



**NYU**

**ROBERT F. WAGNER GRADUATE  
SCHOOL OF PUBLIC SERVICE**

# **PADM-GP 2472**

## **Climate Economics**

### **Spring 2023**

#### **Instructor Information**

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- Office Hours: By Appointment only

#### **Course Information**

- Class Meeting Times: Wednesdays; 4:55-6:35pm
- Class Location: 60 Fifth Avenue, Room 110 Loc: Washington Square

#### **Course Prerequisites**

The prerequisites are [CORE-GP 1018 Microeconomics](#) and (concurrently) [CORE-GP 1011 Statistical Methods](#) — or the equivalent classes.

#### **Course Description**

This course attacks the problem of climate change from the perspective of economics. Topics covered include benefit-cost-analysis, the social cost of carbon; market-based and prescriptive policy solutions; economic efficiency vs. distributional equity; electric power; energy efficiency; and transportation. Classes feature lecturing but prioritize student participation throughout.

Course assignments are designed to give practice in a variety of tasks relevant for students' personal and professional lives. Through these activities, students will:

- 1) Become knowledgeable in the area of climate economics and policy
- 2) Develop a versatile economic intuition, for use in any environmental professional setting
- 3) Become more comfortable with quantitative thinking and analysis
- 4) Improve their ability to communicate, translate, and wield rhetoric in the highly divisive scientific debate about how to respond to the changing climate.

## Course and Learning Objectives

The course has three goals:

- #1 build our environmental economic policy toolkit and know when to apply which tool to real world problems and issues;
- #2 communicate the results of our analyses in plain English to experts and lay audiences;
- #3 make better-informed environmental policy decision, all while distinguishing between *positive* analyses and *normative* judgements.

Three presentations plus responses and the group project will build on and reinforce class discussions.

## Required Readings

There are two required texts for the class: Richard Tol's [Climate Economics, Second Edition](#) (Edward Elgar 2019), referred to as "CLIMATE".

The other text is Nathaniel Keohane and Sheila Olmstead's [Markets and the Environment, Second Edition](#) (Island Press, 2016), referred to as "MARKETS"..

There will be several other materials, ranging from lecture notes/slides to peer-reviewed academic papers to news articles, to brief excerpts from other books. All of those will be available online via the course website.

Beginning with week 2 of the course, come prepared to class having done the readings for the day, including any lecture notes/slides. We will use class times to review the most important concepts and then discuss the merits and demerits of the tools and applying them to real-world situations.

**There is a LOT of research in the climate mitigation and adaptation space. The reading list is a starting point that is designed to identify some of the key issues, not necessarily always the most recent estimates of climate change impacts. We will use additional resources in class and keep our weekly discussions as current as possible.**

Useful Websites

Resources for the Future (RFF): <https://www.rff.org/topics/>

Energy Information Administration (EIA): <https://www.eia.gov/environment/>

Center for Climate and Energy Solutions: <https://www.c2es.org/>

Intergovernmental Panel on Climate Change: <http://www.ipcc.ch/>

UNFCCC Paris Agreement: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

International Energy Agency: <https://www.iea.org/>

US Environmental Protection Agency: <https://www.epa.gov/climate-change>

European Green Deal: <https://www.consilium.europa.eu/en/policies/green-deal/>

United Nations: <https://www.un.org/en/climatechange>

International Monetary Fund: <https://www.imf.org/en/Topics/climate-change>

## Assessment Assignments and Evaluation

<i>Type</i>	<i>Description</i>	<i>%</i>
<b>Homework: Presentations &amp; Response</b>	<p>Three presentations plus response, 5% each.</p> <p>The three presentations are designed to be useful and applicable to your personal lives and professional careers. They are a maximum of five minutes in length and will be uploaded to Brightspace both as an assignment as well as a posting in a discussion forum for everyone to view. These presentations will be:</p> <ol style="list-style-type: none"><li>1) The response to a reporter by you, the climate advisor to the mayor, on what the three most important economic issues are when it comes to climate mitigation policies,</li><li>2) The response to a reporter by you, the climate advisor to the mayor, on what the three most important steps people can take in their personal lives to combat adverse climate change impacts, and</li><li>3) The response to a reporter by you, the climate advisor to the mayor, on what role technology plays in the challenge to promote growth as well as environmental preservation.</li></ol> <p>Your responses need to incorporate some of the economic principles covered in the course! You will also review other students' presentations and provide a written response to one of them in the Brightspace discussion forum.</p>	15%
<b>Group project</b>	<p>In groups, you will explore, research, and analyze an economic policy topic that is directly relevant to climate economics. Further guidance will be provided in Brightspace and in class.</p> <ul style="list-style-type: none"><li>• Project scope memo – 5%</li><li>• Project Presentation – 10%</li><li>• Project Paper – 20%</li></ul>	35%
<b>Midterm exam</b>	<p>Exam with short answer questions, limited numerical applications, and (brief) essay questions.</p>	20%

