Big Oil U.

Center for Science in the Public Interest

Acknowledgements

The Integrity in Science Project of the Center for Science in the Public Interest gratefully acknowledges the financial support of the Beldon Foundation, the Richard and Rhoda Goldman Fund, the Rockefeller Family Fund, the Saperstein Family Fund, the Arkay Foundation, and the Nathan Cummings Foundation.

This report was co-written by Integrity in Science project director Merrill Goozner and former program manager Eryn Gable. Design by Debra Brink.

The Center for Science in the Public Interest (CSPI), founded in 1971, is a nonprofit health-advocacy organization. CSPI conducts innovative research and advocacy programs in the areas of nutrition, food safety, alcoholic beverages, and provides consumers with current information about their own health and well-being. The Integrity in Science Project exposes conflicts of interest in the conduct of science and seeks to reduce their influence on the scientific literature and public policy. CSPI is supported by almost 900,000 subscribers in the United States and Canada to its *Nutrition Action Healthletter* and by foundation grants.

1875 Connecticut Avenue, NW, #300
Washington, DC 20009
Ph: 202-332-9110 fax: 202-265-4954
www.cspinet.org
www.integrityinscience.org

Table of Contents

Executive Summary v

The Origins Of University-Industry Alliances 1

Big Oil U. 3

Moving Toward Big Oil U. 5

No Strings Attached 7

Controlling Collaborations 9

Recommendations 15

University Programs Don't Make Up For The Shortfall 17

Appendix A — The Programs 21

Appendix B — Survey Questions 22

Appendix C — Survey Responses 22

Notes 23

EXECUTIVE SUMMARY

As the scientific consensus surrounding climate change has solidified, the oil, gas, coal, and electricity industries have reluctantly recognized the inevitability of political action to reduce greenhouse gas emissions. Most energy companies are distancing themselves from campaigns to discredit global warming science. Instead, some actually have begun funding university research aimed at developing technologies and exploring policies that address the global warming crisis. They are touting the programs in slick public relations campaigns, including full page advertisements in the nation's leading newspapers.

This report documents that some of the universities that have agreed to host these efforts are accepting extensive industry controls over the research process – controls that violate hallowed traditions of academic independence. Indeed, industry funding for energy research has come with so many strings attached that it threatens the academic freedom of researchers and has the potential to compromise the integrity of the research.

While any agreements that compromise academic independence are deplorable, universities that allow energy firms to exert inappropriate controls over the use of their grants have sold their academic birthright at an extremely low price. For over a quarter century, industry has sharply reduced its investment in its own energy research and development, especially in alternative technologies that would reduce U.S. dependence on carbon-emitting fuels. The university-based programs that have been established in recent years will do little to redress this imbalance. Indeed, these programs amount to little more than a fig leaf for large corporations seeking to green their image.

Since 1991, the major oil companies have committed to investing more than $792 million in at least nine major universities in the United States. Leading institutions like MIT, Stanford, Princeton, and the University of California at Berkeley have major collaborative research agreements with the energy industry.

This study identified five major limitations on academic freedom that are occurring in the nine programs. They include:

- Allowing ***company representatives on governing boards*** (6 universities)
- Giving industry sponsors ***first rights to intellectual property*** (5 universities)

Universities … are accepting extensive industry controls over the research process — controls that violate hallowed traditions of academic independence.

- Allowing industry sponsors a role in ***deciding what research projects are funded*** (6 universities)
- Permitting ***industry review of research*** before it is published (5 universities)
- Allowing companies to ***delay publication of research results*** (5 universities)

For example:

- To manage British Petroleum's grant of $500 million over 10 years to the University of California at Berkeley, the University of Illinois, and Lawrence Berkeley Laboratories, Berkeley's Energy Biosciences Institute set up a 10-member panel, which includes two scientists from BP, to review all grant proposals; that group's final list of potential grantees is then submitted to an 8-member governance board made up of four BP officials and four university officials, effectively giving either BP or the university veto power over the direction of the program.
- Stanford University's 10-year, $225 million Global Climate and Energy Project, funded by ExxonMobil, Toyota, General Electric, and oil services giant Schlumberger, gives an exclusive, five-year royalty-free license to the companies that fund any research that leads to a university-patented invention. Researchers at 20 universities outside Stanford have applied for grants from the program, thus extending this restriction far beyond Stanford's walls.
- The Georgia Institute of Technology's 5-year, $12 million grant from Chevron Corp. for biofuels research eschews open competition for grants and gives the company officials the final review for every project funded by the program. "It's their money," said Roger Webb, a retired professor of electrical engineering who runs the program at Georgia Tech.
- Chevron's 5-year, $25 million grant to the University of California at Davis, also for biofuels research, gives the company three to four months to review research results to remove confidential business information and to identify potential intellectual property worthy of filing for patents.

These encroachments on academic freedom have the potential to exact a heavy toll. There have been numerous instances in the recent past where companies that funded university-based research have used research reviews to suppress

studies that produced unwanted results or uncovered significant health threats from an industrial product; insisted on long delays prior to publication; and deleted or ignored data that contradicted the results that were eventually published.[1]

Moreover, inappropriate industry demands can cause universities to lose some control of their research agendas and become more like business enterprises than generators of knowledge. "Universities should stoutly resist any effort by a corporate sponsor either to restrict the informal interchange of ideas within their institution or to keep results secret for more than two or three months after the research has ended," former Harvard University president Derek Bok wrote. "They should oppose equally strongly any attempt by sponsoring firms to control the data, influence the design, or participate in writing up the results of any research project conducted by members of the university."[2]

As universities become more commercialized, there is less space to perform research that is critical of industry or challenges the conventional wisdom. In the field of energy research, this is particularly important since the energy industry has a major stake in continuing our reliance on fossil fuels or politically popular substitutes like biofuels that do not threaten the status quo.

Academic freedom requires that university researchers be free to follow their research wherever it leads them. Sheldon Krimsky, a Tufts University professor who has studied the role of corporations in biomedical research, notes that giving the sponsors input or control over what questions are being asked and who's answering them could damage the quality of research. "It's when they ask, 'Can you write the research in a certain way?', that it takes away the autonomy of the researchers, and many researchers are perfectly willing to trade that away so that they can get funding," Krimsky said.[3]

There is an inherent conflict between the interests of universities and the interests of corporations. Former Labor Secretary Robert Reich noted recently, "Corporations obviously are interested in making proprietary, that is . . . having as their personal property, whatever intellectual capital is generated from their sponsorship, but academic freedom – indeed, the life of the mind – depends on the free flow of information."[4] Although universities and corporations often defend these programs on the basis that they have similar goals and complementary knowledge, the fact is that the interests of universities and corporations can diverge. University research is supposed to work toward the common good. Corporate research is primarily aimed at maximizing profits.

