



ENVS 6302 Climate Technology: Finance and Policy

Class Day & Time: Tuesday, 5:15 – 8:15 PM

Classroom: TBD

Instructor: Nicholaus Rohleder

Email: nrohl@sas.upenn.edu

Phone: +1 918 231 2942

Office Hours: By appointment via email.

Response Policy: Will respond within 12 hours via email any day of the working week.

Instructor: Andrew Stone

Email: stonean@upenn.edu

Phone: +1 917 597 9929

Office Hours: By appointment via email.

Response Policy: Will respond within 12 hours via email any day of the working week.

Course Overview

The growing field of climate technology requires a multifaceted skill set anchored in a sound understanding of finance and policy. This course is designed for students interested in the climate economy seeking to gain functional proficiency in climate finance and policy. The course will cover four key areas of the climate economy from a finance and policy angle: electrification, carbon management, critical minerals & materials, and breakthrough technologies. The finance portion of the course will deliver a basic understanding of the financial reporting of companies within the given subsector, the functionality of the relevant technologies, the capital structure of relevant companies, and the general business model of relevant companies. The policy portion of the course will focus primarily on the electricity sector and deliver a basic understanding of the salient policies and issues facing companies in the aforementioned subsectors as well as sector-wide headwinds and tailwinds catalyzed by policy. Throughout the course, students will build a policy opinion, financial model, and business plan and present their deliverable at the end of the course.

Learning Objectives

L1: Describe and articulate the climate technology value chain in the context of an investor or operator.

L2: Describe and articulate the climate policy universe with a particular focus on the electricity sector.

L3: Construct a business plan and supplementary 3-statement financial model.

L4: Describe and articulate the basic technology functionality, business model, and supply chain in the areas of semiconductors, solar, wind, energy storage, vehicle electrification, hydrogen & carbon capture, circular economy, and critical materials.

L5: Generate value-added independent thought and present it in front of an audience.



Readings

To be assigned throughout the course of the semester.

Required Subscriptions:

1. Seeking Alpha
 - a. www.seekingalpha.com
 - b. This will be used as a tool for students to construct a news catcher specific to industries and companies that would be required on the job.
 - c. "Seeking Alpha: Stock Market Analysis & Tools for Investors." SeekingAlpha, <https://seekingalpha.com/>.
2. Financial Times
 - a. www.ft.com
 - b. This will be used as a tool for students to construct a news catcher on macroeconomic and general events that are of relevance to be up to speed on as a professional.
 - c. "Financial Times Home." Financial Times, <https://www.ft.com/>.
3. Breaking Into Wall Street
 - a. www.breakingintowallstreet.com
 - b. This will be a required semester-long assignment for students to gain proficiency in excel, presentation construction, and financial modeling, which will be necessary for any job in the sustainability field.
 - c. "Financial Modeling Courses & Training." Breaking Into Wall Street, 14 Oct. 2021, <https://breakingintowallstreet.com/>.

Course Requirements (Assignments)

1. **Climate Policy Opinion:** Students will, in their groups, select a policy and construct a 5-page, double-spaced paper arguing for the policy as a headwind or tailwind for the sector of the climate economy of their choosing.
2. **Climate Finance and Policy Business Plan & Financial Model:** Students will construct a business plan and associated financial model on a business of their choosing (public or private) and take into account the policy context (positive or negative) that the business faces in its everyday course of operation. This will be done in groups that will be assigned at the onset of the course based on interest areas.
 - a. Students will submit the financial model and business plan as a part of the final assignment. The deliverables should consist of a full 3-statement financial model and a ~15-slide, well-formatted deck outlining the business and policy case.
3. **Climate Finance and Policy Pitch:** Students will conduct a 15–20-minute pitch in groups mimicking a shark tank/investor/idea pitch format.
4. **Breaking Into Wall Street:** Students will, throughout the semester, complete the Breaking Into Wall Street "Core Financial Modeling" course. This will provide students with an understanding of financial modeling in an applicational context that will be sufficient for on-the-job use.



