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An Overview

1. INTRODUCTION

The Department of Scientific and Industrial Research (DSIR), one of the Departments of the Ministry of Science and Technology, was set up through a Presidential Notification, dated 4th January, 1985 (74/2/1/8 Cab.). The mandate of DSIR includes promotion of industrial research for indigenous technology promotion, development, utilization and transfer.

The Allocation of Business for the Department is as follows:

- All matters concerning the Council of Scientific and Industrial Research (CSIR).
- All matters relating to National Research Development Corporation (NRDC).
- All matters relating to Central Electronics Limited (CEL).
- Registration and Recognition of R&D Units.
- Technical matters relating to UNCTAD and WIPO.
- National register for foreign collaborations.
- Matters relating to creation of a pool for temporary placement of Indian Scientists and Technologists.

The primary endeavour of DSIR is to promote R&D by the industries; support industrial units to develop state-of-the-art globally competitive technologies of high commercial potential; catalyze faster commercialization of laboratory-scale R&D; augment technology transfer capabilities; enhance the share of technology intensive exports in overall

exports; strengthen industrial consultancy and establish a user-friendly information network to facilitate scientific and industrial research in the country. The DSIR has two public sector enterprises viz. National Research Development Corporation (NRDC) and Central Electronics Ltd (CEL) and two autonomous organizations viz. Council for Scientific and Industrial Research (CSIR) and Consultancy Development Centre (CDC). The Department also provides host facilities and assistance to a regional institution of the United Nations Economic and Social Commission for Asia and Pacific (UN-ESCAP) viz. Asian and Pacific Centre for Transfer of Technology (APCTT) as the focal point in the country.

2. DSIR PROGRAMMES

The Department of Scientific & Industrial Research (DSIR) had operated the umbrella scheme on “Industrial Research & Development (IRD) during the 12th Five Year Plan consisting of following four sub-schemes :

- (i) Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM) – This scheme primarily focuses on supporting individual innovators, start-up companies, incubatee companies in public funded technology business incubators and MSMEs.
- (ii) Patent Acquisition and Collaborative Research & Technology Development (PACE) – This is a scheme focusing on technology acquisition and its





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development and demonstration for commercialization.

- (iii) Building Industrial Research & Development and Common Research Facility (BIRD-crf) – This is a scheme which focuses on creation of Common Research facilities for micro and small enterprises and components of scheme, viz., Industrial R&D Promotion Programme. The other components of BIRD-crf sub-scheme that operated during the 12th Plan were “Industrial Research & Development Promotion Program”, “Information Technology and e-Governance” and “Asian and Pacific Centre for Transfer of Technology (APCTT)”.
- (iv) Access to Knowledge for Technology Development and Dissemination (A2K+) – This is a scheme focusing on facilitating access to scientific journals by In-house R&D units of industry and Scientific and Industrial Research Organizations (SIROs). The scheme subsumes the 11th Plan component scheme on Technology Development and Utilization Programme for Women (TDUPW) and DSIR Building and Infrastructure. Besides, the scheme supports the approved 11th Plan projects related to Technology Development and Demonstration Programme (TDDP) spilling over from the 11th five year plan.

Based on “**Outcome Review**” of IRD Scheme, continuation of Scheme beyond 12th Five Year plan has been recommended to make the scheme coterminous with 14th Finance Commission ending on **31.03.2020**. The IRD Scheme of DSIR now comprises the following sub-schemes:

- (i) Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM)
- (ii) Patent Acquisition and Collaborative Research & Technology Development (PACE)
- (iii) Building Industrial Research & Development and Common Research Facility (BIRD-crf)

– This is a scheme which focuses on creation of Common Research facilities for micro and small enterprises and components of scheme, viz., Industrial R&D Promotion Programme. The other components of BIRD-crf sub-scheme that operated during the 12th Plan were “Industrial Research & Development Promotion Program”, “Information Technology and e-Governance” and “Asian and Pacific Centre for Transfer of Technology (APCTT)” have been de-linked beyond 31.03.2017 and shall operate outside this sub-scheme.

- (iv) Access to Knowledge for Technology Development and Dissemination (A2K+) – This sub-scheme includes components of Technology Development and Utilization Programme for Women (TDUPW); Support to Studies; Support to Events and Technology Development and Demonstration Programme (TDDP).

2.1 Major Achievements

The major achievements of the various programmes of the Department during the period under report are as under:

2.1.1 Industrial R&D Promotion Programme.

DSIR is the nodal Department for granting recognition to In-house Research and Development centres established by corporate industry. During this period, there were **1997** In-house R&D centres with DSIR recognition. Of these, **121** companies incurred an annual R&D expenditure of over Rs.5000 lakhs each, **489** companies incurred an annual R&D expenditure in the range of Rs. 500 lakhs to Rs. 5000 lakhs and **420** companies incurred an annual R&D expenditure in the range of Rs. 200 lakhs to Rs. 500 lakhs. During the period under report, **163** In-house R&D centres were accorded fresh recognition and recognition of **537** R&D centres were renewed.

Under the e-governance initiative of DSIR, department invites online applications for Industrial R&D Promotion Programme for greater



accessibility and transparency of the Department programmes / schemes. Department upload the barcode generated certificates for recognition, registration and its renewal of In-house R&D units of industries, Scientific & Industrial Research Organizations and Public Funded Research Institutions. Department is making efforts to make this programme paperless in future.

Scientific research foundations in the areas of medical; agriculture; natural and applied sciences; and social sciences seek DSIR recognition and registration as Scientific and Industrial Research Organisations (SIROs) under the programme granting recognition to SIROs. The recognized and registered SIROs are eligible for availing Customs Duty exemption on imports required for R&D activities. During the period under report, 33 SIROs have been accorded fresh recognition.

Secretary, DSIR, Ministry of Science and Technology, is the Prescribed Authority to certify expenditures where higher rate of depreciation is to be allowed for the plant and machinery installed for the manufacturing of products using indigenous know-how as per provisions of rule 5(2) of IT Rules. During the period under report, three certificate involving Rs. 3184.27 crores during 2015-16 on cost of plant & machinery were issued by DSIR.

DSIR is the nodal Department for registration of public funded research institutions (PFRI), Universities, IITs, IISc and NITs, for availing concessional custom duty exemption, vide Notification No. 43/2017-Customs dt. 30.06.2017 and corrigendum dated 22.07.2017-Custom Notification no. 43/2017 dt 30.06.2017, amending the main notification No. 51/96-Customs dt. 23.07.1996 and amendments thereof. During the period under report, 22 such institutions were newly registered with DSIR; and 112 institutions were granted renewal of registration.

Secretary, DSIR is designated as the Prescribed Authority under section 35(2AB) of Income-tax Act, 1961. Fresh approvals were accorded to 106 companies by the prescribed authority. Agreements of co-operation for R&D were also

signed with these companies. The detailed R&D expenditure of the approved companies have also been examined by DSIR and 614 reports valued at Rs.16015 crores have been forwarded to Chief Commissioner of Income Tax (Exemption) CCIT (E) in Form 3CL, as required under the IT Act.

