

**ESPP 90z**  
**Climate Policy—Past, Present, and Future**  
Fall 2017

*Instructor:* [Gernot Wagner](mailto:gwagner@fas.harvard.edu)  
[gwagner@fas.harvard.edu](mailto:gwagner@fas.harvard.edu)  
Harvard University Center for the Environment  
26 Oxford Street

*Class:* Mondays 2:45-5:15 pm\*  
26 Oxford Street, Room 429

*Office Hours:* Mondays 1-2:45 pm†

## **A. COURSE OVERVIEW AND OBJECTIVES**

What's the optimal way to curb carbon emissions? Should we price fossil or subsidize low-carbon energy? What's the role of solar geoengineering? What should it be? What will it be?

The course has two goals: to provide a set of tools to approach these and many other fundamental climate policy questions, and to help us distinguish positive (“what will be”) from normative (“what should be”) analysis. Economics and political economy provide particularly powerful lenses through which to analyze climate policy—past, present, and future.

Many questions discussed don't have a clear answer. Come prepared to argue both sides of each issue in class. Student-led debates, semi-regular 1,000-word essays, and the final paper will reinforce class discussions. They will also ask you to pick a side. Think *Economist* leader: crisp, logical, and always with a point of view. By the end of the course, you will be well prepared to apply fundamental economic and political economy tools to a host of climate questions, and to do so without fear, favor, or jargon.

## **B. PREREQUISITES**

Formally, the prerequisite is *Economics 10ab: Principles of Economics*. Informally, it is simply that we need to speak the same language. Please talk to me after the first class if you don't meet this formal requirement, or if you have other questions or concerns.

---

\* With one exception: The first class meets on Friday, September 1<sup>st</sup>, same time. Note that this day is the only class before the course registration deadline (Wednesday, September 6<sup>th</sup>). Please check the course outline below for a detailed agenda.

† Other times by appointment. Just [email me](mailto:gwagner@fas.harvard.edu). You'll hear back from AI scheduler “Andrew” to help find a time. Another option: most days 6:15-7:00 a.m. somewhere between [B.U. and Eliot Bridges](#).

## C. COURSE MATERIAL

There is no textbook. All readings are available online or via the course website except (ironically) my own book, [Climate Shock](#). The whole book isn't required reading, though the preface is on the reading list for week 1, the 'fat tails' chapter is on the list for week 5, and chapters 5 and 6 are on the syllabus for the discussion on solar geoengineering. The book is available at the Coop and on reserve in Lamont.

This is not a drill.

It's not a class taught in a vacuum, to give you abstract tools. It's about real-world questions, using real-world tools. That implies that there is no one-size-fits all approach. Reading amounts, thus, vary by topic, week, and type of material. Use your judgment.

If the report is 150 pages long, skim it.

If it's a non-technical, 5-page article, study it.

If it's a dense, technical economics paper, [focus](#) on the main results presented in abstract, introduction, and conclusion; don't internalize footnote 18 from the technical appendix.

In short, come prepared to discuss the gist of the reading materials and be able to submit brief reflections prior to class. A good portion of your grade depends on it. Equally important, where appropriate, incorporate the readings into your short essays, peer reviews, and the final paper.

Given the rapidly changing nature of energy issues, this syllabus will inevitably evolve—most likely during the semester. I will announce any changes to the reading list at least a week before the respective class discussion. Similarly, feel free to suggest both topics and readings you deem particularly relevant for the course.

There are many good general surveys that aren't just interesting but also fun to read. One is Daniel Yergin's *The Quest: Energy, Security, and the Remaking of the Modern World*. Another is David MacKay's [Sustainable Energy – without the hot air](#). Both will not just make you a better climate economist and policy analyst, they will also make you a better writer.

