



POLYPROPYLENE

INDUSTRY
FOLLOW-UP
REPORT

2017/9 Months



PAGEV

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 polymers of polypropylene (PP) and other olefins of 3902 GTP, the contents of which are summarized in the following table.

| HS Code | Description |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 39.02 | Polymers of propylene and other olefins (in the first form): |
| 3902.10.00.00.00 | - Polypropylene (PP) |
| 3902.20.00.00.00 | - Polybutylene |
| 3902.30.00.00.00 | - Propylene copolymers |
| 3902.90 | - Others: |
| 3902.90.10.00.00 | - - A-B-A block copolymer of polystyrene, ethylene-butylene copolymer and polystyrene (Containing 35% by weight or less styrene) (6 (b)) |
| 3902.90.20.00.00 | - - Polybut-1-ene (but-1-ene with 10% or less by weight of ethylene By weight of a copolymer or polybut-1-ene containing 10% by weight or Less polypropylene (PP) and / or 25% or less by weight Polypropylene (PP) mixture) (as specified in note 6 (b) of this chapter) One) |
| 3902.90.90.00.00 | - - Others |

Table 1: Polymers of Polypropylene and Other Olefins HS Code of 3902 Covered By the Report

Source: PETKİM Annual Reports

2. INSTALLED CAPACITY

The only plant producing polypropylene in Turkey is PETKİM and its current production capacity is capable of producing 144,000 tons of polypropylene per year.

| | |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Date of Operation | 1985 |
| Initial Capacity | 60.000 Ton/Year |
| Extension Dates | 1993, 2005 |
| After-Capacity | 144.000 Ton/Year |
| Products | PP Fiber (EH-251, EH-241, EH-341, EH-102) Filler (MH-418, MH-220, MH-180) Pipe BC050) Film (FH-250, FH-360 , Molding (MH-220N) |

Table 2: PETKİM Production Capacity of Polypropylene Products

Source: PETKİM Annual Reports

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PETKİM started production of polypropylene in 1985 with a capacity of 60.000 tons and increased its production capacity to 144.000 tons with the investments realized in 1993 and 2005.

The main uses of polypropylene produced by the company are; cloth, sack, carpet yarn, rope, table cloth, mop, filter cloth, felt, cord cloth, pipe, cable sheath, fish net, brush, basin, table, chair, toy, picnic products.

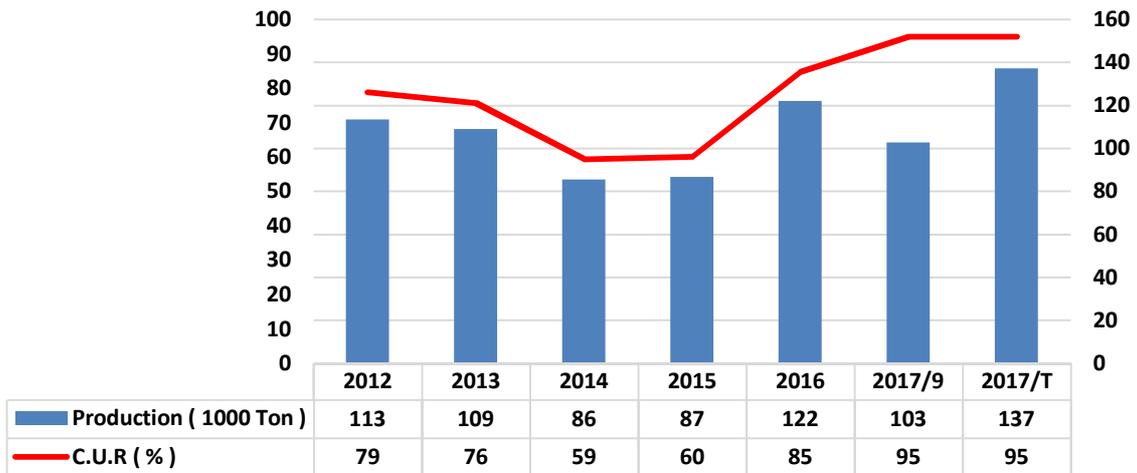
3. PRODUCTION AND CAPACITY UTILIZATION

The production of polypropylene produced by PETKİM between 2012 and 2017 period has been given in the table and graphic below. Production has reached to its maximum level with 137,700 tons in 2010 and decreased in the following years. The production of PETKİM realized as 103 thousand tons and capacity utilization rate as 95% in the 9 months of 2017. Production is expected to be 137 thousand ton at the end of 2017.