5. **Financial Times News Consumption Plan:** Students will submit a screenshot of their personalized Financial Times newsfeed. This will enable students to learn to efficiently consume global news.
6. **Seeking Alpha News Catcher:** Students will create a news catcher in Seeking Alpha and submit an Excel sheet detailing the constituents. This will enable students to gain a real-time understanding of the business model and supply chain in application on a day-to-day basis for each constituent.
7. **Reading Responses:** Students will respond to question prompts regarding assigned readings for class discussions as prompted by the instructor to be submitted at 5:00pm EST the Sunday prior to the next class where the material will be discussed.

Evaluation/Grading

Students will be evaluated on their ability to generate work product supplemented by defensible data supporting the point of view, idea, or plan articulated in the deliverable.

The final grade will be calculated as described below:

FINAL GRADING SCALE

Grade	Percentage	ASSIGNMENT	% Weight
A+	98–100 %	Climate Finance and Policy Financial Model	20%
A	93–97.9 %	Climate Finance and Policy Business Plan	20%
A-	90–92.9 %	Policy Opinion Paper	20%
B+	87–89.9 %	Breaking Into Wall Street Completion Certificate	10%
B	83–86.9 %	Class Reading Discussion Papers	10%
B-	80–82.9 %	Class Participation, FT News Catcher, & SA News Catcher	20%
C+	77–79.9 %		
C	73–76.9 %		
C-	70–72.9 %		
D	60–69.9 %		
F	59.9% and below		



Course Schedule/Course Calendar

Date	Topics and Activities	Readings (due on this day)	Assignments (due on this date)
Class 1	Climate Technology: Finance and Policy Introduction	➤ None	<ul style="list-style-type: none"> ➤ Subscribe to Seeking Alpha ➤ Subscribe to Financial Times ➤ Subscribe to Breaking Into Wall Street
Class 2	Solar & Wind (Finance)	➤ Breaking Into Wall Street	<ul style="list-style-type: none"> ➤ Seeking Alpha News Catcher ➤ Financial Times News Consumption Plan ➤ Form Groups for Semester
Class 3	Foundations of US Electricity System/Restructuring (Policy)	<ul style="list-style-type: none"> ➤ <i>The History and Evolution of the U.S. Electricity Industry.</i> University of Texas, July 2016 (19 pp) ➤ Richard R. Hirsh, <i>PURPA: The Spur to Competition and Utility Restructuring</i> (1999) (11 pp) ➤ Linda G. Stuntz, <i>The Energy Policy Act of 1992: Changing the Electricity Industry</i> (1995) (4 pp) ➤ *Kathryne Cleary, Electrification 101, Resources for the Future (March 24, 2022) ➤ *Listen: Energy Policy Now Podcast, 200 Years of Energy History in 30 Minutes (March 19, 2019) (34 mins.) 	➤ Discussion Paper #1
Class 4	Batteries – Grid & Vehicle Applications (Finance)	➤ Breaking Into Wall Street	
Class 5	Introduction to Competitive	➤ <i>Energy Primer: A Handbook for Energy Market Basics</i> , Federal Energy Regulatory Commission,	➤ Discussion Paper #2

	Electricity Markets (Policy)	<p>pp. 35-69, 85-90, and introductory section for each region in pp. 70-105 (2020) (40 pp)</p> <ul style="list-style-type: none"> ➤ <i>PJM Explained</i>, Sustainable FERC Project (2016?) (5 pp) ➤ <i>Understanding the Differences Between PJM's Markets</i>, PJM Interconnection (2022) (2 pp) ➤ <i>ERCOT Market Structure</i>, Electric Reliability Council of Texas (2019) (2 pp) ➤ <i>*The Repeal of the Public Utility Holding Company Act of 1935 and Its Impact on Electric and Gas Utilities</i>, Congressional Research Service (2006) (5 pp) ➤ <i>*Chapter 15 of Richard F. Hirsh, Power Loss</i>, MIT Press (1999) (11 pp) 	
Class 6	Hydrogen & Carbon Capture (Finance)	<ul style="list-style-type: none"> ➤ <i>Breaking Into Wall Street</i> 	
Class 7	Introduction to Electricity Policy & Regulation (Policy)	<ul style="list-style-type: none"> ➤ <u>FERC 101: Electricity Regulation and the Federal Energy Regulatory Commission</u>, Resources for the Future (2021) (~2 pp) ➤ <u>What a Full FERC Panel Means for the Grid</u>, E&E News (2024) (2 pp) ➤ <i>The Legal Framework of the Federal Power Act</i>, Congressional Research Service (2020) (3 pp) ➤ <i>An Overview of PUCs for State Environment and Energy Officials</i>, US Environmental Protection Agency (2010) (6 pp) ➤ <u>State Renewable Portfolio Standards and Goals</u>, National Conference of State Legislatures (2021) 	<ul style="list-style-type: none"> ➤ Discussion Paper #3

