Climate, Energy, and the Politics of Change*

Professor John Zysman† and Mark Huberty‡

March 2, 2012

1 Introduction

This course explores the problem of climate change, the economic and political challenges in addressing it, and the success or failure of attempts by both individual countries and the international community to do something about it. We begin from a consideration of the natural and social basis of the climate problem itself, before turning to the mainstream discussion of the politics and economics of climate change mitigation policy. We then step back to consider climate change as a problem of large-scale transitions in social and technological systems, and look to other examples from history to understand how we should expect the climate change problem and its solutions to evolve. Finally, we consider three radical set of critiques of climate change and mainstream climate policy, that together point out a set of unique political and economic problems.

While there are no prerequisites for this course, students should be prepared to absorb a diverse range of material from the natural as well as social sciences. Course lectures will review concepts that might be unfamiliar to students, as well as considering their social, political, and economic implications.

2 Course Requirements

This course will be reading intensive across broad range of literature from the natural and social science. Students are expected to be up-to-date on the reading. Lectures will not cover the readings in detail, but will emphasize new concepts that students may not be familiar with, or the implications of the readings for social and political systems.

This course will also have a heavy writing component that will emphasize analytic reasoning and clarity. Students will prepare, over the course of the semester, a 15-20 page

*Spring 2012

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paper on an analytic problem of their choosing related to questions raised by the course materials. Further information will follow as paper deadlines draw closer.

2.1 Grading

Grades will be based on performance in three areas:

- Class participation (20%) Class participation should emphasize contributions to the analytic focus of the class, rather than just demonstration of having done the reading. Indeed, we expect students to have done the reading for each class. We're rather more interested in what you think about the readings and their implications for how climate policy might evolve.

  At several points in the semester, students will also be asked to make short presentations in class.

- Class project (65%) Students should expect to prepare a significant (4000) word research project on a topic related to the course. Students may work on related topics, but must submit individual papers.

- Final exam (15%) The final exam will consist of one or two long-form essay questions. Its primary purpose is to allow students to demonstrate their mastery of the readings.

2.2 Late submission of work

Late submission of work is highly discouraged. Late work will be reduced by one letter grade unless accompanied by written proof of extenuating circumstances. Students who foresee work arriving late due to illness or other factors are encouraged to contact the professor as early as possible.

2.3 Plagiarism

Plagiarism, is, of course, not tolerated. The University functions as a community because we are generous with our knowledge and respectful of others'. Clearly indicating where we learned from others is part and parcel of that. Doing otherwise undermines the very thing that allows the University to do what it's best at–discovering and communicating new things about the world. Students are expected to adhere to the University's policy on plagiarism.

3 Course project

As noted above, 65% of the course grade will depend on a significant research paper of 4000 words, covering a topic related to the course content. The instructors will provide a list of candidate topics that students can choose from. Students may also select their own, but must consult with the instructors before doing so.

Several mid-semester deadlines will help students structure the project:

- January 24: Students should an email with general areas of interest to both Mark Huberty and Professor Zysman
- February 21: Paper topic selection and proposal due at the start of class.
- March 20: Full sentence outline of the paper due at the start of class. Instructors will schedule time to discuss the outlines with students that week and again after spring break.
- April 24: Final paper due at the start of class.

4 Course Logistics

4.1 Location and time

The course will meet on **Tuesdays from 2-4pm in Barrows 706**. Please note that we may need to reschedule class the week of April 7 due to prior commitments by both instructors. You will be notified before Spring Break of any change.

4.2 Readings

All readings are available as PDFs through bSpace. Please contact one of the instructors if you have difficulty accessing the readings.

4.3 Office Hours

Office hours for Mark Huberty are scheduled for Monday afternoons from 2-4pm in Barrows 716 (Prof. Zysman's office). Please email him for an appointment if this time doesn't work.

Office hours for Prof. Zysman are by appointment. Please contact him directly to schedule time to meet.

Extra office hours will be scheduled to discuss paper proposals and final presentations.

