



PAGEV

Turkish Polystyrene Follow-Up Report 2017



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PREFACE

The plastic industry is one of the most important actors of the Turkish economy. Today, the contribution of the plastics industry to the country's economy is gradually increasing with the total production exceeding 9 million tons, and 35 billion dollars' worth of turnover, the approaching direct exports of 5 billion dollars and the annual growth of 12% for the last 10 years.

Our industry, with its production capacity, has reached the second place in Europe and the sixth place in the world. As PAGEV, we continue to lead the industry successfully in the framework of the "Unifying Power" mission of the Turkish Plastics Industry.

We also know that having the right and reliable data and information is the most important part of the solution when we sign the indispensability of Plastics in our lives and sign our work to tackle our industrial problems with concrete steps based on scientific evidence. In this direction we constantly investigate, collect new data, compile and report them. We present our reports that we believe are important for the development of our industry and our booklets containing important information to the plastics industry representatives, stakeholders and public institutions.

As PAGEV, we prepared a report set that will contribute to the industry in a serious way in the face of our long and dedicated researches. With our reports, we made booklets with the comments of our expert reporters about the point where the Turkish Plastics Industry is in the right and reliable light, common problems and what should be the search for concrete solutions. We believe that our reports and information set will benefit all of our stakeholders, especially our members, and will guide the plastics world. At the same time, we are pleased that our public institutions have reached the most up-to-date and accurate information about the plastics industry.

On the other hand, with our sector reports in English, we think that our colleagues will be able to share the potential of our country's plastics industry with the most up-to-date business partners in the global marketplace.

Hereby, presenting our current reports and information files relating with our industry, we would like to thank all of our colleagues who have contributed to this day's achievement of our industry, who has taken a position as a locomotive mission in the development of our country.

Best regards,

Yavuz EROĞLU
PAGEV President

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1. PLASTIC RAW MATERIALS COVERED BY REPORT

The plastic raw material covered by the analysis is Polystyrene HS Code 3903. In the analysis, foreign trade data is taken as 3903 HS Code sum.

HS Code	Definition
39.03	Styrene polymers (in the first form):
	Polystyrene:
3903.11.00.00.00	expandable
3903.19.00.00.00	Others
3903.20.00.00.00	Styrene-acrylonitrile (SAN) copolymers
3903.30.00.00.00	Acrylonitrile-butadiene-styrene (ABS) copolymers
3903.90	Others:
3903.90.10.00.00	Only the styrene and allyl alcohol copolymer (acetyl value 175 or more)
3903.90.20.00.00	The brominated polystyrene (58% by weight or more but not 71% by weight containing bromine, in one of the Figures given in Note 6 (b) of this chapter,
3903.90.90.00.00	Others

Table 1: Styrene Polymers by Hs Code Covered By the Report

Source: Turk Stat and ITC Trade Statistics

2. INSTALLED CAPACITY

Turkey has 170 MT/year of EPS, 20 MT/year of HIPPS and 20 MT/year of GPPS production capacity. RAGAGO has EPS production with an annual capacity of 150 MT/year and ASCHEM has 20 MT/year of EPS, 20 MT/year of GPPS and 20 MT/year of HIPS in Turkey. Total installed capacity of PS accounts for 210 MT/year.

	RAVAGO	ASCHEM	Total
EPS	150	20	170
HIPS		20	20
GPPS		20	20
Total	150	60	210

Table: 2 Installed Capacity of Polystyrene in Turkey

Source: Manufacturing Companies

3. PRODUCTION

As the demand for polystyrene is increasing, domestic production continues its growth. Having been 158 thousand tons and 311 million dollars in 2013, the production reached up to 180 thousand tons and 273 million dollars in 2017 with an annual increasing rate of 3.3% on amount and decreasing rate of 3.2% for the last 5 years.

