



National Metrology Conclave

Theme:

Metrology for Inclusive Growth of India

(4th January, 2021)

**CSIR-National Physical Laboratory
Dr. K.S. Krishnan Marg, New Delhi-110 012, India**

Kindly go to <https://info.nplindia.org/75jubilee> and click "please register yourself for the event".



सत्यमेव जयते

प्रधान मंत्री
Prime Minister
MESSAGE

I am pleased to learn that Council of Scientific and Industrial Research-National Physical Laboratory (CSIR-NPL) is celebrating its 75th Foundation Day on January 04, 2021. It is a memorable occasion for everyone associated with the institution.

India is a youthful nation with youthful dreams and aspirations. With holistic efforts, we are creating the right ecosystems where energy, strong intent and good ideas of our youth power the vision of self-reliant India. Role of research, innovation and enterprise is vital to further this vision.

We have no dearth of talent, hard working workforce or purpose. This is evident from India's rapid emergence in the field of science and technology in the last few decades. We need to take leverage of our strong scientific research ecosystem to find solutions that help enhance the quality of life of common citizens.

On the occasion of the Platinum Jubilee celebration of CSIR-NPL, different technology-based initiatives will showcase the scientific progress made by the nation. These achievements will further the spirit of *Aatmanirbhar Bharat* in every sector of activity.

The book titled 'Metrology for Inclusive Growth of India' will reflect the contribution made by the institution. It will also serve as a reference guide for the scientists, researchers and science students in the times to come.

My greetings and best wishes to all the members of CSIR-NPL for the 75th Foundation Day celebrations. May the occasion strengthen scientific temper in younger generations and inspire everyone to serve the nation with renewed dedication and commitment.

(Narendra Modi)

New Delhi
भाद्रपद 10, शक संवत्, 1942
1st September, 2020

Dr. Harsh Vardhan
Union Minister for Health & Family Welfare,
Science & Technology and Earth Sciences
348, A-Wing, Nirman Bhawan
New Delhi – 110011

National Metrology Conclave

4th January, 2021

to be inaugurated by



Shri Narendra Modi

Hon'ble Prime Minister



Dedicating to the Nation

- The **"National Primary Timescale of India"** generating **Indian Standard Time (IST™)** with 2.8 nanosecond accuracy (one of the best in the world) making India self-reliant in precise time and frequency signals and **Pan-India IST dissemination link** for "Safe Digital India"
- **"Bhartiya Nirdeshak Dravya (BND®)"** - trademarked Indian Reference Materials and **link with reference material producers** for self-reliance in supporting all the testing and calibration laboratories across the country for quality assurance at par international standards

Laying a Foundation Stone of

- India's first **"National Environmental Standard Laboratory"** for self-reliance in the certification of ambient air and industrial emission monitoring equipment

and releasing of

- Book titled **"Metrology for Inclusive Growth of India"** to commemorate the 75th Foundation day of CSIR-NPL.



Dr. Harsh Vardhan

Union Minister for Health & Family Welfare
Science & Technology and Earth Sciences

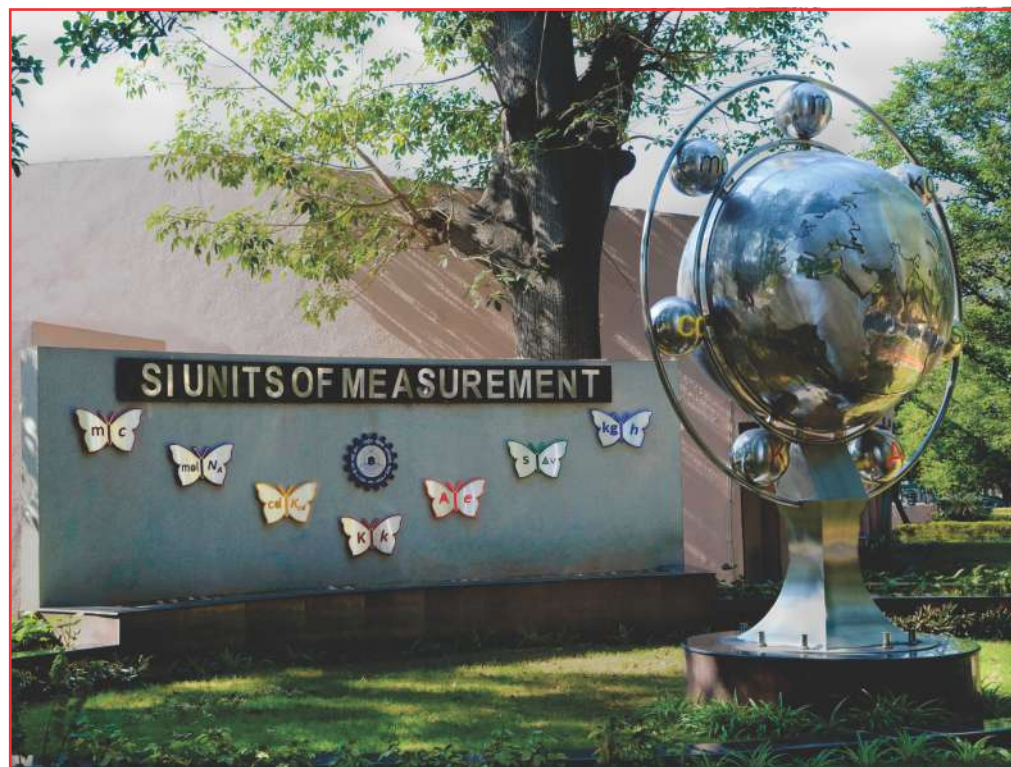


Dr. Shekhar C. Mande

Director General CSIR and
Secretary, DSIR



Photograph after India voted for the revised SI units at 26th CGPM meeting, Versailles, France, on 16 November, 2018 (Center: Dr. D.K. Aswal, Director, CSIR-NPL. Right: A.K. Srivastava, Secretary, Ministry of Consumer Affairs, Govt. of India; Left: Dr. T.D. Senguttuvan, CSIR-NPL).



Wall of SI units at the campus of CSIR-National Physical Laboratory, New Delhi, depicting the relationship between the SI units of measurement and fundamental constants. CSIR-NPL implemented the revised SI units in the country on May 20, 2019.