2.1.2 Common Research and Technology Development Hubs (CRTDHs).

The Department of Scientific and Industrial Research (DSIR) has a program for providing support to Common Research and Technology Development Hubs (CRTDHs) that aims to enhance translational research and fostering industry institution interaction targeted towards innovative product development. CRTDHs provide facilities to research institutes and enterprises for translation of scientific knowledge, ideas and inventions into products and services. The facilities at CRTDHs will be used by the Micro and Small Enterprises / Innovators. The CRTDHs shall be operated on a cost plus non-commercial basis and are evolving a business model for self-sustainability.

Three such hubs have been approved under the program in the first phase at three CSIR institutions, viz. Centre for Cellular and Molecular Biology (CCMB), Hyderabad; Institute of Himalyan Bioresource Technology (IHBT), Palampur and National Institute for Interdisciplinary Science & Technology (NIIST), Thiruvananthapuram; the first two are in the area of affordable healthcare and the third one is in the area of environmental interventions.

During 2016-17, in the second phase, the Department approved setting up of four new hubs at Central Mechanical Engineering Research Institute (CMERI), Durgapur; Central Electronics Engineering Research Institute (CEERI), Pilani; Indian Institute of Technology, Roorkee and Indian Institute of Technology, Gandhinagar in sectors of Low cost machining, Electronics/ Renewable Energy and New Materials/ Chemical Process respectively.

The main objectives of the scheme are to create common research facilities equipped with





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analytical equipment and pilot plant facilities to facilitate and encourage enterprises, startups and micro and small enterprises for R&D and technology development.

These hubs were engaged in identification of the needs of the enterprises through seminars and workshops as well as through interaction with the MSME Development Institutes (MSME-DI), Directorate of Industries (DIC), S&T Councils and other state government bodies. Technological development has started in project mode in the CRTDHs approved in the first phase wherein several agreements have been made with enterprises as well as state government agencies for the benefit of the MSMEs and start-ups.

2.1.3 Information Technology and e-Governance (ITeG).

IT-eG division implements e-Governance in the Department progressively that needs to be in conformance to the National eGovernance Action Plan. IT-eG Division operates on a separate IT Budget Head that came into effect in DSIR since FY 2004-05 for the implementation of an IT Action Plan.

The DSIR Website has been made compliant to the Guidelines for Indian Government of Websites (GIGW). The website has been regularly updated.

A project entitled 'Design, Development, Implementation of Enterprise Application and Maintenance Support Services for DSIR' has been developed and implemented to automate all the operations of DSIR and link it to providing online services to the Industries and relevant stakeholders. The project has two RFPs, ie. RFP1 includes Enterprise Integration, Program Implementation and eService Delivery and RFP2 includes Office Automation Solution, Workflow Management, Record Management, and Data Warehousing. Incidental benefits include reduction of costs / efforts in seeking and obtaining information and services and minimization of administrative overheads.

2.1.4 Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM)

PRISM (Promoting Innovations in Individuals, Start-ups and MSMEs) scheme aims at to support individual innovators which will enable to achieve the agenda of inclusive development – one of the thrust area of XIIth five year plan (2012-2017). It would also provide support to autonomous institutions or organizations or to society registered under the Societies Registration Act, 1860 or Indian Trusts Act, 1882 or other statues leading to development of state-of-art new technology solutions aimed at helping MSME cluster units. The Scheme tenure was till 31.03.2017. However, the scheme has now been extended till 31.03.2020 (31st March, 2020) i.e. co-terminus with the fourteenth finance commission period.

The proposals shall preferably be considered in the following focus sectors: Green technology, Clean energy, Industrially utilizable smart materials, Waste to Wealth, Affordable Healthcare, Water & Sewage Management and any other technology or knowledge intensive area.

The financial assistance under the programme may vary from Rs. 2.00 lakh to Rs. 50.00 lakh. The department has also successfully completed 15 (fifteen) on-going PRISM projects supported during the period under report. Some of the successfully completed projects are Commercial Extraction of Bio- product from Biomass, Development of bio-degradable sanitary napkin for women, Scaled prototype development for a functionally upgraded 72NM³/day Bio-CNG Plant Indian Conditions, Vision aid electronic wand, Transient 3D framework for seeding and expansion of cells towards delivery *in vivo* and therapeutics, Efficient composting of Bio-degradable wastes through Mesophili Aerobic Rapid Composting (MARC) Method, Development of Kits for Direct-PCR Amplification of Plant DNA, Development of novel DIVA ELISA Kit for detection of paratuberculosis infection - a major threat in animal husbandry, Biomass based environmental friendly incubator for hatching of Fertile Poultry Eggs, Development of counter irritant against contact



dermatitis among cashew nut women workers, Development of cost-effective, technically modified Liquid Chromatography Counter, solar multi-purpose handcarts for hawkers, Cost-effective portable chalk board eraser cleaner and so on.

The financial assistance was extended to **twenty-one (21)** individual innovators for their innovation centric project proposals during the period ending 10th December, 2017.

2.1.5 Patent Acquisition and Collaborative Research and Technology Development (PACE).

The DSIR through the PACE scheme provides catalytic support to industries and institutions for development and demonstration of innovative product and process technologies, traversing the journey from proof of concept or laboratory stage to pilot stage, so that they can be launched for commercialization. The scheme supports ingenious work and assists in development of new technologies or creative/innovative application of the existing technologies to solve unmet needs of industry. The scheme also strengthens the interface between industry, R&D establishments and academic institutions by supporting collaborative proposals. The scheme also jointly supports initiatives of other Ministries / Departments aimed at technology development and demonstration, e.g. IMPRINT initiative of Ministry of Human Resource Development, wherein institutions of higher learning are being supported for development and demonstration of technologies.

Following activities were completed or were in progress during the year under report:

- 13 technology development projects were monitored during the year. These projects involve a total project cost of Rs. 6310.68 Lakhs for which, DSIR has sanctioned a support of Rs. 2518.905 Lakh. Out of this support, Rs. 2007.00 Lakh is in the form of loan to industry and Rs. 511.905 Lakhs is in the form of grant to public funded research Institutions.
- 8 technology development and demonstration projects supported are either from industries

alone or with collaborating partners (public funded Indian R&D organizations/ academic institutions/ universities). Out of these three projects have been successfully completed and five projects are under progress. These projects involve a total project cost of Rs. 5795.35 Lakhs for which DSIR is extending a support of Rs. 2007.00 Lakh as loan to industry and Rs. 254.24 Lakhs as grant to collaborating partners.

- 5 technology development projects from institutions (IITs and IISc) in the Manufacturing and Water Resources domains are supported under IMPacting Research Innovation and Technology (IMPRINT) initiative of Ministry of Human Resource Development (MHRD) and are under progress. These projects involve a total project cost of Rs.515.33 lakh for which DSIR is extending a support of Rs. 257.665 lakhs as grant to institutions and an equivalent grant is provided by MHRD.

