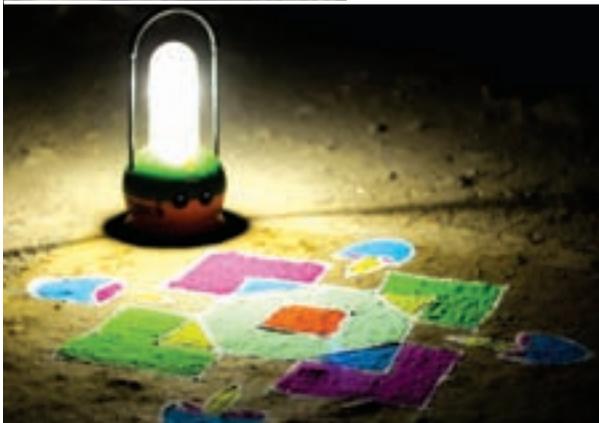




Introducing TERI



The Energy and Resources Institute



Introducing TERI



The Energy and Resources Institute

An ISO 9001:2008 certified organization



TERI is now perhaps the largest institution of its kind in the world. Under its umbrella activities have grown towards cutting edge research in the field of biotechnology, development of renewable energy technologies, innovative solutions in the forestry sector, design and rating of buildings for energy and resource use efficiency and of course a range of policy based research which informs and assists governments on international issues such as climate change and other subjects at the national, sub-national and local levels across the globe. As a philosophy, TERI values the approach of implementing solutions at the basic grassroots level in order to develop models of sustainable solutions in the fields of energy access, protection of the environment and conservation of natural resources. These are implemented not only for providing proof of concept but also with a view to scaling up solutions that work.

TERI has unique features as an institution. The staff of TERI consists of youthful and dynamic professionals who bring into their work vigour, vitality and vision that symbolizes the future of India as well as many other countries of the world. This organization receives no regular grants from any single source and generates all its resources through its own initiative. There is in TERI, therefore, an all pervading spirit of entrepreneurship which motivates the development of creative solutions and innovation in everything that the Institute pursues. This organization emphasizes new knowledge which is essential for finding solutions to the complex problems that the world is facing today in the fields of energy, environment, natural resources and the global commons. TERI attempts to remain ahead of the curve and anticipates problems so that solutions can be devised before we get overwhelmed by the daunting challenges we face. TERI, therefore, also emphasizes the importance of capacity building to see that knowledge once created and applied can be used by one and all on a wide scale. The following pages provide a brief description of TERI and its activities, which would be adequate for introducing to its readers an organization that lives and functions in the realities of the 21st century.

A handwritten signature in black ink, which appears to read 'R K Pachauri'. The signature is written in a cursive, flowing style.

R K Pachauri
Director-General, TERI

INTRODUCTION

A dynamic and flexible not-for-profit organization with a global vision and a local focus, TERI is deeply committed to every aspect of sustainable development. From providing environment-friendly solutions to rural energy problems to tackling issues of global climate change across continents and advancing solutions to growing urban transport and air pollution problems, TERI's activities range from formulating local- and national-level strategies to suggesting global solutions to critical energy

and environmental issues. With over 1,000 employees drawn from diverse disciplines, the Institute's work is supported by ministries and departments of the government, various bilateral and multilateral organizations, and corporations of repute.

Buoyed by more than 35 years of excellence in research and innovation, TERI is poised for future growth with a philosophy that assigns primacy to sustainable development and environmental governance.



AN IDEA COMES TO FRUITION

The origins of TERI lie in Mithapur, in a remote corner of the north-western state of Gujarat in India, where a visionary chemical engineer was concerned about the enormous amounts of energy his factory spent on desalination—fresh potable water is scarce in those salty plains—and on making caustic soda from salt. This visionary was Mr Darbari Seth of Tata Chemicals who appreciated the importance of energy as a resource and envisaged an institute “to tackle and deal with the immense and acute problems that mankind is likely to face in the years ahead on account of the gradual depletion of the earth’s finite energy resources that are largely non-renewable, and the existing methods of their use, which are polluting”. The idea instantly appealed to Mr JRD Tata, Chairman of the Tata Group, a great visionary himself and a staunch supporter of scientific research, and TERI was duly established in Delhi in 1974, as the ‘Tata Energy Research Institute’. As the scope of its activities

widened over time, it was renamed ‘The Energy and Resources Institute’ in 2003.

TERI began its operations in Mumbai in Bombay House, headquarters of the house of Tatas, India’s most respected industrial house. In its first decade, its approach was to support deserving research projects on renewable energy. TERI also set up a documentation and information centre, which began publishing *Indian Energy Abstracts*, and a small field station in Puducherry (formerly Pondicherry) was established to undertake research on renewable energy. However, in 1984, it moved to Delhi and began its own research. The first project it took up was to develop an energy model for India. For a decade after that, keeping with TERI’s conscious policy that activities must precede brick and mortar, the institute operated out of rented premises. In 1993, it came into its own as it moved into Darbari Seth Block, in the India Habitat Centre complex on Lodhi Road at New Delhi.



FINANCES

In the year 1974, TERI's founding fathers had set aside a corpus of ₹35 million; now more than 35 years later research programmes and projects in TERI itself contribute much more, amounting to almost 93 per cent of TERI's income. In a financial year, income from investments accounts for 4.31 per cent, sale of publications fetches 1.52 per cent, and other miscellaneous sources accounts for 1.17 per cent. This focus on self-sustainability, largely through resources from specific programmes and

activities—and the functional autonomy that comes with it—is the institute's greatest strength.

A major part of TERI's income flows into the Institute in the form of funds and research grants from multilateral and bilateral organizations; national and international banks and financial institutions; central and state governments; grant-making bodies; the corporate sector, and international academic institutions.



OUR ACHIEVEMENTS

In its 30-odd years of existence, TERI has completed more than 3,500 projects. Their outcomes have been as varied as the fields they covered, as can be seen in the following miscellany.

Policy to ensure a greener India

Nationally, TERI's influence on government policy-making is evident as the Institute has been active in drafting two major policy documents—the National Renewable Energy Policy for the Ministry of New and Renewable Energy, and the National Environmental Policy for the Ministry of Environment and Forests. The Institute's determined pursuit of an integrated energy policy for the country is showing results—the Government of India has resolved to address the matter in earnest and has fully endorsed the holistic approach advocated by TERI, which focuses on rural energy access instead of rural electrification.

Crusading against climate change

In its capacity as a research institute working on climate change from a

developing country perspective, TERI has organized various events to raise awareness on this critical issue. It has been playing a major role at subsequent Conference of Parties (COP) to the UN Framework Convention on Climate Change (UNFCCC). TERI has taken a lead in projecting its research activities related to climate change by participating in key side events and discussions and holding exhibitions at designated booths. The Institute has undertaken research to design policies in the face of a rapidly changing and uncertain future, and is exploring the role of market mechanisms as the urgency for adaptation to climate change increases. On the scientific front, it has successfully installed an Earth System Model at its supercomputing facility in collaboration with the Bjerkness Centre on Climate Research, Norway.

Ensuring energy access

Through its global flagship initiative, the Lighting a Billion Lives (LaBL) campaign, a commitment to action made at the Clinton Global Initiatives

Annual Meeting held in New York on September 26–28, 2007, TERI seeks to bring light to homes. The initiative, committed towards the goal of a sustainable tomorrow, was officially launched by the Prime Minister of India, Dr Manmohan Singh, at the Delhi Sustainable Development Summit in 2008. The inspiration for the campaign lies in TERI's commitment to global sustainable development and creation of innovative solutions for a better tomorrow. Through the campaign, TERI has already made solar lighting devices available to rural communities that have until now been forced to depend on traditional resources like dung cakes, firewood, crop residue, and kerosene.

Making concerted efforts towards addressing the challenge of providing clean lighting to energy-starved populations by adopting a localized bottom-up approach, the programme has already impacted the lives of around half a million people across 26 states of India and has reached out globally to countries like Afghanistan, Pakistan, Bangladesh, Myanmar, Uganda, Ethiopia, Kenya, Mozambique, Tanzania, Liberia, Malawi, Sierra Leone, and Cameroon. In another interesting project with Humboldt University, TERI initiated a pilot project to explore the viability of a community-based cooperative solution to enable the switch to LPG. This initiative suggested that social capital in



cities can be effectively used to support development programmes.

TERI has also been associated with alternative cooking technologies like improved (biomass fuelled) cook stoves (ICs) and biogas for the last 20 years. While there are multiple alternative cooking technologies available (most notably LPG), TERI has focussed on research and development of ICs for two reasons: (i) the percentage of biomass energy within the total share of different energy sources is set to increase from 10 per cent to 30 per cent by 2050 according to the International Energy Agency; and (ii) since biomass is largely produced and consumed locally, it does not require establishment of elaborate and expensive supply chains (unlike LPG or kerosene).

TERI's activities include study of kitchen air quality in households using traditional stoves, research on user requirements for an alternative cooking technology, evaluation of commercially available stove models, research and



development of prototype cookstoves with improved thermal efficiency, creating awareness amongst rural communities to switch to cleaner cooking technologies, conducting extensive user trials of such developed stoves, and customization of technology based on user feedback. TERI has developed a low cost stove which costs almost 40 per cent lesser than a commercial model with comparable performance.