| | Production 1000 Ton | C.U.R. % |
|---------|------------------------|----------|
| 2012 | 113 | 79 |
| 2013 | 109 | 76 |
| 2014 | 86 | 59 |
| 2015 | 87 | 60 |
| 2016 | 122 | 85 |
| 2017 /9 | 103 | 95 |
| 2017/T | 137 | 95 |

Table 3: PETKİM Polypropylene Production and Capacity Utilization

Source: PETKİM Annual Reports



Graphic 1: PETKİM Polypropylene Production and Capacity Utilization

Source: PETKİM Annual Reports

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4. FOREIGN TRADE

4.1. IMPORTS

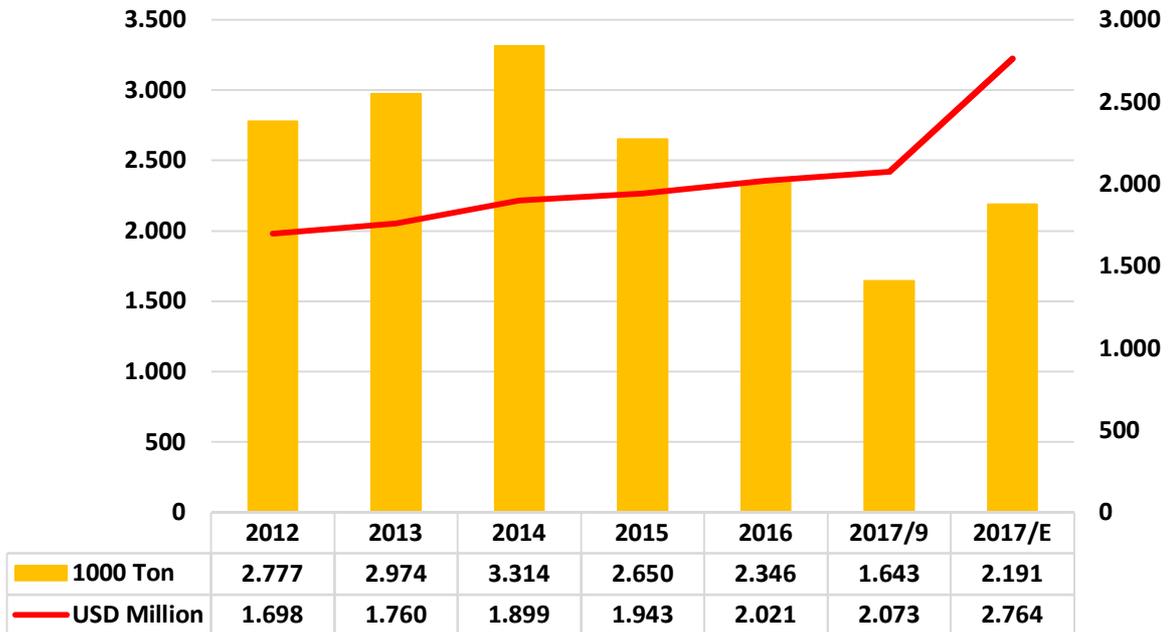
While total polypropylene imports, realized in 2012-2016 period, decreased by 4.1% per year on amount basis, increased by 4,5% per annum on value basis, reaching to 2 million 346 thousand tons and 2 billion 21 million dollars in 2016

Imports, realized as 1 million 643 thousand tons and 2 billion 73 million dollars in the 9 months of 2017 are expected to reach to 2 million 191 thousand tons and 2 billion 764 million dollars at the end of the year, decreasing by 4.1% on amount and increasing by 36, 7% on value basis compare to 2016.

| | 2012 | 2016 | 2017/9 | 2017/E | CAGR (%) 2016/2012 | % Increase 2017/2026 (E) |
|--------------------|-------|-------|--------|--------|-------------------------|-----------------------------|
| 1000 Ton | 2.777 | 2.346 | 1.643 | 2.191 | -4,1 | -6,6 |
| USD Million | 1.698 | 2.021 | 2.073 | 2.764 | 4,5 | 36,7 |

Table 4: Polypropylene Imports of Turkey

Source: Turk Stat and ITC Trade Statistics



Graphic 2: Polypropylene Imports of Turkey

Source: Turk Stat and ITC Trade Statistics

In Turkey, polypropylene in primary forms accounted for 80% on amount and 78% on volume basis of total imports in the 9 months of 2017. On the other hand, the primary forms of

polypropylene copolymers accounted for 19, 5% of the total imports on amount and 22% on value basis.

