Knowledge and Strategy Partner

TATA STRATEGIC MANAGEMENT GROUP

FICCI

3rd NATIONAL CONFERENCE ON POLYMERS & PLASTICS

poly INDIA 2016

Theme:
Indian Plastic Industry: Challenges & Opportunities



A report on

Plastic Industry

January 2016



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Message

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The growing use of plastics in different segments of economy has been very useful. Its use esp, in agriculture has helped farmers increase crop production, improve food quality as also in more efficient usage of water resources. Similar has been their contribution to other key sectors, viz: packaging, auto, construction, healthcare etc.

While the usage and benefits of plastics are manifold, it invariably gets branded as a polluting material. The facts or myth regarding the polluting characteristic of plastic need to be addressed in a scientific manner. Going ahead recycling & reuse of plastics might be a leading step towards fostering innovation and sustainability. Also, increasing awareness among general mass with the help of industry groups and government may help address some of these challenges. In fact, there is wide scope for industries based on re-cycling of plastics waste.

I wish all the success to Poly India 2016.

(Prabh Das)

Message

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Plastics constitute a very important segment of Indian economy and are a facilitator of a large number of industries. The sector has been growing at a very good pace at above 10% for the past many years and is also highly employment intensive. With a turnover of above Rs.85,000 crores and employing above 3.3 million persons it is making good contribution to the national economy.

The plastics industry continues to break into newer spheres of industry, thereby enabling Indian industry churn out products that are lighter and cost-effective. This industry has been one of the of the fastest growing industries in the Indian economy. The sector has huge unrealized potential, as indicated by the present very low per capita consumption levels in the country compared to the global levels.

I wish all the success to Poly India 2016.

Vinay Mathur

Vinay Mathur



Table of Contents

Foreword 01

Executive Summary 03

Introduction 05

Key Growth Drivers: 10

Key Challenges. 14

Key Opportunities 16

Way Forward. 19

Current Scenario & Way Forward of Indian Plastic Industry 21

Indian PVC industry-Potential & Challenges 23

'Strategy to Meet the Challenge of Plastics Waste Management' 27
& 'Role and Potential of Plastics Recycling Industry'- Indian Context

A Window to Plasticulture. 30

References 33

About TATA Strategic Management Group 34

TATA Strategic Contacts 35

About FICCI 36

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LIST OF FIGURES AND TABLES

Figure 1: Past growth of the plastics industry 05
Figure 2: Structure and Organization of the Indian Plastic Industry 06
Figure 3: HDPE Demand-Supply Analysis (Figures in '000 TPA) 07
Figure 4: LDPE Demand-Supply Analysis (Figures in '000 TPA) 07
Figure 5: PS Demand-Supply Analysis (Figures in '000 TPA) 08
Figure 6: EPS Demand-Supply Analysis (Figures in '000 TPA) 08
Figure 7: PP Demand-Supply Analysis (Figures in '000 TPA) 08
Figure 8: PVC Demand-Supply Analysis (Figures in '000 TPA) 08
Figure 9: Planned capacity additions (FY15-18) 09
Figure 10: Demand outlook of the plastics industry (MTPA) 10
Figure 11: Per Capita plastic products consumption (kg/person) 11
Figure 12: Upcoming technologies 15
Figure 13: Sustainability interventions in packaging value chain 18

Foreword



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Federation of Indian Chambers of Commerce & Industry (FICCI) & TATA Strategic Management Group (TSMG) have been regularly tracking the Indian Plastics industry. This report is a part of our efforts to deliver to the reader an outline of the Indian Plastics Industry, its growth prospects, challenges and emerging trends in this segment of the market with a focus on relevant sustainable practices.

The Indian plastics industry is likely to witness high growth over the next five years. The growth will primarily be driven by end-user segments such as packaging, food and beverage, construction, electronics, etc. Fast-tracked globalization, swift change in technology and growing consumerism have brought with it sweeping changes and abundant opportunities for plastic industry to grow domestically and globally.

Key end-user industries to which plastics cater to are automobiles, agriculture, construction, healthcare, electronics, FMCG etc. With population growth, these industries are slated to grow at double-digit rate, in turn pushing the plastics demand to grow further. Additionally, low penetration level of plastic products in India, especially rural areas, is reflected in the low per capita consumption. Going ahead, plastics will find more usage in everyday lives, leading to higher growth rate of the industry.

We sincerely thank industry leaders, experts and all other participants whose valuable inputs have helped in developing this report. As always, it was an insightful experience for the team to materialize this report.?

Executive summary



Indian Plastic industry is making significant contribution to the economic development and growth of various key sectors in the country such as: Automotive, Construction, Electronics, Healthcare, Textiles, FMCG[1], etc. It has grown at 10% CAGR over the last five years to reach 13.4 MTPA[2] in FY15. Current low penetration level and hence, low per capita consumption (~9.7 Kg) along with increased growth in end use industries could propel the growth of plastics further. Plastic industry is estimated to grow at ~10% in the near future reaching 21.6 MTPA by FY20.

The growth of the Indian plastic industry is mainly driven by HDPE, LDPE and PVC plastics. For PS/EPS, there exists over-capacity in the Indian market. For HDPE, LDPE and PVC, domestic production is much lesser than demand and this demand-supply gap is met through imports. Industry is plagued with increasing demand along with higher import dependence for raw materials and no planned capacity addition in near future.

The plastic industry finds numerous applications in agriculture. In India, 70% of the rural population is dependent on agriculture as their principal mean of livelihood and the plastics utilization (by application) in agriculture is only 2% compared to the global average of 8%. If plasticulture is efficiently introduced into this segment, it has great potential to enhance the production and productivity of various phases of agriculture.

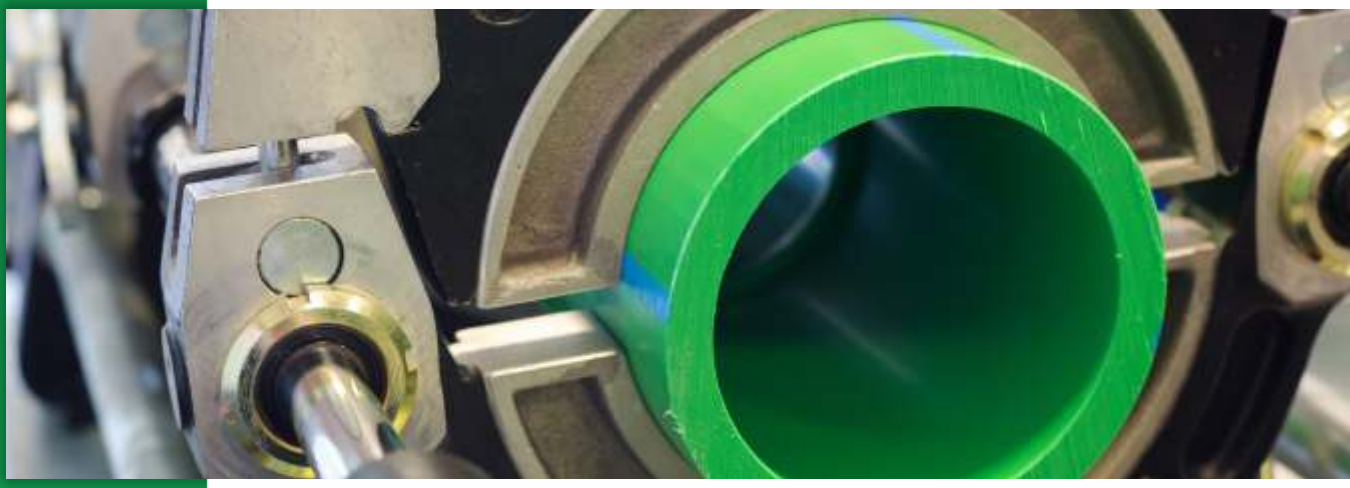
[1] Fast Moving Consumer Goods

[2] Million tons per annum

Growing interest in green products, healthier lifestyles and growing concern to protect environment is leading to a shift towards bio-plastics. These plastics are significantly made of renewable materials like bio mass and save up to 40% energy in production as compared to their petrochemical counterparts. They play a crucial role in further advancement of the plastic industry and as result businesses are focusing on the adoption of such eco-friendly products.

Environmental issues due to issues with disposing off plastics, lack of local technologies, high import dependence for raw material, etc. are few critical issues the industry faces today. Going ahead recycling & reuse of plastics might be a leading step towards fostering innovation and sustainability. Also, increasing awareness among general mass with the help of industry groups and government may help address some of these challenges.?