Regional Knowledge Hub for Water and Climate Change Adaptation in South Asia

TERI has been actively involved in understanding the intricate nexus between water-energy and climate change and its implications. In 2009, the Asia-Pacific Water Forum endorsed TERI as the Regional Knowledge Hub for Water and Climate Change Adaptation in South Asia. One of the main aims of this knowledge hub is to encourage and facilitate knowledge-sharing on a wide range of issues related to water and climate change. For this purpose a web portal was established and launched in February 2010. The portal is accessible at www.waterknowledgehub.org.

Key Resource Centre In addition to the above, the Water Resources Division of TERI has been recognized as a National Key Resource Centre for rural drinking water and sanitation by the Ministry of

Drinking Water and Sanitation of the Government of India.

TERI's Glacier Research Programme

Since 2009–10, TERI's Glacier Research Programme, through its glacier monitoring observatories at Kolahoi Glacier and East Rathong Glacier, has conducted several experiments to measure the melting of ice, accumulation of snow, changes in snow density, discharge from proglacial streams, and measurement of black carbon concentrations. With special emphasis on the Himalayan ecosystem and with continued research on glacial studies, many outreach activities have been successfully carried out in this area.

Developing modelling frameworks for analysing energy–environment policies

TERI has been using the national level MARKAL model to explore energy

options for India under alternative energy security and low-carbon pathways. The Institute is currently building a similar model for Malaysia and training in-country professionals in its use. Recognizing the growing challenges associated with rapid urbanization at the city level, integrated spatial land use and transport planning models are being developed. Keeping in sync with the country's agenda for poverty eradication and sustainable development, TERI has been focussing on sustainable development pathways for growth.

Energy-efficient technological solutions for micro, small, and medium enterprises

The organization has also been actively involved in developing energy-efficient and environment-friendly technological

options for various energy-intensive micro, small, and medium enterprise (MSME) sub-sectors. Till 2011, 650 replications of energy-efficient technologies developed by TERI have taken place. This has resulted in substantial reduction in fuel consumption and also helped in improving the environmental performance and workplace conditions in these units.

Renewable energy based solutions

With a view to providing sustainable and environmentally benign solutions to diverse user-groups since its inception, TERI has been engaged in development and deployment of renewable energy based solutions. These include smart micro grids and renewables based decentralized cold storage for rural areas; biomass-based solutions for



micro, small, and medium enterprises as well as for power generation; solar lighting design and testing; advanced biomethanation plants for treating organic waste; and GIS-based integrated renewable energy assessment.

Designs for more sustainable buildings

TERI's facilities in Delhi (TERI University building), Gurgaon (RETREAT), Bengaluru, Guwahati, and Mukteshwar (TRISHA) serve as models of eco-friendly design. In 2006–07, TERI's Green Rating for Integrated Habitat Assessment (GRIHA) was launched. This innovative environmental performance rating system for buildings (commercial, institutional or residential) has been specifically developed for Indian conditions, taking into account India's prioritized national concerns, namely, power, water, and waste. Some of its salient features are as follows:

- It is among a handful of global rating systems that use qualitative and quantitative assessment criteria based on benchmarks derived from existing national codes and standards.
- It evaluates the environmental performance of a building throughout its lifecycle, thereby providing a definitive standard for what constitutes a 'green building'.
- It gives equal importance to non-air-conditioned buildings that rely on passive architectural systems, as it



does to intermittently air-conditioned buildings and fully air-conditioned buildings.

- It also attempts at reviving traditional Indian architectural systems at a time when every city is beginning to look exactly like the other in terms of the built environment.

GRIHA has now become a national rating system adopted by the Government of India, and currently there are over 250 projects (10.4 million square metres) registered under GRIHA. Key projects include the Commonwealth Games Village; Earth System and Environment Science Engineering Building; Indian Institute of Technology, Kanpur; Fortis Hospital, Delhi; and Suzlon One Earth project. ADaRSH, Association for Development and Research of Sustainable Habitats, is an independent platform (registered as a society) for the interaction on scientific and administrative issues related to sustainable habitats in the Indian context. It was founded jointly by



Ministry of New and Renewable Energy (MNRE), Government of India and The Energy and Resources Institute (TERI), New Delhi along with experts in the fields related to sustainability of built environment from across the country. ADaRSH promotes Green Rating for Integrated Habitat Assessment (GRIHA) — the national rating system as a design and evaluation tool for green buildings and habitats.

Engaging with developments in nanotechnology

Gauging that nanotechnology can play a vital role in alleviating poverty and

furthering sustainable development, TERI is engaged in examining various aspects of the capability needed from a developing country perspective to engage with and respond to nanotechnology developments and the governance framework needed to address the accompanying challenges and risks around this new technology.

TERI's nanobiotechnology

Research in agriculture and human health involves the biosynthesis of nanomaterials, nanobiosensors for disease diagnosis and pathogen detection, chimeric drug delivery vehicles, algal

nano-farming, and nanoformulations of ayurvedic medicine and antibiotics, as well as pesticides. Deakin University, Australia, has complementary expertise in material and physical sciences that drove TERI to sign a Memorandum of Understanding (MoU) with it in November 2010, and set up a Centre of Excellence, the TERI-Deakin Nanobiotechnology Centre at TERI's green campus in Gurgaon, Haryana.

Mycorrhiza technology

TERI's Mycorrhiza technology which is unique and the only technology in the world has gone to seven industries in India and in North America and created a niche in this area with a global edge with next generation products for agriculture and environmental application.

Microbes for efficient recovery of oil

With state-of-the-art fermentation facilities, TERI has successfully developed some novel technologies for the oil industry—Oilzapper and MEOR. Oilzapper is globally acknowledged for its broad implications in cleaning up oil spills and treatment of oily sludge generated by refineries. TERI is currently engaged in a mega project granted by Kuwait Oil Company (KOC) for the bioremediation of 400,000 tonnes of oil-contaminated soil. A Microbial Enhanced Oil Recovery (MEOR) technology has also achieved substantial recognition

across public sector oil companies in India for enhanced oil recovery from oil reservoirs by tackling the worldwide problem of oil well stripping. TERI and ONGC have formed a joint-venture company known as the ONGC and TERI Biotech Ltd (OTBL) to implement this technology on a commercial scale.

Enhancing food security

The activities of TERI also focus on developing new plant varieties with improved yield and quality attributes, thereby increasing the productivity and productive capacity of all types of land using cost-effective, eco-friendly microbial resources known as mycorrhizal fungi, and large-scale propagation of high-quality plant material using modern biotechnological techniques.

Resource-efficient process technologies

TERI has been at the forefront of developing technologies for economical use of waste materials such as membrane filters from bagasse ash for applications in wastewater treatment, hot gas cleaning, juice clarification, and biodegradable plastics from renewable agro resources.

Raising awareness online

TERI website became operational in December 1996. To increase awareness and interaction on a variety of issues related to sustainable development, TERI's website has become thematic.

TERI's projects, events, publications, films, and case studies are divided under particular themes, such as biodiversity, nanotechnology, sustainable habitats, and so on. The website records more than 2 million hits and over five lakh page views a month from over 130 countries; close to 1,000 websites the world over carry a link to www.teriin.org.

Urban mobility

Recognizing the need for capacity-building and training in the area of urban transport planning, TERI has designed modules to operationalize a training programme on transport planning and provision for 67 cities in India. These include cities with a population greater than 0.8 million, and the 63 cities that

figure in the Jawaharlal Nehru National Urban Renewal Mission (JNNURM).

Micropropagation Technology Park

TERI has extensive capabilities in the area of plant tissue culture backed by over two decades of research, development, and commercialization. In 1989, TERI established a state-of-the-art Micropropagation Technology Park (MTP) at Gual Pahari, Gurgaon, on the Delhi-Haryana border, which has complete infrastructural facilities ranging from modern laboratories and greenhouses to nurseries. With an annual production capacity of 1.5 million tissue-cultured plants, the facility is managed by a dedicated team of research scientists and production staff.



Power regulation studies

TERI has also been actively engaged in studies in the field of energy regulation and governance and Demand Side Management (DSM). It has recently undertaken a detailed study of the electrical load patterns of different categories of consumers in the southern Indian state of Tamil Nadu and Rajasthan and identified DSM interventions that would help in demand management. A few Learning and Development Programmes on 'Regulatory Framework in Power Sector' for senior officials of Powergrid and POSOCO were

organized in 2012. The objective of these programmes was to provide in-depth insight into relevant acts, policies, and regulations of interest to practicing professionals.

South–South Knowledge Exchange

The South–South Knowledge “Exchange” is a TERI platform to share experiences and knowledge of sustainable development related to climate change, energy, resources, trade, and so on, to aid people from various developing, least developed, and emerging countries. The South-South Knowledge Exchange aims to integrate diverse regions and its people through this forum. The platform offers a unique opportunity to people associated with activities in these diverse nations to voice their opinions and perspectives on sustainable development and is available at <http://south-south.connect.teriin.org/>

Responsible minerals policy and management for India

TERI has been focusing on a more responsible minerals policy and management for India. In this context, its research and advocacy has highlighted some of the areas in which minerals development can work more positively for local people, such as the importance of sharing benefits with local people, ensuring consent, and environmental stewardship. It is also engaged in identifying critical minerals and ensuring their security, working on materials efficiency, and on emerging issues around trade in minerals and metals. Its work on resource and environmental federalism seeks to highlight the point that federalism is not just about the distribution of powers across government levels, but has to also be understood with reference to people of the states.