## D. GRADING

Type	Description	%
Participation and engagement	Actively engage with the readings and participate in class discussions.  The 30% total is made up of three parts:	30%

Type	Description	%
	<ol style="list-style-type: none"> <li>1. Brief (150-300 word) reflections on the readings, posted by 10:00 p.m. the day before class on Canvas. (Total grade: 5-15%)</li> <li>2. Active engagement in the conversation to debate the merits and demerits of any one particular approach and tool. (Total grade: 5-15%)</li> <li>3. Three brief peer reviews (150-300 words) of short essays (3.33% each)</li> </ol> <p>The ratio between the first two parts is not fixed: to those more comfortable with written comments, emphasis (up to 15 percentage points of the 30% total) will be placed on the pre-class postings. To those more comfortable with oral participation during class, emphasis (up to 15 percentage points) will be placed on class participation.</p> <p>Bonus points for anyone able to point to recent news stories relevant to the topic at hand. (Please post them, by 10:00 p.m. the night before each class, on Canvas, in addition to your reflections on the readings.)</p> <p>The third part is peer review of short essays submitted by your colleagues. Your job is to write short (150-300 word) constructive critiques of your colleagues' essay submissions, between 10:30 p.m. on Thursday and 10:00 p.m. on Sunday of that week. You will be randomly assigned to review an essay from one of your peers, ideally in weeks when you do not submit an essay yourself.</p>	
Short Essays	<p>You might call them "policy memos." You might call them "op-eds." Either way, these three short essays have a point of view, they are well argued, and they come in at just around 1,000 words (sans bibliography).</p> <p>You are asked to indicate by Monday 10:00 p.m. whether you are submitting an essay by that same Thursday. Final submissions are due as a Word or PDF file via Canvas by Thursday 10:00 p.m. the week the topic appeared on the syllabus. If you are late, it is your responsibility to negotiate with your assigned peer reviewer to assure that the review can still happen by Sunday, 10:00 p.m.</p> <p>Essays will be graded on a 10-point scale, and each counts for 10% of your final grade.</p> <p>Please add a word count and make sure it comes within 50 words of 1,000 to avoid point deductions. If you submit more than three 1,000-word essays, your overall essay grade will be based on the best three of the first four submitted. Make sure to use proper citations of materials, including those from the syllabus.</p>	30%
Final Essay	The final paper is generally between 10,000 and 15,000 words long and	40%

Type	Description	%
	<p>covers one or more of the topics discussed in class in greater depth.</p> <p>Please discuss and get approval for the paper topic before you begin writing, and no later than Monday, October 30<sup>th</sup>. Outlines are due Monday, November 13<sup>th</sup>. The paper is due by Wednesday, December 6<sup>th</sup>.</p>	
<b>Total</b>		<b>100%</b>

### **E. ESSAY GRADING POLICIES**

All written assessments are individual. Discuss the topic with each other; join up in reading groups; come to office hours alone or in groups to discuss details; but submit your own, individual essays.

If you need more time, you will need to optimize in light of the following time-grade tradeoff: You will lose one point (out of a possible 10) for each day the essay is late—i.e. minus 1 between Thursday 10:01 p.m. and Friday 10:00 p.m., minus 2 between Friday 10:01 p.m. and Saturday 10:00 p.m., and minus 3 between Saturday 10:01 p.m. and Sunday 10:00 a.m. Submissions will be accepted until 10:00 a.m. on Sunday after the due date. After that point, your essay will be marked as a zero, assuming it's required (i.e. if you don't submit at least three 1,000-word essays over the course of the semester). In addition, you need to negotiate the timing of your submission with your assigned peer reviewer for that week.

### **F. ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES**

Students needing academic adjustments or accommodations because of a documented disability must present their Faculty Letter from the [Accessible Education Office](#) (AEO) and speak with the instructor by the end of the second class, Monday, September 12<sup>th</sup>. Failure to do so may result in the instructor's inability to respond in a timely manner.