5 Course Outline

This course emphasizes three broad themes:

1. The basis of climate change and the conventional responses to it
2. The origins of climate change in modern energy systems, and the political and economic characteristics of a low-emissions systems transformation
3. Forward-looking radical solutions to the climate problem, including green growth and geoengineering

5.1 Background: causes and approaches to climate solutions

We begin with an overview of the dominant narrative on the causes and consequences of climate change, and policy options for dealing with it. The physical science that has led to the understanding that climate change is a real and present danger also has much to say about who benefits and loses from climate change. But it says almost nothing about the best way to structure a response. There, economics, more so than any other discipline, has had the most influence (often for good reasons). These four weeks will consider how domestic and international policy should respond to the scientific projections on the location and severity of climate change.

5.1.1 Week 1 (January 17): Where we're coming from

NOTE: students are expected to have read the materials below prior to the first week of class.

We might as well get our biases out up front. This week reviews recent work by the course instructors and their collaborators on the problem of climate change and energy-driven emissions. This week is intended to let you know where our views lie, so you can discount the rest of what we say appropriately.

Readings:

- Giddens (2009, introduction and chapters 1-2)
- Zysman and Huberty (2011)
- Huberty (2011)

5.1.2 Week 2 (January 24): Climate change: what do we know and how?

EMAIL WITH INTEREST AREAS DUE TO MARK HUBERTY AND PROF. ZYSMAN

Most people begin and end with the emissions problem that lies at the heart of climate change. But understanding whether and how to respond to climate change requires a deeper understanding of the consequences that climate change will most likely have, and the uncertainties that surround our understanding of those consequences.

Readings:

- Solomon et al. (2007, Introduction and summary for policymakers)
- Parry et al. (2007, Introduction and summary for policymakers)
  These readings constitute parts I and II of the landmark IPCC Fourth Assessment Report on climate change. Part I deals with the causes, and Part II the consequences, of unchecked climate change.

Students should consider the following questions when reviewing the reading:

1. How do the sources or origins of the climate change problem compare to the distribution of damages from climate change?
2. Do these reports document uncertainties around projected changes to the global climate? How? How large are they?

5.1.3 Week 3 (January 31): Responding to climate change: carbon pricing and its discontents

An economic view of the climate change problem has dominated the discussion of climate policymaking. The concept of negative externalities, and the logic of economic efficiency, are central to that discussion. This week covers the concepts of emissions pricing and cap-and-trade systems. In covering this week's readings, students should pay particular attention to the assumptions made by advocates of a price-based approach when constructing their arguments and models.

Readings:

- Baumol (1972)
  What is an externality, and how might we deal with it?

- Weitzman (1974)
  Should we pay attention to the distribution of risks, and not just the level? What does that do to our policy proposals?
- Nordhaus (2010)
  Is price enough to deal with climate change, and why?
- Victor (2011, Chapters 1-2)
  What about the politics of prices? Surely they matter somewhere?

Students should consider the following questions in reviewing this week's readings:

1. What is the principal difference between Nordhaus and Victor? Are they prioritizing the same things?
2. Based on what we read in week 1, how would Nordhaus or Weitzman justify their respective positions on the best kind of climate policy?

5.1.4 Week 4 (February 7): Responding to climate change: what might it cost and who should pay?

Readings:

- Stern (2006, Executive summary)
  The Stern Review constitutes the most comprehensive consideration of the economics of climate change published to date. However, as we shall see, it is not without its critics.
- Nordhaus (2006)
  Nordhaus pays attention to one particular aspect of the report: how it values the welfare of present versus future generations, and how that matters to its conclusions
- Weitzman (2007)
  Weitzman asks a different question: what if the costs of climate change are discontinuous (i.e., they might very quickly become very large past a certain emissions level)?

Students should consider the following questions in reviewing this week's readings:

1. What justification does Stern provide for the assumptions that Nordhaus and Weitzman attack?

2. Are there other inter-generational problems that you can think of (such as, for instance, retirement or health care) in which the problem of who pays and who benefits has been solved in the past? Does that help us think about this problem?

3. What do any of the arguments reviewed this week assume about the broader political situation? Do they discuss it at all? Is this a problem?

