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# FINANCING AND DEPLOYING CLEAN ENERGY

An online certificate program offered by:



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# EDUCATING FOR IMPACT

This online certificate builds your capacity in the areas of policy, finance and clean technology.

The world urgently needs leaders with this combination of skills; in 2017, the International Energy Agency estimated that \$3.5 trillion per year in energy investments would be required until 2050 to offset the rise in carbon emissions. Of these, approximately \$1 trillion per year must be dedicated to the deployment and financing of clean energy. The challenges—and the opportunities—are both immense and immediate.

To tackle them, all must come together to develop innovative approaches to how we produce, distribute, and consume energy. It requires a cross-sectoral approach and an interdisciplinary lens. It requires an informed workforce and powerful knowledge networks. And it requires sharp skills and a willingness to learn.

This is why the Yale Center for Business and the Environment (CBEY) has developed this year-long, admissions-based online certificate for working professionals who seek to accelerate the financing and deployment of clean energy. CBEY has drawn on its vast network of professionals and on the expertise of Yale faculty to offer a unique program marrying academic rigor with practical skills.



## Program Objectives

The key objective of this program is to help professionals understand the interplay of the financial, technological, and socioeconomic drivers in financing and deploying clean energy.

### Upon completion of this program, participants will be able to:

- Understand how policy supports or hinders the scaling up of clean energy;
- Understand how current energy models work and examine the technological and economic challenges to the clean energy transition;
- Understand the development process, investment requirements, and economic risks and returns associated with clean energy, and practice skills in financial modeling; and
- Examine what innovative business models, policy, and technological solutions can be used to overcome these obstacles.

# 2019-2020 COHORT PROFILE

**76** Total Participants

## Gender Identity

 **40%**  
women

 **60%**  
men

## Years of Experience

0–5 Years	<b>28%</b>
6–10 Years	<b>33%</b>
10–15 Years	<b>16%</b>
16–20 Years	<b>8%</b>
21+ Years	<b>16%</b>

## Industry Sector

Power sector	<b>21%</b>
Financial or insurance	<b>20%</b>
Consulting and professional services	<b>18%</b>
Public administration, policy, or lobbying	<b>17%</b>
Research	<b>5%</b>
Advocacy	<b>3%</b>
Natural resources exploration or extraction	<b>3%</b>
Real Estate	<b>3%</b>
Consumer goods	<b>1%</b>
Education or the arts	<b>1%</b>
Other	<b>8%</b>

“

The program is helping me develop a deeper understanding of not just the technology, but also project development and finance as well as the business case.”

—CARISHMA GOKHALE-WELCH

Project Leader Clean Energy at National Renewable Energy Laboratory (NREL)



## Countries of Residence



- United States
- Brazil
- Canada
- France
- India
- Nigeria
- Panama
- Rwanda
- South Africa

## Indicative Functions

- Assistant Project Developer
- Attorney
- Director of Communications
- Director Policy and Regulation
- Energy Data Analyst
- Head of Environment, Social and Governance
- Program Manager
- Project Development Analyst
- Power & Utilities Advisory Associate
- Senior Director, Government Affairs
- Senior Loan Investment Administrator
- Senior Program Officer
- Senior Researcher
- Senior Vice President
- Solar Installer

## Indicative Organizations

- American Wind Energy Association
- AVANGRID
- Bank of America
- Best Buy
- Connecticut Green Bank
- Enel Trading North America, LLC
- Google
- Government of Canada
- KPMG LLP
- Laplace Financas
- National Renewable Energy Laboratory
- Siemens Energy Business Advisory
- The Kresge Foundation
- U.S. Department of Energy
- U.S. Environmental Protection Agency
- Wind Solar Alliance

“

It's nice to be in a room that is not just all financing people. You have your engineers, you have your funders, you have your policy folks, your state regulators. I think that brings in the best perspectives. It adds a lot of value and depth to our conversations and expands learning.”