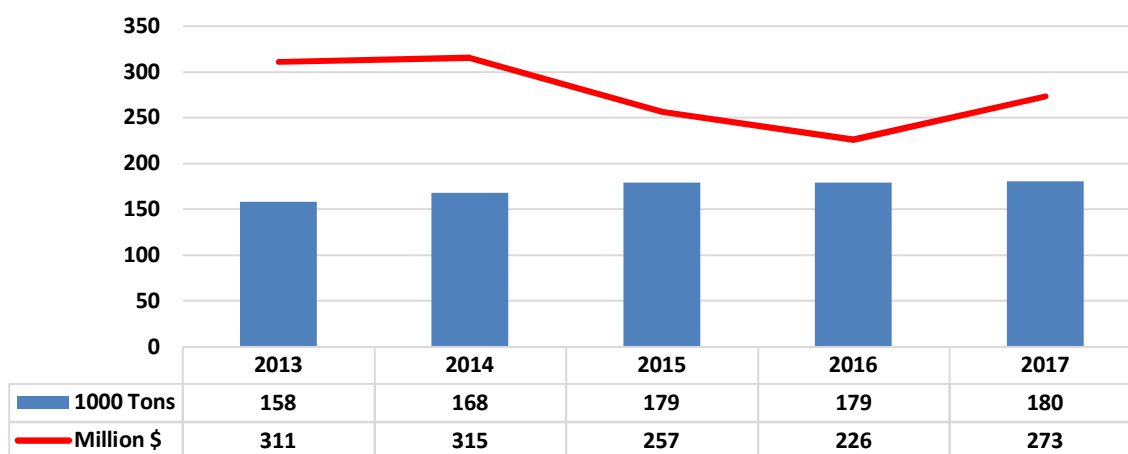
Production increased by 0.6% on amount and 20.9% on value basis in 2017 compared to 2016.

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	2013	2016	2017	CAGR % 2013 - 2017	% Increase 2017/2016
1000 Tons	158	179	180	3.3	0.6
Million \$	311	226	273	-3.2	20.9

Table 3: Polystyrene Production in Turkey

Source: Manufacturing Companies



Graphic 1: Polystyrene Production in Turkey

Source: Manufacturing Companies

4. FOREIGN TRADE

4.1. IMPORTS

As domestic polystyrene production is far from meeting the demand of the growing domestic market, Turkey imports polystyrene to a large extent. However, in recent years there has been a decline in imports parallel to the increase in domestic production.

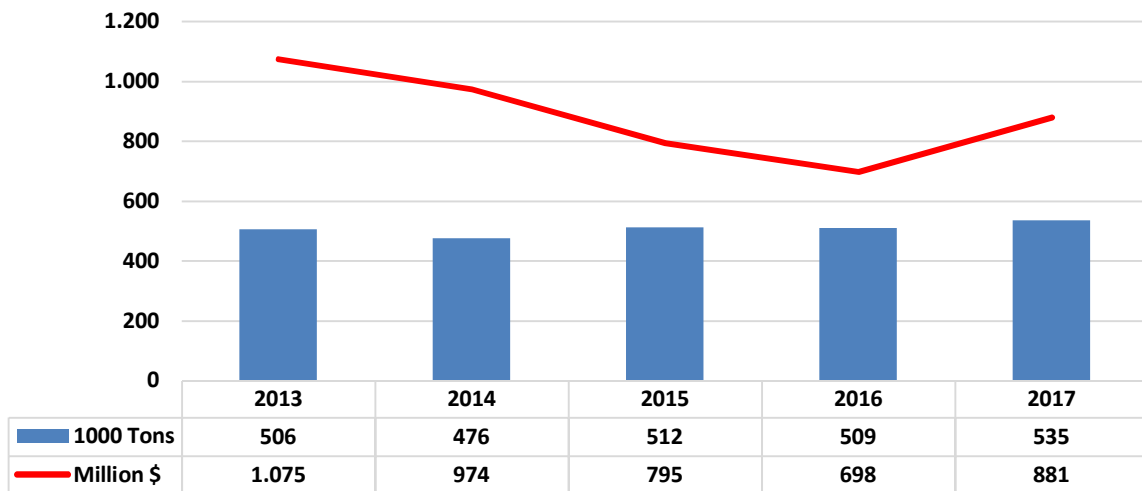
Imports of 506 thousand tons and 1 billion 75 million dollars in 2013 realized as 535 thousand tons and 881 million dollars in 2017 in the last 5 years with an annual increasing rate of 1.4% on amount and decreasing rate of 4.9% on value basis.

In 2017, the imports of polystyrene increased by 5.1% on amount and by 26.1% on value basis in 2017 compared to 2016.

