IMPLEMENTING GREENHOUSE GAS EMISSIONS CAPS: A CASE STUDY OF THE LOS ANGELES DEPARTMENT OF WATER AND POWER

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Our almost forty-year experience with landmark federal environmental statutes, demonstrates unequivocally that implementing grand and noble environmental goals is an arduous and difficult experience. California is now embarking on a similar project: implementing the country's most ambitious greenhouse gas emissions limitations, including rolling back the state's emissions to 1990 levels by 2020. The state's leadership on climate change legislation deserves significant praise. But the hard work in actually achieving emissions limits is just beginning.

In this Essay, Professor Ann Carlson provides a case study of the country's largest municipally owned utility—the Los Angeles Department of Water and Power (DWP)—and the challenges it will face in holding its emissions to 1990 levels by 2020. The case study is particularly useful to anticipate challenges utilities across the country will face if the federal government also mandates greenhouse gas emissions reductions. The DWP's energy mix, with its heavy reliance on coal, looks quite similar to the energy mix of the country as a whole (and quite different from the rest of California's electricity market).

The challenges are daunting. They include shifting rapidly to renewable energy sources in the face of labor pressures to have DWP own its own sources; building miles of transmission lines to bring the renewable energy to DWP's customer base; repowering natural gas facilities while attempting to comply with stringent Clean Water Act requirements; and eliminating the utility's reliance on coal over the next two decades. These efforts will raise complex environmental and other value clashes, pitting those concerned about jobs, water pollution, species protection, and aesthetic harms against a utility admirably committed to cutting its greenhouse gas emissions significantly. Whether and how we resolve these clashes remains an open and contested question.

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INTRODUCTION

California deserves accolades for its aggressive approach to reducing greenhouse gas emissions. In 2002 the state enacted the country's first mobile source greenhouse gas emissions standards, followed in 2006 with an overall economy-wide cap that will roll back the state's emissions to 1990 levels by 2020.[1] More recently, the governor has signed an Executive Order committing the state to even more aggressive rollbacks by 2050, when the state is to reduce its overall emissions to 80 percent below 1990 levels.[2] These caps are particularly daunting given projections that California will add ten million people to the state by 2020, increasing to almost 60 million by 2050.[3] How the state will achieve the caps remains to be seen since responsibility for establishing the necessary regulatory mechanisms has largely been delegated to the state's Air Resources Board (Air Board).[4]

1. The mobile source standards are contained in CAL. HEALTH & SAFETY CODE § 43018.5 (West Supp. 2008); the economy-wide cap, known as Assembly Bill 32, 2005–2006 Leg., Reg. Sess. (Cal. 2006) (AB 32), is codified at CAL. HEALTH & SAFETY CODE §§ 38500–38599 (West Supp. 2008).

2. Cal. Exec. Order No. S-3-05 (June 1, 2005), http://gov.ca.gov/index.php?/executive-order/1861.

3. *See* Mary Heim & Melanie Martindale, State of Cal., Population Projections by Race/Ethnicity for California and Its Counties 2000–2050 (2007), http://www.dof.ca.gov/html/DEMOGRAP/ReportsPapers/Projections/P1/documents/P-1_Tables.xls.

4. *See* discussion *supra* notes 20–24.

Despite the promise of the California approach, implementation issues loom large. The state will likely pursue multiple regulatory options, including a market-based cap-and-trade program that will cover all major sectors of the economy that contribute significant greenhouse gas emissions.[5] California's experience in implementing its legislation is likely to influence the rest of the country as the United States attempts to grapple with how to reduce carbon emissions.

Electric utilities will obviously be included in any California cap-and-trade system. In this Essay, I sketch out a number of the challenges that the Los Angeles Department of Water and Power (DWP)—the country's largest municipally owned utility—will face in dramatically reducing its carbon emissions as required by California law. I focus on a case study of the DWP because its energy mix looks more similar to the rest of the country than to many of California's other utilities, private or publicly owned. Unlike most of the state's utilities, the DWP imports a significant amount of coal-fired electricity to serve its customer base.[6]