—TODD PARKER

Director of Programs at Michigan Saves



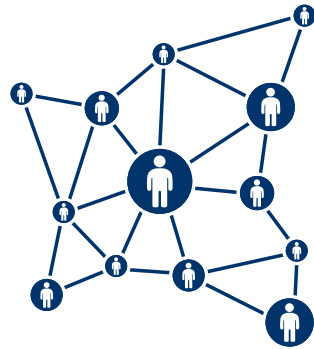
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# BENEFITS OF THIS CERTIFICATE



## Build your knowledge

Accelerate the transition to the clean energy economy by learning about policy, technology and finance from world-class faculty and industry experts



## Expand your networks

Build new relationships through the online sessions and the week on campus

Interact with experts and build your own peer community



## Connect with people in real time

Discuss ideas with and receive feedback from instructors, peers, and experts weekly



## Access online materials from anywhere

Learn at your own convenience without interrupting your professional commitments

# CURRICULUM AND FORMAT

The program kicks off in the summer with a five-week long precourse aimed at bringing the cohort up to speed on basics of energy and finance concepts. The foundational precourse is entirely self-paced. The precourse will be either required or recommended based on an initial assessment of participants' skills and knowledge areas during the admissions process.

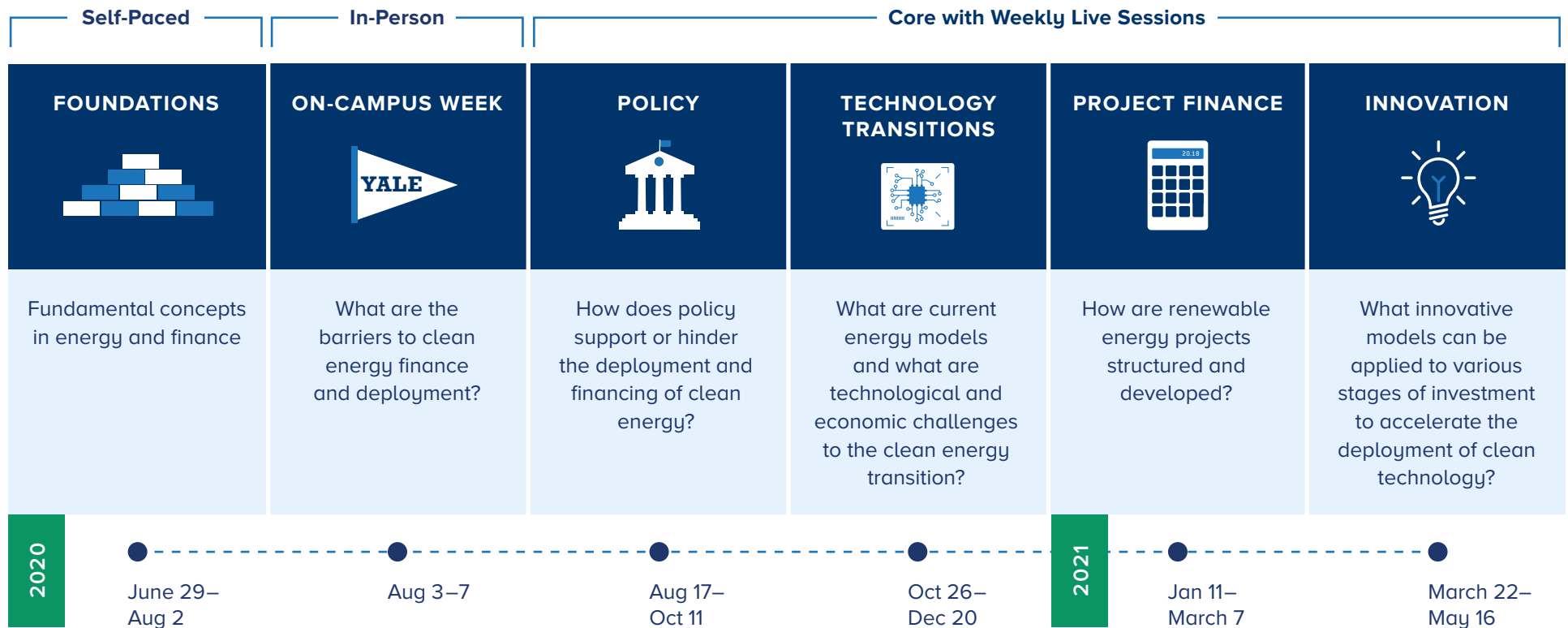
In August, the cohort will meet on Yale's campus for one week. During the on-campus session, participants will receive an introduction or a refresher on