<b>Final exam</b>	Exam with short answer questions, limited numerical applications, and (brief) essay questions.	20%
<b>Participation</b>	Actively engage with the readings and participate in class discussions.	10%
<b>Total</b>		<b>100%</b>

## Course Overview

Week	Date	Class topics	Assignments
1	January 25	Introduction & Climate Science	
2	February 1	Cost of Climate Change	
3	February 8	Benefit-Cost Analysis	Everyone assigned to a group
4	February 15	Valuation of Benefits/Costs	Presentation #1
5	February 22	Social Cost of Carbon	Response #1
6	March 1	Renewable and non-renewable Resources	Project scope memo
7	March 8	MIDTERM	
	March 15	SPRING BREAK	
8	March 22	Environmental Policy: Economics	
9	March 29	Environmental Policy: Prices vs Quantities	Presentation #2
10	April 5	Global Climate Policy	Response #2
11	April 12	Industry focus: Built Environment, Transportation	
12	April 19	Industry focus: Food	Presentation #3
13	April 26	Resilience Investments	Response #3
14	May 3	Course Summary & Presentations	Group Presentations Group Paper
	TBD	FINAL EXAM	

# Detailed Course Overview

## WEEK 1: Introduction & The Science of Climate Change

- *Tools/concepts:* Introduction to the science of global temperatures and different future pathways

### Readings

1. CLIMATE, Chapter 1 and 2
2. IPCC "Sixth Assessment Report, Climate Change 2021: The Physical Science Basis – Summary for Policy-Makers" August 6, 2021.

## WEEK 2: The Cost of Climate Change

- *Tools/concepts:* Estimates of climate change impacts & introduction to benefit-cost analyses

### Readings

1. CLIMATE, Chapter 3
3. MARKETS, pp. 11-34, 80-90: Chapter 2 "Economic Efficiency and Environmental Protection" and Chapter 5 "Market Failures in the Environmental Realm", the first two subsections: "Externalities" and "Public Goods."
4. Coase, Ronald. "[The Problem of Social Cost](#)," *Journal of Law and Economics* 3, 1960: pp. 1-44.

## WEEK 3: Benefit Cost Analysis as a Tool for Policy

- *Tools/concepts:* Negative externalities, net-present value (NPV) analysis, BCA, and some alternative decision criteria

### Readings

1. CLIMATE, Chapter 10 & 11
2. MARKETS, pp. 35-68: Chapter 3 "The Benefits and Costs of Environmental Protection."
3. Arrow *et al.*, "[Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?](#)" *Science* 272(5259), 1996: pp. 221-222.
4. Arrow *et al.*, "[Determining Benefits and Costs for Future Generations.](#)" *Science* 341(6144), 2013: pp. 349-350.
5. Gayer and Viscusi, "[Resisting Abuses of Benefit-Cost Analysis.](#)" *National Affairs*, Spring 2016

## WEEK 4: Valuating the benefits and costs of environmental protection

- *Tools/concepts:* Revealed preference methods, stated preference (contingent valuation), benefit transfer, Value of a Statistical Life (VSL)
- *Deliverable:* Presentation #1

## Readings

1. CLIMATE, Chapter 5 & 12
2. MARKETS, pp. 48-53: (re-read) Chapter 3's subsection on "Evaluating the Benefits"
3. Kling, Catherine L., Daniel J. Phaneuf and Jinhua Zhao. "[From Exxon to BP: Has Some Number Become Better than No Number?](#)" *Journal of Economic Perspectives* 26(4), 2012: pp. 2-26.
4. Carson, Richard T. "Contingent Valuation: A Practical Alternative when Prices Aren't Available." *Journal of Economic Perspectives* 26(4), 2012: pp. 27-42.
5. Hausman, Jerry A. "Contingent Valuation: From Dubious to Hopeless." *Journal of Economic Perspectives* 26(4), 2012: pp. 43-56.

## WEEK 5: The "optimal" carbon price: Social Cost of Carbon

- *Tools/concepts*: Economic optimality, the limits of BCA
- *Deliverable*: Response #1

## Readings

1. CLIMATE, Chapter 6
2. Rennert, K., Errickson, F., Prest, B.C. et al. "[Comprehensive evidence implies a higher social cost of CO2](#)" *Nature* 610, 687–692 (2022).
3. William D. Nordhaus, "[Why the global warming skeptics are wrong,](#)" *New York Review of Books* (March 22, 2012).
4. U.S. Office of Management and Budget, [Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis](#), August 2016 update. [Don't read in detail. Look at the gist, and the summary tables.]
5. Ricke, Katharine, Laurent Drouet, Ken Caldeira and Massimo Tavoni, "[Country-level social cost of carbon,](#)" *Nature Climate Change* (24 September 2018).

