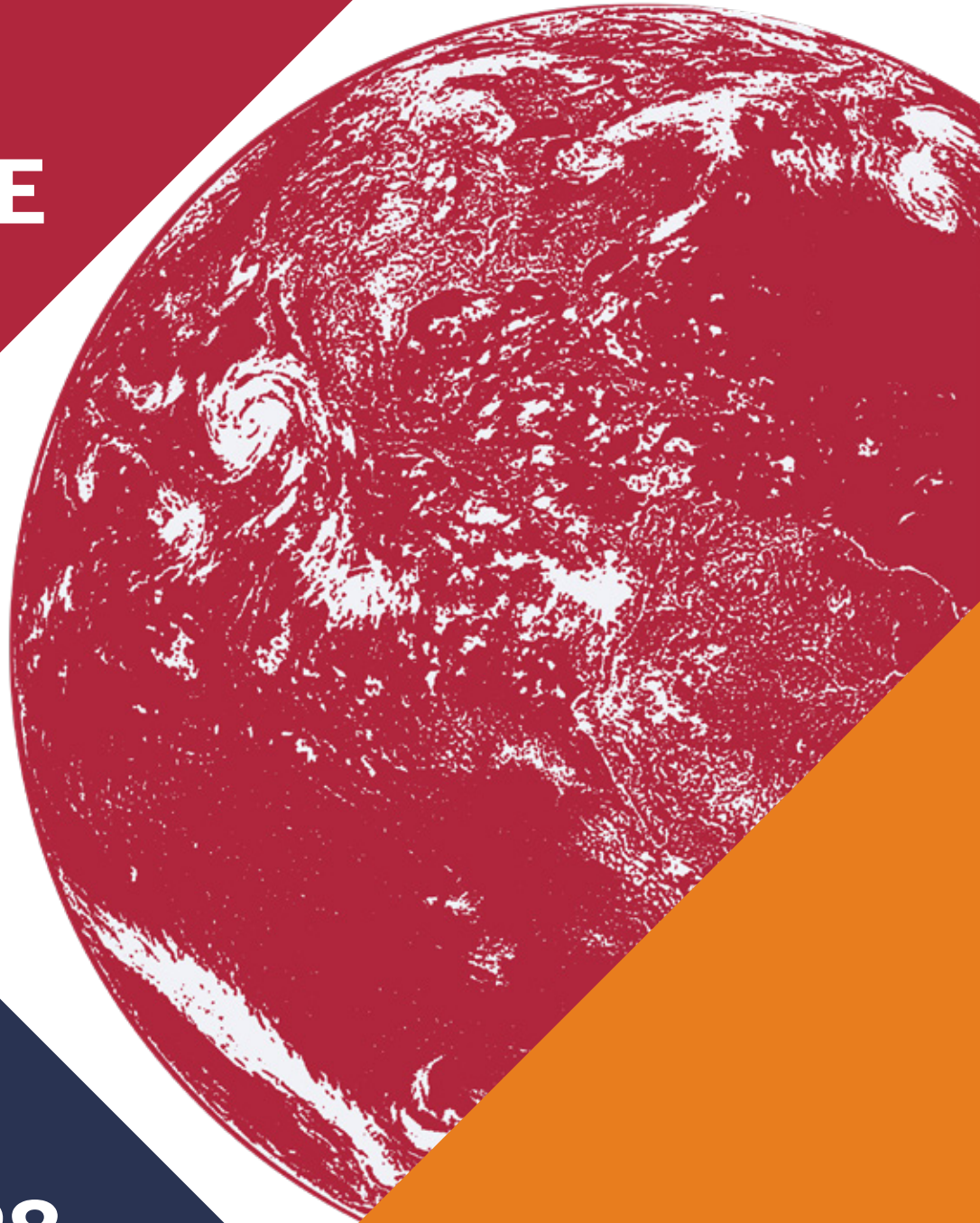


**2020
CLIMATE
CHANGE
DEEP DIVE**



**FEB. 27–28
BOSTON, MA**



HARVARD
Advanced Leadership Initiative

2020 Climate Change Deep Dive Chair

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About the Advanced Leadership Initiative

The Advanced Leadership Initiative (ALI) is a third stage in higher education designed to prepare experienced leaders to take on new challenges in the social sector where they have the potential to make an even greater societal impact than they did in their careers.

ALI Deep Dive sessions highlight one major global or community challenge where ALI Fellows might fill a gap. Deep Dives include readings, outside experts, often faculty from relevant Harvard programs, and a focus on problem solving and practical applications of knowledge.

ALI Fellows contribute ideas based on their experience and knowledge for immediate solution-seeking with major figures in the field under discussion and with affected constituencies.

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Executive Summary

The 2020 Climate Change Deep Dive was an opportunity for the ALI Cohort to learn about the causes and consequences of climate change, and the efforts across sectors to address the issue. ALI Faculty Executive Committee Member Forest Reinhardt chaired the Deep Dive, convening faculty from around the university to share their insights on the topic with the group.

On the first day of the Deep Dive, Daniel Schrag of the Harvard John A. Paulson School of Engineering and Applied Sciences provided a summary of the science behind climate change, and helped frame the problem and potential solutions from a scientific perspective. Richard Lazarus of Harvard Law School then discussed recent legal efforts made to combat climate change, using a landmark U.S. Supreme Court Case to draw the issue into focus. Robert Stavins of Harvard Kennedy School took a close look at the economics of climate change and Reinhardt furthered the discussion with a case study of the economics of energy supply. Rebecca Henderson of Harvard Business School concluded the first day of the Deep Dive with a presentation on what the private sector might do to address climate change.

The second day of the Deep Dive began with former Secretary of the U.S. Navy Ray Mabus discussing his efforts to combat climate change in the U.S. military. Jan Hammond of Harvard Business School then used a case study to show how supply chains can be altered to address a global issue like climate change. James Engell of the Harvard Faculty of Arts and Sciences brought a humanities

perspective to the Deep Dive, asking if humanity needed to fundamentally shift mindsets to address the issue. Reinhardt and ALI Faculty Chair Meredith Rosenthal helped the group synthesize the content of the last two days and asked what lessons the group had learned to address complex social issues more broadly. Terry Tempest Williams of Harvard Divinity School closed the Deep Dive with an inspiring presentation, urging fellows to confront the moral and personal challenges of climate change head on.

In the closing sessions with Reinhardt and Rosenthal, the group developed a series of important takeaways from the Deep Dive:

- The private sector has an important role to play in addressing climate change, both through new technology and through systems change
- Individual activism is critical to driving change; it is especially important to motivate voters to elect legislators who will act on the issue;
- Education, information, and storytelling are important tools in spreading awareness and helping oneself, and others, to see the issue clearly.

During Rosenthal's session, fellows also stressed that even if their plans for social good did not focus explicitly on climate change, they would undoubtedly be mindful of the environmental impacts of their work moving forward.

What Makes Climate Change So Difficult?

