

## **CENTRES OF EXCELLENCE IN PETROCHEMICALS SECTOR**

This is a new Central Scheme for creation of “Centres of Excellence in the field of Petrochemicals”.

### **Introduction**

The twentieth century has been a witness to the invention of some of the most versatile materials, synthetic polymers (also known as plastics), which have revolutionized our everyday lives. The driving force for this development was provided by the need for conservation of natural resources and energy efficiency and the inherent advantages of the material which created possibilities of innovative designs and cost savings. Its versatility led to a shift in manufacturing from the metal/conventional material based products to synthetic products.

Petrochemicals which comprise plastic and a host of other chemicals, are downstream hydrocarbons derived from crude oil and natural gas. These hydrocarbons are valuable resources and constitute vital raw materials for industrial development.

The downstream petrochemical products permeate our daily lives in almost every aspect. The value additions in the petrochemical chain offer immense possibilities and cater to the need of textiles and clothing, agriculture, packaging, infrastructure, healthcare, furniture, automobiles, information technology, power, electronics and telecommunications, irrigation, drinking water, infrastructure, construction and a host of other articles of daily and specialized usage amidst other emerging areas.

New advancements have also taken place in performance plastics, engineering polymers and specialty plastics. There are also developments in advanced composite & nanocomposites materials. Innovations in additives, master batches, alloys, blends, compounds, composites and high grade reinforcement materials such as glass, nanoclays/carbon nanotubes (CNTs) and carbon fibers also require attention for technology development. New developments in the field of bio and photodegradable plastics, are also taking place all over the world. With an eye on the emerging usages, Research and Development efforts should focus on the need to modernize and upgrade the existing manufacturing processes, improve the quality of existing product and make it safe for environment and human health.

### **Nature of Indian Petrochemical Industry:**

Indian Petrochemical Industry has a large and growing domestic market, low per capita polymer and synthetic fibre consumption, expertise in specialized products and availability of trained manpower. The upstream petrochemical products are technology intensive for which the technologies are imported from global licensors. However, there are still some old units which need to upgrade technology in terms of product qualities and newer application. The entire downstream plastic processing and fabrication industry needs major technological upgradation in the areas of scales of operation, core processing machineries, finishing equipments, tools, moulds and innovations in end products to meet the emerging global and domestic market demands. The upstream and downstream industry need to be supported by excellent academic institutions that would provide world class programmes in terms of product and process innovation,

technological interventions, designing, educational curriculum, training, commercialized research and development.

### **R&D Status & its prospects:**

Currently the expenditure on R&D in this sector is less than 1% of industry turnover. This needs to be increased in phases to 2 to 3%. India has a highly trained manpower base. However, as per world industry estimates, inadequate R&D infrastructure is a constraint for attracting investment in innovation. Ultimately, India stands to lose out on the world polymer and plastic market if low-cost-high-return programmes are not implemented by the government.

The future Research & Development vision of the Petrochemical industry needs to provide long term commitment to investment in R&D and strive for continuous innovation in terms of raw material usage, energy efficiency, process/operation improvement, technology forecasting and adoption of emerging technologies, in particular on recycling technologies and development of recycled products etc. New process technologies for high performance polymers (green processes etc.) ,thrust on new platforms-bio-/nano sciences as enablers for advanced polymeric materials are also the need of the hour. At the same time R&D thrust in development of moulds, dies and tools is also required. Collaborative investment in Public Private Partnership (PPP) mode in technology development by Government, academic Institutions and Industry could push the agenda for R&D which will have a long term impact on the Industry.

## **National Policy on Petrochemicals**

Department of Chemicals & Petrochemicals (DCPC) announced a National Policy on Petrochemicals which was published in the Gazette of India (Extraordinary) Part -1-Section -1 dated 30<sup>th</sup> April, 2007 vide No.116.

The National Policy on Petrochemicals mentioned that the vision for sustainable development of the petrochemical sector is to be achieved through promotion of Research and Development and Human Resources Planning and Development to cater to the needs of the industry by adopting a mission mode approach. The policy states that a National programme on Petrochemical Development is to be formulated to improve the existing petrochemical technology and research in the country and to promote the development of new applications of polymers and plastics, for which setting up of Centers of Excellence would be one of the components.

As per the National Policy, Centers of Excellence will be set up in existing educational and research institutions working in the field of polymers, to inter alia, include the following:

- Updating products for new uses, extending the cycle for existing products through modification.
- Innovative product technology and product design changes.
- Improvements in the production processes to make it more efficient.
- Recycling process technology, innovative collection, segregation, cleaning and development of recycled products.
- Development of biopolymers and biodegradable polymers.

- Product developments using engineering polymers/compounds/blends/alloys.
- Industrial spent water treatment for recycling.
- Other emerging areas in the field of Petrochemicals.

