

Rutgers University

**Climate Change Policy - Spring 2023** (3 credits)

**Professor Cymie Payne**

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**Readings:** As identified on the syllabus. These will be available on Canvas, the web, or University Library e-reserves.

**Course Description** Climate policy includes a wide range of measures aimed at providing tolerable climate conditions for life on earth as we know it. It raises classic issues of distributional justice, law and science, risk, uncertainty and precaution, technology policy, energy regulation and international relations. You will leave this course with a basic understanding of the sources and impacts of climate change and key state, national and international climate change policies.

**Learning outcomes and objectives** You will understand key definitions, concepts, histories, and theories for domestic and transnational governance strategies for reducing climate disruption (mitigation) and adapting to unavoidable climate disruptions. You will develop your ability to analyze a policy problem and develop policy recommendations. You will develop your research, analytical, writing and presentation skills.

The EPIB learning objectives that are particularly addressed by this class are:

*1.1 Describe major patterns and drivers of natural resource use, pollution, and climate and environmental change.*

*1.2 Identify different approaches to the governance and management of human activities that affect the environment, both in the US and abroad, including institutions, property relations, management regimes, politics, and policies*

*2- Students will acquire the skills to use appropriate conceptual and methodological tools to structure inquiries about human-environment interactions*

**Basis for Evaluation**

- Attendance/Participation
- Reading summaries of key concepts (6 total) - Due each week 2 hours before class
- Writing assignments - Announced in class
- Complete the Indiana University Plagiarism Tutorials and Tests, to learn and understand what plagiarism is and how to ensure that you do not inadvertently commit plagiarism. Go to <https://www.indiana.edu/~academy/firstPrinciples/index.html> and do the tutorials and practice tests, then take the certification tests and send me the certificate. This should take you roughly one hour. If you have previously completed the Indiana course you can send me the certificate you earned then. (0 points, but you will not get a grade for this class if not completed)

## Syllabus and Reading Assignments

NB: Assignment directions may be found at the end of the syllabus

### **Course Overview: Climate Change Policies**

Global Climate Change Planning and the United States

### **Policy Analysis – The Risk Governance Model**

#### **Sources of GHGs and Sources of Information**

Reading: IRGC (2017), Intro to IRGC Risk Governance Framework

Read the IRGC Introduction to Risk Governance. Reflect on what you know about climate change policy and identify aspect of the Risk Governance Framework that seem relevant.

The "sources" assignment is an experiment in research that will also get us right into answering basic questions about climate change. Bring your results to class so we can compare the best research tools.

### **IPCC Reports**

Reading: IPCC AR5, Synthesis Report, Summary for Policymakers

List of key terms that you will find helpful to understand.

Video: watch Stephen Schneider, “Climate Change: Is the Science ‘Settled’?” (1h 39m)

Stephen Schneider was a gifted professor and leading climate change researcher who gave this lecture, “Climate Change: Is the Science ‘Settled’?” (1h 39m) to Stanford Law students in 2010. He’s low-tech but easy to listen to, and in this lecture he covers the basic climate science and information about the IPCC. I suggest that you watch his lecture before you read the IPCC report.

We looked at the IRGC’s risk governance steps, and some questions that can be helpful evaluating a policy or designing a policy recommendation. As you read the IPCC report, bear in mind some of those questions. I suggest these three: - What are the risks and opportunities that we are addressing? - What are the various dimensions of the risk? - Do we have a scarcity of scientific data about the risk (risk agent and risk-absorbing system)? If our questions are about the sources, rate, and future of planetary temperature increase, the answer has to be “yes” - especially about the future for which there is no data! The follow-up question is how do we get that information?

### **Climate Models**

Guest: Professor Robert Kopp

Reading: Moss, et al., “The next generation of scenarios for climate change research and assessment,” Nature (February 2010) doi:10.1038/

### **Methane**

Reading:

Executive Summary of the IPCC chapter (2021) on Short-Lived Climate Forcers

Aaron Clark, “A massive gas leak is adding to climate scrutiny,” Bloomberg (Dec 13, 2022)

Global Methane Pledge

US Dept of State, Global Methane Pledge

## EPA Methane Rules (website summary)

What is methane? Read the Executive Summary of the IPCC chapter (2021) on Short-Lived Climate Forcers (4pp). What's the problem with methane? Read Clark. How are the international community and the USA dealing with methane? Read the Global Methane Pledge pieces.

## Electricity

Reading: Rossi & Hutton, in Gerrard et al, Climate Change (ABA, 2<sup>nd</sup> ed)

We've seen that electricity generation is a major source of GHGs. Please read sections I and II.a and III in Rossi and Hutton. Read for the big picture, with less attention to the details of the regulatory structure.

If you're interested:

Alejandro Gallego-Schmid, "Environmental assessment of microwaves and the effect of European energy efficiency and waste management legislation," *Science of the Total Environment* 618 (2018) 487–499.

Congressional Research Service, "Hydrogen in Electricity's Future," (June 30, 2020)

The directions for the first written assignment are posted here (and can always be found in the Assignments tool, of course). Read through the directions, and begin to consider what you would like to look into and write about. We'll discuss in class 6, and I'd like you to propose your topic no later than the end of the week.

