



DRAFT NATIONAL CHEMICAL POLICY

(Draft NCP-2012)

**Government of India
Ministry of Chemicals & Fertilizers
Department of Chemicals & Petrochemicals**

1. Background

1.1 The chemical industry is an indispensable and integral constituent of the growing Indian industry. The mankind is immensely benefited, right from its inception till date, by the use of chemicals and life, without chemicals, is unimaginable and inconceivable. The wide range of chemical products play vital role in catalyzing not only the economy of the country, but also making the life-style of human beings comfortable and sophisticated. Apart from the above, chemicals are essentially contributing in several other fields, viz., health, agriculture, environment, forest, communications, pharmaceutical, transport, power, textile, infrastructure, housing, etc. However, in spite of the above, the word “**chemical**” denotes a negative connotation.

1.2 The chemical Industry, one of the oldest in India, is critical to the economic development of any country and has played an important role in the country's ongoing metamorphosis from an agrarian economy to an industrialized economy. This industry occupies a pivotal position in meeting basic needs & improving quality of life and is one of the most diversified sectors covering thousands of commercial products. The industry is the mainstay of the industrial & agricultural development of the country & provides building blocks for several downstream industries, such as textile, paper, paint, soap, detergent, pharmaceutical, varnish, etc. The chemical sector is predominately based on feed stock derivatives from cracking of naphtha in oil refineries providing the building blocks, such as Benzene, Toluene, Xylene, Cresols, etc.

1.3 The economic reforms of 1991 had a significant impact on the domestic chemical industry. With the onset of liberalization, the hitherto protected industry was exposed to international competition, which had been insulated so far by keeping high tariffs and import substitution centric policies. With the advent of liberalization, the role of the public sector substantially reduced, and the focus of the industry gradually shifted from base chemicals to petrochemicals, pharmaceuticals, specialty chemicals, construction chemicals, dyestuff and a wide range of agro-chemicals.

Achievements in the recent past in the Petroleum, Chemicals and Petrochemicals (PCP) sectors have been very encouraging. Yet, it is the future that holds even more spectacular possibilities. A fascinating opportunity has now arisen that rests on the foundation of what has been achieved in the past decades in these areas. Petroleum, Chemicals and Petrochemicals (PCP) sectors have the potential to script glorious India's future essentially in the fields of economy and society.

1.4 PCP has been contributing substantially to the economic growth of the country. More importantly, it can immensely help in accelerating the growth momentum by enhancing competitiveness and technological edge across various sectors.

1.5 Indian companies have already begun innovating new substances, molecules and products by registering their own patents and Intellectual Property Rights (IPRs). The stage is now set for a major jump in this trend. Another positive aspect is that there is a growing trend of entrepreneurship and product innovation. The policy recognizes that entrepreneurship and innovation hold the key and so seek to provide the necessary enabling environment to nurture this evolution.

1.6 This sector, though holds promise for the future, faces significant challenges also. Lack of a strong base in R&D, an adverse international trade environment and failure to build eco-friendly technologies in the industry enabling eco-system are among the major barriers. A stage has now been reached where sustaining growth trends are largely dependent on our ability to foster a strong R & D and manufacturing base in the country. A holistic view, by evolving interdependent and synergistic policies, can overcome the enormous challenges.

1.7 Some other aspects also merit attention. Inadequate capability and production of a number of key items indigenously is a weak area. **With increasing demand, without commensurate increase in domestic output, India had an import bill of around US \$ 18200 Million in 2010-11.** Growth and sustainability of this sector may also get affected by heavy dependence on imports. Absence of a strong manufacturing and R&D base also pose perpetuating threats to India's strategic sectors and interests, which is a cause for rising concern. **However, the silver**

lining is the growing domestic market, and commitments to develop infrastructure , upgrade technology and products.

1.8 In a nutshell, the principal policy objectives are to optimally leverage our existing and developing infrastructure and capabilities to meet the growing demands in all areas to foster innovation, catalyze manufacturing, green technologies, encourage HRD and R&D through academic institutions & industry and create a range of products that not only meet domestic needs but also address global demand as a logical expansion of the industry.

1.9 Concerns about environmental pollution due to chemical industries are gaining attention, especially in public perception. Current efforts in these areas need to be stepped up with appropriate arrangements for co-ordination across multiple agencies involved, and make them effective in meeting new and emerging challenges. Department of Chemicals & Petrochemicals, and Department of Environment & Forest would need to play a key role in this endeavour.

2. Preamble

2.1 Ensuring adequate availability of clean water, food and healthcare facilities for every citizen are the key challenges for the future, and the chemical industry, by its very nature, can play an important role towards achieving these goals. In order to emphasize the importance of the chemical industry in meeting the key challenges for the future, the United Nations Organization has proclaimed 2011 as the 'International Year of Chemistry'.

2.2 The chemical sector has emerged as an important key driver for growth and development, in which India needs to play a significant role. National Chemical Policy envisages transforming the existing scenario through accelerated economic growth. The thrust of this policy is to underscore the imperative that sustained adoption of technology up-gradation would offer viable options in overcoming developmental challenges across multiple sectors. NCP-2012 is an initiative to create a conducive policy framework to address these issues and to touch lives of all citizens and transform the country. By formulating a clear policy regime, NCP-2012 visualize creating an investor friendly environment for attracting additional

investments in the sector apart from generating manifold employment opportunities in various segments of the sector.