The agency will face hard questions about how to meet emissions reductions: whether to shift away from coal toward renewable resources or natural gas—with likely increases in the cost of electricity; whether to attempt to sequester carbon emissions from a coal-fired plant; whether to increase rates and to what levels, which must be approved by an elected city council; how to induce large gains in energy efficiency; how to develop alternative renewable sources of energy; and how to transmit that energy to its customers. And the agency will face obstacles—legal, technological, and political—in its attempt to cut emissions. The story of DWP, then, is one that will likely become a familiar one to the rest of the country if Congress enacts an economy-wide cap on carbon emissions over the next several years. California's experience will show not just how to achieve large carbon reductions, but also the stumbling blocks, difficulties, and legal challenges such reductions will likely entail. Indeed, the DWP experience may be easier

5. In order to assist the state in developing a market-based scheme, Governor Arnold Schwarzenegger created a Market Advisory Committee that issued a detailed report recommending the establishment of an economy-wide cap-and-trade system. *See* MKT. ADVISORY COMM., CAL. AIR RES. BD., RECOMMENDATIONS FOR DESIGNING A GREENHOUSE GAS CAP-AND-TRADE SYSTEM FOR CALIFORNIA (2007), http://www.climatechange.ca.gov/publications/market_advisory_committee/2007-06-29_MAC_FINAL_REPORT.PDF. The Air Resources Board recently concurred with the recommendation for an economy-wide cap-and-trade program in its Draft Scoping Plan. *See* CAL. AIR RES. BD., CLIMATE CHANGE DRAFT SCOPING PLAN: A FRAMEWORK FOR CHANGE, JUNE 2008 DISCUSSION DRAFT 11 (2008) [hereinafter DRAFT SCOPING PLAN].

6. *See* discussion *supra* notes 50–54.

than that faced by much of the rest of the country because the utility has worked admirably since the mid-1990s to stabilize and even reduce its carbon emissions.[7]

Each of the challenges California will face is worthy of extensive analysis beyond the scope of my efforts here. My more limited aim is to outline some of those challenges in order to focus policy and legal scholarship—not just on designing the overarching legislation that will be necessary to reduce carbon emissions, but also on follow-up implementation. Experience with the landmark federal environmental statutes enacted in the early 1970s has proven that the hard work following legislative passage has in many ways dwarfed the accomplishments of Congress. Numerous areas of the country, for example, remain out of compliance with key provisions of the Clean Air Act[8] and the Clean Water Act[9] almost forty years after their passage.[10] Implementation of carbon emissions legislation will also prove daunting and difficult. Indeed, one of the lessons from this DWP case study is that the decisions utilities must make as they work to reduce greenhouse gas emissions will create complex environmental and other value clashes, pitting important local questions about water pollution, species protection, aesthetic harms, and job protection against international efforts to tackle climate change. How we resolve these clashes remains an open and contested question.

Part I begins with an overview of California's legislative and regulatory efforts to reduce greenhouse gas emissions and presents a more specific discussion of the DWP, its current energy mix, and its greenhouse gas emissions profile. Part II then sets forth how the utility is proposing to cut emissions through a combination of strategies, each of which poses individual challenges that may make compliance with the emissions reduction requirement quite difficult to achieve. Part III then briefly analyzes several of these challenges and suggests further avenues of research to address the challenges.

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7. *See* discussion *supra* notes 60–63.
8. 42 U.S.C. §§7401–7624 (2000).
9. 33 U.S.C. §§1251–1387 (2000).
10. For a list of areas of the country out of attainment with the National Ambient Air Quality Standards of the Clean Air Act, see U.S. Environmental Protection Agency, The Green Book Nonattainment Areas for Criteria Pollutants, http://www.epa.gov/oar/oaqps/greenbk/index.html (last visited May 1, 2008). For a description of the state of the nation's water bodies, see ENVT. PROT. AGENCY, DRAFT REPORT ON THE ENVIRONMENT: PURER WATER (2003), *available at* http://www.epa.gov/roe/roe/pdf/roeWater.pdf.