There is an inherent conflict between the interests of universities and the interests of corporations.

This report documents that, despite the industry's efforts to spin their academic alliances as proof of their commitment to tackling climate change by investing in new technologies, the major oil and gas companies still spend less than one percent of their sales on research and development. Industry investment in R&D fell from $4 billion in 1985 (2002 constant dollars) to $1 billion in 2004. The new university collaborations fall well short of making up the difference.

As public awareness and anxiety about global warming has risen, the oil, coal, auto and electric utility industries have reduced their investment in professional skeptics who downplay industry's responsibility for the problem. Instead, they've begun investing in academic research institutions, both as a technological hedge against rapid changes in the global energy mix and as a public relations ploy to show their concern about the problem.

Yet industry's investment amounts to far less than is advertised. Energy firms remain among the least research and development-intensive among all industrial sectors. A typical oil company spends 20 times more for searching and exploiting new oil reserves than it does for seeking out alternatives to its mainstay products, reducing pollution or increasing the efficiency of the use of carbon-based fuels.[5] Its overall R&D budgets are just a fraction of what leading high-tech industries like biotechnology, pharmaceuticals, and information technology spend.

The carbon-dependent industries have lavished intense public relations attention on these modest university R&D programs. Their modest size and modest goals raise serious questions about whether universities have paid too high an intellectual price for the relatively few dollars they have brought in from these corporate sources.

THE ORIGINS OF UNIVERSITY-INDUSTRY ALLIANCES

The energy industry's foray into university-based research follows a path pioneered by biotechnology and manufacturing industries in the early 1980s. Because the oil and gas companies' strategy and tactics mimic those industries' playbooks, it is useful to examine briefly the origins of university-industry alliances.

Collaboration between universities and industry is not new. The 1861 charter establishing the Massachusetts Institute of Technology (MIT) called on the school to aid "the advancement, development, and practical application of science in connection with arts, agriculture, manufactures, and commerce."[6] The nation's public land-grant universities have from their start in 1862 forged close ties with agriculture and agriculture-oriented industries. But, except for a few engineering and science-oriented schools like MIT, most universities did not actively seek major partnerships with industry until the late 1970s, when American universities began to view such relationships as a way to address concerns about increased competition with Japan and other countries.[7] At the same time, industry was also becoming more interested in forging ties with universities, believing that such connections would give them access to cutting-edge research at what amounted to bargain prices.[8] As Edward E. David, president of the Exxon Research and Engineering Co. and former science adviser to President Nixon, commented in a 1979 *Science* article, "The time has come for a closer and more intimate relationship between industry and academia."[9]

Those more intimate relations were fostered by the University Small Business Patent Procedures Act of 1980, commonly known as the Bayh-Dole Act. Responding to concerns that America was lagging behind other nations in scientific research, the law sought to encourage more collaboration between universities and industry by allowing universities to patent and license their government-funded discoveries.[10] Previously, government-funded scientific advances that resulted in patentable technologies were placed in the public domain. That provided little incentive for an individual firm to commercialize a technology since competitors could easily piggy-back on its R&D investment and market comparable products. The result was that many government-funded advances never found their way into the commercial marketplace.

The legislation revolutionized university administrators' attitudes about the

patenting of knowledge and the commercialization of science. Not only were professors on campus encouraged to patent their inventions and start up firms, but major companies saw an opportunity to forge research collaborations with university administrators and university-based scientists who were suddenly freed from the traditional norm that academies remain free of commercial influence. By the early 1980s, dozens of multi-year, multi-million dollar contracts had been announced: DuPont gave $6 million to the Harvard Medical School for genetic research; Hoechst, the West German chemical giant, doled out $50 million to the Massachusetts General Hospital for medical research; 10 companies contributed $7.5 million for a new computer center at Stanford; Control Data, Burroughs, and Minnesota Mining and Manufacturing (3M) pledged up to $5 million for computer research at the University of Minnesota; and Exxon financed an $8 million project on combustion research at MIT.[11]

Nowhere has the commercialization of American universities been more evident than in the life sciences and biomedicine, where professors increasingly serve as consultants for and sit on the advisory boards of drug manufacturers, as well as founding medical and agricultural biotechnology start-ups and research joint ventures. An early and controversial example was the $25-million, five-year alliance between the giant Swiss pharmaceutical giant Novartis and the University of California at Berkeley. The agreement granted Novartis first right to licenses on about one-third of the Department of Plant and Microbial Biology's discoveries, including those that were funded partially by federal and state money, and granted the biomedical firm two of five seats on the department's research committee, which determined the allocation of research funds.[12] The deal created a furor on campus and culminated in a controversy over whether one of the deal's chief critics, Ignacio Chapela, was denied tenure for political reasons.[13] An external review conducted by Michigan State University researchers called the Berkeley-Novartis alliance, which expired in 2003 with few tangible benefits to the company, "outside the mainstream for research contracts with industry" and concluded that "there appears to be little rationale for repeating the approach."[14] Yet, the Berkeley-Novartis-style deal would be repeated again, not just by biotechnology companies, but also by energy companies seeking to "green" their images by funding research on solutions to climate change.

BIG OIL U.

In the late 1980s, when the issue of global warming was just becoming part of the public dialogue, there was vigorous scientific debate about the magnitude of the problem and how much blame to assign to human activities. Despite more than a century of research on the relationship between carbon dioxide and climate, the scientific evidence that human activities, and specifically emissions of greenhouse gases, were affecting earth's climate was just beginning to crystallize. Many scientists argued that further research was required before any firm conclusions could be drawn.[15]

Not surprisingly, energy, automotive, and other industrial companies, concerned about the potential repercussions for their businesses, quickly moved to refute the then-emerging science regarding the role of human activities – specifically greenhouse gases produced by burning fossil fuels – in climate change. The front organization for these efforts was the Global Climate Coalition (GCC), a group formed in 1989, and comprised of a who's who of American businesses that either produced or consumed fossil fuels. GCC was run out of the National Association of Manufacturers. The coalition emphasized the uncertainties in climate science and sought to thwart government action to address the problem.[16] The coalition challenged the need for action on global warming by denying its existence and calling it a natural phenomenon.[17] But these arguments would become more difficult for the coalition to make by the late 1990s, as the research on climate science became more definitive.