	2013	2016	2017	CAGR % 2013 - 2017	% Increase 2017/2016
1000 Ton	506	509	535	1.4	5.1
Million \$	1,075	698	881	-4.9	26.1

Table 4: Polystyrene Imports of Turkey

Source: Turk Stat and ITC Trade Statistics



Graphic 2: Polystyrene Imports of Turkey

Source: Turk Stat and ITC Trade Statistics

In 2017, 17% of Turkey's imports were expanded polystyrene (EPS) on amount and value basis. Other polystyrene imports shared 47% on amount and 42% on value basis.

HS Code	Definition	Amount Basis (%)	Value Basis (%)
390311	Expandable Polystyrene (EPS) (Primary Form)	17	17
390319	Other Polystyrene's (excluding EPS)	47	42
390320	Styrene-acrylonitrile (SAN) copolymers	2	2
390330	Acrylonitrile-butadiene-styrene (ABS) copolymers	25	29
390390	Other polystyrenes (Primary Form)	10	10
	Total	100	100

Table 5: Polystyrene Imports by HS Codes in Turkey (2017)

Source: Turk Stat and ITC Trade Statistics

4.2. EXPORTS

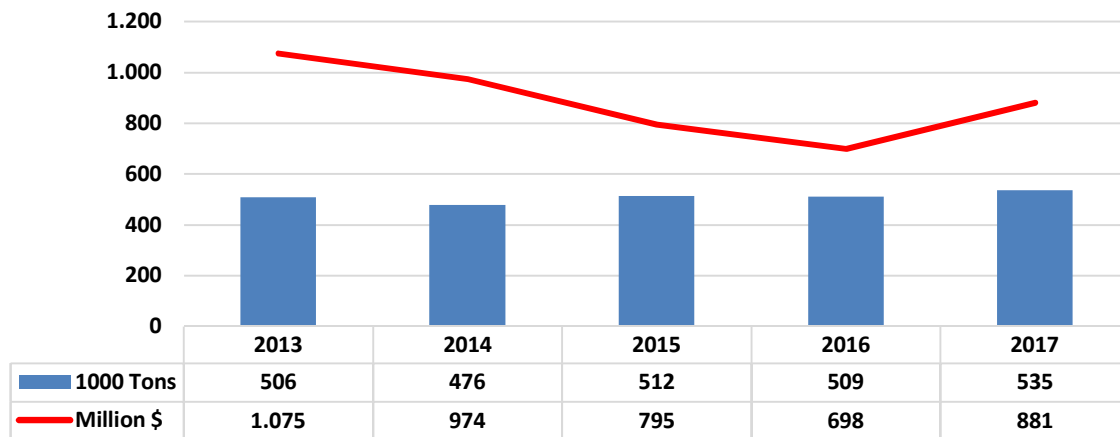
Exports of 26 thousand tons and 47 million dollars in 2013 increased by 4.6% per year on amount and decreased by 2.2% on value basis respectively for the last 5 years and reached to 31 thousand tons and 43 million dollars in 2017.

Exports of polystyrene increased by 18.6% on amount and 42.8% on value basis in 2017 compared to 2016.

	2013	2016	2017	CAGR % 2013 - 2017	% Increase 2017/2016
1000 Tons	26	26	31	4.6	18.6
Million \$	47	30	43	-2.2	42.8

Table 6: Polystyrene Exports of Turkey

Source: Turk Stat and ITC Trade Statistics



Graphic 3: Polystyrene Exports of Turkey

Source: Turk Stat and ITC Trade Statistics

In 2017, share of EPS in polystyrene exports realized as 63% on amount and 71% on value basis. Other polystyrene imports shared 29% on amount and 20% on value basis.

