

**PubPol 572S/ENERGY 572S**  
**Impact Evaluation: Energy and Development**  
**Spring 2025**

**Mon, Wed 3:05 PM - 4:20 PM**  
**Sanford 102**

**Instructor**

Professor Robyn Meeks

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Office hours: Wednesdays, 4:45-6:15 pm (Rubenstein Hall 258)

Individual meetings: by appointment, please email to arrange

**Course description**

Access to clean and modern energy (electricity, natural gas, biogas, etc.) is key to both meeting basic needs and achieving economic growth (World Bank, 2006; UN, 2016). For example, with one in five people throughout the world still lacking access to electricity, an urgency surrounds this push to increase electrification rates and access to energy more broadly in many developing countries.

Indeed, energy access was included in the recently Sustainable Development Goals, ensuring it continues to be a development priority through at least 2030 (UN, 2016).

Universal energy access is often viewed as a catalyst for economic growth and development, yet the existing evidence on the welfare impacts of electrification remains mixed. An incomplete understanding of the microeconomic foundations of the energy-development relationship is both a significant knowledge gap and a critical policy challenge. Indeed, governments and international organizations alike are mobilizing considerable resources to ensure access for all, but there may be profound opportunity costs associated with large-scale investments in energy infrastructure in low-income settings.

With an increasing number of organizations operating at the energy-development intersection seeking to determine the extent to which their programs or policies have a causal impact on particular outcomes, the ability to understand rigorous impact evaluations and the methods they employ has become a valuable skill. This course will provide students with an understanding of (1) the status of empirical economic evidence on the energy and development relationship, and (2) the importance of causal evidence to estimate the impacts of energy interventions and policies in developing countries. This course aims to provide the skills necessary to both evaluate the merits of existing studies as well as propose future impact evaluations.

To do so, the course will first cover the empirical methods commonly employed in such evaluations. Applications of these methods will be understood through topics such as measuring the energy “ladder”, the demand for and role of electrification in development, the demand for energy efficiency, the health impacts of and demand for clean cook stove technologies, and spillovers in technology adoption, amongst others. Before the end of the course, students will apply these methods by designing their own impact evaluation and commenting on other students’ proposed evaluations.

## Goals of the course

- To understand the current status of (and gaps in) the economic evidence on the energy-development relationship;
- To understand the case for evaluating the impacts of energy-related programs and policies in developing countries;
- To understand conceptually the empirical economic methods commonly applied to evaluate programs and policies and to assess the relative strengths and weaknesses of these methods;
- To build skills necessary to identify research questions relevant for policy, how an impact evaluation might contribute to current understanding for such policies, and the appropriate empirical methods used to measure impacts of a given program or policy.
- To build the case for an impact evaluation and evaluate the merits of proposed research given existing research, methods employed.

## Course textbooks & reading materials

- Gertler, Paul J.; Martinez, Sebastian; Premand, Patrick; Rawlings, Laura B.; Vermeersch, Christel M. J.. 2016. *Impact Evaluation in Practice*, Second Edition. Washington, DC: Inter-American Development Bank and World Bank. *This is marked in reading list as [IEP 2<sup>nd</sup> Edition]*. Also available online: <https://openknowledge.worldbank.org/handle/10986/25030>
- All other readings can be found via a link in the syllabus or posted on our course Sakai site.

## General notes

The *instructors' obligations* to students are to (1) treat students with respect; (2) foster students critical thinking skills while providing them with a substantive foundation in the course's subject matter; (3) create and sustain a learning community that fosters robust discourse, deep listening, and the collective pursuit of knowledge; 4) assess students fairly, conscientiously, and in a timely manner; (5) be available to answer students questions and otherwise facilitate their progress in class.

*Students' obligations* to the instructors and classmates are to (1) attend class regularly and arrive on time; (2) arrive well prepared to contribute thoughtfully and constructively; (3) treat instructors and classmates with the respect and dignity with which they themselves wish to be treated; 4) conduct themselves in a professional manner befitting their future standing as a public representative of our School and University, as well as the other communities of which they are, and will be, a part; and 5) abide by the [Duke Community Standard](#).

### Computers in class

You may use computers to take notes in class if it does not block or distract other students. Please do not multi-task during class; it's distracting to others who want to learn. Participation in class discussion is an important part of this class!