### **Role of a Centre of Excellence:**

It is expected that each Centre of Excellence (COE) will emerge as an internationally recognized Centre for the analysis and dissemination of existing global knowledge in the chosen fields, provide authoritative, strategic and timely information to organization and companies to use in the development and implementation of their projects/programmes, while engaging in future path-breaking R&D efforts. Each of the activity areas are to be developed through a logical framework of specifying the detailed activities, outputs, assumptions and timelines, together with the resources needed for their successful implementation. The Centres of Excellence are expected to attract excellent researchers and developers, earning a reputation as a significant resource for the progress of science and technology and the spread of innovation in the field of polymers.

### **Elements of a COE Project:**

A COE Project should, inter-alia, aim to have the following basic elements:

- \* To focus on a specific area as identified in the national policy and create a competency center for developmental activity in the identified areas.
- \* To carryout R&D, Product & Process Development, process equipment selection, testing facility, training for industry

(workshops/short & long duration training) with requisite capability for modifying and designing syllabus for specific needs of the industry, etc.

- \* To also do work in global emerging areas and with an overall objective to benefit the larger interest of the sector.
- \* To disseminate the results of the R&D and other activities through publication of papers in reputed international journals etc.
- \* To establish a sound new institutional base for executing the programmes/projects by strengthening the existing infrastructure.
- \* To redefine Center's strategy, business plan and programme.
- \* To upgrade the Center's technical capacity and information architecture.
- \* To strengthen and broaden the scope of the Centre's external relations and develop Public Private partnerships, wherever possible.
- \* The efforts must be to concentrate existing capacities and resources to facilitate collaboration across disciplines and across organizations on long-term programmes and projects of direct relevance to the sector.

The proposed CoE should also be equipped to undertake developmental activities in any of the focus areas identified by Department of Chemicals & Petrochemicals (DCPC). All parties involved in the Center of Excellence will bring to the partnership a special expertise of strategic importance to the petrochemical sector.

The Team Leader of the proposed Center of Excellence must be an established research scientist who should have requisite Administrative Experience to direct the program and guide the co-investigator & other Team Members in the Proposed CoE.

The Team Leader should have continuity in research in the relevant area, as demonstrated from the publications in the last five years in various peer-reviewed international journals. The team Leader should include details of research projects handled and number of Ph.D students registered in the proposal.

Similarly, Co-investigator & other Team members must be under the permanent payroll of the proposed Institute and should have publications in International journals.

### **Eligibility for creation of Centre of Excellence:**

The following are eligible to apply:

- Autonomous institutions that have a proven track record of academic excellence,
- Are currently involved in research and development activities in the petrochemical sector and
- Are involved in providing service to the industry.

### **Submission of proposals for COE Projects:**

- The proposals are to be submitted as per the format and guidelines enclosed as Annexure/or can be downloaded from the website <http://www.chemicals.gov.in>.
- Last date for submission of complete proposals is 15.07.2010.

### **Modalities for Approval of a CoE**

Approval mechanism for setting up a CoE will be three tiered viz:

- 1) Internal to the Institute: Team Leader to Head of Institution: Team Leader of the proposed centre will prepare the Project Report and

submit it to the Head of the institution, who after evaluating it at his/her level for qualitative improvements, will cause it to be submitted to DCPC with his/her specific recommendations. He/she will make observations on achievements of the identified centre, its position in existing research and development life-cycle, availability of infrastructure, potential for growth and requirements of additional support. Internal competition between different units/centers of the same institute should be encouraged while selecting.

- 2) Evaluation in DCPC-An expert Panel consisting of the Head of the applicant institute, experts in the identified fields, representatives from any user Ministries/Departments, CSIR, Department of Science & Technology will be created under the stewardship of Joint Secretary DCPC, with Director PC as the Convener, for evaluating the proposal. The project proposals received from the institutes will be evaluated by this Expert Panel. Team Leader will make a presentation to the Expert Panel and the Expert Panel will make specific recommendations regarding selection of the center.
- 3) Final approval will be provided by the Ministry at Secretary DCPC level.
- 4) Wherever possible, the project will be run on the lines of Public Private Partnership. The financial input/sponsorship has to be worked out as per the selected topics and institution's outputs. Besides, financial obligation has also to be undertaken by the institute/autonomous body where CoE is being created. The Panel will also finalize the framework, if a PPP partner is available.
- 5) After selection, a Memorandum of agreement (MoA) will have to be signed by the applicant institution with DCPC.



### **Review Mechanism**

The progress in project implementation will be reviewed periodically by a Review Committee constituted for the purpose. This will meet periodically and submit reports to Department of chemicals & Petrochemicals. Review Committee will consist of the Head of the applicant Institute, experts in the area of operation, etc.

The timelines for the project will be for an initial period of 3 years. The Centre should become self sustaining within this period to attain a globally recognized status of a Centre of Excellence in its chosen area. Continuation of the support will depend upon performance and new advancements in the chosen area.

