

Advt No: A2KS-15011/1/2023-IRD-DSIR

Call for proposal under Support to Studies - A2K+ program of DSIR

1. Affordable and Clean Energy (Ensure access to affordable, reliable, sustainable and modern energy) – Policy support and mobilization of public and private capital for clean and renewable energy

Scope:

In order to facilitate the development of agriculture, business, communications, education, healthcare, and transportation, it is imperative to ensure widespread access to clean and affordable energy. Access to energy plays a crucial role in driving economic and human development, and the lack thereof poses significant obstacles. Recognizing this, Sustainable Development Goal 7 emphasizes the importance of achieving universal access to affordable, reliable, and modern energy services by 2030.

The Government of India has also set ambitious goals to provide affordable power to every citizen through its 'Power for All' scheme. Furthermore, India's commitment to being a net-zero emitter by 2070, as stated during COP26, underscores the urgency for investment in research and development across all aspects of decarbonized energy systems. This includes energy storage technologies such as electrochemical, thermal, chemical, and mechanical solutions, as well as fuel choices for various applications. Additionally, investment is required in areas such as generation, transmission, operation, and demand response.

To fulfill these commitments and achieve a sustainable and decarbonized energy future, it is crucial to prioritize research and development efforts at all levels of the energy system. This entails exploring innovative solutions for energy storage to overcome intermittency challenges, developing cleaner and more efficient fuel options, and enhancing the performance and resilience of energy generation, transmission, and distribution infrastructure. Furthermore, a focus on demand response mechanisms that can optimize energy consumption patterns and promote efficient energy use is also desired.

In light of the aforementioned context, the Department of Science and Industrial Research (DSIR) aims to present a comprehensive roadmap that will serve as a catalyst in realizing the vision of attaining affordable, reliable, and sustainable green energy. This roadmap will be instrumental in achieving climate goals by fostering an environment of continued policy development and support, as well as by leveraging scientific and technological advancements. Furthermore, the roadmap will emphasize the importance of mobilizing significant public and private capital investments along the entire energy value chain to drive the transition. Through the roadmap it is aimed to create an enabling

ecosystem that fosters collaboration between various stakeholders, including government bodies, research institutions, industry players, financial institutions, and the public.

Terms of Reference:

1. To assess the current energy landscape and its challenges.
2. Exploration of emerging technologies and innovations in the energy sector with focus on energy storage: electrochemical, thermal, chemical, and mechanical, and Fuel Choices.
3. National R&D investments in various elements of green power systems, including generation, transmission, operation and demand response.
4. Identification of best practices and lessons learned in achieving affordable and decarbonized energy
5. Discussion on potential barriers and enablers for transitional success of STI in energy sector
6. Roadmap for facilitating technology transfer for Green Transitions
7. To identify Role of International Partnerships in collaborating innovative technologies.
8. Scope for up-scaling and up-skilling regulatory agencies and facilities at the state and central levels
9. Recommendations for policymakers, Industry stakeholders and researchers.
10. A comprehensive report with data, graphs and presentation to be submitted to DSIR at the end of the study.

2. India's technological import liabilities and the development of framework and methodologies for S&T interventions on import substitution.

Scope:

Import substitution has been a significant policy objective for the Government since its independence. The Government has implemented various strategies and S&T interventions to reduce dependence on imports and promote domestic production. As part of investments in R&D to support import substitution, institutions like CSIR, ISRO and DRDO were formed, which had contributed significantly in technological advancements and the development of indigenous capabilities. With an aim to boost domestic manufacturing and reduce import dependence across various sectors, Make in India initiative was launched in 2014 and since then S&T interventions have been an integral part of this initiative in enhancing the competitiveness of domestic industries in term of technology upgradation, innovation and R&D investments.

As Government is embracing globalization & liberalization in recent years along with its continuous focus on domestic production and technological development, technology imports still remain a major concern. Thus, it would be worthy for Government, industry stakeholders and researchers to collaborate & assess the current situations and develop strategies to strengthen current import substitution. Also, country needs to devise a mechanism for preparedness towards forecasted import liabilities.

In recent years, India has witnessed significant advancements in science and technology (S&T), resulting in significant progress in reducing its dependence on imported goods and bolstering domestic production. Nevertheless, targeted interventions are still required in crucial technological sectors, such as renewable energy, electric vehicles, quantum computing, machine learning and artificial intelligence. These sectors hold immense potential for India's sustainable growth and technological progress. However, the nation must address its dependence on imported raw materials, such as specialized semiconductors and advanced computing hardware, to fully leverage the benefits of these technologies. Also it's important for India to realize the potential of upcoming technological areas such as flexible batteries, neural electronics, smart textiles, thin films, and flexible displays, light based computer chips among others.