I. LOS ANGELES DWP AS A PROXY FOR U.S. UTILITIES

A. Customer Base and Demographics

The Los Angeles DWP provides both water and electricity to almost 4 million residents and businesses in the city of Los Angeles. The utility owns and operates its own generation, transmission, and distribution systems, and, unlike most of the rest of California's utility providers, does not need to rely on external markets to supply its customers with electricity during peak demand periods.[11] As a result, Los Angeles largely escaped the rolling blackouts and skyrocketing electricity prices that much of the rest of the state experienced in 2001.[12]

The DWP's infrastructure is massive: the utility has 7000 megawatts of electric capacity; 6000 miles of above-ground transmission lines and another 4200 underground miles of transmission infrastructure.[13] DWP is the largest municipally owned utility in the country and is governed by a five-member board appointed by the mayor.[14] Mayoral and city council involvement in the DWP's activities is not limited to board appointment; instead, any rate increase requires full city council and mayoral approval.[15] The city has just approved its first rate increase since 1992.[16] The combination of political factors and the DWP's energy mix—which like that of utilities in much of the United States is about half coal[17]—has meant that its customers have paid among the lowest electricity rates in the state, about 25 percent lower than ratepayers served by the state's investor-owned utilities.[18]

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11. CITY OF L.A. DEP'T OF WATER & POWER, 2007 INTEGRATED RESOURCES PLAN 8 (2007), http://www.ladwp.com/ladwp/cms/ladwp010273.pdf [hereinafter 2007 INTEGRATED RESOURCES PLAN]; *see* L.A. Dep't of Water & Power, Water and Power Today, http://www.ladwp.com/ladwp/cms/ladwp001557.jsp (last visited July 15, 2008) [hereinafter LADWP Water and Power Today].

12. Press Release, Business Wire, LADWP Reminds Customers City Has Ample Supplies of Power; Residents Asked to Use Power Wisely During Emergency (July 10, 2002), *available at* http://www.allbusiness.com/energy_utilities/utilities_industry_electric_power/5975411-.html (explaining LADWP's role during the 2001 crisis).

13. *See* LADWP Water and Power Today, *supra* note 11.

14. *See* L.A. Dep't of Water & Power, Our Service and History, http://www.ladwp.com/ladwp/cms/ladwp000508.jsp (last visited July 15, 2008).

15. *See* Press Release, L.A. Dep't of Water & Power, LADWP Commissioners Approve New Water & Electric Rate Actions (Oct. 2, 2007), *available at* http://ladwpnews.com/go/doc/1475/176896.

16. *Id.*

17. *See* discussion *supra* notes 50–54.

18. Among the state's major utilities, only customers of the Sacramento Municipal Utility District pay less than DWP customers, even taking into account the proposed DWP rate increase scheduled for 2008. *See* News Release, L.A. Dep't of Water & Power, LADWP Commissioners Approve New Water and Electric Rate Actions (Oct. 2, 2007), http://www.ladwp.com/ladwp/cms/ladwp009847.jsp; *see also* CITY OF L.A. DEP'T OF WATER & POWER, DRAFT 2006 INTEGRATED

The DWP now faces an emerging and stringent regulatory regime to control its carbon dioxide emissions. The next section describes the legislative and regulatory environment in which DWP will operate.

II. CALIFORNIA'S REGULATORY BACKGROUND

A. Greenhouse Gas Legislation

California has taken a number of steps to control carbon dioxide and other greenhouse gas emissions that the scientific community believes with near consensus are contributing to the warming of the globe.[19] Many of these measures will affect DWP's operations directly.

Most prominent is the state's Global Warming Solutions Act,[20] also known as Assembly Bill 32 or AB 32, which commits the state to rolling back emissions to 1990 levels by 2020. Unlike more comprehensive legislation pending at the federal level, California's bill is elegantly simple and leaves the hard implementation work to the Air Board. In rolling back emissions levels, AB 32 mandates that the Air Board ensure that its regulations are equitable, do not disproportionately affect low-income communities, are cost-effective, do not increase air pollution, increase other societal benefits such as energy diversification and cleaner air, minimize administrative burdens, and minimize leakage. The Air Board may consider enacting market-based mechanisms, including a cap-and-trade system.[21]

AB 32 contains two additional provisions of special import to utilities. First, emissions from both the generation and transmission of electricity are to be included within the scope of regulatory coverage. Additionally, the regulations must take into account not only in-state electricity generation, but also energy generated out-of-state but used in-state.[22] With those guidelines as a backdrop, the design of mechanisms to achieve the emissions rollback is effectively delegated to the Air Board. To date, it seems relatively clear that a centerpiece of the regulatory efforts will be the adoption of an

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RESOURCE PLAN 12 (2006), http://www.ladwp.com/ladwp/cms/ladwp008065.pdf [hereinafter DRAFT 2006 INTEGRATED RESOURCE PLAN].

