

## Syllabus

### Course Name

Climate Change Economics

### Semester

Spring 2024 semester

### Main Instructor

Silvester Van Koten, PhD

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### Date

- Classes: March 4 – April 12, 2024
- Final exam week: April 15 – 19, 2024
- Make-up exam week: April 22 – 26, 2024

### Time

- To be determined.

### Office Hours

- To be determined.
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## Course Description

Energy is a basic necessity of daily life and a vital input to industry in any society. New technologies, especially renewable power generators, such as wind and solar, are changing the industry. Also, new climate policies have a growing influence on the economics and practical functioning of energy systems, especially the electricity industry.

First, this course aims to give a deeper theoretical insight regarding economic externalities, such as global warming. Several classical economic instruments are presented, such as Pigovian taxes, cap-and-trade programs, subsidies, and mandates. The theory addressed has broad applications, including in the field of public finance and public policy.

Second, this course gives an overview of the economics of new potential decarbonization technologies, such as hydrogen, heat pumps, electric cars, and gas as a transition fuel. Third, the most recent decarbonization developments will be discussed.

## Prerequisites

Microeconomics, specifically the topics of consumption, production, supply and demand, to at least at the level of any of the following books (any editions):

- Besanko, D., and Braeutigam, R. 2020. "Microeconomics." *Wiley Global Education*.
  - Krugman, P., Wells, R., Ray, M., and Anderson, D. A. 2013. "Microeconomics in Modules." *Macmillan Higher Education*.
  - Perloff, J. M. 2018. "Microeconomics, Global Edition." *Pearson Education Canada*.
  - Pindyck, R. S., Rubinfeld, D. L., & F. E. 2001. "Microeconomics." *Prentice-Hall Madrid*.
  - Varian, H. R. 2014. "Intermediate Microeconomics With Calculus: A Modern Approach." *WW Norton & Company*.
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## Grading

Participants are expected to review the readings for the class, and to participate in class discussions actively and constructively. The final grade for the course will be based on the final exam (60% of the grade), homework (30%), and quizzes during the class (10%). There will be two homework assignments in total. There will be five quizzes; your quiz grade is the average score of your best four quizzes. Quizzes will not be announced beforehand and can be held at any time during the lecture. A general rule is that a student must have more than **50% of overall course results, and more than 50% on the final exam**, to pass a DLP course and be awarded the CERGE-EI Foundation certificate.

## Detailed Schedule

Lecture		
	<b>A. Global Warming</b>	
1	- The Issue - Policy So Far, Globally (UNCOP) and Regionally (EU, California, China)	Gruber, Chapter 6 Harris, Chapter 12 Tol
	<b>B. Economic Instruments for Global Externalities</b>	
2	First-Best: Pigovean Taxes - Theory - Current State	Cramton Gruber, Chapter 5 Varian, Chapter 34 Harris, Chapter 3 Schotter, Chapter 24
3, 4	First-Best: Cap-and-Trade - Theory - Current State	Schotter, Chapter 24 Varian, Chapter 34
5	Second-Best: Subsidies and Mandates	Cramton

	- Theory - Current State	Gruber, Chapter 5 Tietenberg, Chapter 14
6	Interaction of Instruments	Boehringen
	<b>C. Electricity, the New Renewables and New Tech</b>	
7	Renewables - What Are They?	Murdock, Hardwick
9	Promoting Renewables: - Costs and Benefits The Problem of Intermittency - LCOE and Its Drawbacks	Marcantonini 2015 Marcantonini 2017 Hirth
10	How to Price Renewables and Energy - The Utility Dead-Spiral	Borenstein 2012
11	Hydrogen, Electric Cars	Birol (executive summary) Rapson
12	Past and Future - Optimal Extraction and the Green Paradox - Disasters, Myths, and Miracles	Smil Tietenberg, Chapter 5 Gollier & Tirole 2015 Morris Wilson

**Readings** (optional readings in small print)

**All readings are available in the library or will be provided.**

**A. Climate Policy**

Gruber            Gruber, J. 2016. "Public Finance and Public Policy." *Macmillan*.

Harris            Harris, J. M., and Roach, B. 2018. "Environmental and Natural Resource Economics: A Contemporary Approach." *ME Sharpe*.