## Assignments and grading

The final grade for the course is based on the following activities and assignments:

Assignment	Description	Percent	Due Date
Participation	Attendance and participation in discussion. Quality participation requires completing the readings. This is a seminar and participation is crucial.	20%	Every class
Initial research question	Propose a topic for an impact evaluation. What are potential research questions? Why are these questions important? Submit in writing to Prof Meeks <b>at the beginning of the class session</b> and be ready to share your idea with the class.	5%	Jan 29 <sup>th</sup>
Identify literature	Search the economics literature related to your proposed research topic. (Hint you can start with the syllabus.) What literature exists that is related to your topic and provides causal evidence? What gaps are there in the literature that you found? Submit 1 page document.	5%	Feb 17 <sup>th</sup>
Method proposal	Of the methods covered in the class, which method would be best suited to provide causal evidence on your research question? Why would that method be appropriate? Would there be any challenges?	5%	March 3 <sup>rd</sup>
Presentation of draft proposal	Present slides on your draft project proposal to class (~ 8-10 minutes per student). Should build on research question, connect topic to existing literature, describe proposed impact evaluation method, potential data. Submit your presentation slides to Prof Meeks and your peer reviewer <b>at the beginning of the class session</b> . <i>Presentations randomly allocated across dates.</i>	20%	See assigned dates
Peer review	Review a fellow student's proposal. Provide constructive feedback on research design, methods, etc. Submit in writing to Prof Meeks and your peer <b>at the beginning of the class session</b> .	20%	April 2 <sup>nd</sup>
Final research proposal	Prepare final proposal, incorporating all feedback (including peer review). These are due on <b>at the beginning of the class session</b> .	25%	April 16 <sup>th</sup>

Accommodations: Please contact Professor Meeks as soon as possible if you have any special needs that require accommodation for assignments, course attendance, etc., so that we can ensure that proper accommodations are made.

Class participation: You are expected to come to class on time and prepared for the lecture and/or discussion. You are encouraged to ask questions during class and express your views during class discussions. If part of a lecture is confusing and you are unable to get clarification during class, please attend office hours.

Academic honesty: Honesty is basic to what we do at the university and in this course. I encourage you to study together, discuss course material outside of class. However, **when it comes to writing assignments, you must do your own work.**

You are expected to adhere to all aspects of the *Sanford School of Public Policy Code of Professional Conduct* (available on pp. 18-22 of the MPP Student Handbook). The MPP student handbook has been made available to you through your Class of 2020 Sakai site.

## Reading assignments

Class	Date	Topic & Readings
1	Jan 08	<p><b>Energy and development – Why do we care?</b>  Topics: Intro to class and topic.</p> <ul style="list-style-type: none"> <li>UNDP. “The Energy Access Situation in Developing Countries.” (<i>skim</i>)</li> <li>SDG 7: Affordable and Clean Energy.  <a href="https://www.un.org/sustainabledevelopment/energy/">https://www.un.org/sustainabledevelopment/energy/</a></li> <li>(Optional) Tracking SDGs: <a href="https://sdg-tracker.org/energy#targets">https://sdg-tracker.org/energy#targets</a></li> </ul>
2	Jan 13	<p><b>Energy and development – Why evaluate?</b>  Topics: Evidence-based policies/investment; Theory of change; Overview of methods</p> <ul style="list-style-type: none"> <li>IEP 2<sup>nd</sup> Edition Chapter 1-2</li> <li>Wolfram, Shelef, and Gertler “How will Energy Demand Develop in the Developing World?”</li> </ul>
3	Jan 15	<p><b>Evaluating impacts</b>  Topics: Causal inference &amp; counterfactuals; Intro to randomized control trials</p> <ul style="list-style-type: none"> <li>IEP 2<sup>nd</sup> Edition Chapters 3-4</li> <li>Lee et al. 2020. Does Household Electrification Supercharge Development?</li> </ul>
4	Jan 22	<p><b>Randomized experiments</b>  Topics: RCTs in more detail; RCT application to energy</p> <ul style="list-style-type: none"> <li>Hanna and Oliva “Moving Up the Energy Ladder” <i>AER: Papers &amp; Proceedings</i> (2015)</li> <li>(Optional) Duflo, Glennerster, and Kremer, “Randomization Toolkit”</li> </ul>
5	Jan 27	<p><b>Randomized experiments and energy</b>  Topics: An RCT on the demand for electricity  <i>Read according to random assignment:</i></p> <p><u>Group A</u></p> <ul style="list-style-type: none"> <li>Wolfram, Lee, and Miguel. “Experimental Evidence on the Economics of Rural Electrification.”</li> </ul> <p><u>Group B</u></p> <ul style="list-style-type: none"> <li>Hanna, Duflo, and Greenstone. “Up in Smoke: The Influence of Household Behavior on the Long-run Impact of Improved Cooking Stoves”</li> </ul> <p><u>Group C</u></p> <ul style="list-style-type: none"> <li>Berkhouwer and Dean. "Credit, attention, and externalities in the adoption of energy efficient technologies by low-income households."</li> </ul>
6	Jan 29	<p><b>Regression discontinuity</b>  Topics: An intro to RDD</p> <ul style="list-style-type: none"> <li>IEP 2<sup>nd</sup> Edition Chapter 6</li> </ul>
7	Feb 03	<p><b>Regression discontinuity</b>  Topics: An application of RDD to electricity</p> <p><u>Group A</u></p> <ul style="list-style-type: none"> <li>Burlig and Preonas. 2022 version. “Out of the Darkness and Into the Light? Development Effects of Rural Electrification”</li> </ul> <p><u>Group B</u></p> <ul style="list-style-type: none"> <li>Mahadevan. “The Price of Power: Costs of Political Corruption in Indian Electricity”</li> </ul>

