

Environmental Product Declaration



In accordance with ISO 14025 for:

Biaxially Oriented PolyPropylene (BOPP)

films from

The SIBUR logo consists of the word "SIBUR" in a bold, white, italicized, sans-serif font, set against a teal rectangular background.

Programme:

The International EPD® System, www.environdec.com

Programme operator:

EPD International AB

EPD registration number:

S-P-02298

Publication date:

2023-08-01

Valid until:

2028-07-31



Programme information

Programme:	<p>The International EPD® System</p> <p>EPD International AB Box 210 60 SE-100 31 Stockholm Sweden</p> <p>www.environdec.com info@environdec.com</p>
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<p>Product category rules (PCR): Multi-Purpose Films Pcr 2021:01 Version 1.0.2 Date 2022-02-02</p>
<p>PCR review was conducted by: The Technical Committee of the International EPD® System. See https://www.environdec.com/about-us/the-international-epd-system-about-the-system for a list of Members.</p> <p>Review chair: Marta Mancin, Aequilibria S.r.l., mmancin@aequilibria.com. The review panel may be contacted via the Secretariat www.environdec.com/contact</p>
<p>Independent third-party verification of the declaration and data, according to ISO 14025:2006:</p> <p><input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification</p>
<p>Third party verifier: Dr Hüdai Kara, Metsims Sustainability Consulting (www.metsims.com)</p>
<p>Approved by: The International EPD® System</p>
<p>Procedure for follow-up of data during EPD validity involves third party verifier:</p> <p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p>

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

Company information

Owner of the EPD:

SIBUR Holding 16/1 Krzhizhanovskogo St., Moscow, 117218

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Fax: +7 (495) 777-55-00

E-mail: info@sibur.ru

Web site: <http://www.sibur.ru/en/>.

Description of the organisation:

BIAXPLEN LLC is a subsidiary of the SIBUR petrochemical group and a leading manufacturer of biaxially oriented films (BOPP) in Russia. The production sites of BIAXPLEN are located in five regions of Russia and in Italy (a joint venture with Manucor S.p.A.): Novokuibyshevsk (Samara Region), Kursk, Balakhna (Nizhny Novgorod Region), Zheleznodorozhny (Moscow Region), Tomsk.

Name and location of production site:

“BIAXPLEN”, Balakhna branch

606425, Nizhny Novgorod Region,
Balakhna District, Gidrotorf
Administrativnaya, 17
Phone: +7 (831) 243-01-69
Fax: +7 (831) 444-83-92
E-mail: biaxplen@biaxplen.sibur.ru

“BIAXPLEN”, Kursk branch

305045, Kursk, Obiezdnyaya, 10
Phone: +7 (4712) 44-60-92
E-mail: secretar_bk@sibur.ru

“BIAXPLEN”, Zheleznodorozhny branch

143980, Moscow region, Savino district
Balashikha, Promyshlennaya, 35
Phone: +7(495)527-97-84
E-mail: Office@biaxplen.sibur.ru

“BIAXPLEN”, Tomsk branch

634067, Tomsk, Kuzolevsky tract, 2/396
Phone: +73822602640

“BIAXPLEN”, Novokuibyshevsk branch

446201, Samara region, Novokuibishevsk,
Zheleznodorozhny dribeway, 1
Phone: +7(4712) 44-60-92
E-mail: SecretaryNK@biaxplen.sibur.ru

The total capacity for the production of BOPP films in Russia is over 180 000 tons per year. The company is actively developing export deliveries of films to the EU market.

Product-related or management system-related certifications:

The SIBUR Integrated Management System complies with the requirements of the following international standards:

ISO 9001 "Quality Management Systems"

ISO 45001 "Occupational health and safety management systems"

ISO 14001 Environmental Management Systems.

For more information see <http://www.sibur.ru/ru/sustainability/integrated-management-system/>.