## WEEK 6: Non-renewable and renewable resources

- *Tool/concept*: Hotelling Rule, Public goods, tragedy of the commons
- *Deliverables*: Project Scope Memo

## Readings

1. MARKETS, pp. 99-112: Chapter 6, "Managing Stocks: Natural Resources as Capital Assets"
2. MARKETS, pp. 114-137: Chapter 7, "Stocks that Grow: The Economics of Renewable Resource Management"
3. MARKETS, pp. 184-189: Chapter 9's subsection on "Market-based instruments for managing natural resources."
4. Covert, Thomas, Michael Greenstone and Christopher R. Knittel. "[Will We Ever Stop Using Fossil Fuels?](#)" *Journal of Economic Perspectives* 30(1), 2016:
1. Solow, Robert M. "[The Economics of Resources or the Resources of Economics.](#)" *American Economic Review* 64(2), 1974: pp. 1-14.

2. Stavins, "[The Problem of the Commons: Still Unsettled After 100 Years.](#)" *American Economic Review* 101(1), 2011: pp. 81-108. [Focus especially on Part I]

## WEEK 7: in-class MIDTERM EXAM

## WEEK 8: Economics of pollution control

- *Tools/concepts:* Negative externalities, efficiency, cost-effectiveness, domestic instrument choice (under certainty)

### Readings

1. MARKETS, pp. 138-161 and 166: Chapter 8, "Principles of Market-Based Environmental Policy," except for subsection on "Setting Prices versus Setting Quantities"
2. MARKETS, pp. 167-198: Chapter 9, "The Case for Market-Based Instruments in the Real World" (Note that pp. 184-189, "Market-based instruments for managing natural resources" covers renewable resources, from week 6.)
3. Aldy, Joseph E., Maximilian Auffhammer, Maureen L. Cropper, Arthur G. Fraas, Richard Morgenstern, "[Looking Back at Fifty Years of the Clean Air Act,](#)" NBER Working Paper No. 26687, January 2020.
4. Cushing et al (2018). Carbon trading, co-pollutants, and environmental equity: Evidence from California's cap-and-trade program (2011–2015). *PLOS Medicine*.  
<https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002604>
5. Hernandez-Cortez, Danae and Kyle J. Meng (2020). Do Environmental Markets Cause Environmental Injustice? Evidence from California's Carbon Market.  
<https://www.nber.org/papers/w27205>

## WEEK 9: Optimal Policy Choices: Prices/Subsidies vs. Quantities

- *Tool/concept:* Instrument choice under uncertainty; experience with economic policy instruments
- *Deliverable:* Presentation 2

### Readings

1. MARKETS, pp. 162-166: Chapter 8's subsection on "Setting Prices versus Setting Quantities"
2. Weitzman, M.L., "[Prices vs. quantities.](#)" *The Review of Economic Studies* 41(4), 1974: pp.477-491.
1. Schmalensee, Richard and Robert N. Stavins. "[The SO<sub>2</sub> Allowance Trading System: The Ironic History of a Grand Policy Experiment.](#)" *Journal of Economic Perspectives* 27(1), 2013: pp. 103-22.
2. Jaffe, Adam, Richard Newell and Robert Stavins. "[A tale of two market failures: technology and environmental policy.](#)" *Ecological Economics* 54, 2005: pp. 164-74.

3. Wagner, Gernot, Tomas Kåberger, Susanna Olai, Michael Oppenheimer, Katherine Rittenhouse, and Thomas Sterner. "[Push renewables to spur carbon pricing](#)" *Nature* 525: 27–29 (3 September 2015).
4. van Benthem, Arthur, Kenneth Gillingham and James Sweeney. "[Learning-by doing and the optimal solar policy in California](#)," *The Energy Journal* 29, 2008: pp. 131-51.
5. Borenstein, Severin. "[The Private and Public Economics of Renewable Electricity Generation](#)," *Journal of Economic Perspectives* 26(1), Winter 2012.
6. Acemoglu, Daron, Philippe Aghion, Leonardo Bursztyn, and David Hemous. "[The Environment and Directed Technical Change](#)." *American Economic Review*, 102(1), 2012: pp. 131-66. [skim abstract and introduction]

## WEEK 10: Global (warming) problem, global solution

- *Tool/concept*: International policy choice, game theory of climate negotiations
- *Deliverable*: Response Presentation 2

### Readings

1. CLIMATE, Chapter 13
1. Stavins, "[The Problem of the Commons: Still Unsettled After 100 Years](#)." *American Economic Review* 101(1), 2011: pp. 81-108. [Part II]
2. Victor, David, "[Why Paris Worked: A Different Approach to Climate Diplomacy](#)." *Yale Environment* 360, (December 15, 2015).
3. Fabre, Adrien and Gernot Wagner, "[Risky geoengineering option can make ambitious climate mitigation agreement more likely](#)," *NYU Wagner Research* paper (9 December 2019).
4. Barrett, Scott, "[The problem of global environmental protection](#)," *Oxford Review of Economic Policy* 6(1), 1990: pp. 68-79.
5. Green, Jessica F., Thomas Sterner, and Gernot Wagner. "[A balance of bottom-up and top-down in linking climate policies](#)." *Nature Climate Change* 4.12 (2014): pp. 1064-7.

