

## About the Programme



With increasing energy crisis and global climate change issues, renewable energy has occupied a prominent position in industry and international relations in recent years. This has resulted in an increased demand for specialists and engineers in renewable energy with adequate knowledge of managing the renewable energy. There are very few institutions in India that offer structured programme to cover the diverse range of issues to meet this demand. The MTech (Renewable Energy Engineering and Management) programme at

TERI SAS are intended to fill this gap and provide the much needed human resource capacity in renewable energy technology and management. The programme, offered by the Department of Energy and Environment, is designed to train students not only in renewable energy technology and implementation but also in equally important synergetic areas of energy infrastructure, energy economics, and energy conservation. The programme will lead to a specialization in Renewable Energy Engineering and Management.

### About TERI School of Advanced Studies

Academic programmes at the TERI SAS are focused around the challenges of providing the rising global population with a limited and degraded natural resource base. In moving towards sustainability, the implicit understanding is that there is no panacea or straight road, with recognized and established methodologies, tools or specializations leading to such development. The solutions therefore do not lie in a specific subject discipline, but must be appropriate and relevant to the context or the practical problem being addressed. Developing such an understanding among its students is best achieved through exposure to a variety of subjects, tools, and methodologies offered in interdisciplinary mode. This has been the guiding philosophy behind the programmes offered by the TERI SAS and is practised by building a theoretical understanding in courses covering a variety of traditional disciplines, such as ecology, natural and social sciences, governance, policy, law, and engineering.

Over a period of two years, students converge upon a few areas of focus based upon their interest, having been exposed to a new way of thinking that looks at problems not from the lens of a subject specialist, but from the perspective of one who recognizes the complex linkages between man and his environment.

Apart from doctoral research, the TERI SAS offers MSc degree programmes in Environmental Studies and Resource Management, Environmental and Resource Economics, Geoinformatics, Water Science and Governance, Climate Science and Policy, and Plant Biotechnology; MBA programmes in Infrastructure and in Business Sustainability; MTech programmes in Renewable Energy Engineering and Management, Water Science and Governance and Urban Development and Management; and LL.M. programmes in Environment & Natural Resources Law and in Infrastructure & Business Law.

The University offers two MA programmes, one in Public Policy and Sustainable Development, and the other in Sustainable Development Practice. The TERI SAS is one of a select group of 22 institutions chosen worldwide by the MacArthur Foundation, USA, to run the Sustainable Development Practice programme. The University uses modern pedagogical tools, richly supplemented by field visits, live industry projects, and hands-on applications. It provides the very best in equipment and instruments, which includes state-of-the-art computer facilities, well-equipped laboratories, video-conferencing facilities, and access to South Asia's most comprehensive library on energy and environment.

TERI SAS has established excellent partnerships and collaborative arrangements with a number of institutions overseas, including Yale University, USA; The Freie University of Germany; Utrecht University, The Netherlands; North Carolina State University, USA; and University of Technology, Australia.

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## MTech (Renewable Energy Engineering and Management)



[www.terisas.ac.in](http://www.terisas.ac.in)

# Renewable Energy Engineering And Management

There is now a growing realization that India has to emerge as an economy driven by knowledge. Given the rapid progress that intellectual enterprises are making worldwide, higher education must benefit from a continuous accretion of knowledge through research. This is what the TERI SAS is attempting to do through all its programmes, for the benefit of not only Indian citizens but also students from other countries, who would pass through the portals of this institution. This University offers education supported by rigorous research.

Human existence, survival, and development are dependent on the quality and quantity of available natural resources. Human development is dependent on the efficient utilization of resources. This is true even in the case of fossil fuels. Even the slightest imbalance in resource extraction and conservation may lead to disasters, some of which humankind has already witnessed in the form of landslides, floods, water depletion, and, above all, climate change.

Energy is vital for improving the quality of human life of every nation. Growing scarcity of conventional fuels and their adverse ecological and environmental impacts have raised global interest in harnessing various renewable energy sources. Renewable energy technologies are emerging as the source of sustainable energy, which will be very important

for future energy supply strategies of the entire world. Availability of adequate manpower and appropriate resources is crucial for success in these endeavours. Providing renewable energy education at all the required levels in an efficient and effective manner is a challenging task. Adding 175 GW by the year 2022 to the total electricity generation through renewable energy sources is an ambitious target set by Government of India. This enforces that academia and industry must work together for adequate capacity building.

With an objective to provide complete education in the field of renewable energy focussed on technology and management, TERI SAS offers a fulltime programme, MTech (Renewable Energy Engineering and Management). This programme is structured to provide theoretical, practical, as well as professional knowledge to the students.