## Renewable Energy

Guest: Professor Rachael Shwom

Reading:

Qiu et al., "Impacts of wind power on air quality, premature mortality, and exposure disparities in the United States," *Sci. Adv.* 8, eabn8762 (2022) 2 December 2022

E. Gibney, "Could solar panels in space supply Earth with clean energy?" *Nature* (Feb 1, 2023)

Some things to consider as you think about Qiu, et al. - what do the authors consider to be the role of "co-benefits" of wind turbines installed for GHG emission reduction? What other policies do they consider important, along with climate change mitigation?

## Mapping Paths to Reducing GHG Emissions: Sources of Emissions – Wedges – Carbon Footprint

Reading:

S. Pacala and R. Socolow, "Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies," *Science*, 305:5686 (Aug. 13, 2004), pp. 968-972

N Johnson, R Gross and I Staffell, "Stabilisation wedges: measuring progress towards transforming the global energy and land use systems," *Environ. Res. Lett.* 16 (2021) 064011.

**Read about the "wedge" approach and give it a try using the guidance in the Mapping Paths Assignment sheet. If you wish you can use the approach that you are planning to write your paper on as your wedge.**

The Pacala Socolow approach has continued to be popular, but it has also been criticized for being simplistic, etc. If you have time, Johnson, et al. explains the criticisms while at the same time evaluating progress that has been made since the 2004 paper was published.

## UN Framework Convention on Climate Change

## Reading:

Friedrich Soltau, "Development of the International Climate Change Regime," in *Fairness in International Climate Change Law and Policy*, pp. 50 – 132 (2009)

Robinson Meyer, "A Reader's Guide to the Paris Agreement," *The Atlantic* (Dec 16, 2015)

Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104.

### **(short articles on UNFCCC COP 27 in *Nature*, *Forbes*, UNEP press release)**

The first reading, in Soltau, will introduce you to the international climate change regime. Focus on the UNFCCC, and with respect to the very long sections on the Kyoto Protocol, be sure that you understand the Kyoto mechanisms and the KP's general function, but don't feel that you need to master every detail in the 80+ page chapter. Instead, save some time to read the piece on the Paris Agreement, and where it asks you to look at the Paris Agreement text, do so. I've posted the PA text as well. We'll discuss the most recent activities at COP 27.

## **Paris Agreement**

Reading: Radoslav S. Dimitrov, "The Paris Agreement on Climate Change: Behind Closed Doors," *Global Environmental Politics* 16:3, August 2016

In class, we will discuss how policy is formed through the treaty negotiation process, and what steps are needed to implement these international agreements. You may want to review the material that we covered on the UNFCCC and the Paris Agreement so far.

## **Emissions Trading – EU ETS and Voluntary Emissions Trading**

### Reading:

Kurukulasuriya L. Robinson N. A. & UNEP Division of Environmental Policy Development and Law, *Training manual on international environmental law* (2006) - ch 10, section 3, pp 117-118, and 119-120, describing the Kyoto Protocol and the role of emissions trading – key points are the quantified emission reduction targets for Annex I parties, and two of the flexible mechanisms: CDM (KP Article 12) and emissions trading (KP Article 17); and the EU ETS.

Di Leva and Vaughan, "The Paris Agreement's New Article 6 Rules," *IISD-ENB* (Dec 13, 2021)

UNFCCC website summary on emissions trading

## **Peer Review of Policy Papers – BRING YOURS**

"As a peer reviewer, your job is not to provide answers. You raise questions; the writer makes the choices. You act as a mirror, showing the writer how the draft looks to you and pointing out areas which need attention." - S. Williams (Univ. of Hawaii at Manoa's Writing Program)

## **State and Local Action**

Devashree Saha, Tom Cyrs and Alex Rudee, "What's Next for State Climate Action in the US? 7 Areas to Watch," *World Resources Institute* (Feb 4, 2021)

Devashree Saha and Joel Jaeger, "Ranking 41 US States Decoupling Emissions and GDP Growth," *World Resources Institute* (July 28, 2020)

Hari M. Osofsky and Lesley K. McAllister, *Climate Change Law and Policy* (2012)

The short WRI papers explain the role of local and state action in addressing climate change. If you have been researching or doing an internship on local or state climate change policy, how do these

articles fit with your first-hand experience? What do you see as the advantages and disadvantages of working at the local or state scale, as compared to federal or international?

Read Osofsky and McAllister, sections on adaptation and cross-cutting issues, and consider question 1 on pp 61-62 (wicked and super-wicked problems) for discussion in class.

### **New Jersey Climate Change Policy**

Guest: Marjorie Kaplan, Assoc Director, Rutgers Climate Institute, co-facilitator of the New Jersey Climate Change Alliance, and Co-director of the New Jersey Climate Change Resource Center

Reading:

NJ Executive Order 100 (Jan 27, 2020)

NJ Global Warming Response Act, N.J.S.A. 26:2C-37 (2007)

New Jersey's Global Warming Response Act 80x50 Report: Evaluating Our Progress and Identifying Pathways to Reduce Emissions 80 % by 2050 (online)

NJDEP's rulemaking page on Protecting Against Climate Threats (online)

NJ Office of Planning Advocacy, Department of State, Business Action Center, Municipal Climate Resilience Planning Guide (Oct 2021)

Read Ex O 100 which reviews important past policy events and directs state agencies to carry out three policy initiatives; the executive summary of New Jersey's 80X50 Report; the NJ DEP web page to get an overview of what NJ PACT (Protecting Against Climate Threats) is. These are cutting-edge rulemakings and policies to implement the 80x50 Plan. You may want to watch one or more of the webinars. Also read the Municipal Climate Resilience Planning Guide (6 pp).