Against this backdrop, Department proposes to bring out a structured report on current and future import liabilities and a systematic approach to evaluate the impact of past and current import substitution policies and strategies, including research and development (R&D) efforts. The study would bring out a multi-pronged approach that can reduce India's dependence on imported goods, drive domestic production, and position itself as a self-

reliant nation capable of harnessing its potential and leading the way in technological advancements.

Terms of Reference:

1. Compile a comprehensive database of India's current and projected import liabilities in the technological domain taking in account the trends in Industrial growth and demand projections. The database shall encompass various sectors and technologies, providing a thorough understanding of the nation's current and projected import dependencies.
2. Analytical insights to identify key areas of import dependence, highlighting sectors, technologies, and specific components that require focused interventions. The study to provide valuable insights in the field of S&T policy and import substitution.
3. The study to develop a robust framework that outlines a systematic and structured approach for S&T interventions on import substitution. This framework shall provide guidelines and methodologies to facilitate effective strategies for reducing import reliance through indigenous technological development and domestic production.
4. The study to review impact of S&T interventions on import substitution across different sectors, industries, and regions in India assessing success and challenges.
5. The study shall provide guidance on selecting appropriate indicators to measure the impact of S&T interventions on import substitution.
6. Present well-informed recommendations for policy adjustments, resource allocation strategies, collaboration mechanisms, capacity-building initiatives, and technology transfer strategies.
7. The comprehensive report to consolidate the findings and serve as a valuable resource for policymakers, industry leaders, and stakeholders involved in shaping India's S&T policies and import substitution strategies.

3. Women and Technology: STI Investments and Policy Foresights for Economic and Social Empowerment

Scope:

India is sustaining its position as the fastest growing large economy in the world and with G20 presidency India has reinforced its commitment towards Sustainable Development Goals agenda 2030. Currently, Women's economic contribution in India accounts for 17% of the GDP though women constitute little less than half of total population. It is also observed that rural sector has a better female workforce participation rate of 17.5 % compared to 14.2 % of urban women workforce.

Enhancing women participation in the economy is essential for sustainable economic development, and poverty alleviation. Women 20 2023 (W20) calls upon G20 leaders to increase the quantity and quality of Women's employment and to facilitate, promote and incentivize access to markets (domestic and international). Technology has been a driving force for economic and social growth in many countries worldwide. However, women's access to technology and their ability to benefit from it remains a challenge in many parts of the world. Women 20 2023 (W20) has stressed upon women access to new technologies with particular attention to sustainable and emerging sectors (space, blue, green, circular and digital technologies).

According to recent studies, women tend to face more barriers in accessing and using technology due to various reasons including economic, social, and cultural factors. Therefore, participation of women especially rural and sub-urban women in Science, Technology and Innovation is imperative to mainstream rural economy for improving the lives of rural citizens, preparedness of policy responses and to make most of the future opportunities that may emerge. The embracing of technologies available with Academia and research Institutes by rural and sub-urban women or women owned business and vice versa i.e development and deployment of location specific technologies by Academia and research Institutes can be the catalyst to achieve Sustainable Development Goals in the rapidly approaching 2030 agenda. It will also enable rural women participation in climate change vision of the Nation.

Against this backdrop, DSIR proposes to bring out a report to explore and promote better policy and investment initiatives that can enhance women's technology innovation and adoption, thus boosting their economic and social empowerment

Terms of Reference (ToR):

1. To provide an overview of the current state of women's use of technology worldwide - identifying the existing gaps and challenges.

2. To assess the National institutional capabilities that can support the development, deployment, dissemination, and adoption of technology by women
3. To suggest enabling factors that can promote women's access to and utilization of technology, considering social, economic, and cultural aspects
4. To develop technology banks tailored to different demographic zones of the country, considering the specific needs and requirements of women
5. To identify emerging technologies that have the potential to significantly enhance rural women's productivity and well-being, thereby serving as game changers
6. A comprehensive report with data, graphs and presentation to be submitted to DSIR at end of the study period.

4. Funding mechanisms for strengthening Industrial R&D and Innovation landscapes

Scope:

Over the years, the Indian government has made several efforts to promote and support R&D activities, both in the public and private sectors. Indian government's sustained efforts to catalyze R&D activities in both the public and private sectors underscore its unwavering commitment to advancing science and technology.