2.3 All out efforts to boost productivity and production in the sector are the need of the hour, as continuous economic growth in the country is leading to a high demand for products. NCP-2012 provides a roadmap for India to play an important role in cutting-edge, state-of-the art technologies through R&D and creation and incorporation of Indian IPRs in global standards. This will require measures for boosting entrepreneurship and creating a major global manufacturing hub for chemicals to achieve self-sufficiency while squarely addressing strategic concerns. At the same time, establishment of processes and standards for protection of the environment will also be required.

2.4 NCP-2012 recognises that the rapid growth in the chemical sector requires to be supported by an enhanced pace of human capital formation and capacity building. It becomes imperative to put in place an integrated skill development strategy so that there is continuous up-gradation of skills in tune with the technological developments. The cornerstone of this strategy is to derive maximal dividend from our young population and their creative abilities.

2.5 The emerging trends in the global chemical industry reveals that it is witnessing a gradual eastward shift. This eastward shift is in line with the shift of its key consumer industries such as automotive, electronics, etc. to leverage greater manufacturing competitiveness of emerging Asian economies and to serve increasing local domestic demand. Over the last 10 years, the share of Asia in global chemical sales has increased by about 14%. Further, to address environmental concerns chemical companies are increasingly working towards reducing energy intensity of their operations, minimizing effluent discharge and pollution, increasing the share of recyclable products in their portfolio and diversifying their raw material base to include bio-feedstock.

2.6 Currently, the chemical industry accounts for approximately 7% of GDP of India. Share of industry in national exports is around 11%. Despite its large size and significant GDP contribution, India's chemicals industry represents only around 3% of the global chemicals.

2.7 **Although the growing Indian chemical sector is currently estimated to be worth \$108 billion, nevertheless, the spread of the chemical industries has been uneven across different parts of the country, giving rise to regional imbalances.** The chemical industries are concentrated heavily in some pockets whereas other parts have not kept pace with them. The Indian government is committed to provide the necessary support to the chemical industry for taking it onto accelerated growth path.

2.8 As the policy, per se, is an evolving and a dynamic concept to facilitate the growth and development of the chemical sector, it may be revisited, as and when required in the future, to address the emerging trends & scenarios.

2.9 Against this backdrop, the Government recognises the need to formulate a policy, with the following aims, to bridge the gaps and face the challenges for becoming a world leader:

Aims and Objectives

- i. Increase investments in the sector through facilitating capacity additions and ensuring availability of necessary feedstock and quality infrastructure;
- ii. Increase the domestic demand & per capita consumption of chemicals:-
 - (a) Create a conducive environment for serving domestic demand through domestic production;
 - (b) leveraging the significant export potential of country, after meeting the domestic demand, in segments like pharmaceuticals, agrochemicals, dyestuffs & specialty chemicals;
- iii. Adoption of cluster approach and encourage development of ancillary industries around them;
- iv. Facilitate access to the latest technologies, assistance in up-gradation of the existing technologies and substitution of the outdated technologies;
- v. Promote research and development with focus on sustainability and green technologies;
- vi. Promote human resource development to ensure the availability of critical human resources, required for achieving the desired growth, and to meet the future challenges;

- vii. Establish a Chemical Standard Development Organisation (CSDO) to enable the growth and development of a globally competitive, high quality chemical sector in India and also to meet the international standard/ norms, and their enforcement ;
- viii. Set up a **National Chemical Centre** for promoting an integrated and holistic growth & development of the sector in an environmental friendly manner;
- ix. Put in place a robust frame-work for striving towards a disaster resistant and resilient chemical sector in India;

3. Present status of the chemical industry

With Asia's growing contribution to the global chemical industry, India emerges as one of the focus destinations for chemical companies worldwide due to high domestic demand, significant knowledge pool and favorable demographic dividend. The Indian chemical industry, estimated to be \$108 billion, is at the threshold of accelerated growth. Indian chemical sector ranks 6th in the world and 3rd in the Asia. It is also one of the largest industrial sectors in the Indian economy and an important employment generator. The Indian Chemical Industry comprises both small and large-scale units, and presently, there are about 40,000 chemical manufacturing units located in the country out of which about 80% are covered in the small scale sector. This sector provides employment to about 3.3 million people. There are no quantitative or other restrictions on the import of chemicals except for few chemicals which are covered under the obligations as per International Conventions. Indian chemical industry exports dyes, pesticides and specialty chemicals to the developed world and to the developing countries which form about 3% share in the global market and contributes significantly to the foreign exchange basket of the country. The fiscal concessions granted to small scale sector in mid-eighties led to the establishment of a large number of units in the Small Scale Industries (SSI) sector.

In the chemical sector, 100% FDI is permissible under automatic route. Manufacture of most chemical products inter-alia covering organic/ inorganic chemicals, dyestuffs and pesticides is de-licensed. Entrepreneurs need to submit only IEM (Industrial entrepreneurs Memorandum) with the Department of

Industrial Policy & Promotion to set up chemical manufacturing. Only the following items are covered under the compulsory licensing list because of their hazardous nature:

- Hydrocyanic acid & its derivatives
- Phosgene & its derivatives
- Isocyanates & di-isocyanates of hydrocarbons

The basic customs duty on most chemical feedstocks is 2.5%. Import Duty on most of the chemical products is at 7.5% ad valorem. In general, the central excise duty rate for chemical sector is about 10%.

