HARVARD UNIVERSITY

> Universities are accountable to the future. They have a special role and a special responsibility to confront the challenges of climate change and sustainability.
>
> -President Drew Gilpin Faust

GENERATING SOLUTIONS TO CLIMATE CHANGE

From creating new materials that revolutionize solar energy production to probing the human influences on climate change and providing analysis to policy-makers, Harvard faculty and students are playing key roles in the transition to renewable energy sources and a more sustainable future.

260+ courses offered on energy, sustainability, or the environment

225 faculty affiliated with the Harvard University Center for the Environment engaged in energy and environment-related research

$120 million raised for energy and environment research since the start of The Harvard Campaign

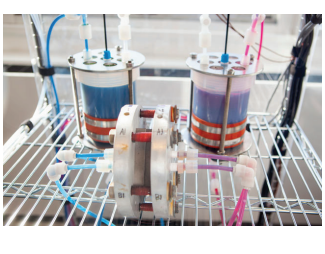
RESEARCH HIGHLIGHTS

Climate convergence

The Harvard Project on Climate Agreements draws upon leading thinkers from around the world to identify and advance scientifically sound, economically rational, and politically pragmatic public policy options for addressing global climate change. Led by Professor Rob Stavins, the project has released 64 papers and published three books since its inception in 2007. Professor William Hogan is actively engaged in the design and improvement of competitive electricity markets in many regions around the world.

Groundbreaking research

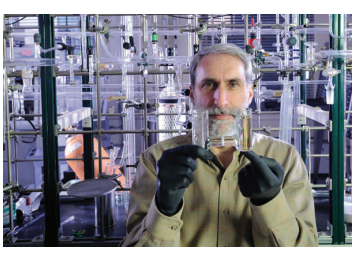
Tracking the changes in our climate over time is key to understanding the challenge. From the Brazilian rainforest to the Arctic, Harvard faculty including David Keith, Jim Anderson, Peter Huybers, Zhiming Kuang, Jim McCarthy, Michael McElroy, Paul Moorcroft, Dan Schrag, Eli Tziperman, and Steven Wofsy have provided key scientific insights. Decades-long research at the Harvard Forest contributes to our understanding of how carbon and emissions flow through the forest. Professor Ali Malkawi leads the new Harvard Center for Green Building and Cities aimed at creating the next generation of sustainable, high-performance buildings. Historian Naomi Oreskes focuses on understanding scientific consensus and dissent, with a special focus on climate change.



Battery offers renewable energy breakthrough

A key challenge to the transition away from fossil fuels is the ability to store energy produced from renewable sources. Professor Michael Aziz, and his collaborators Roy Gordon and Alan Aspuru-Guzik, have developed a new battery technology that could allow adoption of renewable energy on a much larger scale by allowing generators to store it until demand peaks.

Splitting water to save the planet



Could photosynthesis and other cues from nature provide the answer to humankind's energy demands? Chemist Dan Nocera created an "artificial leaf" to mimic the power of plants, which use sunlight to convert water into energy. Nocera also works with Professor Rohini Pande to study the challenges of promoting sustainability in the developing world.

Removing indoor air pollution

Students also play a vital role in the search for solutions. Catlin Powers, a doctoral candidate at the School of Public Health, designed an emissions-free solar-powered grill. At the Graduate School of Design, faculty and students are working together to envision more resilient communities that will be prepared for rising sea levels and other effects of climate change.

Lending expertise on policy

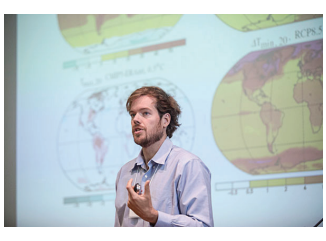
Harvard faculty lend their expertise to policymakers at all levels of government. Professor Dan Schrag, a leader in climate science research who serves on President Obama's Council of Advisors on Science and Technology, and Professor Joyce Rosenthal, for example, are advising the City of Cambridge on their Climate Vulnerability Assessment.

Map to renewable energy?