climate change, an overview of investment opportunities and challenges, and an introduction to the barriers to clean energy finance and deployment.

Participants will also meet their peers, learn the basics of team dynamics to address the challenges of collaborating online, and expand their professional networks.

Immediately following the on-campus week, participants will begin the first of four eight-week online core courses, which run from August through May. Core courses are Clean Energy Policy, Renewable Energy Project Finance, Technology Transitions and Innovation.

All online course material, be it the foundations precourse or the core courses, will be made accessible through Yale's online platform, Canvas.



# CORE COURSES



## Clean Energy Policy

This course, led by Hillhouse Professor of Environmental Law and Policy at the Yale Law School and the Yale School of Forestry & Environmental Studies and former Commissioner of the Connecticut Department of Energy and Environmental Protection Dan Esty, examines the policies that hinder or support the financing and deployment of clean energy.

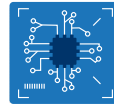
Because energy is a highly regulated market, policy plays a large role in shaping the transition to a clean energy economy. At its best, effective policy promotes a sustainable energy future by encouraging innovation and leveling the playing field for all fuels to compete fairly. Poorly designed policy, even if well-intentioned, can have the opposite result. This class will explore how policy is made and what makes it successful through examining the current regulatory framework, energy policy history, and case studies.

“

Creative strategies for finance — using limited public money to leverage private capital — must be considered a priority in any policy framework to address climate change. We need people who understand the ins and outs of policymaking but also of finance. This program is designed to do just that.”

—DAN ESTY

Hillhouse Professor of Environmental Law & Policy at Yale University



## Technology Transitions

This course, led by Director of Energy Studies at Yale Michael Oristaglio, aims at exploring energy models and the technological and economic challenges to the clean energy transition. The transition from the entrenched fossil fuel economy is fraught with obstacles that require deep systems knowledge to navigate. Moving along a pathway to a low carbon future means understanding which technologies are available, how they work, and what their limitations are.

Coal, oil, and natural gas currently account for 85% of the world’s primary energy use. The environmental and social consequences of such a combustion-driven power regime have led the world to begin remaking its energy system radically and at an unprecedented rate. This course will examine technological transitions, current and incoming energy technologies, the structure of the utility grid and how it will fare with integrating new technologies and increasing demand, as well as the socio-behavioral insights that influence buildings, transport, materials, and energy storage.

“

Navigating the transition from fossil fuels to low-carbon energy without running aground will require a deep understanding of what technologies are available and fit for purpose, as well as what are their limitations.”

—MICHAEL ORISTAGLIO

Director of Energy Studies Undergraduate Research Scholars and Senior Research Scientist at Yale University



# CORE COURSES



## Renewable Energy Project Finance

This course, led by Yale School of Forestry & Environmental Studies Lecturer and private equity investor Daniel Gross, examines how renewable energy projects are developed under project financing structures. Project financing refers to a type of structured non-recourse or limited recourse financing that has traditionally been used for long-term and large-scale infrastructure projects. This course will delve into the foundational principles of project finance from both the perspective of the renewable energy investor as well as the developer.

It will take a closer look at the challenges inherent to financing renewable energy projects whose cashflows stem from the sale of intermittent power through power purchase agreements and teach students how to analyze risks, structure a transaction, read legal documentation derived from real projects, and build financial models.