OUR RESEARCH AND SUPPORT SERVICES DIVISIONS

Research in TERI is undertaken through Divisions. It caters to the needs of the national and international community within the broad mandate of energy, resources, environment, and sustainable development.

Biotechnology and Bioresources

Biotechnology and Management of Bioresources Division focuses on basic and applied research using microbial resources for biotechnological intervention to address agriculture, energy, and environmental issues, and to supplement conventional methods of improving plant species with biotechnological techniques. It is actively involved in the development and application of bio-fertilizers in a wide range of plants, and has a core competence in mycorrhizal technology, bioremediation, plant tissue culture, and plant genetic engineering. With ingenious combinations and permutations of these areas, important traits or genes can be introduced into plants, resulting in crop improvement and production of unique features in the plants. TERI is currently

seeking to establish a bio-refinery (using wheat and rice residues as feedstock) with a capacity of 500,000 tonnes per year with the objective of maximizing ethanol production as a substitute for petrol.

Environmental and Industrial Biotechnology

The role of biotechnology remains crucial for the protection of the environment and the development of renewable energy options in a growing economy. Recognizing the need for innovative technologies for broad commercial application, the Environmental and Industrial Biotechnology Division (EIBD) focuses on research exploring microbial and plant resources to protect the environment, enhanced oil recovery by addressing oil well stripping, and protection of crops from pests. With a state-of-the-art pilot-scale fermentation facility, the Division has successfully developed the aforementioned Oilzapper and MEOR technologies. Carrying forward its activities, EIBD is now focusing its efforts on commercializing



its low-cost, highly effective bio-based technologies for tackling wax deposition in oil pipelines through the employment of mesophilic and extremely thermophilic paraffin degrading bacteria for enhanced oil recovery and for pest control in various agricultural crops. Currently, in partnership with various industries, the Division is keen on finding a sustainable solution to climate change related problems by identifying bacteria for the production of cost-effective, cleaner energy forms, such as bio-hydrogen for carbon capture and storage that would displace the methane on coal seams

with carbon dioxide, and bio-butanol production from lignocellulosic biomass.

Industrial Energy Efficiency

Industry drives the processes of growth in all sectors of the economy, be it infrastructure, agriculture, transport, and household. It also consumes huge amounts of energy, accounting for more than half of the total commercial energy consumed in India. Energy audits conducted by TERI in over 1,000 industrial units—across both large industries and Micro, Small, and Medium Enterprises (MSMEs)—show that energy consumption can be reduced by 10%–20% through better energy management and the use of suitable energy-efficient technologies. In recognition of its expertise in energy optimization, TERI is increasingly being invited to undertake energy audits and develop management plans for the corporate sector. During 2011–12, TERI engineers conducted baseline energy audits of approximately 40 large industrial consumers in the power, cement, textile, and chlor-alkali sub-sectors under the Perform, Achieve, and Trade (PAT) mechanism of the National Mission on Enhanced Energy Efficiency (NMEEE) of Government of India. Other detailed energy audits undertaken during the year included international airports at Istanbul and Male, a large public sector petrochemical complex,

and corporate buildings of an IT company. Small and medium enterprises (SMEs) are the backbone of the industrial sector in India and TERI has been very actively involved with many of these for nearly two decades. TERI also has a long-standing relationship with the Swiss Agency for Development and Cooperation (SDC), which aims at promoting energy efficiency in small enterprises. The partnership with SDC was extended for three more years in January 2012. TERI provided knowledge and implementation support to the Bureau of Energy Efficiency (BEE) for its SME programme during the 11th Five Year Plan. The Division also works in the field of energy regulation and practices with a focus on the electricity sector. It works closely with the regulatory commissions, distribution companies, and other stakeholders in the power sector and regularly undertakes studies pertaining to tariffs for different consumer categories, demand side management, load analysis, and other related aspects.

Green Growth and Development

The Green Growth and Development division brings together sector-specific initiatives that TERI is pursuing within the framework of protecting the environment, conserving the planet's natural resources, and ensuring inclusive and green development. It focuses on

Modelling and Economic Analysis, Energy Security, Science, Technology and Innovation, and Green Growth Strategies.

The Division has continued to use the national level MARKAL model to explore energy options for India under alternative energy security and low-carbon pathways. Deliberations based on the findings at various forums have not only contributed in the form of recommendations to national policy-making, but also as suggestions for the design of frameworks and mechanisms at the global level for limiting carbon emissions. TERI is currently building a similar model for Malaysia and training in-country professionals in its use. Further, recognizing the growing challenges associated with rapid urbanization at the city level, the Division is developing integrated spatial land use and transport planning models.

With the urban population predicted to nearly double in the next two decades, there exists a real opportunity to develop frameworks and inform the development of more sustainable new infrastructures. The Division has undertaken a large-scale project on 'Rural Energy Transitions' to analyse rural energy inequities and to examine how transitions to clean energy can be enabled in rural India. The study focuses on an in-depth analysis of the barriers to and drivers of transition to cleaner energy forms among rural

households. Keeping in sync with the country's agenda for poverty eradication and sustainable development, the Division has been focusing its research on sustainable development pathways for green growth and is actively contributing to debates and discussions at various forums in the run-up to the Rio+20 Conference.

The division is also launching collaborative activities with other countries, such as the People's Republic of China, the Republic of Korea, Japan, Malaysia, Germany, and Sri Lanka. Some flagship initiatives in the division include a collaborative project with China on low carbon development, project on energy risk modelling, understanding international energy governance, rural energy transitions, and innovations for green growth in India. The division has publications, such as *TERI Energy Data Directory and Yearbook*, *Energy Security Insights*, and the recently initiated *Green Growth and Development Quarterly*.

Sustainable Habitat

The Sustainable Habitat division is actively engaged through policy and practice in steering the attainment of urbanization and habitats towards a logical and sustainable conclusion. To promote the implementation of the National Mission on Sustainable Habitats, the Division has actively engaged with the Ministry of Urban Development to



develop an implementation and capacity-building strategy. It has partnered with national and global agencies and has been successful in forming an India Urban Forum, which brings together the strengths of various organizations working on urban sustainability issues. Focusing on urban and inter-city mobility issues, the Division has been engaged in developing toolkits that can assist cities in practicing sustainable mobility. The work on high-speed rail projects supplements the Ministry of Railways' future plans to implement high-speed rail corridors. Work on enabling sustainable building construction has been scaled up and associations with developers, members of the real estate fraternity, industry stakeholders, and academia are all being nurtured to bring about a transformation in the building and construction sector. One of the recent activities undertaken is to integrate the Energy Conservation Building Code and GRIHA requirements (wherever possible) in the general

specifications and accordingly modify the Plinth Area Rates of the Central Public Works Department. Recent achievements of the teams based in Delhi and Bengaluru include development and customization of an assessment toolkit for promoting energy efficiency in residential buildings. Towards this end, the Division has facilitated low-cost interventions to achieve GRIHA rating with minimum incremental costs for the slum housing project at Lonar. The Division is also working at the rural level and has constructed the first solar passive silkworm rearing house in the country to upgrade the quantity and quality of cocoon production.

Energy–Environment Technology Development

This Division endeavours to develop innovative technological products and services based on renewable energy technologies and resource efficiency through a multidisciplinary approach and close interaction with the user—the community and industry. Its activities range from providing biomass-gasifier-based energy to remote rural communities to facilitating renewables-based large-scale power generation; from efficient utilization of biomass in small- and micro-enterprises to enhancing resource efficiency in industrial applications; from developing renewables-based multi-utility platforms for productive



loads in villages to smart mini-grids for large habitats; and from developing a two-stage gasifier capable of providing ultra-clean syngas to the next generation of liquid biofuels. The Division also focuses on innovative utilization of waste materials for a variety of applications, such as biodegradable polymers for packaging and biomedical applications, fly ash filters for water treatment, membrane bioreactors for wastewater treatment, advanced biomethanation systems for organic waste treatment, and waste-derived catalysts.

Technology Dissemination and Enterprise Development

Over the past three decades, TERI has developed a range of sustainable technologies and solutions—from organic pesticides and oil-eating microbes

to biomass gasifiers and low-cost membrane filters. Some of the emerging technologies are bioplastics, the smart mini-grid, and the TEAM process. The primary objective of the Division is to ensure smooth and systematic movement of technologies from laboratories to industry. Comprising the accounts, materials, TERI RETREATs located in Gual Pahari and Mukteshwar, ecotourism cell, and the technology development sections, the Technology Dissemination and Enterprise Development (TDED) Division brings together a diverse group of people with multidisciplinary skills to attain this objective. TDED's technology development team promotes TERI's technologies at numerous exhibitions, trade shows, and conferences. The ecotourism cell aims at increasing awareness about biological diversity and highlighting the importance of sustainable use and conservation of locally available bio-resources by organizing ecotourism

programmes for schoolchildren and interested organizations at TERI's Dera Green, Mukteshwar. The ecotourism programme generates employment for local people and sensitizes visitors towards sustainable tourism. The Division actively facilitates the framing and signing of commercial agreements, identifies potential licensees and network agents, and ensures intellectual property protection through patents. One of the key goals is to develop strategic alliances and partnerships for the marketing and dissemination of technologies that lead to the creation of synergies for the mutual benefit of TERI and its partners. Over the past few years, TERI has effectively disseminated its research with joint ventures and partnerships, such as Glori Energy Inc., OTBL, TIME, and TERI-CPW.