By 1997, scientific understanding that human-caused emissions of greenhouse gases were causing global warming led to the Kyoto Protocol, an amendment to the international treaty on climate change that required signatory nations to reduce these heat-trapping gases. In response to the strength of the scientific consensus on global warming and the international commitment to address it, leading oil companies such as British Petroleum, Shell, and Texaco changed their stance on climate science and left the Global Climate Coalition.[18] After the U.S. rejected global efforts to implement the Kyoto Protocol, the coalition disbanded, noting that action on climate change was heading in the direction of developing new technologies to reduce greenhouse gas emissions.[19]

But even as most of the world's major energy companies began to accept the science behind global warming, at least one company remained highly skeptical. ExxonMobil, led by long-time CEO Lee Raymond, created a small task force

"Today, an energy company and a leading university share a common goal. The common good."

— ExxonMobil Ad Campaign, 2006

called the "Global Climate Science Team" that invested millions of dollars in a disinformation campaign.[20] Between 1998 and 2005 (the most recent year for which company figures are publicly available), ExxonMobil gave more than $19 million to organizations that promoted the idea that global warming was a hoax and otherwise manufactured uncertainty about climate science.[21] These groups included well-known conservative think tanks, such as the American Enterprise Institute, Cato Institute, and Competitive Enterprise Institute, as well as such lesser-known organizations as the Atlantic Legal Foundation, Committee for a Constructive Tomorrow, Heartland Institute, and Tech Central Station. ExxonMobil became the single largest corporate donor for some of these groups, accounting for more than 10 percent of their annual budgets.[22] The groups then funneled the money to a corps of committed climate skeptics, including Sallie Baliunas, Willie Soon, David R. Legates, Patrick J. Michaels, Robert C. Balling Jr., S. Fred Singer, Richard S. Lindzen, and John Christy.

Although many of these skeptics have not published in the peer-reviewed scientific literature for years, they continue to be cited in the popular press, often without any reference to either their industry funding or the industry funding of the think tanks that sponsored their work. For example, an Associated Press article that ran in the *Washington Post* in October 2006 allowed Michaels to dismiss local communities' efforts to combat global warming without reporting that, as a previous July 2006 AP report noted, Michaels recently received "at least $150,000 in donations and pledges" from Colorado-based electric utilities, including the Intermountain Rural Electric Association.[23] Michaels is also affiliated with 20 organizations that have received funding from ExxonMobil.[24]

MOVING TOWARD BIG OIL U.

As scientific understanding of the role of human activities in global climate change evolved, most energy companies began to understand that it was essential to their future survival that they actively fund and participate in research aimed at developing cleaner technologies or cleaning up existing fossil fuel technologies. The first major industry-sponsored research project was established in 1991 at MIT, with the founding of the university's Joint Program on the Science and Policy of Global Change.[25] The program combined two pre-existing research centers – the Center for Global Change Science and the Center for Energy and Environmental Policy Research – and concerned itself primarily with the intersection of the natural and social sciences aspects of climate change. To this day, the program relies on a combination of government and industrial sponsors, including American Electric Power, Chevron Corp., ExxonMobil Corp., Ford Motor Co., General Motors Corp., and Shell Petroleum.[26]

The second major corporate climate change research effort at a university started in 1995, when Carnegie Mellon University launched the Center for Integrated Study of the Human Dimensions of Global Change. Like the MIT program, Carnegie Mellon's center relied on government and corporate support, including the Electric Power Research Institute, American Petroleum Institute, and Exxon, and was primarily interested in looking at the natural and human dimensions of global climate change.[27] The center disbanded in 2004.[28]

One of the key features of both of these projects was their focus on energy policy, not technology development. They did not produce patentable inventions and their research results and papers became part of the public domain. Grants were not conditioned on overt control over the research agenda. The mix of sponsors enabled recipients to claim that since there was no single funding source for any study, the sponsors did not exert much influence over the direction of research.

"One of the great things about our program is that we're not dependent on any one source for our funding," said Henry Jacoby, a co-director of MIT's Center for Energy and Policy Research.[29] "Not once did EPRI, API, or Exxon-Mobil Education Foundation try to influence the direction of the research we do," averred Hadi Dowlatabadi, the former director of the program at Carnegie Mellon.[30] These comments, common among industry-funded researchers, may

be sincere but ignored the body of social science evidence that has demonstrated that even small gifts can have a powerful influence over people's behavior.[31] For instance, at MIT, whose corporate support comes from a number of major electric utility companies, two of the three latest major reports on the future of energy technology focused on the need to promote carbon sequestration to maintain coal as a viable option in a carbon-constrained world, and eliminating roadblocks to the successful deployment of more nuclear power plants.[32] It has yet to issue reports on solar, wind or other non-polluting electricity-generating technologies other than geothermal.

NO STRINGS ATTACHED

In this decade, most of the subtleties surrounding industry's influence over its university grants disappeared as energy companies switched their focus to investing in research programs focused on finding specific technologies for reducing greenhouse gas emissions. The earliest major program of this type was the 2000 Carbon Mitigation Initiative, a 10-year, $20-million project at Princeton University sponsored by BP and Ford.[33] At the time, it was the largest corporate grant that Princeton had ever received.[34]

Unlike the programs at MIT and Carnegie Mellon, Princeton's Carbon Mitigation Initiative specifically sought to address the carbon problem by identifying technologies that are "safe, effective, and affordable."[35] For example, the program's "capture group" looks at technologies for capturing carbon dioxide emissions from fossil fuels, as well as alternative fuel combustion.[36] But the program also examines how natural sources and sinks of carbon will respond to future climatic change and explores the policy implications of different carbon mitigation strategies.[37] One of the project's major initiatives has been promoting "the wedge concept," a hypothesis that suggests the world's carbon emissions could be kept flat until 2056 only through a combination of available technologies, with each one reducing the projected growth in carbon dioxide emissions by 25 billion tons over 50 years.[38]

Princeton's program also includes strict guidelines that are intended to ensure its researchers' independence. For example, the agreement establishing the initiative stipulates that representatives of the sponsor companies cannot sit on its advisory boards, ensuring that program decisions are made independently, said Stephen Pacala, a biology professor who co-directs the Carbon Mitigation Initiative with Princeton physicist Robert Socolow. "We decide what we're going to do," Pacala said.[39]

The BP agreement is part of a university-wide policy against accepting funding with strings attached, according to Michelle Christy, Princeton's director of research and project administration. "The university protects itself from accepting funding that has requirements for undertaking a specific type of research" by using both legal and contractual means, she wrote.[40]

Princeton also requires its faculty and research staff to fill out forms on an annual basis disclosing outside funding sources and potential conflicts of interest, according to Christy. The forms are reviewed by a Conflict of Interest Commit-

tee comprised of senior faculty and staff and chaired by the dean for research. "Any non-conforming situations are adjudicated and modified as necessary to comply with University policy," she wrote.

