

ENVIRONMENT AND ENERGY: CHALLENGES TO BALANCE

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INTRODUCTION

Achieving environmental protection has always been a matter of choosing the right compromises. Today, the compromises among which the U.S. government must choose are more numerous and complex than ever before. Early on, the Obama administration placed energy reform at the very top of its list of priorities. Energy transformation was to be one of its main legacies and the primary means by which it would improve America's environmental record and leadership in dealing with climate change. These are lofty, admirable, and worldly goals, in the sense that they recognize the central role that energy must play and that this role includes many economic, technological, and social realities. Yet these goals may well suffer from a degree of over-ambition and from too much unmeasured hope in the earliest stages.

Green energy, in turns out, is not yet ready to run America or large parts of it, even in the west, which seeks to take the lead in installing its own versions of the Obama plan. Renewable technologies are accompanied by environmental trade-offs of their own. The idea that green energy will solve many problems while creating none of its own is proving to be naïve. Complexity has settled on the energy option of nuclear power, too, once thought by environmentalists to be a closed issue but now reopened by energy security and climate change worries and supported by many green energy proponents, including a democratic president.

As issues, energy and the environment are inseparable. A "green" future with reduced environmental and climate impacts is inconceivable without major changes to how society takes care of its energy needs. U.S. administrations that seek such a future will therefore face a number of complex challenges beyond those related to regulating toxins and controlling land use.

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This article outlines a number of these challenges, as they have emerged specifically for the Obama administration, which has adopted a greener America as one of its goals. The discussion begins with the unique connections between energy and the environment in the U.S. (each of the world's major nations are unique in this regard.) It then turns to renewable sources and nuclear power, two areas of energy generation that the administration promotes in order to achieve its goals, and also looks at where issues involving oil fit in. Finally, the article takes a brief look at the matter of competing priorities in energy and the environment between federal and state governments, a long-standing matter endemic to American democracy that has interesting contours today.

Treatment of these matters here is necessarily selective. The reader, however, will hopefully profit from what follows in finding support for the truth that creating a "green America" is far from simple and, as the current administration understands, will require much patience, hard work, innovation, and political savvy.

WHY ENERGY?

With Barack Obama's election to the U.S. presidency in 2008, Americans on the Left and the Right perceived the sum of all hopes and fears regarding environmental protection. Environmentalists felt a glow of promise for a complete turnaround in policy from the previous eight years, during which the Bush administration rolled back rules governing such protection in nearly every major area of concern (including defense of wetlands to leasing of the Alaska National Wildlife Refuge (ANWR) for drilling). Conservatives, meanwhile, saw the same landscape, but in photo-negative. Gains made under Bush in holding back the tide of "environmental extremism" were likely to be lost. Such fears seemed wholly confirmed when, in 2009, the Environmental Protection Agency (EPA) declared carbon dioxide, the primary greenhouse gas, an emission within its power to regulate.³

Beneath the rhetoric on both sides lies a fundamental understanding: designating the environment, including the Earth's climate, a major policy goal means a move toward transforming energy, its use, and technology. For those on the Left and the Right, the emphasis on energy is significant. Along with food and water, energy defines the most socially penetrative aspect of modern

³ Press Release, U.S. Env'tl. Prot. Agency, *Greenhouse Gases Threaten Public Health and the Environment*, Dec. 7, 2009, available at <http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceac8525735900400c27/08d11a451131bca585257685005bf252!OpenDocument>.

life and involves realities of economics, the role of government, consumer choice, and more. In the U.S., moreover, there are specific and unique reasons why “environment” and “energy” are inseparable. Three in particular stand out.

First, America is a resource-rich country where the extraction of oil, natural gas, coal, and uranium occur on a gigantic scale. With the greatest volume of recoverable coal of any country on Earth, the U.S. is the home of the world’s largest coal mine (in eastern Wyoming)⁴, as well as over 3 million oil and gas wells drilled since the 1860s, more than the rest of the world combined.⁵ This scale of extraction impacts many types of terrain—eastern woodlands, Midwest flatlands, western High Plains, Gulf Coast onshore and offshore, Rocky Mountain plateaus and valleys, California desert, and Alaskan tundra, to name but a few.

Second, energy consumption in the U.S. is enormous. The dominance of fossil fuels (~80 percent of all energy use⁶) in this consumption has led to corresponding levels of air, water, and surface pollution for well over a century. While there are many forms of development (building new malls, suburbs, etc.) and industry (chemicals, mining, etc.) that pose potential environmental threats to ecosystems and public health, none are as damaging as oil and gas production or the burning of petro-fuels for transportation or coal for electricity.

Third, there is the matter of worldview, both on the environmentalist and anti-environmentalist sides. Relevant here is the deep-rooted sensibility among many in the environmental community that modernity, with its mixture of benefit and damage, is tilted too much on the “brown” side of the equation, in a runaway, profiteering fashion. Western society first based its material progress on coal in the 19th century and on oil in the 20th century, both polluting and limiting resources controlled by companies that have earned traditions of damaged public trust (“Big Oil,” for example). Nuclear power, because of its troubled

⁴ See U.S. ENERGY INFORMATION ADMINISTRATION, COAL DATA, <http://www.eia.doe.gov/fuelcoal.html> (last visited Apr. 13, 2010).