Professor Daniel Schrag of the John A. Paulson School of Engineering and Applied Sciences kicked off the 2020 Climate Change Deep Dive by providing a scientific overview of the causes and consequence of climate change. He explained that scientists have long known about the dangers of a changing climate and global carbon dioxide (CO₂) emissions, but that the full impacts of the problem remained uncertain. Schrag also explained the physical basis of the problem and highlighted some potential solutions to drive meaningful change on the topic.

Schrag started his talk by sharing that “the science of climate change is more than one hundred years old.” Scientists John Tyndall and Svante Arrhenius were making predictions and setting up public experiments to highlight the impact of CO₂ on the climate in the early 1900s. Arrhenius calculated that burning coal could double the atmospheric concentration of carbonic acid—a correlate for CO₂—and increase the Earth’s temperature by about 4 degrees Celsius. “The basic physics has been known for a long time,” Schrag said, “but exactly what is going to happen to the planet is harder to say.”

In the last century, he said that our rate of CO₂ emissions had increased dramatically. “The main issue is about timescale,” he said, “There is nothing wrong with a warmer planet, but we are adapted to the current climate.” The last time global CO₂ levels were close to their current levels was during the Eocene period, when the sea level was 100m higher. “The question is about how fast we are

changing our environment,” he added, “There is a natural analog in the history of the planet, but it happened over a period of 10,000 years, rather than a few hundred years.”

Schrag explained that the challenge of climate change was difficult for humanity to solve for two simple reasons—each one difficult on their own, but together presenting a problem unlike any other. First, climate change presented a collective action problem that was truly global in scale. The climate system responds to global emissions of CO₂, and, therefore, addressing the issue requires global cooperation. Second, climate change presented a problem with long timescales. It is difficult to convince people to act on a problem that impacts future generations.

Climate change is a problem with long timescales in large part because of the ability of Earth’s oceans to slow temperature change. Schrag used a metaphor to explain the role of the oceans in climate change: if a room in a house is cold, you can turn up the thermostat to make it warmer—now imagine that there is a bathtub full of ice in that room. As you turn up the thermostat, it takes longer to warm the room because the heat first must melt the ice in the tub. If the Earth represents the room, and the thermostat represents CO₂, the ocean acts as the bathtub of ice.

He explained that 90% of greenhouse gas energy went into heating the ocean. If the earth was all land it would heat up much more quickly, and humans would experience the impacts of climate

change on a much shorter time scale. Even if we stopped adding CO₂ to the environment today, Schrag explained, we would still be heating the planet up for millennia as the oceans slowly warm up. “We are making decisions today that tens and hundreds of generations of humans are going to experience.”

Schrag added that the chemical nature of CO₂ also contributed to the long timescale of the climate change problem. 40% of CO₂ is taken up by the ocean and the biosphere, while nearly 60% of our CO₂ emissions remain in the atmosphere—something scientists call the “airborne fraction.” Schrag said that more than half of this airborne fraction would still be in the atmosphere 1000 years from now, and roughly one third of the airborne fraction would be in the atmosphere 20,000 years from now. Put simply, it takes a long time for CO₂ to completely dissipate from the atmosphere.

To highlight an example of the impacts of climate change, Schrage talked about the melting ice sheets in Greenland and the Antarctic. In Greenland, ice sheets were contributing roughly 0.8mm of sea level rise per year, but that number was steadily increasing over time. “We’re dealing with systems that are really big, and not so easily reversible on short timescales,” he said.

In Antarctica, huge ice shelves are connected to the land mass—should these shelves break off, Schrag said it would be like removing a cork in a bottle: glaciers from west and east Antarctica would begin to flow into the ocean. This could cause a sea

level rise of at least 10m. “We have set something in motion that almost nothing can stop for future generations to come,” Schrag said.

Schrag said that scientists needed to start focusing their research on energy systems, which had grown considerably over the last 150 years. “The access to inexpensive energy thanks to fossil fuels led to incredible growth and innovation,” he said, “and we are all beneficiaries of this transformation.”

While the increase to renewable energy sources in the U.S. was encouraging, he said that the timescale of decarbonization was longer than many policy makers and climate change advocates could image. “Decarbonizing the U.S. or Europe as quickly as possible is not the goal,” he said, “Decarbonizing the world is what matters.”

He added that policy and political will were important steps in global decarbonization, but that humanity would ultimately need technology to solve the problem. “We are not going to ban fossil fuels by decree,” he said, “The only way to increase global demand of wind and solar power is to make them more efficient than coal and natural gas.” He also highlighted the need to expand technology for energy storage, advanced biofuels and synthetic fuels, and to grow the current infrastructure of the energy system globally.

Schrag said that if global decarbonization took longer than the current rhetoric among UN climate discussions suggests, then people’s experience of climate impacts would change substantially over





the coming decades. This could cause a dramatic shift in public opinion on the issue.

Ultimately, to prepare for these unpredictable changes, global leaders needed to focus on adaptation and mitigation. Citing Charles Darwin, Schrag said, “It is not the strongest of the species that survives, not the most intelligent that survives, it is the one that is most adaptable to change.”

The Rule of Five: Making Climate History at the Supreme Court

Professor Richard Lazarus of Harvard Law School told the story of *Massachusetts v. EPA* and of the landmark 2007 Supreme Court ruling in the case. Drawing on his recently published book *The Rule of Five: Making Climate History at the Supreme Court* (Cambridge: The Belknap Press of Harvard University Press, 2020), Lazarus shared the story of the unexpected triumph of environmental advocates who petitioned the Environmental Protection Agency asking it to restrict greenhouse gas emissions from new cars. He described how accidents, infighting, luck, superb lawyering, and the arcane practices of the Supreme Court collided to produce what he called “a legal miracle” that made possible “important environmental safeguards which the Trump administration now seeks to unravel.”

THE RULE OF FIVE

MAKING CLIMATE HISTORY
AT THE SUPREME COURT

RICHARD J. LAYTON

RICHARD J. LAYTON







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The Economics of Climate Change

Professor Robert Stavins of the Harvard Kennedy School presented an important economic perspective on climate change. He explained that while some might think that an economic perspective on climate change would be oxymoronic—an internal contradiction—in fact, an economic lens is essential for a full understanding of environmental problems and the design of potential solutions that are effective, economically sensible, and more likely to be politically feasible. Stavins added that this sort of economic thinking is particularly important for the formulation of climate policies.

Stavins began by briefly explaining the science, economics, and geopolitics of climate change. Because greenhouse gases mix in the atmosphere, the location of emissions has no effect on impacts. Hence, climate change presents a “global commons” problem. Any jurisdiction taking action incurs the costs of its action, but the climate benefits will be distributed globally; therefore, for virtually any jurisdiction, the costs it incurs from its climate policy actions will inevitably be greater than the climate benefits it receives. Hence, there is little incentive for individual jurisdictions to take action, because of the attendant “free-rider” problem: it is in the interest of each jurisdiction to do little or nothing, and simply benefit from the actions of other jurisdictions. “This is why international, if not global, cooperation is essential,” Stavins said.

