

# Use of bisphenol A and its alternatives in thermal paper in the EU – 2018 update

June 2019

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Version	Update	Change made
1.0	05.06.2019	First edition

### Use of bisphenol A and its alternatives in thermal paper in the EU – 2018 update

**Reference:** ECHA-2019-R-12-EN

**ISBN:** 978-92-9481-148-6

**Cat. Number:** ED-02-19-390-EN-N

**DOI:** 10.2823/258259

**Publ.date:** June 2019

**Language:** EN

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## Table of Contents

1. INTRODUCTION.....	4
2. OVERVIEW.....	4
3. TOTAL AMOUNT OF THERMAL PAPER PLACED ON THE EU MARKET, INCLUDING IMPORTS.....	6
4. THERMAL PAPER MANUFACTURED IN AND PLACED ON THE EU MARKET (ETPA MEMBERS).....	9
5. DATA RECEIVED FROM NON-ETPA MANUFACTURERS CONTACTED DIRECTLY AND HANSOL PAPER.....	11
6. THERMAL PAPER IMPORTED INTO THE EU, 2014-2018.....	13
7. OUTLOOK.....	14

## Table of Figures

<b>Figure 1:</b> Thermal paper placed on the EU market per developer type (%; tonnes), 2014-2018, total.....	8
<b>Figure 2:</b> Thermal paper manufactured in and placed on the EU market per developer type (%; tonnes) - ETPA members only.....	10
<b>Figure 3:</b> Thermal paper placed on the EU market in 2014-18 per developer type (non-ETPA manufacturers, including Hansol Paper).....	13

## List of Tables

<b>Table 1a:</b> Thermal paper placed on the EU market, including imports, 2014-18 (tonnes).....	6
<b>Table 1b:</b> Developers used in thermal paper placed on the EU market, including imports, 2014-18 (tonnes).....	7
<b>Table 1c:</b> Thermal paper placed on the EU market, including imports, 2014-18 (%).....	7
<b>Table 1d:</b> Developers used in thermal paper placed on the EU market, including imports, 2014-18 (%).....	7
<b>Table 2a:</b> Thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (tonnes).....	9
<b>Table 2b:</b> Developers used in thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (tonnes).....	9
<b>Table 2c:</b> Thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (%).....	10
<b>Table 2d:</b> Developers used in thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (%).....	10
<b>Table 3a:</b> Thermal paper placed on the EU market, 2014-18 (tonnes). Non-ETPA members (inc. Hansol Paper).....	11
<b>Table 3b:</b> Developers used in thermal paper placed on the EU market, 2014-18 (tonnes). Non-ETPA members (inc. Hansol Paper).....	12
<b>Table 3c:</b> Thermal paper placed on the EU market, 2014-18 (%). Non-ETPA members (inc. Hansol Paper).....	12
<b>Table 3d:</b> Developers used in thermal paper placed on the EU market, 2014-18 (%). Non-ETPA members (inc. Hansol Paper).....	12

## Use of bisphenol A and its alternatives in thermal paper in the EU – 2018 update

### 1. Introduction

This is the third report on the use of bisphenol A (hereinafter BPA), bisphenol S (hereinafter BPS) and other developers in thermal paper in the EU<sup>1</sup> based on the European Commission's request.

The purpose of the report is to monitor the extent to which BPA is being replaced by BPS and other developers following the publication of Commission Regulation (EU) 2016/2235 concerning the restriction of BPA in thermal paper. The Commission decision about the restriction was published on 13 December 2016 and the restriction will enter into force on 2 January 2020.

The most reliable and consistent data source for this report was the European Thermal Paper Association (ETPA). It represents about 70 % of the EU thermal paper market and has provided information on the volumes of thermal paper placed on the EU market as well as the volumes of different types of developers used. The ETPA data has been complemented with information on imports gathered through Eurostat and information obtained from non-ETPA manufacturers located in the EU.