## WEEK 11: Industry Focus: Built Environment & Transportation

- *Tool/concept*: Case studies and policy approaches for decarbonization

### Readings

1. UNEP Website: <https://www.unep.org/interactive/six-sector-solution-climate-change/>
2. Kopp, R.J. (2007). Transport Policies to Reduce Emissions from the Light-Duty Vehicle Fleet. Issue Brief 12 in Assessing U.S. Climate Policy Options. Washington: RFF.
3. C2ES (2017). Federal Vehicle Standards. <https://www.c2es.org/federal/executive/vehicle-standards#timeline>
4. Citizens Budget Commission "Balancing Incentives to Maximize Emission Reduction", August 26, 2021



5. Samantha Linton, Amelia Clarke, Laura Tozer, “Technical pathways to deep decarbonization in cities: Eight best practice case studies of transformational climate mitigation”, Energy Research & Social Science, Volume 86, 2022, 102422, ISSN 2214-629

## **WEEK 12: Industry Focus: Food & Energy**

- *Tool/concept:* Case studies and policy approaches for decarbonization
- *Deliverable:* Presentation 3

### Readings

1. Benjamin K. Sovacool, Morgan Bazilian, Steve Griffiths, Jinsoo Kim, Aoife Foley, David Rooney, Decarbonizing the food and beverages industry: A critical and systematic review of developments, sociotechnical systems and policy options, Renewable and Sustainable Energy Reviews, Volume 143, 2021, 110856, ISSN 1364-0321
2. IEA (2022), Renewables 2022, IEA, Paris <https://www.iea.org/reports/renewables-2022>, License: CC BY 4.0
3. Heil, Alexander “Renewable Sources: What Is the State of Renewable Energy in 2022?” The Conference Board, June 30, 2022
4. Heil, Alexander “US Energy Transition: The Path Toward Net Zero” The Conference Board, September 12, 2022

## **WEEK 13: Resilience**

- *Tool/concept:* Sustainability, green accounting, technology progress
- *Deliverable:* Response Presentation 3

### Readings

1. CLIMATE, Chapter 8
2. World Bank Website: <https://www.worldbank.org/en/news/feature/2020/11/17/the-adaptation-principles-6-ways-to-build-resilience-to-climate-change>
3. US Climate Resilience Toolkit: <https://toolkit.climate.gov/>
4. National Academy of Sciences “Investing in Transportation Resilience” Consensus Study Report, TRB Special Report 340, 2021

## **WEEK 14: Course Summary**

- *Tool/concept:* Review & wrap-up

### Readings

1. CLIMATE, Chapter 15
2. En-ROADS Climate Change Solutions Simulator, [www.en-roads.org](http://www.en-roads.org) [Explore the tool]
3. TEXT, pp. 199-230 and 254-258: Chapters 10, “Market-Based Instruments in Practice,” and 12: “Conclusion.”

## **NYU Brightspace**

All announcements, resources, and assignments will be delivered through the NYU Brightspace site.

## **Academic Integrity**

Academic integrity is a vital component of Wagner and NYU. All students enrolled in this class are required to read and abide by [Wagner's Academic Code](#). All Wagner students have already read and signed the [Wagner Academic Oath](#). Plagiarism of any form will not be tolerated and students in this class are expected to report violations to me. If any student in this class is unsure about what is expected of you and how to abide by the academic code, you should consult with me.

## **Henry and Lucy Moses Center for Students with Disabilities at NYU**

Academic accommodations are available for students with disabilities. Please visit the [Moses Center for Students with Disabilities \(CSD\) website](#) and click on the Reasonable Accommodations and How to Register tab, or call or email CSD at (212) 998-4980 or [mosescsd@nyu.edu](mailto:mosescsd@nyu.edu) for information. Students who are requesting academic accommodations are strongly advised to reach out to the Moses Center as early as possible in the semester for assistance.

## **NYU's Calendar Policy on Religious Holidays**

[NYU's Calendar Policy on Religious Holidays](#) states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. Please notify me in advance of religious holidays that might coincide with exams to schedule mutually acceptable alternatives.