## G. COURSE OUTLINE

Week	Date	Title/Concept	Readings
1	Sep 1 (Fri)	How do world markets react when U.S. oil consumption changes?  [Economic policy concept(s)/learning objective:] <i>Demand basics: elasticity, rebound effect</i>	<i>Please read at least the Pop Quiz (and the syllabus) before the first class, ideally the other readings, too. (You will need them for this week's 1,000-word essay due on September 12<sup>th</sup>):</i> Wagner, Gernot and Martin L. Weitzman, <a href="#">Climate Shock: the economic consequences of a hotter planet</a> , Princeton University Press, 2015: "Pop Quiz." (Excerpted in <a href="#">Ensia</a> ) Gillingham, Ken, David Rapson, and Gernot Wagner. " <a href="#">The Rebound Effect and Energy Efficiency Policy</a> ," <i>Review of Environmental Economics and Policy</i> (Winter 2016). Hughes, Jonathan E., Christopher R. Knittel, Daniel Sperling. 2008. " <a href="#">Evidence of a Shift in the Short-Run Price Elasticity of Gasoline Demand</a> ." <i>Energy Journal</i> 29 (1). <i>Optional:</i> Revkin, Andrew C. " <a href="#">Another Round on Energy Rebound</a> ." <i>New York Times</i> DotEarth blog, 24 October 2014.
	Sep 4	[Labor Day, no class]	[Please indicate by 10:00 p.m. on September 4 <sup>th</sup> whether you would like to write an essay this first week, due Thursday 10:00 p.m.]
2	Sep 11	Are we running out of oil? Aka should Greenpeace have a picture of John D. Rockefeller in each of its offices?  <i>Supply basics: Hotelling &amp; Hubbert</i>	Yergin, Daniel. 2011. " <a href="#">There will be oil</a> ." <i>Wall Street Journal</i> , 17 September. Krautkraemer, Jeffrey and Michael Toman. 2003. "Fundamental Economics of Depletable Energy Supply." RFF Discussion Paper 03-01. (skim; familiarize yourself with the basics) Wagner, Gernot. <i>But Will the Planet Notice?</i> Hill & Wang/Farrar, Strauss & Giroux, 2011, Section "Whale blubber and horse manure" from chapter 6: "Mind versus matter." Bardi, Ugo. 2004. "Prices and Production over a complete Hubbert Cycle: the Case of the American Whale Fisheries in 19th Century." Association for the Study of Peak Oil and Gas. Solman, Paul. 2008. " <a href="#">The 'Whale Oil Myth'</a> ." PBS NewsHour Making Sen\$e with Paul Solman. <i>Optional:</i> Keith, David W. 2009. "Dangerous Abundance." In: <i>Carbon shift: how the twin crises of oil depletion and climate change will define the future</i> , edited by Thomas Homer-Dixon with Nick Garrison, Random House Canada.
3	Sept 18	Energy Paradox: Why don't we all use CFLs and drive hybrids?  <i>Consumer behavior</i>	McKinsey. 2009. " <a href="#">Unlocking energy efficiency in the U.S. economy</a> ." Executive summary. Parry, Ian W. H., Margaret Walls, and Winston Harrington. 2007. "Automobile Externalities and Policies" <i>Journal of Economic Literature</i> 45(2): 373-99. Allcott, Hunt, and Nathan Wozny, " <a href="#">Gasoline prices, fuel economy, and the energy paradox</a> ," National Bureau of Economic Research Working Paper no. 18583 (November 2012).

Week	Date	Title/Concept	Readings
4	Sep 25	Green Paradox: Can environmental policy lead to more pollution?  <i>Supplier behavior</i>	Sinn, Hans-Werner, "Introductory Comment–The Green Paradox: A Supply-Side View of the Climate Problem," <i>Rev Environ Econ Policy</i> 9, 2015: 239-245. Jensen, Sverre, Kristina Mohlin, Karen Pittel, and Thomas Sterner, "An Introduction to the Green Paradox: The Unintended Consequences of Climate Policies," <i>Rev Environ Econ Policy</i> 9, 2015: 246-265. van der Ploeg, Frederick and Cees Withagen, "Global Warming and the Green Paradox: A Review of Adverse Effects of Climate Policies," <i>Rev Environ Econ Policy</i> 9, 2015: 285-303. Harstad, B. 2012. Buy coal! A case for supply-side environmental policy. <i>Journal of Political Economy</i> , 120(1), 77-115.
5	Oct 2	How far how fast? Aka what's the optimal carbon price?  <i>Benefit-cost analysis, social cost of carbon</i>	William D. Nordhaus, " <a href="#">Why the global warming skeptics are wrong</a> ," <i>New York Review of Books</i> (March 22, 2012) U.S. Office of Management and Budget, <a href="#">Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis</a> , 2010, and <a href="#">July 2015 update</a> . Wagner, Gernot and Martin L. Weitzman, <a href="#">Climate Shock: the economic consequences of a hotter planet</a> , Princeton University Press, 2015: chapter 3, "Fat Tails."
	Oct 9	[Columbus Day, no class]	[Papers from October 2 <sup>nd</sup> are due on Thursday, October 12 <sup>th</sup> .]
6	Oct 16	Carbon mitigation policies: What's the best way to cut pollution?  <i>Domestic instrument choice</i>	Gilbert E. Metcalf, "Designing a carbon tax to reduce U.S. greenhouse gas emissions," <i>Review of Environmental Economics and Policy</i> 3(1): 63-83 (2009). Nathaniel O. Keohane, "Cap-and-trade rehabilitated: The case for emissions trading to regulate greenhouse gases," <i>Review of Environmental Economics and Policy</i> 3(1): 42-62 (2009). Aldy, Joseph E, Alan J. Krupnick, Richard G. Newell, Ian W.H. Parry, and William A. Pizer. "Designing climate mitigation policy." RFF discussion paper 08-16. Wagner, Gernot. <i>But Will the Planet Notice?</i> Hill & Wang/Farrar, Strauss & Giroux, 2011, Chapter 5: "Curious Company Kept."