HS Code	Definition	Amount Basis (%)	Value Basis (%)
390311	Expandable Polystyrene (EPS) (Primary Form)	63	71
390319	Other Polystyrene's (excluding EPS)	4	4
390320	Styrene-acrylonitrile (SAN) copolymers	0	0
390330	Acrylonitrile-butadiene-styrene (ABS) copolymers	3	5
390390	Other polystyrenes (Primary Form)	29	20
	Total	100	100

Table 7: Polystyrene Exports of Turkey by HS Codes (2017)

Source: Turk Stat and ITC Trade Statistics

4.3. FOREIGN TRADE DEFICIT

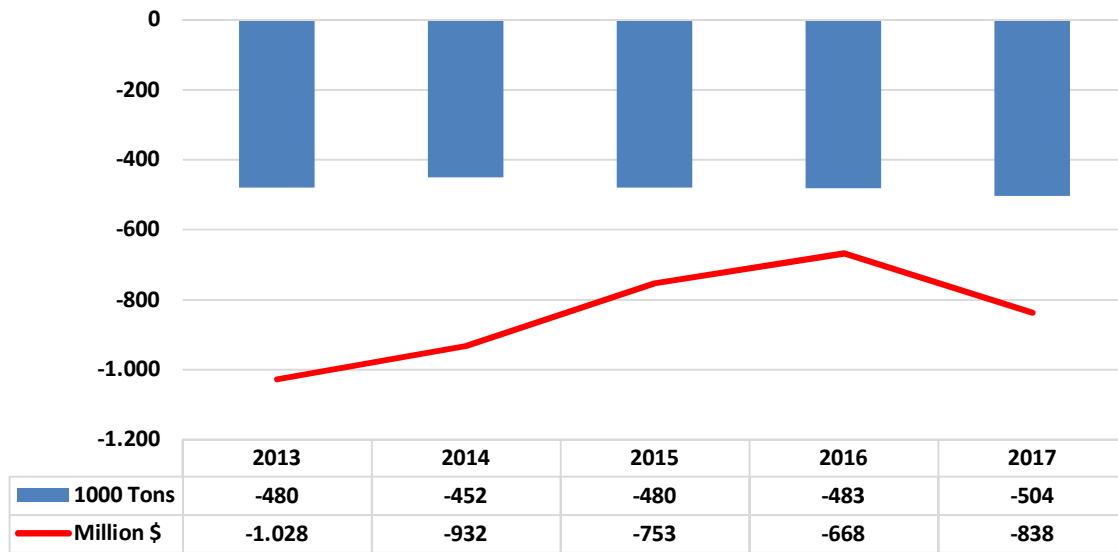
Turkey, always gives deficit in polystyrene foreign trade both on the basis amount and value. Having been 480 thousand tons and 1 billion 28 million dollars in 2013, foreign trade deficit of polystyrene reached up to 504 thousand tons and 838 million dollars in 2017 with an increasing rate of 1.2% on amount and decreasing rate of 5% on value basis for the last 5 years.

Foreign trade deficit increased by 4.3% on amount and 25.4% on value basis in 2017 compared to 2016.

	2013	2016	2017	CAGR % 2013 - 2017	% Increase 2017/2016
1000 Tons	-480	-483	-504	1.2	4.3
Million \$	-1,028	-668	-838	-5.0	25.4

Table 8: Polystyrene Foreign Trade Deficit of Turkey

Source: Turk Stat and ITC Trade Statistics



Graphic 4: Polystyrene Foreign Trade Deficit of Turkey

Source: Turk Stat and ITC Trade Statistics

4.4. IMPORTS BY COUNTRIES

Turkey imported 88% of total polystyrene imports on amount and 86% on value basis from 10 countries in 2017. South Korea, Belgium, Yumurtalık Free Trade Zone, Iran and France were the main import partners of Turkey.

Countries	1000 Tons	Million \$	% - Ton	% - \$
Korea	115	211	22	24
Belgium	114	180	21	20
Yumurtalık Free Trade Zone	67	97	13	11
Iran	50	68	9	8
France	26	43	5	5
Germany	24	40	4	5
Taiwan	24	39	4	4
Austria	16	29	3	3
Netherlands	12	24	2	3
S.Arabia	17	24	3	3
10 Countries Total	463	756	87	86
Others	71	125	13	14
Total	535	881	100	100

Table 9: Polystyrene Imports of Turkey by Countries (2017)

Source: Turk Stat and ITC Trade Statistics

4.5. EXPORTS BY COUNTRIES

In 2017, 62% of Turkey’s total polystyrene exports on amount and 63% of on value basis destined to 10 countries. In the mentioned period, Romania, Saudi Arabia, Israel, UAE and Egypt formed the top 5 countries that Turkey exports most polystyrene.