2.1.6 Access to Knowledge for Technology Development and Dissemination (A2K+):

The continued twelfth five-year plan scheme of A2K+ has been evolved on the premises that access to knowledge is one of the most desirable inputs for any entrepreneur, innovator conceptualizing a business model to establish or run a company for wealth creation through innovative R&D interventions. The scheme includes the following programme components:

- National and International conferences, exhibitions (A2K+ Events)
- Industrial Technology related studies (A2K+ Studies)
- Technology Development and Utilization Programme for Women (TDUPW)
- Technology Development and Demonstration Programme (TDDP)

The sub-scheme on A2K+ - Events supports organization of workshops, interactions, training programmes, exhibitions and other events and provides a platform for exchange of views among industry, consultancy organizations, academic and research institutions that will assist in developing





useful insights on issues relating to industrial research and technological innovation and in evolving tools and techniques to remain competitive in today's business climate. The scheme also aims at identification of collaborative projects between academia, institutions and industry during their participation in the events, organized under the scheme.

During the financial year, proposals were received from a number of agencies to organize workshops, stakeholder meetings, interaction meets, training programmes, exhibitions and other events on topics related to promotion of industrial research and innovation. These proposals will be discussed in Technical Advisory Committee (TAC) Meeting and proposals recommended by TAC will be processed for financial concurrence & approval before sanctioning of the event.

The sub-scheme on A2K+ - Studies, supports studies on frontier areas of technology that impact the country are being undertaken. These include technology status studies in specific product and process areas, analytical reports of specific industry clusters, cases studies bringing out industry practices, research studies on industry related subjects, technology norms of industrial sectors, and other categories of reports. During the period under report 03 studies were initiated.

Technology Development and Utilization Programme for Women (TDUPW) is aimed to meet specific needs of women and to enhance their contribution towards technology capability building. Currently 08 projects were in progress under this program

The Technology Development and Demonstration Programme (TDDP) is started in 1992, the department has supported 254 R&D projects of Industrial units with a total project cost of Rs. 750.60 crores in which DSIR support is Rs. 280.40 crores. The projects cover a number of industry sector and the share of these industry sectors in the project supported is: 32% engineering; 27% electronics; 21% Chemical; 7% energy and waste utilization and 13% Health & Pharma. The projects supported have been spread over 22 states

of the country and the share of top five states in the number of project supported is: Andhra Pradesh 18%, Karnataka 15%, Maharashtra 13%, Delhi 10% and Tamil Nadu 10%.

98 technologies developed under the scheme have been commercialized and the department has received a cumulative royalty of around Rs.52.54 Crore during 1997-2017.

In the current financial year, progress of on-going projects was monitored and 4 projects were successfully completed.

3. ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY (APCTT):-

The Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology (MOST), Government of India has been the national focal point of APCTT for India since its inception in 1977. Matters pertaining to APCTT and UNESCAP are dealt with in cooperation with the Ministry of Commerce and Industry and the Ministry of External Affairs, Government of India. DSIR also plays an active role in APCTT's functioning, particularly relating to its policies and programmes. India being the host country has been providing institutional support to APCTT since its inception.

APCTT receives annual institutional support of US\$ 200,000 in Indian Rupees (to meet the local costs) from DSIR in addition to funding for building repairs, renovation work, and municipal taxes. DSIR also extended programme support towards the APCTT project entitled, "Promotion of National Innovation Systems (NIS) in Countries of the Asia-Pacific Region - Phase II" which concluded in 2016. APCTT is currently developing a new proposal entitled "Promoting Technology Commercialization through PPP in the Asia-Pacific Region" for funding support from DSIR to be implemented from 2018 to 2021.

4. RTI ACT 2005

The Right to Information Act 2005, enacted on 15th June 2005, has been implemented successfully in the department. As per the provisions of the Act



Nodal Officer, Appellate Authority, Transparency Officer, Central Public Information Officer and Central Assistant Public Information Officer are designated.

The proactive disclosures under Section 4 (1) (b) of the RTI Act 2005 enacted on June 15, 2005 are regularly updated [Last Update on February 10th, 2017] and available on the DSIR Website at <http://www.dsir.gov.in>. DSIR has complied with the directives received from Central Information Commission. DSIR has received 177 Applications during 01/12/2016 to 30/11/2017 and all the Applications were registered and disposed off on RTI Request & Appeal Management Information System at <https://rtionline.gov.in/RTIMIS>. During 01/12/2016 to 30/11/2017, 33 applications were registered as first appeal and 07 applications was registered as second appeal.

DSIR has been effectively using various IT applications like RTI Request & Appeal Management Information System at <http://rtionline.gov.in/RTIMIS>, RTI Annual Return Information System at <http://rtiar.nic.in> and <http://dsscic.nic.in/users/pn-login> wherein quarterly returns were uploaded regularly. The Division provided technical support by way of lectures on 'RTI Online Portal, RTI Annual Return Information System, Proactive Disclosures under Section 4 (1) (b) of the RTI Act' during Training Programme on "Effective Implementation of RTI Act and Record Management" organized by Council of Scientific and Industrial Research at CSIR-Human Resource Development Centre, Ghaziabad during 06-07 April 2017.

5. AUTONOMOUS INSTITUTIONS

5.1 Council of Scientific and Industrial Research (CSIR)

- The Council of Scientific & Industrial Research, constituted in 1942 is an autonomous body which is known for its cutting edge R&D knowledgebase in diverse S&T areas, is a contemporary R, D & E organization. CSIR has pan India presence through its network of

38 national laboratories which undertake well focused basic and applied research in diverse fields of science and technology. CSIR has also established 39 outreach centres, 3 Innovation Complexes and 5 units. CSIR's R&D expertise and experience is embodied in about 4000 active scientists supported by about 7000 scientific and technical personnel.

- Into its 75th year now, CSIR has been playing a stellar role in building up the scientific and technological prowess of the country. Through its technological interventions, CSIR has not only provided solutions and innovations for the industry but has also proved to be a catalyst in improving the quality of life of millions of people across the country. CSIR covers a wide spectrum of science and technology – from radio and space physics, oceanography, earth sciences, geophysics, chemicals, drugs, genomics, biotechnology and nanotechnology to mining, aeronautics, instrumentation, environmental engineering and information technology. It provides significant technological intervention in many areas with regard to societal efforts which include environment, health, drinking water, food, housing, energy, leather, farm and non-farm sectors.
- CSIR is the Nation's custodian for Measurement Standards of Mass, Distance, Time, Temperature, Current etc. CSIR has created and is the custodian of Traditional Knowledge Digital Library (TKDL) which is a powerful weapon against unethical commercial exploitation of Indian traditional knowledge. CSIR maintains Microbial Type Culture Collection (MTCC) and Gene Bank.
- Pioneer of India's intellectual property movement, CSIR today is strengthening its patent portfolio to carve out global niches for the country in select technology domains. CSIR has pursued cutting edge science and advanced knowledge frontiers. It has published around 5549 papers in SCI Journals during 2016 with average impact factor of 3.227.