4. Vision, targets and future thrust areas

The Indian chemical industry is poised for growth, and a clearly defined vision has been developed to enable it. Vision for Indian Chemical Industry is:

- To facilitate the growth and development of the chemical industry in an environmental friendly manner; with focus on innovation to meet local needs, sustainability, and green technologies & processes; so as to enable it to become a globally competitive major-player

Two distinct scenarios for the future of the Indian chemical industry would emerge.

- The conservative scenario, with an overall GDP growth rate of 8-9% p.a., the Indian chemical industry could grow at 11% p.a. to reach the turnover of \$224 billion by 2017. However, the Indian chemical industry could aspire to grow much more, and its growth potential is limited only by its aspirations & imaginations.
- The optimistic scenario of high end-use demand, based on increasing per capita consumption, improved export competitiveness and resultant growth impact for each sub-sector of the chemical industry could lead to an overall growth rate of 15% p.a. to reach turnover of \$290 billion by 2017. This would require the industry to not only effectively meet its domestic demand but also exploit the huge export market potential.

The evolution of the chemical industry globally provides valuable pointers to understand how countries/ regions have ensured growth. For example, the European chemical industry, faced with a structural framework of limited carbon based feedstock availability, focused on specialty chemicals segment which has a much lower dependence on raw materials than base chemicals. Effective utilization of its strengths in technology and access to markets enabled the growth of specialty chemicals segment which currently accounts for 40% of the total chemical sales (excluding pharmaceuticals) in Europe. Simultaneously, European chemical companies set up subsidiaries in oil-producing countries to minimize feedstock risk. Likewise, the Japanese chemical industry grew significantly based on government initiatives such as low interest rates, policies to encourage imports of raw material & technology rather than finished products and invested in setting up of large petrochemical complexes. This was complemented by a strong R&D focus in particular from the late 80s till early nineties, basically "innovating" out of the less favorable position at that time. Indian chemical industry could draw inspiration from these examples and provide the necessary thrust for development of specialty chemicals industry to bypass feedstock availability challenges.

Thrust areas for chemicals include specialty chemicals developed in close-collaboration with end-user industries, green chemicals, feedstocks, etc., including bio-fuels, and exploiting export opportunities for generic agrochemicals and pharmaceuticals.

5. Chemical industry imperatives

India's chemical industry should leverage some of its key strengths, viz. a domestic market with critical size, skilled workforce and world class engineering capabilities, favorable demographic dividend to become a prominent player in the global chemical industry.

India has established itself as a center of global Active Pharmaceuticals Ingredients (API) production demonstrating how these strengths can be utilized for business advantage. Furthermore, several chemical companies have set up global R&D centers in India to benefit from these strengths. Similarly strengths in product/ process engineering - as demonstrated by the success of auto-

components, refining and pharmaceutical industries - could be further utilized by the chemical industry.

At the same time, the industry also faces some key challenges, such as lack of adequate infrastructure (e.g. high cost of power, poor storage and transportation network), disadvantaged feedstock position (e.g. shortage of chemical grade naphtha and therefore basic building blocks of ethylene, propylene, xylene, benzene & naphthalene from coke oven batteries of steel plants, etc.), and shortage of other basic raw materials like ammonia, phosphorous, potash, along with access to the latest technologies.

India envisages the future growth of its chemical industry by successfully utilizing its inherent strengths while effectively addressing the key challenges. The following challenges need to be addressed to achieve the aspirational growth target defined in the vision.

5.1. Feedstock

India faces significant challenges in terms of feedstock availability and prices. Organic chemicals based on ethylene/ propylene, xylene, naphthalene and their derivatives are imported in large quantities due to non-availability of cost-competitive feedstock. Apart from large imports of methanol (about 80% of domestic demand in 2009), India also imports significant volumes of sulphur, urea, ammonia, phosphorous and potash, which are key raw materials for various downstream sectors.

In addition, utility prices in India are higher than the global average. This translates into high end-product prices, exposure to commodity pricing volatility and continuous threat of dumping from low-cost producers.

The various measures that could be considered by the government for securing key feedstocks are as follows:

- (i) To set up world class capacity plants, Government could undertake strengthening and improving capacities of state owned chemical companies for the manufacture of base chemicals such as phenol, methanol, nitro benzene, ammonia & etc. Presently, dyestuff manufacturers are dependent on import of intermediates from

China, and therefore, capacity needs to be built up in the country for intermediates.