Countries	1000 Tons	Million \$	% - Ton	% - \$
Romania	3,3	5,5	11	13
S.Arabia	2,8	3,5	9	8
Israel	2,7	3,5	9	8
UAE	2,1	2,8	7	7
Egypt	2,7	2,7	9	6
Serbia	1,5	2,5	5	6
Bulgaria	1,1	1,8	3	4
Georgia	1,1	1,8	3	4
Kayseri Free Trade Zone	0,9	1,6	3	4
Morocco	1,0	1,6	3	4
10 Countries Total	19,1	27,3	62	63
Other	11,9	15,8	38	37
Total	31,0	43,1	100	100

Table 10: Polystyrene Exports of Turkey by Countries (2017)

Source: Turk Stat and ITC Trade Statistics

4.6. IMPORT AND EXPORT PRICES

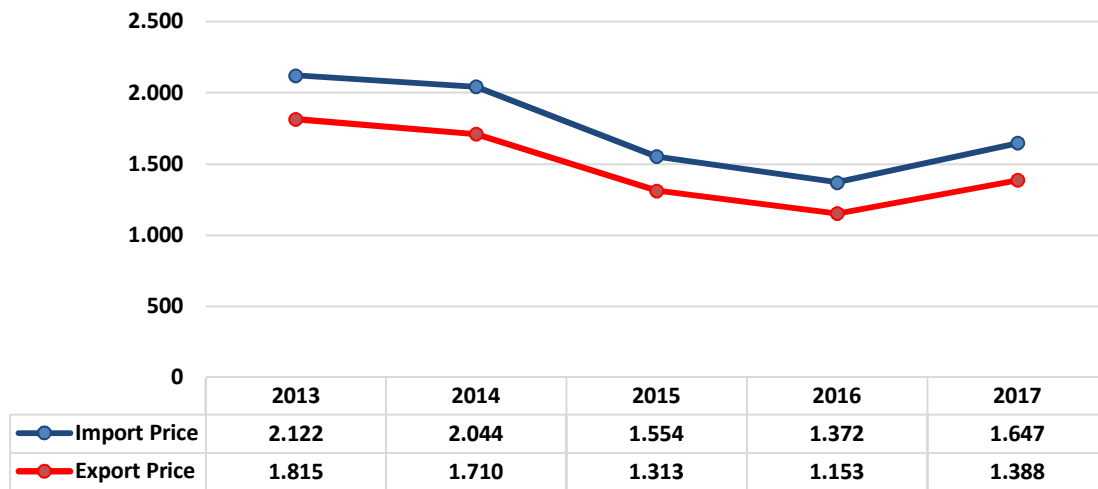
Turkey's average import prices of polystyrene have been higher than average export prices in all years. In the last 5 years, import prices have declined by 6.1% on average, and export prices by 6.5%.

	2013	2016	2017	CAGR % 2013 - 2017	% Increase 2017/2016
Import Price	2,122	1,372	1,647	-6.1	20.0
Export Price	1,815	1,153	1,388	-6.5	20.4

Table 11: Polystyrene Average Foreign Trade Prices of Turkey (\$/kg)

Source: Turk Stat and ITC Trade Statistics

In 2017, import price increased by 20% and export price 20.4% compared to 2016 and the average import price of polystyrene was 19% above the average export price.



Graphic 5: Polystyrene Average Foreign Trade Prices of Turkey (\$/kg)

Source: Turk Stat and ITC Trade Statistics

5. DOMESTIC CONSUMPTION

In parallel with the rapid developments in the Turkish plastics industry, the consumption of polystyrene in the industry has also shown an upward trend and has increased with a compound growth rate of 1.7% on amount in the period covering 2013-2017.