Further complicating matters, the temporal dimension of climate change creates a significant political challenge. Greenhouse gases accumulate in the atmosphere and do not dissipate quickly, with carbon

dioxide having a half-life in the atmosphere on the order of 100 years. The most severe consequences of climate change are in the long-term, but the costs of mitigation are up front. This combination of up-front costs and delayed benefits presents a challenge for politicians who have obvious incentives to give benefits to voters today and place costs on future generations.

To address these problems, analysts and economists like Stavins favor carbon-pricing policies in the form of either a carbon tax or cap-and-trade. A carbon tax is a tax on fossil fuels in proportion to their carbon content; a cap-and-trade system allows governments to determine how much CO₂ emissions are allowed, giving emitters the chance to buy and sell allowances depending on the admissions they actually produce. Stavins said that only carbon-pricing instruments can provide meaningful emissions reductions.

Carbon-pricing policies would be the least costly solution in both the short-term and the long-term. In the short-term, these policies encourage low-cost controllers to take on an added burden. In the long-term, the policies provide strong incentives for the innovation of carbon-friendly technological change. Even so, carbon pricing might not be sufficient to reduce global CO₂ emissions, because of other market failures that get in the way of price signals.

He then showed the current status of carbon-pricing policies around the world. Some countries and regions have adopted a carbon tax, while others

have launched cap-and-trade systems. All told, carbon pricing covers about 15% of global CO₂ emissions—but recent developments in China could significantly increase total coverage of carbon-pricing policies.

The consequence of these carbon-pricing systems has diverse effects across sectors and regions. In the energy sector, these policies are bad news for coal, mixed news for natural gas, and good news for renewable energy. In other sectors, these policies increase energy costs, so, in general, sectors that use energy (nearly every sector) see increased costs. However, industries that produced energy consuming durable goods, like airplanes, actually benefit. In the case of airplanes, airlines are more likely to buy newer, more fuel-efficient planes, increasing profits for airplane producers.

Stavins also highlighted some of the progress that had been made in terms of international cooperation on climate policies. The Paris Climate Agreement in 2015 was a landmark accord that provides a broad foundation for global CO₂ emissions reductions. Whether the agreement is truly successful might not be known for decades—while 97% of countries around the world participate in the agreement there is considerable variation in the stringency of and adherence to their individual policies.

In the U.S., many climate policies had been reversed under the Trump administration, and the administration announced its intention to withdraw from the Paris Accords. Stavins said that

despite the administration's efforts to roll back Obama-era climate policies, some federal policies and nearly all state climate policies remain in place. "Sub-national action is increasingly important under this administration," he said.

In conclusion, Stavins noted that the economic costs of climate change policies will likely exceed the economic impacts of unabated climate change over the next two decades.



The Economics of Energy Supply

Professor Forest Reinhardt of the Harvard Business School continued the economic discussion of climate change—using a case discussion to turn the ALI cohort’s attention to energy supply. Reinhardt examined the case of Chilean electricity supplier Colbún to help the cohort consider the practical challenges of shifting a nation’s energy supply and the unintended consequences of environmental protections.

To launch the discussion, he had the group examine various energy sources in purely economic terms: the group considered the costs of using coal, gas, diesel, nuclear, hydro-powered, and wind-powered plants in Chile. Early in the conversation, it was clear that comparing costs across these energy sources was difficult—some sources of energy were costly to build but inexpensive to run, and others were cheaper to build but had greater variable costs.

The group also had to consider how to establish a discount rate to compare the future value of these energy sources. Doing so, however, raised ethical questions in the long-term: adopting the commonly used 10% rate would largely ignore the consequences of energy supply for future generations. “If you assume this discount rate,” Reinhardt said, “the welfare of your grandchildren becomes a rounding error.”

The discussion highlighted that even energy sources with low private costs could have significant social costs. Coal is cheap but produces more carbon dioxide than other sources, building dams

could lead to population displacement, and so on.

The case discussion also helped fellows gain a clearer understanding of the costs of carbon pricing and the ways in which the fracking revolution transformed the energy sector. Colbún had to consider the increased cost of coal thanks to carbon taxes, the dramatic increase in supply of liquid natural gas (LNG) thanks to fracking, and the associated costs of transporting and using that LNG. As Reinhardt explained, “Some people argue that the Clean Power Plan destroyed coal, but really natural gas is the true cause for the decline of coal in many countries around the world.”

Toward the end of session, Reinhardt said that considering all of the tradeoffs in energy sources was essential to make good decisions around energy supply. “Many of the energy policy discussions are far divorced from the actual costs of energy supply,” he said, “And sometimes we don’t like to consider that environmental quality costs money.”

Reinhardt also acknowledged that while economists say the best way to handle climate change is to make costs transparent, this has proven difficult politically. “People want their energy to be cheap as well as clean,” he said, “and politicians are reluctant to show them the price tag.”

To get CO₂ emissions to net zero requires hard trade-offs and will not occur quickly. To maintain economic growth and population growth, countries may need to embrace less palatable energy sources like nuclear power. But any discussion of climate



change must consider energy. “Energy is absolutely essential. To be rich is to have easy access to energy.”

Reimagining Capitalism In a World on Fire

Professor Rebecca Henderson of Harvard Business School built on the Deep Dive's earlier sessions, saying that it was not only important to consider the political and economic dimensions of climate change, but also the role that the private sector could play in helping to address the issue. Henderson argued that business had a strong collective case for solving climate change. She said that the private sector could arrest climate change by developing technologies that could help make climate adaptation good for the bottom line and by aggressively working to rebuild global institutions.

Henderson suggested that the climate crisis had represented a “Kodak moment” for the global economy. The Kodak company developed an idea that took off, reached maturity, but was then unable to adapt in the face of the introduction of digital photography. In the case of climate change, the world built an economic system based on the idea that greenhouse gases are ‘free’; but that it now needs to transition to a system that in which greenhouse cases are “expensive.” The alternative is equivalent of the collapse that Kodak experienced.

Henderson then detailed the stages of a “Kodak moment” to explain how to avoid this outcome. “First comes denial,” she said, “then ‘we won’t make any money’, then ‘we can’t get it done.’” She said the most important thing businesses—and our institutions—need to overcome the Kodak moment is a strategy. Henderson also noted that the firms that have historically made it through these transitions are emotionally committed to change—much the same way younger generations are committed

to addressing the issue of climate change.

She acknowledged that the first and best solution to climate change was politics. Climate change is a public goods problem, so from a policy perspective, it is clear that we need international cooperation to put in place some kind of carbon-pricing program. With that said, she pointed out that while local carbon pricing efforts have met with some success, international efforts are still struggling to succeed.

Because institutions are not able to address climate change in the short-term, businesses need to step in. Businesses have an individual case for action: there are increasingly strong examples that reducing emissions can lead to increased profits. Henderson explained that exploiting shared value—changes that can make money and address public goods—can help firms to attract talent, increase employee engagement, reduce risks, reduce costs, drive differentiation, and build entirely new businesses.

