# Harvard hosts energy lectures

Last winter and spring the Harvard University Center for the Environment presented a series of four lectures on "The Future of Energy." The speakers were Matthew Simmons (whose *Twilight in the Desert* was reviewed in our Fall 2005 issue by Al Bartlett), Ian Conn (Executive Director, BP Group), John Podesta (President, Center for American Progress and Former Chief of Staff to President Clinton), and Robert Socolow (of Princeton University). The website for the series, , provides the PowerPoint presentations used by Simmons and Socolow and the complete text for Conn and Podesta. Given our review of Simmons' book and coverage of a similar talk by Socolow in our Spring 2005 issue, we will here focus on the text of Conn's and Podesta's lectures.

Conn, speaking on 8 March 2006 on "Energy Trends and Technologies for the Coming Decades," sought to "show how we should be moving towards a world in which we use new forms of energy and progressively only the minimum amounts of energy needed to fulfill our needs." To do this, he began with what he considered to be the four "forces driving the future of energy" -- "demand for energy, the challenge of energy supply, concerns about energy security, and environmental constraints. . . . ."

Noting that energy use per capita in the United States has remained pretty much the same over the last 20 years, Conn attributed increased demand for energy in the U.S. to increasing population. Elsewhere, especially in developing economies such as those of China and India, economic growth is a key factor. Altogether, Conn expects a worldwide growth in energy demand of 60% between 2002 and 2030.

Eighty-five percent of world energy demand continues to come from fossil fuels, Conn pointed out, though the fraction due to oil (largely for transportation) has been decreasing while that for natural gas has been going up. But to the question, "Are we going to run out of fossil fuels in the near future?" Conn answers "no," and he gives four reasons to support his answer: 1) data indicating that "we have decades worth of fossil fuels in the ground"; 2) "unconventional" fossil fuel resources on which we can also draw -- "heavy oil, tar sands, oil shale, and unconventional gas resources"; 3) "significant resources yet to find"; and 4) "technology . . . not only helping us to find new reserves and enhance recovery rates but . . . also helping to make coal and other hydrocarbons more environmentally sustainable." To illustrate his points, Conn notes that the world reserves of oil were almost twice as great in 2004 as they were in 1972, and he estimates being able to find additional reserves to multiply the present number by 2.5. Still, this gives us only 100 more years at the present rate of usage, only about twice the time estimated by many other prognostications.

But when it comes to the security of fossil fuel reserves, Conn concedes that "consumers in ten years' time will be materially dependent on supplies of oil from just three regions -- West Africa, Russia and, most important of all, the five states around the Persian Gulf. . . ." A similar dependence on Russian and the Middle East will also hold for natural gas. Regarding coal, he notes that "proved US coal reserves are a significantly greater energy resource than Saudi Arabia's proved *oil* reserves. . . ."

But he goes on to note that people want energy that is not only affordable and reliable; they also want energy that is "clean," and here fossil fuels fail because of their generation of carbon dioxide. He presents basically the same data displayed by Al Gore in *An Inconvenient Truth* and observes that if "we . . . double our use of energy by 2050" and "the imperative of climate change requires that total emissions in 2050 must be the same as today," then "by 2050 we must halve the carbon intensity of the world's energy. . . ." Conn notes that "BP advocates a coordinated global precautionary effort to limit average global temperature increases to less than around two degrees Celsius relative to late 19th century levels, which the IPCC estimate would require stabilizing atmospheric CO2 concentrations at 500-550 ppm." He adds that "research indicates that the target level of 500-550 ppm can be attained by using a range of existing technologies, including carbon sequestration, energy efficiency, increased capacity in solar, wind, and gas-fired power, as well as nuclear power," and he refers to the work of Socolow cited above.