Product information

Product name: Biaxially Oriented PolyPropylene (BOPP) films

Product identification:

Produced in accordance with Specifications 2245-003-70378591-2015 Biaxially oriented polypropylene film and Specifications 2245-002-

70378591-2016 Aluminum metallized biaxially oriented polypropylene film

Product description:

UN CPC code: 36390

Geographical scope: Russia

Film type		Application area	Brand assortment
Tobacco films		Shrink films for wrapping packs of tea, cigarettes and group wrapping of cigarette blocks	TSHL
			TSHD
			TSHT
			TSHS
			TSHB
Label films		3- and 5-layer BOPP films for circular labels of PET bottles, for the production of self-adhesive and in-mould labels	LGBA
			LOBA
			LOBB
			LOHM.M
			HOHM
			LGBM.M
			LGBL
			LWBL
			SOIL
			STL
			SWL
			STG
			SOL
			SOBL
			LGHM.M
Confectionary films	metallized	Heat-sealable and non-heat-sealable metallized films with various barrier properties for the production of confectionery packaging	PGS
			LOBM.M
			PMP.M
			HMIL.M
			HMHW.M
	filled films	Filled heat sealable films for the production of confectionery packaging	HMPLB.M
			HBV.M
			HOHMLB.M
			HOHL
			HOH
			HOHW
			HOCL
			HWHL

			HOHG	
			HOSL	
			HWHW.PF	
	matte film	Matte films to give the packaging a matte, "papery" appearance		MGS
				MGPL
				MGR
				MGI
				MGFL.PF
				MGL
	Transparent heat sealable films	Heat sealable films for high quality printing and lamination. All films are corona activated.		HGHL
				HGPL
				HGP
				HGFL
				HGHW
				HGPL.PF
Other food films	For food packaging.		HGGW	
			PGR	
			HASL	
Non-food films	Mono-films for packing industrial goods (adhesive tape, stationery, decorative packaging, etc.).		ReS	
			PMD.M	
			MGT	
			PGA	
			PGA	
			MGD	
			PGD	

LCA information

Functional unit / declared unit:

The functional unit used for the EPD is one square meter (1 m²) of BOPP.

HGPL film with a thickness of 25 microns and a density of 0.910 g/cm³ was taken as a representative unit.

Description	Value	Unit
Declared functional unit	1	m ²
Thickness	25	μ
F.U. weight	0.02275	kg/m ²
Density	0.910	g/cm ³

Reference service life:

Guaranteed shelf life in terms of physical and mechanical properties of the film – 6 months from the date of manufacture.

Time representativeness:

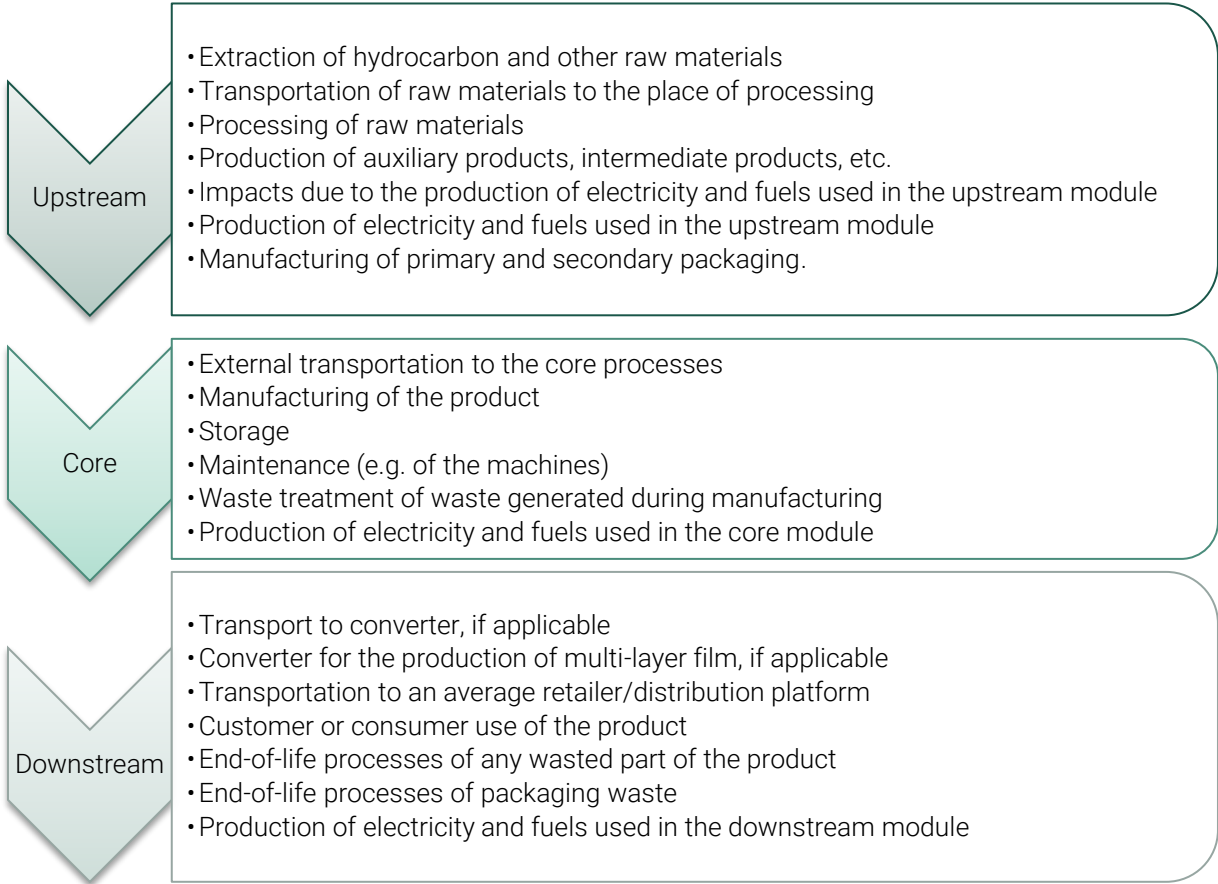
Primary data for 2021 were used for production stage were collected.