Nonetheless, she warned that one firm is not capable of managing significant change on its own. Sharing examples from the palm oil industry and sustainable apparel, she showed that without cooperation across firms, it can be virtually impossible to drive systemic change. Collective action is necessary, but industry will not self-regulate without external motivation.

Henderson said that the issue was like trying to solve the prisoner’s dilemma—how to get individuals to cooperate and find mutual benefit

rather than trying to protect their self-interests. “We need to have a focus on the long-term,” she said, “A strong case for cooperating, the ability to monitor what people are doing, and the ability to sanction people who cheat.” Returning to the palm oil example, she explained that this can be very difficult to achieve on a global scale—how could institutions sanction the people who cheat around the globe?

Henderson suggested that investors could play an important role in enforcing cooperation among firms. Citing the example of investor Hiro Mizuno, she explained that an investor could force every firm in its portfolio to decarbonize. In essence, powerful investors would internalize market externalities to promote the public good.

She also suggested that corporate environmental, social, and governance (ESG) metrics could help investors in this process. Widespread adoption of these metrics—which measure material, non-financial aspects of performance for a firm—would give investors the ability to monitor and sanction firms in their portfolio. She even noted that recent evidence showed that there is a positive correlation between financial performance and performance on ESG measures.

Concluding her session, Henderson explained that there was a viable pathway to systemic change through the private sector. “By creating shared value, building cooperation, and rewiring the means of finance,” she said, “businesses could begin to drive meaningful progress on climate change.”

But she recognized that free markets could not survive without free politics and suggested that business could potentially play an important role in strengthening democracies worldwide. Protecting the rule of law, a free press, respect for minority rights, democracy, and a voice for labor was essential to ensuring a free political system and a free market. “Businesses aren’t stupid enough to let the world be destroyed” she suggested. When push comes to shove, they will step up.



Pat
Nissen

THE MILE OF FIVE

Adapting to Climate Change in the U.S. Armed Forces

Former Secretary of the U.S. Navy and Governor of Mississippi Ray Mabus shared his efforts to lead climate change mitigation efforts in the armed forces. His example showed how leadership decisions could help drive organizational change and how the military played a role in impacting climate change. Mabus highlighted the tremendous progress the Navy had made in reducing its emissions and switching to renewable energy sources, and how these changes improved their efficiency. He also shared leadership lessons for managing change, getting buy-in, and shaping a narrative.

From the outset of his time as Secretary of the Navy, Mabus recognized that energy was evolving and shaped much of the day-to-day work of the organization. At the beginning of his tenure, fuel prices were rising, and he had to make hard decisions about how to cut fuel use.

Moreover, he had to be thoughtful about where the Navy's fuel was coming from, and how their fuel use was endangering the lives of sailors and marines. "We were losing a marine for every 50 convoys of fuel we brought into Afghanistan," Mabus said, "That was way too high a price to pay."

To address these issues, he set audacious goals for the Navy: by no later than 2020, at least half of all naval energy would come from non-fossil fuel sources. Many senators and stakeholders pushed back on Mabus' plan, but he recognized that the Navy was such a big consumer of fuel, that it had the ability to move the market. He was also able to get buy-in from soldiers and marines who saw

that alternative energy sources were lighter and more efficient. "All of these changes were to make us better war fighters," Mabus said, "To make us better at what we do."

He built momentum behind his plan by crowd-sourcing ideas from the bottom up. Sailors and marines offered suggestions for how to improve efficiency and reduce fuel use, and Mabus started to fund these ideas. Even relatively simple suggestions had significant impacts: one sailor recommended switching to LED lightbulbs on all ships, saving the Navy 20,000 gallons of fuel per year. Hybrid ships were able to use half their allotted fuel and stay out longer than other comparable ships on the sea.

Thanks to Mabus' efforts, 2/3 of the Navy's energy now comes from non-fossil fuel sources and fuel use is down 16% in the Navy and 63% in the Marines. His plan also saved the Navy \$400M per year.

Beyond the fuel and cost savings, Mabus explained that fighting climate change was central to the core mission of the Navy. When there is a natural disaster or need for humanitarian aid, the Navy is one of the first responders on the scene.

In addition, migration, and the resulting conflict from migration, are increasing because of climate change. "If you don't pay attention to climate change, you put sailors and marines at risk," Mabus said. He also highlighted that because naval bases are almost always located on the coast, they would

be the first to suffer the consequences of rising sea-levels.

Under Mabus' leadership, what started out as a fringe idea developed into a key tenet of the Navy's operating principles. In 2015, he held a conference on the impacts of climate change and had more than 200 senior officers speaking out on the topic.

Mabus credited his success to a few key leadership decisions. First, he narrowed his focus: his strategy focused on people, platforms, power, and partnerships. Next, he crafted a narrative, not just of how these changes would affect the organization but how they would affect individuals. Then, he shared this story over and over again—that these changes would make sailor and marines better at their jobs—until it gained momentum.

Mabus said that climate change is a serious problem that requires a national effort to address. "Climate change is happening, and it's speeding up," he explained, "We don't have until 2050 to figure this out." He said that if people cared about national defense, the security of the country, and the lives of soldiers, that they needed to take this issue seriously.

For Mabus, and others in the military, climate change was an issue of national security. In 2013, the Pentagon published a report listing climate change as the second greatest national threat. Addressing the issue, he explained, required not just buy-in from the military, but from every sector. "National security and climate change are irrevoca-

bly linked, and if we don't pay attention to climate change, we are going to have some very serious national security implications."





Managing Supply Chains to Reduce Food Waste

Professor Jan Hammond of Harvard Business School highlighted another practical example of an organization working to address the climate change crisis. Examining the case of Unilever, Hammond showed how their efforts to reduce waste in the supply chain had the potential to drive meaningful progress on environmental issues. She also explained how aspects of the case were relevant to the social impact projects of ALI Fellows, regardless of their areas of focus.

In the case, Unilever was attempting to put public good ahead of its fiduciary responsibility to shareholders. Namely, they were attempting to reduce waste and improve efficiency in their supply chain to promote more sustainable business practices. Through their discussion, the cohort identified that Unilever was making a bet that the long-term social benefits of this decision would be good for the environment and the bottom line and would ultimately outweigh the short-term costs of change.

Hammond helped fellows uncover just how daunting some of those short-term costs would be. While the organization hoped to reduce waste in their supply chain, in reality they had very little control over most of the links in that chain. Enforcing new policies with a host of farmers, distributors, and middlemen would take a gargantuan effort.

With that said, to be able to truly reduce the amount of waste they were producing, Unilever needed cooperation from these parties. “Most of the impact comes not from doing something better

within an organization,” Hammond explained, “but at the interface of different organizations.”

In part, she said, the challenges around coordination stemmed from a lack of understanding of the incentives for the different players in the supply chain. Hammond highlighted that incentives for different parties often extended beyond cost; organizations needed an aspirational frame to these conversations, where the different stakeholders could view changes as universally good.

