



# Department of Sustainable Energy Engineering Indian Institute of Technology Kanpur

## Proposal for Course Modification

|   |   |
|---|---|
| Course Title  | Introduction to Sustainable Energy Policy   |
| Number  | SEE-617   |
| Credits (L-T-P [C])   | 3-0-0-9   |
| Departments proposing the course  | : Sustainable Energy Engineering  |
| Name of the Proposer  | : Deepika Swami, Rajeev Jindal  |
| Offered for   | PG Students of SEE and other departments<br>3/4 <sup>th</sup> year UG students of other departments |
| Status of the course  | : PG Elective/ UG Elective  |
| Prerequisite(s) for the course  | : Consent of Instructor   |
| Faculty members interested in teaching  | : Deepika Swami, Rajeev Jindal, Sheo Shankar Rai, Indu Shekhar Chaturvedi, Anna Agarwal             |
| Other Departments/Programmes of whose the students are expected to take up the course | : ME, EE, CHE, MSE, AE, IME, ECO  |

### Objective

The course will introduce different aspects of energy policy including energy resources, energy security, energy efficiency, energy justice, energy transition, integration of energy policy with climate governance, challenges and opportunities associated with coal and renewable energy. One of the major requirements is that energy policy should be aligned towards our development and rapid economic growth. Policymakers have predominately relied on policy instruments that utilize price mechanisms to deploy sustainable energy without giving much consideration to security and transition concerns and larger geopolitical questions of *who* owns the energy system, and *how* the energy needs to be generated and distributed.

### Expected Learning Outcomes

The students completing this course will be equipped with the theoretical and analytical abilities to examine the nuanced relationship between **energy policy and climate change** and how the transition towards sustainable energy systems will change the overall scenario of energy system. They will understand the role of various policy instruments and institutions in shaping India's energy policy. The course will develop analytical and critical thinking and introduce new perspectives about energy, environmental and climate policies at global and national level and will give a new dimension to their innovative thinking, motivating them to come up with policy relevant technical solutions in the field of sustainable energy.

## Course outline

The course begins with providing an overall context about the history of energy system and introduction of India's energy landscape. Next, it focuses on understanding energy security, geopolitical factors important to achieve energy security for India. Following this, we will understand the production, generation and distribution of various energy resources and the instruments that can help in achieving smooth transition from fossil-based sources to renewable energy. Lastly, we will understand how global climate governance and commitments will shape India's energy future.

### Lecture -wise break up

| Sr. No. | Topics   | Lectures |
|---------|--|----------|
| 1       | <b>Overview of the Indian Energy Scenario:</b> <ul style="list-style-type: none"><li>• Historical Development of India's and Global Energy Sector</li><li>• Introduction to India's Energy Landscape: Energy Production, Demand, Supply, and Consumption Patterns</li><li>• Linking energy and environment: Emissions, Emission factor, Role of energy, Kaya identity and need for energy transition</li></ul>   | 6        |
| 2       | <b>Energy security, and formulation of energy policy</b> <ul style="list-style-type: none"><li>• India's energy landscape: growth and challenges</li><li>• Energy security: challenges and role of policies</li><li>• Formulation of energy policy: Major stakeholders and process involved</li></ul>  | 6        |
| 3       | <b>Conventional energy sources and Indian energy portfolio</b> <ul style="list-style-type: none"><li>• Role of Fossil fuel sources: Role of coal, oil and gas in India's energy mix, including production, energy generation, environmental implication. Policy scenario and how is it evolving?</li><li>• Indian economy and dependence on coal: Political economy of coal</li><li>• India's energy management system – roles of GENCO, TRANSCO, DISCOM</li><li>• Electricity act and its development</li></ul> | 10       |

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| 4 | <p><b>India's energy transition and various policy initiatives</b></p> <ul style="list-style-type: none"> <li>• Drivers of energy transition: Environmental, Social, Economic, and Technological Factors</li> <li>• Growth of non-fossil based: Wind, Solar, Bioenergy, Tidal, Geothermal. Current status and policy support.</li> <li>• Driving demand and generation growth through policy framework: RPO, GEOA, roof top solar, PM-KUSUM Yojna, NBP, PMUY, CAFC, EBP, EV,</li> <li>• Regulatory institutions (MNRE, SERC, BEE, CEA etc.)</li> <li>• Economics of energy generation and distribution: Feed-in Tariffs, PPAs, Tax Incentives, Subsidies, Grants, Carbon Pricing, Cap-and-Trade Systems, and Emission Trading Schemes</li> <li>• Integration of renewables in grid: policy framework</li> <li>• India's energy policy for critical minerals for renewable energy</li> </ul> | 10 |
| 5 | <p><b>Indian energy policy and global climate governance</b></p> <ul style="list-style-type: none"> <li>• National and international missions: UNFCCC, COPs, NPACC, NCAP</li> <li>• India's commitments and agreements (Kyoto, Paris, Glasgow)</li> <li>• India's efforts in integrating renewable energy policies with climate change mitigation strategies</li> <li>• Future of energy generation in context of climate change</li> </ul>   | 8  |

## References

### Books

1. Gupta, J. (2014). Handbook of Climate Change and India: Development, Politics and Governance.
2. Laird, F. N. (2004). Power politics: equity and environment in electricity reform: Washington, DC: World Resources Institute, 2002. xv+ 175 pp. Paperback. \$30.00. *Utilities Policy*, 12(1), 51-51.