Database(s) and LCA software used:

GaBi Software version 10.0.1.92 was used to model the life cycle of BOPP.

Secondary data from GaBi Database content version 2022.1 was used to perform LCA modelling. Individual datasets from Environmental Footprint Database v. 2.0 were also taken.

System diagram:



Description of system boundaries:

System boundaries covered by the EPD is “from cradle-to-grave”.

Estimates and Assumptions:

The mass of flows excluded from the LCA does not exceed 5% of the total mass of the corresponding product system and 1% of the mass of the flows of the main production process. The contribution to the environmental impact of the excluded flows does not exceed 1% of the total life cycle impact of BOPP. Allocation in Core processes was avoided by system expansion. Allocation by mass was applied where it was necessary.

More information:

More information about the company and products could be found on the EPD’s holder web-site - <https://www.sibur.ru/ru/>

LCA and the EPD prepared by CIS Center LCA team – Dmitrii Vadivasov, Olga Reshetar., CIS Center web-site: <https://www.ciscenter.org/>



Content declaration

BOPP, Balakhna

Materials / chemical substances	[Unit]	%	Environmental / hazardous properties
Virgin PP	g/m ²	80	None*
Pre-consumer recycled PP	g/m ²	2	None*
Additives	g/m ²	18	None*

BOPP, Kursk

Materials / chemical substances	[Unit]	%	Environmental / hazardous properties
Virgin PP	g/m ²	88	None*
Pre-consumer recycled PP	g/m ²	7	None*
Additives	g/m ²	6	None*

BOPP, Zheleznodorozhny

Materials / chemical substances	[Unit]	%	Environmental / hazardous properties
Virgin PP	g/m ²	85	None*
Pre-consumer recycled PP	g/m ²	3	None*
Additives	g/m ²	12	None*

BOPP, Toms

Materials / chemical substances	[Unit]	%	Environmental / hazardous properties
Virgin PP	g/m ²	84	None*
Pre-consumer recycled PP	g/m ²	7	None*
Additives	g/m ²	8	None*

BOPP, Novokuibyshevsk

Materials / chemical substances	[Unit]	%	Environmental / hazardous properties
Virgin PP	g/m ²	87	None*
Pre-consumer recycled PP	g/m ²	4	None*
Additives	g/m ²	9	None*

*Products under the scope of the EPD do not contain restricted substances designated in Annex XVII of REACH Regulation; Substances designated in REACH candidate list; Substances listed in Annex XIV of REACH Regulation.

Packaging

Distribution packaging:

- Wood packaging: pallet, sideboards, tablets
- Plastic packaging: plugs, strapping, stretch-film
- Cardboard: tube (core), interlayer

Environmental performance

This section presents the **weighted average** LCIA results for the 5 production sites studied. The results for individual sites presented separately in the Additional information section.