She also stressed the importance of piloting changes to the supply chain. By following a system of plan; do; check; act; repeat, organizations could constantly revisit the consequences of their decisions.

In conclusion, Hammond said that effecting change required data, methodologies, metrics, and realigned incentives. Organizations need metrics to evaluate their progress and to define metrics, they need methodologies that make clear how to measure progress. She ended her session by highlighting how these changes can lead to significant benefits: “Focusing on an objective like this can drive innovation, efficiency, bring you closer to customers, and excite employees.”

New Consciousness? New Decisions?

Jim Engell, professor of English and faculty associate of the Harvard University Center for the Environment, brought a humanities and interdisciplinary perspective to the 2020 Climate Change Deep Dive. In his session with the fellows, he argued that the global climate crisis calls for more than scientific and political solutions; it calls for a change in consciousness. By examining articles, videos, poems, and letters, Engell made the case that humanity needs a fundamental shift in values to address climate change.

He started his session by describing “tipping points” in our global climate system. “When we reach these points, the feedback loops are so reinforcing that there is no turning back,” he said. Engell explained that climate change is not simply a slow process that can be reversed; it is a change on a quantum level for the entire planet. While he acknowledged that we cannot accurately predict exactly how fast Earth’s climate systems are changing, he noted that nearly every model to date had underestimated the actual acceleration of those changes.

Engell also highlighted that efforts in the scientific and policy communities would not be enough on their own to address the scale of the problem. Most economists believe that we need carbon pricing but recognize that this alone will not adequately address climate change; some scientists think technology like solar geoengineering might help, but there would be no way to predict the potential consequences of these solutions. “We can neither trust a technological fix nor the idea that this will

simply be handled by the tools we currently have at our disposal,” he said.

To emphasize the need for a shift in values, Engell discussed Pope Francis’ 2015 Encyclical Letter. In the Encyclical, Francis explains that climate change is also a matter of human rights, and that the people who will suffer first are the poorest. He goes on to warn against the “interests of a deified market,” stressing that free markets alone cannot address the problem, especially if we believe that those markets need no regulation. Only a fundamental ethical shift—a “bold, cultural revolution”—could save the planet.

Francis also discusses the laws of ecology—the interconnectedness of life—in his Encyclical. As Engell explained, communities must come together to address climate change. Francis talks about the necessity for international action without delay, and Engell added that including indigenous communities in these conversations was critical. “We need regional and international cooperation to make meaningful progress,” Engell explained, “but we are not on target to meet our goals.”

To close his presentation, Engell shared a striking poem by Seamus Heaney, *Höfn*. The poem recalls a flight over Iceland in which Heaney could see the glacier below through his fogged window. Reading the poem aloud left the group with a sense of unease and a question: what will we do when the ice disappears? “There is a ‘we’ in this poem,” Engell said, “a community that doesn’t know what they are going to do when the glacier melts.”





Synthesis

Bringing the content of the previous sessions together for discussion, Professor Forest Reinhardt helped ALI Fellows synthesize the presentations of the 2020 Climate Change Deep Dive. Reinhardt divided the group into small discussion sections, asking them to think through what government, the private sector, and other actors could do to address the climate change crisis. He then brought the group back together to share insights and to add his own closing thoughts on the topic.

Reinhardt began the full group discussion by asking the cohort what governments would do to address climate change. Overall, the cohort was not hopeful for a dramatic response from government, especially in the short term. Fellows highlighted that politics made coming to a consensus solution challenging, particularly in the U.S., and that, internationally, responses to the crisis would vary considerably. The best we could hope for from government was to help mitigate against future disaster and to eventually institute broad carbon-pricing plans.

The group was more optimistic about the role of the private sector in responding to the climate change crisis. By making “green the new gold” companies could begin to see the financial rationale for protecting the environment and make serious efforts to address challenges in the public domain. Fellows highlighted that many individuals trust their employers more than other institutions in society. Nonetheless, they warned against companies becoming too involved in political processes and recognized that any private sector actions

would also require regulation from government.

The discussion also highlighted the importance of the media and activists in addressing climate change. Some fellows suggested that media needed to point more coverage toward solutions to leave room for hope and to help mobilize action. Others stressed that activists, particularly young activists, could help drive change even on this challenge. Ultimately, the group stressed that individuals—taxpayers, consumers, voters, and investors—needed to get more involved.

Addressing this question of individual action head on, Reinhardt asked the group what they would do personally to drive progress on climate change. The cohort discussed the need to consume less and focus on more sustainable activities, and they also talked about the importance of sharing what they learned with others in their network. By helping educate other leaders about the dangers of climate change, they could help drive more individuals to seek solutions to the problem.

Reinhardt closed the discussion by returning to the topic of energy first raised during his case of Colbún. “We want our energy to be clean, local, and cheap, but mostly cheap,” he said, “The question is if we want to tolerate greater expense to make it cleaner.” Reinhardt noted that energy was essential to human prosperity, but that our collective addiction to energy was creating unlivable consequences for future generations. Even so, he was optimistic about the future: “There is a huge opportunity for those who are able to de-energize our economy.”

Broader Insights for Building a Social Impact Strategy

Nearing the end of the Deep Dive, ALI Faculty Chair Meredith Rosenthal helped the group draw broader conclusions about how lessons learned on climate change might apply to their individual plans for social impact. Rosenthal revisited the 3 P's for social impact—the problem, person, and pathway—to help fellows consider how they might intervene to address complex social issues. Using climate change as a perfect example of a complex problem, she stressed how fellows might look for opportunities for collaboration to tackle nonlinear problems in nonlinear systems.

Rosenthal then asked the group for their personal takeaways from the two-day conference. Some general themes emerged during this discussion:

- Business can have an impact on social problems, and investors can have an impact on business behavior;
- Young activists and innovators may drive change, but experienced leaders are necessary to help them 'crystallize wisdom';
- All projects can benefit from considering the implications of climate change; individual projects need not change but they must consider broad questions about the environment;
- Information and storytelling are powerful; no one can sit through a compelling story without being affected.

To close her session, Rosenthal highlighted the important connections between individuals, communities, and systems to drive complex social change. Individuals need collaborative leadership;

communities need coalition building and advocacy; and all stakeholders need to understand the complex contexts of the systems within which they are working. "This not just a question of systems leadership," she said, "At some level this is a question of moral leadership."

Erosion

In an inspiring conclusion to the 2020 Climate Change Deep Dive, Terry Tempest Williams, writer-in-residence at Harvard Divinity School, shared her story and her personal connection to climate change. She applauded fellows on having the courage to “find a different type of power” and encouraged them to “stare down” the problem of climate change. Her stirring presentation helped fellows examine the issue in a spiritual dimension.

Williams shared her story—at times beautiful and at others heartbreaking—about her connection to her home in Utah and her lived experience of the consequences of climate change. While her father worked in the fossil fuel industry, laying pipe to carry natural gas through the American west, Williams became an activist and a writer, calling attention to the devastating effects of nuclear testing and oil and gas leasing on her family, and in Utah more broadly.