⁵ See T.S. Dyman et al., *Deep Natural Gas Resources*, in NATURAL GAS RESOURCES IN DEEP SEDIMENTARY BASINS ch. K, p. 3 (2002), available at http://www.osti.gov/bridge/product.biblio.jsp?osti_id=833232 (Regarding the number of oil and gas wells in the U.S. and worldwide, various estimates have been given for the totals. These figures will always be estimates, since many thousands of wells drilled in the 19th and early 20th centuries, prior to the establishment of state and national petroleum agencies, were never officially recorded. According to the U.S. Geological Survey, over 3 million wells have been drilled in the U.S.); see also Kevin Parker, *Capabilities and challenges with geographic information systems*, E&P, June 16, 2009, <http://www.epmag.com/WebOnly2009/item41091.php> (estimates 3.5 million wells for the U.S. out of a total 4.5 million worldwide).

⁶ U.S. ENERGY INFORMATION ADMINISTRATION, PRIMARY ENERGY OVERVIEW 1949-2008, <http://www.eia.doe.gov/emeu/aer/overview.html> (last visited Apr. 13, 2010).

early history, has added other forms of perceived risk into the equation. The set of ideas composing this worldview tend to place environmentalists against fossil fuels and nuclear energy because of what these sources represent at a deep level. A corollary idea, widely assumed but in fact unproven, is that we are rapidly approaching exhaustion of fossil sources, especially oil. Government must therefore seek to limit and reduce its further use in favor of sources with lower impacts.

On the other side, there exists a mixture of free market and nationalistic views of the situation. Fossil fuels are thought of as essential resources that nature has granted the U.S. These fuels have brought far more benefits to America than harm, and they remain essential to our daily well-being and the strength of our economy. Fossil fuels are also the source of innumerable technological advances, many of them invented in the U.S., involving everything from transportation to building materials. While pollution must certainly be contained, it should be contained through innovation, not through overly restrictive regulations that deform markets and injure company performance. Government has mistakenly taken many lands and offshore areas away from industry's ability to harvest America's resources for the national good. Access to these areas would provide jobs, stimulate market competition, and reduce America's dependence on foreign sources (the energy security issue).

These three reasons—scale of extraction for traditional fuels, high levels of consumption, and worldviews related to the American people's discussion of energy sources—have placed energy near the top of the list of concerns over environmental protection. Viewing environmental protection through the lens of energy does not capture the whole of the problem, to be sure. But this perspective does help clarify how the Obama administration hopes to frame a large part of its new agenda in this area. Moreover, it highlights the type of problems and challenges this new Administration will inevitably face.

GREEN DREAMS

Waking to the Economic Situation

The first part of this new agenda includes Obama's focus on green energy. Obama's motives are not complex, but stem from public and media outcry over the oil price shock of 2007-2008 (the first in three decades) and its revelations of America's dependence on foreign oil.⁷ "Green" in this context has a number

⁷ In fact, such dependence has been obvious for many years.

of overlapping meanings: renewable energy sources, systems that make use of these sources (“clean technology”), and more efficient use of energy in any form (e.g. more fuel efficient cars). The environmental connection stems from the idea that every unit of energy saved from use or generated by renewable sources is one unit less that contributes toward pollution and climate change.

President Obama’s Green Energy plan was predicted to generate new industries, new jobs, and new revenue to help the country fend off economic crisis and prepare the ground for rapid future growth, while simultaneously improving America’s environmental record. According to the Obama the administration’s “Organizing for America” website, “[a]merica can be the 21st century clean energy leader by harnessing the power of alternative and renewable energy, ending our addiction to foreign oil, addressing the global climate crisis, and creating millions of new jobs that can’t be shipped overseas.”⁸ As is typical of ideas that emerge out of bold campaigns in difficult times, the Obama Green Energy plan has the shine and aroma of a magic lamp about it.

While lofty, the specifics of the Green Energy plan are diverse and have been contemplated with varying degrees of rigor and realism. For example, the \$150 billion investment in green energy research and development between 2009 and 2019 is a true turnaround, since such research reached its peak in 1978 and fell by over 70 percent (real dollars) in 2005.⁹ In 2009, no less than \$16 billion generated by the American Recovery and Reinvestment Act (ARRA) was directed to energy improvement programs.¹⁰ Priorities in the ARRA included: improving energy efficiency in businesses, homes, and commercial enterprises; stimulating conservation efforts; furthering solar, wind, and biofuels; implementing smart grid technology; funding newer technologies such as hydrogen fuel cells and ultracapacitors (an electricity storage technology).¹¹ A combination of stimulus funding, loan guarantees, and research initiatives was instituted. On May 19, 2009, President Obama proposed new fuel economy standards of 30 mpg for light trucks (pickups, SUVs, mi-

⁸ BarackObama.com, Organizing on the Issues, <http://www.barackobama.com/issues/> (accessed Apr. 13, 2010).

⁹ Daniel M. Kammen & Gregory F. Nemet, *Reversing the Incredible Shrinking Energy R&D Budget*, ISSUES IN SCIENCE AND TECHNOLOGY, Fall 2005, at 84.

¹⁰ Chart, Department of Energy, *DOE Recovery Act Funding*, available at <http://www.energy.gov/recovery/> (accessed Apr. 16, 2010).