Introduction

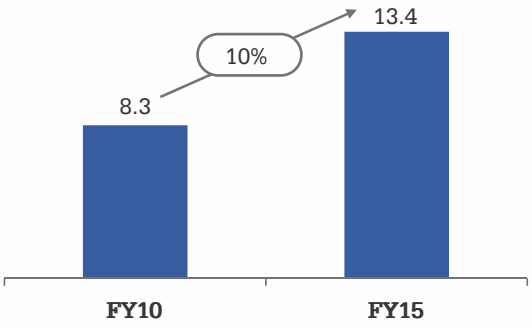


1. Market Overview

India's plastic manufacturing industry is worth approximately INR 90,000 crore in 2015 and has grown at a rate of 10% over the last 5 years. India is presently the third largest consumer of plastics globally after the United States and China. The plastic industry has made significant contributions to the economic development of the nation and in the growth of various key sectors such as consumer durables, healthcare etc. The industry employs about 40 lakh people directly or indirectly and has more than 30000 processing entities that symbolize a promising manufacturing sector and ample employment opportunities.

The industry is expected to grow at a CAGR of ~10% from 13.4 MTPA in FY15 to 21.6 MTPA by FY20.

Figure 1: Past growth of the plastics industry

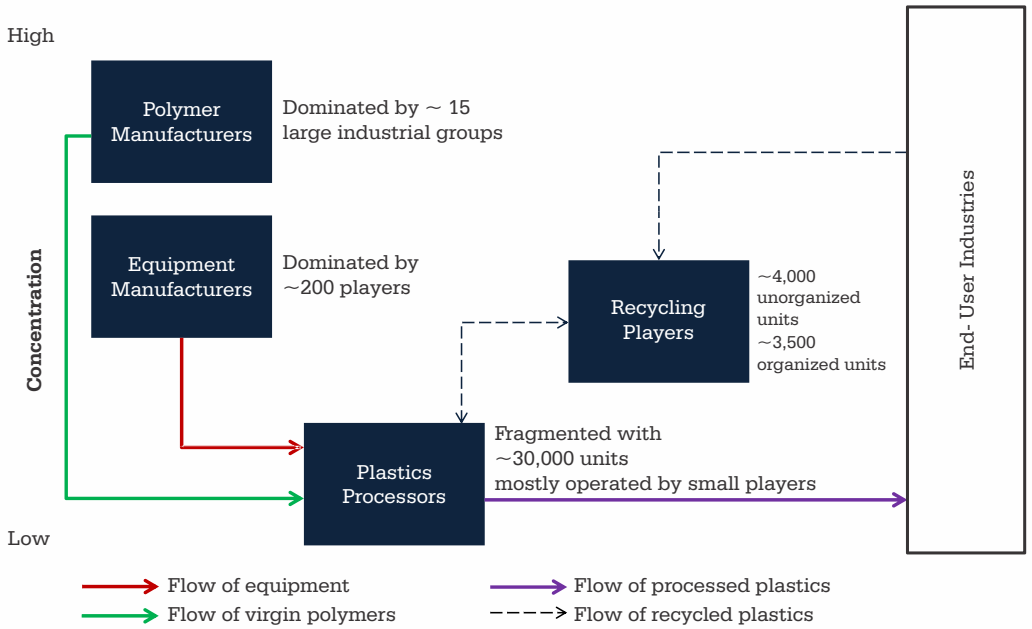


Source : Industry reports, TATA Strategic Analysis

However, different parts of the plastic value chain have not reached to same level of maturity. The entire chain in the Plastic industry can be classified into (A) manufacturing of Polymers and is called "upstream" and (B) conversion of polymers into plastic articles and is known as "downstream". The upstream Polymer manufacturers have commissioned globally competitive size plants with imported state-of-art technology from the world leaders. The upstream petrochemicals industries have also witnessed consolidation to remain globally competitive.

The downstream plastic processing industry is highly fragmented and consists of micro, small and medium units. Presently there are about 26,000 registered plastic processing units of which about 75% are in the small-scale sector. The small-scale sector, however, accounts for only about 25% of polymer consumption. The industry also consumes recycled plastic, which constitutes about 30% of total consumption.

Figure 2: Structure and Organization of the Indian Plastic Industry



Source: CRISIL, Plastindia Foundation, Kanvic, TSMG Analysis

2. Types of Plastics

To meet the material needs of different sectors of the economy, a wide variety of plastics raw materials are produced. They are broadly categorized as bulk (commodity), engineering and specialty plastics.

Commodity plastics account for the bulk of plastics and include Polyethylene (PE), Polypropylene (PP), Polyvinyl Chloride (PVC) and Polystyrene.

Conversely, Engineering and Specialty plastics are produced for specific purposes, as they exhibit superior mechanical and thermal properties in a wide range of conditions. These include styrene derivatives (PS/EPS[3] & SAN/ABS[4]), polycarbonate, poly methyl methacrylate, polycarbonates, poly-oxy methylene (POM) plastics etc.

There are three major types of PE, viz.: Low-density Polyethylene (LDPE), High-density Polyethylene (HDPE) and Linear Low-density Polyethylene (LLDPE). Most of the plastic materials such as PE and PP are derived from Ethylene and Propylene respectively, while other plastics such as PVC, PS and ABS are produced from benzene, butadiene and other feedstock.

3. Market Trends

Plastic industry has grown at a rate of 10% in the past 5 years. This growth has mainly been driven by HDPE, LDPE and PVC plastics. For PS/EPS, there exists over-capacity in the Indian market. For HDPE, LDPE and PVC, domestic production is much lesser than demand and this demand-supply gap is met through imports.

Figure 3: HDPE Demand-Supply Analysis (Figures in '000 TPA)

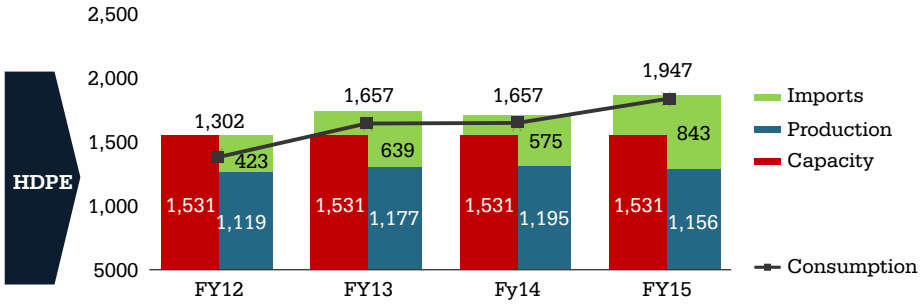
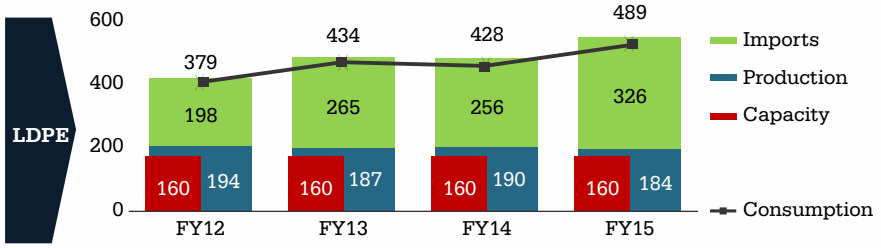


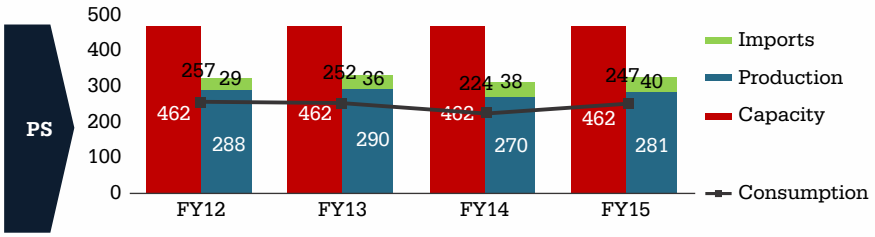
Figure 4: LDPE Demand-Supply Analysis (Figures in '000 TPA)



[3] Polystyrene/ Expanded Polystyrene

[4] Styrene Acrylonitrile/ Acrylonitrile butadiene styrene

Figure 5: PS Demand-Supply Analysis (Figures in '000 TPA)



Source: Chemicals and Petrochemicals Statistics at a glance, 2015

Figure 6: EPS Demand-Supply Analysis (Figures in '000 TPA)