During her presentation, she highlighted that much of the leasing on oil and natural gas was happening in our nation’s public lands—lands that were taken from natives and that now belonged to all of us. “Come to the west, where oversight is nonexistent,” she said, “Watch the black snake of methane infiltrate the San Juan river; listen to the native women talking about how their clinics cannot hold any more people.” Again, Williams implored the group to “stare it down”—to consider the communities that are paying the price for environmental desecration.

She made the case that addressing climate change

is personal—for all of us—and that what is needed above all else is a personal transition. She recognized that our society needs oil and gas, but that it also needs transition, that all individuals have the capacity to act, each in their own way, each in their own time, with their individual gifts. “Climate change is personal, and engagement is a prayer,” she said, “Can we love ourselves enough to change?”

Williams encouraged the group to listen to the pulse of the Earth. To help fellows understand this more deeply, she played the pulsating rhythm of Castleton Tower, moving with the Earth’s natural vibrations at the rate of a human heartbeat. Scientists used a pair of seismometers to measure the movement of the rock formation in Utah, and then sped up the low-frequency data into audible sound.

Williams explained that the conversation about climate change can no longer be about anger; it must be about healing. Again, she told the group they must “stare down their grief,” explaining that there is a real world that is really dying—a world that includes species beyond our own. “Grief is love; engagement is a prayer,” she said, “We are evolving at once. We have a pulse; Castleton Tower has a pulse.”

To end the Deep Dive, Williams played a selection of *Recomposed by Max Richter—Vivaldi Four Seasons*. Richter’s recomposition and reinterpretation of Vivaldi’s *The Four Seasons* was an example of the sort of re-imagining that Williams was calling for around climate change. “We need

to reimagine our lives, reimagine this moment in time, so we can reimagine this world together in all its brokenness and beauty.”





Speaker Biographies

Rebecca Henderson



Rebecca Henderson is the John and Natty McArthur University Professor at Harvard University, where she has a joint appointment at the Harvard Business School in the General Management and Strategy units. Professor Henderson is also a research fellow at the National Bureau of Economic Research. Her work explores how organizations respond to large-scale technological shifts, most recently in regard to energy and the environment. She teaches Reimagining Capitalism in the MBA Program.

From 1998 to 2009, Professor Henderson was the Eastman Kodak Professor of Management at the Sloan School of the Massachusetts Institute of Technology, where she ran the strategy group and taught courses in strategy, technology strategy, and sustainability. She received an undergraduate degree in mechanical engineering from MIT and a doctorate in business economics from Harvard.

Professor Henderson sits on the boards of Amgen

and of IDEXX Laboratories, and she has worked with both members of the Fortune 100 and small, technology-orientated start-ups. She was retained by the U.S. Department of Justice in connection with the remedies phase of the Microsoft trial, and in 2001 she was named Teacher of the Year at the Sloan School. Her work has been published in a range of scholarly journals including *Administrative Science Quarterly*, *The Quarterly Journal of Economics*, *Strategic Management Journal*, *Management Science*, *Research Policy*, *The RAND Journal of Economics*, and *Organization Science*.

Her most recent publication is *Leading Sustainable Change: An Organizational Perspective*, edited jointly with Ranjay Gulati and Michael Tushman, and published by the Oxford University Press.

James Engell



James Engell, Gurney Professor of English and Professor of Comparative Literature, began his studies first in science and was a young NSF fellow at the Jackson Laboratory in Maine. He also researched comparative effects of non- and biodegradable detergents immediately introduced to freshwater fish populations, with results later confirmed by others.

His first employment was at Janney, Battles & E. W. Clark (now Janney), where he was offered a partnership in a local brokerage office. He decided in the end primarily to pursue studies in the humanities with an emphasis on literature. In that field he has authored four books and edited and contributed to nine others.

His writing on energy policy has appeared in *The Huffington Post* and *The Energy Collective*. He conceived of and co-edited the widely used text *Environment* (Yale, 2008). His awards and fellowships include those from the Ford Foundation, the

Council for Advancement and Support of Education, and The National Humanities Center. *Saving Higher Education in the Age of Money* (2005, co-authored with Anthony Dangerfield) won the Association of American Colleges and Universities award for “Best Book on Liberal Education.” His essay “The CFR Task Force Report on ‘U.S. Education Reform and National Security’: A Reply and Response,” received acclaim.

While devoting most of his career to the humanities, he has pursued a life-long formal and informal interest in science. A member of the American Academy of Arts and Sciences and recipient of several faculty-wide teaching prizes as well as a national mentoring award, Engell teaches (as well as co-teaches, in the Economics Department at Harvard) courses that engage environmental and other issues involving human values and expression, history, science, economics, and reform.

Janice Hammond



Janice H. Hammond is the Jesse Philips Professor of Manufacturing and the Senior Associate Dean for Culture at Community at Harvard Business School. She currently teaches Supply Chain Management in the HBS MBA program. She serves as program chair for the HBS Executive Education International Women's Foundation and Women's Leadership Programs and created the online Business Analytics course for Harvard Business School Online CORE (a 9 to 11 week program that teaches business fundamentals via courses in Business Analytics, Economics, and Financial Accounting).

Professor Hammond has previously taught courses in Technology and Operations Management; Business Logistics and After-Sales Service; Decision Support Systems; Quantitative Methods; and Managerial Economics in the MBA program. She has taught in several of the HBS Executive Education courses for general managers, including Managing the Supply Chain; Manufacturing in Corporate Strategy; Retailing; and Managing Or-

ders, Vendors, & Customers, as well as in numerous custom executive programs.

She has previously served as Senior Associate Dean, Director of Faculty Planning; Unit Head for the Technology and Operations Management Unit; Course Head for the Required Technology and Operations Management Course; Faculty Chair of the HBS Analytics Program, and as Faculty Chair of the January Cohort of the Harvard MBA Program.

Professor Hammond's current research focuses on speed and flexibility in manufacturing and logistics systems: specifically, how these systems develop the attributes necessary to respond quickly and efficiently to changing customer demand. An important component examines how coordinating mechanisms within organizations and along supply channels affect those channels' ability to compete. In particular, much of her work focuses on the interface between manufacturing and retail organizations. A portion of this research has been conducted in the textile and apparel industries under an industrial competitiveness grant from the Alfred P. Sloan Foundation. She is co-author with Fred Abernathy, John Dunlop, and David Weil of *A Stitch in Time: Lean Retailing and the Transformation of Manufacturing -- Lessons from the Textile and Apparel Industries*, published by Oxford University Press.

Professor Hammond has an active interest in the field of e-learning. Prior to creating the Business Analytics course for Harvard Business School

Online CORE, she completed two on-line learning courses: a global supply chain management simulation and a twenty-hour on-line quantitative analysis course.

Professor Hammond holds a Sc.B. degree in Applied Mathematics from Brown University and a Ph.D. in Operations Research from the Massachusetts Institute of Technology. She has published widely on the topics of logistics and channel coordination, and consults and teaches at several major multi-national corporations.