		<ul style="list-style-type: none"> ➤ Alexandra B. Klass, Federalism “Collisions” in Energy Policy, The Regulatory Review (Nov. 19, 2018) (~2 pp) ➤ *Review of PJM’s Market Power Mitigation Practices in Comparison to Other Organized Electricity Markets (Executive Summary), The Brattle Group (2007) (4 pp) ➤ *Mark C. Christie, <i>It’s Time to Reconsider Single-Clearing Price Mechanisms in U.S. Energy Markets</i>, Energy Law Journal (2023) (30 pp) 	
Class 8	Waste to Value & Alternative Fuels (Finance)	<ul style="list-style-type: none"> ➤ Breaking Into Wall Street 	
Class 9	The Energy Transition: Part 1 (Policy)	<ul style="list-style-type: none"> ➤ World Energy Outlook 2022 Outlook for Electricity, International Energy Agency (2022) ➤ Annual Energy Outlook 2023, U.S. Energy Information Administration (2023) ➤ Carbon Pricing 101, Union of Concerned Scientists (2017) ➤ Listen: Energy Policy Now Podcast, Energy Transition Puts Grid Reliability to the Test (April 25, 2023) (1:09) (Also available on Apple Podcasts, Spotify, etc.) ➤ Dan Lashof, Lori Bird, & Jennifer Rennicks, 4 Things to Know About US EPA’s New Power Plant Rules, World Resources Institute (May 3, 2024) ➤ *Jeff St. John, FERC Order 2222: Experts offer cheers and jeers for first round of filings, Canary Media (March 14, 2022), & Jeff St. John, ‘Enormous Step’ for Energy Storage as Court Upholds 	<ul style="list-style-type: none"> ➤ Discussion Paper #4

		<p>FERC Order 841, Opening Wholesale Markets, Greentech Media (July 10, 2020)</p> <p>➤ *Robinson Meyer, The Biden Climate Law's Carrots are About to Become Sticks, Heatmap News (April 27, 2023)</p>	
Class 10	Critical Minerals & Materials (Finance)	<p>➤ Breaking Into Wall Street</p>	
Class 11	The Energy Transition: Part 2 (Policy)	<p>➤ Ethan Howard, FERC Approves PJM's 'First-Ready, First-served' Interconnection Reform Plan, Steps to Clear Backlog, Utility Dive (Dec. 1, 2022) (PJM's Interconnection Reform)</p> <p>➤ Christine Powell and Ada Statler, FERC's New Interconnection Rule Modernizes the Process to Bring Clean Energy Online, Earthjustice (August 28, 2023) (FERC Interconnection Reform Order 2023)</p> <p>➤ The Importance of Capacity Accreditation, Energy Systems Integration Group (February 2023)</p> <p>➤ Ethan Howland, FERC Approves PJM Capacity Accreditation, Modeling Reform Aimed at Boosting Reliability, Utility Dive (Feb. 1, 2024) (PJM Capacity Market Reform)</p> <p>➤ Claire Lang-Ree and Tom Rutigliano, PJM's Capacity Auction: The Real Story, NRDC (Aug 22, 2024) (PJM Capacity Market Reform)</p> <p>➤ Jayni Hein & Jonathan Wright, FERC Issues Order No. 1920 To Accelerate Regional Transmission Planning, Covington & Burling LLP (June 1,</p>	<p>➤ Discussion Paper #5</p>