Christy noted that the relationship with BP and Ford is much like other research undertaken at the university with such government funders as the National Science Foundation and the Energy Department. "BP and these other similar organizations request proposals for research in a specific area of interest that is discovery-based, not outcome-based," Christy wrote. "Our faculty then prepares proposals for a particular field of research, and the institution endorses that this work is appropriate to be done here at Princeton."

This structure has allowed CMI researchers to work on broader issues that aren't in the direct financial interests of the sponsors. For instance, Pacala is working on a new way to model vegetation, one of the biggest uncertainties in climate change models.

Additionally, since the program's technological focus is more geared toward comparing different technologies than inventing new ones, Princeton has been able to avoid the sticky issues of patenting and licensing. Princeton spokeswoman Cass Cliatt said CMI does not have any patents pending or issued.[41]

CMI researchers meet once a year with their sponsors to make a progress report. Also present at the annual meeting is a six-person external advisory committee, which is comprised of academics such as Franklin M. Orr Jr., Stanford University professor of energy resource management, and representatives of outside interest groups such as the Natural Resources Defense Council and the Electric Power Research Institute.[42]

CONTROLLING COLLABORATIONS

Princeton's Carbon Mitigation Initiative could have been a model for universities seeking to protect the freedom of their researchers when accepting corporate money, but all of the programs that followed chose a different path.

The next major corporate-sponsored energy research program at a university came in 2002, when ExxonMobil, Toyota, General Electric, and oil service firm Schlumberger created the Global Climate and Energy Project (GCEP) at Stanford University. At the time, the 10-year, $225 million pledge was greater than all industrial grants to Stanford over the previous 10 years.[43] The program immediately drew criticism on- and off-campus, in part because of the role its primary sponsor had played in manufacturing uncertainty about climate change science. Shortly after the deal was signed, ExxonMobil ran advertisements on the Op-Ed page of *The New York Times* touting its collaboration with the "best minds" at Stanford, including one ad carrying the official seal of Stanford University that suggested "there is a lively debate" about climate change.[44]

"It certainly appears that Exxon is using it as a fig leaf for what it's doing, and it does play into the hands of the Bush administration's view that if we just leave it up to industry and the private sector, everything will be fine," said David Ritson, emeritus professor of physics at Stanford.[45] "It's basically part of their advertising budget. I don't think it's serious," added Martin Hoffert, a professor at New York University and a prominent climate researcher who began his career as an Exxon-funded scientist.[46]

Indeed, ExxonMobil has continued to tout the partnership in recent ad campaigns. "ExxonMobil has teamed up with Stanford University to find breakthrough technologies that deliver more energy while reducing greenhouse gas emissions," the oil giant gushes in a Spring 2007 television commercial. An ad in the *New York Times* read, "Today, an energy company and a leading university share a common goal. The common good."

The ad campaign has brought more attention to the program, and not all of that attention has been positive. After seeing the ads, movie producer Steve Bing – who has donated $22.5 million to Stanford – decided to rescind a promised $2.5 million donation to the school. Bing is also asking other donors to follow his lead and reconsider their donations as well, but so far no one else has done so.[47]

Perhaps in recognition of the political sensitivity of having ExxonMobil as a chief sponsor, Stanford made its contract with the project's sponsors publicly available and set up procedures that it claims ensures GCEP researchers will have sufficient independence from the program's sponsors. GCEP director Orr noted that both the project's sponsors and the university recognized the value of maintaining the independence of GCEP researchers. "They have the intellectual freedom and the academic freedom to publish whatever they want," he said.

Indeed, despite concerns that having ExxonMobil as a chief sponsor would cause the program to focus too heavily on fossil fuels, GCEP has poured significant resources into renewable energy, particularly solar. A large portion of the $72.1 million awarded by GCEP through November 2007 went for projects not associated with carbon-based fuels.[48] Nearly one-quarter of those projects went to solar energy research alone.[49] This funding comes despite top ExxonMobil officials having stated that renewable energy sources – wind, solar and hydrogen – will never be economical or reliable enough to replace fossil fuels.[50]

Yet, a closer look at GCEP reveals that Stanford missed several opportunities to insulate its researchers from its sponsors:

- The sponsors provide technical evaluations of the proposals before GCEP officials decide which projects should receive funding.
- After GCEP's staff has recommended projects for funding, the sponsors have the final say on research topics and budgets each year.
- The sponsors have exclusive rights to commercialize any inventions that result from GCEP research, without paying a dime to Stanford, for the first five years after patents are issued. GCEP has filed at least five patent applications in the fields of biohydrogen, nanoprobes, carbon nanotubes and bioelectricity.
- Individual sponsors can unilaterally terminate a project by giving the university 90 days written notice. Individual sponsors can withdraw from the project by giving two years notice.
- Research can be withheld from the public for 60 days, and possibly longer, to allow for patent applications.
- The management committee, which consists of one university representative and one representative of each of the four sponsors, must approve press releases and statements before they can be publicly released.

Faculty input has been limited from GCEP's inception. Given the high-profile of ExxonMobil and its long-established ties to some of the most prominent skeptics of global warming, one might have expected such an arrangement would have prompted a forceful examination by the university. Instead, the negotiations were carried out at the dean's offices, with minimal input from faculty and no student involvement. The faculty senate, which in the past had been informed of similar large projects, was not even told of the project until it was announced to the Stanford community in November 2002.[51] The deal also was not subject to any sort of independent review at the university level, since Stanford, unlike many other major universities, does not have an independent research board charged with reviewing such partnerships with industry.