- (ii) A strategic plan to secure its feedstock from feedstock rich countries with competitive supplies needs to be developed. The Government could participate in securing mining rights in resource-rich countries for, e.g. gas, oil-rich countries, such as in Middle East & Russia, and coal-rich countries, like Indonesia, South Africa, Australia. PSUs' may be encouraged to secure refineries in oil-rich countries & supply the feedstocks back to India for further conversion into value added products by domestic industry. India is also deficient in three basic inorganic chemicals feedstocks, viz. sulfur, rock phosphate and potassium chloride. Govt. to Govt. agreements for long-term supply of basic minerals at competitive price could be initiated to improve feedstock availability.
- (iii) Government will, in consultation with industry, develop a policy for allocation of feedstocks to best suited products (gas for fertilizers, coal for power, naphtha for petrochemicals).
- (iv) Government will boost domestic feedstock supply by ensuring adoption of the "consortium cracker" approach. Every PCPIR must have a Naphtha cracker which produces all the building blocks (ammonia, methanol, ethylene, propylene etc.). Such crackers could to be set up through government PSUs. The Consortium Crackers would offer each of the building blocks to different promoters interested in setting up downstream petrochemicals/ intermediates and by entering into long-term take or pay contracts and distributing the cracker costs across, the Consortium Crackers would be ensured of independent economic viability. These crackers could be treated as anchor units and an area of 2,000 to 5,000 acres could be set aside around these crackers for dependent downstream units.
- (v) Government would set up support funds or provide incentives for adoption of certain capital intensive technologies, such as coal gasification (simultaneously production of power and fertilizer based on coal gasification) and coal to methanol/ olefins/ acetic Acid.
- (vi) A three pronged strategies is envisaged to be adopted for chemical industry as given below:-

- a) Government will provide incentives for using **bio-based raw materials** as a way to reduce dependence on crude oil based products. The bio-based raw materials could be bio-ethanol from agro wastes and molasses for chemical feedstock and Glycerine. National level research laboratories, such as NCL (National Chemical Laboratory) and IICT (Indian Institute of Chemical Technology) should take initiatives towards process development for commercial products such as epichlorohydrin, propylene glycol and 1,3 propanediol and bio-ethanol from agro-waste, a key strategic resource for the future and of particular relevance to India;
- b) Encouraging the setting up of chemical plants abroad, with special focus on African & Latin American countries, where the required raw materials are available and their products have demand in India;
- c) Setting up of chemical clusters in India along the lines of PCPIR.

Further, the Government would negotiate with other countries to facilitate the availability of funds/ loans on preferential basis to such chemical plants in other countries.

5.2. Infrastructure

There is an urgent need to build better infrastructure and provide adequate power/ water to support industrial growth. The chemical industry faces various challenges related to safe transportation of products. Infrastructure is also inadequate with respect to proper storage facilities and for seamless exports. Investments are needed in roads, railways, waterways, ports, warehouses etc. to support the overall industrial growth. Various levers which could be explored to provide adequate infrastructure to the chemical industry are -

- (i) Government will consider to revisit the present Petroleum, Chemicals and Petrochemicals Investment Regions (PCPIRs) policy in order to make them more effective and to further encourage additional investments in already planned PCPIRs.

The Petroleum, Chemicals and Petrochemicals Investment Regions will promote investment in this sector and make the country an important hub for both

domestic and international markets, as per the PCPIR Policy. Exclusive chemicals parks need to be earmarked in the PCPIRs.

Infrastructure such as roads and ports near the SEZs/ PCPIRs requires further development.

- (ii) A site operator with the right functional expertise would be considered to manage and market each PCPIR.
- (iii) Government would facilitate the pooling of common infrastructure at existing industry clusters:-
 - Government would encourage development of clusters around the large existing plants by extending benefits similar to those provided to PCPIRs.
 - Industry can benefit from common production and infrastructure distribution network for industries with similar characteristics and complementary requirements.
- (iv) Government envisions adopting PPP model for building necessary infrastructure, especially for ports and roads, and also promoting coastal shipping and inland waterways as alternative modes of transportation;
- (v) A special fund would be setup to ensure availability of finance to improve infrastructural facilities of SMEs and creating infrastructure for SMEs close to large plants;
- (vi) Government may consider the setting up of an Empowered Group of Ministers (EGoM), which has worked well in recent years, with special focus on the following:
 - The EGoM would be empowered to resolve infrastructure and other regular industry issues;
 - It could expedite large scale infrastructure projects, especially those involving multiple states.
- (vii) Government would work towards creation of cluster/ inter-linkages maps, pan-India chemical cluster maps, in digitized format on GIS platform, highlighting linkages with roads to pipelines, effluent treatment plants, power, utilities, etc.
- (viii) Land acquisition is another roadblock faced by the industry in setting up new infrastructure. A common policy for land acquisition and identification/ earmarking

areas for green-field plants could be developed in collaboration with the States and the Centre.

5.3. Chemical clusters

Presently, Chemicals units are dispersed throughout the country due to incentives offered by the respective State Governments. There is a need to form clusters with provision of common infrastructure facilities to address the constraints of common effluent treatment, transport linkages, including roads, power supply, water facilities, etc. For infrastructure related problems of the existing industry, the Department of Chemicals and Petrochemicals (DCPC) considers to set up a “single window support mechanism” to expedite the process in consultations with the concerned Ministries/Depts.

Government will explore the option of promoting the concept of chemical clusters, similar to PCPIRs, and the same will be supported through a mother plant concept, which will provide inputs to downstream plants. Government will co-ordinate with companies to aggregate requirements and accordingly plan to set up clusters.

5.4. Consolidation of small capacities

Government will create awareness about benefits of capacity consolidation amongst SMEs. Wherever possible, government will support consolidation of smaller capacities and establishment of chemical clusters by shifting downstream capacities close to mother plants. Government may consider to provide part financial assistance for any such relocation.