Social Transformation

The high growth rates in India, while taking the nation forward, have led to widening disparities between different sections of society and resulted in conflicts over resources—in particular, land. Resettlement and rehabilitation (R&R) of displaced communities, required increasingly due to industrial development, infrastructure expansion, and provision of energy, requires sensitive handling with attention to long-term development opportunities. TERI's experience at the grassroots has shown



that development initiatives were focused on specific sectors and the interventions adopted have been largely independent of any cross-sectoral linkages. The Social Transformation Division has thus evolved its own model of community participation and benefit sharing, which has resulted in unmitigated progress. The latest design and deployment of socio-economic delivery models for energy access solutions in rural implementation projects have shown remarkable success. Taking the energy access agenda forward, the Division focuses on developing business models for facilitating access to solar PV-based lighting and improved cooking options. The programme, in operation for five years, covers 100,000 households in India and 20,000 across Africa. The Institute is also planning to establish centres that will provide state-of-the-art clean technologies for meeting basic needs, such as energy, education, health, and livelihood (particularly agriculture). These centres will cater to approximately 25–30 villages in rural regions and act as a one-stop solution for people in need of access to services related to basic amenities and livelihood opportunities (at a nominal service fee).

Water Resources

Research at the Division deals with water issues relevant to society through various activities, such as applied research, training, and implementation.

One of the primary activities carried out by the division is studies on the Himalayan ecosystem with special emphasis on the melt response of the cryosphere. Additionally, the Division has been instrumental in carrying out water audits to enhance water-use efficiency, promoting and implementing water conservation techniques like reuse and recycling, and rainwater harvesting for various stakeholders, such as industries, municipal bodies, etc. It has been actively engaged in developing sustainable strategies for water demand management in urban areas and affordable and safe water supply in rural areas. Extensive research on advanced cost-effective water and wastewater treatment techniques is also done by this division. The division is also exploring the intricate linkage between water, energy, and climate change to enhance both water and energy security and provides relevant adaptation frameworks for the same. With its multidisciplinary team of scientists, the division contributes significantly in various aspects of integrated watershed management as well.

Resources, Regulation, and Global Security

The Resources, Regulation, and Global Security (RGS) Division serves as a focal point for TERI's work on studies and strategies for energy and material

resources—their conservation, sharing, responsible development, and use—to assist India’s efforts at developing a positive vision for regional and global security. Resources are at the heart of attempts to arrive at global security that goes beyond a concern only with militaristic threats and involves improved human well-being. The Division seeks to provide policy-relevant knowledge relating to resources with a transnational dimension, unsustainable production and consumption, and global pressures for increased openness and competition. The Division partners initiatives through which TERI can contribute to achieving the UN’s Millennium Development Goals (MDGs)—especially MDG-8, ‘building global partnerships for development’—through building mutual trust for strengthening ongoing and emerging international and regional cooperation. The three core knowledge areas of the Division are the Centre for Global Agreements, Legislation and Trade (GALT), the Centre for Resource Security and Development Policy (CRSDP), and the Centre for Resource and Environmental Governance (CREG). Emerging trade issues, such as carbon barriers to trade, trade in re-manufactured goods, intellectual property rights (IPR), the impact of WTO-induced IPR reforms in India, critical minerals and metals security, environmental fiscal reforms and

resource, and environmental federalism have been the major research areas of this Division. Its current engagements include work on materials efficiency, environmental dialogues in different ecosystems of India, and Sustainable Development Goals. Its actively involved in South–South knowledge exchanges and learning programmes.

Earth Science and Climate Change

The warming of the earth’s surface has highly adverse consequences for all life forms on the planet and is a global policy challenge. At the same time, local environmental degradation has more immediate impacts on social well-being and requires urgent policy reforms. The Earth Science and Climate Change Division has core competencies in environmental monitoring and modelling, impact assessment, and policy analysis. Climate modelling is a thrust area involving the use of state-of-the-art global and regional climate models. It uses experience, along with multi-sector expertise, to follow an interdisciplinary approach towards integrated impacts and vulnerability assessments for defining policy responses to climate change at national and sub-national levels. Energy–environment relationships in urban, industrial, and rural settings have received continued interest in a number of research studies that involved both quantitative modelling and participatory

field-based methods. The Division also gives importance to ecosystems and ecosystem services by focusing on emerging issues related to climate change and forests, as well as issues of long-standing interest, such as participatory natural resource management, natural resource economics, productivity enhancement, and biodiversity conservation and management. Recently, the Division has started extending its research and capacity-building activities to other developing countries and emerging economies, including a major e-learning programme on the science and policy of climate change. A strong research-based collaborative programme is already in place for Africa. A number of international collaborations with institutions of global repute have ensured that there is exchange of knowledge and expertise and strengthening of the core competencies within the Division.

Educating Youth for Sustainable Development

The Educating Youth for Sustainable Development (EYSD) Division works diligently to enable youth to comprehend the importance of the environment and makes concerted efforts to conserve it. It firmly believes in the need for governments, civil society organizations, academic institutions, and every individual to work in solidarity for the protection of nature. It works



with school teachers, national and international educationists, policy-makers, NGOs, cultural networks, and so on, besides the youth. The Division is also involved in cutting-edge research on education for sustainable development, and in publishing books, newsletters, workbooks, manuals, films, and other IEC materials periodically. Various projects undertaken by the Division stand testimony to their reach and influence, such as Climate EduXchange, a school programme that harnesses the power of information and communication technology (ICT) to bridge the digital divide and reach out to students from marginalized backgrounds. The GREEN Olympiad and TERRAQUIZ are ways to encourage school students to learn, quiz, and read more about the environment.

Project Sensitization, Education, and Awareness on Recycling for a Cleaner Habitat, or Project SEARCH, is a school environment education programme on waste management that encourages youth to practice the 4Rs—refuse, reuse, reduce, and recycle. Project Building Energy Awareness on Conservation, or Project BEACON, a programme to create awareness amongst teachers, students, and their parents on energy conservation, entered its third phase in 2011. Yet another project by EYSD aims at promoting water, sanitation and hygiene education, and water quality monitoring in Mangalore, India. Under another project, science resource centres are being set up in villages of Assam to look into the challenge of enhancing knowledge and skills amongst the youth.

Sustainable Development Outreach

Even as TERI strives to find solutions for contemporary challenges to

sustainable development, the Sustainable Development Outreach (SDO) Division ensures that TERI's knowledge and research is shared with discerning global audiences. The TERI-Business Council for Sustainable Development (BCSD) India comprises a network of 100 top corporates from across the country, and helps them to adopt sustainable practices in their respective businesses. TERI-BCSD organizes the World CEO Sustainability Summit (the new *avatar* of the World CEO Forum organized until 2011) as a prelude to the Delhi Sustainable Development Summit (DSDS). In 2012, TERI-BCSD introduced the Chief Sustainability Officer (CSO) Forum that aims to mainstream sustainability in business and scale up sustainable business actions by collaboration. The CSO Forum presented its first set of project recommendations at the 10th World CEO Sustainability Summit at the DSDS 2013. The Communication Services Area of SDO functions as a link between TERI and the media. Besides ensuring smooth communication of information, the area focuses on developing cutting-edge strategies to share TERI's work and perspectives with the global and national community. TERI's Film and Television Unit (FTU) produces a range of audio-visual content on environment and sustainable development. This includes documentaries, children's films,



animation films, and a television quiz on the environment, which are used widely by TERI and its partners for training and education, and for telecast on networks like the National Geographic Channel.

Knowledge Management

As a research organization, TERI emphasizes knowledge creation and global dissemination of its research on sustainable development. Its objectives are fulfilled through the provision of library, information, documentation, and publication services. The Division manages databases of TERI's research activities through a well-designed, state-of-the-art knowledge management system. The Library and Information Centre (LIC) caters to the knowledge needs of both institutional and external professionals by collecting, collating, and disseminating knowledge products and by services documented in a wide array of resources, including books, reports, periodicals, and e-resources. Besides providing research assistance to users, the core competency of LIC professionals includes providing innovative services, web content development, contributions to publications, and setting up specialized information centres on contemporary themes like transport, renewable energy and environment, mycorrhiza, and climate change. The Institute runs a Specialized Library on Climate Change (SLCC), supported by



the Norwegian government. TERI Press, the publishing arm of TERI, develops and distributes higher education and reference books, knowledge books for children, and various journals and periodicals within the Institute's mandate of energy, resources, environment, and sustainable development.