| | Quantity | Value |
|-------------------------------------|--------------|--------------|
| Polypropylene (Primary Form) | 80,3 | 77,7 |
| Propylene copolymers (Primary Form) | 0,2 | 0,3 |
| Others | 19,5 | 22,0 |
| Total | 100,0 | 100,0 |

Table 5: Polypropylene Imports of Turkey by Grades (2017/9)

Source: Turk Stat and ITC Trade Statistics

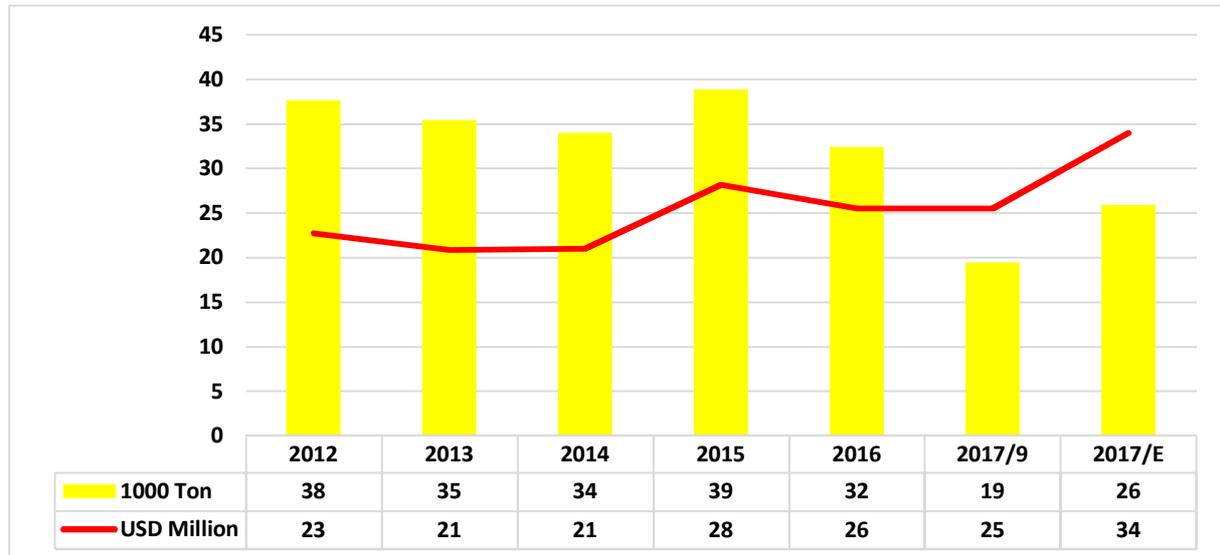
4.2. EXPORTS

Total polypropylene exports, which amounted to 38 thousand tons and 23 million dollars in 2012, realized as 32 thousand tons and 26 million dollars in 2016, decreasing by 3, 7% per annum on amount and increasing by 2, and 9% on a value basis.

| | 2012 | 2016 | 2017/9 | 2017/E | CAGR (%) 2016/2012 | % Increase 2017/2016 (E) |
|--------------------|------|------|--------|--------|-------------------------|-----------------------------|
| 1000 Ton | 38 | 32 | 19 | 26 | -3,7 | -20,0 |
| USD Million | 23 | 26 | 25 | 34 | 2,9 | 33,1 |

Table 6: Polypropylene Exports of Turkey

Source: Turk Stat and ITC Trade Statistics



Graphic 3: Polypropylene Exports of Turkey

Source: Turk Stat and ITC Trade Statistics

The intellectual property rights of this report belong to PAGEV and cannot be quoted even partly, without being shown as a source.