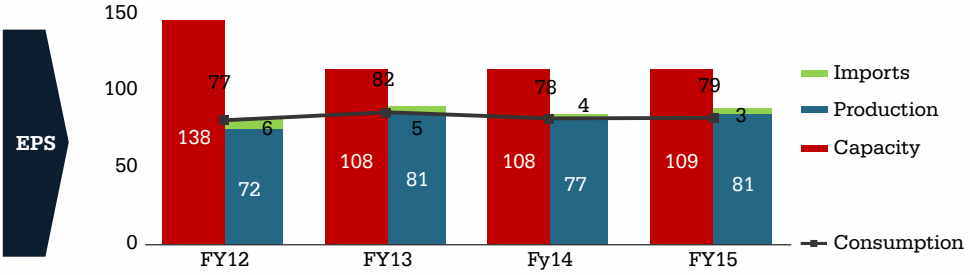


Figure 7: PP Demand-Supply Analysis (Figures in '000 TPA)

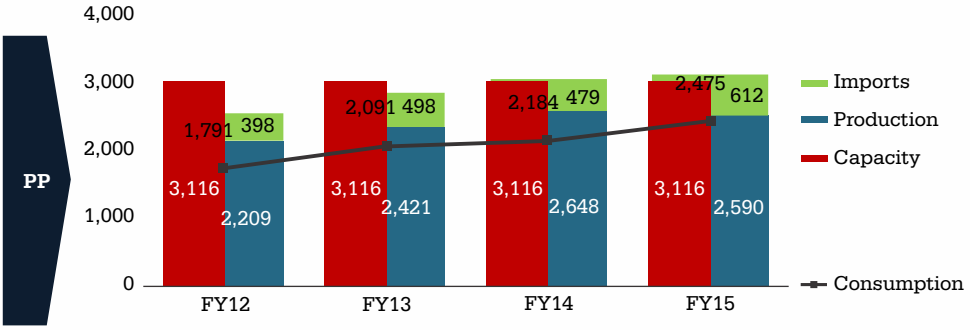
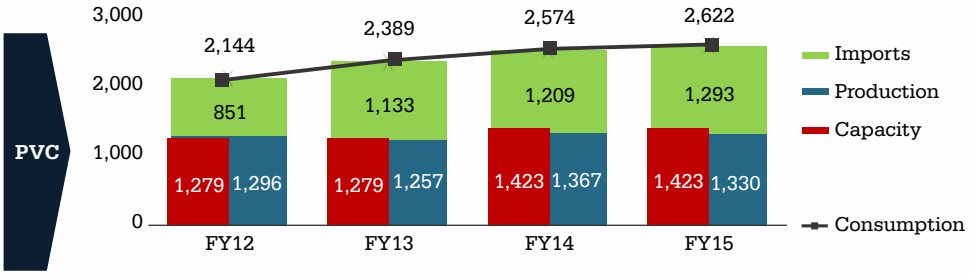


Figure 8: PVC Demand-Supply Analysis (Figures in '000 TPA)



Source: Chemicals and Petrochemicals Statistics at a glance, 2015

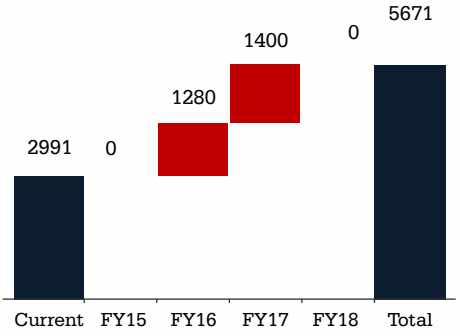
4. Capacity scenario

India has significant production capacity of plastics. Polyethylene (PE) continues to be the largest commodity with LLDPE experiencing the fastest growth in this category. Major players in the segment are Reliance Industries Ltd. (RIL), Haldia Petrochemicals Ltd. (HPL), Indian Oil (IOCL) and Gas Authority of India (GAIL). Approximately 75-80% of Polypropylene demand in India is met by Reliance Industries with around 20% coming from four Government run companies Indian Oil (IOCL), Haldia Petrochemicals, Bharat Petroleum (BPCL) and the Gas Authority of India Ltd (GAIL). Partially due to the growth of the Indian construction industry, the demand for PVC is exceptionally high with domestic production barely meeting 50% of the demand. Of the domestic suppliers, Reliance is the largest followed by Chemplast and Finoflex (with the latter two accounting for about 5% of demand).

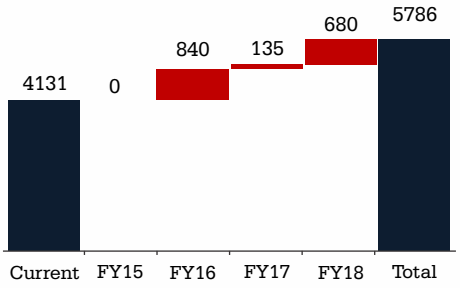
Table for the planned capacity addition is given below:

Figure 9: Planned capacity additions (FY15-18)

Polyethylene – Proposed Capacity Additions (In '000 tonnes)



Polypropylene – Proposed Capacity Additions (In '000 tonnes)



BCPL: Brahmaputra Cracker and Polymers Ltd
IOCL: Indian Oil Corporation Ltd.
RIL: Reliance Industries Ltd

MRPL: Mangalore Refinery and Petrochemicals Ltd
OPAL: ONGC Petro-Additions Ltd

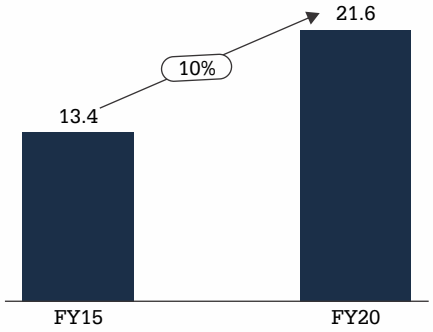
Source: CRISIL Research, TSMG Analysis

Key Growth Drivers:



The Indian plastic industry is expected to grow at a CAGR of ~10% from 13.4 MTPA in FY15 to 21.6 MTPA by FY20.

Figure 10: Demand outlook of the plastics industry

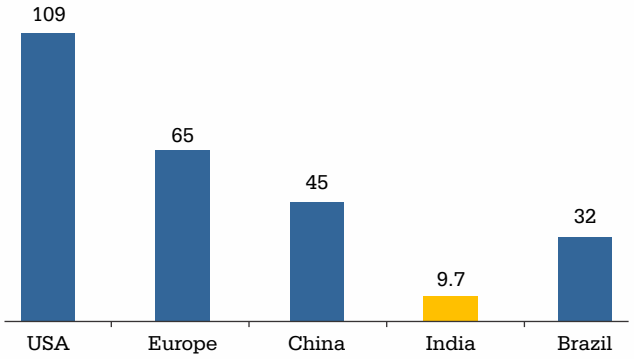


Source: Industry reports, TATA Strategic Analysis

The industry clearly has an optimistic future with plastics progressively becoming the material of choice for extensive usage due to their unique and diverse set of properties. With the government policies and initiatives stressing on manufacturing in the country, competitive rivalry in the sector is bound to grow considerably.

However, due to low penetration levels of plastic products in Indian market, especially rural segment, the per capita consumption of plastics is low. With current per capita consumption of plastics in the U.S. at 109 kg and in China at 29 kg, India at 9.7 kg has a long way to go. The low consumption level indicates an enormous growth potential for the plastics sector

Figure 11: Per Capita plastic products consumption (kg/person)



Source: Plastindia, Business Press, TSMG Research

1. Government Initiatives:

Government is in the process of launching a series of reforms to promote growth of the plastic industry

a) Make in India campaign

Driven by the increased focus on the 'Make in India' campaign, Ministry of Chemicals & Fertilizers and the Central Institute of Plastics Engineering & Technology (CIPET) have actively extended their support for the growth of plastic industry in India. To highlight this support, an export-oriented plastic cluster has been proposed to be set up at an investment of over INR 100 crore in Lucknow. India Industries Association (IIA) in collaboration with CIPET will set up this cluster.

As reported by Shri Hansraj Ahir, (Minister of State in the Ministry of Chemicals and Fertilizer) in the Lok Sabha, the government is implementing a scheme to support the setting up of need based Plastic Parks with requisite state-of-the-art infrastructure and enabling common facilities through cluster development approach. The objectives of the scheme, inter-alia, are to consolidate and enhance the capacities of domestic downstream plastic processing industry by increasing investment, competitiveness, production and export.