Harnessing the power of Harvard's computer technology, Professor Alan Aspuru-Guzik is using quantum computing to search for new materials to make cheap, flexible, organic, photovoltaic cells, while Professor Efthimios Kaxiras is developing novel materials for efficient solar energy conversion. Federico Capasso is developing methods to harvest heat to generate energy and Evelyn Hu is attempting to reduce the energy needed for modern computing and communications. Professors Cynthia Friend and Pam Silver are developing new energy efficient methods to produce chemicals from biomass and through microbial methods.

Business and the environment

At the Harvard Business School, Rebecca Henderson, Forest Reinhardt, and Joseph Lassiter bring years of experience studying industry and investment banking to understand best practices for stimulating innovation and efficiency in the renewable energy sector. Harvard Kennedy School Professor Joe Aldy is examining the true economic and environmental costs of fossil fuel subsidies.



Urgent prep work

Climate change will impact the health and well-being of people throughout the globe, and it is a particular focus of Peter Huybers's research. Professors Jennifer Leaning and Michael VanRooyen are using their expertise in disaster relief to develop plans for meeting future humanitarian crises that will likely be a part of climate change this century, and an interdisciplinary team of scientists, engineers, and public health practitioners is examining the impacts of climate change on the nutritional quality of the food we eat.

Changing the climate of environmental law

The growing Environmental Law Program at HLS, which includes Professors Jody Freeman, Richard Lazarus, and Wendy Jacobs, provides expert legal analysis and research support for energy and climate challenges facing local, state, and national policy-makers, including environmental and health issues in hydraulic fracturing, and state clean energy laws.

A carbon tax for China?

As its economy evolves, China is struggling to confront severe air quality issues. Harvard China Project researchers conduct interdisciplinary studies related to air pollution and greenhouse gases in China and analyze the economic costs and environmental benefits of policies to control carbon emissions in the world's most populous nation, including the potential for wind power along China's grid.

ACADEMIC CENTERS AND INITIATIVES

Harvard University Center for the Environment

Biofuels and Globalization Project (HKS)

Business and Environment Initiative (HBS)

Center for Health and the Global Environment (HSPH)

Consortium for Energy Policy Research (HKS)

The Energy History Project

The Energy Research, Development, Demonstration, and Deployment Policy Project (HKS)

Energy Technology Innovation Policy Research Group (HKS)

Environmental Law Program and the Emmett Environmental Law & Policy Clinic (HLS)

Environment and Natural Resources Program (HKS)

Evaluating the Energy Efficiency Gap: Research and Practice (HKS)

Food Law Lab and the Petrie-Flom Center for Health Law Policy, Biotechnology, and Bioethics (HLS)

Food Law and Policy Clinic (HLS)

Future of Energy Initiative

The Geopolitics of Energy Project (HKS)

Governance Innovations for Sustainable Development (HKS)

Harvard Center for Risk Analysis (HSPH)

Harvard Center for Green Buildings and Cities (GSD)

Harvard Center for Population and Development Studies (HSPH)

Harvard China Project (SEAS)

Harvard Electricity Policy Group (HKS)

Harvard Environmental Economics Program (HKS)

Harvard Global Health Initiative

Harvard Graduate Consortium on Energy and Environment

Harvard NIEHS Center for Environmental Health (HSPH)

Harvard Project on Climate Agreements (HKS)

Innovation and Access to Technologies for Sustainable Development (HKS)

Project on Managing the Atom (HKS)

Program on Science, Technology, and Society (HKS)

Regulatory Policy Program (HKS)

Science, Technology, and Public Policy Program (HKS)

Sustainable Development of the Amazon and its Surrounding Regions: The Interplay of Changing Climate, Hydrology, and Land Use (HKS)

Sustainable Development of the Energy Sector in China: Challenges and Options (HKS)

Sustainability Science Program (HKS)

Working Group for Sustainable Cities

Zofnass Program for Sustainable Infrastructure (GSD)

Ecology and Biodiversity Research

Arnold Arboretum

Concord Field Station

Harvard Forest

Harvard University Herbaria