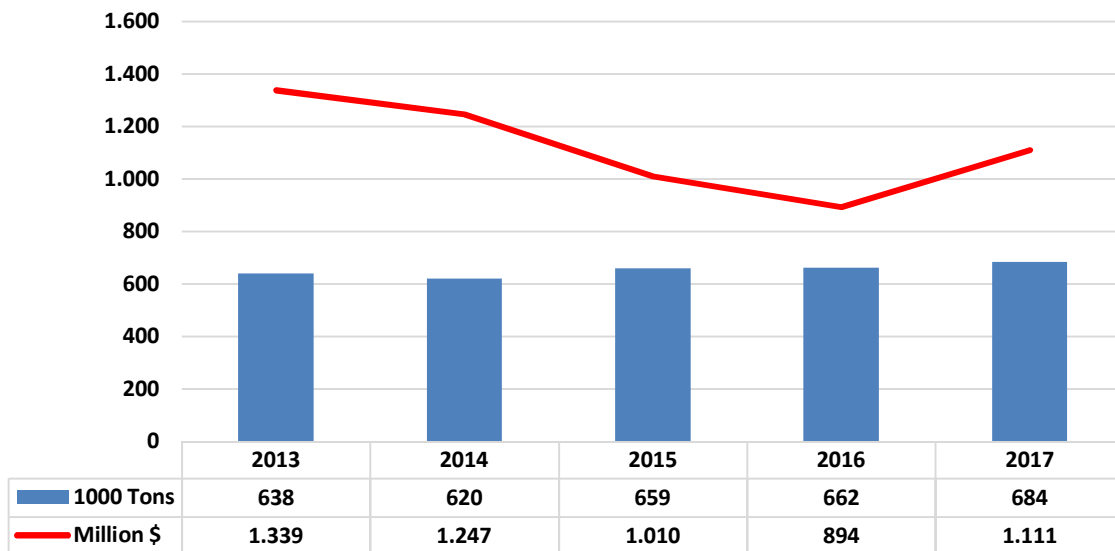
Consumption declined by an average of 4.6% per annum on value basis due to the decline in average selling prices. Consumption reached up to 684 thousand tons and 1 billion 111 million dollars in 2017.

Consumption increased by 3.3 on amount and 24.2% on value basis in 2017 compared to 2016.

	2013	2016	2017	CAGR % 2013 - 2017	% Increase 2017/2016
1000 Tons	638	662	684	1.7	3.3
Million \$	1,339	894	1,111	-4.6	24.2

Table 12: Polystyrene Domestic Consumption of Turkey

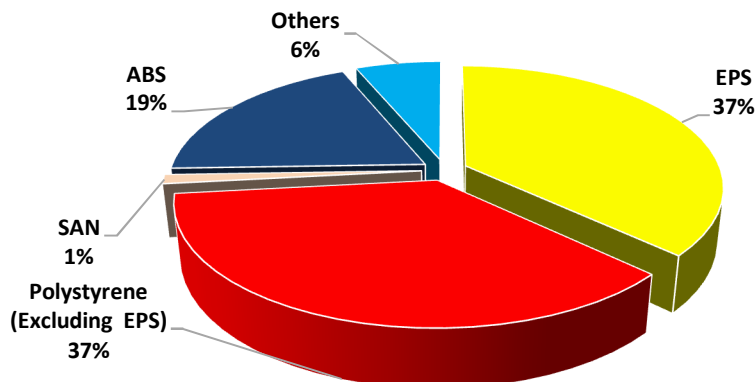
Source: Turk Stat and ITC Trade Statistics



Graphic 6: Turkey's Polystyrene Domestic Consumption

Source: Turk Stat and ITC Trade Statistics

In the 9 months of 2017, EPS accounted for 37% of Turkey's domestic market consumption and other shared 37% of total. The share of ABS in total consumption is 19%. The share of the others was 1% and 6% respectively.



Graphic 7: Turkey's Polystyrene Domestic Consumption by Types (2017)

Source: Turk Stat and ITC Trade Statistics

6. MAIN APPLICATION AREAS FOR POLYSTYRENE IN TURKEY

6.1. Packaging Applications

Eggs and dairy products, meat, fish and poultry, cold drinks or packaged foods. All of these products do not deteriorate when packaged securely with polystyrene packaging materials. When good packaging, cooling and transportation practices are put together in western

society, only two percent of the food is wasted and wasted, while in developing countries this rate is 50 percent. Polystyrene has proved to be a versatile and cost-effective solution for packaging and disposable food packages whatever the product package.

6.2. Electronic Appliance Applications

Polystyrene resins meet virtually all finished product requirements in refrigerators, air conditioners, ovens, microwave ovens, hand held vacuum cleaners and mixers. Polystyrene resins are safe, low cost, and have excellent functionality due to their excellent appearance and easy process ability. For this reason, almost 26 percent of the polystyrene demand is used for injection molding, extrusion and thermoforming

6.3. Consumer Electronics Applications

Polystyrene is used everywhere in TV casters where it is the use criterion for any new trend emerging in IT equipment, i.e. combination of function, shape, aesthetics and cost / high performance ratio. Polystyrene is the first choice in media boxes, cassette boxes and valuable transparent boxes that protect CDs and DVDs.