In Turkey, polypropylene in primary forms accounted for 71, 6% on amount and 65, 6% on volume basis of total exports. On the other hand, the primary forms of polypropylene copolymers accounted for 28, 2% of the total exports on amount and 33, 9% on value basis.

| | Quantity | Value |
|-------------------------------------|--------------|--------------|
| Polypropylene (Primary Form) | 71,6 | 65,6 |
| Propylene copolymers (Primary Form) | 0,2 | 0,5 |
| Others | 28,2 | 33,9 |
| Total | 100,0 | 100,0 |

Table 7: Polypropylene Exports of Turkey by Grades (2017/9)

Source: Turk Stat and ITC Trade Statistics

4.3. FOREIGN TRADE DEFICIT

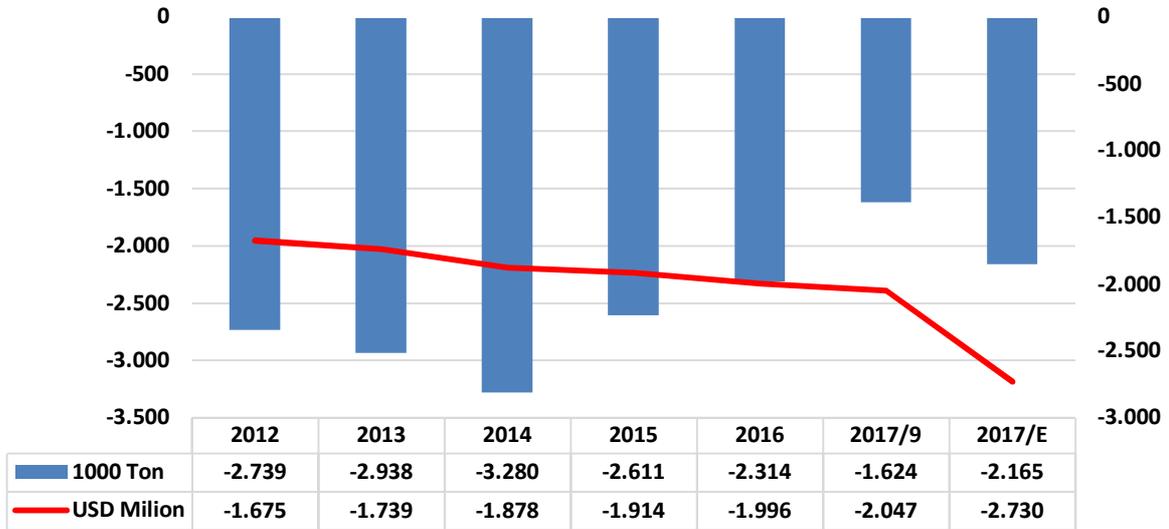
Polypropylene foreign trade always gives a large deficit in terms of both quantity and value. The polypropylene trade deficit has increased by 4,5% per annum on amount and 0,5% on value basis in the period of 2012-2016 and realized as 2,31 million ton and 1,99 billion dollars in 2016.

Foreign trade deficit which realized as 1 million 624 thousand tons in the 9 months of 2017 is expected to be 2 million 165 thousand tones and 2,73 billion dollars at the end of the year increasing by 36,8% on amount and decreasing by 14,3% on value basis with respect to 2016.

| | 2012 | 2016 | 2017/9 | 2017/E | CAGR (%) 2016/2012 | % Increase 2017/2026 (E) |
|-------------------|--------|--------|--------|--------|-------------------------|-----------------------------|
| 1000 Ton | -2.739 | -2.314 | -1.624 | -2.165 | 4,5 | 36,8 |
| Million \$ | -1.675 | -1.996 | -2.047 | -2.730 | 0,5 | -14,3 |

Table 8: Foreign Trade Deficit of Turkey

Source: Turk Stat and ITC Trade Statistics



Graphic 4: Foreign Trade Deficit

Source: Turk Stat and ITC Trade Statistics

4.4. IMPORTS BY COUNTRIES

In the 9 months of 2017, Turkey has realized 80% of total polypropylene imports in terms of amount and 79% in value terms from 10 countries. S. Arabia, Korea, Egypt, Israel and Belgium have made the top 5 import partners of Turkey.

| Countries | 1000 Ton | USD Million | % - Ton | % - \$ |
|-----------|--------------|--------------|------------|------------|
| S. Arabia | 467 | 538 | 28 | 26 |
| S.Korea | 177 | 231 | 11 | 11 |
| Egypt | 169 | 204 | 10 | 10 |
| Israel | 103 | 133 | 6 | 6 |
| Belgium | 79 | 115 | 5 | 6 |
| Iran | 84 | 100 | 5 | 5 |
| Spain | 60 | 91 | 4 | 4 |
| India | 77 | 88 | 5 | 4 |
| Germany | 48 | 73 | 3 | 4 |
| Greece | 54 | 65 | 3 | 3 |
| 10 Total | 1.318 | 1.638 | 80 | 79 |
| Others | 325 | 435 | 20 | 21 |
| Total | 1.643 | 2.073 | 100 | 100 |