19. *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 72 (2007), http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf (stating that "[w]arming of the climate system is unequivocal" and "*likely* . . . human-induced").

20. A.B. 32, 2005–2006 Leg., Reg. Sess. (Cal. 2006) (codified at CAL. HEALTH & SAFETY CODE §§ 38500–38599 (West Supp. 2008)).

21. *See* CAL. HEALTH & SAFETY CODE § 38562(b).

22. Seth Hilton, *The Impact of California's Global Warming Legislation on the Electric Utility Industry*, 19 ELECTRICITY J. 10, 11–12 (2006).

economy-wide cap-and-trade scheme based on recommendations made by the Board's Market Advisory Committee,[23] the state's Public Utilities Commission,[24] and the Air Board itself.[25]

At least two other recently enacted measures are aimed directly at the state's utilities. First, Senate Bill 1368[26] (SB 1368) prohibits electric utilities from entering into long-term (five years or more) contracts or financial commitments for baseload electricity generation, unless the generation meets a performance standard for greenhouse gas emissions.[27] More specifically, SB 1368 requires the state's Public Utilities Commission (PUC) to set the performance standard "no higher than the rate of emissions of greenhouse gases for combined-cycle natural gas baseload generation."[28] This measure is intended to require utilities to purchase electricity that is at least as clean as modern natural gas facilities operating efficiently.[29] The important net result of the performance emission standard is that coal-fired electric generation facilities will not be able to meet the standard without significant technological change, such as carbon sequestration.[30]

Also in 2002, California passed legislation committing its electric utilities to procure 20 percent of their energy from renewable sources by the year 2017;[31] subsequently, Senate Bill 107[32] (SB 107), adopted in 2007, accelerated the target to 2010.[33] The Renewables Portfolio Standard (RPS), as the renewable requirement is known, does not govern municipal utilities like the DWP because it applies only to private utilities regulated by the PUC. The same legislation, however, requires municipal utilities to design RPS programs with similar goals and to report to the state's Energy Commission on their progress. As a result of this requirement, the DWP is now committed to meeting by 2010 the same RPS-20 percent standard as

23. *See supra* note 5.

24. *See* CAL. PUB. UTILS. COMM'N, INTERIM OPINION ON GREENHOUSE GAS REGULATORY STRATEGIES 4 (2008) (recommending the adoption of a cap-and-trade program for electric utilities).

25. *See* DRAFT SCOPING PLAN, *supra* note 5, at 11.

26. 2005–2006 Leg., Reg. Sess. (Cal. 2006).

27. The baseload generation performance standard is codified in Division 4.1 of the CAL. PUB. UTIL. CODE §§ 8340–8341 (West Supp. 2008).

28. *See id.* The Public Utilities Commission's implementation of the standard is described in a PUC news release. Press Release, Cal. Pub. Util. Comm'n, PUC Sets GHG Emissions Performance Standard to Help Mitigate Climate Change (Jan. 25, 2007), *available at* http://docs.cpuc.ca.gov/Published/NEWS_RELEASE/63997.htm. The actual numeric level of the standard is 1100 pounds of carbon dioxide per megawatt hour. *Id.*

29. *See* Hilton, *supra* note 22, at 13.

30. *See id.* at 14.

31. *See* 2002 Cal. Stat. c. 516 (codified as amended at CAL. PUB. UTIL. CODE § 399.11).

32. 2003–2004 Leg., Reg. Sess. (Cal. 2003).