¹¹ See U.S. DEPARTMENT OF ENERGY, BREAKDOWN OF FUNDING, <http://www.energy.gov/recovery/breakdown.htm> (last visited Apr. 13, 2010). For allocations to energy specifically, see FRED SISSINE ET AL., CONGRESSIONAL RESEARCH SERVICE, ENERGY PROVISIONS IN THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009 (P.L. 111-5) (Mar. 12, 2009), available at http://assets.opencrs.com/rpts/R40412_20090312.pdf.

nivans) and 39 mpg for cars to be achieved by 2016.¹² Environmental groups, a number of business organizations, and members of the auto industry and the AFL-CIO showed strong support for the proposal.¹³ Yet what has happened since the green agenda was first announced?

The economic crisis has made it far more difficult for new green energy businesses to get off the ground and for established ones to move forward. A major reason for this difficulty is that Uncle Sam remains the only big lender. Banks have been reluctant either to lend or extend credit.¹⁴ Another factor is the excessive layoffs in the construction and manufacturing industries. Lack of new construction means less demand for solar technology in homes and businesses than hoped for, though the industry as a whole continued to grow last year.¹⁵ Meanwhile, due to the turndown in business generally, electricity demand has fallen as well, reducing new projects in wind energy overall (though, again, the industry did grow).¹⁶ Rather than expanding the workforce in droves, many green energy companies in the U.S. have had to lay off workers, and some have even moved production overseas. Overall, by early 2010, government economists stated that 52,000 jobs had been created or saved by stimulus money.¹⁷ This hardly qualifies as a new era of green labor when compared with the millions of people now out of work.

WHAT ABOUT OIL?

Green energy also aims to deal with the problem of oil dependence, the most public of all energy topics. In resolving this problem, the focus is on bio-fuels. But the biofuel industry has also suffered from the economic turndown and is also heavily reliant on subsidies from the federal government. Several large oil companies, especially BP, Exxon, and Shell, have dedicated significant amounts of money toward research on biofuels, hoping to cash in on federally-

¹² Stephen Power & Christopher Conkey, *U.S. Orders Stricter Fuel Goals for Autos*, WALL ST. J., May 19, 2009, at A1, available at <http://online.wsj.com/article/SB124266939482331283.html>.

¹³ See, e.g., Lymari Morales, *Americans Green-Light Higher Fuel Efficiency Standards*, GALLUP, May 19, 2009, available at

<http://www.gallup.com/poll/118543/americans-green-light-higher-fuel-efficiency-standards.aspx>; Dave McCurdy, *Auto Industry Applauds Obama's New Fuel Economy Standard*, THE WONK ROOM, May 19, 2009, <http://wonkroom.thinkprogress.org/2009/05/19/auto-industry-applaud/>.

¹⁴ David Goldman, *Banks Still Reluctant to Lend*, CNNMONEY.COM, August 18, 2009, available at http://money.cnn.com/2009/08/17/news/economy/fed_senior_loan_officer_survey/index.htm.

¹⁵ Jessica Shankleman, *Sun Shines on U.S. Renewable Energy Industry*, BUSINESSGREEN, April 16, 2010, <http://www.businessgreen.com/business-green/news/2261492/sun-shines-renewable-energy>.

¹⁶ *Id.*

¹⁷ Jim Tankersley, *Wind energy job growth isn't blowing anyone away*, L.A. TIMES, Feb. 2, 2010, available at <http://articles.latimes.com/2010/feb/02/business/la-fi-green-jobs2-2010feb02>.

mandated volumes later in the decade and, presumably, a growing global market down the road.¹⁸

In U.S. politics, and especially for the president, “oil” is code for several loaded concerns. These concerns include the U.S.’s over-dependence on foreign sources, effects on national security (since many supplier states are autocratic), and concern over gasoline prices (the consumer-voter). Anxieties over oil, in other words, tend to push environmental concerns to the back burner - but not entirely.

In 2008, the Obama campaign sought to address all of these concerns with its slogan of “energy independence.”¹⁹ This phrase referred mainly to America’s high rate of dependence on imported oil, which had reached over 60 percent (it has since dropped to around 58 percent in 2009)²⁰ and had become a banner issue in the midst of the first major oil shock since the 1970s. Given the scale of U.S. consumption, “independence” for oil was always a fantasy at best, at least for the next several decades. But the idea of energy independence helped add to green dreams, while diverting attention away from another part of the Obama energy plan - one with large environmental implications.

This part of the Obama energy plan was revealed by the Administration’s recent announcement of plans to open large portions of federal offshore waters to oil and gas drilling.²¹ Obama had noted this possibility during his campaign; it was no secret. To be sure, many members of the environmental community hoped this possibility was merely a false compromise, meant to win votes, just as there were people in the oil industry who hoped it was genuine. The plan lifts a long-term moratorium on oil/gas activity over a large portion of the East Coast, with tracts also opened in the eastern Gulf of Mexico and the Arctic Ocean off the coast of north Alaska. No West Coast areas will be available, including off the coast of California, where exploration has been banned since the 1969 Santa Barbara oil spill. In total, 470,000 square miles will be opened, with the possibility for tens of billions of barrels to be discovered.²² Any leas-

¹⁸ See, e.g., Matthew Campbell & Eduard Gismatullin, *Exxon to Invest \$600 Million in Biofuels Development*, BLOOMBERG.COM, July 14, 2009, <http://www.bloomberg.com/apps/news?pid=20601207&sid=athVs6qIqC.s>.