The Government has accorded approval for setting up the Plastic Parks in Madhya Pradesh (Raisen District), Assam (Tinsukia District) and Odisha (Jagatsinghpur District). Proposal for a Plastic Park in Tamil Nadu (Thiruvallur District) has been given 'in-principle' approval. Further, keeping in view the demands received from various other States for setting up the Plastic Parks, Government has approved setting up 6 additional Plastic Parks.

b) New Investments

According to CIPET, new investments are expected in plastic sector with 40,800 additional plastic processing machines are expected to be installed by FY15 and could potentially generate 3 million additional employment opportunities. Significant investments planned in sectors such as water & sanitation management, irrigation, power, transport etc. will result in making India a hub for PVC and CPVC product manufacturing.

2. End-use industry growth

a) Packaging Sector

The packaging industry in India is one of the fastest growing industries having influence on all industries, directly or indirectly. The total worth is about ~USD 15 billion. Indian packaging industry has registered a CAGR of 16% in the last five years. The spending on packaged foods is increasing due to increase in per capita income, urbanization and growing numbers of working women. There is great growth potential since India's per capita consumption of packaging is only 4.3 kg whereas neighbouring Asian countries such as China and Taiwan is about 6 kg and 19 kg respectively. This clearly indicates that the market is under penetrated and offers a great business opportunity for the Indian plastics packaging industry.

b) Automotive

The Indian Auto industry is one the largest in the world with an annual production of 23.3 million vehicles in FY15. It has grown at about 10-11% in the last five years from 14 million units in FY10. The automobile industry accounts for 22% of the country's manufacturing gross domestic product (GDP). An expanding middle class, a young population, and an increasing interest of companies in exploring rural markets have made the two wheelers segment (with 80 per cent market share) the leader of the Indian automobile market. The overall passenger vehicle segment has 14 per cent market share. With growing population, increasing per capita income and aspirations to own a vehicle, various auto segments have experienced aggressive growth in the past five years. Two-wheeler segment saw a 12% growth, while three wheelers segment grew at 8.8%. Commercial and passenger vehicles grew at 6.9% and 7.8% respectively during the same period. Hence, there is high potential for plastic usage to rise in auto segment.

c) Pharmaceutical

India has become a prime destination for manufacture of branded, generic and branded generic medicines with a strong export element. The Indian

pharmaceuticals market stands at ~USD 11 Bn and is growing at 13-15%. Key drivers in pharmaceuticals sector are increasing consumer spending, rapid urbanization and rising healthcare insurance. As per NOVONOUS estimates, pharmaceutical packaging industry in India is expected to grow at a CAGR of 5.46% till 2020.

d) Electronics

The electronics market of India is one of the largest in the world. Technological improvements and cost competitiveness are the main drivers for demand of Indian electronics products abroad. The demand of electronics has grown at an estimated 16% since the past five years. Currently, the demand stands at USD 136 billion up from USD 65 billion in FY10. On the other hand, supply is lagging behind at USD 44 billion in FY15. It has grown at 7% during the same period up from USD 31 billion in FY10. The growing customer base and the increasing penetration of electronic products in consumer durables segment have provided enough scope for the growth of the Indian electronics sector.

e) Construction and Infrastructure

Infrastructure is a key driver for the Indian economy. This segment is highly responsible for pushing India's overall development and enjoys focus from government for policies, ensuring timely creation of world class infrastructure. The Government of India is taking every possible initiative to boost the infrastructure sector. Some of the steps taken in the recent past are being discussed hereafter. As per the 12th Five Year Plan, India had committed USD 1 trillion in upgrading its ageing infrastructure like Power, Telecom, Roads, Irrigation, Railways, Oil& Gas and others. The Reserve Bank of India (RBI) has notified 100% foreign direct investment (FDI) under automatic route in the construction development sector. The new limit came into effect in December 2014. The Government of India has relaxed rules for FDI in the construction sector by reducing minimum built-up area as well as capital requirement. It has also liberalised the exit norms. In fact, the Cabinet has also approved the proposal to amend the FDI policy.

Key Challenges



1. Availability of feedstock

With plastics being a key material going to end-use sectors such as packaging, electronics, agriculture, etc., the demand for plastics is increasing day by day. With crude contributing heavily in deriving plastics such as PVC, PP, PE, PS[5], etc., availability of raw material is an issue these days with plunging crude prices and infrastructural issues. Along with prices of crude, exchange rate has led to an increase in price pressure and lower profits in spite of high volume realisations. India depends heavily on crude imports for satisfying its growing plastic needs. With the way plastic requirements are growing and are projected for the upcoming time, planned capacity addition won't be able to match the supply-demand gap. It would further aggravate the situation by higher import dependence which is unsustainable in the long run.

2. Low Investment in Technology

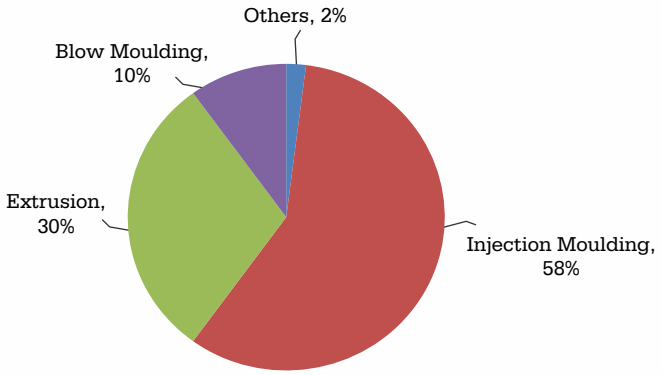
Domestic plastics processing industry in India has seen a shift from low output/low technology machines to high output/high technology machines. Focus to develop a state-of-the-art R&D is dying down with more focus on increasing the capacity utilization. Domestic machinery is manufactured as per the current technology to improve productivity and energy efficiency, in order to enable the processors to compete globally. Key machineries are imported from Europe, the U.S. and Japan which invite a 7.5% customs duty resulting in huge

[5] Poly Vinyl Chloride, Poly Propylene, Poly Ethylene, Poly Styrene

losses. India's technical needs are acute in areas like high production and automatic blow moulding machines, multilayer blow moulding, stretch/blow moulding machines, specific projects involving high capital expenditure like PVC calendaring; multilayer film plants for barrier films, multilayer cast lines, BOPP[6] and non-woven depend exclusively on imported technology/machinery. Other technological needs are:

- Multilayer blown film line up to 9/11 layers
- Automatic Block bottom bags production line
- Higher tonnage Injection Moulding machine >2000 Tons
- Higher tonnage >500 Tons all electric Injection Moulding machines

Figure 12: Upcoming technologies



Source: Industry reports, TATA Strategic Analysis

3. Environmental impact

In the wake of high usage of plastic products, impact on environment has been taken note of. They have taken up a sizable chunk of the municipal solid waste streams and hence are posing an environmental issue. Plastics, being a polymer derived from crude, are made up of long chains of carbon. It takes years for them to decompose completely. Improper disposal of plastics leads to ground water pollution, disturbance in soil microbial activity along with releasing of carcinogenic chemicals in the atmosphere leading to health issues among people. The other life forms also get affected due to this imbalance in value chain, with stray cattle feeding on thrown-away plastics. These adverse impacts are alarming the society and industry to ensure proper disposal of plastics. Both government as well as industry needs to come forward to cater to this issue and sensitize the general mass to follow the ritual of recycling waste plastic products.

[6] Biaxially Oriented Polypropylene

Key Opportunities



1. Plasticulture

Plasticulture can play a key part in energy conservation. It essentially stresses on the use of plastics in agriculture, horticulture, water management, food grains storage and related areas. A multitude of plastic materials may be employed in Plasticulture applications such as water conservation, irrigation efficiency, crop protection, including farm output practices like crop storage and transportation. Growing population and decreasing size of arable lands has necessitated the need to employ clean, green and sustainable practices to save resources and enhance productivity. Usage of plastics in agriculture can lead to:

- Yield improvement upto 50-60%
- Water savings upto 60-70%
- Prevention of weeds growth
- Soil conservation
- Protection against adverse climatic conditions
- Fertilizer savings upto 30-40%
- Reduction in post-harvest losses
- Conversion - cold desert/wasteland for productive use

2. Growth in key end-use industries

The industries which plastics cater to heavily are FMCG, Construction and Infrastructure, Agriculture, etc. Increasing population, growing urbanization and shift in lifestyle has pushed these sectors to gain a high growth in past decade. This has prompted a double-digit growth for plastics in India. With sectors like pharmaceuticals, personal and home care, etc. emerging in the rural areas and reinforced efforts in bringing out innovative plastic products, the industry is expecting further uplift in near future.

