This course explores the implications for the U.S. electricity system of policies designed to slow and ultimately stop the increase in the atmospheric concentration of CO₂ and other greenhouse gases. The logic of such policies requires two things. First, most energy must be delivered to end users in the form of electricity. Vehicles must be powered by electricity rather than by gasoline or diesel fuel; homes and water must be heated by electricity rather than by natural gas. Second, that electricity must be generated in a way that produces near-zero net emissions of greenhouse gases into the atmosphere.

The course is divided into five parts.

- Part 1 introduces the course by looking at the logic summarized in the preceding paragraph, at alternative bases for the policies, and at plans for three jurisdictions that seek to achieve radical transformations of their electricity systems: California, Germany and Japan.

- Part 2 looks at the most important target for electrification: vehicle transportation.

- Parts 3-5 look at the three alternatives for achieving near-zero net emissions in the generation of electricity: renewable energy, carbon capture and storage, and nuclear power.

A topic that will receive little treatment in the course is energy conservation. The lowest cost way to reduce energy-related emissions is to use less energy. The topic nevertheless is not included in the course for two reasons. One is that most actions to reduce energy consumption must be taken by energy users rather than by the electricity industry. Improved home insulation and more efficient light bulbs are examples. The second is that after all possible conservation measures have been taken, modern society still will require enormous amounts of energy, and the question will remain: how can that energy be supplied without significant greenhouse gas emissions into the atmosphere. The three alternatives examined in this course – renewables, carbon capture and storage, and nuclear – appear to comprise the complete list of possible answers to that question.

Readings, Grades and Exercises
There is no required text for the course. Some assigned readings will be available electronically through the JHU library, but most will be available on the Internet or posted on Blackboard. Assignments for the first three classes will be posted on Blackboard at least two weeks before the first class.

For the course grade, about 40% weight will be given to exercises during the term and the remainder to the final examination. For most exercises, students will work together in randomly assigned two- or three-member teams.

**Instructor**

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