### **Funding of the Scheme**

The funding of CoE will be in the form of capital expenditure. No recurring expenditure will be paid from this scheme. The percentage of financial support required from the GOI out of the total investment/costs of the project will be a maximum of 50%, subject to an upper limit of Rs.6 crores over a period of three years. The rest of the amount will have to be met from the resources of the applicant institute and its Partners.

The support under the scheme may include:

- \*Equipment
- \*Plant/Machinery
- \*Building & Infrastructure
- \*Support to Research staffs (JRF, SRF, RA-till the project/period)
- \*Research Literature and Consumables
- \*Organizing Workshops/Conferences/Seminars in the relevant area.

## **Outcomes**

CoEs will help in development of new products, newer applications, innovation and improvement of technology, process innovation, quality, environmentally sustainable development, etc. The CoEs will also help in building brand image for India in exports.

Institutions through this project will interact and pass on their research findings, expertise etc. to the industry for modernization of the petrochemical industry, both upstream and downstream.

The creation of CoEs will also serve the purpose of having a “low-cost-high-returns” intervention by the Government.

**FORMAT FOR SUBMISSION OF PROPOSAL FOR CENTRE OF EXCELLENCE**

*(to be filled by the applicant)*

**PART I: GENERAL INFORMATION**

1. Name of the Institute/University/Organization submitting the Project Proposal;
2. Address and Status of the Institute:
3. Name and designation of the Executive Authority of the Institute/University forwarding the applicant;
4. Project Title;
5. Duration of the project (in years)
6. Total Cost (Rs. );
7. If the project is multi-institutional; please furnish the following:  
Name of Team Leader and Co-investigators:  
Designation:  
Address
8. Scope of the proposed work (in broad sense)
9. Project Summary (Not to exceed one page. Please use separate sheet).

**PART II: PARTICULARS OF TEAM LEADER / INVESTIGATORS**

TEAM LEADER

10. Name:

Date of Birth:

Sex(M/F):

Designation:

Department:

Institute / University:

Address:

PIN

Telephone:

Fax

Email

Number of Research project being handled at present:

Co-Investigators

11. Name:

Date of Birth:

Sex(M/F):

Designation:

Department:

Institute / University:

Address:

PIN

Telephone:

Fax

Email

Number of Research project being handled at present:

(Note: Use separate pages, if more Members are involved)

### **PART III: TECHNICAL DETAILS OF PROJECT**

(Under the following heads on separate sheets)

12. Objectives and scope of the project (not to exceed 2 pages)
13. Work Plan and Methodology
14. Time schedule for the work (Please provide quantifiable outputs and PERT chart)
15. Project Outcomes and Deliverables

#### **PART IV: BUDGET PARTICULARS**

Give justification for each head and sub-head separately mentioned in the table.

(A) Non-Recurring (e.g. equipments / plants / machinery / building / infrastructure)

S.No	Item	Year 1	Year 2	Year 3	Year 4	Year 5

Total (A)

(B) Recurring  
Support to Research Staffs

S.No	Position No.	Consolidated Emolument	Year 1	Year 2	Year 3	Year 4	Year 5

Total =

Research Consumables

S.No	Item	Quantity	Year 1	Year 2	Year 3	Year 4	Year 5

Total =

Other Items	Consolidated Emolument	Year 1	Year 2	Year 3	Year 4	Year 5
Travel						
Contingency						
Overheads @ 10 % of Total Cost						
Total (B)						
Grand Total (A + B)						

\*In case of multi-institutional project, the budget estimates to be given separately for each institution.

**PART V: BIODATA OF INVESTIGATORS DO NOT EXCEED THREE PAGES**

Name and designation:

Department / Institute / University:

Date of Birth:

Sex (M/F)

Educational details (Post-Graduate onwards)

Position and employment (Starting with most recent employment)

S.No	Institution Place	Position	From (Date)	To (Date)

**PART VI: DECLARATION / CERTIFICATION**

It is certified that,

- a) The research work proposed in the scheme/project has not been submitted to any other agency for financial support.
- b) If the project involves field trials/experiments/exchange of specimens, etc. we will ensure that ethical clearances would be taken from concerned ethical Committees/Competent authorities and the same would be conveyed to DCPC.
- c) Any research outcome or intellectual property right(s) on the invention(s) arising out of the project shall be informed to DCPC
- d) The institute/university agrees that the equipment/plant & machinery and other basic facilities shall be extended to investigator(s) throughout the duration of the project.
- e) The institute assumes to undertake the financial and other management responsibilities of the project and submit the utilization of the grants annually to DCPC.

**Signature of Team Leader**

**Signature of co-Investigator**

**Date:**

**Date:**

**Signature of Executive Authority**

**Of Institute/University with seal**

**Date:**