Stanford's generous terms for ExxonMobil's contribution to GCEP set the pattern for subsequent corporate investments in university-based energy research. BP received equally generous terms in February 2007 when it vowed to invest $500 million over 10 years in the Energy Biosciences Institute at the University of California at Berkeley, Lawrence Berkeley National Labs (which the University of California runs for the Department of Energy) and University of Illinois at Champaign-Urbana. According to Beth Burnside, Berkeley's vice chancellor for research, up to 30 percent of the funding could go to proprietary work performed by BP scientists, 20 percent will go to the University of Illinois, and the rest will be split between UC–Berkeley and the Lawrence lab.[52]

Although BP's financial commitment dwarfs any similar program that came before it, Burnside noted that even with BP's funding, the amount Berkeley receives from industry overall is small. Burnside said Berkeley received $550 million in external funding in 2006; of which, $16 million was from industry. So, even with an additional $25 million a year from BP, Berkeley would still receive just 5 percent of its funding from corporate sponsors – less than the national average of 7 percent.[53] Burnside also noted that not allowing researchers to take money from BP would impinge upon their academic freedom. "If faculty wants to apply to industry for funding, I think that's appropriate. It's part of the academic freedom of this institution."[54]

The deal immediately prompted skepticism on campus, particularly among faculty members who had been active in resisting the Berkeley-Novartis deal. They fear the BP deal is headed down the same path. "Now, 10 years later I see exactly the same thing happening. . . . Sadly, they seemed to have learned nothing," said Ignacio Chapela, now an assistant professor in Berkeley's Department

of Environmental Science, Policy and Management.[55]

At a faculty forum on the Energy Biosciences Institute, Chapela publicly attacked the deal, likened it to prostitution and warned that signing the contract with BP could lead to doubts about the university's objectivity and advice in the future. "Signing the contract with British Petroleum would yoke the university to a flawed and potentially very dangerous route, at least for the next decade. Because of investments and commitments made, and the roads not taken, most probably much longer," Chapela said, noting that the deal would make it difficult for researchers to illuminate problems with the BP strategy.[56]

There are also concerns about Berkeley's relationship with the project's sponsor. When the final details of the pact were announced in November 2007, it became clear that BP will have a very prominent role in the institute. Berkeley's final contract with BP provides that:

- The governing board will include four BP representatives and four university representatives, and the board would have final say over budget allocation and oversight.
- The company was given two of eight slots on the executive committee that reviews project proposals.
- BP researchers will rent space on Berkeley's campus where they can conduct proprietary research, freely interact with academic researchers, and attend all on-campus activities; however, faculty using the on-campus corporate facilities must sign confidentiality agreements, and the premises are closed to graduate students because they are not allowed to engage in proprietary research.
- Publication of research results may be delayed to give BP time to review it to remove proprietary information and consider its patent possibilities.
- For projects fully funded by BP that lead to patents, the company can choose either a nonexclusive, royalty-free license or get an exclusive license where annual royalties cannot exceed $100,000 a year.

All of these terms have sparked concerns on campus about what the Berkeley-BP deal portends for the future of academic research. Charles Schwartz, a professor emeritus of physics at Berkeley and a long-time critic of industry, noted that the sheer size of the agreement necessitates strict measures to ensure the protection of academic freedom. "I think the Academic Senate should appoint

a special committee to exercise real, ongoing oversight of this project," Schwartz said.[57] Chapela noted that in the past the government and corporations have relied on imperatives such as the Cold War to embark on major new enterprises, including the national laboratories, that at the time were perceived as potential threats to academic freedom. "Global warming is now an imperative as powerful as Nazi Germany taking over the world," Chapela said. "It really behooves the representatives of society to ask the question, 'Are we losing our academic freedom for this?'"

University officials say no. "All of those are standard provisions in industry-university contracts," said Beth Burnside, vice chancellor for research at Berkeley. "The right to publish is guaranteed. That they can delay publication is in the interest of both parties to make sure we don't publish proprietary information and to see if there is something worth patenting."

But exclusive patent licenses may limit the universities' ability to manage those patents in the public interest. In recent years, some critics have raised questions about the potential negative consequences of early-stage patenting of scientific insights, especially in biomedicine. It has the potential to cut off independent academic investigators from promising lines of inquiry that require easy, affordable access to patented concepts or research tools. There is a movement to establish patent pools to forestall the possibility that too much early-stage patenting will fence off the intellectual commons.[58]

It's too early to tell if similar problems will plague the alternative energy field, but the seeds of that possibility are being sown in the generous first rights and licensing terms that universities are offering to their energy industry corporate benefactors. Most of the universities that have signed agreements have followed the Stanford's lead in granting exclusive rights to project sponsors. For example, the California Institute of Technology has given BP first rights to any intellectual property developed as a result of the solar research it is funding, and Caltech allows BP to review and delay research to protect patents.[59]

Rice University is one of the few universities that signed agreements with an oil firm that didn't offer exclusive rights to intellectual property derived from grants. But its Shell Center for Sustainability, which received $3.5 million from Shell Oil in 2002, has two Shell representatives on the seven-person committee that makes decisions about which projects receive funding. "They're there to make sure the research money is spent wisely for the purposes for which they donated the money," said Peter Hartley, who heads up the center.[60]

Most of the universities have signed agreements granting exclusive rights to project sponsors.

Chevron has been especially aggressive in directing how its grant money gets spent and in laying claims to intellectual property that might result. It funded two alternative fuel projects in 2006: one at the Georgia Institute of Technology that will provide $12 million over five years, and another focused specifically on biofuels at the University of California at Davis that will provide $25 million over five years. Under the agreement establishing the partnership at UC–Davis, the university retains the intellectual property rights to inventions developed solely by UC–Davis scientists, but Chevron has the first option to purchase an exclusive license.[61]

According to Lynne Chronister, UC–Davis' associate vice chancellor for research, a joint management committee comprised of university and Chevron officials will set guidelines governing the direction of the research. Research proposals will be vetted by the university and then forwarded to the oil company. Chevron also has the right to review research before it is published to ensure that confidential company information is not included in the report, and it can delay research to file patents. "Chevron's research goals fit UC-Davis's goals – finding clean, sustainable, affordable alternative sources of energy," Chronister said.[62]

UC–Davis has a long history of collaboration with Chevron, which is headquartered in nearby San Ramon, Calif. The company has given the university more than $5.6 million since 1961 and a number of Chevron executives have served on UC-Davis advisory committees and boards. Don Paul, Chevron's vice president and chief technology officer, sits on the school's 33-member External Research Advisory Board and Rick Zalesky, vice president of biofuels and hydrogen for Chevron Technology Ventures, is on the Board of Advisors and the Hydrogen Pathways Program Advisory Committee of the Institute of Transportation Studies.[63]

RECOMMENDATIONS

As the planet heats up, the nation, indeed, the world, will need the intellectual resources of America's leading universities to conquer this global challenge. It's crucial that researchers pursue the goals of discovering cleaner energy sources and reducing greenhouse emissions. But to do that efficiently and effectively, they must be free to pursue their research wherever it leads them, even if it is not an economically or politically popular direction.

Toward that end, universities taking money from industries as they pursue this worthy line of research should adopt policies that protect their autonomy and preserve the freedom of their researchers.