33. *See* 2006 Cal. Stat. c. 464 (codified at CAL. PUB. UTIL. CODE § 399.11).

that imposed on investor-owned utilities.[34] Moreover, the utility has established a target of 35 percent renewables by 2025, related in spirit to the aggressive standard endorsed by the Air Board, achieving a 33 percent RPS by 2020.[35] Eligible renewable electricity includes wind, solar, geothermal, biomass, biodiesel, digester gas, and small (30 megawatts or less) hydroelectric power.[36]

California also establishes priorities for what is known in the regulatory world as "loading order," which is the sequence of actions the state will take to respond to increases in energy need.[37] Energy efficiency and demand-response programs—designed to provide incentives to customers to reduce demand during peak usage periods—lead the loading order. Next, generation needs should be met by renewable resources. Finally, the order designates the provision of new, clean fossil fuel generation and improvements in the transmission grid and electricity infrastructure.[38] Los Angeles' DWP has embraced this loading order in its most recent Integrated Resource Plan, which was adopted in 2007 and sets forth its energy planning and needs for the next five years.[39]

1. Comparative Energy Profiles: California vs. The DWP

Though the composition of the DWP's energy mix looks more similar to the rest of the country than most of California's other energy utilities, the state as a whole has a much different energy profile—and hence per capita carbon emissions profile—than the remainder of the United States.[40] The state has the lowest per capita electricity consumption in the United States.[41] Over the past twenty years, the rest of the country has made only a small

34. *See* L.A. Dep't of Water & Power, Renewable Energy Policy, http://www.ladwp.com/ladwp/cms/ladwp005864.jsp (last visited June 12, 2008).

35. *See* DRAFT SCOPING PLAN, *supra* note 5, at 11.

36. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at D-4 (setting forth the Los Angeles Department of Water and Power Renewables Portfolio Standard Policy).

37. *See* STATE OF CAL. ENERGY COMM'N, PUBLIC UTILS. COMM'N, ENERGY ACTION PLAN II: IMPLEMENTATION ROADMAP FOR ENERGY POLICIES 2 (2005), http://www.energy.ca.gov/energy_action_plan/2005-09-21_EAP2_FINAL.PDF. The loading order was established in the state's first Energy Action Plan in 2003. *See* CAL. EXEC. ORDER NO. S-20-04 (July 27, 2004), http://www.dot.ca.gov/hq/energy/ExecorderS-20-04.htm. The passage of Senate Bill 1037 codified it in 2005.

38. *Id.*

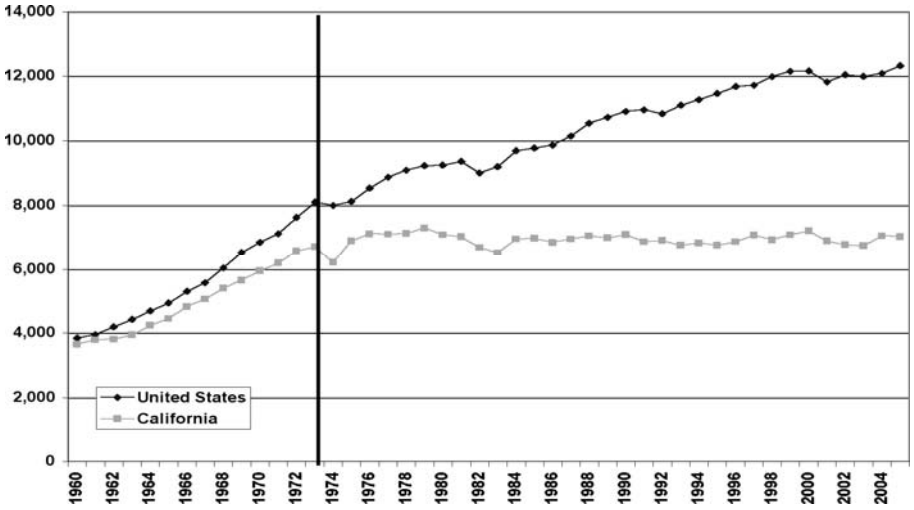
39. *See* 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 1.

40. CAL. ENERGY COMM'N, 2007 INTEGRATED ENERGY POLICY REPORT 2 (2007), http://www.ladwp.com/ladwp/cms/ladwp010273.pdf [hereinafter 2007 INTEGRATED ENERGY POLICY REPORT].

41. *Id.*

dent, about 8 percent, in increasing its energy efficiency while sustaining economic growth.[42] During the same period, California has increased its economic output per unit of electricity consumed by a remarkable 40 percent.[43] And while the rest of the country has experienced an almost 50 percent per capita increase in electricity usage, California's per capita usage has remained flat (Figure 1).