Human Resources

The objective of the Human Resources (HR) Division is to provide the organization with a pool of satisfied employees who work towards the

realization of the vision and mission of TERI and, in turn, serve society. The Division is responsible for not only identifying and acquiring the required ‘talent’ for TERI, but also ensuring adequate synergy between the needs of the employees and the organization. Apart from facilitating the training of staff as per their roles and requirements, HR endeavours to facilitate smooth induction of new employees and enhances the motivation levels of existing employees using various human resource management (HRM) tools. Professionals are exposed to training programmes on refining leadership skills, enhancing personal effectiveness, sharpening interpersonal skills, and improving time management, which help improve their overall efficiency. Frequent team-building activities organized during divisional retreats help in reinforcing team spirit among colleagues. TERI’s system of secondary affiliation encourages professionals to contribute in varied areas apart from their major functions, thereby enhancing interdisciplinary work. The organization also encourages its employees to participate in diverse activities, such as sports, quizzing, music, and so on. Other activities like yoga sessions are also organized from time to time. A system of rewards and recognitions, over and above an annual appraisal system, acknowledges colleagues for

significant contributions at work. The quarterly employee magazine provides a glimpse of events and news from all regional centres of the organization. The Division continuously upgrades its skills and strategies to cater to the changing needs of the organization and, most importantly, to develop new strategies to keep employees happy and engaged.

Information Technology Services

The Information Technology and Services (ITS) Division is mandated to provide accurate, timely, and relevant information to those who need it the most. The Division works to fulfil its mandate through a team of dedicated professionals, leading-edge technology, and strategic outreach activities. It uses a variety of media—print, television, the internet, video, and CDs—to reach out to researchers, policy-makers, administrators, technocrats, and scholars, aiding their activities through effective value-added information that positively impacts their projects. The Division uses state-of-the-art technology to effectively and efficiently collate the volumes of data generated by its spectrum of research and outreach activities. Being the focal point for the assembly, maintenance, and circulation of this information, the Division has achieved considerable experience in information management and dissemination and is at the service of the Institute as well as



external organizations in need of robust information distribution channels. From developing applications on open-source platform and customizing open-source software, the Division has also developed a knowledge base on sustainable building design and its environmental benefits. Taking into account, the power and reach of the social media, it is effectively using such communication platforms to create communities of concerned citizens and

action groups empowered to bring about effective change.

TERI has taken a significant step towards green IT by upgrading its infrastructure using hardware virtualization technologies, energy-efficient equipments, and by using online meetings and web-conferences. Using the latest web trends, technologies, and web 2.0 standards, the Division supports knowledge dissemination and outreach.

In 2011, the Division was particularly effective in developing planning and design tools for rural development with particular emphasis on energy access. TERI now has a fully functional supercomputing facility that will enhance climate modelling capabilities and enable the running of next-generation climate models with better data accuracy and speed.

The Web and Interactive Media (WIM) area of the Information Technology and Services Division of TERI is primarily focusing on developing dynamic websites and web-enabled applications for the institute, research projects and external organizations. The area is specialized and makes extensive use of open source technologies to deploy cost-effective solutions. The area also has visual designers, content developers, and SEOs (Search Engine Optimizers).

Centre for IT Application (CITA) of the Information Technology and Services Division of TERI is mainly responsible for planning and implementation of IT applications, and constantly ensures that the facilities available at TERI keep pace with the latest advancements in the field. Over the years, CITA has developed expertise in diverse areas of IT including customized software development. The area has dedicated teams for Microsoft and Oracle technologies.

The Centre for Information Technology Infrastructure and Networking is responsible for planning, implementation, and management of IT infrastructure. The computing power has been upgraded to the new state-of-the-art technology. Leased line and ISDN Internet links are used for communication, information access and dissemination, outreach, and intra-office and remote connectivity. ISDN technology is also used for video-conferencing. The area has also set up a state-of-the-art video-conferencing system, which has gained recognition as a DLC (Distance Learning Centre) under the World Bank's GDLN (Global Development Learning Network).

Various online platforms for information sharing and awareness building on climate change have also been developed. PACCIFY (Programme for Awareness on Climate Change Issues Featuring the Youth) and Climate EduXchange are few programmes that aim to raise awareness and understanding about climate change amongst students and teachers in different parts of the country. Moreover, TERI has also created online knowledge repositories, databases and inventories, such as Asia Pacific Renewable Energy Knowledge Hub for interaction and exchange of ideas on energy-related issues and developments; online Knowledge Bank for e-Waste Management for sharing technical know-how and best practices

from EU countries with recyclers, assemblers and vendors of e-Waste; a web-based repository of information related to the facets of infrastructure regulation in South Asian countries; a web-based inventory of successful stories on use of ICTs for environment in the Asia Pacific region for the UNEP; and a website for SLCC (Specialized Library on Climate Change) which is an information collection, compilation, and dissemination centre on climate change. The Division has created and maintained e-learning portals as well in Moodle platform for online programmes offered by TERI University.

Support Services and Protocol

The Support Services and Protocol Division provides the necessary administrative and maintenance support to all the facilities located at all TERI offices and the campus at TERI Gram. The strength of the Division lies in the abilities of its motivated and qualified technical support staff, ensuring high levels of serviceability of scientific

equipment in all laboratories. Its strength also lies in the dedication of the administrative staff who support research professionals, thus meeting the high standards of user satisfaction. TERI has developed and implemented a Quality Management System of international standards conforming to ISO 9001: 2008 certification. We also have ISO 14001 and OHSAS 8001 certifications. TERI's growing reach and visibility make it an integral part of the itineraries of many international dignitaries and delegates, including heads of governments. The professional coordination and conduct of all such visits continues to receive appreciation from the Heads of Missions in New Delhi. The Delhi Sustainable Development Summit—TERI'S annual flagship event—and other conferences, events and workshops that attract worldwide participation are regularly organized by the Programme Cell. The year-on-year increase in the number of such events organized by the Division is testimony to the excellence in organizing and conducting these events.



coach learning ability
practice instruction
Training mentor
advising education
development workshop
skill teaching knowledge
motivation

TRAINING AND OUTREACH

Training

The training programmes organized by TERI cover a gamut of topics for participants, ranging from gardeners, who learn how to tend to tissue-cultured plants to regulators, who weigh the pros and cons of setting telecommunication charges by the amount of data transferred rather than the duration of the call. Such programmes serve to make TERI's research more pragmatic and consistent with real-world problems because participants often share their experience in the field with researchers.

TERI also conducts regular training programmes for officers of the Indian Administrative Services on behalf of the Department of Personnel and Training (DoPT). Training programmes are also conducted for officers of the Indian Forest Service on behalf of the Ministry of Environment and Forests (MoEF). The role of forestry in conservation, development, and management of water resources, and clean development mechanism projects related to forestry; climate change and the associated risks and opportunities for businesses; basic statistics; trade and

sustainable development; creation of awareness and knowledge on e-waste management; energy and energy economics; renewable energy and energy efficiency; solar buildings: sustainable design and energy efficiency; and best practices in quality control and assurance in fabrication (biomass gasifiers) are some of the areas in which training has been conducted over the years.

► *Training Programme for Educators*

A 'Training Programme for Educators on Education for Sustainable Development' was conducted by TERI. Teachers are seen as key change agents who can help society develop a relationship with the environment through the classroom. The strength of the teaching community as a partner in bringing about the required change in attitude among the citizens of tomorrow is phenomenal and needs to be taken seriously. An annual residential Educators' Conference is organized which brings together hundreds of teachers from across the country for deliberations on issues related to Education and Sustainable Development.

► ***TERI-ITEC Programme***

TERI-ITEC programmes are being conducted by TERI with the support of the Indian Technical and Economic Cooperation (ITEC) / Special Commonwealth African Assistance Programme (SCAAP), of the Ministry of External Affairs, Government of India. TERI has been an empanelled institute since 2007. The TERI-ITEC courses address sustainable development, renewable energy and energy-efficient technologies, rural energy access, biotechnology, climate change, resource governance, trade, and sustainable development. They are designed to meet the needs of mid-level government and non-government professionals and practitioners in developing, and least developed and emerging countries of the global South.

► ***Programme on solar energy-based technology applications for rural communities of ECOWAS***

This is a knowledge exchange process through a five-day training programme on solar energy based technology applications for providing livelihood solutions for rural communities of the Economic Commission of West African States (ECOWAS). The programme is supported by the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) and attended by

experts, practitioners, and decision-makers from various ECOWAS states. The programme deals with the basics of solar PV technology, its assessment, design, economics, operation, and maintenance. It also deals with project management and business models of solar livelihood projects. One of the essential aspects of the training programme is quality assurance and monitoring of solar PV projects.