### 2. Overview

Key developments
Total market (ETPA members, European non-ETPA manufacturers, and imports)
The total thermal paper market in the EU grew by 0.3 % in 2018 amounting to 491 kilotonnes of thermal paper. While BPA is still the dominant developer used in thermal paper, its share has been shrinking in the EU and has dropped slightly below 50 % in 2018. The share of BPS-based thermal paper has seen an increase from 19 % in 2017 to 21 % in 2018 while the share of thermal paper based on other developers has increased from 30 % to 31 %.
ETPA members
ETPA members placed 332 kilotonnes of thermal paper on the EU market in 2018, up by 1 % from the previous year. This amounts to 70 % of the total thermal paper consumption in the EU. The volume of BPS-based thermal paper placed on the EU market by ETPA members was 52 kilotonnes in 2018, up by 52 % compared with the previous year, whereas the volume of thermal paper based on other developers amounted to 96 kilotonnes, an increase of 7 % from 2017.

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<sup>1</sup> The first report is available [here](#). The second report is available [here](#).

### Overall market

The overall consumption of thermal paper in the EU has seen a slight increase of 0.3 % from 2017 to 2018, totalling 491 kilotonnes. The share of BPA-based thermal paper was 48 % and the share of BPS-based paper increased from 19 % in 2017 to 21 % in 2018 while the share of thermal paper based on other developers, including non-phenolic and non-bisphenolic alternatives, increased from 30 % to 31 % for the same period. The highest increase was seen in the volume of BPS-based thermal paper, which grew by 15 % from 90 kilotonnes in 2017 to 104 kilotonnes in 2018.

### European Thermal Paper Association (ETPA) members

There was a total 1 % increase in the volume of thermal paper placed on the EU market in 2018 by members of the European Thermal Paper Association, amounting to 332 kilotonnes.

The volume of BPS-based thermal paper manufactured and placed on the market in the EU by ETPA members grew from 34 kilotonnes to almost 52 kilotonnes. This represents about 16 % of the total share of thermal paper market held by ETPA members, a significant increase compared to 10 % in 2017 and 5 % in 2016.

Another trend was the increase in the overall share of other developer-based thermal paper from 27 % in 2017 to 29 % in 2018. The share of BPA-based thermal paper placed on the EU market decreased from 62 % in 2017 to 55 % in 2018. In other words, a year before the restriction of BPA in thermal paper enters into force, more than half of the thermal paper placed on the EU market was still BPA-based.

### Non-ETPA members

About 30 % of thermal paper used in the EU is imported from China, India, Japan, Korea and the US. Interestingly, imports from South Korea decreased from 20 kilotonnes in 2017 to about 17 kilotonnes in 2018. The anti-dumping duties imposed by the European Commission on imports of thermal paper from South Korea may be a reason for the decline.

Unfortunately, ECHA has not received information on the shares of developers used in imported thermal paper. Therefore, it has not been possible to verify whether the share of BPS or other developers in thermal paper has changed in imported paper. For this reason, the shares of different developers used in imported thermal paper are not based on actual data but on estimates based on literature and consultations with industry experts.

### 3. Total amount of thermal paper placed on the market in the EU, including imports

This section summarises data obtained from ETPA, three EU companies that are not members of ETPA, four other non-EU companies, as well as information from Eurostat<sup>2</sup> on the import volumes from major thermal paper markets into the EU<sup>3</sup>.

The purpose of this section is to provide a full picture of the thermal paper market in the EU with respect to the actual volumes of thermal paper placed on the market.

Key developments
Overall, the volume of thermal paper placed on the EU market has increased in 2018 by 0.3 % to 491 kilotonnes. The volume of BPS-based thermal paper increased by 13 kilotonnes (15 %), whereas that of <i>other developers</i> , including non-bisphenolic as well as non-phenolic alternatives, increased by about 5 kilotonnes (4 %) from 2017 to 2018.

The total volume of thermal paper placed on the EU market has increased by 0.3 % in 2018. It would seem that there was an overall growth in the volume of BPS and other developer-based thermal paper from 2017 to 2018, whereas the volume of BPA-based thermal paper for the same period has gone down by 7 %.

Tables 1a, 1b, 1c and 1d incorporate data obtained from ETPA, directly contacted non-ETPA manufacturers (excluding Appvion), and Eurostat figures<sup>4</sup>.

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	247 198	250 183	236 622	254 200	237 364	-7 %
BPS	64 499	62 251	74 829	90 652	103 959	15 %
Other developers	115 211	134 279	140 831	144 842	150 083	4 %
<b>Total</b>	<b>426 908</b>	<b>446 713</b>	<b>452 322</b>	<b>489 694</b>	<b>491 405</b>	<b>0.3 %</b>

Sources: ETPA, non-ETPA manufacturers and Eurostat.