5.5 Need for consolidation of Acts and Rules

At present, there are multiple legislations in India governing the chemicals industry that fall under the purview of different Ministries as given below:

Ministry	Act
Ministry of Environment & Forests	Environment Protection Act, 1986
Ministry of Labour	Factories Act, 1948
Ministry of Road Transport & Highways	The Motor Vehicles Act, 1988
Ministry of Commerce & Industry	The Explosives Act, 1884
Ministry of Home Affairs	The Disaster Management Act, 2005
Dept. of Chemicals & Petrochemicals	The CWC Act, 2000
Ministry of Rural Development	Land Acquisition. Act, 1894

The REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) legislation, enacted by the European Union with the main aim of protecting human health and environment from the hazardous effects of chemicals and to have a sustainable chemical policy replaces around 40 different environment related legislations. Several other countries such as Australia, Canada, Japan, China, etc. are also adopting a similar policy to retain their position in the global market. India may also have to pursue similar measures.

Apart from multiplicity of regulations, there are no specific Indian legislations pertaining to:-

- Registration of substances
- Preparation of a national inventory
- Restrictions on hazardous substances
- Banning of certain substances
- Detailed classification and labeling criteria and
- Transport classification

Though some of these issues have been briefly considered under certain legislations; they are yet to be addressed adequately in a comprehensive scientific and coherent manner.

There is a need for adopting a holistic approach towards chemical legislations. A centralized, nodal body, titled – ‘National Chemical Centre’, to be established by DCPC, will be responsible, inter-alia, for working on legislations as well as for monitoring their implementation. The multiple legislations governing chemicals may be consolidated into one coherent and comprehensive piece of legislation, which will simplify its implementation and monitoring. This will also facilitate the creation of a chemicals inventory in the country. There is a need to create REACH like legislation in India for safe use of chemicals for protection of human health & environment.

5.6 Taxes/ duties and energy cost issues

Although the Chemical industry has been witnessing the Customs Duty reduction regime during the last decade, yet the incidence of taxes, viz. Central Excise and VAT continues to be relatively higher as compared to many Asian Countries.

A major issue on duties & taxes that impact the entire cross-section and value chain of the industry is inverted duty structure. Typically, basic raw materials, building blocks/ feedstocks and fuels should be at the lowest rate of duty. This should be followed by slightly higher duty for primary chemicals, still higher for secondary chemicals and still higher for final products/chemicals, to give opportunity for value addition and also provide adequate competitive protection. Government could initiate duty structure rationalization to correct the situation.

Fiscal incentives, duties and taxes rationalization could also be used as a tool to stimulate & support the growth as well as productivity of renewable resources, e.g., bio-mass feedstocks, ethanol, etc. to give fillip to green chemistry.

Introduction of Goods & Services Tax (GST)

GST implementation is expected to be an important step for rationalizing the duties & taxes for the Industry. Molasses & alcohols could be brought under the purview of GST to eliminate differential duty structure between states and eliminate cascading effect on production of green chemicals.

Electricity Duty and Power Cess on Power

Electricity duty and power cess, levied by states on captive power generated as well as power supplied, varies from NIL in some states to as high as 10 to 40 paisa per unit in other states, adding spirally to cost of production as these are not VATable. These taxes & levies, imposed by the state govt. could be made VATable.

5.7 Specialty chemicals as a focus area

Specialty chemicals, viz. high value, low volume chemicals, known for their end use applications or performance enhancing properties, have good future, and need to be declared as a focus area. These include construction chemicals, paint driers, food additives, antioxidants, retarders, water treatment chemicals, etc. Since infrastructure projects are being developed in the country on a massive scale, the demand of these chemicals will grow by leaps and bounds.

Several initiatives need to be undertaken to ensure successful growth of the specialty chemicals sector. Special focus needs to be provided to the specialty chemicals companies to set up capacities in PCPIRs by demarcating special zones to aggregate feedstock demand. The anchor tenant will be encouraged to set up an **Ethylene Oxide (EO)** plant with stringent manufacturing standards to meet the feedstock demand. The additional Ethylene Oxide (EO) requirement by the specialty chemical industry by 2020 will be around 260,000 tonnes per annum, which could comfortably support 1 to 2 EO plants within the PCPIRs.

A **Specialty Chemicals Forum** could be established to frame relevant consumer standards. This forum could have representation from industry, customer and government to recommend consumer standards, incentives to drive innovation, and product safety standards. The forum will also be a means of dialogue to hold seminars on the subject, to discuss issues affecting both these sectors, and to highlight and resolve the primary bottlenecks to growth. This forum will study other countries' regulations and develop consumer standards, and work towards their introduction and implementation.

5.8 Fund for Technology up-gradation for chemicals

To remain globally competitive and comply with requirements like REACH, the Indian chemical industry needs to upgrade its technology to meet world standards and show improved performance in global trade. A number of chemical plants are of smaller capacities and operating at uneconomic scales of production with obsolete technologies. The industry, especially the micro, small and medium enterprise sector, does not have access to capital to upgrade technology on its own. Also, non-availability of technology leads to imports in some technology-intensive sub-segments. To address these issues, the government would establish a “Technology Up-gradation & Innovation Fund” (TUIF) that can address specific technology issues, faced by the industry. The fund should also support setting up of common chemicals infrastructure (e.g. effluent treatment plants, chemical waste disposal plants, etc.), which would benefit industries and the environment.