Key speakers



Dr. Martin Milton

Director

International Bureau of Weights and Measures (BIPM), France



Prof. Joachim Ullrich

President

PTB, Germany



Dr. Peter Thompson

Director

National Physical Laboratory, UK



Dr. Takashi Usuda

Director General

National Measurement Institute of Japan, Japan



Mr. Ndwakhulu Mukahufhi

CEO

National Measurement Institute of South Africa



Dr. B. Warrington

CEO

National Measurement Institute, Australia



Dr. D. K. Aswal

Director

CSIR-National Physical Laboratory, India

A photograph of the opening ceremony of NPL-India on January 21, 1950 (from the album of NPL). From left to right: Mr. G.M. Bhuta, Dr. K.N. Mathur, Prof. O.E.H. Rydbeck, Prof. H.J. Bhabha, Prof. P. Auger, Dr. E.U. Condon, Dr. S.P. Mookerjee, Pandit Jawahar Lal Nehru, Sri C. Rajgopalachari, Sardar Vallabhbhai Patel, Dr. S.S. Bhatnagar, Dr. K.S. Krishnan, Sir Robert Robinson, Lady Robinson, Prof. W.A. Englehardt and Prof. J.D. Bernal.

भारत का राजपत्र
The Gazette of India**The Legal Metrology (National Standards) Rules, 2011****NOTIFICATION**

(d) "General Conference on Weights and Measures" means the conference General des Poids et Mesures established under the Metre Convention to which India acceded in 1957;

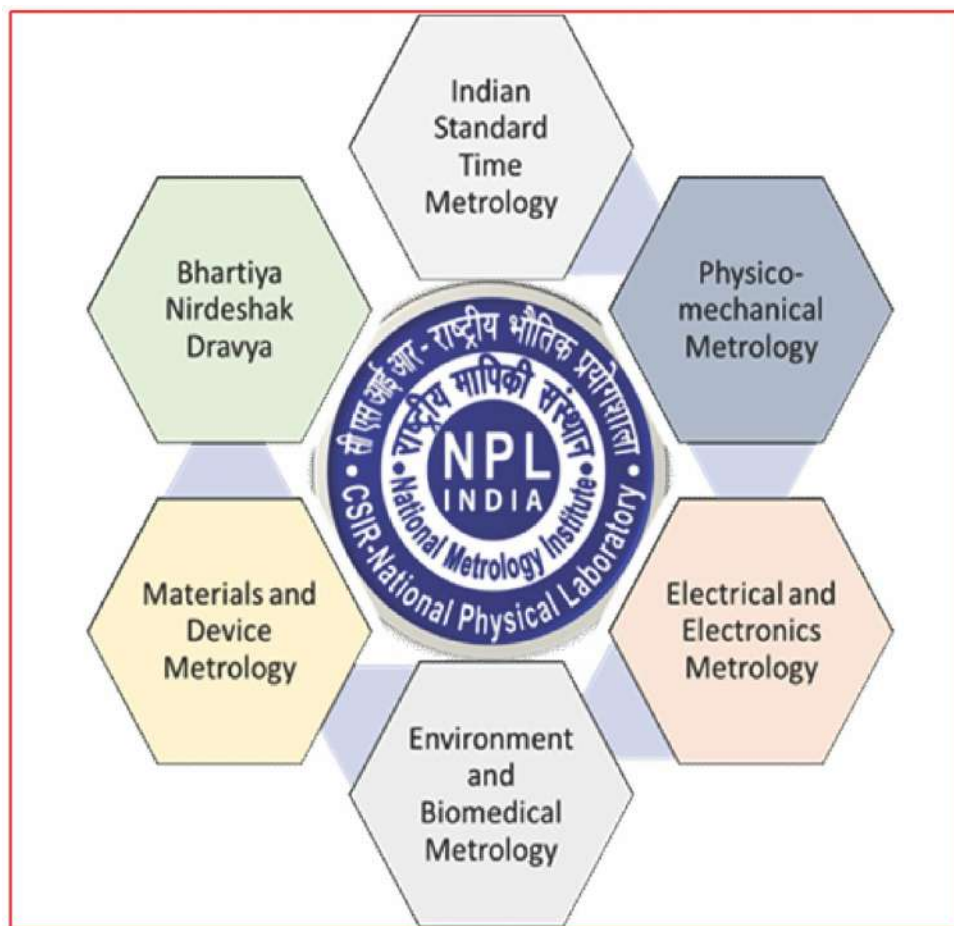
**CHAPTER III
NATIONAL STANDARDS**

23. Custody, maintenance, etc. of national standards of weights and measures.- (1) The work relating to the realisation, establishment, custody, maintenance, determination, reproduction and updating of national standards of weights and measures shall, on the commencement of these rules, be the responsibility of the National Physical Laboratory.

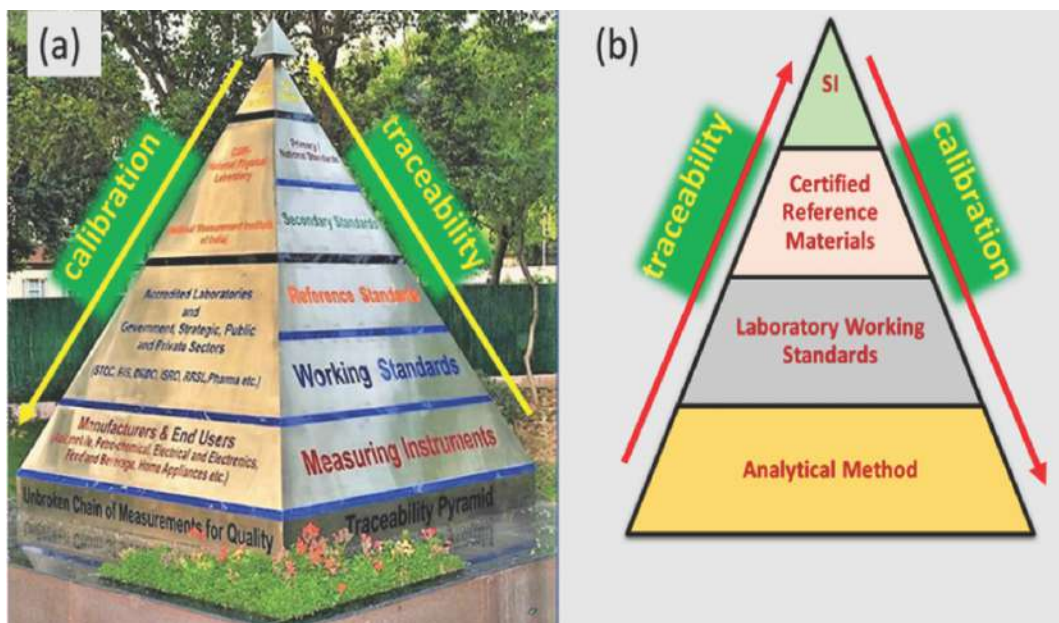
CSIR–National Physical Laboratory: a historical glance

On 4th January 1947, the foundation stone of National Physical Laboratory of India, one of the first laboratories of Council of Scientific & Industrial Research (CSIR) was laid down by Pandit Jawaharlal Nehru, Vice President of the Interim Government of India in the presence of Sir Charles Darwin, Director NPL, UK. Dr. K. S. Krishnan was the first Director and the account of foundation ceremony was published in *Nature*, February 8, 1947 issue. The CSIR-NPL was formally opened by former Deputy Prime Minister Sardar Vallabhbhai Patel on 21 January 1950, and an account of this ceremony was published in *Nature* March 24, 1951 issue. The inaugural ceremony of CSIR-NPL was attended by a galaxy of eminent people from many countries.