Such policies include:

- Prohibiting representatives of corporate donors from sitting on research programs' governing boards;
- Prohibiting industry donors from controlling the content and direction of research programs;
- Eliminating "first rights" intellectual property clauses from donor agreements;
- Barring industry scientists from utilizing campus resources like physical space for corporate research projects; and
- Ensuring that company representatives cannot suppress research or delay its publication.

Adopting such measures would allow universities to free themselves from the market-driven concerns of major energy corporations. Basic and applied scientific research at the nation's universities has been key to many of society's greatest technological discoveries. This will undoubtedly be true as the United States and the rest of the world struggle to create and adopt an energy system that preserves the global environment. It is crucial that universities maintain their independence from the commercial pressures of the fossil fuel and other carbon-emitting industries so their researchers can explore ideas and solutions with no obvious commercial benefit. To do so, universities must return their traditional ideals of academic independence and freedom.

Universities must be free to pursue their research wherever it leads them, even if it is not an economically or politically popular direction.

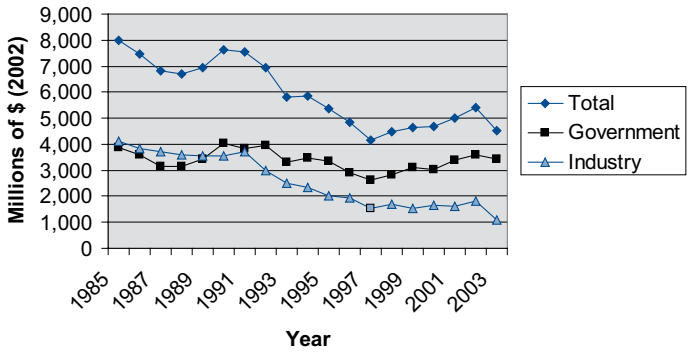
Admittedly, this is no easy task in today's society, particularly as government support for higher education has waned. But universities have little choice if they wish to serve society's long-term interests in reducing carbon emissions and slowing the pace of global warming.

UNIVERSITY PROGRAMS DON'T MAKE UP FOR THE SHORTFALL

Have you seen those ubiquitous advertisements touting the clean energy projects of big oil firms and electric utilities? The hype goes way beyond the reality. The university research programs recently launched by big oil firms do not even begin to make up for these firms' pitifully small investments in a cleaner future.

For decades, energy firms – ranging from the large oil conglomerates to the coal industry to the electric utilities – have been slashing their research and development budgets, including for alternative energy. When coupled with government energy R&D budgets, which have remained stagnant, the nation's investment in a clean energy future has dropped by 40 percent since 1985 (see figure 1).

Figure 1
Eroding Energy R & D



Source: Gregory F. Nemet, Daniel M. Kammen, "U.S. Energy Research and Development: Declining Investement, Increasing Need, and the Feasibility of Expansion," Energy Policy 35 (2007), pp. 746-55.

"Compared to the drug industry, information technology, or biotechnology, it's strikingly different," said Gregory F. Nemet, a University of Wisconsin energy policy analyst. "It raises the question of where the energy technologies are going to come from if we're ever going to move away from fossil fuels."

The high prices that consumers have been paying for oil have not resulted in higher research budgets, according to Nemet's recently published study.[64] Total energy industry investment in R&D, measured in inflation-adjusted dollars, fell sharply between 1985 and 2003 from $4.0 billion to $1.1 billion. Over those nearly two decades, the energy industry invested less than one-quarter of 1 percent of its vast revenues in research, down from over 1 percent between 1975 and 1987 when the nation was perceived to be in an "energy crisis." Industry's contribution to the nation's total investment in energy R&D fell from about half of $7.5 billion in 1991 to just 24 percent of $4.5 billion in 2003. Government spending over this period failed to pick up the slack, falling to $3.4 billion in 2003 from $4.0 billion in 1985 (see figure 1).

Venture capital-funded research into clean technologies hasn't picked up the slack either. Venture capital firms invested $2.9 billion in the "green tech" sector

Researching energy conservation, alternative energy sources and better use of fossil fuels are barely on the map as a national priority.

in 2006, a 142 percent increase over the $1.2 billion invested in 2004.[65] But even adding that to the total R&D budget (and some portion of that money goes for administration, sales, and manufacturing) leaves total spending more than $1 billion below spending of the mid-1980s in inflation-adjusted terms, and about half of what was spent on energy R&D in the late 1970s.

Compared to other sectors, especially health care, researching energy conservation, alternatives energy sources and better use of fossil fuels are barely on the map as a national priority. In the early 1980s, U.S. companies involved in producing energy were investing more in R&D than the drug industry and the infant biotechnology industry combined. Spurred on by the two oil price spikes of the 1970s, research into energy efficiency and oil alternatives rose to an impressive 10 percent of all research for all purposes, whether public or private. The investment binge included huge government programs to develop clean energy alternatives like solar, geothermal, and biofuels, as well as energy boondoggles like the failed synthetic fuels program.

But the steady erosion (until recently) in oil prices, a sharp rightward turn in national politics, and the heavy influence of carbon fuel-based industries on public policy put an end to that early dabbling with a clean energy future. Over the last three decades, the combined public and private budgets for medical research more than quadrupled in inflation-adjusted dollars while energy firms cut their spending by more than half. Today, energy accounts for just 2 percent of the nation's overall research effort. "Total private sector energy R&D is less than the R&D budgets of individual biotech companies such as Amgen and Genentech," Nemet said.[66]

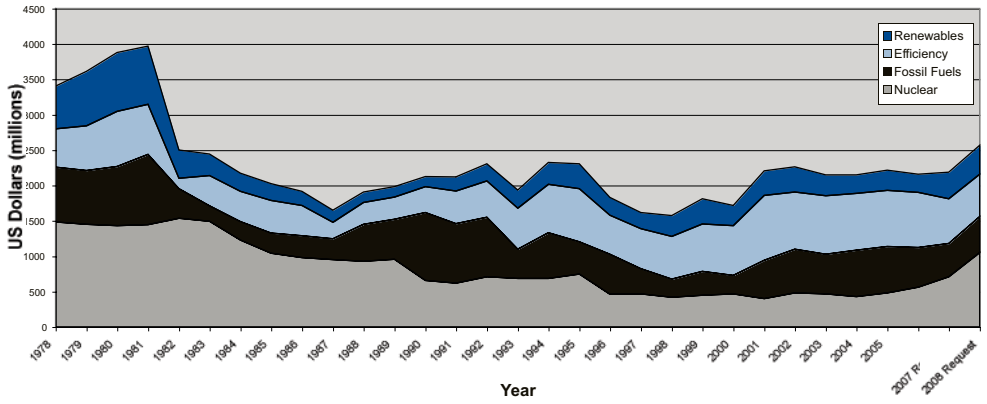
Economists focus on industry and government research patterns because they are an important indicator of where an economy is headed. R&D leads to the development of new products and processes. An expanding R&D budget creates jobs for knowledge workers with advanced degrees and encourages graduate students to gravitate to fields with rising budgets and surrounded by an aura of intellectual excitement. Moreover, companies that invest heavily in R&D ensure their futures, since they are better positioned to take advantage of sudden changes in the market like an oil price spike or growing public concern about what economists call "externalities" – like climate change.