¹⁹ Organizing for America, *Building the New Energy Economy: Made In America*, Oct. 20, 2008, available at <http://my.barackobama.com/page/s/newenergy>.

²⁰ U.S. ENERGY INFORMATION ADMINISTRATION, ANNUAL ENERGY OUTLOOK 2009, <http://www.eia.doe.gov/oiaf/archive/aeo09/execsummary.html>.

²¹ John M. Broder, *Obama to Open Offshore Areas to Oil Drilling for First Time*, N.Y. TIMES, Mar. 30, 2010, at A1, available at

<http://www.nytimes.com/2010/03/31/science/earth/31energy.html?th&emc=th>

²² *Id.*

ing, and subsequently, drilling, will not occur for many years until studies are done to determine potential environmental impacts. Development of any oil will then require an additional 5-10 years.²³ Thus, it is unlikely that any production could take place before 2020. By then, however, U.S. production will have decreased a good deal: since 1985, it has declined at a rate of 20 percent per decade, though this rate has recently slowed by new oil from the deep offshore Gulf of Mexico.²⁴ The more U.S. production decreases without corresponding declines in demand or replacement by biofuels, the more imports will grow. These imports will increasingly come from OPEC, which holds the dominant share of remaining reserves.

The Obama administration has made a calculated choice among priorities. This choice is not merely a short-term political gamble to get votes from conservatives on environmental legislation, as maintained by commentators.²⁵ Nor is it an utter betrayal of green ambitions, as claimed by many environmentalists. Concisely put, the Obama administration accepts that oil is a long-term national security concern with a domestic as well as a foreign context, one that needs to be put ahead of blanket opposition to fossil fuels. Raising U.S. production of oil in the future means reducing dependence on countries considered not only unsavory but unstable, while also lowering the transfer of American wealth to those same states, some of which have funded terrorism. If members of the administration refrain from discussing the issue in those terms, it is likely due to a diplomatic sensibility and a desire to not offend these same countries (no such compunction existed under the Bush administration). What Obama has had to face is a disturbing trade-off between national security and environmental priorities. This is a trade-off that many countries will continue to face as long as oil is the world's most crucial source of fuel.

What about the matter of gasoline prices? For a certain period, gas prices acted to drive support for Obama's green hopes, and before them, Bush's focus on corn ethanol. In 2007, when prices exceeded \$3.00 per gallon, the news

²³ *Id.*

²⁴ See U.S. ENERGY INFORMATION ADMINISTRATION, U.S. FIELD PRODUCTION OF CRUDE OIL, <http://tonto.eia.doe.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFPUS2&f=M> (accessed Apr. 13, 2010) (U.S. production peaked in 1970 at 10.04 million bbls per day and then reached a second peak in 1986 at 9.12 million bbls/day, falling to 5.01 Mbbls/day by 2007 before rising slightly to 5.5 Mbbls/day at the end of 2009).

²⁵ John M. Broder & Clifford Krauss, *Risk is Clear in Drilling; Payoff Isn't*, N.Y. TIMES, Mar. 31, 2010, at B1, available at <http://www.nytimes.com/2010/04/01/business/energy-environment/01drill.html>.

made headlines across the nation.²⁶ The prices kept rising into 2008, exceeding the unimaginable height of \$4.00 per gallon. By this time, impacts were felt throughout the entire transport system and cries arose for change.²⁷ If such prices had been maintained, the momentum in favor of a rapid transformation to more green technologies would have been enormous. As it happened, economic crisis hit, prices collapsed, and the American auto industry went into government receivership. Consequently, the public drive behind renewable fuels fell off.

But isn't there a problem here—didn't prices climb all the way back up to \$3.00 per gallon again in 2009?²⁸ Yes, they did.²⁹ But in the wake of \$4.00 per gallon, prices seemed cheap; people went back to their daily lives with scant complaint. There is a more important reason for this. Americans are much "richer" than they thought relative to fuel prices. This becomes clear when we look at the cost of gasoline as a percentage of disposable income. In the forty years between 1955 and 1995, the cost of gasoline as a percentage of disposable income fell from about 5.3 percent to as low as 2.8 percent, where it stayed until 2002.³⁰ The number rose to about 3.8 percent by 2008.³¹ Even when oil prices reached an all-time high of \$140/bbl in 2008³², gasoline was cheaper, relative to people's incomes, than in the golden age of hot rods and surfer music. The truth is that during the late 1980s and 1990s, Americans became used to extraordinarily inexpensive gas. The recent oil shock has likely highlighted Americans' comfort level with low gas prices, and the collapse and rebound in prices has proven to consumers that a great majority of them are not as severely impacted as they might have thought. So, there is far less pressure from the public to force radical improvements in car technology. Smaller vehicles and more hybrids have appeared on the roads but not in overwhelming numbers and not with any wholesale rush by the public to trade in every SUV or minivan in

²⁶ Clifford Krauss, *Unreasonably High, Gas Prices Add strain on U.S. Consumer*, N.Y. TIMES, Nov. 8, 2007, available at <http://www.nytimes.com/2007/11/08/business/08gas.html>.