<sup>2</sup> Eurostat data was obtained for imports of thermal paper into the EU from the US, India, China, South Korea and Japan. The necessary readjustments have been applied to avoid any double-counting or any other error of a similar kind. For the US, South Korea and Japan, the share of developers used was assumed to be 90 % for BPS and 10 % for other developers (for all four years). For China and India, the share of BPA was estimated to be 90 %, whereas that of BPS was set at 10 % (consulted European manufacturers, distributors, and associations).

<sup>3</sup> For Hansol Paper, the ratio of developers is assumed to be 90 % to 10 % for BPS and other developers (D8), respectively.

<sup>4</sup> Data on the three directly contacted Chinese manufacturers was subtracted from the Eurostat figures on China to avoid double counting.

## 7 | Use of bisphenol A and its alternatives in thermal paper in the EU – 2018 update

**Table 1b: Developers used in thermal paper placed on the EU market, including imports, 2014-18 (tonnes)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	3 368	3 398	3 281	3 513	3 304	-6%
BPS	935	886	1 086	1 237	1 476	19%
Other developers	1 460	1 733	1 812	1 768	2 195	24%
<b>Total</b>	<b>5 763</b>	<b>6 017</b>	<b>6 179</b>	<b>6 518</b>	<b>6 975</b>	<b>7%</b>

Sources: ETPA, non-ETPA manufacturers and Eurostat.

**Table 1c: Thermal paper placed on the EU market, including imports, 2014-18 (%)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	58 %	56 %	52 %	52 %	48 %	-4 %
BPS	15 %	14 %	17 %	19 %	21 %	2 %
Other developers	27 %	30 %	31 %	30 %	31 %	1 %
<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	

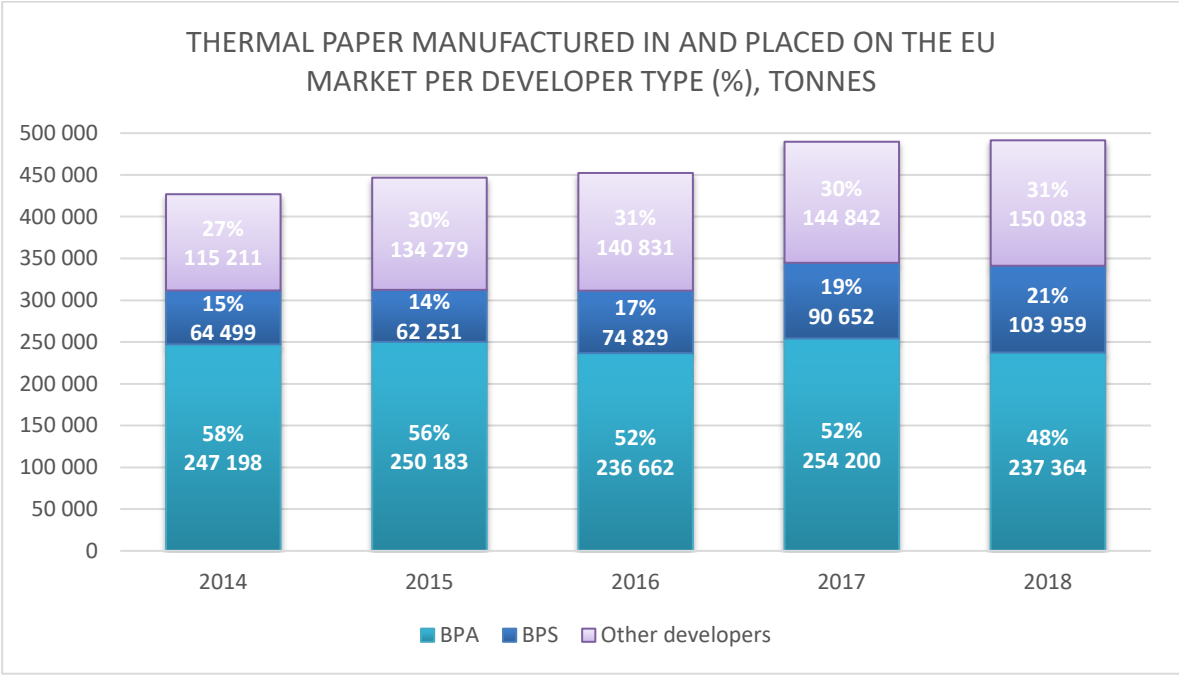
Sources: ETPA, non-ETPA manufacturers and Eurostat.