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- CSIR through its various constituent laboratories is also placing major focus upon creating incubation facilities for spin off and startups. The CSIR would hand hold these companies so as to create a new segment of knowledge enterprises.
- CSIR has been focusing in a significant manner on the development of S&T Human Resource and provided the yeoman service through various fellowships. It has been imparting skills in diverse S&T areas so as to empower youth for better career and employment opportunities. CSIR has forged linkage with Ministry of Skill Development and Entrepreneurship to enhance and widen its contributions for Skill Development in the country.
- CSIR has been ranked 12th in the world among the government institutions in the world, improving its position after being at 14th spot for three consecutive years, according to 2016 report of the prestigious Scimago Institutions Rankings. The overall global ranking of CSIR also improved from 110 to 99th position. CSIR leads the country at the top spot and is the only Indian organization to have found a place among the top 100 global institutions.

5.1.1 Significant Events

The Prime Minister Chairs Meeting of CSIR Society

The Prime Minister, who is also the President of the CSIR, chaired a meeting of the CSIR Society in New Delhi on 6 April 2016. An overview of the work being done at CSIR was presented before the Prime Minister. He was apprised of the efforts of CSIR in addressing national challenges, and its recognition as a major Indian innovator. It was emphasized that a huge potential exists within CSIR for a large number of start-ups to emerge from the research being done in its labs. Research in areas such as medical device manufacturing,

energy, and waste management held immense potential for commercial applications.

The Prime Minister Shri Narendra Modi called for laying down parameters to assess the performance of CSIR labs; and a mechanism whereby there could be internal competition among various labs. He emphasized that CSIR should direct its efforts towards making the life of the common man better, and providing technological solutions to the problems of the poor and downtrodden sections of society. He also expressed that the CSIR should take the lead in providing breakthroughs in sickle cell anaemia among the tribal people, defence equipment manufacturing, life-saving equipment for the jawans, innovations related to solar energy, and innovations related to the agriculture sector.

The Prime Minister and the President of CSIR Society launches CSIR's Platinum Jubilee Function – Applauds CSIR for Leaving Indelible Mark

The Prime Minister of India Shri Narendra Modi ushered in CSIR's Platinum Jubilee Celebrations on 26 September 2016 with a lively interaction with farmers from five different locations across the country. The Prime Minister, who is also the President of the Council of Scientific and Industrial Research (CSIR), dedicated seven new varieties of medicinal plants developed by CSIR laboratories to the nation at a function held in Vigyan Bhawan in New Delhi.

An exclusive exhibition of major technological contributions of CSIR was organized for the benefit of the PM. The exhibits that showcased some of the most stellar achievements of CSIR including the ones that are in the pipeline and have great potential of delivery to remove the drudgery of the common masses, largely in the areas of healthcare, water conservation, solid waste management, waste-to-wealth, Communication & IT, housing, industrial competitiveness, and contributions to the strategic sector.





The Prime Minister at exhibition of major technological contributions of CSIR



CSIR Platinum Jubilee Techno Fest²- CSIR Showcase at India International Trade Fare (IITF)

After the Prime Minister of India and President of CSIR, Shri Narendra Modi inaugurated the Platinum Jubilee celebrations of CSIR on 26 September 2016 from the Vigyan Bhawan, CSIR showcased its myriad achievements, technologies and processes during the 'CSIR Platinum Jubilee Techno Fest' at the India International Trade Fare (IITF) in New Delhi during 14-27 November 2016.

Inaugurated by Union Minister for Science, Technology and Earth Sciences, Dr. Harsh Vardhan, the CSIR Techno Fest pavilion was visited by hordes of visitors for more than a week, catching glimpses of some of the significant and pathbreaking technologies developed by CSIR laboratories.

Dr. Harsh Vardhan said, "This Techno Fest is an Opportunity for the young students, scientists and the common people to come under one roof and witness the knowledgebase of achievements and researches by CSIR." The S&T Minister also unveiled theme publications brought out on the thematic areas encapsulating the vast area of influence of CSIR laboratories.

The developments and achievements of the 38 CSIR laboratories situated across the country were displayed under 14 theme pavilions:

Water, Aerospace & Strategic, Energy, Leather, Healthcare & Generics, Ecology & Environment, Chemicals & Petrochemicals, Food & Nutrition, Agriculture & Floriculture, Engineering & Infrastructure, Metals, Minerals, Mining & Metallurgy, CSIR 800 (Societal Interventions), Human Resource Development, and IP & Entrepreneurship.

Dr. Girish Sahni, Director General, CSIR remarked that the Techno Fest was a matter of pride and satisfaction. "It is an honest attempt to make people aware about the contribution of CSIR scientists," he said. "All 38 labs of CSIR contributed to the Techno Fest, presenting CSIR efforts to solve various issues of the common Indian. We are looking forward to contribute more with every passing year."



Union Minister for Science & Technology and Earth Sciences, Dr. Harsh Vardhan inaugurating the CSIR Platinum Jubilee Techno-Fest 2016





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India International Science Festival (IISF)

The IISF 2016 was jointly organised by the Ministry of Science & Technology and Ministry of Earth Sciences in collaboration with Vijnana Bharti (VIBHA). The theme of the science festival his year was “Science for the Masses”.

The programme was kicked off on 7 December, 2016 with the inauguration of the Mega Science Technology & Industry Expo by Dr. Harsh Vardhan, Union Minister for Science & Technology and Ministry of Earth Sciences, and Shri Y.S. Chowdary, Minister of State. Speaking at the event, Dr. Harsh Vardhan said, “Any new and innovative idea will be appreciated and supported by our science department and the government.” Let’s learn science in a more creative way, he added.



Dr. Harsh Vardhan inaugurating the India International Science Festival 2016, IISF-2016 Mega Expo

Inaugurating the Young Scientists’ Conclave, Union Home Minister Shri Rajnath Singh appealed to the youth to take Prime Minister Shri Narendra Modi’s S&T programmes such as Digital India, Make in India, Skill India, Stand Up India-Start Up India to the common man.

Underlining the need to create scientific temper in the society, Shri Rajnath Singh said India is the world leader in Software Technology. Indians constitute the largest majority of software developers among immigrants in the Silicon Valley while the top executives of leading software companies including Microsoft and Google are headed by Persons of Indian Origin, he added. Shri Rajnath Singh said he would not like India to emerge as a Superpower, but rather aim to be the world’s “guru” or teacher, as it will be enlightening rather than being intimidating.



Showcasing Technology

The five day IISF 2016 showcased India's S&T prowess and technological developments through the Mega Science & Technology Expo. It projected Indian technological developments through more than 400 scientific models and exhibits by CSIR Laboratories and other organisations like DST, ISRO, DRDO, DBT, IITs etc. The Mega Science Expo also displayed innovations as parts of government missions such as Swachh Bharat, Digital India, Unnat Bharat Abhiyan, etc.