Historically, the Indian government has implemented various policies, incentives, and funding programs aimed at promoting R&D and innovation across industries. Despite these efforts, there remain gaps in funding accessibility, especially for startups, small and medium-sized enterprises (SMEs), and unconventional or high-risk projects. These gaps hinder the realization of India's full innovative potential and its ability to compete on a global stage. To enhance India's standing as a knowledge-driven economy, it is crucial to benchmark against successful funding models and strategies adopted by leading nations. These models often involve collaborations between the public and private sectors, leveraging the strengths of both to catalyze R&D and innovation.

Against this backdrop, the Department of Scientific and Industrial Research (DSIR) proposes to undertake a study aimed at identifying strategies to strengthen Industrial R&D and Innovation landscape in India. The study aims to identify the challenges faced by industries, explore the effectiveness of existing funding mechanisms, and propose innovative strategies that align with India's unique socio-economic context. The study will also explore various avenues and methods to increase India's industrial contribution to Gross Expenditure on Research and Development (GERD).

Through this study, DSIR intends to provide actionable recommendations for instituting innovative programs, incentives and roadmaps that can bridge the funding gaps, encourage greater collaboration invigorating Industrial STI infrastructure, adding value for companies, enhancing their global competitiveness and contribution in GERD. This effort is aligned with India's aspiration to achieve self-reliance, sustainability, and global excellence in science, technology, and innovation, contributing to the nation's journey toward becoming a knowledge-based economy.

Terms of Reference (ToR):

1. To provide an overview of current state of Industrial Research and Development (R&D) and Innovation in India and accurate assessment of Industrial R&D investment and sectorial growth.

2. Evaluate the existing funding mechanisms and policies supporting Industrial R&D and Innovation in India while examine their effectiveness. Highlight successful case studies where these mechanisms have yielded tangible results.
3. Provide comparative analysis of policies and funding mechanisms across the globe fostering Industrial technology competitiveness with case studies of countries where R & D expenditure is more than 2 % GDP
4. To discuss in detail and identify the critical factors contributing in higher Industrial innovative competitiveness.
5. Identify gap areas or specific sectors or domains for nurturing private R&D infrastructure and academic research collaborations.
6. Explore novel financing approaches, such as venture capital, angel investing, public-private partnerships, and crowdfunding, which can play a role in filling the funding gaps.
7. Propose a comprehensive set of policy recommendations, define Key performance Indicators –KPIsto measure impact and suggest creation of new mechanisms (including suggestions on ongoing monitoring and evaluation mechanisms) that incentivize private sector participation, increase collaboration, and reduce barriers to funding.

5. Scope for Machine learning and artificial intelligence based technologies in sectors of national importance such as healthcare, education, agriculture, smart cities and infrastructure and smart mobility and transportation

Scope: The rapid evolution of Artificial Intelligence (AI) and Machine Learning (ML) has led to transformative opportunities in various thrust areas of national importance, such as healthcare, education, agriculture, smart cities and infrastructure, and smart mobility and transportation. These technologies hold immense potential to simplify operations, drive economic growth, and improve the overall quality of life. However, to fully harness the benefits of AI and ML, it is crucial to assess the nation's capacity for their effective implementation.

With this objective in mind, DSIR invite researchers and experts to submit study proposals that focus on assessing the national capacity for integrating AI and ML in the aforementioned thrust areas. The study aims to evaluate the existing infrastructure, policies, regulatory frameworks, and human resources while identifying challenges and opportunities. Additionally, the study will explore ways to overcome obstacles related to data privacy, security, biases, scarcity, and other ethical considerations.

Terms of Reference (ToR):

1. Researchers will conduct a comprehensive analysis of the current national landscape of AI and ML implementation. This assessment will encompass ongoing projects, initiatives, research centers, and collaborations in these thrust areas
2. The study will evaluate the nation's technical and infrastructural capacity to adopt AI and ML technologies effectively. It will identify strengths and weaknesses to provide a holistic understanding of the readiness level.
3. The study will delve into the specific challenges and opportunities associated with implementing AI and ML in healthcare, education, agriculture, smart cities and infrastructure, and smart mobility and transportation. It will highlight sector-specific requirements and potential benefits.
4. The study will analyze existing policies, action plans, and regulations pertaining to AI and ML implementation. This analysis will help identify gaps and potential areas of improvement in the context of responsible and inclusive AI adoption.
5. Researchers will identify and present best practices and successful case studies from both national and international contexts. These examples will serve as valuable insights for policymakers and stakeholders.
6. Based on the findings, the study will provide informed recommendations for augmenting AI and ML integration in the thrust areas. These recommendations will emphasize ethical considerations, inclusivity, privacy, and sustainability.