► ***Delhi Sustainable Development Summit***

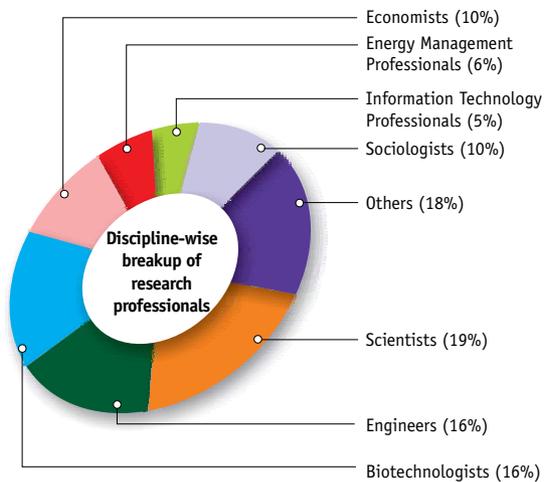
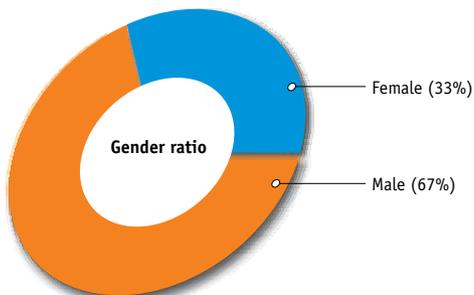
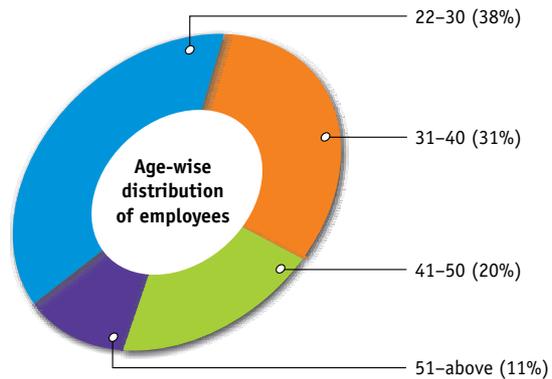
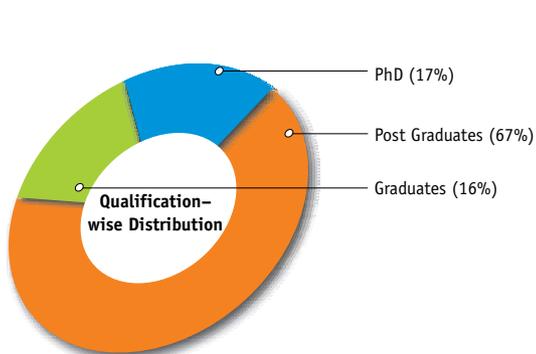
The Delhi Sustainable Development Summit (DSDS) Series was launched in 2001 following the overwhelming response to the series of international conferences organized in 2000, the 25th year of the Institute's existence. Over the years, the Summit has emerged as a leading international platform for exchange of knowledge on sustainable development. Addressing issues of environment and energy related to sustainable development, the theme for its 13th edition was "The Global Challenge of Resource Efficient Growth and Development". DSDS enjoys widespread support with participation from over 50 countries and close to 10,000 delegates have participated thus far. The Summit also attracts a plethora of Heads of State and Governments, thought leaders, legislators, and the crème de la crème of industry and



academia. Till date, a total of 32 Heads of States and over 50 countries have registered their presence at the Summit.

Global in nature and focus, over the years, the Summit has discussed some very critical issues from poverty and livelihoods to MDGs and climate change. The salient features of DSDS include the World CEO Sustainability Summit, a platform for corporates to brainstorm on ideas to do business without harming the environment; the

Sustainable Development Leadership Award, given every year since 2005 to an eminent global leader felicitating their contributions in the field of sustainable development; and the Youth Unite for Voluntary Action (YUVA) Meet which engages youth from around the globe in the discourse on sustainable development to record their experience and encourage positive action on their part.



HUMAN CAPITAL AT TERI

At TERI, we consider our people to be of utmost value and the key reason for the success of the institution. The synergy brought about by our human resources is a result of the freedom and flexibility that the Institute provides to its research professionals. TERI fosters a culture which respects diversity in age, gender, and education and realizes that each individual is unique and each one brings a fresh perspective and a distinct set of skills to the table, which in turn helps TERI build a collaborative culture. Our strength lies in the diversity of our people and we respect the fact that differences of views and ideas help us stimulate our minds intellectually. The following charts depict the distribution of Human Capital in TERI at a glance.



OUR NETWORK

Global Reach

The evidence of TERI's growing commitment to a sustainable future lies in the research and outreach activities that the Institute conducts in over 30 countries. With close to 1,000 people on its rolls; regional centres in north-eastern, southern, and western India, and in the Himalayas; an office in Mumbai; a 36 hectare field campus in Gurgaon, 25 kilometres from Delhi; affiliate institutes in Washington and London, and a presence in Tokyo, Kuala Lumpur, Dubai, and Addis Ababa; TERI's global presence is significant for a developing country institution.

Regional Centres

TRISHA, Mukteshwar

TERI's Research Initiative at Supi for Himalayan Advancement (TRISHA), at a height of 7,500 feet in the district of Nainital, Uttarakhand, is a unique endeavour. A herb garden has been established at the Supi farm to assess

the suitability of various culinary, medicinal, and aromatic plants under local conditions, thereby infusing confidence among the local farmers to undertake cultivation using bio-fertilizers on a commercial basis. Saplings and cultures of various species of herbs from the herbal garden are provided to the farmers. The produce of herbage from such farms results in an additional source of revenue for the local farmers. Various facilities at Supi include a vermicomposting unit to produce bio-fertilizer, a climate change laboratory, polyhouses and glasshouses, distillation unit, herbal garden, knowledge-cum-training centre, Kumaon Vani (a community radio service for the local populace), and rainwater harvesting systems (RWHs). TRISHA has expanded its fieldwork to other areas of Uttarakhand including Bageshwar, Chamoli, Gopeshwar, and Munsyary. TERI also has linkages with farmers across the state and is

constantly working to improve their socio-economic conditions.

North-eastern Regional Centre, Guwahati

Deemed an unexplored paradise, the North East is a region of the Indian subcontinent where nature herself leisurely painted the vibrant landscape of lush green hills and unique flora and fauna. The multiplicity of tribes and indigenous communities are the hallmark of this region. Globalization of the economy and the attending development processes put relentless pressure on the rich ecosystems of the region, pushing it towards vulnerability to disruption. These attributes and the associated developmental challenges in the region were the driving force behind the establishment of TERI's North-eastern Regional Centre in 1994. Natural resource management, biofuels, multi-location field trials, biotechnological research, and outreach programmes are the major activities that are being undertaken by the centre.

TERI's Western Regional Centre at Goa and Mumbai

TERI's Western Regional Centre (WRC), operates out of Goa and Mumbai. Goa is established as a multidisciplinary research centre and has been implementing research in the areas

of sustainable agriculture and forestry, marine and coastal resources, and water resources management. In addition, an environmental awareness programme for schools is an ongoing activity of this centre. One of the focused research activities pertains to assessing the pesticide load in the environment. The project on bioaccumulation of organo-pesticides in the Khazan ecosystem of Goa aims to analyse pesticide pollution in terms of bioaccumulation in sediment and biota, caused by agricultural operations. The project, funded by the Water Resource Department, Goa, evaluates the impacts of siltation and its effects on recharge capacity, and quality of surface and groundwater due to mining activities. Plant tissue culture is another recent project initiated by the Centre and is supported by the Forest Department of Goa. The aim is to reinstate the old plant tissue culture laboratory to its fullest functional potential, train forest officials to execute proper functioning of the tissue culture laboratory, and develop protocols for endangered forest species. The Centre is also involved in dissemination and outreach activities in collaboration with key stakeholders through events and workshops. A training programme on 'Air Quality Modelling and Management' was conducted in Goa which included the concepts of air quality modelling, demonstrated the use of air

quality models, and provided ready-to-use course material. Workshops were also conducted to create awareness and encourage farmers to engage in organic farming and floriculture activities in Goa. Over a period of six years, TERI Mumbai has established a strong base not only in Mumbai but across Maharashtra. The Centre successfully submitted the Environment Status Report (ESR) 2009–10, a benchmark for Maharashtra, to the Pune Municipal Corporation (PMC). Prepared as per the Drivers, Pressure, Status, Impact, and Response (DPSIR) framework recommended by the Maharashtra Pollution Control Board (MPCB), the report also calculated the Environmental Performance Index (EPI) for the first time. The Centre is also involved in preparing the municipal level carbon footprint estimation report for the PMC. As part of the flagship initiative Wetland Management Programme (WeMaP), the Centre developed a first-of-its-kind interactive resource kit entitled ‘Experience the World of Wetlands’ for visually challenged students. The kit consists of a booklet in Braille script (in English) and three touch-and-feel sheets explaining the importance of wetlands. Realizing the potential of integrating diverse environment-friendly approaches into agriculture, the Centre organized a multi-stakeholder forum ‘Krishi Dhan 2011’. The main attraction

included a ‘walk-through model of a green farmhouse’ which displayed green building concepts based on the GRIHA rating system. The Centre also organized a two-day training programme on ‘Air Quality Modelling and Management’ to bridge the gap and to build capacity of government officers, industrialists, environment consultants, and other stakeholders in this field.