Additional information:

NJ Climate Change Alliance Reports

Climate Change and NJ, Sea Level Rise Reports

New Jersey Energy Master Plan

Executive Order 89

### **The Impacts of Climate Change: Migration**

The White House, Report on the Impact of Climate Change on Migration (Oct 2021)

What are the different kinds of displacement caused by climate change? Identify three approaches that this report recommends for the US Government.

### **The Impacts of Climate Change: Human Rights**

Reading:

Bill McKibben, Global Warming Reader

Video: What are the universal human rights? - Benedetta Berti

UN Office of the High Commissioner for Human Rights (OHCHR), What are Human Rights?

International Covenant on Civil and Political Rights (signed 1966, effective 1976)

International Covenant on Economic, Social and Cultural Rights (signed 1966, effective 1976)

OHCHR Fact Sheet: Climate Change

Petition To The Inter-American Commission on Human Rights Seeking Relief From Violations Resulting from Global Warming Caused By Acts and Omissions of the United States (2005) (Inuit Petition)

Read in the McKibben Global Warming Reader – pp 88-93, Jeff Masters, Causes of the Russian Heat Wave and Pakistani Floods; pp 361-364, Images; pp 400-403, Nepal’s Farmers on the Front Lines.

Watch the short video to get a quick history of human rights and a general idea of what they are. Then look through the preamble and articles 1-27 of the International Covenant on Civil and Political Rights and the preamble and articles 1-15 of the International Covenant on Economic, Social and Cultural Rights; as you read, consider how these apply to people affected by the consequences of climate change.

Read the 2-page information note - how does this UN human rights body apply human rights to climate change?

Read the Inuit Petition, focusing on the human rights that are claimed.

### **The Impacts of Climate Change: Loss and Damage**

Reading:

COP27 – The Past, Present and Future of Loss and Damage Compensation, Rabobank  
Dahiya1 & Okitasari, Accessing the Loss and Damage Fund, Science (2022)

CRS – Loss and Damage, Recent Developments

Dellinger, Taxing Excess Oil and Gas Profits for L&D Fund

Cymie Payne, “Valuation of climate change loss and damage,” in Research Handbook on Climate Change Law and Loss & Damage (M Doelle and S Seck, eds) (2021)

### **The Impacts of Climate Change: Who Pays?**

Reading:

Daniel A. Farber, Climate Justice, 110 Mich. L. Rev. 985 (2012)

Read Prof. Farber's review of Posner and Weisbach's book "Climate Change Justice". What arguments do Posner and Weisbach make (according to Farber)? What arguments does Farber make? How do you weigh these perspectives? (note: all three are law professors)

### **The Impacts of Climate Change – Ocean**

Reading:

Elizabeth Kolbert, The Darkening Sea

DOSI Policy Brief, Ocean Deoxygenation: A hidden threat to biodiversity beyond national jurisdiction

Sébastien Treyer & Julien Rochette, “From Canary to Hummingbird: The Ocean vs The Climate Crisis” and Karen Sack, et al., “Responding to the Urgency of Ocean Risk,” in LSE Global Policy Lab, From “Green” to “Blue Finance”: Integrating the Ocean into the Global Climate Finance Architecture (

Why does Kolbert think we should care about pteropods?

What are the effects of climate change on the ocean described by Kolbert and DOSI? Why do these matter?

What international organizations do Treyer and Rochette identify and which would address mitigation, which deal with adaptation?

What kinds of investments do Sack et al. say are needed, how would they contribute to mitigation or adaptation in relation to the ocean, and why aren't normal market-driven investments adequate?

### **Climate Intervention: Carbon Dioxide Removal**

Reading: Gattuso et al (2021), The potential for ocean-based climate action: Negative emissions technologies and beyond, 2 *Frontiers in Climate* 37

### **Private Sector Role**

Carrington and Taylor, "Revealed: the 'carbon bombs' set to trigger catastrophic climate breakdown," *The Guardian* (May 11, 2022)

Quinson, "Bridgewater sets path for net-zero investors," *Bloomberg* (Dec 21, 2022)

Martinez-Pogue, "Fla. Treasury to divest from BlackRock, citing ESG policies," *Law360* (Dec 1, 2022)

Hunton Andrews Kurth, "European Union Adopts Corporate Sustainability Reporting Directive With Impacts Beyond Europe" (Dec 1, 2022)

Ropes & Gray LLP, "Climate-related Disclosures and Targets Proposed for U.S. Federal Government Contractors - An Overview" (Nov 30, 2022)

World Business Council for Sustainable Development and International Energy Agency, "Cement Technology Roadmap 2009: Carbon Emissions Reductions up to 2050"

This is a handful of readings that reflects the diversity of ways that the private sector is responding to the climate challenge, both positive and negative. These positions evolve over time - what do you think drives certain approaches as contrasted with others? As you read, pay attention to who the authors are - a law firm advising clients, a progressive newspaper, business-oriented news sources ...

Industry sector-specific approaches to mitigation were encouraged in association with the Kyoto Protocol. The Cement Sustainability Initiative was a successful one. This report provides a detailed look. Read the introduction and pages 21 and 26. Skim some of the specific sections to get a sense of the roadmap. What are the advantages for the industry of this approach? Should this kind of sectoral approach be tried in other industries? Why or why not?