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Tol Tol, R. S. 2022. "Costs and Benefits of the Paris Climate Targets." arXiv preprint arXiv:2209.00900.

Havranek, T., Irsova, Z., Janda, K., & Zilberman, D. 2015. "Selective Reporting and the Social Cost of Carbon." *Energy Economics*, 51, 394-406.

Tol, R. S. 2019. "Climate Economics: Economic Analysis of Climate, Climate Change and Climate Policy." *Edward Elgar Publishing*.

Yergin, D. 2020. "The New Map: Energy, Climate, and the Clash of Nations."

## B. Economic Instruments for Global Externalities

Boehringen Böhringer, C., Rosendahl, K,E, 2009. "Green Serves the Dirtiest." *Discussion Papers* No. 581, April 2009, Statistics Norway, Research Department.

Cramton Crampton, P., Ockenfels, A., and Stoft, S. 2017. "Global Carbon Pricing" in Peter Crampton, David J.C. Kay, Axel Ockenfels, and Steven Stoft (editors), "Global Carbon Pricing: The Path to Climate Cooperation" pp. 31-90.

Gruber Gruber, J. 2016. "Public Finance and Public Policy." *Macmillan*.

Harris Harris, J. M., and Roach, B. 2018. "Environmental and Natural Resource Economics: A Contemporary Approach." *ME Sharpe*.

Tietenberg Tietenberg, T. H., and Lewis, L. 2018. "Environmental and Natural Resource Economics." *Routledge*.

Schotter Schotter, A. 2009. "Microeconomics: A Modern Approach." *Cengage Learning*.

Varian Varian, H.R. 2010. "Intermediate Micro Economics." Ch.34.

## C. Electricity and the New Renewables

Birol Birol, F. 2019. "The Future of Hydrogen: Seizing Today's Opportunities." IEA Report prepared for the G20.

Hardwick Hardwick, J., Smith, H., Fitch-Roy, O., Connor, P. M., & Sundaram, S. 2018. ICE report T1. 1.1: "An Overview of Renewable Energy Supply Potential."

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- Hirth 2015 Hirth, L. 2015. "The Optimal Share of Variable Renewables: How the Variability of Wind and Solar Power Affects Their Welfare-Optimal Deployment." *The Energy Journal*, 149-184.
- Marc. 2015 Marcantonini, C., & Ellerman, A. D. 2015. "The Implicit Carbon Price of Renewable Energy Incentives in Germany." *The Energy Journal*, 205-239.
- Marc. 2017 Marcantonini, C., & Valero, V. 2017. "Renewable Energy and CO2 Abatement in Italy." *Energy Policy*, 106, 600-613.
- Morris Morris, E. 2007. "From Horse Power to Horsepower." *Access* 30.
- Murdock Murdock, H. E., Gibb, D., André, T., Appavou, F., Brown, A., Epp, B., ... & Sawin, J. L. 2019. "Renewables 2019 Global Status Report."
- Wilson Wilson, R. 2013. "The Future of Energy: Why Power Density Matters." *The Energy Collective*: <http://theenergycollective.com/robertwilson190/257481/why-power-density-matters>
- Rapson Rapson, D. S., and Muehlegger, E. 2022. "The Economics of Electric Vehicles (No. w29093)." *National Bureau of Economic Research*.
- Smil Smil, V. 2014. "The Long Slow Rise of Solar and Wind." *Scientific American*, 282 (1):52-57. [PDF](#)
- Stoft Stoft, S. 2002. "Power System Economics: Designing Markets for Electricity." *IEEE Press: Wiley*.
- Tietenberg Tietenberg, T. H., and Lewis, L. 2018. "Environmental and Natural Resource Economics." *Routledge*.
- Yergin, D. 2013. "The Prize: The Epic Quest for Oil, Money, and Power." *Simon and Schuster*.
- Fisher. 2008 (1981). Chapter 2: "Exhaustible resources: the theory of optimal depletion" in *Resource and Environmental Economics*.
- Smil, V. 2010. Power Density Primer. From <http://www.vaclavsmil.com/wp-content/uploads/docs/smil-article-power-density-primer.pdf>
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