Southern Regional Centre, Bengaluru

The Southern Regional Centre, in Bengaluru, continues to provide comprehensive service packages to its clients in areas as varied as energy efficiency and other environmental services, rural extension, consultancy for green buildings and sustainable habitat activities, research on resource-efficient process technologies, and educating the youth on sustainable development. Its wide clientele includes the government and other governmental agencies, the corporate sector, the public sector, and NGOs. It has an existing MoU with the Government of Karnataka in pursuance of which several projects have been undertaken. While the Industrial Energy Group is working extensively with both public sector and corporate undertakings in energy audit and energy efficiency activities, the Rural Extension Group has done commendable work in demonstrating the use of community

models of improved biomass cookstoves. Carbon footprint assessment studies are being carried out by the Environmental Studies Group, while the Sustainable Building Science Group is actively pursuing policy changes that could be effected in the various statutes governing construction activities in order to ensure maximum energy efficiency. The Resource Efficient Process Technologies Group is focusing on the development of biodegradable and 'green' plastics using renewable natural resources, which would have attractive commercial possibilities. In the coming years, special emphasis would be laid on the improvement of the quality of life in rural areas by involving all stakeholders under the public-private partnership (PPP) model. In addition, it proposes to establish a close relationship with the Karnataka Energy Regulatory Commission to consider strategies to promote greater energy efficiency in different sectors. A state-of-the-art Environmental Laboratory has also been established to provide in-house support to the research professionals and handle requests from outside.

International Presence

TERI-North America, Washington, DC

TERI-North America was established in 1990 as a 501(c)(3) company in Washington, DC, to foster new

partnerships between the countries in the north and south in order to solve some of the most serious environment-related problems facing the world. TERI-North America, or TERI-NA, has emerged as an intellectual bridge between the US and India with regard to issues of sustainable development. Dr P K Joshi, TERI University, was invited to offer a course on Remote Sensing of the Earth from Space at the Yale School of Forestry and Environmental Studies under the TERI University faculty-student exchange programme facilitated by TERI-NA. Six students from TERI University are working on their major projects at Yale University. TERI-NA joined hands with the Illinois-based Urbana High School's Interact Club to raise money to sponsor solar lamps for the Lighting a Billion Lives (LaBL) campaign, which managed to raise \$4,500, enough to provide solar lanterns to one village in India. TERI-NA, in collaboration with Yale University, organized the third US-India Energy Partnership Summit on the theme 'Fostering Innovations for a Sustainable Future' in Washington, DC. Over 200 participants from government, industry, think tanks, academia, and financial institutions deliberated on strategies and activities for Indo-US collaboration on energy security. The Summit saw eminent speakers

like Mr Al Gore, Nobel laureate and former US Vice President; HE Ms Melanne S Vermeer, Ambassador-at-Large, Office of Global Women's Issues, US Department of State; Mr David J Hayes, US Deputy Secretary of the Department of the Interior; Dr John P Holdren, Assistant to the President for Science and Technology and Director, Office of Science and Technology Policy, Executive Office of the President of the United States; Dr R Chidambaram, Principal Scientific Advisor, Government of India; Prof. Jagdish N Bhagwati, University Professor, Economics and Law, Columbia University; and HE Ms Nirupama Rao, Ambassador, Embassy of India to the US, deliberate on a number of issues of vital importance.

TERI Europe

TERI established its physical presence in Europe more than a decade ago to reinforce its global network and international relevance. TERI UK was the first office and was set up in January 2000 as a company limited by guarantee under the UK Companies Act, and is registered as a charity. In 2009, TERI entered into a long-term partnership with the Belgium-based organization VITO, to advance scientific knowledge and facilitate the transition towards

sustainable development in Europe and India. Areas of focus include biomass transformation, renewable energy, energy efficiency, sustainable habitat, water management, rural development, and corporate responsibility. During 2011–12, a number of projects have been undertaken in partnership with VITO, ranging from a research project on the potential of biomass as a source of energy and chemicals in India, to a major project in Gujarat based on TERI's INSTEP (Integrating New and Sustainable Technologies for the Elimination of Poverty) concept, to the holding of various events in Europe and India on themes related to corporate responsibility, clean technologies, and sustainable development. To underline the importance of the collaboration between India and Europe in all our fields of expertise, it was decided to establish a TERI Office in The Netherlands. The Utrecht University, the Utrecht Province and the Municipality have provided the resources and facilities. TERI Utrecht was inaugurated in October 2011 by Princess Maxima of The Netherlands and Dr R K Pachauri, Director-General of TERI. In these 12 years since it was established, TERI Europe at Utrecht has been implementing projects that support climate change policies in developing countries, include carbon trading and sustainable building design, promote trade in sustainably

produced goods, analyse corporate responsibility trends and practices, analyse sustainable investing trends in emerging markets, and build capabilities for sustainability reporting amongst small and medium enterprises (SMEs). TERI will continue to expand its presence in Europe by furthering commercial and scientific collaboration and is teaming up with various corporations and research institutes for this purpose.

TERI Japan, Tokyo

TERI-Japan continues to promote relationships with Japanese institutions, universities, governmental agencies, and NGOs interested in emerging global concerns about energy, environment, and sustainable development. It has also taken several initiatives to promote Japan–India collaboration and technology transfer in energy conservation and renewable energy sectors to move towards a low-carbon economy. TERI has a close working relationship with the Institute of Global Environmental Strategies (IGES), where the office of TERI-Japan is located. In 2012, the IGES, with support from TERI, organized its annual International Forum for Sustainable Asia and the Pacific (ISAP 2012) under the theme “Steering towards a sustainable and resilient future”, focusing on four timely issues—follow-up to Rio+20; climate change; resilience, and green

economy. Coinciding with ISAP 2012, a joint IGES-TERI Symposium was also held on the theme of “India-Japan Technology Cooperation towards Sustainable Development” to mark the 60th anniversary of the establishment of diplomatic relations between Japan and India. The ongoing joint IGES–TERI project for “Promoting Low Carbon Technology Transfer between Japan and India (JST-JICA)” is making good progress.

TERI Gulf

The TERI Gulf Centre has been moulding its activities around the growing interest in renewable energy and environment conservation in an oil-rich region. These include active involvement and facilitation of regional discussions, exploring opportunities to further TERI’s research interests, promoting and adding to TERI’s activities, maintaining contacts and networking with related institutions and experts, and consolidating research and documentation. One of the major activities of 2011–12 focused on raising awareness and garnering support for global renewable energy use through TERI’s flagship programme, Lighting a Billion Lives (LaBL). Two important partners joined the campaign in 2011—the KEF Company FZC, Sharjah, and the Unique Friends Group, spearheaded by the Unique Maritime Group Company

FZC, Sharjah. TERI Gulf also undertook efforts to educate the youth in schools on environment conservation through activities that enabled them to light up lives through solar energy. The selfless contributions by the children of the primary wing of Delhi Private School (DPS), Sharjah; DPS Dubai; and the Kindergarten Starters, Dubai, have struck a chord and inspired many more. In another attempt to raise environmental awareness among schoolchildren in this region, TERI Gulf is also encouraging schools to send students to the natural environs of TERI Mukteshwar, where they can spend time with nature and immerse themselves in activities closely linked to environmental conservation and education. The first foray was made by the Grade 5 students of DPS, Sharjah, setting an example for other schools to follow.

TERI South East Asia, Kuala Lumpur

TERI has been involved in a number of activities in the energy sector of Malaysia for the past decade. Over the years, it has provided its expertise to a range of stakeholders, including the government, regulatory, and industry and academic institutions. In 2009, TERI entered into an agreement with UNITEN to provide strategic directions to its newly launched Institute of Energy Policy and Research (IEPR). The mission of IEPR is to

take up independent research in energy and environment issues relevant to the country's socio-economic goals, which will benefit the government, regulators, industry, academia, public, and also contribute to capacity building. Since then, TERI has worked on several pertinent issues relevant to Malaysia. Most recently, the Institute was engaged in developing a long term roadmap for 40% reduction in carbon intensity for the Ministry of Natural Resources and Environment. The broad aim of this study was to carry out a preliminary analysis of current trends in the Malaysian economy with a view to examine the mitigation options available to Malaysia for GHG reduction. While Phase-1 of this study was intended to serve as a preliminary analysis, the ongoing Phase-2 will delineate the key areas that require focus from the perspective of mitigation and also incorporate studies on adaptation to reduce impacts of climate change and technology needs assessment in developing a low carbon economy pathway. The findings will provide inputs for informed policy making for achieving a sustainable and low-carbon path for 2020 and beyond.