### **How International Competition and the International Trade Regime Influence Climate Policy**

Reading:

Wold, Hunter and Powers, "Climate Change and the International Trade Regime," in *Climate Change and the Law* (2013)

Ewa Krukowska, Jennifer Dlouhy and Laura Millan, "Climate policy has become central in the fight for global power," *Bloomberg Green Daily* (Dec 20, 2022)

WTO Agreement, Preamble

GATT, Articles I, III and XX

**Go to p. 563 of Wold et al and read the Class Exercise. Bear in mind the questions it raises as you read the chapter. What questions do you have about how climate change policy influences and is influenced by global trade? How would you analyze the questions in the Class Exercise?**

Krukowska et al is a short, very current article that I'd like for you to read (the Wold et al reading is essential for understanding this part of the course work, but it was published in 2013 so you will notice that some of the discussion (for example, of the Kyoto Protocol) is a little dated.)

Excellent additional reading: Harro van Asselt, "Trade," in Oxford Handbook of International Environmental Law (2nd ed, Rajamani and Peel, eds, 2021)

### **International Cooperation – A negotiation**

For this class we'll be doing a negotiation between rich countries, middle class countries and poor countries over pledges to manage GHG emissions and forest carbon sinks using the C-ROADS simulation. Look at the Assignment for the preparatory reading and information about what we will be doing in this class. The Excel document has links to the background notes and forms you will need.

The second writing assignment depends on the results of the simulation in class, so be sure to read both the preparation for the class and this assignment carefully.

### **Policy Paper Presentations**

*International Cooperation Paper Due*



## Sources Assignment

We know that climate change is a "moving target" for policy - the rate of increase and composition of GHGs in the atmosphere change as we reduce some sources and increase others; global temperature varies; human activities change over time, and so on. Therefore, one of the first things we'd like to do is to identify good sources of information. The assignment is to find good sources of information about sources of GHGs ... and a couple of other things.

This assignment is an experiment in research. You will divide into groups, and each group will try to answer the following questions, using different sources of information:

1. What is the most recent figure you can find for the increase in global temperature from 1990 levels? 2005 levels?
2. What GHGs are the largest contributors to climate change?
3. What are the five or so largest sources of those GHGs?

Be sure to write down the location where you found the information (e.g., url, journal citation). If you can, identify the date of the information (e.g., sometimes data collection and analysis lags so you might only be able to find answers from a few years ago), and your search term for the information you find.

The sources that you will use - note that each group should use only one of these sources - are:

- Major newspaper database on the RU Library website
- EBSCOHost database on the RU Library website
- IPCC website
- Social media (your choice)
- Google search that does not include the other sources.

We'll compare notes in class and see which of these sources we like best.

## Some Key Terms:

**Climate change** in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

The **Hockey Stick Graph** – “Back in 1998, a little known climate scientist named Michael Mann and two colleagues published a paper that sought to reconstruct the planet's past temperatures going back half a millennium before the era of thermometers--thereby showing just how out of whack recent warming has been. The finding: Recent northern hemisphere temperatures had been "warmer than any other year since (at least) AD 1400." The graph depicting this result looked rather like a hockey stick: After a long period of relatively minor temperature variations (the "shaft"), it showed a sharp mercury upswing during the last century or so ("the blade").” <https://www.theatlantic.com/technology/archive/2013/05/the-hockey-stick-the-most-controversial-chart-in-science-explained/275753/>

The **Kaya identity** is a simple mathematical framework to assess the main factors governing global CO<sub>2</sub> emissions (Kaya, 1995):

$$F = P \cdot (G/P) \cdot (E/G) \cdot (F/E)$$

*F*, global CO<sub>2</sub> emissions

*P*, global population growth

*G*, global gross domestic product

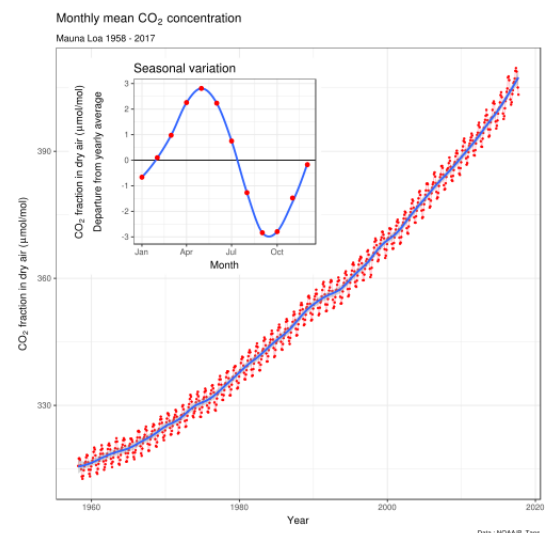
*E*, global energy consumption.

Changes in CO<sub>2</sub> emissions can be traced to population growth (*P*), the per capita economic activity (*G/P*), the energy intensity (*E/G*), and the carbon intensity of energy consumption (*F/E*).

With a growing global population and increasing economic production, the Kaya identity reveals that overall emissions will increase unless the energy intensity and/or carbon intensity are reduced. - Feron (2016)

<https://www.sciencedirect.com/topics/engineering/kaya-identity>

The **Keeling Curve** is a graph that represents the concentration of carbon dioxide (CO<sub>2</sub>) in Earth's atmosphere since 1958. The Keeling Curve is named after its creator, Dr. Charles David Keeling.



### Directions for Written Assignment 1 – Mitigation Tools

Having begun to consider some of the ways that we can take to reduce sources and increase sinks of greenhouse gases to mitigate climate change, we turn to finding out how to put one of those into effect and putting the results into a policy memo directed at an individual who has the capacity to advance the policy. There are two overarching goals to this assignment: 1) to investigate more deeply, and through a policy lens, an aspect of climate change mitigation that interests you; and 2) to learn how to construct a policy paper.