**Table 1d: Developers used in thermal paper placed on the EU market, including imports, 2014-18 (%)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	58 %	56 %	53 %	54 %	47 %	-7 %
BPS	16 %	15 %	18 %	19 %	21 %	2 %
Other developers	25 %	29 %	29 %	27 %	31 %	4 %
<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	

Sources: ETPA, non-ETPA manufacturers and Eurostat.

**8 | Use of bisphenol A and its alternatives in thermal paper in the EU – 2018 update**



**Figure 1:** Thermal paper placed on the EU market per developer type (%; tonnes), 2014-2018, total.

Sources: ETPA, non-ETPA manufacturers and Eurostat.



## 4. Thermal paper manufactured in and placed on the EU market (ETPA members)

This section summarises data obtained from ETPA concerning the market developments. These data are considered most reliable as they come from one source and give the breakdown of thermal paper based on the developer used.

Key developments
<p>The overall volume of thermal paper manufactured in and placed on the EU market by the members of the ETPA grew by about 4 kilotonnes (1 %) while the volume of the developers increased by less than 200 kilos (3 %). There were significant shifts in the shares of developers used. The shifts can be summarised as follows:</p> <ul style="list-style-type: none"> <li>- The volume of BPA-based thermal paper declined by 20 kilotonnes (10 %) from 2017 to 2018.</li> <li>- The volume of BPS-based thermal paper increased by about 17 kilotonnes (52 %) in the same period.</li> <li>- The volume of other developer-based thermal paper increased by roughly 7 kilotonnes (7 %)<sup>5</sup>.</li> </ul>

**Table 2a: Thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (tonnes)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	208 466	208 652	191 025	204 378	184 117	-10 %
BPS	11 682	11 106	15 035	34 010	51 831	52 %
Other developers	73 938	89 865	93 688	89 860	96 319	7 %
<b>Total</b>	<b>294 086</b>	<b>309 622</b>	<b>299 748</b>	<b>328 248</b>	<b>332 268</b>	<b>1 %</b>

Source: ETPA

**Table 2b: Developers used in thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (tonnes)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	2 799	2 784	2 606	2 776	2 516	-9%
BPS	150	125	200	397	678	71%
Other developers	806	1 029	1 065	1 022	1 132	11%
<b>Total</b>	<b>3 755</b>	<b>3 938</b>	<b>3 871</b>	<b>4 195</b>	<b>4 327</b>	<b>3%</b>

Source: ETPA

<sup>5</sup> The increase in the use of other developers, which includes non-bisphenolic as well as non-phenolic alternatives, is a noteworthy market development.

## 10 | Use of bisphenol A and its alternatives in thermal paper in the EU – 2018 update

**Table 2c: Thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (%)**

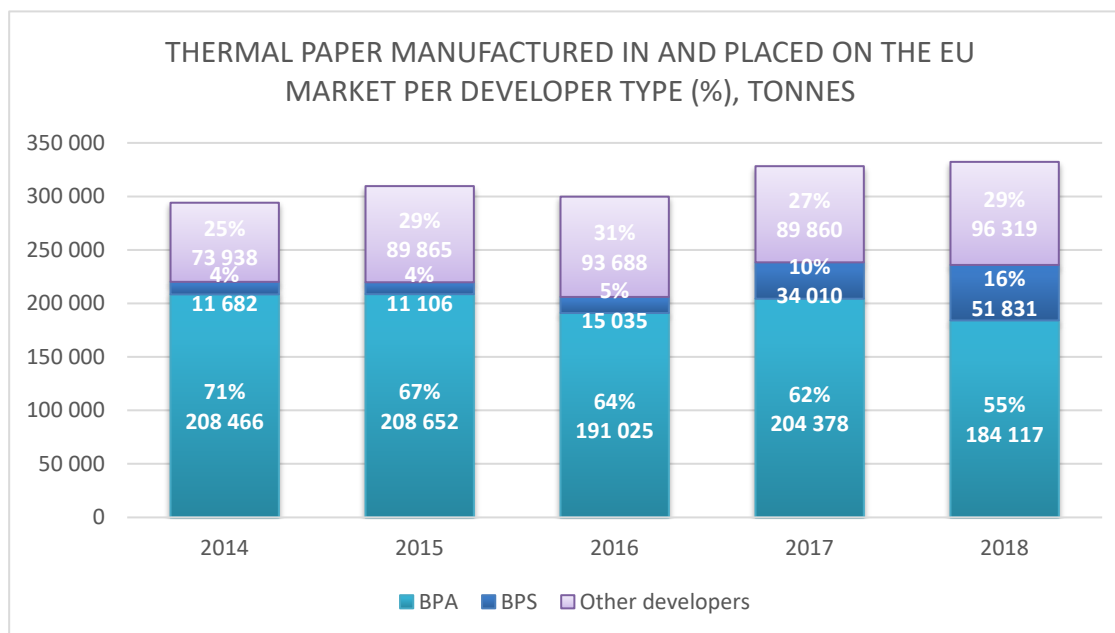
Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	71 %	67 %	64 %	62 %	55 %	-7 %
BPS	4 %	4 %	5 %	10 %	16 %	5 %
Other developers	25 %	29 %	31 %	27 %	29 %	2 %
<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	