The CSIR-NPL was expected to fill a wide gap in scientific and industrial organizations of India. At that point of time, India neither had a well-equipped laboratory to take up the measurement standards work nor had the statutory acceptance from International Bureau of Weights and Measures (BIPM), France, for the mass and length standards. In addition, the country also did not have the capabilities to disseminate the length and mass standards with scientific precession for the use of industry. Therefore, the core mandate assigned to CSIR-NPL was to maintain the fundamental and derived measurement standards and to undertake research for achieving high degree of accuracy in the measurements through regular inter-comparisons with standard laboratories of the world.



Various metrology activities at the National CSIR–Physical Laboratory, New Delhi
- the National Metrology Institute (NMI) of India.



Two routes of establishing an unbroken chain of measurement traceability:
(a) using the traceability pyramid and (b) using the certified reference materials.

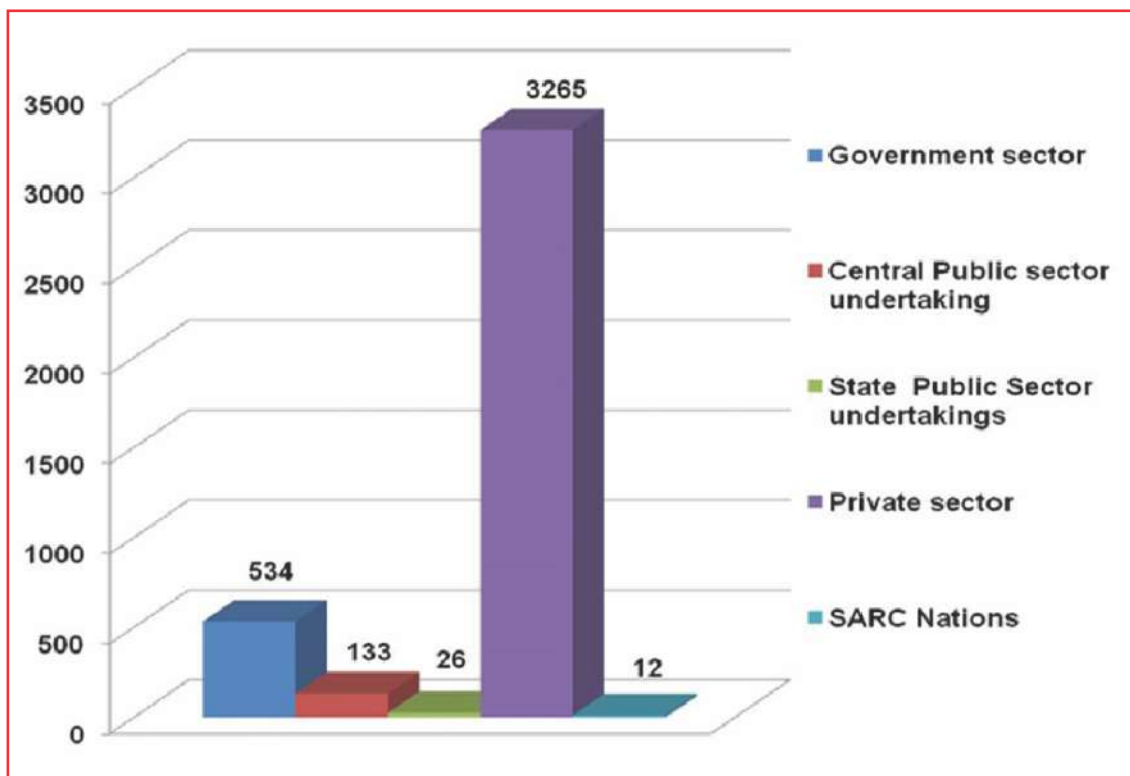
The "Standards of Weights and Measures Act" was enacted by Government of India for the first time in 1956 to ensure that each of its citizens has an access to uniform standards of weights and measures that are traceable to the SI units. The Legal Metrology (National Standards) Rules, 2011 under Chapter III states: *"The work relating to the realization, establishment, custody, maintenance, determination, reproduction and updating of national standards of weights and measures shall, on the commencement of these rules, be the responsibility of the National Physical Laboratory."* Therefore, this is the core mandate of CSIR-NPL. In 1957, India became a Member State of International Bureau of Weights and Measures (BIPM), France. CSIR-NPL implemented the revised SI units based on fundamental and atomic constants in the country on May 20, 2019.

Recent Focus of CSIR-NPL on Metrology

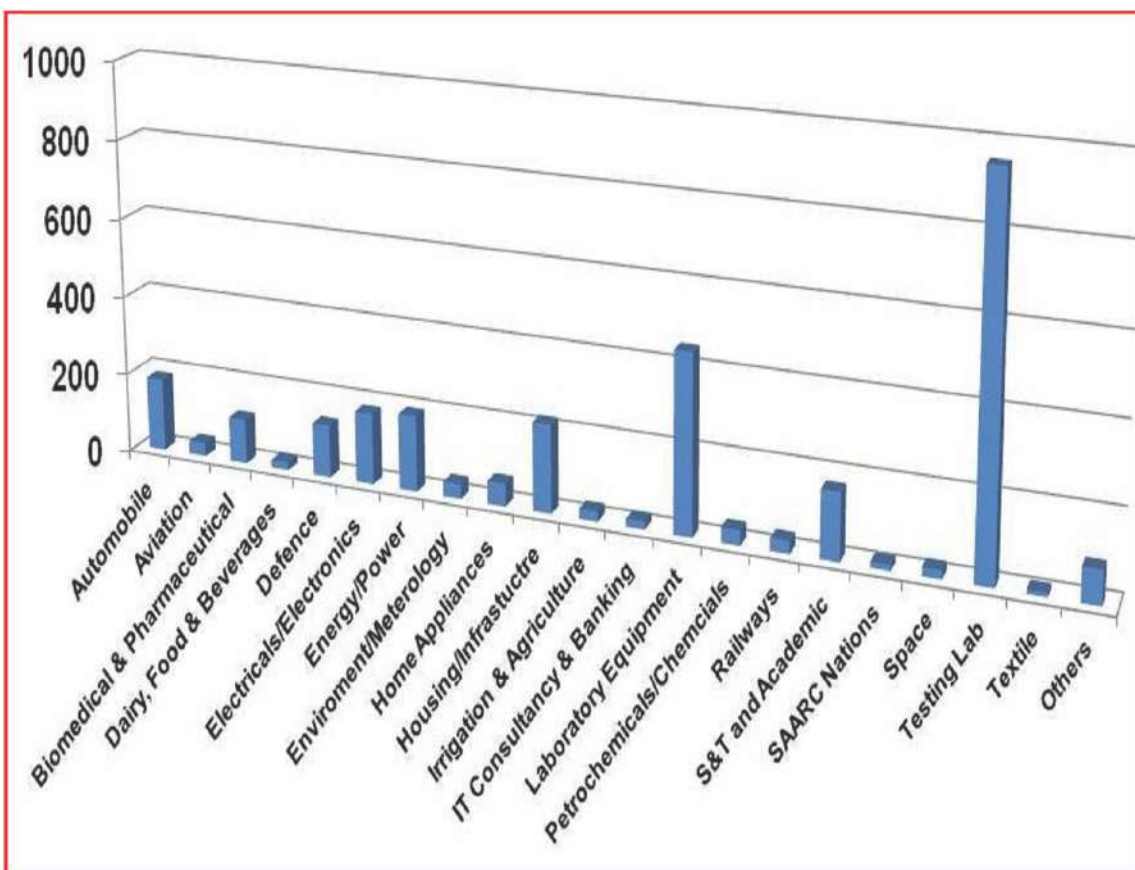
Support for Make in India and Atmanirbhar Bharat missions