#### Policy Paper Assignment

1. Choose one of the climate change policy “wedges” proposed by Pacala and Socolow or the “solutions” in Drawdown. For the purposes of this assignment, let’s call them all “wedges,” since it’s less ambiguous than “solutions.” We will have a class when we will work with the wedges, but you can get started on your paper topic choice now. If you wish to work on an aspect of climate change that is different, let’s talk about it.
2. Identify *who* is capable of implementing your wedge. Your “who” will be a real person who is in a public policy role capable of influencing implementation of your wedge. I’d prefer for you to identify someone in government, though I am willing to consider others. This person will be the target of your policy paper.

As an example, these are suggestions of “who” you will address your policy memo to:

Educating girls is a “wedge” – national governments and international organizations are able to influence girls’ education in other countries (where this wedge is likely to be most effective) – U.S. Congressional representatives from New Jersey (primarily regarding foreign assistance for programs) like Rep. Bonnie Watson-Coleman, see [here](#) are in positions to direct financial resources to support girls’ education

Plant-based diet – Department of Agriculture, NJAES – perhaps a mid-level official with responsibilities for food labeling and proposing nutritional standards or other food policies

Refrigerants – national governments, Montreal Protocol parties – Secretary, U.S. Dept. of Energy, members of U.S. Congress like Senator Corey Booker

Efficient buildings – local and state governments – Mayor Ras Baraka of Newark

Bicycle transportation (infrastructure or other actions) – local government, transportation authorities

Mass transit – national, state and local government working together

Solar power/hot water and wind energy – national government, utilities, investors, regional grid operators

Peatlands, Afforestation – national, state or local government (of the country where the forestlands are located)

*Note:* You may quite rightly think that the real power in implementing particular solutions lies in the hands of engineers and inventors, style influencers, religious leaders, or others. However, it is less likely that these people would request a policy paper, nor are they generally considered public policy makers.

3. Prepare a briefing paper based on independent research and using the memo style as described to inform the “who” identified above about specific aspects of the issue. Write as though you were that person’s staffer. **Be clear, concise, objective.** Avoid rhetorical flourishes, jokes, personal opinions – here you will present your professional judgment, not your emotions. Keep to the information that your recipient will likely need to make a decision, defend a decision, or to convince others. Use the active voice. Keep sentences short and direct. Avoid generalizations. Help your recipient decide between options by identifying the criteria you use to assess your evidence and to form your recommendation. Support your assertions with relevant data. Refer to the HO\_Herman\_Policy-Memos document in Canvas for guidance, but note that for this assignment you do not need to do all the steps suggested there (what you do need is indicated here and will be covered in class).

4. Follow the directions for content and format demonstrated in the sample below. It will, of course, have **perfect spelling and grammar** (run your spell and grammar check just before you submit) and will use a style of English appropriate to the intended audience. It should be **Microsoft-Word compatible** (no pdfs!), **single-spaced**, with **page numbers**. Please **use footnotes** (because I like them, even though policy papers do not use footnotes but list sources at the end). Replace the curly brackets {} in the template below with the information indicated. Keep the headings or customize them to your topic, as appropriate. Headings are extremely helpful in guiding the reader through your document.

5. Your memo should be long enough to provide the requested information, but no longer than necessary to explain it adequately. The body of the paper should be between **1500 and 2500 words**. To check this in MS Word, go to Tools-Word Count; other software programs have similar tools. The **file name** should be {your last name} – Briefing Paper.

6. Submit your memo by **March 10, 11:50pm** via Canvas.

7. **Support your statements** with valid and relevant evidence from primary and secondary sources. You likely will need to conduct additional independent research on the web. Use your good judgment: use peer-reviewed sources when possible (the library databases are your best source for peer-reviewed journals); you can also use other reliable sources of information (leading newspapers, magazines, or government or non-government institutions). Do not use other student work on the web or other undocumented sources (for example, blogs unless they are by experts in the relevant area and identify reliable support for their information). Much of the interesting and useful information on these topics is published by think tanks, NGOs and similar difficult-to-rate entities. If a key source is of this type, you can do an internet search of the author and/or people involved in the organization (board of directors, board of advisors, relevant staff members) to vet their credentials as an expert – what their education is, where they have worked, what they have published.

Please cite your internet research using footnotes that include the following information for each web page: Author (if available), *Title of Page*, Institution, web address, and date consulted. For example, a

proper citation would be: Drawdown, *Solutions*, Drawdown, <http://www.drawdown.org/solutions>, last viewed 20 January 2023.

