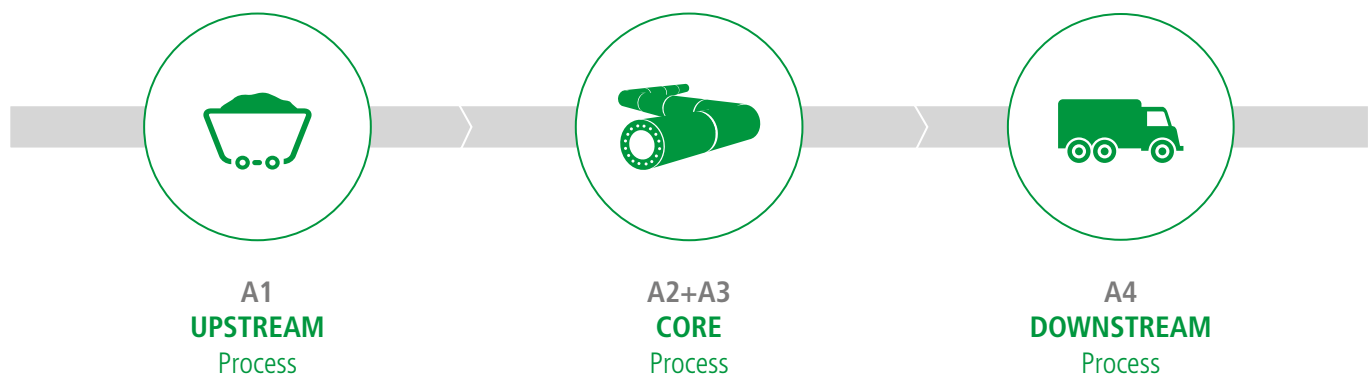
EEE Exported electrical energy

EET Exported thermal energy

The environmental impacts associated with waste disposal to landfill and incineration are accounted in the indicators related to the potential environmental impact (page 12).

Calculation Rules

According to the PCR 2012:01 v. 2.2 the main activities are listed and divided in three subsystems:
UPSTREAM Process, CORE Module, Downstream Process



LCA METHODOLOGY

The environmental burden of the product has been processed according to the general rules of the EPD (Environmental Product Declaration) International Programme and the N.PCR 2012:01 (versions 2.2), construction products and construction services - Multiple UN CPC codes (Cradle to gate with options).

This declaration is based on the application of Life Cycle Assessment (LCA) methodology to the whole life-cycle system. Seamless pipe product at plant level, was described by using specific data from Dalmine manufacturing facility for year 2017.

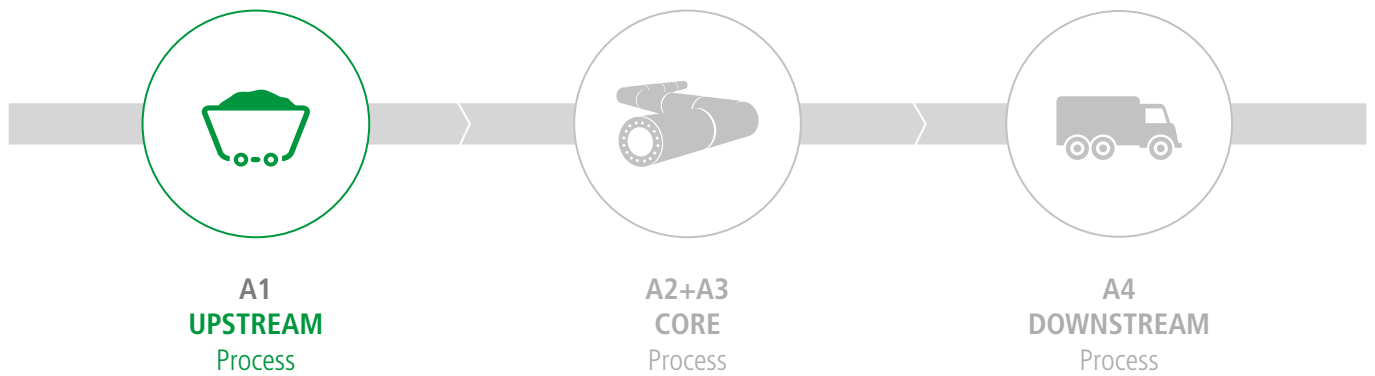
Packaging used for product delivery and pollutant concentration in wastewater is considered negligible in accordance with the cut-off criteria established in PCR 2012:01 v.2.2 (ch. 7.6).

Customized LCA questionnaires were used to gather in-depth information about all aspects of the production system (for example, raw materials specifications, pre-treatments, process efficiencies, air emissions, waste management), ultimately providing a complete picture of the environmental burden of the system:

Raw materials supply (A1), Transport (A2), Manufacturing (A3) and transport to final destination was considered (A4).