In 2015, to support the Make in India and Atmanirbhar Bharat programs launched by Honourable Prime Minister Shri Narendra Modi, CSIR-NPL focused its metrology R&D and dissemination activities to the areas of physico-mechanical, electrical and electronics, Indian Standard Time, environmental and biomedical; materials metrology and devices, and Bhartiya Niradeshak Dravyas (BND®). The idea is to make India's measurement capabilities at par with developed nation as well as to disseminate these measurements to over several lakhs of testing and calibration laboratories belonging to government, industries, academia as well as to the NMIs of SAARC nations.

CSIR-NPL supports industries to establish an unbroken chain of measurement traceability using the traceability pyramid and/or by certified reference material - the Bhartiya Niradeshak Dravyas (BND®). The *Aswal model of inclusive growth* suggests that trustworthy data with SI traceability obtained from the national quality-infrastructure (metrology, accreditation and standards) facilitates strong interactions amongst government, academia, industry and society, which is essential for national economy and quality of life. The metrology is key to indigenous technology development at par with international quality as well as industrialization, cyber-physical systems and cyber security, affordable healthcare and safety, clean environment and climate change studies, sustainable energy, facilitation of international trade without any technical barrier, for creation of a level playing field in the society, etc.



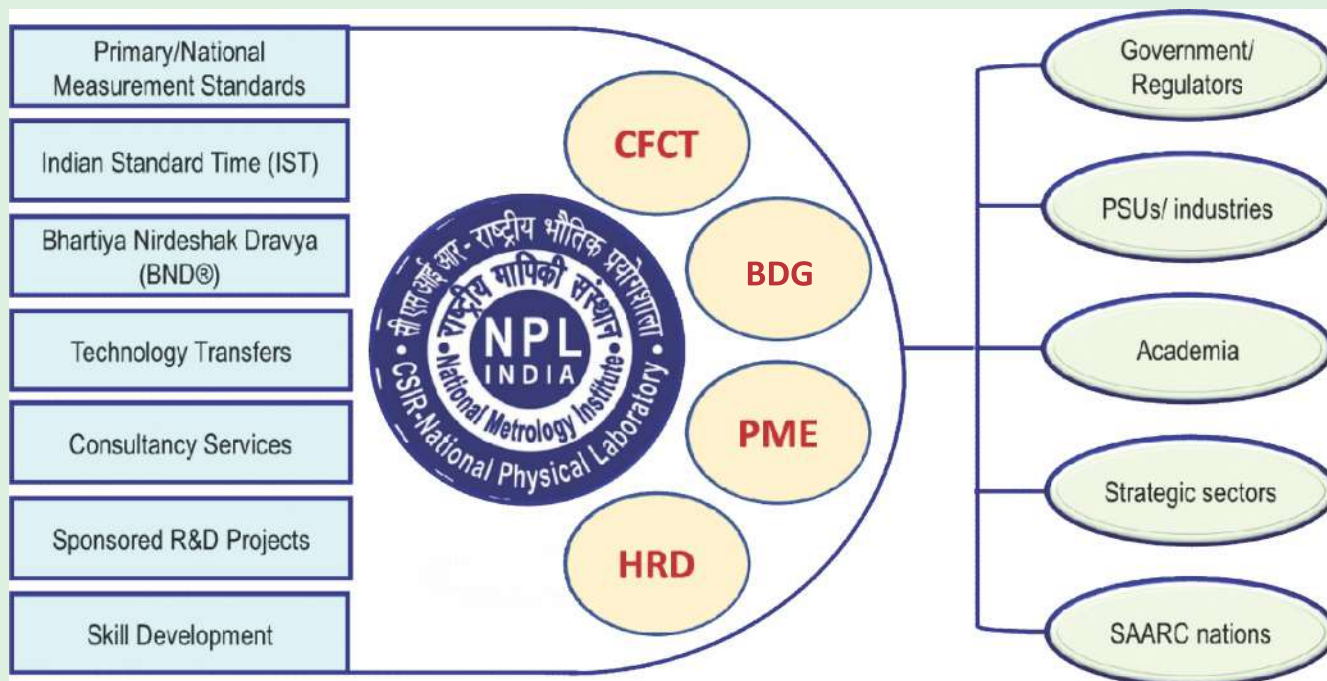
CSIR-NPL provides calibration and testing to several government organizations, private industries and SAARC nations.



Sector wise distribution of metrological services of CSIR-NPL for 2015-16 to 2019-20.

CSIR-NPL provides measurement traceability to nearly 4000 agencies, which are distributed across the government sectors, central PSUs, state PSUs, private industries, and SAARC nations. As accurate and precise measurements are key to the manufacturing, it is not a surprise that >82% of the CSIR-NPL metrological services are availed by private industries, which includes small scale industries and NABL accredited testing and calibration laboratories across the country. Other major sectors that obtain measurement traceability from CSIR-NPL are automobiles, biomedical and pharmaceutical, defense, home appliances, housing/infrastructure electrical and electronics, energy/power, S&T and academic, aviation, railways and space. The measurement traceability to sectors like dairy, food & beverages, environment/metrology, IT consultancy & banking, textile etc. needs to be improved for the quality control and quality assurance.