“

Renewable energy project finance is a critically important toolkit for the global deployment of wind, solar and other clean energy infrastructure. Students need to develop a familiarity with industry vocabulary, financial modeling and legal documentation in order to drive the clean energy transition.”

—DANIEL GROSS

Lecturer at Yale University; Private Equity Investor



## Innovation

This course, led by Yale School of Management Lecturer and Chair of the New York State Energy Research and Development Authority Board Richard Kauffman, will examine what innovative models can be pursued to accelerate the clean energy transition.

After being introduced to the lifecycle of innovation, participants will hear from a range of experts about what technological solutions are required or being developed (e.g., smart grids, blockchain-enabled peer-to-peer energy trading, demand response technology, IoT), what role the government and businesses can play in building them (e.g., green investment banking), and the financial tools that can support scaling (e.g., green bonds and securitization).

“

George Westinghouse and Nikola Tesla did not design a grid for energy efficiency, intermittent renewables, or distributed energy resources. To decarbonize the grid, we need to think of utilities as system integrators. And for utilities to be successful, they need to open themselves up to some of the forces of history that have been going on elsewhere in the global economy. Let's think critically about the business model of the utilities of the 21st century.”

—RICHARD L. KAUFFMAN

Chair of the New York State Energy Research and Development Authority Board





# Our Network Of Faculty, Experts And Partners

**Jacob Thomas**  
Williams Brothers  
Professor of Accounting  
and Finance at Yale  
School of Management



**William English**  
Professor in  
the Practice of  
Finance at Yale



**FINANCE**  
**Daniel Gross**  
Lecturer at Yale  
University and  
Private Equity  
Investor



**Chris Magalhaes**  
Chief Investment  
Officer at Inclusive  
Prosperity Capital



**Diane Strauss**  
Former Research Director at Yale  
Initiative on Sustainable Finance



**Sam Krasnow**  
Senior Policy Advocate for Climate at  
the Natural Resources Defense Council



**Robert J. Klee**  
Former Commissioner at the Connecticut  
Department of Energy and Environmental Protection



**Michael Oristaglio**  
Director of Energy Studies  
Undergraduate Research  
Scholars at Yale



**Ronald Smith**  
Damon Wells Professor at Yale  
University Geology & Geophysics  
and Yale School of Forestry &  
Environmental Studies



**Narasimha Rao**  
Assistant Professor of Energy  
Systems at Yale School of Forestry  
& Environmental Studies



**Jeffrey Schub**  
Executive Director  
at Coalition for  
Green Capital



**Chéri Faso Olf**  
Founder and Executive Director  
at Covenant Solar Initiative



**Sue Reid**  
Vice President of Climate  
and Energy at CERES



**Kenneth Gillingham**  
Associate Professor of Environmental  
& Energy Economics at Yale



**Kerry O'Neill**  
Chief Executive Officer at  
Inclusive Prosperity Capital



**Bryan Garcia**  
President and  
CEO at Connecticut  
Green Bank



**Dan Esty**  
Hillhouse Professor of  
Environmental Law &  
Policy at Yale



**POLICY**

## TECHNOLOGY

**Martin Wainstein**  
Resident Fellow at the  
Yale Center for Business  
and the Environment



**Sonia Yeh**  
Professor, Department of Space,  
Earth and Environment, Physical  
Resource Theory at Chalmers  
University of Technology



**Jessica Bailey**  
CEO & Co-founder at  
Greenworks Lending



**Shimon Anisfeld**  
Senior Lecturer and Research Scientist  
in Water Resources and Environmental  
Chemistry at Yale School of Forestry  
& Environmental Studies



**Rodrigo Canales**  
Associate Professor of  
Organizational Behavior at  
Yale School of Management



## INNOVATION

**Richard L. Kauffman**  
Chair of the New York  
State Energy Research  
and Development  
Authority Board



**Mary Evelyn Tucker**  
Senior Lecturer and  
Research Scholar at  
Yale University



**Katie Dykes**  
Commissioner of the  
Connecticut Department  
of Energy and  
Environmental Protection



**Hannah Wiseman**  
Assistant Professor, Florida State  
University College of Law



**Casey Pickett**  
Director of the Carbon Charge at Yale



**Marten Ovaere**  
Postdoctoral Researcher at Yale School  
of Forestry & Environmental Studies



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# PROGRAM INFORMATION

## Tuition

The tuition for the 2020–2021 academic year is \$9,500.