6.4. Construction Applications

Polystyrene resins are among the most popular materials used in building and building applications such as insulating foam, roofing, facade cladding, panels, bath and shower units, lighting fixtures and fixtures. Polystyrene resins are used in these building products because of their excellent price / performance balance, good workability and other performance characteristics.

6.5. Medical Applications

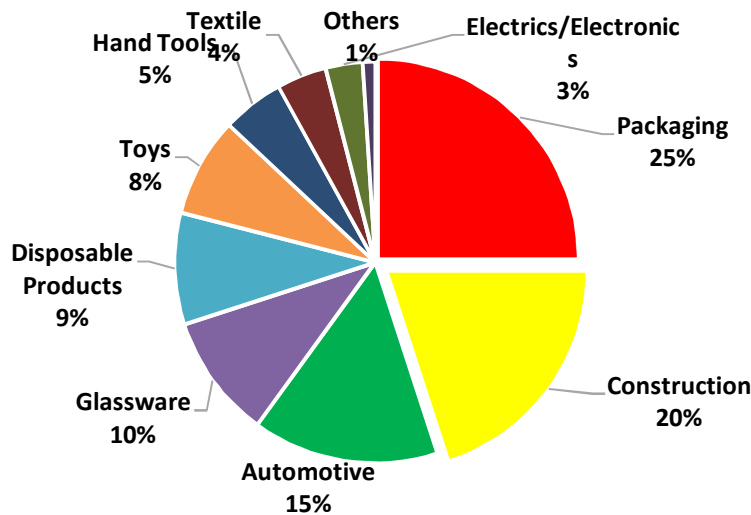
Delivering new and better medical technologies to patients and doctors is a complex and timely process. Polystyrene resins are used in the production of many disposable medical applications such as tissue culture trays, test tubes, petri dishes, diagnostic components and test kit containers due to excellent clarity and workability and superior post-sterilization aesthetics.

6.6. Other Applications

In addition to the general use of polystyrene, consumer goods such as toys, electric lawn and garden equipment, kitchen and bathroom accessories and other durable goods are produced from polystyrene. Polystyrene resins have an excellent cost / performance ratio and are often used in place of more costly polymers.

About % 15 of total EPS consumption comes from exports in Turkey. Only 1% of HIPS and GPPS consumption constitute from exports.

In Turkey, 25% of total polystyrene consumption is in packaging, 20% in construction, and 15% in automotive, 10% in glassware, 9% in single use and 8% in toy sectors. Other sectors account for 10% of total consumption.



Graphic 8: Turkey's Polystyrene Consumption by Industries

Source: Turk Stat and ITC Trade Statistics

7. SUPPLY AND DEMAND

It is observed that the annual average increase of Turkey's polystyrene production have realized as 3.3% imports by 1.4% exports by 4.6% consumption by 1.7% and foreign trade deficit by 1.2% in the last 5 years. In 2017, 78% of domestic consumption was covered by imports while 17% of production was exported.

It is estimated that production to reach up to 185 thousand tons, imports 550 thousand ton, exports 35 thousand tons domestic consumption 700 thousand tons in 2018. In this period, polystyrene foreign trade deficit is estimated to be 515 thousand tons, 79% of domestic consumption will be met by import while 19% of production will be exported.

	2013	2016	2017	CAGR % 2013 - 2017	% Increase 2017/2016	2018
Production	158	179	180	3.3	0.6	185
Imports	506	509	535	1.4	5.1	550
Exports	26	26	31	4.6	18.6	35
Domestic Consumption	638	662	684	1.7	3.3	700
Foreign Trade Deficit	-480	-483	-504	1.2	4.3	-515
Exports/Production	16	15	17			19

Imports/Domestic Consumption	79	77	78			79
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Table 13: Supply and Demand for Polystyrene in Turkey

Source: Turk Stat and ITC Trade Statistics

The rapid growth trend in Turkish plastics industry has also caused the consumption for polystyrene and styrene to increase rapidly. But domestic production is far from this consumption.