CSIR-NPL collaborates with various stakeholders for metrological, technology and consultancy services, sponsored R&D projects and specialized skill development programs through Centre for Calibration & Testing (CFCT), Business Development Group (BDG), Planning, Monitoring and Evaluation (PME) and Human Resource Development (HRD).





Shri Narendra Modi, Hon'ble Prime Minister (a) displaying the mark of indelible-ink developed by CSIR-NPL and manufactured by Mysore Paints and Varnish Ltd. (b) paying respect to the "Original copy of the Constitution of India" (Hindi and English versions) at Parliament Library, preserved in especial hermetically sealed cases which are looked after by CSIR-NPL.

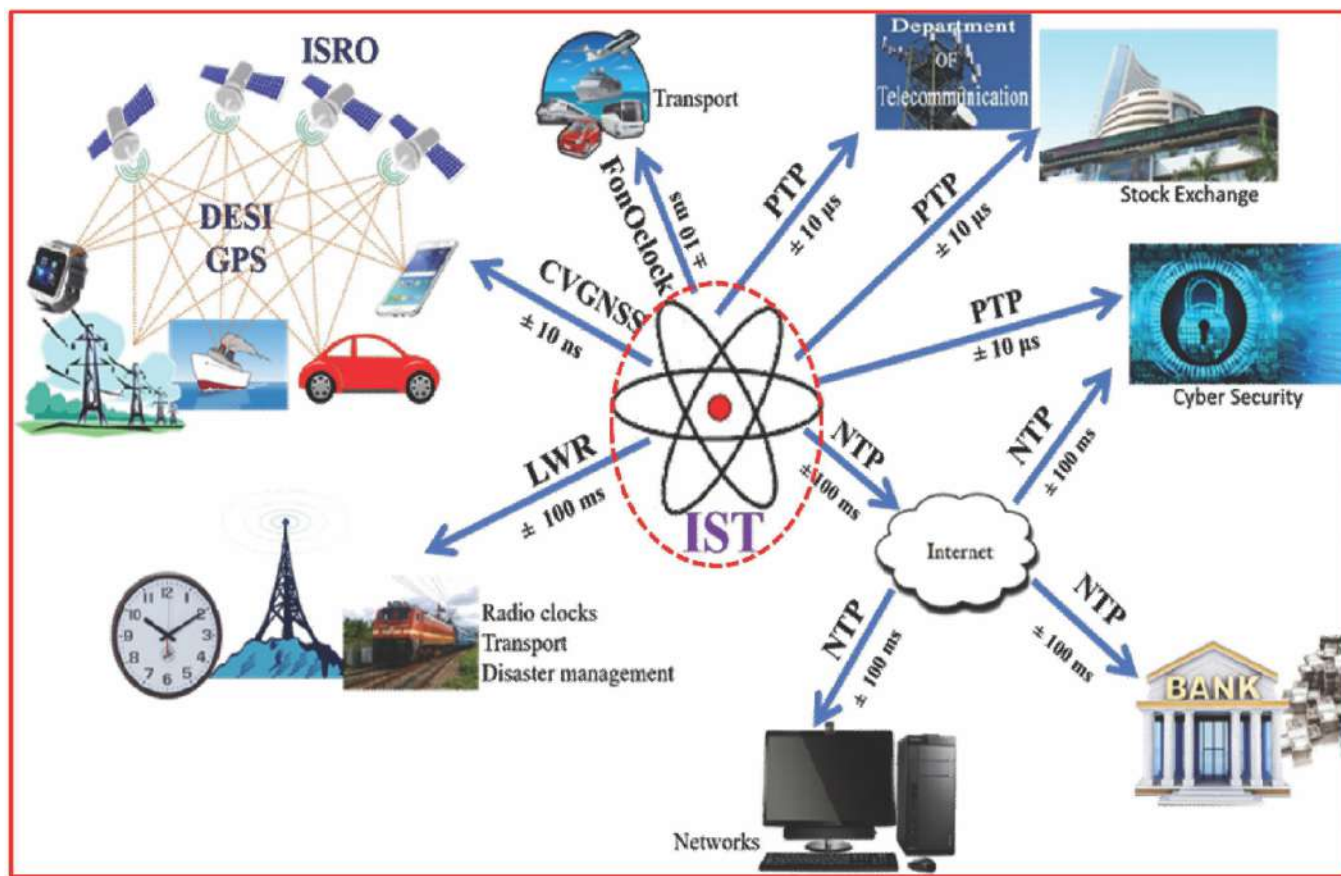
National Metrology Conclave

To commemorate its 75th foundation day on 4th January, CSIR-NPL is organizing *National Metrology Conclave (NMC)* on this auspicious occasion. This being the Platinum Jubilee year, organisation of NMC-2021 is very significant and special for all the metrologists across the country who obtain their traceability in measurement from CSIR-NPL.

The theme topic for discussion and deliberations of NMC-2021 is '*Metrology for Inclusive Growth of India*'. This will be an opportunity for stakeholders to brainstorm and explore the gaps in the existing national metrology scenario and recommend remedial steps to fill the identified gaps which would have a direct implication in economic growth of the country. The invitees for the meeting are from various NMIs across the globe, several lakhs of participants from the QCI, BIS, CPCB, Legal Metrology Department, NABL, NABH, APEDA, ICAR, FSSAI, ICMR, Department of Telecommunication, Railways, Oil Giants, DAE, ISRO, DRDO, NCCBM, GAIL, IOCL, BEE, ELCOMA, AYUSH, industries, academia, calibration and testing laboratories etc. This conclave would mainly focus on deliberations with delegates having diverse expertise, including policy makers, regulators, academicians, scientists, industrialists etc. to cover wide spectra of metrology related issues, such as development of measurement standards, quality system and standardization, accreditation and conformity assessment, regulators and legal metrology, education and awareness, etc.



National Primary Timescale at CSIR-NPL



National Primary Timescale generating (IST™) at CSIR-NPL, the pan-India IST synchronization links with ISRO and RRSLS and requirements of IST synchronization by various sectors.

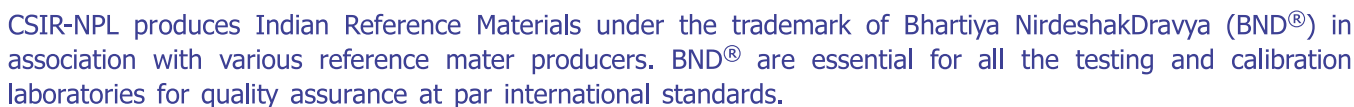
Dedication of CSIR-NPL's Achievements by Hon'ble Prime Minister to the Nation

On this occasion, Hon'ble Prime Minister, Shri Narendra Modi will dedicate the following most significant achievements to the nation for commemorating the contributions of CSIR-NPL in the field of Science & Technology and Metrology for the inclusive economic growth of the country.