For raising fund for the above purposes, it is proposed to levy an “Chemical Up-gradation & Innovation Cess” at the rate of 0.5% ad-valorem and may be collected by the Excise Authorities, and then subsequently transferred to the DCPC (pl. also see 5.9.2).

5.9 Research and Development

Research and Development (R&D) is critical for the growth & development of any sector. R&D helps the industry to remain competitive in the international arena. To meet the evolving consumer requirements and to compete globally, the industry would need to increase R & D spending substantially from existing 1-2% to at least 5-6 %. The industry has to gear up to face the challenges of product patent regime. Various measures, which could be considered to promote research in the chemical industry are –

- For focused indigenous development in the chemical sector, concentrated efforts towards creating a suitable road-map to align technology, demand, standards and regulations are required, after considered evaluation of available and emerging technologies and the emerging trends.

- Promoting synergy of academia, R&D centres, manufacturers, and other stakeholders for achieving collaboration and reorientation of their efforts for creation of IPRs, and deployment of new products and services suited to Indian environment. The qualified scientists could undertake research, which would be expected to be initially funded, primarily by the State, and individual companies could invest at a later stage. Further, the new Technologies/ research / patent/invention could be provided at subsidized rates to SME industries.
- Strengthening the links in the complete value chain from basic research to Intellectual Property Rights (IPR) generation, product design and development, product commercialization, and simultaneously achieving economies of scale, thereby enabling the product to compete internationally. As effective Intellectual Property Rights (IPR) systems are critical to promote investment in innovation, India has already reformed IPR substantially in last decade by becoming a signatory to the “Trade-Related Intellectual Property Rights” (TRIPs). It has also introduced product patent protection for food, pharmaceutical, chemical inventions, etc. However, enforcement of IPR in India still remains a concern.
- Creating a state-of-the art testing & laboratory infrastructure for carrying out R & D , conformance testing, etc. This state-of-the-art labs/infrastructure would be suitable not only for testing and certification, but also act as an aid in the development of new products positioned in the vicinity of strong R&D clusters and academic institutions, and would be available to engineering/academic institutions to assist the scholars in real time chemical product development.
- It is envisioned to position India as the R& D hub for the Indian sub-continent and other neighbouring countries, and accordingly, new schemes are required to be formulated for this sector. These schemes could cater to the needs of several major technologies like bio-technology, green technologies, renewable energy, clean technology including bio-fuels, efficient water management technology to enable to manufacture chemicals at low affordable cost.

- The profile of customers is undergoing a shift with middle class (annual household income of Rs. 1-10 lakh) gaining prominence. The key needs of this segment are food & nutrition, water, energy, healthcare, transport, education and communication. Product innovations for meeting these needs could be enabled by several major technologies like bio-technology, renewable energy and clean technologies, including bio-fuels, water management technologies, technologies to enable low cost vehicles, wireless connectivity, etc. Low cost innovation and frugal engineering could help create products and services for the Indian market at acceptable prices.
- To effectively serve growing Indian markets, products/ services need to be customized as per local needs. This emphasizes the need of innovation where local business and R&D can be leveraged.
- To promote investments in upcoming technologies/ sunrise sectors, fiscal incentives such as accelerated depreciation, tax benefits, subsidies, etc. could be provided. The Government could facilitate technology tie-ups with global companies, wherever needed. Besides attracting foreign companies to invest in India, such partnerships will enable Indian companies to make a marked change in technology and sales & marketing, thereby not only serving the domestic market, but also increasing competitiveness for exports

For realizing the above, the following steps / initiatives, in line with National Innovation Strategy to support innovation, could be initiated for the Chemical Sector:-

5.9.1 Establish chemical sector council for innovation

A Chemical sector council, consisting of experts, would be set up, which will have representatives from the government, academia, chemical companies, industry associations and reputed research/ educational institutes (e.g., NCL, ICT). The council will :-

- Carry out technology and product development forecast.
- Evolve and periodically update the national program for technology/product development.

- Be a nodal group to monitor and ensure the implementation of various recommendations made for promoting indigenous R&D, IPR creation, and manufacturing and deployment of products and services.
- Formulating the roadmap for innovation 2020.

5.9.2 Establish a fund for chemical innovation

- The chemical sector needs to establish a Fund, viz. **Chemical Up-gradation & Innovation Fund through a cess, as indicated in para 5.8**, to invest in ventures/ innovations for the chemical industry. This fund would be utilized to:-
 - Promote indigenous R&D, IPR creation, entrepreneurship, manufacturing, commercialising products. Emphasis will be given to creation of Indian IPRs which go into international standards as well as in product manufacturing in implementation of major programs and projects as a vehicle to develop **Brand India**.
 - Harness India's entrepreneurial energy and intellectual capital for the cause of R&D and manufacturing by encouraging the young entrepreneurs through making available needed funding (pre-venture and venture capital), management and mentoring support.
 - Assist entrepreneurs to develop and commercialize Indian products
 - Facilitate soft credit to the Indian innovative product manufacturers for domestic deployment and exports
 - Shortlist a few focus areas (e.g. food, energy, water, etc.) where chemical innovations can significantly contribute in developing solutions which promote inclusiveness.