Richard Lazarus



Richard Lazarus is the Howard and Katherine Aibel Professor of Law at Harvard University, where he teaches environmental law, natural resources Law, Supreme Court advocacy, and torts. Professor Lazarus has represented the United States, state and local governments, and environmental groups in the United States Supreme Court in 40 cases and has presented oral argument in 14 of those cases. His primary areas of legal scholarship are environmental and natural resources law, with particular emphasis on constitutional law and the Supreme Court. He has published two books, *The Making of Environmental Law* (U. Chicago 2004), and *Environmental Law Stories* (Aspen Press, co-edited with O. Houck 2005). He was also the principal author of *Deep Water - The Gulf Oil Disaster and the Future of Offshore Drilling* (GPO 2011), which is the Report to the President of the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling Commission, for which he served as the Executive Director. The Commission was charged with investigating the

root causes of the oil spill in the Gulf of Mexico in the Gulf of Mexico in 2010 and recommending changes in law and policy to reduce the risk of future spills and to mitigate their impacts. Prior to joining the Harvard law faculty, Professor Lazarus was the Justice William J. Brennan, Jr., Professor of Law at Georgetown University, where he also founded the Supreme Court Institute. He graduated from Harvard Law School in 1979 and has a B.S. in chemistry and a B.A. in economics from the University of Illinois.

Ray Mabus



Ray Mabus has been Secretary of the US Navy, Governor, Ambassador and CEO.

Ray Mabus served as the 75th United States Secretary of the Navy from 2009 to 2017, the longest tenure as leader of the Navy and Marine Corps since World War I. As Secretary during President Obama's Administration, he revolutionized the Navy and Marine Corps, opening all jobs to women, aggressively moving to alternative energy as a warfighting measure, building more than twice as many ships during his term than in the preceding eight years and developing the Gulf Coast Restoration Plan after the Deepwater Horizon oil spill. It was during his watch that Navy SEALs killed Osama bin Laden. Among many awards, he was chosen as one of the top fifty CEOs in America by GlassDoor, the only government person picked.

From 1988 to 1992, Mabus served as Governor of Mississippi, the youngest elected to that office in more than 150 years. Mississippi experienced

record growth in jobs, education, tourism and exports.

Mabus was United States Ambassador to the Kingdom of Saudi Arabia from 1994-1996. He was CEO of a public company from 2006-2007 leading it out of bankruptcy in less than a year while paying all creditors in full and saving equity.

Today, Mabus is Chairman of InStride, a public benefit education company, a senior advisor to Google Ventures, a director of two public companies, Hilton and Dana, a lecturer at Harvard Law School and an executive fellow at Harvard Business School. He is a member of the Council on Foreign Relations, the Explorers Club, and the Screen Actors Guild. He serves on the boards of the Environmental Defense Fund and Jose Andreas' World Central Kitchen. He has thrown out the first pitch at all 30 major league ballparks. He has stood on both poles and, during his life, has traveled to more than 190 countries and territories.

Secretary Mabus is a native of Ackerman, Mississippi, and received a Bachelor's Degree, summa cum laude, from the University of Mississippi, a Master's Degree from Johns Hopkins University, and a Law Degree, magna cum laude, from Harvard Law School. Mabus served in the Navy as an officer aboard the cruiser USS Little Rock.

Forest Reinhardt



Forest L. Reinhardt is the John D. Black Professor of Business Administration at Harvard Business School.

Professor Reinhardt is the head of HBS's Business, Government, and the International Economy unit. He also serves as the faculty chair of Harvard Business School's Asia-Pacific Research Center and the chair of the HBS Executive Education in the Asia-Pacific Region.

Recently, Professor Reinhardt taught, with HBS colleagues Martha Crawford and Joe Lassiter, an MBA elective course called "Twenty-First Century Energy." This course analyzes the global energy system from economic and political perspectives, and explores the strategies both of incumbent firms and startups.

Professor Reinhardt also teaches regularly in the HBS Agribusiness Seminar, and he teaches an MBA elective course called "Food and Agribusiness," which uses case studies from all over the

world to examine the ways in which people raise plants and animals and the ways in which food is transported, processed, distributed, marketed, and consumed.

Professor Reinhardt's other recent teaching assignments have included a core course called Global Markets in the HBS Owner/President Management Program. Drawing on microeconomics, macroeconomics, political science, and history, the course helps business leaders understand the economic and political environment in which business is conducted, and the strategic opportunities and risks to which globalization gives rise. In addition, Professor Reinhardt has taught the required MBA courses on Strategy and on Business, Government, and the International Economy at HBS.

Professor Reinhardt is interested in the relationships between market and nonmarket strategy, the relations between government regulation and corporate strategy, the behavior of private and public organizations that manage natural resources, and the economics of externalities and public goods. He is the author of *Down to Earth: Applying Business Principles to Environmental Management*, published by Harvard Business School Press. Like that book, many of his articles and papers analyze problems of environmental and natural resource management. He has written numerous classroom cases on these and related topics, used at Harvard and elsewhere in MBA curricula and in executive programs.

Professor Reinhardt serves on the Board of Tutors

for the Harvard College concentration in Environmental Science and Public Policy, on the Steering Committee of the Harvard University Center for the Environment, and on the Steering Committee of the HBS-Harvard Kennedy School Joint Degree Programs. He is Co-Chair of the Harvard Advanced Leadership Initiative.

Reinhardt received his Ph.D. in Business Economics from Harvard University in 1990. He also holds an MBA from Harvard Business School, where he was a Baker Scholar, and an A.B., cum laude, from Harvard College.

Born and raised in Montana, he lives in Belmont, Massachusetts.

Meredith Rosenthal



Dr. Rosenthal received her B.A in International Relations (Commerce) from Brown University in 1990 and her Ph.D. in Health Policy (Economics track) from Harvard University in 1998.

Her research focuses primarily on policies that will help slow the growth in healthcare spending and improve value. These efforts include changes in payment incentives, benefit design, and the provision of information and behavioral “nudges” to both patients and providers. Her research has influenced the design of provider payment systems in both the public and private sectors. She has advised federal and state policymakers in health-care payment policy and implementation. She has also testified in Congressional hearings on direct-to-consumer advertising of prescription drugs and pay-for-performance and in legislative hearings in California and Massachusetts concerning healthcare provider payment and benefit design policies.

Dr. Rosenthal’s work has been published in the New England Journal of Medicine, the Journal of the American Medical Association, Health Affairs, and numerous other peer-reviewed journals. In 2014, Dr. Rosenthal was elected to the Institute of Medicine (recently renamed the National Academy of Medicine). Daniel P. Schrag is the Sturgis Hooper Professor of Geology at Harvard University, Professor of Environmental Science and Engineering, and Director of the Harvard University Center for the Environment.