The National Primary Timescale of India at CSIR-NPL and Pan-India IST™ dissemination for "Safe Digital India"

CSIR-NPL, as the time keeper of India, realizes and maintains the Indian Standard Time (IST™), traceable to coordinated universal time (UTC; international reference time) with an uncertainty of ± 2.8 ns. This IST™ is realized through the National Primary Timescale consisting of a bank of ultra-stable atomic clocks. Dissemination of IST™ across Indian subcontinent is done through network time service and satellite links. CSIR-NPL is on a mission of *"One Nation One Time"* to synchronize all the clocks in the country to IST™ for securing digital infrastructure and reducing cyber-crime. IST™ traceability to ISRO's timing centres located at Bengaluru and Lucknow are already established for their space program. CSIR-NPL is establishing five IST™ traceable secondary timing centres at *RRSLs (Regional Reference Standard Laboratories)* across India at Ahmedabad, Bengaluru, Bhubaneswar, Guwahati and Faridabad for Department of Legal Metrology. These regional timing centres will aid in providing IST™ dissemination services to all the various stakeholders/sectors to create a safe digital India.

Demand for precise time synchronization is rapidly growing in sectors like telecommunication, cyber security, secure banking and stock transactions, geodesy, deep space navigation, radio telescopes, air traffic control, power grids, cyber physical systems and so many more applications. An estimate shows that an economic impact of IST synchronization in these sectors is more than 10% of GDP.



Indian Reference Materials — trademarked as Bhartiya Nirdeshak Dravya (BND®) for self-reliance in supporting all the testing and calibration laboratories for quality assurance at par international standards

Reliability of laboratory results depends upon traceable calibration through certified reference materials (CRMs). The CRMs are used to calibrate the testing equipment with utmost accuracy. These CRMs, traceable to SI units are produced under the stringent conditions following the international standards for quality assurance and the data as per international acceptance. These CRMs are also used for calibration, testing, quality control, method validation purpose, assigning the values to other tested materials and finally to maintain or establish traceability to conventional scales. The Indian CRMs are registered as trademark name Bhartiya Nirdeshak Dravayas (BND®). These BNDs are used by industries, government sectors and academia to ensure the best accuracies with minimum uncertainties in measurements through calibration of instruments, validity of measurements and method validation for quality assurance.

As on today India imports CRMs worth several hundreds of crores. Being the NMI, it is the responsibility of CSIR-NPL to overcome this flow of foreign exchange and produce as many CRMs and become self-reliant. In order to cater the demands of Indian industries and huge potential of CRMs production, CSIR-NPL has started a massive mission mode program in association with Ministry of Commerce and Industry (MoC) for indigenous production of CRMs/BNDs. Many MoUs have been signed with several Reference Material Producers (RMPs) viz. M/s Aashvi Technologies, Ahmedabad; NCCBM, Faridabad; HPCL, Vizag; FARE Labs Pvt. Ltd., Gurgaon; Sigma Aldrich, USA; Global PT Provider, Delhi; BPCL, Mumbai; CSIR-IITR, Lucknow, etc. in various sectors like cement, pharmaceuticals, environment, food, agriculture, petroleum products, etc.

This huge initiative of CSIR-NPL would certainly bring a paradigm shift in socio-economic fabric of country through quality control and quality assurance for export and import to fulfill the ever-increasing demand of CRMs and save foreign exchange. Production of BNDs® would also help in employment generation, enhance global trade and international visibility of India.

MINISTRY ON ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 22nd August, 2019

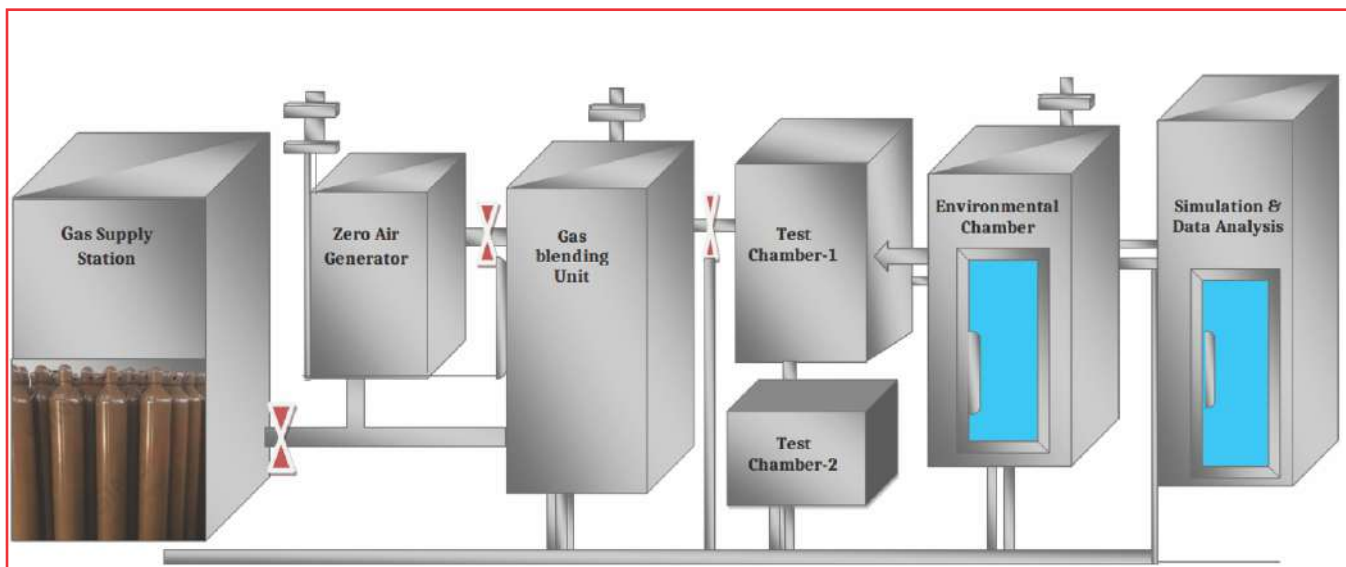
S.O. 3023(E).—Whereas, with a view to protecting and improving the quality of environment and preventing, controlling and abating environmental pollution, there is a need to take measures relating to certifying instruments and equipments for monitoring air quality.

Now, therefore, in exercise of the powers conferred by section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government here by designates the Council of Scientific and Industrial Research - National Physical Laboratory (CSIR-NPL) as national verification agency for certifying instruments and equipments for monitoring emissions and ambient air.