Week	Date	Title/Concept	Readings
7	Oct 23	How to solve the global commons problem?  <i>International climate architecture</i>	Scott Barrett, "The problem of global environmental protection," <i>Oxford Review of Economic Policy</i> 6(1): 68-79 (1990). Joseph E. Aldy, Scott Barrett, and Robert N. Stavins, " <a href="#">Thirteen plus one: A comparison of global climate policy architectures</a> ," <i>Climate Policy</i> 3: pp 373-397 (2003). Olmstead, Sheila M. and Robert N. Stavins. " <a href="#">An Expanded Three-Part Architecture for Post-2012 International Climate Policy</a> ," Discussion Paper 09-29, Harvard Project on International Climate Agreements (September 2009). Bodansky, Daniel M, Seth Hoedl, Gilbert E Metcalf, and Robert N Stavins. " <a href="#">Facilitating Linkage of Heterogeneous Regional, National, and Sub-National Climate Policies Through a Future International Agreement: Executive Summary.</a> " Harvard Project on Climate Agreements, 2014.
8	Oct 30	<i>Solar geoengineering is nuts, but nuts compared to what?</i>  <i>Policy tradeoffs</i>	[Reminder: discuss, get approval for final essay topic by today.] Wagner, Gernot and Martin L. Weitzman, <a href="#">Climate Shock: the economic consequences of a hotter planet</a> , Princeton University Press, 2015: chapter 5, "Bailing out the planet," and chapter 6, "007." Keith, David, " <a href="#">Geoengineering the climate: history and prospect</a> ," <i>Annual Review of Energy and the Environment</i> 25: 245-84 (2000). Keith, David and Gernot Wagner, " <a href="#">Toward a more reflective planet</a> ," Project Syndicate (16 June 2016). Irvine, Peter J., Ben Kravitz, Mark G. Lawrence, and Helene Muri. " <a href="#">An overview of the Earth system science of solar geoengineering</a> ." <i>Wiley Interdisciplinary Reviews: Climate Change</i> (2016), doi: 10.1002/wcc.423
9	Nov 6	Electricity: How should we pay for demand response?  <i>Second-best policies (1/2)</i>	United States Department of Energy. " <a href="#">Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them: A report to the United States Congress Pursuant to Section 1252 of the Energy Policy Act of 2005.</a> " (February 2006). "Brief of Robert L Borlick, Joseph Bowring, James Bushnell and 18 Other Leading Economists in Support of the Petitioners." <i>Amicus curiae. Electric Power Supply Association v. Federal Energy Regulatory Commission</i> . Nos. 11-1456, <i>et al.</i> United States Court of Appeals in the District of Columbia. (June 13, 2012). "Brief of Stanford Economic Professor Charles D. Kolstad as <i>Amicus Curiae</i> in Support of Petitioners." <i>Amicus curiae. ERNOC Inc. v. Electric Power Supply Association</i> . Nos. 14-840 and 14-841. United States Supreme Court. (July 16, 2015).