5.9.3 Development of regional clusters and innovation centers in universities dedicated to chemical industry

- Driving the innovation agenda nationally would require strengthening regional capacity for innovation and strong industry-academia linkages.
- Dedicated clusters for chemical industry would be created in regions with large share of chemical industries (e.g. in Gujarat, Maharashtra, Tamil

Nadu, Andhra Pradesh) and similarly universities focused on chemical engineering (e.g. ICT, IIT Mumbai) would be short listed to develop innovation hubs for chemical industry.

5.9.4 Sign international collaboration agreements with other advanced countries in this sector

- The countries, with presence of large scale chemical industries and world scale research facilities, can be good partners for India to learn and develop capabilities in chemical product and process innovation. Further, India, while establishing PCPIRs, can benefit significantly from the experience of those countries, which have world class large scale chemical parks (e.g., Ludwigshafen in Germany, Jurong in Singapore) with integrated infrastructure, knowledge management and R&D facilities. These collaborations could be in the form of bilateral exchange forums, linkages between relevant industry association and research institutes.

Success of these initiatives will be dependant on complex interplay of dynamics among various players (e.g. government, companies, venture capitalists, individual innovators, end user, educational and research institutes) within innovation eco- system.

5.10 Sustainability

One of the key issues facing the chemical industry is “Sustainability”. Far from being an economic and an environmental issue, it has gradually acquired strong socio-political overtones, which already have deep impact on the industry, and likely to deepen in the coming years.

Government would encourage companies to seek “Responsible Care Certification” and empanel reputable auditors for the same. A mechanism to incentivize the compliant companies such as fast track clearances could be set up and priority loans to those who meet environment standards could be facilitated. Further, the Government could facilitate the setting up of more Common Effluent Treatment Plants (CETPs), thus supporting SMEs in adhering to Safety, Health & Environment (SHE) norms.

The Government envisages identifying some focus areas and then supporting reputed and active educational & research institutes to develop low water intensive, environmentally compliant, safe green processes, etc. These institutes, like the Indian Institute of Technologies (IITs), Council of Scientific and Industrial Research (CSIR) Labs, and University Departments of Chemical Technology (UDCT) with the association of industry experts, can each focus on sectors and areas of key interest, tasked to develop into Centers of Excellence and Consultancy within 5 years.

Incentives for development of Green Products and Processes (bio-feedstock, bio-degradable products, eco-friendly processes, etc.) could be introduced. These could include -

- Putting in place a national policy and action plan to develop the necessary plantation industry, including industrial utility plants such as castor oil, bio-fuels, etc., on waste land;
- Identifying and inventorizing all agro-wastes (e.g. molasses) and their utility as raw materials and bring in the processes for necessary commercial utilization;
- Setting up a **Centre for Green Technologies** and regional '**Centers of Excellence**', which will also partner with international technology organizations and institutes, to conduct R & D as well as to develop and upgrade processes and products;
- Treating renewable resources/ agro-waste based chemical industry of strategic national importance.
- For efficient and effective disposal of chemical wastes, generated by chemical plants, it is required to put in place suitable waste disposal mechanisms through means like incinerator, etc.

5.11 Chemical Standard Development Organisation (CSDO)

To enable the growth and development of a globally competitive, high quality chemical sector in India, the Govt. envisages the setting up of a Chemical Standard Development Organisation (CSDO), under the aegis of the DCPC, with

strong participation of the industry, R&D centres, and academia to drive consensus regarding national requirements, including safety norms. It will facilitate access for the Indian Industry to the International Standards Development Organisations and act as an advisory body for incorporation of Indian requirement/IPRs/standards in the international standards.

The Chemical Standard Development Organisation (CSDO) will be primarily responsible for the following:

- Ensuring compliance with chemical standards, including safety norms, by evolving & implementing a comprehensive Certification and Inspection framework;
- Performing functions relating to the Disaster Management in the chemical sector, as indicated in para 5.13;
- Setting up an “**Institute of Chemical Safety**” and conducting training courses in this area;
- Further, there is also a need to re-evaluate and re-formulate existing environmental standards, regulations and policies, having bearing on the chemical sector by CSDO. For maintaining a level playing field, Standards/Norms, adopted in India, should be comparable to those applicable in other developing countries. Wherever required, help could be taken from international technical bodies for establishment of pollution norms and standards. Along the lines of REACH, Indian Industry and CSDO/DCPC are to jointly develop an effective set of regulations, including safety norms, covering the entire lifecycle of chemicals, which do not put excessive compliance cost burden on the companies.

5.12 Chemical Disaster Management

To strive towards the creation of a Disaster Resistant & Resilient India by building the capacity at all levels for disaster prevention and preparedness in the **management of industrial disasters**, DCPC, in collaboration with National Disaster Management Authority (NDMA), State Disaster Management Authorities (SDMAs) and other concerned Govt. Departments, Ministries, industries, associations, etc., will work on evolving industrial segment-specific

guidelines, in line with the internationally accepted guidelines/norms/standards etc., with special focus on the Indian conditions/requirements. It may be mentioned that NDMA has issued National Disaster Management Guidelines for Chemical Sector (Industrial) which are of generic nature, and hence segment-wise such guidelines may be framed by the DCPC. For implementation of the guidelines, **Standard Operating Procedures (SOPs)** will be framed and followed to ensure effective and early mitigation during disasters and emergencies.