Celebrating Science

However, the highlight of the IISF was the "Science Village" - a conglomeration of around 3000 school students from all across the country. The students were selected by Members of Parliament from their respective adopted villages under the Pradhan Mantri Sansad Aadarsh Gram Yojana. These students from villages schools were exposed to many scientific activities like interaction with scientists during special interactive sessions, planetarium, science films, laboratory visits and tours around Delhi.

Industry Academia Interaction

The industry-Academia Interaction focused on Outstanding Technologies; Industry Oriented Curriculum Development; Entrepreneurial Ideas for Inductable Technologies in Small Industries; Metrology for Time & Frequency, Need for Environment Pollution and Monitoring Initiatives, and Agriculture & Industries.

Young Scientists' Conclave

A key component of IISF 2016 was the Young Scientists' Conclave, during which parallel sessions were organised to discuss topics with great relevance to the society. Sessions were conducted under six themes - Agriculture, Health, Water, Information Technology, Space and Defence & Energy - in which eminent scientists shared their research work through a series of highly informative talks.

CSIR Tableau at Republic Day Parade 2017- CSIR@75: Touching Lives

The contributions of the Council of Scientific and Industrial Research (CSIR) once again found resonance in a colourful tableaux displayed during the Republic Day Parade on Delhi's Rajpath on 26 January 2017. The tableaux with the theme, **CSIR@75: Touching Lives**, showcased the successful innovations of one of the largest network of scientific laboratories in the world during its journey of 75 years. CSIR participated in the Republic Day Parade for the second time after its debut in 2011 with the theme, **Healthcare: From Generics to Genomics**.

The CSIR tableau, which took part in the Republic Day Parade this year depicted a few of the significant milestones of the organisation since its inception. The centre of the tableau highlighted major achievements of CSIR so far, featured as decade-wise sparks from the CSIR wheel with the support of its 38 national laboratories. It also highlighted its global standing - CSIR ranks 12th in the world amongst government funded institutions.



A model of the CSIR Tableau



CSIR Tableau at Republic Day Parade 2017





5.1.2 Significant S&T Achievements

Design and Development of Continuous Ragi Mudde Making Machine and Ball Making Unit.

The production of ragi mudde (finger millet ball) in large scale was felt difficult by many catering institutions, student hostels, jails, matt and restaurant due to existing manual method of batch type operations. It is a quite a cumbersome, manual process under go three stages to get the final product namely preparation of ragi porridge and addition of ragi powder followed by vigorous mixing and final cooking and then made in to round balls. All these cumbersome stage are carried out by manual operation which are time consuming, drudgery to the chef. Further the manual operations leading to the end product is un-hygienically prepared one and quality of the product as questionable due to the presence of blow holes with encapsulated raw powder in the mudde etc.

The need was felt to standardize the ragi mudde making process and mechanization to serve large population society. Thus ragi mudde making machine was conceptualized and materialized by CSIR-CFTRI. It was developed with the funding from Department of Science and Technology, Government of India.

The is fully automated Machine and Ragi mudde is steam cooked inside the machine. Ragi flour and water is added to the machine, ragi balls come out as continuous discharge with consistent shape and weight. It can discharge 200 to 250 mudde/ hr. (200 gm each ball weight).

This machine is very useful in big restaurants, hostels, industrial canteens, defence canteens, jails, airport restaurants etc. Steam quality and other working parameters of the machine is maintained within the range by the control system of the machine. Unit is easy to clean and has provision for CIP (Clean in position) ensuring quality and hygiene.

Fermentation Technology for production of metal Gluconates

CSIR-IIIM has developed a technology to convert glucose to gluconates using a fungal strain i.e.

Aspergillus niger with a productivity of 5-6 kg Kl-1 h-1 under certain specifically defined physico-chemical conditions. A final product recovery of 90- 95% can be achieved at 120-150 g l-1 glucose concentration within 72 h.

Gluconates have several established pharmaceutical, agricultural and other industrial applications. Calcium, copper, ferrous and zinc salts find use in oral metal supplements for humans, animals and agricultural applications. Sodium gluconate being an excellent sequestrant, finds application as metal or bottle cleaning agent. For its ability to slow the process of polymerization of cement at highly reduced moisture conditions, very large quantity of sodium gluconate is used as an additive by cement industry in Europe and Japan.

Oneer— a novel solution for safe drinking water for domestic and community purpose.

A number of technologies are available in the market for disinfection of water to make it potable. The existing technologies are mainly based on microfiltration, UV irradiation or Reverse Osmosis which are expensive to install and maintain for community supply purpose

CSIR-IITR has developed device is based on the principle of anodic oxidation. The device is particularly useful for the treatment of drinking water supplies that have microbial contamination to disinfect pathogenic microorganisms and to provide safe drinking water to communities as per National and International standards [World Health Organization (WHO) and Environmental Protection Agency (EPA) USA] prescribed for potable water. This has high disinfection efficiency of >8 Log reduction of bacteria (E coli) and is maintenance-free. It is a low-cost water disinfection device that can even treat brackish or turbid water unlike UV technology. Cost of treated water is less than 1 paisa per litre. Domestic device can supply 10 litres of water for homes and small establishments while the online version can supply 450 litres of safe water for communities.



Argemone Oil Detection Kit (AO Kit)

Mustard oil constitutes a prime dietary component of various households. Consumption of mustard oil adulterated with Argemone Mexicana oil is known to cause an epidemic popularly referred to as Dropsy. Several outbreaks have been reported in the past. The dropsy incidence at Delhi in August 1998 appears to be the largest reported in the country involving over 2500 victims with more than 60 deaths. Consumption of Argemone oil contaminated edible oil, even at low levels of adulteration for short duration, causes toxicity. Hence presence of Argemone oil even in trace quantities needs to be ascertained.

CSIR-IITR has developed AO-kit which is used to detect Argemone oil adulteration in Mustard oil. The kit consists of a paper strip and a small instrument for the visualization of fluorescence. The test is easy to perform and takes about 20 minutes. The test is very sensitive with a minimum detection limit of 0.01% (100ppm).