²⁷ Jesse McKinley, *Most Stunning View in Town is the One at the Pump*, N.Y. TIMES, Mar. 12, 2008, available at <http://www.nytimes.com/2008/03/12/us/12gorda.html>.

²⁸ ENERGY INFORMATION ADMINISTRATION, U.S. REGULAR WEEKLY RETAIL, available at http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_dcus_nus_w.htm.

²⁹ *Id.*

³⁰ U.S. Energy Information Administration, *Motor Gasoline Consumption 2008, A Historical Perspective and Short-Term Projections*, April 2008 *Short-Term Energy Outlook Supplement*, Figure 12. Motor Gasoline Cost as a Percent of Disposable Income, 1950-2007, http://www.eia.doe.gov/emeu/steo/pub/special/2008_sp_02.html.

³¹ *Id.*

³² See ENERGY INFORMATION ADMINISTRATION, *supra* note 26.

sight. Gasoline at \$3.00 per gallon or even \$3.50 per gallon will not trigger a clamor for a totally new auto future.

Biofuels, meanwhile, are supposed to replace large volumes of petroleum gasoline by 2020,³³ but these fuels continue to require significant federal subsidies, which effectively add to the cost consumers are paying for transportation.³⁴ Additionally, a significant amount of new research has questioned whether production of these fuels over the next ten years, before advanced methods of making them become commercial, is actually bad for the environment and unable to reduce greenhouse gas emissions.³⁵ Finally, with regard to oil, there is little likelihood that the U.S. petroleum industry will pull back on its oil extraction as long as prices remain as high as they are. The struggle between environmentalists and oil/gas companies will not abate any time soon.

THE NUCLEAR GENIE

Climate change, as an encompassing issue, has redefined the context of nuclear power in western nations. Environmentalists who have traditionally opposed this energy source, and continue to do so, now find themselves increasingly on the defensive. President Obama's recent endorsement of the "nuclear option," backed by his science advisor, John Holdren, and his Department of Energy head, Steven Chu, is a sign of a major change in U.S. policy.³⁶ It is a change that defies older ideas about nuclear energy as a grave environmental threat and that demands a new balance between these ideas and the more global problem of climate change. Such a balance may not be easily achieved.

As recently as the mid-1990s, few politicians outside of France (where nuclear power contributes 80 percent of the nation's electricity)³⁷ would have risked their careers by openly advocating for expansion of this energy source.

³³ Mandated biofuel use in the U.S. was set out by the Energy Independence and Security Act of 2007. Specific yearly increases in such use are given by EPA. See U.S. Env'tl. Prot. Agency, *EPA Finalizes Regulations for the National Renewable Fuel Standard Program for 2010 and Beyond, Fuel and Fuel Additives section*, <http://www.epa.gov/otaq/renewablefuels/420f10007.htm>.

³⁴ *Id.*

³⁵ The Pros and Cons of Biofuels, *Ethanol Tanks: More Suggestions that Biofuels are not an Environmental Free Lunch*, THE ECONOMIST, Oct. 22, 2009, available at http://www.economist.com/world/international/displaystory.cfm?story_id=14710469&source=login_payBarrier.

³⁶ See, e.g., Kate Sheppard, *Graham: Obama Admin 'Very Pro-Nuclear,'* MOTHER JONES, January 28, 2010, available at <http://motherjones.com/mojo/2010/01/graham-obama-admin-pro-nuclear-power>

³⁷ Steve Kidd, *Nuclear in France – What did they get Right?* NUCLEAR ENGINEERING INT'L, June 22, 2009.

Three Mile Island, Chernobyl, waste disposal, proliferation - these incidents and issues, following the protests of the 1970s and 80s, seemed to have shut the lid on future growth of the industry. This was certainly true in the U.S., where no new plants had been ordered for a generation.

Return of the Nuclear Option

Yet nuclear power has now returned as an alluring option due to its “clean” nature and a brand of attractive politics. Consider a few facts that have had their influence on the current administration. First, the technology delivers constant, reliable electricity (unlike solar and wind) on a massive scale with no greenhouse gas emissions during operation, no air pollutants, and no import dependence problems—no major contribution to global warming or energy security worries. Second, from the 1980s to the 2000s, the load factors (essentially how much of total capacity a plant utilizes during operation) of American plants increased from 50-60 percent to over 85 percent and into the 90 percent range, without any major incidents at any facility.³⁸ By taking the place of fossil fuels in power generation, especially coal, nuclear energy actually reduces carbon emissions and more direct pollutants by a significant amount.³⁹

In 2008, the U.S. had 104 operating reactors, producing 19 percent of its total electricity and roughly 2,000 tons of radioactive waste, mainly in solid form.⁴⁰ In the same year, some 500 coal-fired power plants yielded 115 million tons of ash, sludge, and airborne effluents, much of it bearing the noxious tidings of mercury, cadmium, lead, arsenic, and even radiation (U.S. coal contains small amounts of uranium and thorium).⁴¹ Were it not for those 104 reactors, America would have reaped at least 50 million more tons of this material. Nuclear waste, meanwhile, is sealed and locked up in containment areas. It is dangerous, long-lived, and kept away from public exposure. Coal ash and sludge are dumped into landfills, unlined disposal pits, quarries, and old mines, often open to moving water.⁴² The danger of radioactive waste lasts for hundreds, even thousands of years.⁴³ The poison in mercury or cadmium or lead lasts

³⁸ See “Nuclear Power in the World Today,” World Nuclear Association, <http://www.world-nuclear.org/info/inf01.html>; see also “Nuclear Power in the USA,” <http://www.world-nuclear.org/info/inf41.html> (accessed April 16, 2010).