But the trajectories of public and private energy R&D budgets reveal that this nation is doing next to nothing to cope with rising energy prices or to head off global warming. The United States today relies on oil, coal, and natural gas for

over three-quarters of its energy supplies. Based on current R&D priorities and the inertia of the existing infrastructure, that won't change much over the next 10 or 20 years. "They're not investing in new technology to replace what they do," said Scott Sklar, a green energy consultant who used to run the solar cell manufacturers' trade association.[67]

The government, of course, could make up for this massive failure by the private sector to provide for a clean energy future. But the Department of Energy's research budget has stayed relatively flat for 20 years after a sharp falloff in the early 1980s. In 1979, government spending on energy R&D peaked at $8.0 billion in inflation-adjusted dollars – double what it spent in recent years (see figure 2).

Figure 2
Government Energy Spending 1978-2008



Source: Gallagher, K.S., Sagar, A, Segal, D, de Sa, P, and John P. Holdren, "DOE Budget Authority for Energy Research, Development, and Demonstration Database, " Energy Technology Innovation Project, John F. Kennedy School of Government, Harvard University, 2007.

Renewable sources like solar energy have taken the biggest whacks. The U.S. government invested over $550 million in inflation-adjusted dollars (2004) in solar research in 1981. But by 2004, that was down to $83 million and has only rebounded slightly to an estimated $159 million in 2007. Meanwhile, government support for fossil fuel research, including clean coal technologies, also declined, but took a proportionally much smaller hit, falling from $994 million to $562 million in the same period, according to an analysis prepared by Kelly Gallagher and colleagues at Harvard's John F. Kennedy School of Government.[68]

Some analysts interested in reducing U.S. dependence on fossil fuels dismiss concerns about falling energy R&D budgets. "R&D is nice, but it isn't going to solve the problem," said Anne Korin of the Institute for the Analysis of Global Security, which promotes energy independence on national security grounds. "The technology is out there. Plug-in hybrids are ready to be deployed. It's not the job of the oil companies. That job belongs to the car companies and the government."[69]

But rather than stepping in to either mandate or provide incentives for such

changes, the government under four straight presidents has allowed alternative energy technologies to remain the unfertilized plant in the national energy garden. "The United States government will spend just $1.25 billion on renewables like solar and wind and efficiency this year," Sklar said. "It needs to be ten times larger for an economy the size of the U.S."

Such a dramatic increase would not be unprecedented. Nemet's study compared a projected large increase in the government's clean energy research and deployment budget to previous high-tech buildups, including the Manhattan Project, the Apollo space program, the Reagan defense build-up, the National Institutes of Health's doubling of the late 1990s, and the War on Terror. "A five to ten-fold increase in spending from current levels is not a 'pie in the sky' proposal," he concluded. "In fact, it is consistent with the growth seen in several previous federal programs, each of which took place in response to clearly articulated national needs."

APPENDIX A — THE PROGRAMS

Institution(s)	Sponsor(s)	Program Focus	Funding
California Institute of Technology	BP	Solar Energy	unknown
Carnegie Mellon	Multiple sponsors including National Science Foundation, American Petroleum Institute, ExxonMobil Education Foundation, Electric Power Research Institute	Climate Science and Policy Analysis	$20 million from 1991-2004
Georgia Institute of Technology	Chevron Corp.	Alternative Fuels	$12 million over 5 years
Massachusetts Institute of Technology	Multiple sponsors including 5 government agencies, American electric Power, Chevron Corp., DaimlerChrysler AG, Duke Energy, ExxonMobil, Ford Motor co., General Motors Corp., Schlumberger, and Shell Petroleum	Climate Science and Policy Analysis	$6 million annually
Princeton University	BP and Ford Motor Co.	CO2 Capture and Storage	$20 million over 10 years
Rice University	Shell Oil Co.	Methane Hydrates, Carbon Management, Nanotechnology, Energy and Sustainable Development	$3.5 million
Stanford University	ExxonMobil, General Electric, Schlumberger, and Toyota	Solar, Biomass, Hydrogen, Advanced Combustion, CO2 Capture & Separation, and CO2 Storage	$225 million over 10 years
University of California at Berkeley, Lawrence Berkeley National Laboratory, University of Illinois	BP	Biofuels	$500 million over 10 years
University of California at Davis	Chevron Corp.	Biofuels	$25 million over 5 years

APPENDIX B — SURVEY QUESTIONS

1. Do the sponsors have any input on what research is funded?
2. Do you allow company representatives on governing boards?
3. Are you leasing on-campus space to the sponsors?
4. Do your industry sponsors have first rights to intellectual property?
5. Can the sponsors review research before it is published?
6. Can the sponsors delay research publication?
7. Can the sponsors terminate the project early?
8. Can the sponsors review press statements and releases before public release?
9. Are there any patents pending or issued as a result of the project?

APPENDIX C — SURVEY RESPONSES

	Berkeley	Stanford	Princeton	MIT	Rice	Caltech	Davis	Ga. Tech	Carnegie
Input?	Y	Y	N	N	Y	Y	Y	Y	N
On boards?	Y	Y	N	N	Y	N	Y	Y	Y
Leasing space?	Y	N	N	N	N	N	N	N	N
IP?	Y	Y	N	N	N	Y	Y	Y	N
Review research?	Y	Y	N	N	N	Y	Y	Y	N
Delay research?	Y	Y	N	N	N	Y	Y	Y	N
End project early?	N	Y	N	N/A	N	N	Y	Y	N/A
Review press releases?	N	Y	N	N	N	N	N	N	N
Patents?	N	Y	N	N	N	N	N	Y	N/A

NOTES

1 Jennifer Washburn, "University Inc.: The Corporate Corruption of Higher Education," Basic Books, 2005. See, for instance, the cases of Betty Dong, pgs. 19-21; Tyrone Hayes, pgs. 21-3; Michael Wolfe, pg. 112; and Nancy Olivieri, pgs. 123-4.