5.1.5 Week 5 (February 14): International responses to climate change

Now that we have in hand the origins of climate change and the opportunities and costs of potential responses, we can pay closer attention to the politics of acting. Though the principle causes of climate change originate from a small set of countries, the problem will have global consequences. Moreover, as the emerging economies develop, their emissions growth could, if left unchecked, overwhelm any reductions by the industrialized economies. This problem led, early on, to the search for an international agreement on emissions control. But, with the exception of the Kyoto Protocol, agreement has proven hard to arrive at and even harder to enforce.

This week will examine the structure, function, and failure of international agreements on climate change mitigation.

Readings:

- Keohane and Victor (2011)
- Victor (2007)
  These two readings detail the structure, potential, and shortcomings of the structure of international climate negotiations.
- Victor (2011, Chapters 7-8)
  Based on those readings, Victor then turns to other possible structures that might perform better.
- Kemfert (2004)
- Buchner et al. (2005)
  Finally, the US has been a laggard in adopting or complying with global negotiations. These readings explore what incentives might draw the US back in.

Students should consider the following questions in reviewing this week's readings:

1. Climate change is a global problem. Several authors here suggest, however, that requiring its solution to be global as well caused major problems. What problems could have arisen if the proposals of, say, Victor had been used from the start?

2. What does the experience of the US exit from the Kyoto Protocols teach us about the problem of international regimes?

3. Should (can) we rely on international negotiation to solve the climate issue?

5.2 Climate change and socio-technological systems

To this point, we have focused on the macro analysis of climate change. This analysis has emphasized the emissions problem first and foremost and sought ways of responding directly to that problem. But those emissions result from highly complex social and economic systems of production, the majority of which rest on a foundation of highly reliable, reasonably priced energy. The next several weeks consider how the political, economic, and technical structure of the energy system influences the politics of emissions reduction.

5.2.1 Week 6 (February 21): Energy systems

PAPER PROPOSAL DUE AT THE START OF CLASS

This week begins the discussion of the energy system by asking one synthetic question: how did the structure of today's energy system emerge?

Readings:

- (Troesken, 1996, Introduction)
  Troesken asks a simple question: why do we have energy utilities?

- Hughes (1962, 1976)
  Hughes has written perhaps the best historical accounts of large-scale technological change in the US electricity system. In these two pieces he explores the inter-linkage of the technical, economic, and political nature of the energy system

- (Smil, 2011, Introduction and conclusion)
  Smil takes pains to point out the myriad problems of energy systems transitions, and cautions against optimism that these problems can be easily circumvented.

- Pfund and Healey (2011)

Students should consider the following questions in reviewing this week's readings:

1. How would you describe the structure of modern energy systems?
2. Was that structure inevitable?
3. How would changing one piece of the system affect the rest?
4. If Smil is right about how long it will take to change the system, then what implications does that have for the political regime that will govern it?

5.2.2 Week 7 (February 28): Low-emissions energy systems

Now that we have some idea of where the energy system came from, we can also ask where it is going. This week looks at two questions vital to the restructuring of modern energy systems: where the new technologies will come from, and what problems–technical and otherwise–they will pose to the energy system.

Readings:

- Integration of Variable Generation Task Force (2009)
  The task force asks what it actually means to adopt large amounts of renewable energy in the US power grid.
- Grübler et al. (1999)
  Many of the technologies that we would need for emissions reduction don't yet exist. This paper asks what we know about the dynamics of large-scale technological change and innovation.

Students should consider the following questions in reviewing this week's readings:

1. What are the primary *technical* problems at stake in a low-emissions energy systems transformation?
2. What *economic* or *political* implications do these technical challenges have?
3. How might we expect these challenges to vary across countries?
4. If they vary, then what implications does that have for the global arrangements we studied in week 4?

5.2.3 Week 8 (March 6): Stepping back: climate as a socio-technological problem

Each of this week's readings explore the question of how technological choices and change are grounded in patterns of economic, social, and political life. Todd (1987) in particular takes up the question of energy and electricity generation, while the others look at other kinds of technologies.