Potential environmental impact for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	3.02E-02	1.42E-04	2.79E-06	3.04E-02
	Biogenic	kg CO ₂ eq.	5.56E-04	1.19E-06	7.56E-06	5.65E-04
	Land use and land transformation	kg CO ₂ eq.	7.74E-04	7.34E-08	1.21E-08	7.74E-04
	TOTAL	kg CO ₂ eq.	3.05E-02	1.43E-04	1.04E-05	3.07E-02
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	7.91E+00	1.22E-18	9.73E-19	7.91E+00
Acidification potential (AP)		kg SO ₂ eq.	9.19E-05	4.98E-07	9.84E-09	9.24E-05
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	7.13E-04	7.43E-08	6.24E-10	7.13E-04
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	4.50E-03	7.54E-07	9.04E-09	4.50E-03
Abiotic depletion potential – Elements		kg Sb eq.	3.13E-03	1.99E-12	2.43E-13	3.13E-03
Abiotic depletion potential – Fossil resources		MJ, net calorific value	1.24E+00	3.46E-04	3.13E-05	1.24E+00
Water scarcity potential		m ³ eq.	8.44E-02	8.78E-03	1.70E-04	9.33E-02

Use of resources for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	9.36E-03	1.31E-05	2.06E-06	9.37E-03
	Used as raw materials	MJ, net calorific value	1.36E-04	0.00E+00	0.00E+00	1.36E-04
	TOTAL	MJ, net calorific value	9.49E-03	1.31E-05	2.06E-06	9.51E-03
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1.19E+00	1.99E-04	2.93E-05	1.19E+00
	Used as raw materials	MJ, net calorific value	4.19E-06	0.00E+00	0.00E+00	4.19E-06
	TOTAL	MJ, net calorific value	1.19E+00	1.99E-04	2.93E-05	1.19E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m ³	7.58E-03	1.50E-05	3.32E-07	7.60E-03

Waste production for one square meter (1 m²) of BOPP

PARAMETER	UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Hazardous waste disposed	kg	3.30E-11	2.96E-14	3.69E-16	3.30E-11
Non-hazardous waste disposed	kg	1.71E-04	9.11E-08	2.42E-07	1.72E-04
Radioactive waste disposed	kg	2.66E-06	1.12E-08	1.61E-10	2.67E-06

Output flows for one square meter (1 m²) of BOPP

PARAMETER	UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00



Additional information

“BIAXPLEN”, Balakhna branch

Potential environmental impact for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	2.84E-02	1.63E-05	2.18E-06	2.84E-02
	Biogenic	kg CO ₂ eq.	9.37E-04	1.22E-06	7.53E-06	9.46E-04
	Land use and land transformation	kg CO ₂ eq.	2.59E-03	5.68E-08	1.13E-08	2.59E-03
	TOTAL	kg CO ₂ eq.	2.87E-02	1.76E-05	9.72E-06	2.87E-02
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	2.65E+01	6.82E-19	9.65E-19	2.65E+01
Acidification potential (AP)		kg SO ₂ eq.	1.18E-04	6.23E-08	8.13E-09	1.18E-04
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	8.78E-06	7.67E-09	1.30E-09	8.79E-06
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	2.94E-04	5.21E-08	7.47E-09	2.94E-04
Abiotic depletion potential – Elements		kg Sb eq.	4.70E-09	1.10E-12	1.90E-13	4.70E-09
Abiotic depletion potential – Fossil resources		MJ, net calorific value	1.17E+00	5.21E-08	7.47E-09	1.17E+00
Water scarcity potential		m ³ eq.	8.80E-02	4.25E-02	8.40E-04	1.31E-01

Use of resources for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	9.36E-03	1.31E-05	2.06E-06	9.37E-03
	Used as raw materials	MJ, net calorific value	1.36E-04	0.00E+00	0.00E+00	1.36E-04
	TOTAL	MJ, net calorific value	9.49E-03	1.31E-05	2.06E-06	9.51E-03
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1.19E+00	1.99E-04	2.93E-05	1.19E+00
	Used as raw materials	MJ, net calorific value	4.19E-06	0.00E+00	0.00E+00	4.19E-06
	TOTAL	MJ, net calorific value	1.19E+00	1.99E-04	2.93E-05	1.19E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	1.60E+00	1.40E-02	5.89E-03	1.62E+00
Net use of fresh water		m ³	7.58E-03	1.50E-05	3.32E-07	7.60E-03