8	Feb 05	<p><b>Difference-in-Differences</b></p> <p>Topics: An intro to DD</p> <ul style="list-style-type: none"> <li>• IEP 2<sup>nd</sup> Edition Chapter 7</li> </ul>
9	Feb 10	<p><b>Difference-in-Differences</b></p> <p>Topics: An application to privatization (... of water...) and property rights</p> <ul style="list-style-type: none"> <li>• Galiani et al. “Water for Life: The Impact of the Privatization of Water Services on Child Mortality”</li> <li>• Field “Entitled to Work: Urban Property Rights and Labor Supply in Peru”</li> </ul>
10	Feb 12	<p><b>Matching Methods</b></p> <ul style="list-style-type: none"> <li>• Khandker, Koolwal, and Samad. Ch4 Propensity Score Matching.</li> </ul>
11	Feb 17	<p><b>Matching Methods</b></p> <p><i>Read according to random assignment:</i></p> <p><u>Group A</u></p> <ul style="list-style-type: none"> <li>• Peters, Vance and Hardsdorff. “Grid Extension in Rural Benin: Micro-Manufacturers and the Electrification Trap.”</li> </ul> <p><u>Group B</u></p> <ul style="list-style-type: none"> <li>• Samad and Zhang. “Heterogeneous Effects of Rural Electrification.”</li> </ul>
12	Feb 19	<p><b>Instrumental variables</b></p> <p>Topics: An intro to IV</p> <ul style="list-style-type: none"> <li>• IEP 2<sup>nd</sup> Edition Chapter 5</li> <li>• Duflo and Pande. “Dams”</li> <li>• Meeks, Sims, Thompson. “Waste Not: Can Biogas Deliver Sustainable Development?”</li> </ul>
13	Feb 24	<p><b>Instrumental variables</b></p> <p>Topics: Applications of IV to electricity</p> <p><i>All read</i></p> <ul style="list-style-type: none"> <li>• Meeks, Thompson, and Wang. “Decentralized Renewable Energy to Grow Manufacturing? Evidence from Microhydro Mini-grids in Nepal” (2024).</li> </ul> <p><i>Please read one more according to random assignment:</i></p> <p><u>Group A</u></p> <ul style="list-style-type: none"> <li>• Dinkelman. “The Effects of Rural Electrification on Employment: New Evidence from South Africa” (2011)</li> </ul> <p><u>Group B</u></p> <ul style="list-style-type: none"> <li>• Lipscomb et al. “Development Effects of Electrification: Evidence from the Topographic Placement of Hydropower Plants in Brazil” (2013)</li> </ul>
14	Feb 26	<p><b>Addressing Methodological Challenges: Energy Efficiency</b></p> <p>Topics: Heterogeneous Treatment Effects; Spillovers;</p> <ul style="list-style-type: none"> <li>• IEP 2<sup>nd</sup> Edition Chapter 9</li> <li>• Fowlie and Meeks. 2021. “Rethinking Energy Efficiency in the Developing World”</li> </ul>
15	Mar 03	<p><b>Addressing Methodological Challenges: Energy Efficiency</b></p> <p>Topics: Unintended Behavioral Effects Other issues</p> <p><i>All read</i></p> <ul style="list-style-type: none"> <li>• Carranza and Meeks. 2021. “Energy Efficiency and Electricity Reliability”</li> </ul> <p><i>Please read one more according to random assignment:</i></p> <p><u>Group A</u></p>