## Placements

After the completion of MTech (Renewable Energy Engineering and Management) programme, students gain enough confidence to work as a research professional, policy analyst, or technical solution provider in the field of renewable energy in both public and private sector organizations.

The university has a fully functional placement cell that helps students find suitable organization as per their interest and specialization for their summer internship, major project, and final placement. Our potential recruiters have shown keen interest in hiring our students at different levels. Some of the organizations where the students have been successfully placed in the past are listed below:

- Suzlon Energy Limited
- Larsen & Toubro Power
- Idam Infrastructure
- GE (General Electric) Energy
- The Climate Group
- Shakti Sustainable Energy Foundation
- Emergent Ventures
- Faber Capital
- Infosys
- Tata Power
- Azure Power
- Inox Wind
- Enzen Global
- IT Power Consulting Private Limited

## Programme Outline

The objective of the MTech (Renewable Energy Engineering and Management) programme is to prepare the students in theoretical, practical, as well as professional knowledge of renewable energy technologies and energy management. The programme is structured to enable them to deal with real-time problems of design and development for industrial applications and to pursue the academic research. The curriculum consists of core courses, elective courses, field visits, summer training, and major project spread over four semesters. The summer training at the end of second semester and major project during fourth semester is carried out at industry or institution outside the university.

### Semester 1

- Fundamentals of thermal and electrical engineering
- Renewable energy resource characteristics
- Power system engineering
- Heat transfer
- Conventional energy and environmental implications
- Technical Writing (Communication skills and technical writing)
- Energy conservation and management
- Introduction to management techniques – I
- Energy Lab – I (Power system lab and Heat transfer lab)

### Semester 2

#### Core Courses

- Field visits / exposure to RE plants
- Solar technologies
- Wind, small hydro and RE hybrid systems
- Biomass and other renewable technologies
- Renewable energy policy and regulations
- Optimization techniques for energy management and planning
- Renewable energy project management
- Energy lab – II

#### Elective Courses

- Fluid mechanics and wind turbine models
- Applied numerical methods

### Semester 3

#### Core Courses

- Energy economics
- Energy simulation laboratory
- Summer internship/minor project

#### Elective Courses

- Introduction to management techniques – II
- Solar photovoltaic power generation
- Solar thermal power generation
- Wind power generation
- Biofuels and decentralized energy systems
- Building energy and green building
- Grid integration of renewable energy
- Energy audit and management
- Waste to energy
- Independent study
- Smart grid

#### Semester 4

#### Major Project

Students carry out 4 to 6 months of major project in any industry/organization outside the university under the joint supervision of a faculty member from TERI SAS and the host organization.

## About Department of Energy and Environment

Given the global depletion of natural resources due to unsustainable consumption pathways societies have adopted, emerging economies like India are at crossroads to choose a trajectory which ensures inter-generational equity, inclusiveness and sustainability in their growth journey. The Department of Energy and Environment (DEE) at TSAS, aims to address the challenges relating to energy and environmental resource management through teaching, research and capacity building. The DEE creates a cadre of trained professionals committed to bring positive change through scientific, technological and policy innovations for strengthening resilience in communities. The DEE offers interdisciplinary post-graduate and doctoral programmes in renewable energy engineering & management, environmental studies & resource management, climate science & policy, and urban development & management to equip students with knowledge and skill sets to create solutions for sustainable development pathways in urban and rural habitats. The Department undertakes research in areas such as renewable energy, energy efficiency, air & water pollution, waste management, energy & environmental modelling, environment & health, sustainable consumption & production, sustainable agriculture, climate adaptation & mitigation, ecosystem management, and smart cities with focus on services, infrastructure & governance. The DEE encourages collaboration with industry, government, academic & research institutions, and multi-lateral organisations to deliver practice informed research and teaching.

## Pedagogical Tools

Pedagogical tools consist of lectures, tutorials, and practical. We also take students to industry/field visits along with demonstration/experiments on in-house solar roof top power plant. Trainings on relevant state-of-the-art softwares are also part of the curriculum. A number of experts from industry are invited to deliver lectures on special topics.

## Eligibility

A Bachelor's degree in any branch of engineering or MSc with a minimum cumulative grade point average of 6.75 on a 10-point scale or equivalent or 60% marks in aggregate.

## Selection Process

Admissions will be based on a written test and interview. Preference will be given to GATE/NET qualified candidates.

## Sponsored Candidates

Candidates working in the industry/government organizations are encouraged to apply for the programme. An NOC (No Objection Certificate)/sponsorship letter from the employer will be required at the time of interview.

