




CENTRE FOR INTEGRATED ASSESSMENT AND MODELLING

THE ENERGY AND RESOURCES INSTITUTE

Creating Innovative Solutions for a Sustainable Future

ENERGY | AGRICULTURE | ENVIRONMENT | HABITAT | RESOURCE SECURITY | CLIMATE | HEALTH & NUTRITION

The Centre for Integrated Assessment and Modelling (CIAM) at TERI undertakes modelling and economic analysis of energy and climate change-related data. It provides inputs related to energy, economy and environment to researchers, industries, and policymakers at the global, national, and sub-national levels. The Centre has a well-diversified team, comprising economists, engineers, social scientists, and policy analysts. CIAM plays a key role in informing policies within India and other developing countries and is an integral part of national and international modelling consortiums.

Objectives

To develop and use a suite of appropriate tools, techniques, and frameworks to formulate scenarios and arrive at policy and technology choices that can facilitate sustainable growth and resource efficiency development across all sectors and at all levels of the economy to effectively meet the following objectives :

- Build an integrated assessment model with soft-linked components that feed into each other.
- Undertake assessment of inter-linkages between resources/sectors under alternative scenarios.
- Examine energy-related issues to inform policy debates.
- Develop frameworks to assess thematic and sector-based issues in short, medium, and long terms.
- Undertake application of remote sensing and geographic information system (GIS) for carrying out spatial modelling, planning, management, and analysis in various sectors

Inter-thematic Works

- Energy Systems Modelling
- Greenhouse Gas (GHG) Mitigation Studies
- Computable General Equilibrium Modelling
- Econometric Modelling
- Food Water Energy Linkages
- Integrated Techno–Economic Modelling
- Spatial Modeling
- Risk and Uncertainty Analysis
- GIS-based Modelling

Modelling Themes

Energy Systems Modelling

1. Assess the allocation of scarce resources and energy-efficient options across sectors .
2. Examine sectoral demands and policy options through scenario building and analysis.

Energy Demand Assessment

1. **Evaluate useful, final energy and resource demands through:**

a. Consumer behaviour models
b. Forecasting techniques
c. Time series analysis
d. Cross-sectional, panel data analysis

Integrated Assessment Models

1. Examine response strategies and options of social, economic sectors, and natural systems to the varying levels of GHG and air pollutant emissions.
2. Assess implications of sectoral growth on socio-economic indicators, GHG emissions, resource use, air quality, and human health.

Risk and Uncertainty Analysis

1. To suggest a viable and secure energy plan for the country along with a communication strategy for risk.
2. To create comprehensive mapping of energy-related risks and evaluate measures to mitigate these risks.
3. To evaluate and assess risks pertaining to the energy chain due to rare or extreme events such as earthquake, accidents, and terrorist attacks.

Socio-economic and Behaviour Modelling

1. Understand implications of socio-economic changes and demographic patterns on sectoral energy demands.
2. To understand the impact of changes in socio-economic indicators on vulnerability and adaptation.
3. To explore and analyse influences of behaviour on consumption and adoption of policies as well as role of policies to change behavioural pattern.

Macro-economic Models

1. Understanding feedback effects on the socio-economic indicators through I/O and CGE models for changes in energy demand, GDP and emission profile.
2. To assess the impact of economic, energy and climate policies on inequality and welfare.

Spatial Modelling

1. To examine options for managing the multiple demands on land and other resources in a

dynamic environment of urbanization and economic growth.
2. Assessment of regional-/state-level energy and resource production and consumption and its implications.

Food Water Energy Linkage

To identify and measure the interaction and feedback between food, water, and energy at various spatial levels.

Impact Assessment Models

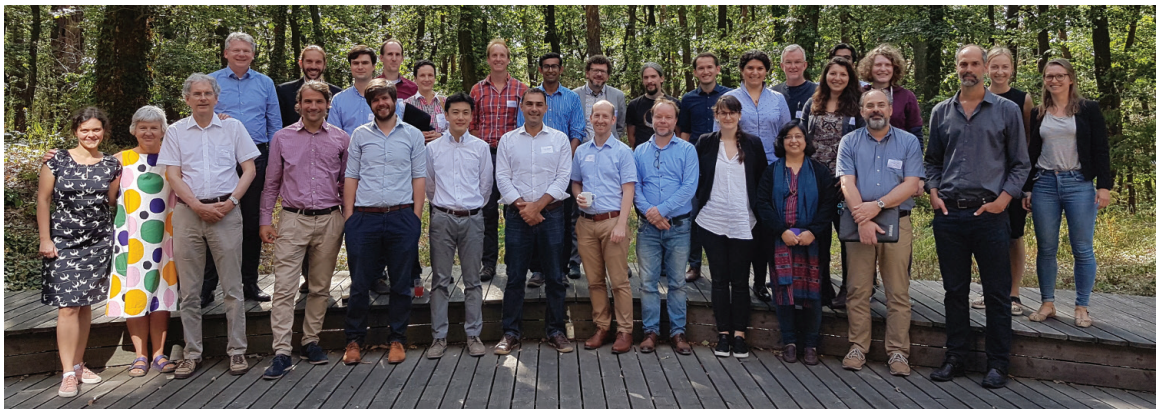
To assess the effect of growing economy on energy, emissions, socio-economic indicators through the application of integrated models and databases at national and regional scales.