³⁹ Dept. of Energy/U.S. Env'tl. Prot. Agency, *Carbon Dioxide Emissions from the Generation of Electric Power in the United States*, July 2000, available at <http://tonto.eia.doe.gov/ftproot/environment/co2emiss00.pdf>.

⁴⁰ Scott L. Montgomery, *The Powers that Be* (forthcoming July 2010).

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.*

forever.⁴⁴ Finally, nuclear power saves the Earth's atmosphere hundreds of millions of tons of carbon each year.⁴⁵

Contrasted with these concerns are advances in nuclear technology. Newly designed plants are more modular, efficient, and come with state-of-the-art safety systems, redundant monitoring, and improved automation (past accidents have been due almost entirely to human error).⁴⁶ These improvements should be seen against a backdrop void of major accidents at any U.S. facility in 30 years.⁴⁷ In literal terms, nuclear power has the highest safety record of any major industry in the nation in terms of actual injuries and demonstrated threats to public safety⁴⁸ (neither of these occurred at Three Mile Island, as independent study has confirmed).⁴⁹

Nuclear Politics in Another Light

The reason this all matters most in the western hemisphere is that entrenched opposition to nuclear power doesn't exist anywhere else. Indeed, the global nuclear industry is very much alive and expanding. In Asia, where coal use exceeds that in the rest of the world combined,⁵⁰ over 120 new reactors could be built before 2030, mostly in China, Korea, and India.⁵¹ These reactors are planned as replacements for future coal use. A number of nations, such as Egypt, Indonesia, Thailand, and Vietnam, are quite interested in establishing the technology within their borders.⁵² Thus, the major global concern over nuclear power is proliferation; environmental worries fade in this new context where climate change and worry over the spread of weapons command growing attention.

All of these factors have convinced the Obama administration that the U.S. needs to be involved directly in the nuclear option. America needs to remain a

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ Scott L. Montgomery, *The Powers that Be* (forthcoming July 2010).

⁴⁷ *Id.*

⁴⁸ *Id.*

⁴⁹ "Backgrounder on the Three Mile Island Accident," U.S. Nuclear Regulatory Commission, available at <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html>. See also, Samuel J. Walker, *Three Mile Island: A Nuclear Crisis in Historical Perspective*, Berkeley: University of California (2004).

⁵⁰ See U.S. Energy Information Administration, *International Energy Statistics, Coal Consumption*, available at <http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=1&pid=1&aid=2>.

⁵¹ See U.S. Energy Information Administration, *World Nuclear Reactors summaries*, available at http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/reactsum2b.html.

⁵² For country information on existing, planned, and proposed civilian reactors, see, "Table of World Nuclear Power Reactors", World Nuclear Association, <http://www.world-nuclear.org/info/reactors.html>.

leader—technologically, economically, and politically—with regard to nuclear power. It is the administration’s clear purpose that the U.S. not get “left behind” in any sense for what may prove to be a growing portion of the global energy system.⁵³ Again, despite the President’s outspoken support for nuclear power during his campaign, for a sizeable portion of the environmental community this is likely to act as one more source of disappointment. This shift toward nuclear power impedes future negotiation and compromise on other environmental issues.

But the matter doesn’t end here. The interests of individual states, or their representatives, can intervene to weaken action at the federal level. The nuclear option brings its own brand of politics to Washington D.C., as demonstrated by the Nevada delegation’s influence on nuclear waste disposal at Yucca Mountain. The President’s desire to appease Senate Majority Leader Harry Reid and gain his cooperation on other issues is the likely reason for the announcement by Obama in 2009 that he was mothballing the underground waste repository site at Yucca Mountain in Senator Reid’s home state.⁵⁴ The majority of experts agree that such a site (or sites) is necessary to ensure the safest storage of dangerous waste, which otherwise continues to build up at individual reactor facilities throughout the country.⁵⁵ Yet Senator Reid has repeatedly expressed his intent to prevent Nevada from becoming America’s nuclear “dumping ground.”⁵⁶ No less than \$10 billion dollars has been spent on Yucca to date, most of it researching Yucca’s suitability as a repository.⁵⁷ In geologic and engineering terms, it is perhaps among the most intensively studied pieces of ground anywhere on Earth. In view of the moderate-to-poor standards that continue to be used for coal waste, the accountability applied to Yucca Mountain does not just seem excessive; nuclear waste is effectively treated as being many times more toxic than any other material produced by humans. In practical terms, this means no site for underground storage can be made acceptable.

⁵³ Barack Obama & Joe Biden, *New Energy for America*, at 6-7, available at http://www.barackobama.com/pdf/factsheet_energy_speech_080308.pdf (accessed Apr. 16, 2010).

⁵⁴ Paul Bedard, *Reid Celebrates Obama’s Yucca Mountain Decision*, U.S. NEWS & WORLD REP., Feb. 26, 2009.