Pedal operated millet dehuller:

Small millets are the staple food of millions. Their slow digestibility and nutritive value makes them one or most preferred commodity among health conscious population. A few important small millets are foxtail millet, kodo millet, little millet, banyard millet and proso millet. Farmers growing these millets, consume it themselves since there are no small scale mills. With an aim to empower them to dehulk these millets, a pedal operated millet dehuller was developed by CSIR-CFTRI. Being manually operated, this system is most suited for the rural sector. This system has dehusker and an aspiration system to separate the husk from the mixture and all components are available locally. It was found that the speed at which each person operates the system varied and hence the dehulling percentages were found to be different. In addition, different types of millets require different speeds for maximum dehulling and there was no system to indicate the speed of the impeller. Hence, a speedometer was retrofitted onto the system which indicated the speed of the impeller in km/h. With

this simple gadget in place, studies were conducted on different millets at different speeds to determine the optimum condition for maximum dehulling efficiency. It was found that for little millets, impeller speed of 4500 rpm (SM: 15.3 km/h) gave maximum dehulling percentage, for foxtail millets, impeller speed of 4140 rpm (SM: 14.5 km/h) gave maximum dehulling percentage and 4860 rpm (SM: 16.4 km/h) was found to be best suited for proso and kodo millets. Dehusking efficiency is more for foxtail and Proso millets at impeller speed of 3420 rpm (SM: 11.3 km/h), for little millets at impeller speed of 3780 rpm (SM: 12.8 km/h), for kodo at 4140 rpm (SM: 14.5 km/h) respectively. It was found that at higher speeds percentage of broken grains were more for these millets. These speeds were found to be quite easy for the operator and were not tedious.

“Jalabhishek - Eco-Friendly Immersion of POP - Ganesh idols”

Large number of Plaster of Paris (POP) based idols worshiped and immersed during various festivals in India is a major issue of concern to society due to the water pollution caused by insoluble POP especially in the situation of water scarcity. To address this issue CSIR-NCL has worked out an eco-friendly, very simple solution without hurting the sentiments of the devotees by using food grade salt to dissolve POP based idols. In this process food grade ammonium bicarbonate (ABC) dissolved in water is used to immerse POP Ganesh idol which converts POP into water soluble fertiliser (ammonium sulphate) and cement additive (calcium carbonate). This project was successfully implemented during Ganesh festival 2016-17. About 30,000 in 2016 and 50,000 in 2017 citizens immersed the idols using this concept. Several cities around Pune, and other CSIR labs (NEERI, IITR) also initiated this activity in 2017.

A new class of self-expandable stents

CSIR-NCL in collaboration with a start-up has developed a new class of self-expandable stents





based on a novel scroll design. These stents have been made with simple polymer-metal composites unlike the shape memory alloy based stents. The novel design allows these stents to meet the characteristics of shape memory alloy based stents. These stents could be made at a much lower cost than the currently available ones.

Synthetic Aviation Lubricants:

Indigenous technology for synthetic aviation lubricants was developed for the first time in the country by CSIR-IICT in collaboration with five other organizations using indigenously available renewable raw material to a major extent. Thus a new knowledge base has been created successfully in the country which will help in import substitution of aviation lubricants catering to defence and civil sectors. The developed lubricants have passed all the mandatory tests. With this landmark development, India will join the select group of countries having capabilities in aviation lubricant technologies. Moreover, Indian aviation sector is growing at a very rapid pace with many small and big players entering the market. One of the developed lubricant is also used extensively in civil aircrafts which will benefit society. The process developed for base oils SVS-11 and SVS-21 in pilot plant scale (100 kg/batch) was designed, fabricated and commissioned with indigenous capabilities meeting stringent specifications. The developed formulations for aviation lubricants SVS-11 & SVS-21 meet the stringent specifications of MILPRF-23699FDEF-STAN 91-98. The lubricant passed Ryder test at US NAVAIR. After successful completion of phase-I activities of the project, inflight testing with the indigenously developed lubricants is initiated as Phase-II activity in collaboration with, HPCL and IAF, 3BRD, Chandigarh.

Organic Light Emitting Diodes (OLEDs)

Organic light emitting diodes (OLEDs) are the next generation lighting sources whose aesthetic appeal and the resemblance to the natural light make it more suitable for lighting application. In

line with the developments in OLEDs worldwide. White OLED with brightness more than 20000 cd/m² has been developed in CSIR-NIIST. These have maximum current efficiency of 40 cd/A and max power efficiency of 26 lm/w. At 10000 cd/m² the values are 38 cd/A and 16 lm/w. Further, CSIR-NIIST developed a light extraction technique which when applied improved the performance to 62 cd/A and 48 lm/w. At 10000 cd/m² brightness the values are 52 cd/A and 24 lm/w.

Utilization of Fly Ash through Geopolymer Technology in the Construction Sector

CSIR-CBRI has signed an agreement with NTPC Ltd. on June 7, 2016 for utilization of fly ash through geo-polymer technology in the construction sector (buildings/roads). The Institute undertook a systematic study on the development of heat and ambient cured geo-polymer using fly ash as a precursor. In view of variability in the constituents of fly ash, the property optimization of geo-polymeric pastes was carried out as a function of activator concentration and its dosage, water-geo-polymer solid ratio, curing time and curing temperature. Geo-polymerisation reaction, thermal stability, identification of bond linkages and micro structural features were analysed by various techniques such as quasi isothermal DSC, TGA, FTIR and FESEM. The durability of geo-polymer pastes/concrete was also studied in terms of aggregate reactivity and deterioration against acidic and sulphate attacks. The suitability of these geo-polymer pastes was assessed in making various geo-polymeric products such as mortars and concrete, bricks, solid and hollow blocks, insulation concrete, foam, sandwich composites and temperature resistant coatings. The technology is ready for commercialization. Considering the "zero waste objective", geo-polymer technology is capable of utilizing huge amount of fly ash as it can be produced from the fly ash as a major constituent. The concrete is cured at ambient condition and also requires no water during curing. The main advantages of using geo-polymer concrete are its high early compressive strength, low permeability, good chemical resistance and excellent fire resistance behaviour. Because



of these properties, geo-polymer is a promising candidate for producing building materials, concrete, structural elements etc.

Development of Acoustic Based Acoustic Based Hit Identification and Analysis System (ABHIAS)

CSIR-NAL has taken up the development of Acoustic Based Hit Identification and Analysis System (ABHIAS) for marksmanship training in the subsonic range. It is primarily aimed at the strategic market consisting of the Armed Forces-Army, Navy and Air Force, CRPF, CISF, NSG, BSF etc. Considering there are more than 2000 firing ranges across India requiring at least 8 systems per firing range, this indigenous system has good market potential. The system currently under ruggedization with armed forces and MoU at final stage with BEL, Bengaluru for productionisation, marketing and after sales service. Apart from low maintenance cost this indigenous system is 60% of the cost of comparable imported system.

GMR based gear tooth position sensor

A giant magnetoresistance (GMR) based gear tooth position sensor was successfully developed at CSIR-NAL. The developed speed sensor module (NAL GSTM-14xx) as per the system required specification (SRS) provided by TVS motor Limited, Tamilnadu. CSIR-NAL GSTM-14xx was certified by Automotive Research Association of India (ARAI), Pune and the vehicle test was covered more than 10000 km. The accelerated test was conducted by TVS Motor Ltd and they were very much satisfied with the performance. CSIR-NAL is in the process of transferring the technology to MSMEs. The India automotive sensors market is expected to grow to \$1.51 billion by 2018 at a CAGR of 11.64% over the period 2015-2020. Further, as there are only handful of companies worldwide which make these sensors, there is a good opportunity to export these sensors to companies across the globe.