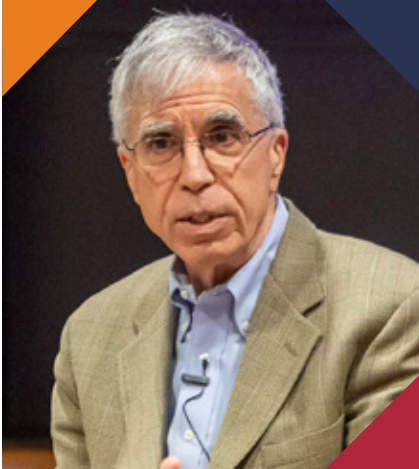
Daniel Schrag



Schrag studies climate and climate change over the broadest range of Earth history. He is particularly interested in how information on climate change from the geologic past can lead to better understanding of anthropogenic climate change in the future. In addition to his work on geochemistry and climatology, Schrag studies energy technology and policy, including carbon capture and storage and low-carbon synthetic fuels.

From 2009-2017, Schrag served on President Obama's Council of Advisors on Science and Technology. Among various honors, he is the recipient of the James B. Macelwane Medal from the American Geophysical Union and a MacArthur Fellowship. Schrag earned a B.S. in geology and geophysics and political science from Yale University and his Ph.D. in geology from the University of California at Berkeley. He came to Harvard in 1997 after teaching at Princeton.

Robert Stavins



Robert N. Stavins is the A. J. Meyer Professor of Energy & Economic Development at the Harvard Kennedy School, Director of the Harvard Environmental Economics Program, Chairman of the Environment and Natural Resources Faculty Group, Director of Graduate Studies for the Doctoral Program in Public Policy and the Doctoral Program in Political Economy and Government, Co Chair of the Harvard Business School Kennedy School Joint Degree Programs, and Director of the Harvard Project on Climate Agreements. He is a University Fellow of Resources for the Future, a Research Associate of the National Bureau of Economic Research, Co-Editor of the *Review of Environmental Economics and Policy*, and a Member of: the Board of Directors of Resources for the Future, the Board of Academic Advisors of the AEI Brookings Joint Center for Regulatory Studies, the Editorial Boards of *Resource and Energy Economics*, *Climate Change Economics*, *Environmental Economics Abstracts*, *B.E. Journals of Economic Analysis & Policy*, *Economic Issues*,

and *Environmental Economics and Policy Studies*. He is also a Vice-President of the American Association of Wine Economists, an editor of the *Journal of Wine Economics*, and is the Chair of the Expert Advisory Board of the Harvard Alumni Alliance for the Environment.

He was elected a Fellow of the Association of Environmental and Resource Economists in 2009, and was named the 2016 recipient of the Edmund G. Pat Brown Award. He was formerly a member of the Scientific Advisory Board of the Fondazione Eni Enrico Mattei, the Editorial Board of *Land Economics*, *The Journal of Environmental Economics and Management*, the Board of Directors of the Association of Environmental and Resource Economists, a member and Chairman of the Environmental Economics Advisory Committee of the U.S. Environmental Protection Agency's (EPA) Science Advisory Board, a member of the Executive Board of the U.S. Environmental Protection Agency's (EPA) Science Advisory Board, the Editor of the *Review of Environmental Economics and Policy*, Chair of the Scientific Advisory Board of the Massachusetts Executive Office of Environmental Affairs, a member of the Executive Committee of the Harvard University Center for the Environment, a Lead Author of the Second and Third Assessment Reports and a Coordinating Leading Author of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, and a contributing editor of *Environment*. He holds a B.A. in philosophy from Northwestern University, an M.S. in agricultural economics from Cornell, and a Ph.D. in economics from Harvard.

Professor Stavins' research has focused on diverse areas of environmental economics and policy, including examinations of: market based policy instruments; regulatory impact analysis; innovation and diffusion of pollution control technologies; environmental benefit valuation; policy instrument choice under uncertainty; competitiveness effects of regulation; depletion of forested wetlands; political economy of policy instrument choice; and costs of carbon sequestration. His research has appeared in the *American Economic Review*, *Journal of Economic Perspectives*, *Quarterly Journal of Economics*, *Journal of Economic Literature*, *Science*, *Nature*, *Journal of Environmental Economics and Management*, *Ecology Law Quarterly*, *Journal of Regulatory Economics*, *Journal of Urban Economics*, *Journal of Risk and Uncertainty*, *Resource and Energy Economics*, *The Energy Journal*, *Energy Policy*, *Annual Review of Energy and the Environment*, *Explorations in Economic History*, *Brookings Papers on Economic Activity*, other scholarly and popular periodicals, and several books. In 2017, he received the Publication of Enduring Quality Award from the Association of Environmental and Resource Economists, together with Richard Newell and Adam Jaffe for their 1999 article, "The Induced Innovation Hypothesis and Energy-Saving Technological Change," published in the *Quarterly Journal of Economics*.

He is the co-editor of *Post-Kyoto International Climate Policy* (Cambridge University Press, 2009), *Architectures for Agreement: Addressing Global Climate Change in the Post-Kyoto World* (Cambridge University Press, 2007), editor of the

fourth, fifth, and sixth editions of *Economics of the Environment* (W. W. Norton, 2000, 2005, 2012), co editor of *Environmental Protection and the Social Responsibility of Firms* (Resources for the Future, 2005), editor of *The Political Economy of Environmental Regulation* (Edward Elgar, 2004), co editor of the second edition of *Public Policies for Environmental Protection* (Resources for the Future, 2000), and the author of *Environmental Economics and Public Policy: Selected Papers of Robert N. Stavins, 1988-1999* (Edward Elgar, 2000) and *Economics of Climate Change and Environmental Policy: Selected Papers for Robert N. Stavins, 2000-2011* (Edward Elgar, 2013).

Professor Stavins directed Project 88, a bipartisan effort co chaired by former Senator Timothy Wirth and the late Senator John Heinz, to develop innovative approaches to environmental and resource problems. He continues to work closely with public officials on matters of national and international environmental policy. He has been a consultant to the National Academy of Sciences, several Administrations, Members of Congress, environmental advocacy groups, the World Bank, the United Nations, the U.S. Agency for International Development, state and national governments, and private foundations and firms.

Prior to coming to Harvard, Stavins was a staff economist at the Environmental Defense Fund; and before that, he managed irrigation development in the Middle East, and spent four years

working in agricultural extension in West Africa as
a Peace Corps volunteer.

Terry Tempest Williams



Williams's appointment at HDS is supported by the Compton Foundation and the Susan Shallcross Swartz Fund.

Terry Tempest Williams joined HDS as a writer-in-residence for the 2017–18 academic year and is continuing in 2018–19 and 2019–20. She is the author of numerous books, including the environmental literature classic, *Refuge: An Unnatural History of Family and Place*. Her most recent book is *The Hour of Land: A Personal Topography of America's National Parks*, which was published in June 2016 to coincide with and honor the centennial of the National Park Service. Her writing has also appeared in *The New Yorker*, *The New York Times*, *Orion Magazine*, and numerous anthologies worldwide as a crucial voice for ecological consciousness and social change.

While at HDS, Williams will spend time contemplating and writing about the spiritual implications of climate change, and will lead a seminar with HDS students.



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