2 Derek Bok, "Universities in the Marketplace," Princeton University Press, 2003, pg. 144-5.

3 Interview. March 1, 2007.

4 Faculty forum on the Energy Biosciences Institute, March 8, 2007.

5 See, for instance, the Chevron annual report to the Securities and Exchange Commission. In 2006, the company spent $12.6 billion on exploration and $468 million on research.

6 http://libraries.mit.edu/archives/mithistory/charter.html

7 Jennifer Washburn, *University Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2005), p. 57.

8 Ibid., pp. 58-59.

9 Edward E. David Jr., "Science Futures: The Industrial Connection," *Science*, 203(4383), March 2, 1979: 837.

10 Jennifer Washburn, *University Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2005), p. 61.

11 Ann Crittenden, "Industry's Role in Academia," *New York Times*, July 22, 1981, p. D1.

12 Jennifer Washburn, *University Inc.: The Corporate Corruption of Higher Education* (New York: Basic Books, 2005), p. 3.

13 Ibid., p. 15.

14 http://www.berkeley.edu/news/media/releases/2004/07/external_novartis_review.pdf

15 For a review of the early debate over global warming, see Eugene Linden, *The Winds of Change: Climate, Weather, and the Destruction of Civilizations*, New York: Simon and Schuster, 2006.

16 http://www.sourcewatch.org/index.php?title=Global_Climate_Coalition

17 Chris Mooney, "Some Like It Hot," *Mother Jones*, May/June 2005.

18 http://www.sourcewatch.org/index.php?title=Global_Climate_Coalition

19 Pamela Najor, "RIP: Global Climate Coalition: Voice for industry opposed global treaty," *Bureau of National Affairs*, Jan. 24, 2001.

20 Union of Concerned Scientists, *Smoke, Mirrors, and Hot Air: How ExxonMobil Uses Big Tobacco's Tactics to Manufacture Uncertainty on climate Science*, January 2007, pp. 9-10.

21 ExxonMobil corporate reports, 2002-2005, and http://www.exxonsecrets.org

22 Jennifer 8. Lee, "Exxon Backs Groups That Question Global Warming," *New York Times,* May 28, 2003.

23 Matt Sedensky, "Despite Federal Resistance, Cities Begin Embracing Kyoto," Associated Press, October 22, 2006.

24 http://www.exxonsecrets.org/html/personfactsheet.php?id=4

25 http://web.mit.edu/globalchange/www/

26 http://web.mit.edu/globalchange/www/structure.html#funding

27 http://hdgc.epp.cmu.edu/history.pdf

28 http://hdgc.epp.cmu.edu/summary.pdf

29 Interview, Nov. 14, 2006.

30 Email communication, Dec. 18, 2006.

31 Dana J, Loewenstein G. "A social science perspective on gifts to physicians from industry," Journal of the American Medical Association. 2003;290:252-255.

32 See "The Future of Coal" and "The Future of Nuclear Power," available on the MIT Center for Energy and Environmental Policy Research webpage at http://web.mit.edu/ceepr/www/publications/index.html (accessed Dec. 12, 2007). The third major report was "The Future of Geothermal Energy."

33 http://www.princeton.edu/~cmi/news/CMI06Report-web.pdf

34 Kristy Allenby, "BP, Ford Award Princeton $20 Million for Research," *The Daily Princetonian*, October 26, 2000.

35 http://www.princeton.edu/~cmi/summary/documents/annreport06.pdf

36 Ibid.

37 Ibid.

38 "A Plan to Keep Carbon in Check," *Scientific American*, September 2006, pp. 1-7.

39 Interview, Oct. 31, 2006.

40 Email, Dec. 14, 2006.

41 E-mail communication. Feb. 16, 2007.

42 http://www.princeton.edu/~cmi/people/advisorycouncil/advisory1.htm

43 Goldie Blumenstyk, "Greening the World or 'Greenwashing' a Reputation?", *The Chronicle of Higher Education*, Jan. 10, 2003.

44 Jennifer Washburn, "The Best Minds Money Can Buy," *The Tulsa World*, July 30, 2006, p. G3.

45 Interview, Nov. 21, 2006.

46 Interview, March 5, 2007.

47 Julie Sevrens Lyons, "Stanford's Big Oil Ties Rile Donor," *San Jose Mercury News*, March 12, 2007.

48 Maxine Lym, written reply to query, Nov. 15, 2007. See also Stanford University press release: (http://gcep.stanford.edu/news/press_3_23_07.html, accessed Oct. 10, 2007).

49 Maxine Lym, written reply to interview questions, December 5, 2006.

50 Brad Foss, "Energy Cos. Finance Stanford Project," Associated Press, November 20, 2002.

51 David Ritson, "Fuel for Thought," *Nature*, 421. February 6, 2003: 575-576.

52 Faculty forum on the Energy Biosciences Institute, March 8, 2007.

53 Faculty forum on the Energy Biosciences Institute, March 8, 2007.

54 Ibid.

55 Interview. Feb. 7, 2007.

56 Faculty forum, March 8, 2007.

57 Faculty forum on the Energy Biosciences Institute, March 8, 2007.

58 Merrill Goozner, "Innovation in Biomedicine: Can Stem Cell Research Lead the Way to Affordability?" PLoS Medicine, May 2006, Vol. 3, Issue 5, p. 611-4.

59 Interview, CalTech spokesman Dick Seligman, March 1, 2007.

60 Interview, Feb. 27, 2007.

61 "Private Sector Partnership Propels UC Davis," *California Aggie*, Sept. 28, 2006.

62 Email, March 6, 2007.

63 http://www.news.ucdavis.edu/search/news_detail.lasso?id=7873

64 Nemet GF, Kammen, DM, "U.S. energy research and development: Declining investment, increasing need, and the feasibility of expansion," Energy Policy 35 (2007) 746-755.

65 TechNet Green Technologies Task Force, "Green Technologies: An Innovation Agenda for America," 2006, pg. 8. (available at http://www.technet.org/resources/GreenTechReport.pdf, accessed Nov. 21, 2007)

66 Interview, Feb. 6, 2007.

67 Interview, Feb. 8, 2007.

68 Gallagher, K.S., Sagar, A, Segal, D, de Sa, P, and John P. Holdren, "DOE Budget Authority for Energy Research, Development, and Demonstration Database," Energy Technology Innovation Project, John F. Kennedy School of Government, Harvard University, 2004

69 Interview, Feb. 7, 2007.