2. CSIR-NPL shall develop necessary infrastructure, management system, testing and certification facilities conforming to international standards like ISO 17605 and ISO 17025 for both manual samplers and Continuous Ambient Air Quality Monitoring Stations (CAQMS) in addition to Continuous Emission Monitoring Systems (CEMS) and CSIR-NPL shall also be responsible for preparation of all documentation and protocol for measurements, in consultation with the Central Pollution Control Board.

[F. No. Q-16017/72/2018-CPA]

NIDHI KHARE, Jt. Secy.



Ministry of Environment, Forest and Climate Change (MoEF&CC) notified CSIR-NPL as national verification agency for certifying instruments for monitoring emissions and ambient air. CSIR-NPL has established NPLICSTM certification scheme and is in process for establishing India's first "National Environmental Standard Laboratory"

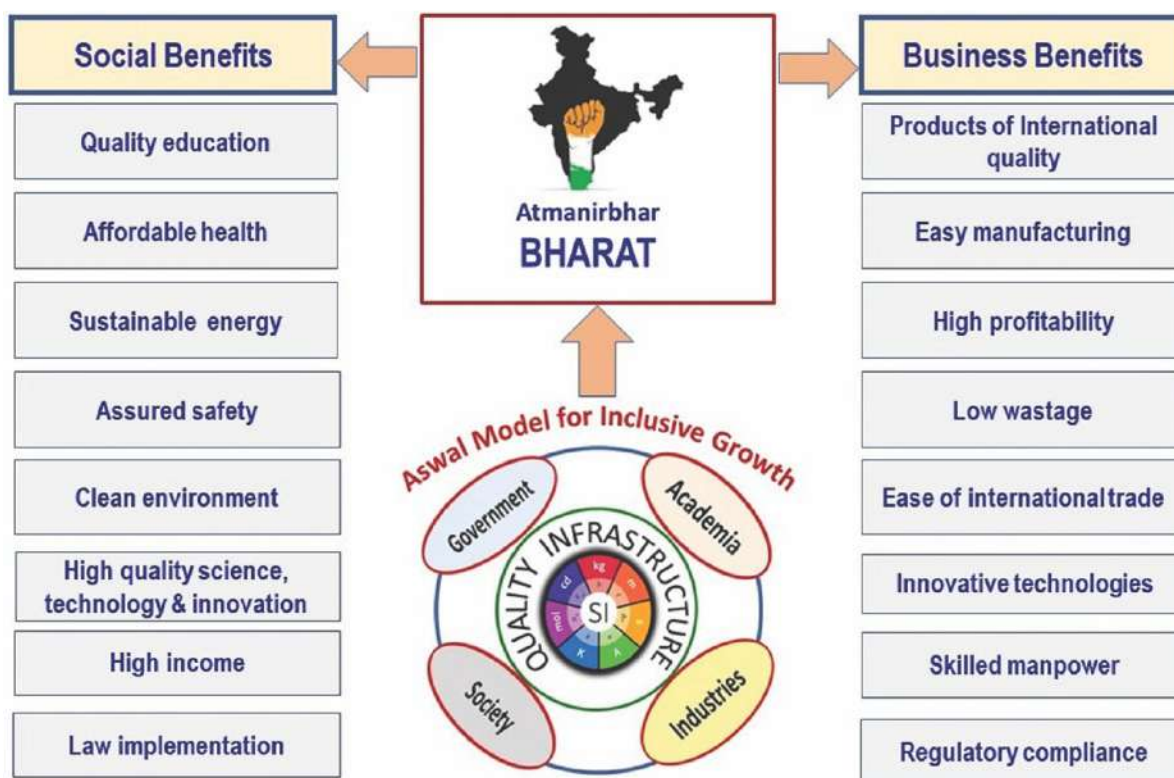
India's first "National Environmental Standard Laboratory" for self-reliance in the certification of ambient air and industrial emission monitoring equipment

In the field of air pollution monitoring, the data quality is posing a major challenge as the reliability of such measurements needs to be ascertained. The roles of instruments and their calibration are the major issues that need to be addressed. While most of the instruments used are usually imported from abroad which comes with product certifications from international agencies like US-EPA, TUV, MCERT, etc. These certificates are issued based on the environmental conditions of the certificate issuing country which are very much different from the environmental conditions prevalent in India. This affects the quality of measurements by the instrument operating for a long time in the Indian conditions and warrants a revisit of the certification process at regular intervals.

In view of this, the Ministry of Environment, Forest & Climate Change (MoEF&CC) has designated the CSIR-NPL as verification and certification agency for emission and ambient air pollution monitoring equipment in India through a gazette notification. To meet this requirement CSIR-NPL has developed a "CSIR-NPL India Certificate Scheme (NPLI CS™)" to provide certification of performance evaluation of air pollution monitoring equipment. In order to develop requisite testing and calibration facility for air pollution monitoring equipment, CSIR-NPL is establishing a state of art 'National Environmental Standard Laboratory' for measuring the performance of various air ambient & emission pollution monitoring equipment like Online Continuous Emission Monitoring Equipment (OCEMS), Continuous Ambient Air Quality Monitoring System (CAAQMS), etc. with the financial assistance provided by the MoEF&CC. This will facilitate the goals of '*Atmanirbhar Bharat*' envisaged by the Hon'ble Prime Minister of India in the area of air pollution monitoring. All imported as well as indigenously developed environmental monitoring equipment will be certified using this facility. NPLICS will be equivalent to those of the international certification schemes like MCERTS (UK), US-EPA (USA) and TUV (Germany), etc. and save over several thousands of crore Rupees worth of foreign exchange that are annually spent on calibration & certification of such equipment from abroad. NPLICS will facilitate indigenous development and manufacturing of Air quality & industrial emission monitoring equipment, making India self-reliance as well as capable of exporting.