GIS-based Modelling

1. To aid in recognizing and analysing energy users' behaviours and patterns as well as provide a thematic and spatial view of the distribution of energy use.
2. To model trends and future projection of resources.
3. To facilitate with policy decision making.
4. To carry out site-suitability mapping.

Tools: MARKAL, TIMES, GAMS, E-Views, STATA, Excel, ArsGIS, Erdas Imagine, ArcView, AutoCAD, ENVI, @RISK, GEMPACK, Environmental IO-Tables, Q-GIS, Google earth, TRANUS, R, SPSS, SAS, VENSIM

Major Partners: Ministry of Environment, Forest and Climate Change (MoEF&CC), NITI Aayog, Federation of Indian Petroleum Industry (Petrofed), European Commission, Central, State Government Ministries and Agencies, SHELL, Local Urban Bodies, Department of Atomic Energy (DAE), Ministry of Water, Energy, Irrigation Ethiopia, United Nations Industrial Organization (UNIDO), Norwegian Framework Agreement



(NFA), Department for International Development (DFID), Global Green Growth Institute (GGGI), Asian Development Bank (ADB), World Bank, other bilateral and multilateral agencies, World Wildlife Fund (WWF), International Institute for Applied Systems Analysis (IIASA), Institute for Global Environmental Strategies (IGES), VITO

Selected Recently Completed Projects

- Power Demand Assessment (Sponsor: NFA)
- Assessing Energy Efficiency Potential in India (Sponsor: GIZ)
- Climate Policy and Market Scenarios for Oil and Gas Sector (Sponsor: Federation of Indian Petroleum Industry)
- Globalization of Low-carbon Technologies and INDCs (Sponsor: ERIA)
- Preparation of BUR II and III and TNC – Power sector (Sponsor: UNDP)
- Study of Energy-Water-Food Nexus (Sponsor: NITI Aayog)
- Mitigation Actions For NATCOM 3 and BUR II - Industry sector (Sponsor: UNDP)
- ERIA Sea Lane Security for Oil and LNG (Sponsor: ERIA)
- Low-carbon Energy Systems and Green Growth: Implications for Regional Economic Cooperation and Integration (Sponsor: ERIA)

Recent Publications by Division Members

- Bhanja, A., et al. Developing a framework for rural electrification in India: analysis of the prospects of micro-grid solutions. DOI: https://doi.org/10.18280/ijsdp.150821
- Chaudhury, S., Nanda, N., and Tyagi, B. 2020. Impact of FDI on Economic Growth in South Asia: does nature of FDI matters? Review of Market Integration
- Fragkosa P., et al. 2020. Energy System Transitions and Low-carbon Pathways in Australia, Brazil, Canada, China, EU-28, India, Indonesia, Japan, Republic of Korea, Russia and the United States. Energy. Details available at www.elsevier.com
- Mathur, R., Shekhar, S. 2020. India's energy sector choices: options and implications. DOI: https://doi.org/10.1007/s10584-020-02885-1
- Mathur, R., et al. 2020. Reducing stranded assets through early action in the Indian power sector. Environ. Res. Lett. 15 094091, https://doi.org/10.1088/1748-9326/ab8033
- Mathur, R.2020. Taking stock of national climate policies to evaluate implementation of the Paris Agreement Nature Communications 11:2096
- Nayak, B. P., Jena, P. R., and Chaudhury, S. 2020. Public expenditure effectiveness for biodiversity conservation: understanding the trends for Project Tiger in India. Journal of Forest Economics, 35 (2–3): 229–265
- Schaeffer, R. et al. 2020. Comparing transformation pathways across major economies. Climatic Change. DOI: https://doi.org/10.1007/s10584-020-02837-9

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