IITB-Monash Research Academy

Indian Institute of Technology Bombay | MONASH University

An Indian-Australian research partnership

Project Title:	**Analysing the pathways of Indian domestic electricity consumption using bottom-up modelling approach**	
Project Number	**IMURA0880**	
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Research Clusters:

Highlight which of the Academy's CLUSTERS this project will address?
*(Please nominate JUST **one.** For more information, see www.iitbmonash.org)*

1	*Material Science/Engineering (including Nano, Metallurgy)*
2	***Energy, Green Chem, Chemistry, Catalysis, Reaction Eng***
3	*Math, CFD, Modelling, Manufacturing*
4	*CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control*
5	*Earth Sciences and Civil Engineering (Geo, Water, Climate)*
6	*Bio, Stem Cells, Bio Chem, Pharma, Food*
7	*Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng*
8	*HSS, Design, Management*

Research Themes:

Highlight which of the Academy's Theme(s) this project will address?
(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1	*Advanced computational engineering, simulation and manufacture*
2	*Infrastructure Engineering*
3	***Clean Energy***
4	*Water*
5	*Nanotechnology*
6	*Biotechnology and Stem Cell Research*
7	***Humanities and social sciences***
8	Design

The research problem

Define the problem

Domestic (residential) electricity consumption accounts for a quarter of all the electricity consumption in India. The per capita electricity consumption has been increasing over the years and crossed 1000 kWh/annum. As electricity consumption is generally associated with the development of the region, it is important to understand the change in consumption and the trends. There are studied which clearly brought out the inequality in consumption regionally and across economic class. However, most of these evidences are not reflected in policies and in energy planning at the country level. The available energy transition models give various scenarios for different time period, indicating numbers at the national level for electricity and for other resource consumption. For a diverse country like India, where there are multiple socio-economic and cultural contexts influence electricity consumption, it is important to have regional models to visualise energy transitions.

The study proposes a bottom-up and non-black box approach to analyse India's domestic electricity consumption pathways and transitions in next few decades. In this case, instead of using national trends such as GDP, annual installed capacity, etc, the research uses consumption patterns from national and regional survey data. The study accounts for the diversity in consumption among different regions, across economic classes, and the seasonal and tariff policies. Further, the political economy implications of the states or regions will be included to make the transitions more comprehensive. Finally, these results would be compared with other national level forecasts by national and international organisations. More importantly, a new methodology with known assumptions could be developed and compared across existing ones.

Project aims

Define the aims of the project

The primary aim of the proposed research is to develop a bottom-up model to analyse the domestic electricity consumption trends and patterns in India. The model intends to use the information from the socio-economic, cultural and political context. Broadly, the proposed study tries to understand what are the regional trends in electricity consumption and to estimate its transition in the coming decades. Next, it is proposed to compare these scenarios with the national level forecasts. This would give valuable insights on the assumption and resolution of the modelling apart from methodology and data. The proposed project aims to provide evidences for policy making, which typically relies on national level models.

Expected outcomes

Highlight the expected outcomes of the project including likelihood of patents

A bottom-up model to comprehensively understand the forecast the domestic electricity consumption in India, both at regional and national level.

How will the project address the Goals of the above Themes?

Describe how the project will address the goals of one or more of the 6 Themes listed above.

The project goals are in line with energy theme. The outcomes are expected to bridge the existing knowledge gap in the thematic area and more importantly contribute to evidence based policy making.

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

Basic understanding of the bottom-up and top down modelling (or willing to take the courses in the coming semesters) and Indian electricity sector knowledge (basics).

The student is required to be science or engineering background during their UG/PG.

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

Select up to **(4)** keywords from the Academy's approved keyword list **(available at http://www.iitbmonash.org/becoming-a-research-supervisor/)** relating to this project to make it easier for the students to apply.

Energy, Energy Storage, Energy Materials; Modelling and Simulation; Miscellaneous/Uncategorised