3. Bio-Plastics

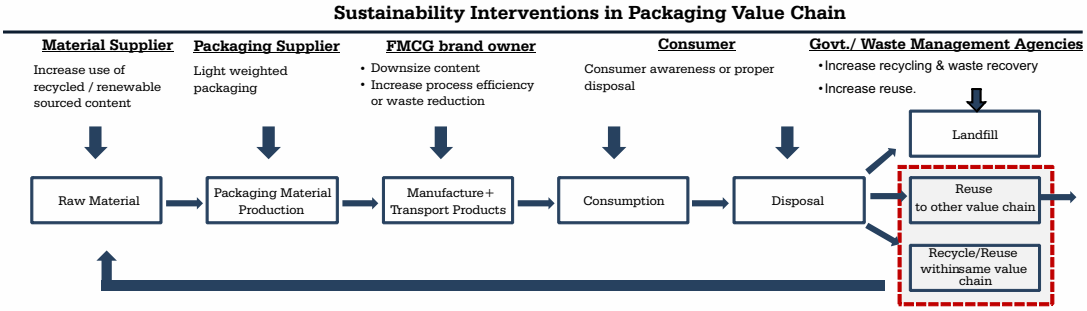
Growing interest in green products, healthier lifestyles and growing concern to protect environment is leading to a shift towards bio-plastics. Bio-plastics are plastics that contain bio-based content, are biodegradable or both. Many polymers like PLA (Poly Lactic Acid), PHA (Poly Hydroxyalkanoates), Bio PTT (Poly Trimethyl Terephthalate), Bio PDO (Propanediol) etc. are the part of this upcoming trend. These plastics are significantly made of renewable materials like bio mass and save up to 40% energy in production as compared to their petrochemical counterparts. They play a crucial role in further advancement of the plastic industry and as result businesses are focusing on the adoption of such eco-friendly products. Large numbers of companies are now looking for the development of alternative feedstock and make use bio-based raw material for their production.

The market for this product is still in its infancy. High cost of bio-plastics, lack of clear understanding and infrastructure, limited amount of funding available are acting as constraint to the evolution of this segment. However, increasing stress on green chemistry is expected to bring down the cost, also increasing environmental awareness, positive attitude from government, continuous R&D efforts and shift in consumer preference towards environmental friendly option will lead to the evolution in demand of this industry.

4. Waste Management

Plastic has low energy requirements during production, hence considered to be energy efficient. It consumes ~25% less energy in production compared to other alternatives. It results in lower emission of CO2 gas. Thus when compared to glass or aluminium plastics results in lighter environmental footprint. However, plastic is a sustainable choice only if recycled and disposed properly. This can be achieved mainly through segregation of waste at source, promotion of waste management infrastructure and the increased the use of bio-based plastics. (Refer figure 13)

Figure 13: Sustainability interventions in packaging value chain





Way Forward



Plastics industry is assured to grow at a good rate with the major applications being in FMCG and consumer goods. There are several factors like low per-capita consumption, manufacturing focus, end use industry growth, availability of feedstock, increasing urbanization, changing lifestyle, demographic dividend etc. promoting growth of plastic across India.

Domestic demand for polyethylene (PE) is estimated to grow at 7-8% CAGR between FY15 and FY20, driven by healthy demand from the downstream segments such as blow moulding and films (for packaging). Moreover, continued substitution of glass and metal packaging by plastic packaging will aid growth in PE demand. During the forecast period, installed domestic capacity is expected to nearly double to 5.7 million tonnes by FY20.

Domestic polypropylene demand is expected to accelerate over FY15 to FY20, driven by healthy demand from end-use segments such as raffia, fibre & filaments, injection moulding and co-polymer applications. Over the forecast period, we expect capacities to increase sharply. The segment's operating rate, though, is expected to remain high on account of healthy domestic demand.

Domestic PVC demand is estimated to increase at a faster pace over the next five years as compared to the past five years. With ever increasing demand for plastic products, there is a need to increase capacity to meet the supply-demand gap. Currently, there is no planned capacity addition expected in next 5 years for PVC which is leading to India's heavy dependence on imports. Today, close to 50% of the demand for PVC in the country is met by imports which were less than 5% of the country's demand ten years ago. This level of imports will be highly

unsustainable and to meet the demand in India in the future, capacity addition in the domestic industry an absolute must. Over the forecast period, with no planned capacity addition and high operating rates, the dependence on imports will increase to 60%.

Polystyrene off take is expected to quicken between FY15 and FY20, driven by demand from electronics, electrical appliances and extrusion/thermo-foaming applications. The segment's operating rate is expected to improve gradually in tandem with growth in domestic demand. Surplus production capacity will keep India as net exporter of polystyrene over the period.

Besides this, plastics are considered detrimental towards environment and hence, several states have imposed a ban on these products but the implementation of these ban are questionable. Thus, the need of the hour is to arrive at a sustainable solution by adoption of technologies, upcoming innovations and eco-friendly solutions. An organized development addressing cost effective plastic processing, along with streamlining operations of recycling of plastics could pave a path for growth of this industry.

The Article is authored by Arvind M Mehta
Chairman Governing Council - AIPMA

Current Scenario & Way Forward of Indian Plastic Industry

INDIA Per Capita Consumption v/s GLOBE

Global economic growth is generally interlinked to petrochemical consumption where plastic is an important partner.

Plastic processing is the pillar of economy in most of the advanced economies. Per capita consumption of the world is 28 kg whereas India's 11 kg and China 38 kg, Brazil 32 kgs. USA, Germany, UK, Italy, Spain, Australia, Japan, Korea, Taiwan it is more than 100 kg. This means India has big potential to grow and many opportunities. India's per capita consumption one of the lowest in Asia.

An overview of Indian Processing Industry

India Per Capita Consumption of Virgin 11 kg & Recycled 3.8 kg

Virgin Polymer consumption in the year 14-15 - 14 MMT

No. of Converting / Processing units - in organised sector - 30,000 plus in unorganized sector 20,000

No of processing Machines - 113,000

Processing Capacity - 30 MMT

Processing Capacity CARG - 13 % last 5 years

No. of Plastics Machinery Manufacturing units in India 200 plus

Investment in Machinery US$ 5 Billion

Investment required for next 5 years around 10 Billion US$ (Project Investments)

Size of Plastic & Polymer Industry -Rupees 1,44,000 Crores

Indian Technology competing globally

Plastics Machinery manufacturing in India is well developed with presence of world leading technologies and our own high tech entrepreneurs including plastic processors which makes us proud that it is Made in India, reversal of earlier impression a decade ago. So we have good growth in exports.

Compounding Lines, Tape Lines & looms, Multilayer Film plants, Pipe plants, Injection Molding Machines, Rotomolding Machines, Thermoforming Machines, Auxiliary equipment such as Material conveying systems,

Mold temperature controllers & chillers, bag making machines, etc.

Major Polymers - Manufacturing Capacity

Manufacturing Capacity is being continuously augmented to meet increasing demand

Indian Polymer Demand: ~24MMT by 2022/23

The players are :

Reliance, Haldia, GAIL, IOCL, OPAL, ONGC, Finolex, SANMAR, Shriram, DCW, Mittal, Bharat Petroleum.

Indian petrochemicals Strength

Availability of skilled manpower and training centers
Presence in all key segments of downstream plastic processing
Large entrepreneurial skill base
Large and growing market for converted products
Revolution in Automobile & Retail segment and now in Agriculture
Large consumption base for specialty Chemicals

By 2020 the future Mission - India

Productivity growth to help India sustain > 8% growth
Per Capita GDP will more than double current levels
Indians will buy 5 times more cars auto manufacturing hub
More than 100 million people will enter labor force
140 million rural dwellers to move to urban areas
Infrastructure investments (Rail, Road & Ports) to match global standards
We expect Per capita consumption of 20 kgs of plastics by year 2020.
Create employment opportunity for 6 Milion workers in the segment. (from current level of 4 million workers in plastic industry, directly and indirectly.

Indian scenario of Plastic exports

During 2014-15 our Plastics Exports were around US$ 7.2 Billion, out of this:

Raw Material i.e. Polymer accounted for 38% i.e.	US$ 2.74 Billion
Finished Plastics Products export accounted for	US$ 4.46 Billion.
	US$ 7.20

For the current year (2013-14), Our Export Target for Plastics Finished Products is US$ 4.82 Billion - a growth of nearly 8%

- Indian economic fundamentals are robust under liberal foreign investment policies of present Government
- Huge growth opportunities in India for Plastics due to lower per capita consumption as compared to world average coupled with low tax structure & labour cost.
- Flexible packaging industry poised for strong growth, insulated from the current economic scenario due to huge & diversified consumer base
- New applications /innovations in Packaging development is driving growth in India which is ably supported by the current and upcoming domestic PE Capacities

The Article is authored by Mr Ram Kumar Shankar
Deputy Managing Director, Chemplast Sanmar

Indian PVC industry- Potential & Challenges

PVC completed 100 years of existence in 2014. The global growth of the industry over these last 100 years has been spectacular. Production capacity has grown from a few thousand tons in the 1930s to over 50 million tons today. Growth, over this period, has been mainly driven by the developed countries in the West. However, in the coming years, growth in demand will be concentrated in developing countries in Asia, Africa, Latin America and the BRICS. The forecasts for the PVC industry are bright. The global market, currently at US$56 billion, is expected to reach revenue of US$65 billion in 2019, with average annual demand expected to increase at 3.9%.