8. Before submitting your memo, **go through the checklist** attached as Appendix II.

## **Appendix I - Template**

To:            {Full name of recipient}  
                  {Full title of recipient}

From:          {Your name]  
                  Staff [this is your title for the purposes of the assignment]

Subject:       {Your wedge}

Date:          {date of submittal}

### **Executive Summary**

{Concisely summarize the points discussed below – your executive summary should not exceed the remaining space on this page in length – write this after you finish the rest of the paper. Get your bottom-line up front: State your recommendation, including the specific steps (policies, plans, legislation, etc.) that are needed to implement. If you have reservations, state them.}

### **Description and Feasibility**

{Describe the wedge in terms that someone not familiar with it will understand. Be sure that you explain how it mitigates climate change.}

{Identify the appropriate spatial, temporal and organizational scale}

{Say whether it already exists, to what extent; if it does not already exist, how long is it predicted to take to bring into existence?}

### **Steps/Resources Required**

{Explain what needs to be done by the recipient of your memo – this might include regulations that prohibit an activity, funding in the form of grants or subsidies, or other actions. State any political, economic, technological or other challenges of implementing this wedge as well as strengths of this wedge that you will not cover in the costs and benefits sections}

### **Direct and Indirect Costs**

{Identify financial, environmental and social costs – the sustainability costs – of implementing the wedge – focus on the direct costs but identify important indirect costs. This and the following section should include identification of stakeholders: people or groups with affected interests, and distributional considerations. These sections should be sensitive to counterarguments that will be made.}

### **Direct and Indirect Benefits**

{Identify financial, environmental and social costs – the sustainability costs – of implementing the wedge – focus on the direct benefits but identify important indirect benefits}

## **Appendix II - Checklist**

### **Spelling, Punctuation, and Grammar**

- Computer spell-check finds no unexplained spelling errors
- Acronyms are defined once, when they first appear
- Closing quotation marks come after (not before) commas and periods
- Footnote numbers or symbols, if any, follow all other punctuation
- Non-sexist language is used (applies especially to pronouns)
- Verbs are consistently in the right tense (past/present/future) and voice (active/passive)
- Every sentence is checked again for grammatical sense and spelling

### **Formatting and Layout**

- All parts of the paper are included, appropriately labeled, and in the correct order (e.g., Executive Summary, appendices, and references, as specified for the assignment)
- Pages are numbered consecutively
- Italics or underlining (but not both in the same paper) are used as appropriate
- Headings and subheadings are formatted consistently throughout
- No dangling headings or widowed/orphaned lines remain
- Tables and figures are properly numbered and labeled
- Every work relied on is footnoted appropriately
- All citations follow APA rules or other similar style as explained above

## ASSIGNMENT: SOLUTIONS

How can we get to our GHG emission reduction target? One approach, proposed by Socolow and Pacala, is to identify the target (in terms of amount of carbon dioxide in the atmosphere), identify our projected emissions under a business-as-usual (BAU) scenario, do the math to identify the amount of reduction we need to achieve,<sup>1</sup> calculate how much reduction in emissions we can get from a menu of existing technologies and practices, and choose those approaches that we think are the best policy choices. What does “best” mean? That’s up to you – but at least take into consideration **political feasibility, equity, cost, and whether the strategy is a “no regrets” action** (one that makes sense irrespective of its climate change impacts).

For their proposal, Socolow and Pacala decided that a “wedge” of each technology or practice would be the amount that, when scaled up gradually over fifty years, would prevent 25 GtC (gigatons or billion tons of C per year) from being released into the atmosphere in the year 2059. Each activity must be “additional” to BAU.

A team of researchers with the Drawdown project updated the wedge approach. They propose 100 activities or practices (which they call solutions) instead of just 15 and they range from rooftop solar to telepresence to educating girls. When you read their methodology in the section *Numbers*, you’ll see that they analyze solutions according to the number of gigatons of carbon that would be either not be emitted or that would be sequestered between 2020 and 2050. The activities or practices have to be “additional” to BAU – that is, they wouldn’t have occurred if we continued to do what we’re doing now. The solutions are then compared to BAU and ranked.

**For this assignment, you have less reading and instead of a reading summary please propose a wedge. You will present your wedge in class and we will design a policy made up of the preferred wedges.** If it appeals to you and it is a good fit with the assignment, you can use your policy paper topic for your wedge. **Please submit your wedge description to the Reading Summary assignment and bring a copy to class so that you can present it.**

### **Read**

Pacala S. & Socolow R. 2004. Stabilization wedges: solving the climate problem for the next 50 years with current technologies. *Science* 305: 968–972.

Drawdown website - <http://www.drawdown.org> - Explore descriptions of Drawdown’s 100 solutions.

### **Choose GHG Emission Reduction Actions and Practices – SUBMIT THIS AS A READING SUMMARY**

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<sup>1</sup> Note that the link between increasing amounts of CO<sub>2</sub> in the atmosphere and increasing average global temperature is complex and therefore somewhat uncertain – the figures used are scientists’ best estimate.



Choose a mitigation technology or practice, have your results available to you in class.

Write up the technology or practice that you selected and fill in the template below.

Submit it to a Reading Summary.

Sources: To complete this part of the assignment, you can rely on the Drawdown site or other sources to help you fill in the information on the Wedge Proposal sheet – the template for it is on the next page. If you do additional research, use your good judgment: use peer-reviewed sources when possible; you can also use other reliable sources of information (leading journals, newspapers, magazines, or government or non-government institutions). Do not use other student work on the web or other undocumented sources (for example, blogs unless they are by experts in the relevant area and identify reliable support). Much of the interesting and useful information on these topics is published by think tanks, NGOs and similar difficult-to-rate entities. If a key source is of this type, you can do an internet search of the author and/or people involved in the organization (board of directors, board of advisors, relevant staff members) to vet their credentials as an expert – what their education is, where they have worked, what they have published.

### **READING SUMMARY: WEDGE PROPOSAL**

*Please use this template to assemble your write-up (you may modify it as necessary).*

**Wedge:** One-line description of your chosen wedge (e.g., Land Sinks – Reforestation).

**Detailed description of wedge and how it might be implemented:**

Description here, with footnotes if you have references.

**Are there examples of such technology already in production or operation?**

Description here, with footnotes if you have references.