Source: ETPA

**Table 2b: Developers used in thermal paper manufactured in and placed on the EU market by ETPA members, 2014-18 (%)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	75 %	71 %	67 %	66 %	58 %	-8 %
BPS	4 %	3 %	5 %	9 %	16 %	6 %
Other developers	21%	26 %	28 %	24 %	26 %	2 %
<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100%</b>	

Source: ETPA



**Figure 2:** Thermal paper manufactured in and placed on the EU market per developer type (%; tonnes) - ETPA members only.

Source: ETPA

## 5. Data received from non-ETPA manufacturers contacted directly and Hansol Paper

### Key developments

The lion's share of thermal paper produced by non-ETPA manufacturers and Hansol Paper is other developer-based, equalling 63 % of the total. The shares of BPS and BPA-based thermal paper are 19 % and 18 % respectively. The volume of BPS-based thermal paper is taken up largely by Hansol Paper (who predominantly exports BPS-based thermal paper to the EU), whereas that of BPA is mostly covered by Chinese manufacturers.

Of the nine<sup>6</sup> non-ETPA manufacturers contacted in 2017, seven agreed to share information on their use of BPA, BPS and other developers. Two manufacturers – Appvion Inc. (USA) and Hansol Paper (South Korea) – declined to share the information with ECHA, neither of which were approached again in 2018. The former had stated a lack of resources as the main reason for not sharing the information; the latter identified the confidential nature of such business information as their rationale. However, the volume of thermal paper imported into the EU by Hansol Paper could be established by relying on Eurostat figures.

The three Chinese manufacturers<sup>7</sup> informed ECHA that they currently use only BPA in the manufacture of thermal paper. They also said that they plan to use BPS as the developer once the restriction enters into force, although they have both non-bisphenolic and non-phenolic alternatives in their product portfolio.

Tables 3a, 3b, 3c and 3d summarise information gathered directly from non-ETPA manufacturers as well as the Eurostat data on Hansol Paper's imported volumes of thermal paper into the EU territory<sup>8</sup>.

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	1 180	1 217	13 157	12 550	14 476	15 %
BPS	14 563	13 622	20 414	18 314	15 368	-16 %
Other developers	37 487	40 746	43 321	51 329	50 326	-2 %
<b>Total</b>	<b>53 230</b>	<b>55 585</b>	<b>76 892</b>	<b>82 193</b>	<b>80 170</b>	<b>-2 %</b>

Source: Non-ETPA thermal paper manufacturers and Hansol Paper (Eurostat)

<sup>6</sup> China: GHS Gold HuaSheng Paper Co. Ltd, Chenming Paper, Guandong Guanhao High-Tech Co. Ltd; South Korea: Hansol Paper; Japan: Nippon Paper Industries Co., Ltd; US: Appvion, Inc.; EU: Ricoh Industrie SAS (France), Blumberg GmbH & CoKG (Germany), Smith and McLaurin Ltd (UK).

<sup>7</sup> Although all the directly contacted Chinese thermal paper manufacturers produce BPA-based thermal paper, other Chinese manufacturers, who were subsumed under Eurostat figures on China, reportedly also use BPS. Therefore, the ratio of 90 % to 10 % for BPA and BPS, respectively, was assumed.