“BIAXPLEN”, Kursk branch

Potential environmental impact for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	3.18E-02	2.97E-05	4.10E-06	3.19E-02
	Biogenic	kg CO ₂ eq.	4.12E-04	1.57E-06	7.56E-06	4.22E-04
	Land use and land transformation	kg CO ₂ eq.	4.82E-05	1.12E-07	2.83E-10	4.83E-05
	TOTAL	kg CO ₂ eq.	3.22E-02	3.14E-05	1.17E-05	3.22E-02
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	4.76E-01	1.64E-18	8.39E-19	4.76E-01
Acidification potential (AP)		kg SO ₂ eq.	8.34E-05	1.26E-07	1.31E-08	8.35E-05
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	1.38E-04	0.00E+00	0.00E+00	1.38E-04
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	9.24E-05	1.02E-07	1.23E-08	9.25E-05
Abiotic depletion potential – Elements		kg Sb eq.	1.37E-03	2.63E-12	2.51E-14	1.37E-03
Abiotic depletion potential – Fossil resources		MJ, net calorific value	1.31E+00	4.86E-04	2.56E-06	1.31E+00
Water scarcity potential		m ³ eq.	8.67E-02	3.70E-05	2.51E-07	8.68E-02

Use of resources for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1.05E-02	2.87E-05	5.52E-07	1.05E-02
	Used as raw materials	MJ, net calorific value	1.30E-04	0.00E+00	0.00E+00	1.30E-04
	TOTAL	MJ, net calorific value	1.06E-02	2.87E-05	5.52E-07	1.07E-02
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1.33E+00	5.22E-04	2.89E-06	1.33E+00
	Used as raw materials	MJ, net calorific value	9.35E-04	0.00E+00	0.00E+00	9.35E-04
	TOTAL	MJ, net calorific value	1.33E+00	5.22E-04	2.89E-06	1.33E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m ³	8.53E-03	3.70E-05	2.51E-07	8.56E-03

“BIAXPLEN”, Zheleznodorozhny branch

Potential environmental impact for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	3.04E-02	1.72E-05	2.35E-06	3.04E-02
	Biogenic	kg CO ₂ eq.	3.87E-04	5.28E-07	7.57E-06	3.95E-04
	Land use and land transformation	kg CO ₂ eq.	1.58E-06	4.89E-08	1.18E-08	1.64E-06
	TOTAL	kg CO ₂ eq.	3.07E-02	1.78E-05	9.92E-06	3.08E-02
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	4.32E-10	8.10E-19	9.73E-19	4.32E-10
Acidification potential (AP)		kg SO ₂ eq.	7.95E-05	6.00E-08	8.55E-09	7.96E-05
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	1.10E-05	6.82E-09	1.37E-09	1.10E-05
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	2.18E-02	4.21E-08	7.85E-09	2.18E-02
Abiotic depletion potential – Elements		kg Sb eq.	5.16E-09	1.28E-12	4.02E-13	5.16E-09
Abiotic depletion potential – Fossil resources		MJ, net calorific value	1.25E+00	2.49E-04	6.23E-05	1.25E+00
Water scarcity potential		m ₃ eq.	8.28E-02	2.20E-04	3.82E-06	8.30E-02

Use of resources for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	9.96E-03	1.30E-05	2.16E-06	9.98E-03
	Used as raw materials	MJ, net calorific value	6.34E-05	0.00E+00	0.00E+00	6.34E-05
	TOTAL	MJ, net calorific value	1.00E-02	1.30E-05	2.16E-06	1.00E-02
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1.27E+00	2.65E-04	3.12E-05	1.27E+00
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	1.27E+00	2.65E-04	3.12E-05	1.27E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m ³	8.13E-03	1.75E-05	3.38E-07	8.15E-03

“BIAXPLEN”, Tomsk branch

Potential environmental impact for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	2.98E-02	2.57E-05	4.81E-06	2.98E-02
	Biogenic	kg CO ₂ eq.	5.41E-04	9.31E-07	7.70E-06	5.49E-04
	Land use and land transformation	kg CO ₂ eq.	7.46E-04	8.69E-08	2.57E-08	7.46E-04
	TOTAL	kg CO ₂ eq.	3.01E-02	2.66E-05	1.25E-05	3.01E-02
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	7.62E+00	9.37E-19	1.12E-18	7.62E+00
Acidification potential (AP)		kg SO ₂ eq.	9.05E-05	1.29E-07	1.60E-08	9.06E-05
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	2.06E-03	0.00E+00	0.00E+00	2.06E-03
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	1.45E-04	9.61E-08	1.46E-08	1.45E-04
Abiotic depletion potential – Elements		kg Sb eq.	4.92E-09	1.95E-12	4.06E-13	4.92E-09
Abiotic depletion potential – Fossil resources		MJ, net calorific value	1.23E+00	3.33E-04	6.29E-05	1.23E+00
Water scarcity potential		m ³ eq.	8.11E-02	4.85E-04	4.95E-06	8.16E-02