**What are the challenges of implementing this wedge (political, economic, technological)?**

Description here, with footnotes if you have references.

**What secondary environmental and social costs are associated with this technology?**

Description here, with footnotes if you have references.

**Relevant diagram, photograph, or image (if it enhances your analysis).**

Description here, with credit to source.

**Useful sources for further information:** List your sources, including those in the footnotes already and any additional sources you relied on if you have additional references.

## Assignment – World Climate Negotiation Simulation

The Paris Agreement calls for each country to propose its own Nationally Determined Contribution, so you won't be negotiating binding targets and timetables. But you must allocate the investments and sacrifices needed to keep planetary temperature rise below 1.5° C. We will use the C-ROADS simulator (see below) to see if we are able to negotiate pledges for the reductions we need.

You will take the identity of a country and one of the negotiating blocs that participate in the international climate change regime. I've assigned you randomly to one of the three negotiating blocs; you can choose your country from those included in your negotiating bloc (some blocs have more than one groups, please choose a country in the grouping next to your name). Your decisions about emissions reductions and land use change (forests) will reflect the interests and needs of your country and your assigned negotiating bloc, not your personal preferences. This may be challenging for those who are unsympathetic to the role they are playing, but it's a useful skill.

During class time, you will engage in a double negotiation: first within your group to make proposals for your negotiating bloc and then with the other groups.

BTW - The main drivers of climate change are sometimes expressed in the Kaya Identity, which you might consider in reflecting on your negotiating group's interests and abilities:

$$\text{Population} \times \text{GDP/capita} \times \text{Energy Intensity/unit of GDP} \times \text{Carbon Intensity of Energy} = \text{Total CO}_2 \text{ Emissions}$$

To prepare for the negotiation, your assignment is:

1. Review classes 10-11, to understand what is required under the Paris Agreement, and read Radoslav S. Dimitrov, *The Paris Agreement on Climate Change: Behind Closed Doors*, 16:3 Global Environmental Politics (2016) to get an appreciation for the negotiating strategies countries use.
2. Find your name below to see what climate change negotiating bloc you will be representing and choose a country within the group or subgroup across from your name.
3. You will represent the country that you choose in your group discussion, so be aware that you will need to take account of your national interests and other group members' concerns to reach an agreed position. You can do quick research on your country with this World Bank resource: <https://data.worldbank.org/country>
4. Go to C-ROADS at <https://c-roads.climateinteractive.org/scenario.html?v=22.11.0&mode=3r> to see the simulator and watch the [introductory video](#). (5 min) We'll be doing the three region version.
5. Look at the background information for your group.
6. Before class, choose values for your negotiating group for each of these pledges, from the perspective of your national interests (members of your group may have different preferences):
  - Emissions peak year (if your group has already peaked, put current year)
  - Reductions begin year (fill in if your group has not already peaked)
  - Annual reduction rate (everyone)
  - Prevent deforestation (everyone)
  - Promote afforestation (everyone)

Write down your proposed values and bring them to class.

In class, you will meet with your group, discuss, and agree on values for each of the pledges. You may not have well-aligned interests; be prepared for that.

Bear in mind information about your negotiating group that is provided and that you yourself are aware of already.

→ There is an additional element to the negotiation: a Climate Change Mitigation and Adaptation Fund of \$100 billion per year. Your negotiations with other groups should include this element. Consider whether your country is a donor or recipient and how much you would be willing to contribute or want to ask for (the World Bank country information should be helpful here)

7. The final writing assignment for this class is to write up your experience. It is due on the last day of class. See the assignment for that.

<b>Group</b>	<b>Individual Nations</b>	<b>You</b>
<b>Developed Nations</b> <i>This includes the Annex I nations</i>	United States, Canada	
	Australia, New Zealand	
	Japan, South Korea	
	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, the United Kingdom, Iceland, Norway, Switzerland	
	Russia, Albania, Bosnia & Herzegovina, Croatia, Macedonia, Slovenia, Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Ukraine, Uzbekistan	
<b>Developing A Nations</b> <i>These are non-Annex I nations, but they have become middle class in some respects; some are now the highest GHG emitters</i>	Brazil, China, India, Indonesia, Mexico, Philippines, Thailand, Taiwan, Hong Kong, Malaysia, Pakistan, Singapore, South Africa	
<b>Developing B Nations</b> <i>These are non-Annex I nations, and also they are the less and least</i>	Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, Yemen,	

<p><i>developed countries – which means, as a general matter,, that they are poorer, have less infrastructure for transportation, energy, health care, education, etc; and that they have contributed very little to GHG emissions. But some are oil-rich, some are members of the European Union, some are small island states that will be submerged with sea level rise, some are involved in devastating civil wars. Nonetheless, they all have to agree on a position</i></p>	<p>West Bank and Gaza (Occupied Territory)</p>	
	<p>Antigua and Barbuda, Argentina, Bahamas, Barbados, Bolivia, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Saint Lucia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Trinidad and Tobago, Uruguay, Venezuela</p>	
	<p>Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoro Islands, Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea and Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Reunion, Rwanda, Sao Tome &amp; Principe, Senegal, Seychelles, Sierra Leone, Somalia, Sudan, South Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zaire, Zambia, Zimbabwe, Mayotte, Saint Helena, West Sahara</p>	
	<p>Bangladesh, Myanmar, Nepal, Sri Lanka, Afghanistan, Cambodia, Laos, Mongolia, N. Korea, Vietnam, 23 Small East Asia nations</p>	