		<ul style="list-style-type: none"> <li>Davis et al. 2014. “Cash for Coolers: Evaluating a Large-scale Appliance Replacement Program in Mexico”</li> </ul> <p><u>Group B</u></p> <ul style="list-style-type: none"> <li>Ryan. 2018. “Energy Productivity and Energy Demand: Experimental Evidence from Indian Manufacturing Plants””</li> </ul>
16	Mar 05	<b><i>In-class movie:</i></b> The Boy Who Harnessed the Wind
----- <i>Spring Break</i> -----		
17	Mar 17	<p><b>Electricity Quality</b></p> <p><i>All read</i></p> <ul style="list-style-type: none"> <li>Meeks, Isaev, Omuraliev, and Wang. “Impacts of Electricity Quality Improvements: Experimental Evidence on Infrastructure Investments” 2023</li> </ul> <p><i>Please read one more according to random assignment:</i></p> <p><u>Group A</u></p> <ul style="list-style-type: none"> <li>Rud “Electricity provision and industrial development: Evidence from India”</li> </ul> <p><u>Group B</u></p> <ul style="list-style-type: none"> <li>Allcott et al. “How do electricity shortages affect industry? Evidence from India”</li> </ul>
18 - 20	Mar 19, Mar 24, Mar 26	<b>In class presentations of draft proposals</b> (dates assigned)
21,22	Mar 31, Apr 02	<p><b><i>Electricity as a Right?</i></b></p> <p><i>All read</i></p> <ul style="list-style-type: none"> <li>Burgess et al. “The Consequences of Treating Electricity as a Right” 2020.</li> </ul> <p><b><i>In-class movie:</i></b> Katibayaz (1 hr 24 minutes)</p>
23	Apr 07	<p><b>Electricity Theft, Bill Non-payment, and the Infrastructure Quality Trap</b></p> <p><i>All read</i></p> <ul style="list-style-type: none"> <li>Ahmad, Ali, Meeks, Wang, Younas. “Down to the Wire: Leveraging Technology to Improve Electric Utility Cost Recovery.” 2024.</li> </ul> <p><u>Group A</u></p> <ul style="list-style-type: none"> <li>McRae “Infrastructure Quality and the Subsidy Trap”</li> </ul> <p><u>Group B</u></p> <ul style="list-style-type: none"> <li>Jack and Smith. “Charging Ahead: Prepaid metering, electricity use and utility revenue”</li> </ul>
24	Apr 09	<p><b>Energy and Pollution</b></p> <p>Topics: Pollution, heating, cooling</p> <p><i>Read according to random assigned:</i></p> <p><u>Group A</u></p> <ul style="list-style-type: none"> <li>Almond et al. “Winter Heating or Clean Air: Unintended Impacts of China’s Huai River Policy”</li> </ul> <p><u>Group B</u></p>

		<ul style="list-style-type: none"> <li>Ebenstein, et al. "Winter Heating or Clean Air: Unintended Impacts of China's Huai River Policy"</li> </ul> <p><u>Group C</u></p> <ul style="list-style-type: none"> <li>Barron and Torrero. "Household Electrification and Indoor Air Pollution"</li> </ul>
25	Apr 14	<p><b>Large-scale experiments and pollution</b></p> <ul style="list-style-type: none"> <li>Greenstone, Pande, Sudarshan, and Ryan "Can Pollution Markets Work in Developing Countries? Experimental Evidence from India"</li> <li>Duflo, Greenstone, Pande, and Ryan "Truth-telling by Third-party Auditors and the Response of Polluting Firms: Experimental Evidence from India"</li> </ul>
26	Apr 16	<p><b>Wrap-up and Bringing it All Together</b></p> <ul style="list-style-type: none"> <li>IEP 2<sup>nd</sup> Edition Chapter 11, 13, 14</li> </ul>