The PVC industry in India is valued at over Rs. 20,000 crores with five major producers and over 6,000 processors, employing tens of thousands of people, making both industrial and consumer products. Currently, the five major producers of PVC have a total installed capacity of 1,535kt while total demand in 2014/15 was at 2,564kt. In terms of per capita consumption of PVC, India's is currently at around 2kg, which is much lower compared to the 11.8kg per capita in the US and 10.3 kg per capita in China. The PVC industry in India has historically been driven by the Agriculture and Infrastructure sectors with the former being the major contributor till the year 2000. For instance, PVC pipes and fittings, which are heavily used in both these sectors constituted only 14% of the total PVC consumption in 1975. This has grown to around 73% today with the other sectors including profiles, wires, flooring etc., comprising only 27%. Globally, pipes & fittings account for only 43% of PVC consumption, showing that PVC applications in India other than pipes & fittings are still in the early stages and are primed for growth. This, along with the relatively low per capita PVC consumption in India, shows that future prospects for the Indian PVC processing industry are bright.

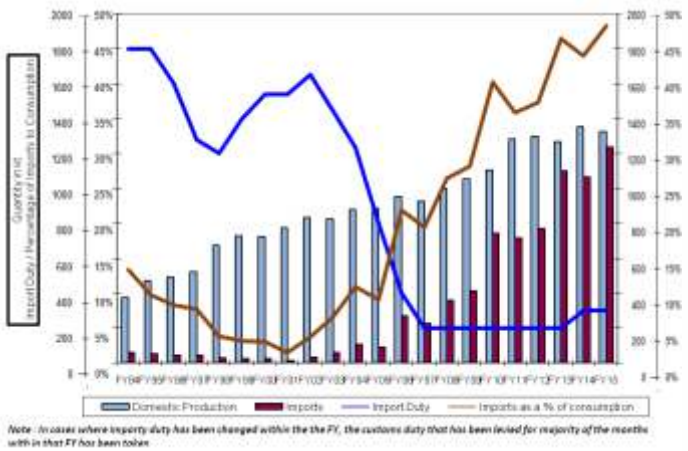
Indian PVC demand in the future will continue to be driven primarily by the Agriculture & Infrastructure sectors. The government has emphasized on bringing in increased land under irrigation and is focusing on rural water and sanitation infrastructure which will be a huge consumer of PVC pipes. The development of 'smart cities' will be a further boost to PVC consumption in India due to the huge requirement of urban infrastructure in these cities. The Housing sector will also be a major driver for PVC demand. The demand for housing from the middle income group in India is expected to increase in the coming years and the Government is taking active steps to bridge the gap in supply. It is estimated that every year, 2 million housing units are built in urban areas while 4.5 million units are built in rural areas. One typical urban unit will require about 200 kg of

PVC in major applications like pipes, doors & windows, conduits, wires & cables, etc. while one rural unit requires approximately 75 kg of PVC. Thus, the potential for PVC in the building and construction sector alone is over 700 ktpa (without taking smart city development into account). Moreover, introduction of green building concepts is picking up. PVC, being recyclable, less energy intensive and having longer life, will be in demand in these segments.

PVC has packaging as well as other applications in the FMCG, Pharmaceutical & Retail segments. These sectors are expected to grow in the coming years as the customer base comprising India's young population increases. Further, there are a number of applications in India, which are still nascent or currently unexploited like wall cladding, technologically-advanced pipes for sewerage application, liners for landfill applications, decking, furniture applications, waterproofing membranes and food grain storage These products are well established abroad and with ever-increasing urbanization, changing lifestyles, new technologies in construction and other factors, investments in these sectors are expected in the future. This bodes well for the PVC industry. Taking into account the above demand drivers and the CAGR in demand of around 9% from 2002-2015, it is estimated that annual demand growth for PVC will be at least 13% in the next five years. Demand is expected to cross 5,000kt in 2020

India has been producing PVC for over 50 years now, ever since the first plant of 6kt per annum capacity was set up by Calico Mills Ltd., in Mumbai in 1961. After this, India never looked back till about the mid-2000s However after the drop in import duty levels in the mid-2000s, capacity addition completely lagged demand, resulting in rapid increase in the arrival of imports. For the period between 2002 and 2015, the total demand for PVC in the country grew at a CAGR of 8.7%. During the same period domestic production grew at a CAGR of 3.7 % whereas imports increased by 39 times, growing at a CAGR of 32.5% (Fig.1).

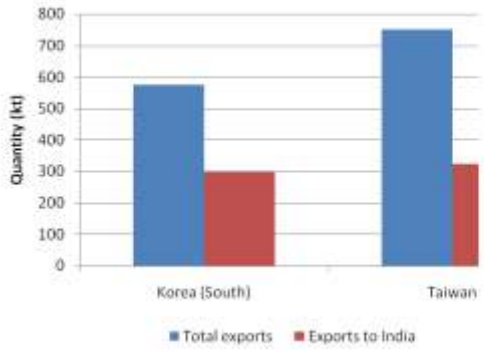
Figure 1 - PVC Production & Imports (1994-2015)



The stagnation in capacity addition can be attributed to the lack of availability of merchant ethylene and higher input costs due to non-availability of adequate feedstock (EDC & VCM) in India (except for chlorine from the caustic soda industry). Also, the delay in PCPIR – Petroleum, Chemicals & Petrochemical Investment Regions - has resulted in non availability of merchant ethylene for stand-alone downstream use. Further, the low import duty on PVC and low import duty differential between PVC and feedstock are leading to inadequate margins in the end market.

As a result, there is a huge supply-demand gap for PVC, which has made India very attractive to producers worldwide. Due to the low import duty for PVC in India and the availability of a fast growing market, international suppliers are able to offload their surplus material easily in India. For instance, import data over the last six months shows that India has imported material from over 24 countries, which include Korea, Taiwan, Japan, China, and EU countries along with U.S.A, U.K. as well as Brazil and Colombia. Looking at the period between April 2014-September 2015, the top five PVC exporting countries to India - Taiwan, Korea (South), China, Japan and Iran alone accounted for 87% of the total imports. MNCs are not interested in creating capacities in India, despite this sector being open to FDI from the 90s, but instead, prefer to supply from their plants outside India, which is also borne out by the proportion of exports in 2014 by Korea & Taiwan (the top two exporting countries to India) to India in relation to their total exports (Fig.2).

Figure 2 - Total Exports v Exports to India - Korea (South) & Taiwan



With any grass root plant taking almost 4-5 years to fructify and with no announcement as on date on creation of fresh capacity in the country, domestic production capacity, and therefore production, is expected to increase marginally or remain at around the same levels during this period. As a result, by 2020, in order to meet the projected demand of 5,000kt, India would need approximately 3,700kt of imports i.e. an additional 2,300kt from the present level to meet its PVC demand. A hypothetical analysis of the addition exportable surplus that could be available from the top five exporting countries (excluding current exports to India) shows that the maximum possible quantum of exports available would be around 2,000kt. However, it would be naive to assume that these countries would only export to India. Moreover, a look at the top five PVC importing countries in

the world shows that no other country imports over a million metric tons per year. This is a clear reflection of the enormous difficulty likely to be faced in trying to import 3-4 million tons per year. Another factor that goes to show that this level of import is almost impossible is the estimated global trade in PVC resin by the year 2020 which is at around 10 million tons. It will again be not prudent for India to expect that almost 37% of this will be an inflow into the country.