CSIR-NBRI Develops Low-arsenic Rice Grain

Rice is a much favoured crop in most parts of the country. But arsenic contamination in rice has been posing serious health risks like kidney disease, cancer and skin problems. Riding on 10 years of intensive research, the CSIR-National Botanical Research Institute (NBRI) has developed 'transgenic rice' that will reduce arsenic accumulation and contamination in rice grains.

The new variety of rice developed by scientists of the CSIR-NBRI has 'arsenic methyl transferase', a gene isolated from a fungus that accumulates less arsenic and would be less toxic. The variety is ready for field trials. The team that worked on the new rice variety published its findings recently in an international journal *Metallomics* published by the Royal Society of Chemistry.

CSIR-NPL Invents a Novel Hydro-electric Cell as a Source of Green Energy

The CSIR-National Physical Laboratory (NPL), New Delhi has recently come up with the "Hydroelectric Cell" that operates at room temperature, produces no excessive heat and greenhouse gases, and being made of inexpensive precursors is cheaper than fuel cells. The hydroelectric cell also scores over the fuel cell in being risk-free.

A novel renewable energy source and a unique manifestation of the galvanic cell, the hydroelectric cell employs a combination of the material properties and electrode chemistry using only water to generate electrical power. The novelty of this work lies in the generation of electrical energy by the dissociation of water molecules at room temperature by nano-porous lithium substituted magnesium ferrite material.

The hydroelectric cell consists of magnesium ferrite pellet, zinc anode and silver cathode and conducts hydrogen and hydroxide ions due to water molecule dissociation. Owing to the electrochemical reaction, zinc hydroxide gets deposited at the anode and hydrogen gas is produced at the silver electrode and the collection of hydrogen and hydroxide ions is achieved using the electrode reduction potential of zinc & silver.





सत्यमेव जयते

At present, this cell has a current density of 4.8 mA/cm² with a voltage of 950 mV and a maximum power output of 74 mW. Three such cells of diameter 4.8 cm can run a small fan as well as 10 LEDs.

The cell is an economical green source for producing renewable energy. Based on the work, an Indian Patent # 792/DEL/2015 has been granted and a US patent has been filed (Application No. 15/067,496).

“Divya Nayan” Developed by CSIR-CSIO for Visually Impaired- A text-to-speech reading machine developed for the visually impaired to help them read.

A reading device developed by the CSIR-CSIO, helps the visually impaired by reading the text aloud. The advanced reading machine named “Divya Nayan” is a stand-alone, Portable Reading Machine (PRM). The PRM enables the visually impaired to read printed archives, ebooks, etc. without any third person’s involvement. It is based on the principle of contact scanning of a printed document and converting it into speech. Currently, it supports English and Hindi language, but soon will be programmed for other Indian and Foreign languages.

The device is completely wireless and uses open source hardware and software, can analyse a multi-column document and provides for seamless reading to the users. It is capable of page, sentence and word-level navigation while reading, hence enabling newspaper, magazine, etc. reading effortless. The device allows the visually impaired to read the print media as well as the electronic files like eBooks.

The team of CSIR-CSIO has developed two different designs & pre device for which the first one takes only 15 to 30 minutes to convert printed documents of A4 size into speech, whereas in the second, a portable scanner is used to scan the printed document as a whole. After connecting the handy scanner to the USB, one can scan the document and listen to the recognized text using headphones.

The device has internal storage of 32 GB with a run-time of up to three hours and weighs 410 grams. It can also be connected to a monitor and used as a mini computer with screen reader utility.

For validation the prototype of the reading machine was tested at the Institute for the Blind in Sector 26, Chandigarh and Saksham, New Delhi. Feedback was also taken from the visually impaired to make it user- friendly.

Among the 39 million visually impaired across the world, India has a population of 15 million visually challenged. Existing technologies do not provide the multi-functionality as available in Divya Nayan. This portable reading machine will bridge the gap at an affordable cost for the visually impaired.

CSIR Lab Grows Kashmiri Saffron in Pune

Saffron, widely identified with Kashmir, can now be grown in Pune as well. The CSIR-NCL based in Pune has produced a new variety of saffron crocus that can grow well in wider environmental conditions. The crop grown in a greenhouse in Pune has shown flowering almost like that in Kashmir. The new technology could benefit progressive farmers and Agri-biotech industries.

CSIR-NCL scientists studied the soil from a saffron field in Kashmir after which a suitable planting medium was formulated. Saffron corms were procured from Kashmir and planted in a modified greenhouse cooled by natural processes, without a fan, pad system or ACs. A simple irrigation method was devised to minimise the use of water and give cold/ice cold water directly to the roots.

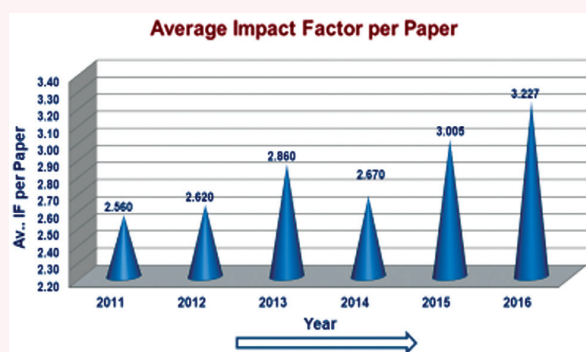
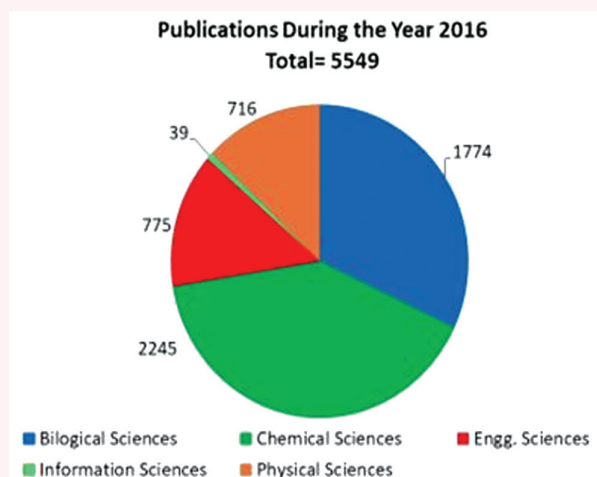
The saffron from the CSIR-NCL greenhouse is being compared with the Kashmir saffron. The CSIR-NCL technique could be suitable for places where the cool deficit is not too much as compared with Kashmir and can be managed by some degree of environmental control, using natural processes for cooling and some amount of freezing.

5.1.3 Scientific Excellence

CSIR has published 5549 research papers during 2016 in SCI journals of repute. The new knowledge generated from CSIR laboratories is reflected in terms of high average Impact Factor (3.005).