Further, it will be made mandatory for the chemical industries, in a phased, time-bound manner, to comply with these guidelines and SOPs. The personnel of this sector will be required to be trained with the disaster management provisions through training, mock drills, etc.

An appropriate conformance and certification frame-work will be evolved to ensure compliance with these laid down guidelines and SOPs so as to achieve the end objectives of them, i.e. a Disaster Resistant & Resilient India.

5.13 Setting up of a National Chemical Centre

For promoting an integrated & holistic growth and development of the sector in an environmental friendly manner, a **National Chemical Centre** would be formed with a view to:-

- provide an effective regulatory framework and adequate safeguards to ensure fair competition, and protection of industry as well as consumer interests
- study the trade practices, adopted by other countries, especially with respect to the dumping of chemicals by them into India, if any, that causes injury to the domestic industry, and provide reports in this regard for taking remedial measures;
- study the international chemical sector scenario, i.e. the trade practices, standards, new innovations, duty structure, and other areas, and recommend to the Government suitable measures;
- evolve and maintain an inventory of the Indian chemical sector, containing data on production, consumption, imports, exports, toxicological properties,

- survey the chemical sector and to forecast and work on emerging trends including demand/supply, technologies, opportunities, etc.;
- disseminate awareness and information about hazardous chemicals.

5.14 Human resource development

Human resources are considered more vital than physical resources. India has around 170 institutes, including IITs, NITs and Universities, which have Chemical Engineering Departments, offering programmes in this discipline. These institutes produce approximately 11,000 chemical engineers every year. However, according to IChE (Indian Institute of Chemical Engineers), there is still a shortage of qualified faculty to provide chemical education in India. It is required to take some urgent steps to strengthen technical education in the country and to establish newer institutes with good facilities.

Towards this end, the following steps would be taken to put in place an HRD eco-system:

- Assess the manpower requirement at different skill and expertise levels by partnering with “National Skill Development Council” and industry to identify the relevant needs of the sector and prepare a roadmap,
- Create an enabling framework in partnership with Ministry of Human Resource Development (MHRD) to periodically upgrade academic curriculum of courses, which are aligned with the technological advancements in the sector for meeting the human resource requirement,
- Coordinate efforts to meet the demand for human resources in different parts of the chemical- eco-system,
- To form a high level Apex body (supported by advisory groups comprising representatives from industry, academia, PSUs, etc.) to oversee and to act as guiding and enabling source for all aspects relating to skill development in chemical field.

For promoting quality training and capacity building for bridging the talent gap for development of the sector, the strategy would be as follows:

- To promote and augment training institutes in urban and rural areas to cater to the skill and training needs of the sector. Govt. would set up ITIs, vocational training institutes, etc. to develop skill base in chemical field & would encourage PPP model for their setting up, with focus on chemicals, in the chemical clusters in Gujarat and Maharashtra.
- Training institutes under the DCPC its other organisations will be developed as national level schools of excellence.
- Collaboration between Government and industries is to be promoted to upgrade the current chemical departments in universities to the status of the state-of-the-art departments (in terms of infrastructure, faculty qualifications, industry interaction, and administration), and to set up specialized universities, which will, inter-alia, run courses such as B.Sc. / B. Tech in specialized chemicals fields like dyes & pigments technology, etc.
- To attract talented students to this area, special incentives such as scholarships, stipends, etc., along with good career prospects may be considered;
- To encourage collaboration with premier educational institutes like IITs and chemical institutes of excellence for bridging the gap between research/ academics and field problems.
- To disperse the created chemical expertise to the related fields. Further, such expertise will also be made available to other countries.

5.15 Chemical industry image

Chemicals find applications in all walks of our life. They increase aesthetic appeal by way of providing coloured dyes and paints, increase our longevity by providing health care pharmaceuticals, provide protection, safety & comfort through building & construction chemicals, and provide food security to the mankind by fertilizers and pesticides.

Although, the chemical industry - through various inventions - has brought about improvements in our lifestyle, it continues to be saddled with a negative image. One of the reasons is that Safety, Health & Environment (SHE) standards are not adopted strictly by the manufacturers of the Chemical Sector.

The Government will encourage undertaking programs/schemes for improving the image of the industry. Specific image building activities, such as leading sustained media campaigns, organizing workshops, trade fairs, etc. could be undertaken in collaboration with industry associations such as FICCI, ICC, etc.

It is expected that the chemical sector industries and their association/federations, would also award scholarships to the promising candidates to further attract and retain talent.

5.16 Promotional Issues

National Awards for Technology Innovation

A scheme of national awards for technology innovation in various fields, such as dyes, pesticides, chlor alkalies, etc., is to be formulated. Under this scheme, the Government would institutionalize awards for outstanding contributions made in technology innovations. The selection for awards would be made by a Committee of eminent persons.

Industrial Trade Fairs and Exhibitions

The Government would actively facilitate and support the marketing and organization of major exhibitions and events in order to provide a platform to the Indian chemical manufactures to show case their strengths.

Market Development

The Government would explore new avenues of export of chemical from India to Latin American, African and Middle East countries through our embassies and missions abroad.

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