## Duration

- Self-paced foundations course: June 29, 2020 to August 2, 2020
- Week of training on Yale’s campus: August 3, 2020 to August 7, 2020
- Core online classes: August 17, 2020 to May 16, 2021

## Workload Expectations

A typical participant will spend four to five hours a week on the core online courses. This weekly time commitment will generally involve:



Up to one hour of video



Two to three hours of individual or group work



One hour participating in live sessions

## For More Information

Visit [cbey.yale.edu/certificate](https://cbey.yale.edu/certificate) or reach out to us at [cbey.certificate@yale.edu](mailto:cbey.certificate@yale.edu)



# APPLYING TO THE CERTIFICATE



## Application Process

Admissions will open on January 6, 2020. Deadline for completed applications is March 1, 2020.

The admissions review committee will seek to balance the cohort across sectors and industries.

Admissions and scholarship decisions will be sent on or about March 23, 2020.

## Application Materials

To apply for this program, you must submit all of the following documents:

1. A completed online application form;
2. Responses to three (3) essay questions, each a maximum of 300 words;
3. One (1) resume or curriculum vitae;
4. Scanned or electronic transcript (official or unofficial) that demonstrates the completion of a four-year bachelor's degree in any subject;
5. A TOEFL or IELTS test score report is required. More information can be found online at [cbey.yale.edu/certificate](https://cbey.yale.edu/certificate); and
6. One (1) letter of recommendation, preferably from a professional supervisor.

There is no application fee, but securing a spot in the program if you are admitted will require payment of the first semester tuition. We recommend you ask your employer whether some funds may be available to cover the costs associated with the certificate.

For detailed information on the application process visit [cbey.yale.edu/certificate-application](https://cbey.yale.edu/certificate-application)

## Certificate of Completion



Upon successful completion of the program, participants will receive a certificate of completion from the Yale School of Forestry & Environmental Studies and the Yale School of Management.

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# ABOUT

## Yale University

Since its founding in 1701, Yale has been dedicated to expanding and sharing knowledge, inspiring innovation, and preserving cultural and scientific information for future generations.

We engage with people and institutions across the globe in the quest to promote cultural understanding, improve the human condition, delve more deeply into the secrets of the universe, and train the next generation of world leaders.

Yale is committed to improving the world today and for future generations through outstanding research and scholarship, education, preservation, and practice.

## Yale Center for Business and the Environment

The Yale Center for Business and the Environment is a joint center of the Yale School of Management and the Yale School of Forestry & Environmental Studies.

Our mission is to educate and inspire interdisciplinary leaders through business solutions to systemic environmental problems. We are building a purpose-driven community that collaborates in diverse networks to see beyond boundaries, disciplines and challenges and move toward sustainable solutions.

Within this framework, we work to accelerate the deployment of clean energy to mitigate climate change.



## Yale School of Forestry & Environmental Studies

The Yale School of Forestry & Environmental Studies aspires to lead the world toward a sustainable future with cutting-edge research, teaching, and public engagement on society's evolving and urgent environmental challenges. Founded in 1900, the school's goal is to prepare students to meet these challenges to benefit society everywhere.

## Yale School of Management

The mission of the Yale School of Management is to educate leaders for business and society. We seek students who care deeply about the problems afflicting our world. We equip them with the knowledge, the resources, and the networks to pursue positive and ambitious change—whether that takes the form of launching a business that can refashion its market, advancing far-reaching and rigorously considered policy initiatives, or steering a multinational corporation with keen awareness of and respect for its impact on workers, communities, and the environment.