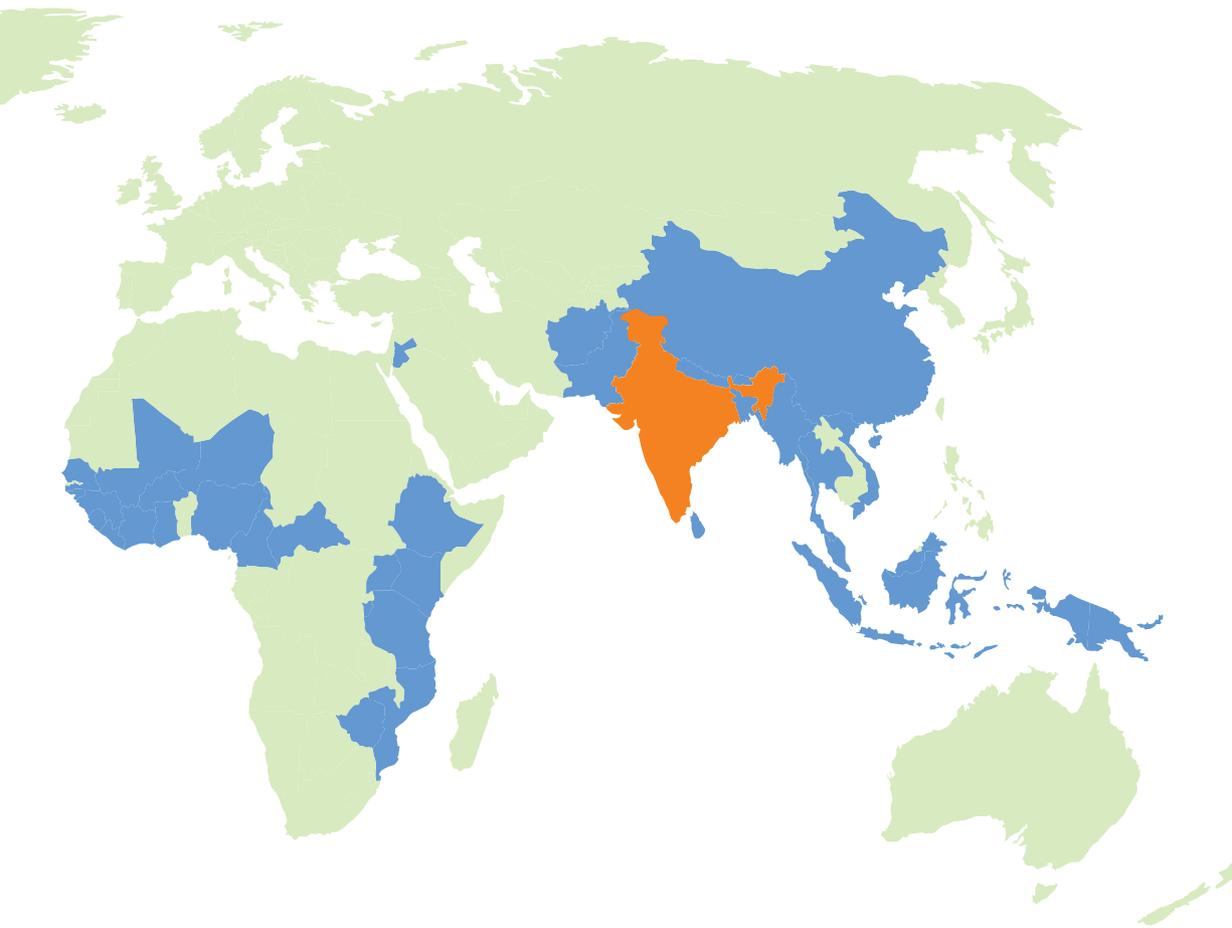
TERI Africa

TERI has been working in several domains of sustainable development in Africa. Initiatives involve capacity

enhancement of institutions, technology transfer and exchange of knowledge and skills.

It has been engaged in projects dealing with ways of infusing renewable energy technology applications and energy efficient practices in municipalities, colleges, buildings, schools, hospitals, and in micro, small, and medium enterprises of Africa. TERI works with regional institutions of Africa in designing adaptation and mitigation related climate policies. Additionally, benefits of application of TERI technologies using modes of biotechnology on degraded lands have been identified. In the policy domain, TERI has initiated work on resource governance issues in Africa. In parallel, TERI has been engaged in training programmes on (1) Decentralized energy solutions, (2) Renewable energy and energy efficiency, (3) Biotechnology applications, (4) Climate Change and sustainability, (5) Trade and sustainable development, and (6) Sustainable habitat. Along with this, it has been actively engaged in policy dialogues and discussion forums in regional networks.





Geographical Reach of South-South Cooperation Projects

Map not to scale



TERI UNIVERSITY

The genesis of the TERI University is rooted in the comprehensive research, consultancy, and outreach activities of TERI, a not-for-profit independent research institute recognized globally for its contribution to scientific and policy research in the realms of energy, environment, and sustainable development.

Recognized as a deemed university by the University Grants Commission (UGC) in 1999, the higher education arm of TERI operated initially under the name of TERI School of Advanced Studies, but was renamed as TERI University on 5 October, 2006, when UGC regulations were relaxed..

The University has a Board of Management, which is responsible for its overall administration and control. It has evolved an organizational structure drawing on the research activities of TERI. Besides the core teaching staff of the University, staff of TERI with PhD and rich research experience of working on projects in various areas function as adjunct faculty. There are two faculties namely, the Faculty of Applied Sciences

and the Faculty of Policy and Planning, with various Centres and Departments functioning under each faculty. The academic programmes of the University integrate the research experience gained in TERI into the academic curricula to provide a practical and contemporary context to learning. Having begun with doctoral programmes in 2001, TERI University has gone on to offer various masters degrees since 2003.

In 2005, the University was entrusted with the task of introducing a master's programme in Public Policy and Sustainable Development for mid-career civil servants of the Government of India; the first batch of students was enrolled in January 2006. The year also saw the first batch of students inducted into the new MBA programme in Infrastructure. This is a unique programme catering to the growing infrastructure demands envisaged for India and has been supported by chairs from the National Thermal Power Corporation and the National Hydroelectric Power Corporation. In 2009, the University has launched

four new master's programmes —an MSc in Climate Science and Policy, an MSc in Economics, an MBA in Business Sustainability, and an MTech in Renewable Energy Engineering and Management. In 2010, an MA programme in Sustainable Development Practice was launched. This is supported by the MacArthur Foundation. TERI University was one of the ten institutions chosen worldwide, by the Foundation, for support.

The TERI University has been awarded the *India Today Award* for the 'Most Innovative Curriculum'.

In February 2002, the TERI University entered into a Memorandum of Understanding (MoU) with the School of Forestry and Environmental Studies of the Yale University. Since 2005, with support from the VK Rasmussen Foundation, there has been a regular exchange of faculty and students between the two universities. The TERI University also has MoUs with the University of Iceland, Michigan

State University, North Carolina State University, and Freie University, Berlin. These inter-institutional MoUs are aimed at facilitating a mutually beneficial exchange of students, faculty, knowledge, resources, and ideas.

The TERI University has been set up as an institution of higher learning to meet the needs of a rapidly developing India. While it draws strength from the ethos and traditions of India, as a global institution it reaches out to source knowledge from across the globe. Its key strength also lies in the reservoir of knowledge, experience, and research of the parent body, TERI.

TERI University has, since October 2008, been operating from its energy-efficient, green campus at Vasant Kunj in New Delhi. The state-of-the-art teaching facilities, the vibrant academic environment and the richness of programmes that have been launched represent a refreshing flavour of innovation and a strong relevance for addressing the challenges of tomorrow.

FROM THE VISITOR'S BOOK

TERI has, under the able and far-sighted leadership of Dr R K Pachauri, earned well-deserved respect and international acclaim for its contributions to the global effort in meeting the twin challenge of energy security and climate change.

Dr Manmohan Singh, Prime Minister of India

Thank you so much for an outstanding briefing, and for the work that you do to protect our environment and green our economy!

**Lisa P Jackson, Administrator (former),
US Environment Protection Agency**

Thank you for the outstanding work you do here! The entire world is grateful to you.

Al Gore, Former Vice-President of the US

Counting on your continuing leadership and commitment in our common endeavour to address climate change.

Ban Ki-moon, Secretary-General, UN

India has been a source of inspiration for Brazilians since its struggle for independence through Mahatma Gandhi. Today, TERI and the work carried out by Dr Pachauri represent an important source of expertise in our common agenda to preserve our environment and ensure that our societies enjoy sustainable development.

**HE Antonio de Aguiar Patriota,
Deputy Minister of Foreign Affairs, Brazil**

TERI is an example of solidarity, development, and innovation applied towards a better, sustainable world. It is an example of what we can, and need to do, to leave a better world to our children. Thank you for the learning experience that I have had here at TERI.

Francisco Santos, Vice-President of Colombia

Your institute is of absolutely key national importance.

Azim Premji, Chairman, Wipro Ltd

With gratitude and recognition for the outstanding contributions that Dr Pachauri and TERI have made to the future of humankind.

**HE Patricia Espinosa C,
Minister of Foreign Affairs, Mexico**

I expected to be impressed by TERI—and I was not disappointed. Its valuable work is important for India in the wider world. I hope that its links with Britain can be further strengthened. I take away the words of one of its Deans that 'TERI is not an ivory tower but a catalyst for change'. Indeed so.

**HE Sir David Gore-Booth,
British High Commissioner to India**

The Energy and Resources Institute
Darbari Seth Block
IHC Complex, Lodhi Road
New Delhi- 110003
India

Tel. 24682100 or 41504900
Fax. 24682144 or 24682145
India +91 . Delhi(0) 11
Email. mailbox@teri.res.in
Website. www.teriin.org



The Energy and Resources Institute