### Papers

- Chapman, A.J., McLellan, B.C., Tezuka, T., 2018. Prioritizing mitigation efforts considering co-benefits, equity and energy justice: Fossil fuel to renewable energy transition pathways. *Appl. Energy* 219, 187–198. <https://doi.org/10.1016/j.apenergy.2018.03.054>
- Dubash, N.K., Ghosh, S., 2019. National Climate Policies and Institutions. *India a Warm. World* 329–348. <https://doi.org/10.1093/oso/9780199498734.003.0019>
- Dubash, N.K., Joseph, N.B., 2016. Evolution of Institutions for Climate Policy in India. *Econ. Polit. Wkly.* 51, 44–54.
- Fischer, F., Miller, G.J., 2017. Handbook of public policy analysis: theory, politics, and methods. Routledge.
- Hirth, L., 2013. The market value of variable renewables. The effect of solar wind power variability on their relative price. *Energy Econ.* 38, 218–236. <https://doi.org/10.1016/j.eneco.2013.02.004>

- International Energy Agency, 2020. India 2020: Energy Policy Review, International Energy Agency. <https://doi.org/10.1007/BF03404634>
- Keady, W., Panikkar, B., Nelson, I.L., Zia, A., 2021. Energy justice gaps in renewable energy transition policy initiatives in Vermont. *Energy Policy* 159, 112608. <https://doi.org/10.1016/j.enpol.2021.112608>
- Kumar, G.S., 2017. Anatomy of Indian energy policy: A critical review. *Energy Sources, Part B Econ. Plan. Policy* 12, 976–985. <https://doi.org/10.1080/15567249.2017.1336814>
- NITI Aayog, 2017. Draft National energy policy, NITI Aayog.
- Patlitzianas, K.D., Doukas, H., Kagiannas, A.G., Psarras, J., 2008. Sustainable energy policy indicators: Review and recommendations. *Renew. Energy* 33, 966–973. <https://doi.org/10.1016/j.renene.2007.05.003>
- Shukla, P.R., Chaturvedi, V., 2012. Low carbon and clean energy scenarios for India: Analysis of targets approach. *Energy Econ.* 34, S487–S495. <https://doi.org/10.1016/j.eneco.2012.05.002>
- Tongia, R., Gross, S., 2019. Coal in India: Adjusting to Transition. *Brookings Pap.* 7.

**Course proposed by**

**Recommended/ Not recommended**

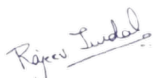
**This course is approved/not approved**



(Deepika swami )

Convener, DPGC (SEE)

Chairman, SPGC



(Rajeev Jindal)

**Modified course vs. present course:** Revised course looks at the energy policy in a more holistic manner, with consideration of various dimensions including, energy resources, their exploration, production, generation along with the broad range of policy initiatives related to both renewable and non-renewable energy, which were found to be missing in the earlier version of the course. Thereby, this course is more comprehensive in nature and focuses on integrating technological, environmental, economic and social aspects with energy policy. The revision in course content is > 50%,



# Department of Sustainable Energy Engineering Indian Institute of Technology Kanpur

## Proposal for a New Course

This is the current version

|   |   |
|---|---|
| Course Title  | Introduction to Sustainable Energy Policy   |
| Number  | SEE-617   |
| Credits (L-T-P [C])   | 2-0-0-6   |
| Departments proposing the course  | : Sustainable Energy Engineering  |
| Name of the Proposer  | : Pradip Swarnakar Anoop Singh  |
| Offered for   | PG Students of SEE and other departments<br>3/4 <sup>th</sup> year UG students of other departments |
| Status of the course  | : PG Elective/ UG Elective  |
| Prerequisite(s) for the course  | : Consent of Instructor   |
| Faculty members interested in teaching  | : Pradip Swarnakar, Anoop Singh   |
| Other Departments/Programmes of whose the students are expected to take up the course | : ME, EE, CHE, MSE, AE, IME, ECO  |

### Course Objectives (Please outline objectives of the course)

The overall objective of the course is to provide students with a comprehensive understanding of the energy policy in India with special reference to clean and renewable energy sources. The role of sustainable energies in shaping the future trajectories of the policy. With climate change threatening the very survival of humanity, the energy transition has climbed to the top of the priority list for the policy-makers. The transition is a multi-dimensional process with technical and social transformations at the heart of it. The course will discuss role of policy framework in shaping up this transition.