- Perez (1983)
- Todd (1987)
- David (1990)

Students should consider the following questions in reviewing this week's readings:

1. Do technological transformations themselves necessarily create productivity and prosperity? Do they do so in the same ways in all states? Why or why not?
2. Based on what we discussed in weeks 5-6, what would these readings have to say about the dynamics of a low-emissions energy systems transformation?

5.2.4 Week 9 (March 13): Have we seen this before? Precedents for large-scale socio-technological change

Technological changes on the scale of those required for significant emissions reduction are large but not unprecedented. This week asks what lessons, if any, previous episodes of technological change have for the policymaking problem and the politics of climate change in general.

Readings:

- Smil (1994, Chapter 1)
  Smil is primarily interested in the pattern of energy use across both societies and time, and the issues at stake when those patterns change.
- Sieferle (2001, Chapter 1)
  Sieferle refers to the initial shift from wood to coal as the adoption of a "subterranean forest"–millions of years of accumulated photosynthetic energy available for powering human activity. That had consequences for a wide range of issues, well beyond its near-term implications for thermal heat in 17th century England.

- Hanemann (2009)
  Hanemann notes that, like the story recounted by Sieferle, we've made major changes to energy and other technological domains before, sometimes even for environmental reasons. He asks whether this provides a guide to the climate challenge, and if not, why.

- Maier (1975, 1981)
  The two readings by Maier address the question in a different fashion: what do the politics of large-scale transformations look like? The Industrial Revolution wrought vast changes to energy systems, economic institutions, and social life. From early in that process, many (like Marx) doubted whether the technical and economic transformation could stabilize itself. Yet it did, especially after 1945. Maier asks how that occurred.

- Patashnik (2003)
  Patashnik asks a subtly different question: what sustains reform after it passes? Since climate change mitigation will take 50-75 years, this is a pertinent question.

Students should consider the following questions in reviewing this week's readings:

1. Based on these readings, is it enough to say that climate change policy is about emissions? What else might / should we add to our understanding of climate policy?

2. What does Maier imply about the conditions that provide political stability to the capitalist system? Does climate policy generate similar conditions?

3. What would Patashnik say about what Maier describes, and how does that matter for climate policy stability?

5.2.5 Week 10 (March 20): What have states actually done? The advanced industrial economies

PAPER OUTLINE DUE AT THE START OF CLASS

Germany, Denmark, and the UK have all taken fairly aggressive steps to curb their own fossil fuel consumption. But those steps have varied across countries. The readings this week detail what those different policy regimes look like, both in the past and now.

- Germany: Jacobsson and Bergek (2004); Jacobsson and Lauber (2006)

- Denmark: Heymann (1998); The Danish Government (2008)

- The United Kingdom: Lipp (2007) and United Kingdom (2010)

NOTE: Student groups will be asked to prepare a short (5 minute) presentation on companion pieces to these readings. The pieces are part of a forthcoming book being prepared by the instructors–hence brutal criticism is welcomed!

Students should consider the following questions in reviewing this week's readings:

1. Is there any common theme to how industrialized countries have sustained progress on low-emissions energy?
2. The UK is usually regarded as a more "free market" system than either Denmark or Germany. Does this hold true for its renewable energy policy? Why or why not?

5.2.6 Week 11 (April 3): What have states actually done? China, India, and the emerging economies (Zysman)

NOTE: This class will tentatively be moved to April 5 pending Prof. Zysman's schedule.

Rapidly developing economies like China and India are usually seen as reluctant participants in emissions control–for them, economic growth may take priority. But beneath the surface, they and other developing economies are rapidly becoming important markets in and exporters of renewable energy and low-emissions goods. This week studies why these countries have pursued this kind of activity, and with what consequences for both the economics and politics of climate change.

- An overview: Chandler et al. (2002)
- India: Rai and Victor (2009)
- China: Levine and Aden (2008); Zhou et al. (2010)

NOTE: Student groups will be asked to prepare a short (5 minute) presentation on companion pieces to these readings. The pieces are part of a forthcoming book being prepared by the instructors–hence brutal criticism is welcomed!

Students should consider the following questions while reviewing these readings:

1. China and India are becoming players in renewable energy goods markets. What effects has this had on those markets? Has it had political effects as well?
2. How do the emissions reduction activities of developing economies compare to those of developed economies? Is there a logic to these differences?