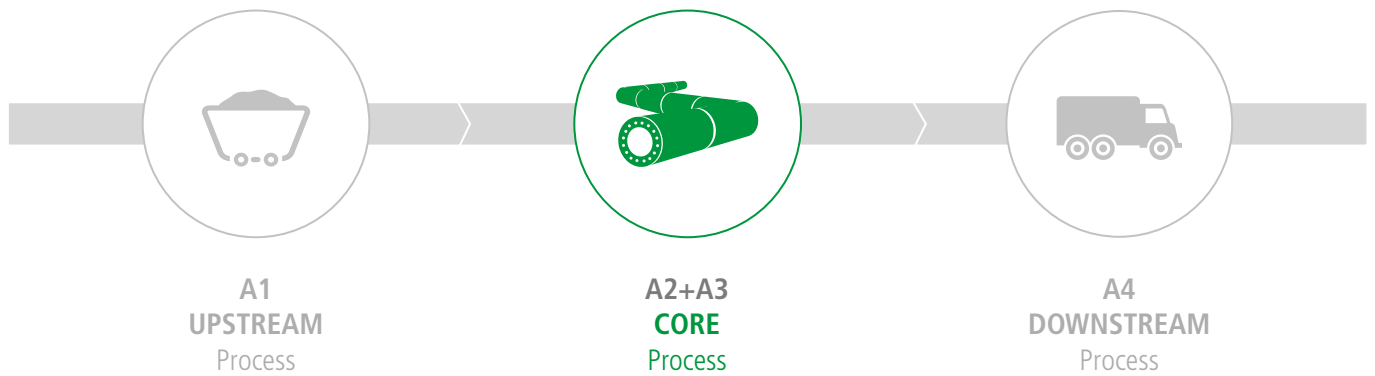
Upstream Process

(A1 Raw material supply)



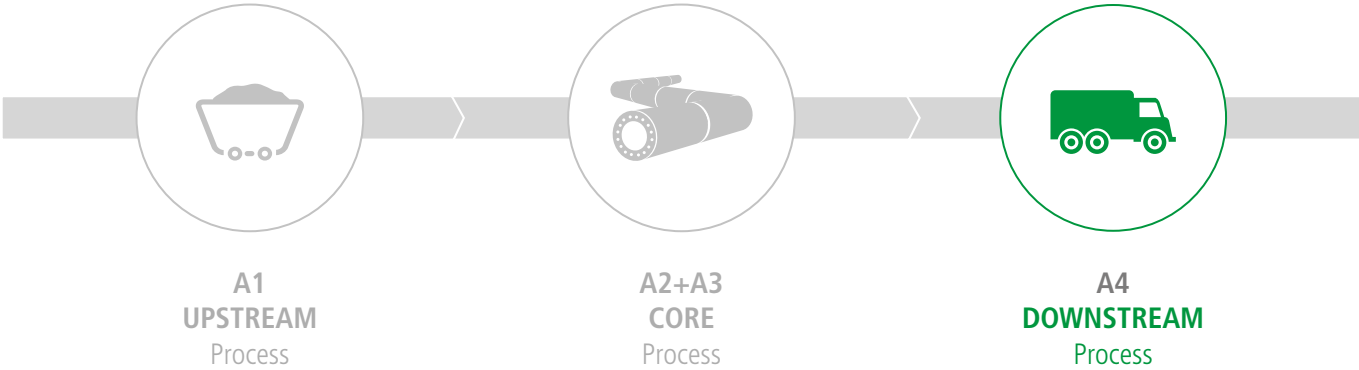
Core Process

(A2 Transportation + A3 Manufacturing)