In order to encourage investments in the PVC industry, both by Indian companies as well as MNCs, the industry would need certain fiscal incentives to enable a minimum duty differential between finished product and feedstock. Also, a renewed thrust to the PCPIR policy is needed to ensure availability of ethylene for downstream units. Developed petrochemical infrastructure can also greatly reduce logistics cost. E.g., in countries with developed petrochemical infrastructure, intermediary feedstock is sourced off a pipeline. In India, these products are shipped across long distances involving huge logistics cost which makes domestic manufacturers uncompetitive compared to international counterparts

To summarise, presently, close to 50% of the demand for PVC in the country is met by imports. Though the levels of imports have been increasing over the years and thereby meeting the supply-demand deficit for PVC in the country, it remains to be seen whether this can be sustained over the medium to long term when domestic demand grows. Moreover, very little capacity expansion is seen in the countries which are currently exporting to India, meaning that there is an upper threshold beyond which these countries cannot supply. There could be a case in the future where Indian demand for PVC could possibly outstrip supply. This would lead to processed PVC products not being available for use as well as a lot of downstream processing facilities having poor capacity utilization levels. The immediate effect would be loss of employment. Considering that tens of thousands of people are employed by the PVC downstream industry, the effects would be detrimental. It would also have a deleterious impact on the foreign exchange outflow and the trade deficit. Increase in domestic production capacity of PVC would give processors a secure and stable source of supply whereby plant capacity utilizations levels can be high leading to wealth creation in the economy. Increase in PVC production capacity will also facilitate increase in chlorine utilization leading to better ECU economics and enhancement in capacity in the caustic soda industry, which is another industry plagued with low capacity utilization levels on account of increased imports.

All these point to the urgent need for extending support to the PVC industry on the lines of what has been explained earlier. Apart from resulting in a potential investment of over Rs. 20,000 crores over the next 5-7 years in India, such support could lead to possible investments in the upstream and downstream sectors as well

Source: White Paper on enhancing Competitiveness of Indian PVC and Caustic Soda Industries, released by FICCI in association with TSMG

This Article authored by
Indian Centre For Plastics In The Environment

'Strategy to Meet the Challenge of Plastics Waste Management' & 'Role and Potential of Plastics Recycling Industry' Indian Context

Due to its versatility, use of plastics is increasing in almost all fields of today's life across the world including India. Though plastics offer numerous benefits by providing safe and hygienic packaging materials for food and food products, conserves water, forests and energy resources, saves Green House Gas Emissions to a great extent compared to its alternatives, management of waste created by discarded plastic items after single use, especially in the packaging sector, has posed a challenging task. While it is imperative that the general mass requires proper behavioral education on 'anti littering', at the same time the users who use plastics for packaging their products also are required to take their part of responsibility in the collection activity of the packaging waste. Authorities also are required to set up proper infrastructure to deal with the waste management issues including plastics waste management.

The first step is collection of waste in segregated manner. 'Wet' and Dry' waste should be collected separately. While the 'wet' or biodegradable waste can be composted to manure or can be subjected to bio-methanation while different types of 'dry' waste can be further segregated in to similar groups / sub-groups of products like – paper, plastics, glass, tin and other metals etc and be recycled or their latent energy be recovered.

Plastics waste is 100% recyclable like other dry waste like paper, metals, glass etc. There are different technologies of plastics recycling. Recycling principally refers to Recovery, which is divided into Material Recycling and Energy Recovery. Material Recycling is again divided into Mechanical and Feedstock Recycling. The choice between Mechanical Recycling, Feedstock Recycling or Energy Recovery depends on the types of plastics waste and the relative ease / difficulty in total or partial segregation from other plastics and / or other waste materials.

India, like many other countries in the world, adopts Mechanical Recycling as the primary mode of recycling of plastics waste. All rigid plastics waste is principally recycled by mechanical recycling process. Thus rigid plastics waste like broken bucket/ furniture/ bottles/ pipes etc do not create a waste management issue.

Flexible plastics packaging waste is the main visible plastics waste component in the MSW which goes to the landfill today. However there is another phenomenon of collection of waste from the landfill. Recent studies in the two major cities of the country – Mumbai and Delhi, show that most of the plastics waste that reach landfill is picked up by the waste pickers for recycling keeping only around 1% of the Plastics Waste unattended.

Apart from Mechanical Recycling, Feedstock Recycling and Energy Recovery have gained attention in the Indian Plastics Recycling Industrial activity in the recent years.

Energy Recovery by Co-processing of all types of plastics waste in Cement Kilns is a reality in the country today. ICPE jointly with cement major ACC Ltd, took the initiative for first time in the country in 2007 – 08, for establishing the protocols for using all types of mixed / uncleaned plastics waste including multilayered plastics waste in cement kilns as an energy substitute of coal. The process involved testing of various kinds of emissions during the process and comparing the result with the approved limits. Some of the tests had to be conducted in the laboratory in Europe as India did not have the facility of testing those emissions during that period. At the rate of 10% replacement of conventional coal by plastics waste, India can recycle the entire quantity of flexible plastics waste being generated today. Germany replaces more than 60% coal in cement kilns by plastics waste. Co-processing of plastics waste in cement kilns is an approved process today. Central Government encourages all cement kilns in the country to adopt the process.

Feedstock Recycling of Pyrolysis of plastics waste in to Hydrocarbon Fuel (Liquid Diesel Oil) has been commercially established in the country during last 5 – 6 years. Today it has gained wide range acceptability and popularity among the entrepreneurs as a business model. Some Municipality Authorities are also showing interest to adopt such mode of plastics recycling as a part of decentralization of Waste Management System. ICPE jointly with an Entrepreneur Group in Delhi has set up a pilot Pyrolysis Plant in a Housing Colony in the middle of the capital city to recycle all types of thin plastics packaging materials including multilayered plastics, EPS etc, generated in the colony. No plastics waste from the Colony goes to landfill in Delhi today. This could be replicated elsewhere.

Another very effective process of utilizing plastics waste in India is its use for the construction of asphalt road. There are three technologies in the country the basic being the same – replacing part of bitumen by plastics waste. The quality of road is improved and life of road is extended. Cost of road construction also reduces as the cost of plastics waste is lower than that of bitumen. ICPE has been propagating this technology since 2008 and has demonstrated construction of such roads at different parts of the country along with Plastics Associations / Institutions.

Compression Moulding Technology has been successfully employed to

manufacture Compressed Boards from multilayered plastics waste. These boards are popular substitutes for conventional plywood. The facilities are localized in the Western India as on date.

Recycling of mixed plastics waste and multilayered plastics waste into Lumber by a special compounding technology for manufacturing furniture / pallets has been developed in the country, which is yet to be widely used.

Adoption of a particular method of plastics waste recycling is determined by the type, nature and volume of waste available at the place. However success and sustainability of all these different processes of plastics waste recycling depends largely on how well the waste has been segregated, preferably at the source of waste generation. While segregation of waste at source is practised at parts of some cities, it is yet to be widely followed across the country. Waste collection cost come in the way of economic viability of recycling process. Government of India, in its latest Draft Plastics Waste Management Rules, 2015 proposes the compulsory participation of producers and users of plastics packaging systems in sharing the cost of waste collection mechanisms with the local authorities. For all these methods, the fundamental requirement is collection and segregation of the waste, for which setting up of an infrastructure together with creating awareness on anti-littering is the starting point.

This article is authored by Mr. P. S. Singh
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A Window to Plasticulture

1. The growing use of plastics in different segments of economy has been very useful. The use of plastics esp. in agriculture has helped farmers increase crop production, improve food quality as also in more efficient usage of water resources.

2. French Institute of Demographic Studies, predicts, that by 2050, India will take the top spot with a staggering population of 1.6 billion (up from the present level of 1.2 billion) to leave behind current world leader China, at the second place with 1.3 billion people. India requires a robust, modernized agriculture sector to ensure the food and nutrition security for its population. Scope for further increasing cultivable land is limited. Similarly the water resources are also limited. In order to meet the food grain requirements of the nation, the agricultural productivity and its growth needs to be sustained and further improved. Given the limitation. Plasticulture can play a very important role in same.

3. Plasticulture represents use of applications of plastics in Agriculture, Horticulture, Water management & related areas. Plasticulture applications offer a multitude of benefits and are considered most important indirect agricultural inputs which results moisture conservation, water saving, reduction in fertilizer consumption, helps in precise application of water & nutrients, controlled environment agriculture is economically viable, plant protection through the use of nets and use of innovative packaging solutions help in increasing shelf-life and during collection, storage & transportation of fruits and vegetables.

4. Similar has been their contribution to other key sectors namely; Automotive, Construction, Electronics, Healthcare, Textiles, and FMCG etc. The sector has been growing at a very good pace at above 10% for the past many years and is also highly employment intensive. With a turnover of above Rs.85,000 crores and employing above 3.3 million persons (both directly and indirectly) the sector is making good contribution to the national economy.

5. There is a huge unrealised potential of further growth of plastic industry as indicated by the present very low per capita consumption level in the country. Per capita consumption of plastics in only about 10 kgs in India compared to about 109 kgs in USA and about 65 kgs in Europe, 45 kgs in China and the world average of about 28 kgs.