		<p>2024) (FERC Transmission Planning Reform Order 1920)</p> <ul style="list-style-type: none"> ➤ Cy McGeady, Assessing Electric Transmission's Cost Allocation Dilemma, Center for Strategic & International Studies (October 6, 2023) ➤ Rayan Sud and Sanjay Patnaik, How Does Permitting for Clean Energy Infrastructure Work?, The Brookings Institution (Sept. 28, 2022) ➤ *Sonal Patel, NERC Identifies Energy Policy as Key Risk to Grid Reliability Amid Evolving Challenges, Power Magazine online (Aug. 24, 2023) (1 pp) ➤ *Lalit Batra, Nishit Pande, Harsha Reddy, and Dinesh Madan, Solar Economics: The PTC vs. ITC Decision, ICF International (Dec. 15, 2022) 	
Class 12	Climate Finance & Climate Insurance (Finance)	<ul style="list-style-type: none"> ➤ Breaking Into Wall Street 	<ul style="list-style-type: none"> ➤ Policy Opinion Paper (Due 11/11)
Class 13	Energy Equity & Justice. Recap & Review (Policy)	<ul style="list-style-type: none"> ➤ Konisky, The Justice and Equity Implications of the Clean Energy Transition, Nature Energy (August 2020) (7 pp) ➤ *Listen: Energy Policy Now Podcast, Overcoming Economic Barriers to Electrifying Everything (December 13, 2022) (29 minutes) (Also available on Apple Podcasts, Spotify, etc.) ➤ Shelley Welton, A Long-Awaited Participatory Revolution in Energy Regulation, The Regulatory Review (June 22, 2021) ➤ Pennsylvania Office of the Consumer Advocate Annual Report 2022-2023, Pennsylvania 	



		Office of the Consumer Advocate (17 pp)	
	No Class – Thanksgiving Break	➤ N/A	➤ Discussion Paper #6
Class 14	Climate Technology: Finance & Policy Final Presentations	➤ N/A	➤ Financial Model ➤ Business Plan/Pitch ➤ Breaking Into Wall Street

University Resources & Course Policies

Class Participation

Class attendance is required. Participation in this class involves your engagement with both group and individual activities. Individual activities will support your own understanding and application to the course material, and group activities will help you crowdsource and vet problems or approaches that are new to you. Some work you will do in small groups, and some in full class discussions. You will see our expectations for your work laid out in the instructions for each assignment which will help guide you on what to include and how to approach your work. However, always ask questions if an assignment is unclear.

Late Assignment Policy

In this course, late assignments are accepted, and extensions are granted at the discretion of the instructors. If you have a circumstance that requires a late submission, please be in communication with your instructor as early as possible, preferably before a due date.

Academic Integrity

Since the University is an academic community, its fundamental purpose is the pursuit of knowledge. Essential to the success of this educational mission is a commitment to the principles of academic integrity. Every member of the University community is responsible for upholding the highest standards of honesty at all times. Students, as members of the community, are also responsible for adhering to the principles and spirit of the Penn Code of Academic Integrity. More details about this policy can be found online at

<https://catalog.upenn.edu/pennbook/code-of-academic-integrity/>

University Services

Penn Libraries: Students can access all online resources available at the University of Pennsylvania by using the website www.library.upenn.edu/ and logging in with their PennKey and password. Students wishing to visit the Library in person and borrow books will need a PennID card.



Student Disability Services (SDS): Although the self-identification process is confidential and completely voluntary, it is required for those requesting accommodation. Student Disability Services (SDS) can be reached by phone at 215.573.9235, by TDD at 215.746.6320 or online at https://www.vpul.upenn.edu/lrc/sds/contact_us.php.

Add/Drop Period: Students may drop a class before the end of the first two weeks of the semester by using Path at Penn. Please see the LPS Academic Calendar for relevant dates and links (<https://www.lps.upenn.edu/about/academic-calendar>). Failure to attend/participate in a course does not automatically result in being dropped from the course. Courses that are dropped will no longer appear on a student's transcript. <https://www.sas.upenn.edu/lps/lps-online/form/course-withdrawal>

Withdrawing from a course: Students may withdraw from a course through the sixth week of the semester with no notation on the transcript and half financial obligation by filling out a late drop form and with the permission of the instructor and program director, and until the end of the twelfth week of the semester with full financial obligation by submitting the withdrawal form and gaining permission from the instructor and program director.