Table 9: Polypropylene Imports of Turkey by Countries 2017/9 (% Share)

Source: Turk Stat and ITC Trade Statistics

4.5. EXPORTS BY COUNTRIES

In the 9 months of 2017, 66% of total polypropylene exports in terms of amount and 70% in value terms destined to 10 countries. Bursa Free Trade Zone, Egypt, Çorlu Free Trade Zone, Hungary and Iran have made the top 5 export partners of Turkey.

| Countries | 1000 Ton | USD Million | % - Ton | % - \$ |
|------------------------|-------------|-------------|------------|------------|
| Bursa Free Trade Zone | 4.7 | 5.9 | 24 | 23 |
| Egypt | 2.1 | 2.8 | 11 | 11 |
| Çorlu Free Trade Zone | 1.0 | 1.5 | 5 | 6 |
| Hungary | 0.9 | 1.4 | 5 | 6 |
| Iran | 0.7 | 1.4 | 4 | 6 |
| Iraq | 1.1 | 1.4 | 6 | 5 |
| China | 0.9 | 1.0 | 5 | 4 |
| Germany | 0.5 | 1.0 | 2 | 4 |
| Azerbaijan | 0.5 | 0.8 | 3 | 3 |
| Aegean Free Trade Zone | 0.5 | 0.7 | 3 | 3 |
| 10 Total | 12.9 | 17.9 | 66 | 70 |
| Others | 6.5 | 7.6 | 34 | 30 |
| Total | 19.4 | 25.5 | 100 | 100 |

Table 10: Polypropylene Export of Turkey by Countries 2017/9

Source: Turk Stat and ITC Trade Statistics

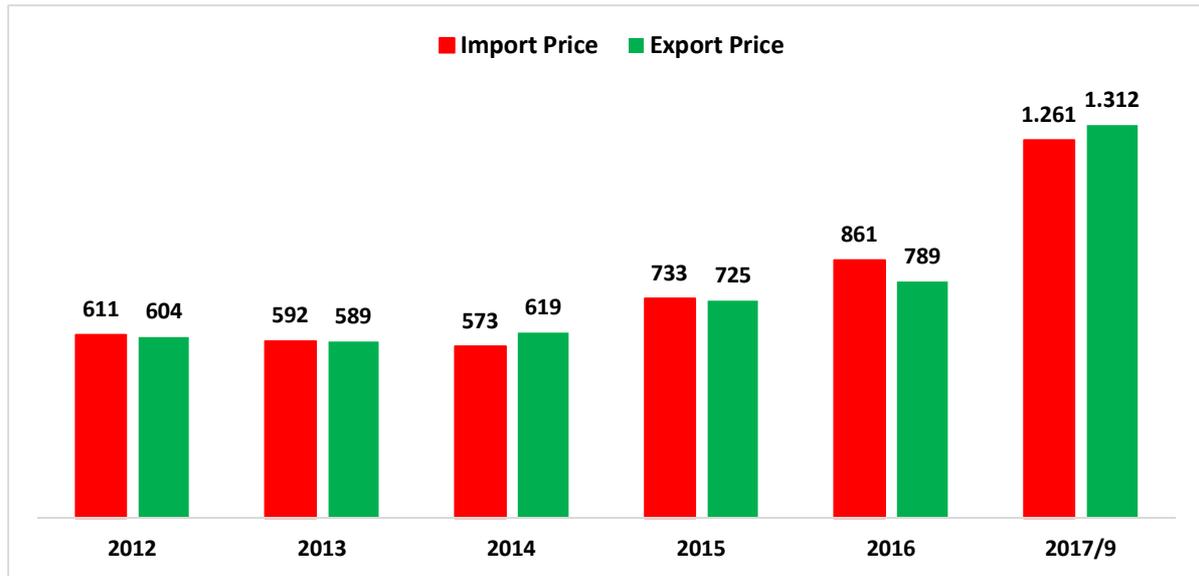
4.6. IMPORT AND EXPORT PRICES

Between 2012 and 2016, the average import prices of polypropylene have increased by an average of 9% and export prices by 6, 9%. In the 9 months of 2017, the average import price realized as 1.261 \$/Ton and export price as 1.312 \$/Ton and import price increased by 46, 4% and export price 66, 4% compare to 2016.