Week	Date	Title/Concept	Readings
10	Nov 13	Cars and trucks and things that go: Can EVs revolutionize the energy sector?  <i>Second-best policies (2/2)</i>	<i>[Reminder: final essay outlines are due today.]</i>  Parry, Ian WH, and Kenneth A. Small. " <a href="#">Does Britain or the United States have the right gasoline tax?</a> " <i>American Economic Review</i> 95, no. 4 (2005): 1276-1289. Holland, Stephen P., Erin T. Mansur, Nicholas Z. Muller, and Andrew J. Yates. " <a href="#">Environmental Benefits from Driving Electric Vehicles?</a> " National Bureau of Economic Research working paper No. w21291 (2015). Archsmith, James, Alissa Kendall, and David Rapson. " <a href="#">From Cradle to Junkyard: Assessing the Life Cycle Greenhouse Gas Benefits of Electric Vehicles.</a> " Energy Institute at Haas working paper 263 (2015). <i>Optional:</i> Wagner, Gernot. 2011. <a href="#">But Will the Planet Notice?</a> Hill & Wang/Farrar, Strauss & Giroux. Chapter 7: "Cars (And Planes)."
11	Nov 20	Energy security: How to explain the 2007-2008 oil shock?  <i>Market power, elasticity (yet again)</i>	Metcalf, Gilbert E. "The Economics of Energy Security," Working Paper No. 19729, NBER, December 2013. Ahn, Daniel P. "The information content of financial market passthrough: Decomposing oil shocks into demand and supply components." Working paper, 2009. Hamilton, James D. " <a href="#">Causes and consequences of the oil shock of 2007-08.</a> " <i>Brookings Papers on Economic Activity</i> , (Spring 2009): 215-59. Hahn, Robert and Peter Passell. " <a href="#">The Economics of Allowing More Domestic Oil Drilling.</a> " Working Paper 08-21, REG – Markets Center, 2008.
12	Nov 27	Dual externalities: Tax pollution or subsidize renewables?  <i>Endogenous technical progress</i>	Jaffe, Adam, Richard Newell and Robert Stavins. 2005. "A tale of two market failures: technology and environmental policy." <i>Ecological Economics</i> 54: 164-74. Acemoglu, Daron, Philippe Aghion, Leonardo Bursztyn, and David Hemous. 2012. " <a href="#">The Environment and Directed Technical Change.</a> " <i>American Economic Review</i> , 102(1): 131-66. van Benthem, Arthur, Kenneth Gillingham and James Sweeney. 2008. "Learning-by doing and the optimal solar policy in California" <i>The Energy Journal</i> 29: 131-51. Borenstein, Severin. " <a href="#">The Private and Public Economics of Renewable Electricity Generation</a> ", <i>Journal of Economic Perspectives</i> , 26(1), Winter 2012.
	Dec 6	[no class]	<i>[Final papers due today.]</i>

## H. ACADEMIC INTEGRITY

Collaboration. The group presentations will be carried out by groups of two or more students, depending on course enrollment. When presenting as part of a team, collaboration with your

partner is permitted and expected. Your short papers and final paper should be your work alone.

Plagiarism. Your final paper should cite the source for each statement of fact (other than common knowledge) and for each opinion that is not your own. Citations should be placed in footnotes. All direct quotations must be placed in quotation marks. Citations are not necessary in the short papers; these papers should contain no direct quotations from other sources.

Honor Code. In accordance with the Harvard College Honor Code, both the final paper and the short papers should include the following affirmation: "I attest to the honesty of my academic work and affirm that I am aware of the standards of the Harvard College Honor Code."

## **I. ACKNOWLEDGEMENTS**

This syllabus is based on classes taught at various institutions. Its first incarnation was largely based on Snorre Kverndokk and Knut Einar Rosendahl's Energy Economics class taught at Johns Hopkins in Spring 2009. I also take some cues from Bill Hogan's Energy Policy Analysis class at Harvard, Paul Joskow's former Energy Economics class at MIT, Rob Stavins's Fundamentals of Environmental Economics and Policy class at Harvard, Erin Mansur's former Energy Economics & the Environment class at Yale, Jim Stock's U.S. Energy Revolution and its Implications seminar at Harvard, and valuable feedback from, among others, Joe Aldy, Lizzie Burns, Frank Convery, Ken Gillingham, Matt Kahn, Steve Salant, Rob Stavins, Thomas Sterner, Martin Weitzman, Matthew Zaragoza-Watkins, participants in an [OurEnergyPolicy.org](http://OurEnergyPolicy.org) discussion forum, and students at Columbia, NYU Stern, and Harvard who have taken versions of this course in the past. Thank you to all.