## Roles<sup>2</sup> - These is some additional background on negotiating positions

### **China**

China has been a forceful advocate for the principle of “common but differentiated responsibilities,” flexibility for developing countries on a range of topics, including monitoring, reporting and verification of emissions; financial and technical support from developed countries to developing countries to help with emissions reductions and adaptation to climate change; and priority attention to the adaptation needs of developing countries. By the time of the Copenhagen climate conference in 2009 (COP-15), China had become the world’s largest emitter of heat-trapping gases. Prior to the Copenhagen conference, China pledged to cut CO<sub>2</sub> emissions per unit of GDP 40%–45% from 2005 levels by 2020—its first international pledge to limit CO<sub>2</sub> emissions. China also pledged to increase the share of non-fossil fuels in primary energy consumption to 15% and increase forest cover 40 million hectares from 2005 levels, both by 2020. ... [In its first NDC,] China pledged to peak its carbon dioxide emissions around 2030 and make best efforts to peak earlier. It also pledged that by 2030, it would (1) lower carbon dioxide emissions per unit of GDP 60%–65% from the 2005 level, (2) increase the share of non-fossil fuels in primary energy consumption to around 20% and (3) increase the forest stock volume by around 4.5 billion cubic meters from the 2005 level.

### **African Group (AG)**

The African Group of Negotiators (African Group) was established at COP1 in Berlin, Germany in 1995 as an alliance of African member states that represents the interests of the region in the international climate change negotiations, with a common and unified voice. The Group comprises 54 Parties. The African Group is active in and supportive to all aspects of the climate change negotiating process, for instance regarding vulnerability, mitigation and adaptation to climate change.

### **Arab States**

The Arab States is comprised of 22 member states namely Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Mauritania, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen.

### **European Union (EU)**

The 28 members of the European Union meet in private to agree on common negotiating positions. The Party that holds the EU Presidency - a position that rotates every six months - then speaks for the European Union and its 28 member states. As a regional economic integration organization, the European Union itself can be, and is, a Party to the Convention. However, it does not have a separate vote from its members. Croatia is the latest country to join the European Union in 2013.

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<sup>2</sup> The following descriptions are taken verbatim from these two sources:

<https://unfccc.int/process-and-meetings/parties-non-party-stakeholders/parties/party-groupings>

<https://chineseclimatepolicy.energypolicy.columbia.edu/en/unfccc>

**Small Island Developing States (SIDS)** *this is generally equivalent to AOSIS, discussed in the Dimitrov article.*

The Small Island Developing States (SIDS) is a coalition of some 40 low-lying islands, most of which are members of the G-77 that are particularly vulnerable to sea-level rise. SIDS Parties are united by the threat that climate change poses to their survival and frequently adopt a common stance in negotiations. They were the first to propose a draft text during the Kyoto Protocol negotiations calling for cuts in carbon dioxide emissions of 20% from 1990 levels by 2005.

### **Umbrella Group**

The Umbrella Group is a coalition of Parties which formed following the adoption of the Kyoto Protocol. The Group is made up of Australia, Belarus, Canada, Iceland, Israel, Japan, New Zealand, Kazakhstan, Norway, the Russian Federation, Ukraine and the United States. One commentator says “the U.S leads “Umbrella Group” of industrialized countries, and drove an exodus from the established international climate rules (the 1994 Framework Convention and its 1997 Kyoto Protocol) into a the Paris Agreement that includes weaker rules and targets for the rich developed countries than ever before. The position of the global superpower, the United States, has throughout this period been shaped substantially by powerful economic lobbies including those of coal, oil, automotive, metals, fertilizer, chemical, agribusiness and others. This has been the case regardless of who sits in the Oval Office and it forms one of the unwritten “rules of the game” of climate change talks.

## Climate Change Policy

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### Directions for Written Assignment 2 – International Cooperation

For this assignment, you will participate in a climate simulation as a member of a team in class. Directions for the simulation are provided in a separate instruction sheet. Afterward, you will write up this assignment individually and turn it in on the last day of class.

In your write-up, summarize the position taken by your negotiating group (Developed Nations, Developing A Nations or Developing B Nations).

State the primary concerns and interests for your country or group in terms of reducing GHG emissions. Please refer to **at least 2 sources** of information for your country/group (preferably peer-reviewed research papers or government reports on emissions trajectories, main sources of GHG emissions, role of your country/group in international climate negotiations in the past, or other related topics). Find this information from assigned readings for this class, your preparation for the simulation, or via Web of Science or SCOPUS databases on the Rutgers Libraries website. Be sure to include footnotes to your 2 articles in your write-up.

Discuss in your write up the proposals that were made by your group in the rounds of the negotiations in class.

Look up the NDC submitted by your country or a country in your group. Were the pledges that you made realistic? How do they align with actual pledges in NDCs? Consult the Paris Agreement National Determined Contributions database at:

<http://www4.unfccc.int/ndcregistry/Pages/All.aspx>

Summarize the material from the actual NDC in your write-up, and reflect on:

- 1) How realistic and ambitious the country targets in the NDC are
- 2) If the targets are dependent on other actions from other countries (e.g., funding from a developed nation for a developing nation, or
- 3) If the targets depend on particular types of climate policies (e.g. carbon taxes, cap and trade, budget investments) and if so, outline what these are.

Offer final reflections on the above and how realistic and potentially effective your country's pledges are in light of topics and themes discussed in class readings. Your write-up should be minimum 1 page and maximum 3 pages.