Use of resources for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	9.80E-03	2.54E-05	4.02E-06	9.83E-03
	Used as raw materials	MJ, net calorific value	1.03E-04	0.00E+00	0.00E+00	1.03E-04
	TOTAL	MJ, net calorific value	9.90E-03	2.54E-05	4.02E-06	9.93E-03
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1.25E+00	3.69E-04	6.39E-05	1.25E+00
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	1.25E+00	3.69E-04	6.39E-05	1.25E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m ³	7.97E-03	3.82E-05	4.35E-07	8.01E-03

“BIAXPLEN”, Novokuibyshevsk branch

Potential environmental impact for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Global warming potential (GWP)	Fossil	kg CO ₂ eq.	3.06E-02	6.19E-04	5.19E-07	3.13E-02
	Biogenic	kg CO ₂ eq.	5.02E-04	1.68E-06	7.45E-06	5.11E-04
	Land use and land transformation	kg CO ₂ eq.	4.85E-04	6.18E-08	1.13E-08	4.86E-04
	TOTAL	kg CO ₂ eq.	3.10E-02	6.21E-04	7.98E-06	3.16E-02
Depletion potential of the stratospheric ozone layer (ODP)		kg CFC 11 eq.	4.95E+00	2.03E-18	9.65E-19	4.95E+00
Acidification potential (AP)		kg SO ₂ eq.	8.83E-05	2.11E-06	3.32E-09	9.05E-05
Eutrophication potential (EP)		kg PO ₄ ³⁻ eq.	1.35E-03	3.57E-07	4.53E-10	1.35E-03
Formation potential of tropospheric ozone (POCP)		kg NMVOC eq.	1.25E-04	3.48E-06	2.97E-09	1.29E-04
Abiotic depletion potential – Elements		kg Sb eq.	1.43E-02	2.97E-12	1.90E-13	1.43E-02
Abiotic depletion potential – Fossil resources		MJ, net calorific value	1.26E+00	6.63E-04	2.87E-05	1.26E+00
Water scarcity potential		m ³ eq.	8.34E-02	6.69E-04	3.76E-06	8.41E-02

Use of resources for one square meter (1 m²) of BOPP

PARAMETER		UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	1.02E-02	2.85E-05	2.06E-06	1.02E-02
	Used as raw materials	MJ, net calorific value	2.47E-04	0.00E+00	0.00E+00	2.47E-04
	TOTAL	MJ, net calorific value	1.05E-02	2.85E-05	2.06E-06	1.05E-02
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	1.28E+00	7.12E-04	2.94E-05	1.28E+00
	Used as raw materials	MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	1.28E+00	7.12E-04	2.94E-05	1.28E+00
Secondary material		kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable secondary fuels		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water		m ³	8.19E-03	5.37E-05	3.32E-07	8.25E-03

Waste production and output flows

“BIAXPLEN”, Balakhna branch

Waste production for one square meter (1 m²) of BOPP

PARAMETER	UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Hazardous waste disposed	kg	3.13E-11	3.24E-15	3.60E-16	3.13E-11
Non-hazardous waste disposed	kg	1.61E-04	6.17E-08	2.42E-07	1.62E-04
Radioactive waste disposed	kg	2.50E-06	5.29E-09	1.58E-10	2.51E-06

Output flows for one square meter (1 m²) of BOPP

PARAMETER	UNIT	A1	A2	A3	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	2.94E-04	0.00E+00	2.94E-04
Materials for energy recovery	kg	0.00E+00	1.02E-04	1.20E-03	1.30E-03
Exported energy, electricity	MJ	0.00E+00	2.19E-04	2.57E-03	2.79E-03
Exported energy, thermal	MJ	0.00E+00	3.98E-04	4.65E-03	5.05E-03