Consumption forecasts indicate that import dependency for polystyrene will be over 80% by 2020.

From this point of view, Turkey seems to have an important market qualification for existing or potential petrochemical facilities in terms of production of polystyrene.

8. PAGEV PROJECTS

PAGEV which is the “Unifying Power “of the Turkish plastics industry develops different projects aiming to solve the problems outlined above. These are in summary: "PAGEV Plastic Center of Excellence" and "International Regional Plastics Production Center".

8.1. PAGEV PLASTICS CENTER OF EXCELLENCE

Plastic materials, used in all areas of life, are rapidly taking place of other alternative products, because of their superior properties, in Turkey as well as in all over the world. Plastics, which usage in all sectors increasing is becoming an indispensable material for the 21st century.

Turkish Plastics Industry which is one of the fastest growing sectors in our country despite being young, is the 6th in the world and the 2nd in Europe. Growing with the goal of leadership in Europe, the Turkish Plastics Sector aims to increase the certification and added value of its products.

PAGEV, "Unifying Power" of the Turkish Plastics industry, is leading the industry with the "PAGEV Plastic Excellence Center" for realizing this purpose. The mission of the PAGEV Center for Plastic Excellence, will include the following activities.

- ✓ Research and Development
- ✓ Test and Laboratory Services
- ✓ Certification
- ✓ Training
- ✓ Competent Consulting

With the Center of Excellence, the test and laboratory support that the plastic industry needs; will be provided to the industry. So, many problems that lead to loss of time and energy such as high test costs, overseas shipping, customs clearance, and long test times will be removed. The platforms that will provide information to and knowledge sharing in the industry will be developed by the Center and detailed training programs will be prepared and presented for the benefit of the industry. While working on the newest technologies, the Center of Excellence will work together with industry organizations, universities, research institutes, professional associations and non-governmental organizations to work for the Turkish plastics industry to be the world leader with R&D and innovation based work.

Established with the support of the Ministry of Science, Industry and Technology, PAGEV Plastic Center of Excellence will provide to the plastics industry and Turkish economy, especially the development of industrial skills and capabilities that will form the basis of Turkey's national projects.

By PAGEV Plastic Center of Excellence, which will be established by strategic cooperation, it is aimed to grow the plastic industry faster with its traceable targets, scientific quality and high potential for commercialization,

Upon completion, the Center of Excellence, which will have an area of over 30 thousand m², rises right beside PAGEV Vocational and Technical Anatolian High School in Küçükçekmece, Istanbul. PAGEV Plastic Center of Excellence, which will make Turkey the center of plastic production in the world, will carry out innovative projects.

In addition to this, the Center will create a control mechanism for the products exported abroad. The Center will also contribute to the preservation of the reliability and reputation of the plastic products produced in Turkey. On the other hand, the introduction of poor quality and non-standard goods into the country will be prevented by determining the technical suitability of the plastic products imported from abroad without any definite importation in the laboratories.

With its superior information infrastructure, the Center of Excellence will present the important documents required by the players of the sector more economically and quickly. By accelerating the development, we will focus on the development of products and production technologies that will increase the competitive power of our firms.

The Center of Excellence, which will develop innovative ideas by following the developments in the world plastic sector, will increase the competitive power of our firms by providing many field consultancy services from the determination of appropriate input materials to the optimization of production process.

8.2. INTERNATIONAL REGIONAL PLASTIC MANUFACTURING CENTER

Although the Turkish plastics sector, with its process capacity reaching 9 million tons, has the 6th largest plastics production capacity in the world and 2nd in Europe, imports more than 85% of the plastic raw material it needs. One of the most important advantages of the plastics industry in Turkey is that it is located between the Middle East countries which are the main petroleum and plastic raw material producer and the European market which is the main plastic consumer.

PAGEV aims to unify the plastic raw materials potential of Middle East countries with the Turkish plastics industry's competent production capability and experience at the international regional plastic production center, which Turkey aims to establish in South East Anatolia Region.

In the center, to be established with the win - win principle, the plastics raw materials producer countries will be supplying cheap and reliable raw materials having a large volume and reliable market while Turkish plastics industry will have greater competition possibilities in the global markets with its growing production capacity and falling costs.