| | 2012 | 2016 | 2017/9 | CAGR (%) 2016/2012 | % Increase 2017/2016 (E) |
|--------------|------|------|--------|-------------------------|-------------------------------|
| Import Price | 611 | 861 | 1.261 | 9,0 | 46,4 |
| Export Price | 604 | 789 | 1.312 | 6,9 | 66,4 |

Table 11: Average Foreign Trade Prices of Polypropylene in Turkey (USD/Ton)

Source: Turk Stat and ITC Trade Statistics



Graphic 5: Average Foreign Trade Prices of Polypropylene in Turkey (USD/Ton)

5. DOMESTIC CONSUMPTION BY INDUSTRIES

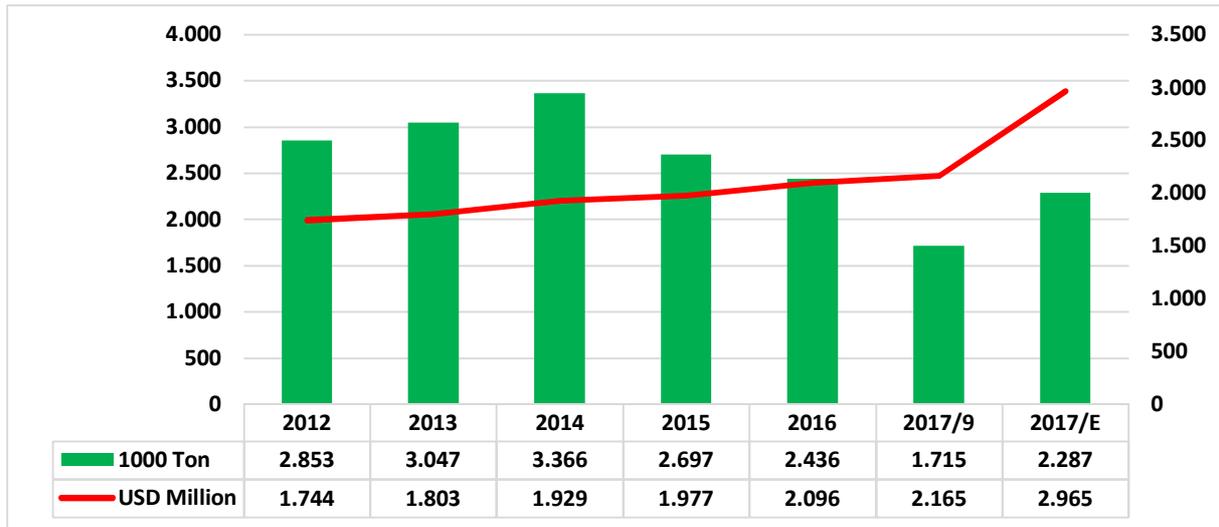
The polypropylene domestic consumption has decreased by an average of 3, 9% per annum on amount and increased by 4, 7% in the period covering 2012-2016 and realized as 2, 44 million tons and 2, 17 billion dollars in 2016.

Domestic consumption which was 1,72 million tons and 2,17 billion dollars in the 9 months of 2017 is expected to be as 2,29 million tons and 2,97 billion dollars at the end of the year decreasing by 6,1% on amount and 41,4% on value basis compare to 2016.

| | 2012 | 2016 | 2017/9 | 2017/E | CAGR (%) 2016/2012 | % Increase 2017/2016 (E) |
|------------|-------|-------|--------|--------|-------------------------|-------------------------------|
| 1000 Ton | 2.853 | 2.436 | 1.715 | 2.287 | -3,9 | -6,1 |
| Million \$ | 1.744 | 2.096 | 2.165 | 2.965 | 4,7 | 41,4 |

Table 12: Domestic Consumption of polypropylene

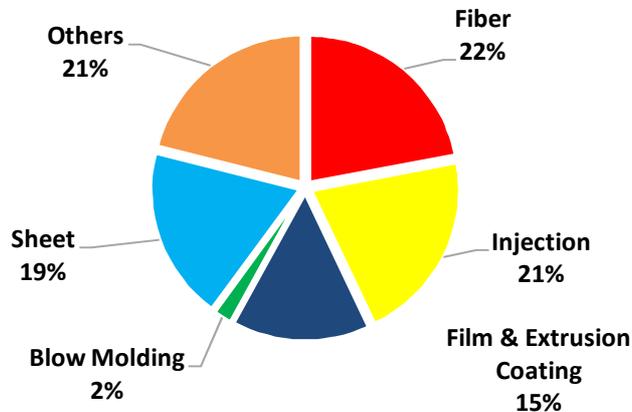
Source: Turk Stat and ITC Trade Statistics