5.3 Beyond the margin: radical proposals for the climate challenge

Thus far, we have focused on mainstream approaches to reducing emissions. As we have seen, these approaches are not without their problems, and have encountered considerable political opposition to aggressive implementation.

But some would argue that climate change is a harbinger of deeper problems that these approaches will not solve. Instead, these critiques point to what they believe to be fundamental flaws in either the system that mainstream approaches seek to preserve; or the entire emissions reduction paradigm itself. The final three weeks will consider the merits and challenges posed by three forms of this critique:

1. A thorough argument about the unsustainability and injustices of an economic system of production founded and dependent on exponential growth in a world of fixed resources
2. An approach to climate change mitigation that ignores emissions and instead tries to change the responses of the global climate to emissions
3. An argument that the investments needed to reduce emissions might become the foundation of new forms of "green" economic growth, rather than just costs, and thus should be enthusiastically pursued

5.3.1 Week 12 (April 10): Saving the system: slow down or bail faster

This week examines two radically different approaches to fundamentally altering the relationship of human activity and the environment. One side argues that the system of economic production we see today is fundamentally unsustainable. Exponential growth in a finite world is, in this view, a problem without technological solutions. Instead, real climate change mitigation requires the fundamental re-working of the system, not just the mitigation of its less pleasant byproducts.

The other side could not be more different: geo-engineering advocates argue that we should be more aggressive in attempts to alter the natural environment, engineering the climate to mitigate emissions in the same way we would engineer any other system.

Both solutions present real problems in the face of what we know about the science, politics, and economics of political and environmental stability.

This class will primarily consist of a debate, presented by opposing teams of students. Further detail will be provided as the semester progresses.

Slowing down: making society more environmentally friendly

- Schepelmann et al. (2009)
- Speth (2009, Introduction and Part One)

Students should consider the following questions in reviewing these readings:

1. The readings here present two views of what *could* be done. What, if anything, do they say about *how* their proposals could be implemented or sustained?
2. What problems would these proposals pose for the kind of settlement discussed by Maier (1981)?

Speeding up: making the environment more tolerant of accellerating growth

- Rasch et al. (2008)
- Wigley (2006)
- Shepherd (2009, Sections 1-5)
- Jamieson (1996)
- Kiehl (2006)

Students should consider the following questions in reviewing these readings:

1. Is there a difference between what we might call "negative" interventions like emissions reduction, and "positive" interventions that seek to solve the problem of one set of changes by making other changes elsewhere?
2. What trade-offs must we make to implement geo-engineering?
3. How do advocates of geo-engineering justify those trade-offs?
4. What consequences would those trade-offs pose for domestic or international governance?
5. What challenges does geo-engineering pose for governing the global climate? Are those different from or the same as the challenges that have derailed international climate talks in the past?

5.3.2 Week 13 (April 17): Green growth(?)

So far, we have discussed climate change investments as costs to be minimized. "Green growth" suggests that these investments could instead become sources of growth themselves. Depending on your perspective, this is either a temporary fad, a fantastic fraud, or the most promising development since the second Industrial Revolution.

This week will examine the economic arguments behind green growth and their political implications.

Readings:

- Barbier (2010)
- OECD (2011)
- Huberty et al. (2011)

Students should consider the following questions in reviewing this week's readings:

1. If feasible, what implications might "green growth" have for the politics of climate change action?
2. How might the prospects for "green growth" vary across countries, and why?
3. What is the specific mechanism that either Barbier or the OECD propose by which green leads to growth?
4. How does this version of "green growth" contrast with the version proposed in week 12? What problems does this version solve that the other did not? What problems does it leave unsolved?

5.3.3 Week 14 (April 24): Course review

FINAL PAPER DUE 6 MAY BY 9AM

Paper submissions can occur via email (preferred) or in hard copy.

- If email, please send to markhuberty@berkeley.edu, zysman@berkeley.edu, and kate.brie@gmail.com
- If hard copy, please drop a copy off with Kate Goldman at the BRIE offices

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