

An Indian-Australian research partnership

<b>Project Title:</b>	Energy Transition in the Indian Economy	
<b>Project Number</b>	IMURA0804	
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### Research Clusters:

### Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? <i>(Please nominate JUST <b>one</b>. For more information, see <a href="http://www.iitbmonash.org">www.iitbmonash.org</a>)</i>		Highlight which of the Academy's Theme(s) this project will address? <i>(Feel free to nominate more than one. For more information, see <a href="http://www.iitbmonash.org">www.iitbmonash.org</a>)</i>	
1	Material Science/Engineering (including Nano, Metallurgy)	1	Advanced computational engineering, simulation and manufacture
2	<b>Energy, Green Chem, Chemistry, Catalysis, Reaction Eng</b>	2	Infrastructure Engineering
3	Math, CFD, Modelling, Manufacturing	3	<b>Clean Energy</b>
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control	4	Water
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)	5	Nanotechnology
6	Bio, Stem Cells, Bio Chem, Pharma, Food	6	Biotechnology and Stem Cell Research
7	Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng	7	<b>Humanities and social sciences</b>
8	HSS, Design, Management	8	Design

## The research problem

*Define the problem*

### **Energy transition in the Indian Economy**

This PhD proposal has three independent energy related projects

- The first project will analyse the changes in energy-mix since the economic reform period. Our objective is to develop a model on energy efficiency considering both demand and supply sides of the energy sector. In doing so, we identify the possible determinants of energy efficiency both at the national and state levels across different sectors.
- In the second project, given the twin challenge of providing electricity to all and expanding the share of renewable sources in energy-supply mix, we explore the energy-finance nexus. Renewable energy targets is set to be 40% of total electricity generation capacity by 2030. This includes a wind power target of 60 GW and solar power target of 100 GW by 2022. Despite the advantages of cheap labour and low construction cost, the cost of renewable energy is quite high due to financing costs. This project will explore the feasibility of different financing mechanisms for renewable energy based projects in extending the share of total renewables within total energy-mix.
- The third project will assesses the socioeconomic effects of implementing solar micro grids. Off-grid solar technologies hold potential as an affordable and clean solution to satisfy basic electricity needs. We will conduct randomized field experiment with rural households to estimate the causal effects of off-grid solar power on electricity access and broader indicators on socio-economic development. Village in Western State of Maharashtra will be selected for experiment purposes. Among socio-economic factors we consider changes in savings, spending, business creation, time spent working or studying, or other broader indicators of socioeconomic development.

## Project aims

*Define the aims of the project*

The PhD proposal aims to connect three independent but related projects pertaining to electricity provisioning. It aims to analyse the changing energy-mix over time, examines the feasibility of renewable energy financing and finally assesses the socio-economic effects of micro-grids implementation in India.

Our first objective is to establish the dynamics of changes in energy-mix particularly since the economic reform period. In the second project, we explore various financing mechanisms in improving renewable energy sources within the total energy-mix. In this context, the role of public vs private capital will be explored for sustainable development in future. Third project is region specific. We implement the RCT in analysing the causal effects of off-grid solar power on electricity access and broader indicators on socio-economic development.

## Expected outcomes

*Highlight the expected outcomes of the project*

- Each project within this proposal will have significant policy implications for policy advisers, academics and development analysts. Both supervisors have extensive experience working in energy related projects. We will present initial findings in national and international conferences on energy related research.
- The data from this research can be utilised for educational research and teaching purposes.
- The research proposal will establish exchange visits, research collaborations within these two institutions.
- We expect to publish three reports and three journal articles (with A/A\* rank following ABDC journal)
- The continuation of this project will prepare both collaborators to explore external funding in future.

## 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.*

### **Clean Energy**

Private companies in India are experiencing growth in energy sector, and expect to triple their financing needs in the next three years. The second chapter of our proposal will explore different methods of financing to explore private-public partnerships. Economic models will be used in analysing different sources considering the experience from other countries such as China and Germany.

### **Humanities and social sciences**

The third chapter will examine the effects of micro-grids implementation on socio-economic factors. Leadership is needed by organizations for an energy-efficient economy in reducing overall energy demand in optimising energy efficiency implementing best practices and policies. This can be accomplished by the manoeuvring of a variety of political, social, cultural, individual, and economic influences on household energy consumption. In this chapter we consider an area where micro-grids are installed in the recent past.

## Capabilities and Degrees Required

*List the ideal set of capabilities that a student should have for this project. Feel free to 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.*

Analytical ability:

Basic econometrics and econometric methods

Ability to collect data: primary and secondary

Knowledge of statistical packages such as Stata, Eviews, Matlab, Python

Willingness to learn and test new theory

Language proficiency: Working knowledge of Hindi, Marathi, English

Good writing skills in English

Degree Required: (i) Masters in Economics/Environmental Science/Public Policy

Studies/Statistics/Mathematics or other sciences; Or (ii) ME/MTech; Or (iii) BE/BTech

## Potential Collaborators

Please visit the IITB website [www.iitb.ac.in](http://www.iitb.ac.in) OR Monash Website [www.monash.edu](http://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.

Renewable energy sources, green energy, modelling and simulation