Graphic 6: Domestic Consumption of Polypropylene in Turkey

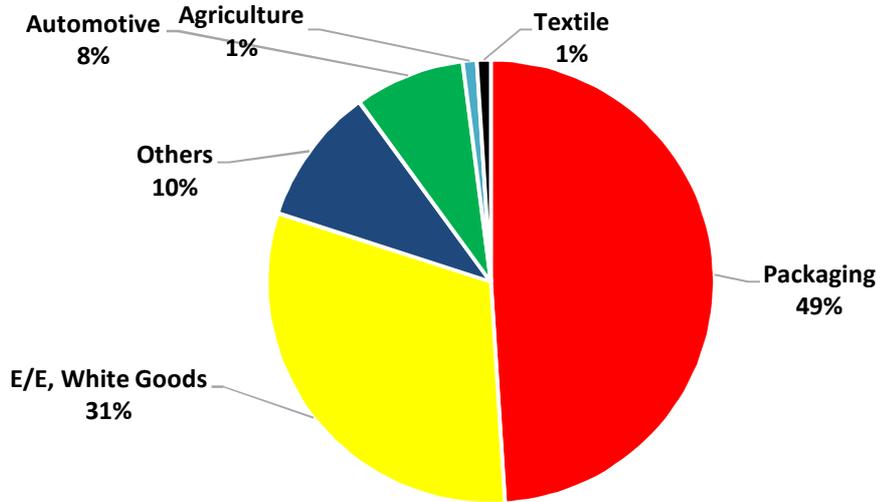
Source: Turk Stat and ITC Trade Statistics

In Turkey, fiber accounts for 22% and injection for 21% of total polypropylene consumption according to process types. The sheets constitutes the third major process type with 19% and the film and extrusion coating with 15%. Blow molding is 2% of total consumption. The total share of all process types other than these is 21%.



Graphic 7: Polypropylene Consumption by Process Types.

In Turkey, 49% of total polypropylene consumption in 2015 constituted packaging, 31% in electricity, electronics and white goods, and 8% in automotive sectors. Agriculture and textile sectors accounted for 1% of total consumption.



Graphic 8: Polypropylene Consumption by Subsectors (%)

6. SUPPLY AND DEMAND

In the last period of 2012-2016, total polypropylene production increased by 1, 8% per annum. On the other hand, imports decreased by 4, 1% exports by 3, 7% and domestic consumption by 3, 7%, respectively.

In the 9 months of 2017, 96% of domestic demand was met by imports and 21% of domestic production is exported and the import coverage ratio of exports realized as 1,2%.

| | 2012 | 2016 | 2017/6 | 2017/T | CAGR (%) 2016/2012 | % Increase 2017/2016 (E) |
|--------------------------------------|-------|-------|--------|--------|-------------------------|-------------------------------|
| Production | 113 | 122 | 92 | 122 | 1,8 | 0,0 |
| Imports | 2.777 | 2.346 | 1.643 | 2.191 | -4,1 | -6,6 |
| Exports | 38 | 32 | 19 | 26 | -3,7 | -20,0 |
| Domestic Consumption | 2.853 | 2.436 | 1.715 | 2.287 | -3,9 | -6,1 |
| Imports / Domestic Consumption (%) | 97,3 | 96,3 | 95,8 | 95,8 | | |
| Exports/ Production (%) | 33,2 | 26,5 | 21,2 | 21,2 | | |
| Export / Imports (%) | 1,4 | 1,4 | 1,2 | 1,2 | | |

Table 13: Supply and Demand for Polypropylene in Turkey (1000 Ton)

Source: Turk Stat and ITC Trade Statistics

Turkey is one of the major importers of polypropylene in the world. However, domestic production fails to meet the increasing demand.

From this point of view, Turkey seems to have an important polypropylene market for existing or possible petrochemical plants for polypropylene production.

7. 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: "Plastic Center of Excellence" and "International Regional Plastics Production Center".

7.1. 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.

- ✓ Test and Laboratory Services
- ✓ Research and Development
- ✓ 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.

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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.

7.2. 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.

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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.

CONNECTING POWER OF PLASTICS INDUSTRY



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