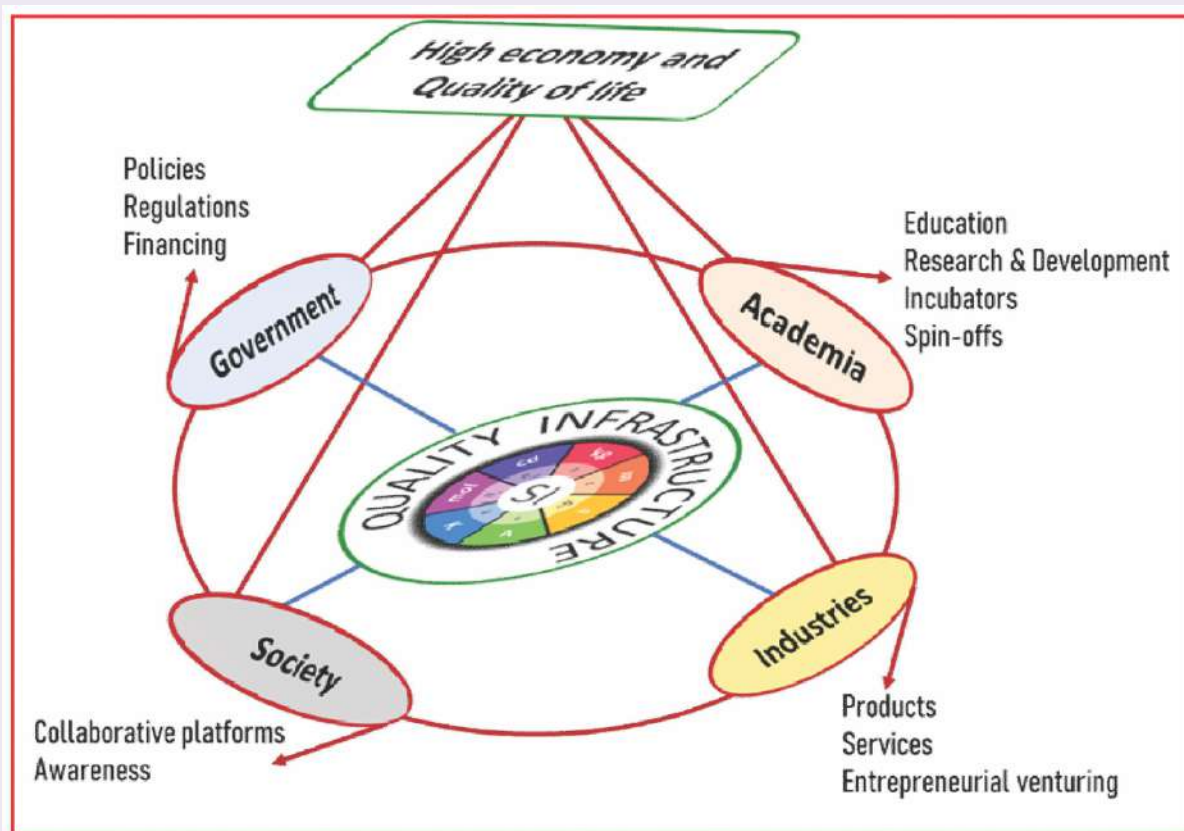
The book Metrology for Inclusive Growth of India presents the national contributions made by CSIR-NPL during past 5 years.



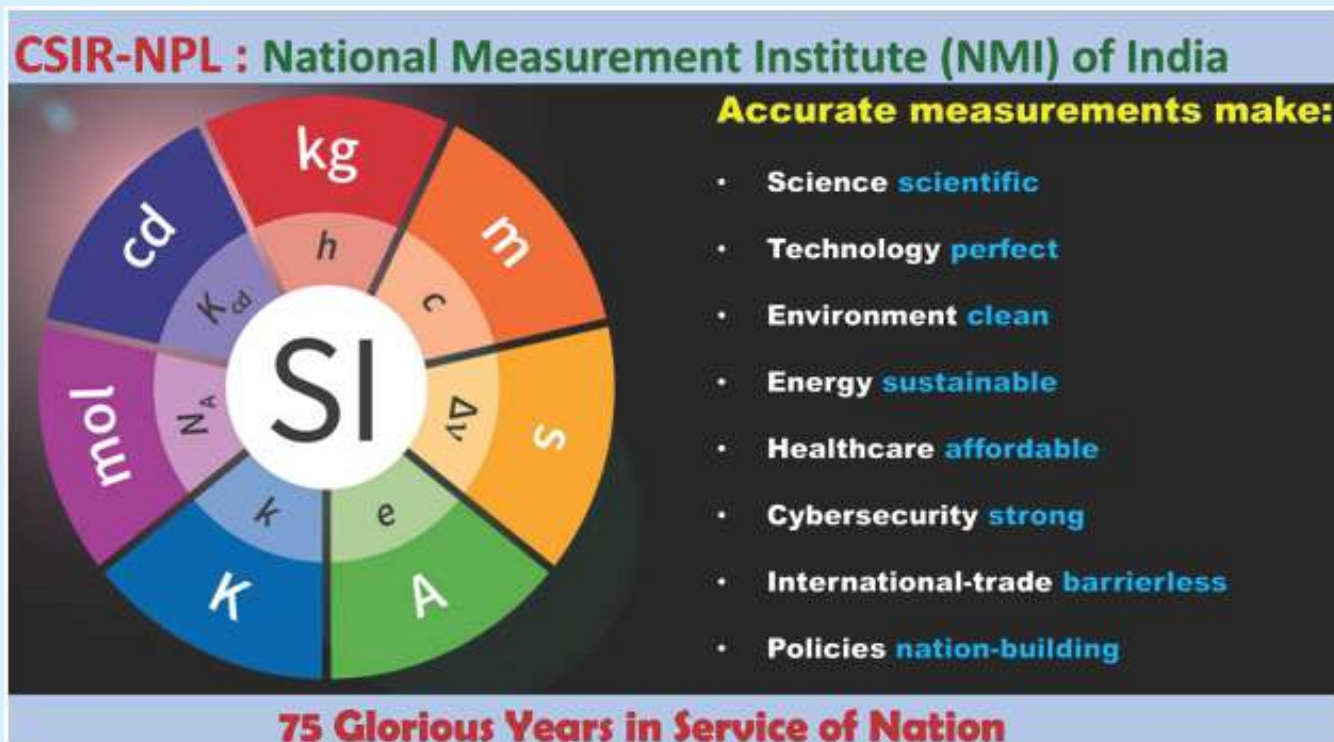
Social and business benefits of Atmanirbhar Bharat implemented using the Aswal Model

Book titled "Metrology for Inclusive Growth of India"

This book describes the significance of metrology for inclusive growth in India and explains its application in the areas of physical-mechanical engineering, electrical and electronics, Indian standard time measurements, electromagnetic radiation, environment, biomedical, materials and Bhartiya NirdeshakDravyas (BND®). Using the framework of "Aswal Model", it connects the metrology, in association with accreditation and standards, to the areas of science and technology, government and regulatory agencies, civil society and media, and various other industries. It presents critical analyses of the contributions made by CSIR-National Physical Laboratory (CSIR-NPL), India, through its world-class science and apex measurement facilities of international equivalence in the areas of industrial growth, strategic sector growth, environmental protection, cybersecurity, sustainable energy, affordable health, international trade, policy-making, etc. The book will be useful for science and engineering students, researchers, policymakers and entrepreneurs.



The Aswal model of inclusive growth. The trustworthy data measured with SI traceability from the national quality-infrastructure facilitates strong interactions amongst government, academia, industry and society, which is essential for national economy and quality of life.



Online Registration :

Kindly go to <https://info.nplindia.org/75jubilee> and click "please register yourself for the event".

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