⁵⁵ See, “Underground Repositories,” International Atomic Energy Agency, Staff report Jan. 23, 2004, <http://www.iaea.org/NewsCenter/Features/UndergroundLabs/Grimsel/repositories.html>.

⁵⁶ HarryReid.com, *Issues: Yucca Mountain*, available at <http://www.harryreid.com/ee/index.php/issues/entry/issues-yucca-mountain> (accessed Apr. 16, 2010).

⁵⁷ Isaac J. Winograd and Eugene H. Roseboom Jr., *Yucca Mountain Revisited*, SCIENCE, Policy Forum, pp. 1426-27, June 13, 2008.

Foreclosing a rational disposal site could well prove to be a way to inadvertently slowly choke the industry, as waste reaches spatial limits at existing sites.

If Obama's hope for nuclear power - that it can prove itself as a truly helpful servant in a greater environmental cause - is to be achieved, it will be necessary to overcome obstacles that have nothing to do with public fear or concern.

STATES OF MIND

A challenge of a different stripe for the Obama administration is that of states determining their own green, or perhaps not-so-green, futures. States have considerable say about the use of land and resources within their borders, and this has provided rich material for both cooperation and conflict with the federal government. Western states have long-standing battles over the designation of national monuments and wilderness areas and energy and mineral resources.

Western State Ambitions

California leads the way in green ambitions but fails to have practical implementations. In 2009, under Governor Arnold Schwarzenegger, California required that 33 percent of its electricity come from renewable sources by 2020⁵⁸ - an enormous amount. Inspired by the Sunshine State's precedent, in 2010 Colorado moved to increase its own "renewable portfolio standard" from 20 to 30 percent.⁵⁹ Such acts of green beneficence might seem to run in exactly the same direction as what the Obama Administration prefers, attracting more green business to these states, creating more jobs, and setting the trend. But, these standards are extremely ambitious, even for places rich in sun and wind. Without radical advances in technology, California's 33 percent goal would require many tens of thousands of square miles of solar and wind farms, land that the state would not be able to develop without incurring public resistance. Large pilot solar installations in the Mojave Desert have already come under fire from environmental groups. Any further development of streams and rivers for hydropower would almost certainly result in similar criticism. Importing large amounts of power from other western states, like Washington, where hy-

⁵⁸ Press Release, Governor Schwarzenegger Announces 244 Proposed Renewable Energy Projects Throughout State, Office of the Governor, Dec. 29, 2009, <http://gov.ca.gov/press-release/14092/> (accessed Apr. 16, 2010) (hereinafter Schwarzenegger).

⁵⁹ "Colorado Legislature Approves 30% Renewable Energy Requirement," *Colorado Energy News*, March 10, 2010, <http://coloradoenergynews.com/2010/03/legislature-nears-final-approval-for-increasing-renewable-energy-requirement/>.

dropower is big, seems unlikely, given that electricity demands are projected to grow in these places.

How, exactly, does California intend to implement its own version of the Obama Green Energy plan? It helps to look at some figures. In December of 2009, Gov. Schwarzenegger announced a list of 244 proposed renewable energy projects in the state.⁶⁰ These projects have a total potential of 70 gigawatts (GW), a vast increase over the 8 GW in use today.⁶¹ He also signed a bill fast-tracking the permit process for such projects on state lands, as well as a memorandum of understanding with U.S. Interior Secretary Ken Salazar to do the same for federal lands (permitting delays have been a major disincentive in the past).⁶² California's list of projects, in order of size and importance, include those for solar, wind, geothermal, biomass, and small hydro facilities.⁶³

In purely objective terms, this seems problematic. California has enormous geothermal resources that are well-identified but developed in merely a handful of sites (though one of these, the Geysers, north of San Francisco, remains the world's largest geothermal installation). But solar is "sexy" today; scientists tend to favor and promote it because of its fundamental appeal, blending fact and imagination - enormous theoretical energy potential and its vitality to life on Earth. Solar is where a great deal of Silicon Valley start-up money has gone and is where media attention also tends to focus when the topic of renewable energy is invoked. In fact, over two-thirds of the proposed 70 GW production would come from solar, especially solar thermal plants (where solar energy heats a fluid that is then used to work a turbine generator), with individual installations generating power in the range of 900 megawatts (MW) up to 4.3 GW.⁶⁴

The practical problem is that no facilities of this size have ever been built. No one yet knows the full upfront costs involved; how well such a facility might perform; what operational and maintenance problems might occur; and how it might stand up to sand storms, snow, and climate change: the learning curve has not yet begun. The first likely project is a deal between the utility Southern California Edison and the solar company BrightSource to build a 1.3

⁶⁰ Schwarzenegger, *supra* note 56.

⁶¹ *Id.*

⁶² *Id.*

⁶³ *Id.*

⁶⁴ The California Energy Commission, Proposed Renewable Energy Projects for California, 33% by 2020: Implementing the Renewable Energy Executive Order, *available at* <http://www.energy.ca.gov/33by2020/documents/index.html> (accessed Apr. 16, 2010).