<sup>8</sup> The ratio of developers for Hansol Paper was assumed to be 90 % to 10 % for BPS and other developers, respectively. This ratio was revised on the basis of consultations with European and Asian thermal paper manufacturers, distributors, and associations.

**Table 3b: Developers used in thermal paper placed on the EU market, 2014-18 (tonnes). Non-ETPA members (inc. Hansol Paper)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	14	16	193	182	211	16%
BPS	219	206	302	272	254	-7%
Other developers	598	650	690	692	1 012	46%
<b>Total</b>	<b>830</b>	<b>872</b>	<b>1 185</b>	<b>1 146</b>	<b>1 476</b>	<b>29%</b>

Source: Non-ETPA thermal paper manufacturers and Hansol Paper (Eurostat)

**Table 3c: Thermal paper placed on the EU market, 2014-18 (%). Non-ETPA members (inc. Hansol Paper)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	2 %	2 %	17 %	15 %	18 %	3 %
BPS	27 %	25 %	27 %	22 %	19 %	-3 %
Other developers	70 %	73 %	56 %	62 %	63 %	1 %
<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	

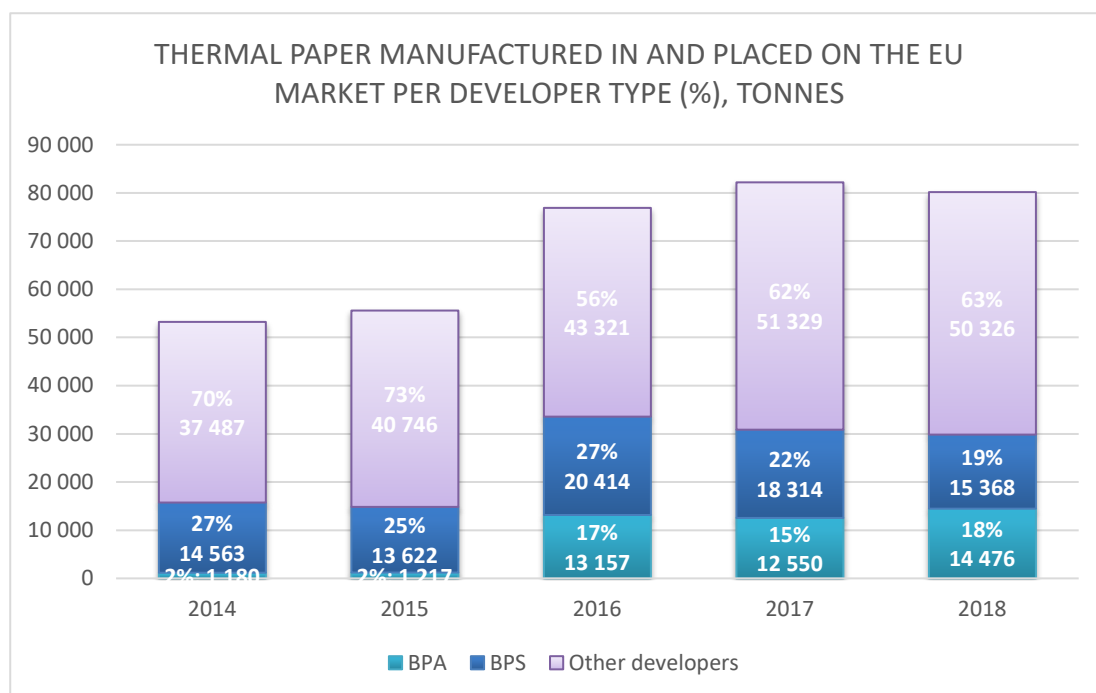
Source: Non-ETPA thermal paper manufacturers and Hansol Paper (Eurostat)

**Table 3d: Developers used in thermal paper placed on the EU market, 2014-18 (%). Non-ETPA members (inc. Hansol Paper)**

Developer	2014	2015	2016	2017	2018	% change from 2017 to 2018
BPA	2 %	2 %	16 %	16%	14 %	-2 %
BPS	26 %	24 %	25 %	24%	17 %	-7 %
Other developers	72 %	75 %	58 %	60%	69 %	9 %
<b>Total</b>	<b>100 %</b>	<b>100 %</b>	<b>100 %</b>	<b>100%</b>	<b>100 %</b>	

Source: Non-ETPA thermal paper manufacturers and Hansol Paper (Eurostat)<sup>9</sup>

<sup>9</sup> See Page 13.