6. Due to their versatility, and imperviousness to water, Plastics save significant amounts of energy and water resources and emit lower quantum of green house gases. They have already displaced many traditional materials, such as wood, leather, paper, metal, glass and ceramic, in most of their former uses.

- **Plasticulture applications** are one of the most useful indirect economy & agriculture inputs with huge unrealized potential such as:

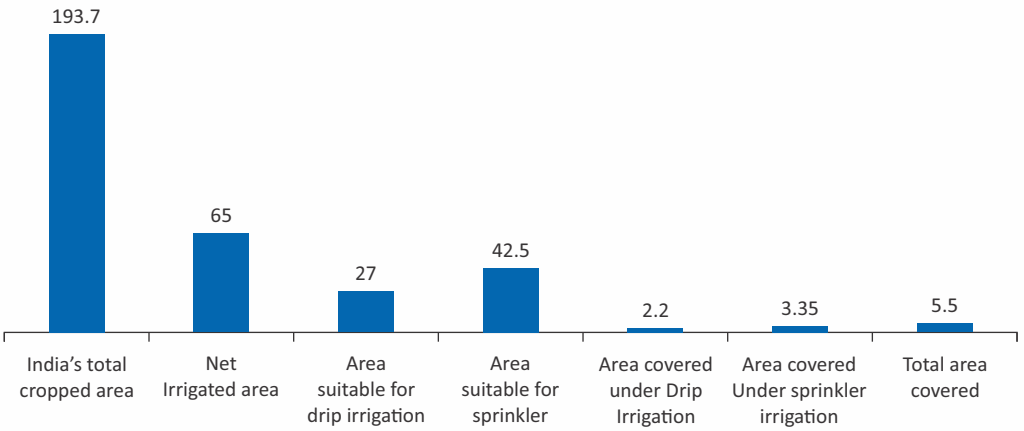
- **Water Management** -Lining of canals, ponds & reservoirs with plastics film/Drip & sprinkler irrigation system/Water conveyance using PVC & HDPE pipes & Sub-surface drainage
- **Nursery Management**- Nursery bags, Pots, Pro-trays, Root trainers, Coco peats, Hanging baskets, Plastic trays, etc.
- **Surface cover cultivation** - Soil Solarisation /Plastics Mulching
- **Controlled environment agriculture**- Greenhouses/Shade net houses/Plastic tunnels/Plant protection nets
- **Innovative Packaging Solutions**- Plastic crates, bins, boxes, leno bags, unit packaging nets etc/CAP covers, controlled atmospheric packaging (CAP) & modified atmospheric packaging (MAP)
- Organic Farming-HDPE vermin bed
- **Benefits of Plasticulture Applications**- These can help the country to meet both food and nutrition needs at a time when population growth is @ +1% per annum with depleting natural resources such as land & water.

S.No.	Plasticulture Applications	Water Saving (%)	Water Use Efficiency (%)	Fertilizer Use Efficiency (%)
1	Drip Irrigation System	40-70	30-70	20-40
2	Sprinkle Irrigation System	30-50	35-60	30-40
3	Plastic Mulching	40-60	15-20	20-25
4	Greenhouse	60-85	20-25	30-35
5	Shade nets	30-40	30-50	Not Available
6	Plastic Tunnel	40-50	20-30	Not Available
7	Farm Pond Lined with Plastic Film	100	40-60	Not Applicable

(Source: National Committee on Plasticulture Applications in Agriculture and Horticulture, Department of Agriculture and Cooperation, Ministry of Agriculture Govt. of India)

7. While the usage and benefits of plastics are manifold, the sector has an image issue (which can be linked to inappropriate civic handling of waste). The myth regarding the polluting characteristic of plastic needs to be addressed in a very scientific manner. If plastics can be collected and disposed off or recycled as per laid down guidelines/rules, the issue of plastic waste can be suitably addressed. In fact, there is good potential for industries based on re-cycling of plastics waste.
8. However, the quantum of usage of plasticulture applications is still limited in India. Out of total 193.7 million hectares (mha) of cropped area in the country, 65.0 mha is under different forms of irrigation sources out of which only about 5.5 mha is under Micro Irrigation. Estimates show that the total cropped area suitable for drip irrigation in the country is to the tune of 27 mha and sprinkler irrigation is about 42.5 mha. Thus there is huge unrealized potential in this sector.

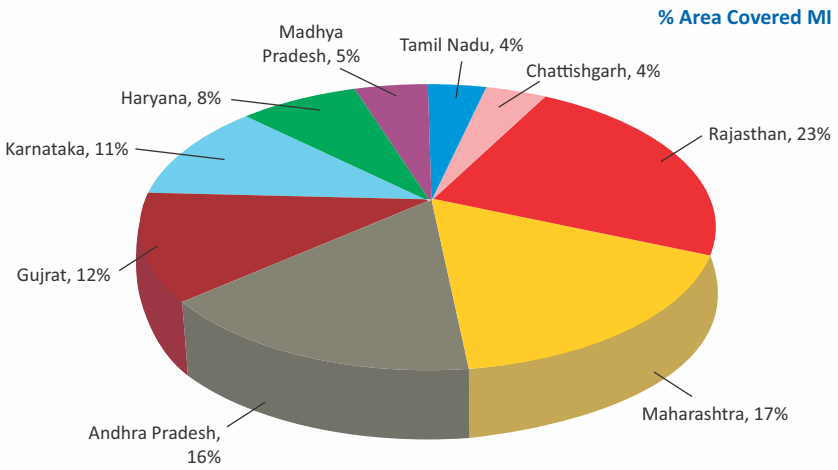
Agriculture Area (Million Hectare)



Source: Ministry of Agriculture, Government of India

9 In a recent survey conducted on the GoI scheme for National Mission on Micro Irrigation (NMMI), it is highlighted that scheme has performed well in terms of reduction in input cost to the tune of 20% - 50% along with energy savings. Approximately 7.4 mha have been covered under GoI scheme.

Performance of leading states under GOI Schemes



10. Concluding, it can be stated that the plasticulture applications hold huge importance for their relationship to water conservation and national food security. A very focused campaign to create awareness about its usage and at the same time ensuring availability of quality products based on good standards by industry, will go a long way.

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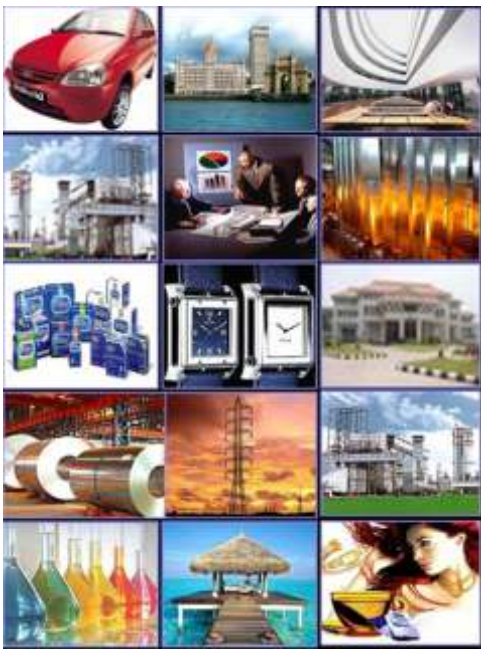
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About TATA Strategic Management Group

Founded in 1991 as a division of Tata Industries Ltd, Tata Strategic Management Group is the largest Indian own management consulting firm. It has a 50 member strong consulting team supported by a panel of domain experts. Tata Strategic has undertaken 1000+ engagements, with over 300 clients, across countries and sectors.

It has a growing client base outside India with increasing presence outside the Tata Group. A majority of revenues now come from outside the group and more than 20% revenues from clients outside India.

Tata Strategic offers a comprehensive range of solutions covering Direction Setting, Driving Strategic Initiatives and Implementation Support



Formulate Strategy	Develop Solutions for Strategic Priorities		
	Organization	Sales & Marketing	Operations
• Competitive Strategy: Entry / Growth • M & A Support • New Biz Models	• Strategy - Culture Alignment • Change Management • Talent Management • Family Governance	• Route of Market • Sales Effectiveness • Rural Expansion	• Supply Chain • Delivery • Biz Process Optimization

Drive Implementation & Change		
Results and Benefits*		
• Revenue • Market Share	• Cost • Throughput • Key Milestones	• Profit • Lead Time • Uptime

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About FICCI (Federation of Indian Chambers of Commerce and Industry)

Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies.

A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

FICCI provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community.

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Industry's Voice for Policy Change