GW solar thermal plant in the desert outside Los Angeles.⁶⁵ When finished, the seven different installations that compose the total project will cover no less than 10,500 acres of land, or 16.4 square miles. Schwarzenegger's list includes 25 projects of similar scale⁶⁶ - translating to over 400 square miles, for power plants that can operate little more than half the day in summer and less in winter. Sacrificing 400 square miles of desert ecology in this way, for less immediate environmental benefits, should not sit well with everyone. There is a growing appreciation among state legislators for the ecological uniqueness of desert areas; for example, there is a proposal by Sen. Dianne Feinstein to set aside nearly 1 million acres of the Mojave Desert for two new national monuments, which has caused several solar companies to cancel projects.⁶⁷

Certainly, the state hopes to reduce power demands with energy efficiency measures affecting TVs and other electronics; appliances; and heating, ventilating, and air conditioning systems (HVAC). In fact, California is one of the few states in the union whose overall electricity per capita has remained flat for over a decade, even as its use of renewables has climbed to more than 10 percent.⁶⁸ But this doesn't mean power demand itself has been horizontal; on the contrary, demand has grown nearly 50 percent since 1990.⁶⁹ What has kept the per-capita figure flat is the long-term rise in population. This growth in population and power demand suggests that the amount of electricity from renewable sources required to meet the 33 percent goal in 2020 will be significantly more than what is required to meet the 33 percent goal today.

Variable State Incentives

Local incentives present a continuing challenge to any large-scale federal plan for advancing any national environmental causes. Assuming wind power is nearly commercial at today's electricity prices in many states, solar power is still far from this goal—estimated to cost more than coal, natural gas, and wind

⁶⁵ Alexis Madrigal, *Biggest Solar Deal Ever Announced – We're Talking Gigawatts*, WIRED SCIENCE, February 11, 2009, available at <http://www.wired.com/wiredscience/2009/02/big-solar/>.

⁶⁶ *Id.*

⁶⁷ Todd Woody, *Desert Vistas vs. Solar Power*, N.Y. TIMES, December 21, 2009, available at http://www.nytimes.com/2009/12/22/business/energy-environment/22solar.html?_r=1.

⁶⁸ California Energy Commission, *2009 Integrated Energy Policy Report*, Final Commission Report, December 2009, CEC-100-2009-003-CMF,

http://www.energy.ca.gov/2009_energypolicy/index.html.

⁶⁹ *Id.*

power.⁷⁰ Solar development, therefore, will require a great deal of government help: subsidies, tax write-offs, and accelerated depreciation. Different states will almost certainly continue to offer such help in their own, individual ways to variable extent. Even among states with rich non-renewables, the policy varies. For example, a state like Wyoming (oil, gas, coal), which has a long tradition of support for the related industries, has much lower renewable standards. Others, like Texas, with both abundant fossil and renewable resources (oil, gas, wind, solar) are taking a mixed approach, attempting to stimulate both types of industries by promoting renewables not as outright replacements of conventional fuels but as offering additional sources to accommodate future growth. Thus, the priority of environmental protection and the specific local laws related to it, as a function of energy issues, will continue to vary also.

Ill-conceived incentives can cause significant economic harms to other industries. As Spain recently discovered, an enthusiastic level of subsidies for renewable energy, especially on a large scale, can render the industry truly vulnerable. In the mid-2000s, the Spanish government decided it would provide large financial incentives, including cheap loans, to create a solar boom in its slumping coal mining areas.⁷¹ By 2008, Spain accounted for no less than half of all new solar installations worldwide: farmers sold their land, new businesses opened, companies rushed to open offices, and solar farms shot up and spread out, often with substandard construction.⁷² Only a year later, suffering from the economic downturn, Spain realized that costs for these plants simply weren't falling fast enough, that it would have to keep its subsidy level high indefinitely.⁷³ Moreover, poor construction practices that had been allowed by a lack of adequate building standards but also encouraged by the gold-rush mentality caused some facilities to fail, exacerbating the financial problem. In late 2009, the government withdrew its support and growth collapsed.⁷⁴ Spain offers a lesson to any government entity interested in furthering renewable energy: there is an inevitable and inescapable need to balance the necessity for subsidy

⁷⁰ See, e.g., Matthew L. Wald, *Cost Works Against Alternative and Renewable Energy Sources in Time of Recession*, N.Y. TIMES, March 28, 2009, available at http://www.nytimes.com/2009/03/29/business/energy-environment/29renew.html?_r=1 (describing predictions given by Electric Power Research Institute about costs of alternative energy sources).

⁷¹ Elizabeth Rosenthal, *Solar Industry Learns Lessons in Spanish Sun*, N.Y. TIMES, March 8, 2010, available at <http://www.nytimes.com/2010/03/09/business/energy-environment/09solar.html?scp=1&sq=Spain%20solar%20energy&st=cse>.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ *Id.*

against the possibility for economic sustainability. Too much subsidy will create a fragile bubble; too little will prevent growth. The right amount will change with time, as costs (of land, materials, and technology) rise or fall.

Because of these lessons, rampant enthusiasm for the green dream in the U.S. has therefore become a bit cloudy. No administration can control or elude the larger economic realities that dictate energy availability and use, nor their impacts on the environment. It is unfair of the Obama administration to expect so much.

The President clearly understands the inescapable importance of energy issues for an economically and environmentally sustainable society. He also understands that presently, America is far from modeling such a society but capable of doing so over time. Sharp and clear-eyed realism, and the ability to choose which compromises to make and avoid, may prove the biggest challenge of all.