Conn also considers biofuels as a less carbon intense energy source for transportation, noting that they are a secure reliable source that also supports agricultural activity. But he also notes that the present practice of using fossil fuels to produce biofuels detracts from their ability to mitigate global warming and holds out greater hope for "the production of so-called 'advanced biofuels' from dedicated energy crops such as switchgrass, poplar, and jatropha," which "must be developed separately and distinctly from food."

In addition to energy for transportation, Conn also considers sources which can be transformed into electrical energy -- natural gas, "clean coal," and hydrogen (which, interestingly, he does not consider for transportation), nuclear (though "barriers for nuclear energy in general have to be overcome, particularly on nuclear waste, if it's to win public acceptance"), renewables, and energy efficiency.

Finally, Conn focused on the importance of the roles of technology and policy. Although "we will remain dependent on fossil fuels for the next few decades," Conn concludes that if "we make progress on new energy technologies and develop appropriate policies in parallel, our fossil fuel resources will not run out before we have sufficient alternatives." ". . . key policy measures and technologies have to be developed in the next 5-10 years so that decisive and significant steps can be implemented and their effects felt in the next 20-30 years."

Podesta's topic, "Fueling the Future: Clean Energy, Climate Security and Sustainable Development," was somewhat belied by the statement early in his talk that "the sources of fuel for our industrial economies are not only the greatest threat to our environment but one of the greatest threats to the welfare of the poorest people on earth." Indeed, this set the theme that fossil fuels, oil in particular, are not only endangering our environment through global warming but also adversely affecting the economic and physical well being of people in developing countries whose agriculture suffers from climate change and whose economies are devastated by high payments for imported oil. "The same communities who stand to suffer from climate change the most cannot afford the oil we use to generate economic growth and that at the same time generates the pollution that threatens their very survival," he said. Heavily indebted developing countries are "spending the money saved from debt relief on the increasing price of

oil rather than on educating their kids, fighting HIV/AIDS, providing clean water, or increasing access to health care."

Podesta sought to address "how we can slow the progress of climate change while, at the same time, promoting sustainable development in the poorest countries around the world." And, he added, "we *cannot* do one without the other." "No one can or should ask the developing world to restrain its economic growth," he went on, "and no country is going to forfeit its ability to raise living standards for its poorest people." Although Podesta acknowledged learning a lot about "low carbon and zero carbon technology" during his visit to Harvard, he chose in his talk to focus on renewable energy sources. His litany of solar photovoltaic and wind energy projects was brief, however, and then he turned to "one particular renewable that I believe is the most practical and potent way *in the very near term* to promote sustainable development and a sustainable environment: biofuels."

In citing landmark achievements with biofuels, Podesta was particularly praiseworthy of Brazil's program to produce ethanol from sugarcane -- at a cost of 40 cents less per gallon than the cost of gasoline. He acknowledged that American production of ethanol from corn is not as efficient as Brazil's from sugarcane (which uses sugarcane waste to power their processing plants), but he held forth the prospect that other developing countries, located in the tropics as Brazil is, could benefit from the Brazilian model. And he hoped that other nations all over the world could benefit from "cellulosic sources like switch grass."

Noting "a vision called 25 by 25 -- an effort to produce 25 percent of US energy from agriculture by the year 2025," Podesta called for a four-point program to "increase biofuels production from agriculture, which I believe is the most practical way to promote development while preserving the environment *in the near term.*" 1) government support, 2) investment in science and technology, 3) increased funding and new creative forms of financing, and 4) "ensuring that we do not cause further environmental damage or adversely impact food production."

With the competition for land between food and biofuels in mind, Podesta cited a "dedicated energy crop that produces biodiesel and holds particular promise for improving local economies and environments" -- Jatropha. "Jatropha is a drought resistant perennial that can grow in the poorest of soils," he said. "Today, in India it is being used to bring agricultural wastelands back under cultivation. In Mali, women's groups use biodiesel generators that run on oil from Jatropha shrubs. . . over half of the land in Africa is considered suitable for Jatropha cultivation."