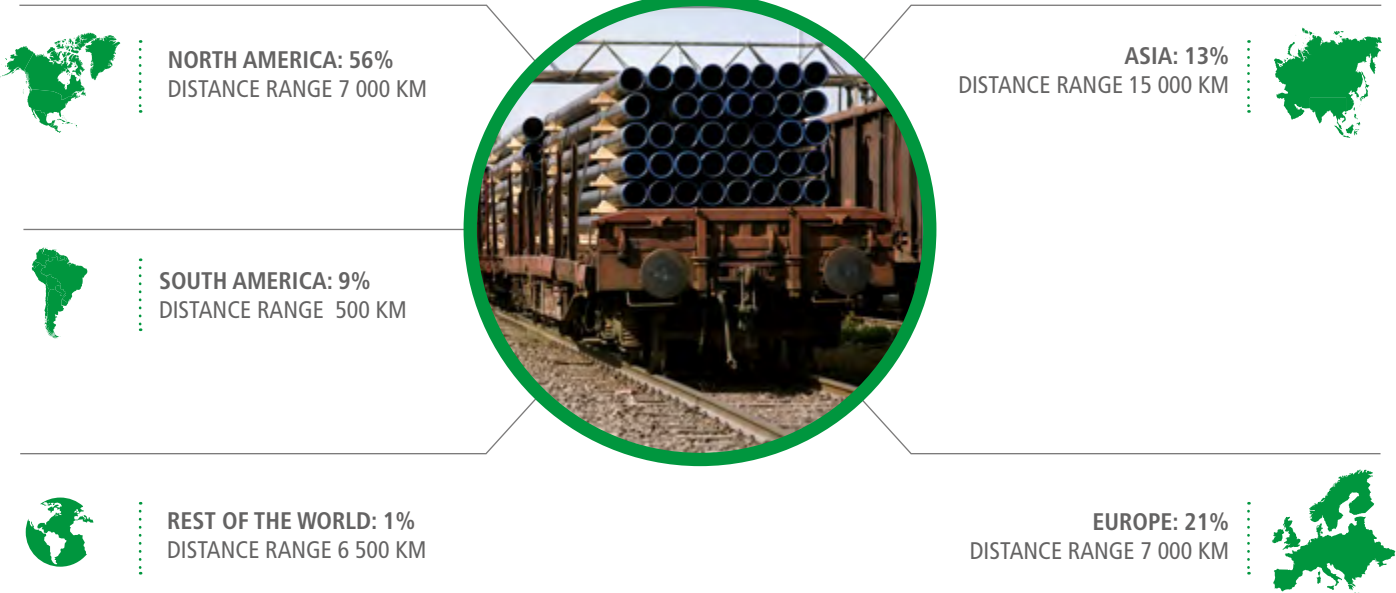
Downstream Process

(A4 Transport to final destination)



ITALY (11%):
DISTANCE RANGE ~ 600 km

WORLD (87%):
DISTANCE RANGE ~ 10 000 km



Additional Information

Tenaris is committed to minimizing the environmental footprint of its operations and products. The company has obtained a multisite certification of its environmental management system according to ISO 14001 standards. Today almost all of the production sites are working under the certified management system. Tenaris is committed to building a culture of transparency and integrity based on ethical behavior and compliance with the law. The company believes that this is essential for the sustainability of the activities.

TENARIS

Applies Best Available Technologies on the design of new lines and the steel making production technology is 100% Electric Arc Furnace and natural gas-based Direct Reduction for iron making

SCRAP RECYCLING

Is one way to minimize the environmental footprint of Tenaris operations, and an important opportunity for the steel industry to contribute to the emission reduction. Scrap use rate in Tenaris steel making process is in average 70%. Production sites recycle around 2 million tons of scrap per year: all scrap from steel and downstream pipe production is collected and reused, as well as post-consumer scrap. Scrap used is classified in different types to allow the most efficient charge bucket preparation.

TENARIS STEEL MILLS

Have continuous emission monitoring systems for particulate material emissions in order to efficiently control emission levels and filters performance. Capture systems in Siderca and Tamsa are under evaluation to further improve their efficiency.

DIOXINS EMISSIONS

Are monitored and Dalmine has a prevention and reduction system for dioxin abatement operating since 2010.

SLAGS AND SCALE MILL

Are co-product for steel operation sold as inert material for construction applications, cement production and other operations.

MANY OF TENARIS FURNACES

Have low-NOx high efficiency burners, which allow lower emission levels, better combustion and improved gas consumption efficiency.

TENARIS PROCESSES

Are energy intensive, that is why production sites have in place programs in order to control and maximize energy efficiency both in terms of electricity and natural gas, the two energy sources Tenaris uses.

DALMINE PLANT

Has certified the energy management system according to ISO 50 001 standard.

TAMSA PLANT

The last rolling mill, heat treatment and finishing lines built that started to operate in 2012 obtained the LEED certification.

Tenaris sites have different industrial water systems, which result in differences in the amount of water withdraw per ton of product produced, absolute cubic meters used and also the source of the water. All sites have water recycling systems, but varying in percentage depending on local conditions. Siderca has the lowest recycling rate but it is implementing a project to recycle waste water from the two rolling mills as a first step of a whole water management program

REFERENCES

- ISO 14025: 2010
- ISO 21930: 2007
- ISO14040: 2006
- ISO14044: 2006
- EN15804: 2014
- General Programme Instructions v 2.5, 2015
- PCR 2012:01, "Construction products and construction services", v 2.2, 2017
- "Life Cycle Assessment Applied to OCTG steel products for EPD® purposes"