“BIAXPLEN”, Kursk branch

Waste production for one square meter (1 m²) of BOPP

PARAMETER	UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Hazardous waste disposed	kg	3.47E-11	2.91E-14	2.31E-16	3.48E-11
Non-hazardous waste disposed	kg	1.81E-04	9.73E-08	2.36E-07	1.81E-04
Radioactive waste disposed	kg	2.80E-06	1.26E-08	1.25E-10	2.82E-06

Output flows for one square meter (1 m²) of BOPP

PARAMETER	UNIT	A1	A2	A3	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

“BIAXPLEN”, Zheleznodorozhny branch

Waste production for one square meter (1 m²) of BOPP

PARAMETER	UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Hazardous waste disposed	kg	3.31E-11	2.07E-14	3.69E-16	3.31E-11
Non-hazardous waste disposed	kg	1.72E-04	5.47E-08	2.43E-07	1.73E-04
Radioactive waste disposed	kg	2.67E-06	6.10E-09	1.61E-10	2.68E-06

Output flows for one square meter (1 m²) of BOPP

PARAMETER	UNIT	A1	A2	A3	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

“BIAXPLEN”, Tomsk branch

Waste production for one square meter (1 m²) of BOPP

PARAMETER	UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Hazardous waste disposed	kg	3.24E-11	7.85E-15	5.26E-16	3.24E-11
Non-hazardous waste disposed	kg	1.69E-04	8.62E-08	2.48E-07	1.69E-04
Radioactive waste disposed	kg	2.62E-06	1.35E-08	2.01E-10	2.63E-06

Output flows for one square meter (1 m²) of BOPP

PARAMETER	UNIT	A1	A2	A3	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

“BIAXPLEN”, Novokuibyshevsk branch

Waste production for one square meter (1 m²) of BOPP

PARAMETER	UNIT	UP-STREAM	CORE	DOWN-STREAM	TOTAL
Hazardous waste disposed	kg	3.33E-11	8.70E-14	3.60E-16	3.34E-11
Non-hazardous waste disposed	kg	1.73E-04	1.56E-07	2.42E-07	1.74E-04
Radioactive waste disposed	kg	2.69E-06	1.85E-08	1.58E-10	2.71E-06

Output flows for one square meter (1 m²) of BOPP

PARAMETER	UNIT	A1	A2	A3	TOTAL
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00



Conversion factors to finding LCIA Results for different BOPP films

Conversion factor		Density, g/cm ³																			
		0,550	0,600	0,620	0,630	0,650	0,680	0,690	0,700	0,710	0,720	0,730	0,740	0,750	0,760	0,870	0,880	0,890	0,910	0,930	0,960
Thickness, μm	9,0																		0,360		
	10,0																		0,400		
	12,0																		0,480		0,506
	15,0																		0,600		0,633
	16,0																		0,640		
	17,0																		0,680		
	17,5																		0,700		
	18,0																0,696		0,720		
	19,0																		0,760		
	20,0															0,765	0,774		0,800		0,844
	22,0																		0,880		
	23,0																		0,920		
	24,0																		0,960		



25,0					0,714			0,769		0,791						0,967		1,000		1,055	
26,0																			1,040		
27,0																	1,044		1,080		
27,5																			1,100		
28,0											0,911	0,923							1,120		1,182
30,0					0,857			0,923		0,949		0,976					1,160		1,200		1,266
31,0																			1,240		
32,0																	1,238		1,280		
35,0	0,846	0,923	0,954		1,000	1,046		1,077	1,092	1,108		1,138					1,354		1,400		1,477
37,0																			1,480		
38,0	0,919		1,036			1,136			1,186			1,236							1,520		1,604
40,0		1,055			1,143				1,248	1,266		1,301	1,319	1,336		1,547		1,600		1,688	
44,0			1,199																		
45,0				1,246		1,345				1,424		1,464							1,800		
47,0	1,136		1,281			1,405															
48,0																			1,920		



50,0	1,209	1,319								1,582	1,604	1,626				1,934	1,956	2,000	2,044	2,110
55,0	1,330																	2,200	2,248	
57,0																2,205		2,280		
58,0											1,861									2,447
60,0	1,451		1,635										2,004		2,321	2,347	2,400			2,532
68,0																2,630				
70,0	1,692	1,846					2,123							2,338				2,800		2,954
80,0		2,110																		
90,0	2,176																			
95,0	2,297																			



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