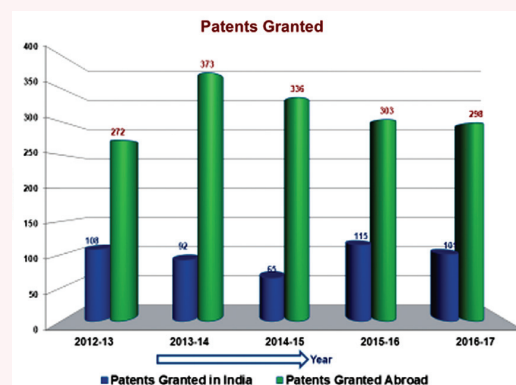
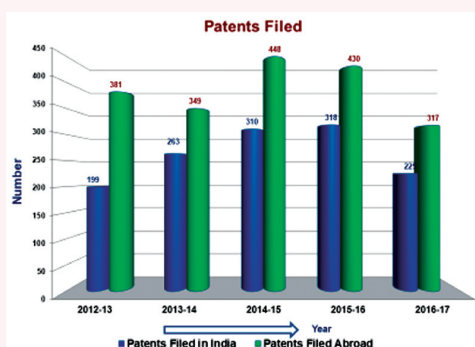


Following Graph shows the trend of research over the last five years as well as cluster wise publications during the year 2016:



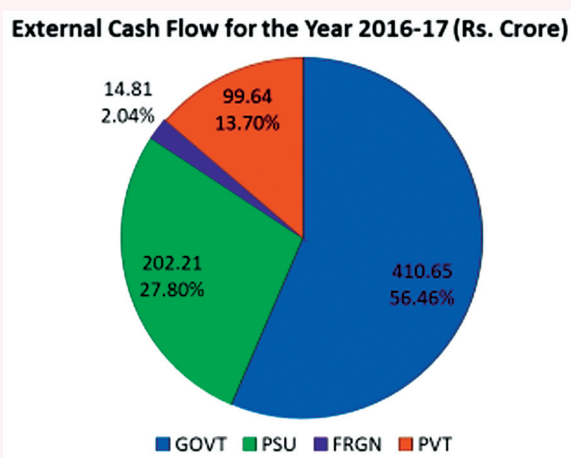
5.1.4 Excellence in Intellectual Property

CSIR has filed 317 patents abroad and 225 patents in India during 2016-17, and it has been granted 298 patents abroad and 101 patents in India. Following graphs provide data on patents filed and patents granted over the last five years:



5.1.5 Value Generation through External Cash Flow (ECF)

CSIR has generated External Cash Flow of Rs. 727.30 crore during 2016-17, through working with various Govt/non-Govt Indian and foreign organizations. Following graphs provide data on ECF generated over the last five years:



5.2 Consultancy Development Centre (CDC):

Consultancy Development Centre (CDC) is an Autonomous Institution of the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, Government of India set up for promotion, development and strengthening of consultancy skills and capabilities in the country including enhancement of export of consultancy and professional services.



During the financial year 2016-17, plan support of Rs. 40.00 lacs was received from DSIR for carrying out specific projects & activities. Besides plan support activities, CDC undertook various funded projects from various Ministries/ Departments of the Government of India.

6. PUBLIC SECTOR ENTERPRISES

6.1 National Research Development Corporation (NRDC):

National Research Development Corporation (NRDC) is a Government of India enterprise, under the Administrative control of Department of Scientific & Industrial Research (DSIR), established in 1953 under section 25 now section 8, of the companies act. The main objective is to promote, develop and commercialize technologies/ know how/ inventions/ patents/ processes emanating from various national R&D institutions. The Corporation offers its services through-out the country in improving the Nation's manufacturing base with innovative technologies specially suitable for our entrepreneurs and conditions. It acts as an effective Interface for translating R&D results into marketable products. Over the last six decades of its existence, the Corporation has forged strong links with various R&D organizations both within the country and abroad and pursued bringing inventions and innovations to commercial fruition. The Corporation is recognized as a repository of a wide range of technologies and has licensed technologies to over 4950 entrepreneurs spread over almost all areas of industry and has provided assistance for filing of 1700 patents.

This endeavor is reflected in the Corporation's signing of 41 new MOUs / MOAs / Agreements with Institutions / Organizations for intellectual property protection, technology commercialization, technology consultation and other value-added services.

During the financial year 108 new processes were assigned to the Corporation, 30 on Exclusive basis as mentioned in and 78 on Non-Exclusive basis as compared to 47 processes in the previous year.

Some of the commercially important processes assigned to the Corporation from various research institutes, universities were:

Central Council for Research in Ayurvedic Sciences, New Delhi

- Shunthi Guggulu – anti-arthritis tablet

CSIR-North East Institute Science and Technology, Jorhat

- Anti-arthritis herbal oil for arthritis

CSIR-Centre for Cellular and Molecular Biology, Hyderabad

- Process for the preparation of novel porphyrin derivatives and their use as PDT agents and fluorescence probes
- DNA markers for assessing seed purity

Central Sericultural Research & Training Institute, Mysuru

- Tray washing cum disinfection machine for sericultural applications

CSIR-Central Building Research Institute, Roorkee

- Acrylic water based coating for the protection of concrete structures
- Beneficiation of phospho-gypsum

The Corporation managed to sign 36 licence agreements during the year compared to 21 licence agreements signed in the previous year

Corporation's consolidated Lumpsum Premia & Royalty income is Rs. 2148.99 lakhs as compared to Rs. 1364.20 lakhs in the previous year. The growth in Lumpsum Premia & Royalty collection is 57.53 % over the last year. The royalty received was from both the NRDC licensees and PATSER projects.

6.2 Central Electronics Limited (CEL):

Central Electronics Limited (CEL) is a Public Sector Enterprise under the Department of



Scientific and Industrial Research (DSIR), Ministry of Science & Technology, Government of India. It was established in 1974 with an objective to commercially exploit indigenous technologies developed by National Laboratories and R&D Institutions in the country. CEL is one of the companies that utilized home grown technologies during all these years of its existence. The Company is primarily engaged in production of strategic components for defence applications of national importance, equipment for railway safety and solar photovoltaic modules and systems.

The Company has developed a number of products for the first time in the country through its own R & D efforts and in close association with the premier National & International Laboratories including Defense Laboratories. In recognition of all these efforts, CEL not only have the distinction of being a DSIR recognized R & D Company, but also has been honored a number of times with prestigious awards.

CEL has already established partnerships and linkages with various stake-holders and business associates in the areas of railways, telecom, police, power generation and distribution companies, service providers in the energy sector, public funded institutions and even rural communities through the state governments. The renewed mandate of CEL includes development and harnessing technology for (i) Solar Energy Systems and Solutions (ii) Strategic Electronic Components and systems required for Defense, Space, Atomic Energy. (iii) Signaling and Safety in Public Transport Systems (iv) Infrastructure, Eco-systems management and energy conservation and (v) Security and Surveillance in strategic establishments.

During the year the Company recorded production of Rs. 302.59 crore and sales of Rs. 291.97 Crore with a net profit after tax is Rs. 16.82 crore .