### Expected Learning Outcomes (Please outline what will students be able to achieve after doing the course)

The students completing this course will be equipped with the theoretical and analytical abilities to examine the nuanced relationship between energy policy and society and how the transition towards sustainable energy systems affects and modifies this relationship. They will understand how the technological innovations are embedded in the overall socio-political fabric. The course will give a human and social dimension to their innovative thinking, motivating them to come up with socially sensitive and policy relevant technical solutions in the field of sustainable energy.

### Course outline

The course begins with providing an overall context about the relationship between energy and society. Next, it focuses on theoretical approaches to understand the policy processes. Following this, it traces the historical development of the energy policy in India. The major emphasis of the course will be on the more contemporary development of the energy policy in India within the context of global climate change governance and the increasing prominence of sustainable energies within it. The course ends with foregrounding the policy challenges of governing a just sustainability transition towards renewables.

### Lecture wise breakup

| S.No. | Topics   | Lectures |
|-------|--|----------|
| 1.    | Introduction: Situating energy within social relations and society   | 02       |
| 2.    | Public Policy: Definition; various approaches to study public policy – elite theory, systems theory, group theory, institutional theory, rational-choice theory  | 03       |
| 3.    | Energy Policy in India (1):<br>(a) Historical background and overview;(b) Understanding the dependence on of conventional sources: the post-independence importance of coal in the Indian context; the socio-political economy of coal and its integration into the energy policy.   | 03       |
| 4.    | Energy Policy in India (2): Institutional development and major regulatory bodies. Sector-specific policy discussion, coal, oil, electricity, RE etc.  | 02       |
| 5.    | Indian energy policy and global climate governance (pre-2007): Claims on Energy justice and insulation from global climate politics; India's role in building the global Southern block  | 01       |
| 6.    | Indian energy policy and global climate governance (post 2007): Increased global integration of energy policy with global climate governance; role of renewables in national plan against climate change: NAPCC, Copenhagen 2009 and Paris Agreement 2015. Understanding energy policy instruments within the context of climate change: coal tax and subsidies of renewables. | 04       |
| 7.    | Renewable energy and challenges for Energy Policy in India: Governing energy transition efficiently- how to price renewables; how to make them financially viable for mass acceptance; The role of science and technology in assisting policy making around energy.  | 03       |
| 8.    | Renewable energies and contested futures: Understanding just transitions: Why we need justice in renewable energy transition?  | 02       |
| 9.    | Environmental Policy Action in India: Coal tax/cess, Energy efficiency and energy security, Energy access and renewable energy, Sustainable energy resources (challenges and opportunities)  | 06       |

Text-books, reference books, suggested readings and any other references

Dubash, Navroz K. 2019. *India in a Warming World: Integrating Climate Change and Development*. Oxford University Press.

Dubash, Navroz K., Radhika Khosla, Narasimha D. Rao, and Ankit Bhardwaj. 2018. "India's Energy and Emissions Future: An Interpretive Analysis of Model Scenarios." *Environmental Research Letters* 13(7):074018. doi: 10.1088/1748-9326/aacc74.

Goldthau, A. (Ed.). (2016). *The handbook of global energy policy*. John Wiley & Sons.

Jasanoff, Sheila. 2018. "Just Transitions: A Humble Approach to Global Energy Futures." *Energy Research & Social Science* 35:11–14. doi: 10.1016/j.erss.2017.11.025.

Mitra, S. (2019). *TEnergizing India: Fuelling a Billion Lives*. Rupa Publications.

Singh, A. (2006). Power sector reform in India: current issues and prospects. *Energy policy*, 34(16), 2480-2490.

Singh, A. (2008). The economics of Iran-Pakistan-India Natural Gas pipeline. *Economic and Political Weekly*, 57-65.

- Singh, A. (2009). A market for renewable energy credits in the Indian power sector. *Renewable and Sustainable Energy Reviews*, 13(3), 643-652.
- Singh, A. (2009). Climate co-benefit policies for the Indian power sector: domestic drivers and North—South cooperation. *Climate Policy*, 9(5), 529-543.
- Swarnakar, Pradip. 2019. “Climate Change, Civil Society, and Social Movement in India.” Pp. 253–72 in *India in a Warming World*. Oxford University Press.
- Urpelainen, Johannes, and Setu Pelz. 2020. *Covid-19 and a Just Transition in India’s Coal Mining Sector*. John Hopkins.
- Vihma, Antto. 2011. “India and the Global Climate Governance: Between Principles and Pragmatism.” *The Journal of Environment & Development* 20(1):69–94. doi: 10.1177/1070496510394325.
- Wu, F. (2018). *Energy and climate policies in China and India: A two-level comparative study*. Cambridge University Press.
- Yenneti, Komali, and Rosie Day. 2015. “Procedural (in)Justice in the Implementation of Solar Energy: The Case of Charanaka Solar Park, Gujarat, India.” *Energy Policy* 86:664–73. doi: 10.1016/j.enpol.2015.08.019.

**Course proposed by**



(Pradip Swarnakar)

**Recommended/  
Not recommended**

Convener, DPGC (SEE)

**This course is approved/not  
approved**

Chairman, SPGC



(Anoop Singh)