**Figure 3:** Thermal paper placed on the EU market in 2014-18 per developer type (non-ETPA manufacturers, including Hansol Paper).

Source: Non-ETPA thermal paper manufacturers and Eurostat.

## 6. Thermal paper imported into the EU, 2014-2018<sup>10</sup>

The imports of thermal paper into the European Union from the five largest exporters have decreased by 2 % from 2017 to 2018, totalling 110 kilotonnes, which roughly represents 30 % of the total EU thermal paper market. China, USA, and South Korea are the largest thermal paper exporters to the EU, followed by India and Japan. Imports from Japan have seen the highest increase (36 %) in 2018, while there has been a decrease in imported volumes from USA and South Korea by 11 % and 14 %, respectively.

Country	2014	2015	2016	2017	2018	% change from 2017 to 2018
USA	34 670	34 224	36 009	33 739	30 074	-11 %
Japan	3 199	2 455	2 210	2 789	4 304	36 %
China	34 505	36 906	40 060	46 499	49 740	7 %
India	7 219	8 223	9 760	8 025	8 449	5 %
South Korea	15 959	14 891	22 527	20 282	17 011	-16 %

Source: Eurostat

<sup>10</sup> CN codes 48119000, 48099000, 48239085, and 48169000.

## 7. Outlook

Since last year's update, the regulatory landscape concerning the main alternative developers to BPA in thermal paper has changed to some extent. Belgium started to carry out a substance evaluation of BPS in 2014 on the grounds of suspected endocrine disruption. Belgium requested various tests from registrants to clarify the endocrine-disrupting nature of the substance. Received test results are under assessment by the Belgian authorities, ECHA and EFSA<sup>11</sup>. Belgium registered<sup>12</sup> its intention to propose a classification of BPS in 2019.

The new development is that Pergafast 201 (EC 432-520-2) and D8 (EC 405-520-5) were included in the Community rolling action plan. Belgium has indicated that it would start evaluating these substances in 2020 and 2021, respectively. The initial ground for concern is the substances' potential endocrine-disrupting and reprotoxic properties.

ECHA has no information on how this regulatory scrutiny on the main alternatives to BPA in thermal paper might affect the substitution following the restriction of BPA in thermal paper in 2020. Based on discussions with paper manufacturers and importers, it seems clear that the clients of the thermal paper manufacturers will decide what paper they will want to buy in 2020. The European paper manufacturers (i.e. ETPA members) are likely to phase out the manufacture of BPA-based thermal paper by Q3 of 2019 and will continue switching to other alternatives so that they can satisfy their customers' needs from January 2020 onwards. At the time of writing (May 2019), based on discussions with representatives of the supply chain, it is expected that bisphenols (in particular BPS), Pergafast 201 and D8 will be the main alternatives used in the EU to replace BPA when the restriction enters into force in 2020.

In parallel, alternative thermal papers not using colour formers or colour developers have been developed<sup>13</sup> and could gain market share in the future if they are able to demonstrate good technical performance while being cost effective. The use of new technologies replacing thermal papers (e.g. electronic receipts) will probably also progressively increase in the future. However, this depends on customers' acceptance in sharing their personal data with retailers, on changing their habits in handling receipts and on retailers' willingness to make the necessary changes in their operations. It should also be noted that these electronic alternatives are not suitable for many thermal papers uses, such as labels.

This year's update further corroborates ECHA's predictions as well as those of ETPA that BPS will most likely be one of the main substitutes to BPA after the restriction on thermal paper has entered into force in January 2020.

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<sup>11</sup> Belgian authorities and ECHA are carrying out the assessment under REACH, while the Commission tasked EFSA to examine the new information jointly with the Belgian authorities and ECHA in the context of the legislation on food contact materials.

<sup>12</sup> <https://www.echa.europa.eu/web/guest/registry-of-clh-intentions-until-outcome/-/dislist/details/0b0236e182ed4414>

<sup>13</sup> See e.g. <https://www.koehlerpaper.com/en/news/publications/Product-News-Blue4est.php>

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