FIGURE 1: PER CAPITA ELECTRICITY SALES—THE UNITED STATES COMPARED WITH CALIFORNIA (KILOWATT HOURS PER PERSON)[44]



California's ambitious climate change policies are part of an extension of an ambitious energy policy the state has actively pursued for more than thirty years. Beginning in the 1970s, the state adopted an aggressive strategy of improving energy efficiency through tough building standards, appliance standard setting, and energy conservation.[45] In addition, the state shifted from petroleum dependence in the 1970s to a much heavier reliance on natural gas, which produces less carbon dioxide,[46] in part because of stringent air pollution control standards.

The result of these aggressive policies is that the state differs from much of the rest of the country in two significant respects. First, by numerous

42. DEVRA BACHRACH, MATT ARDEMA & ALEX LEUPP, NATURAL RES. DEF. COUNCIL & SILICON VALLEY MFG. GROUP, ENERGY EFFICIENCY LEADERSHIP IN CALIFORNIA 2 (2003), *available at* http://www.nrdc.org/air/energy/eecal/eecal.pdf.

43. *Id.*

44. 2007 INTEGRATED ENERGY POLICY REPORT, *supra* note 40, at 3.

45. *Id.* at 3.

46. *Id.*

measures California is much less energy intensive than most other states: The state is in the bottom five for greenhouse gas intensity level and energy intensity, and on a per capita basis California emits many fewer tons of greenhouse gas emissions.[47]

A large reason for California's impressive record on energy and greenhouse gas intensity is the mix of fuels on which the state relies for power. In 2006, only 15 percent of the state's electricity came from coal, whereas more than 40 percent of it came from natural gas. Large hydroelectric (30 megawatts or more) supplied close to 20 percent of California's electricity, nuclear power almost 13 percent, and renewables 11 percent.[48] By contrast, the rest of the United States receives more than three times as much of its electricity from coal (49 percent), whereas only 20 percent of the supply comprises natural gas. Nuclear power supplies almost 20 percent of the country's electricity, hydropower 7 percent, and renewables less than 3 percent.[49]

In contrast, the energy mix of the Los Angeles DWP looks quite different from the rest of the state. Almost half of the utility's energy mix comes from coal (47 percent),[50] almost identical to the national profile. Natural gas supplies 31 percent of the mix, nuclear power 9 percent, large hydroelectric 5 percent, and eligible renewables only 5 percent.[51] Figures 2–4 graphically demonstrate the respective energy mixes of the California, United States, and the DWP.

47. *Id.* at 19.

48. CAL. ENERGY COMM'N, 2006 NET SYSTEM POWER REPORT 3–4 (2007), *available at* http://www.energy.ca.gov/2007publications/CEC-300-2007-007/CEC-300-2007-007.PDF. The figures vary somewhat from year to year because of variability in the energy mix, particularly because of energy generation from northwest hydroelectric power. *Id.* at 2.

49. ENERGY INFO. ADMIN., ELECTRICITY INFOCARD 2006 (2007), *available at* http://www.eia.doe.gov/bookshelf/brochures/electricityinfocard/elecinfocard2006/elecinfocard.html.

50. *See* 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 18.

51. *See id.* at 22.

FIGURE 2[52]

United States Electricity Usage by Fuel Type

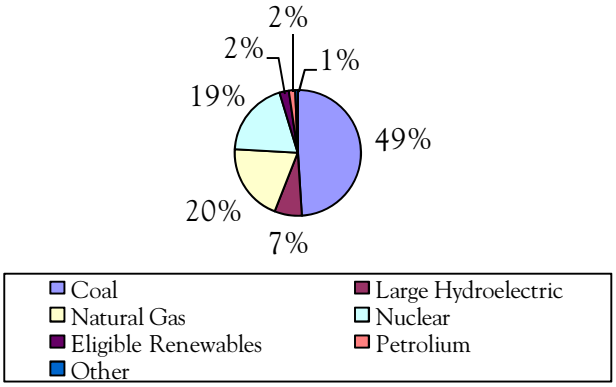
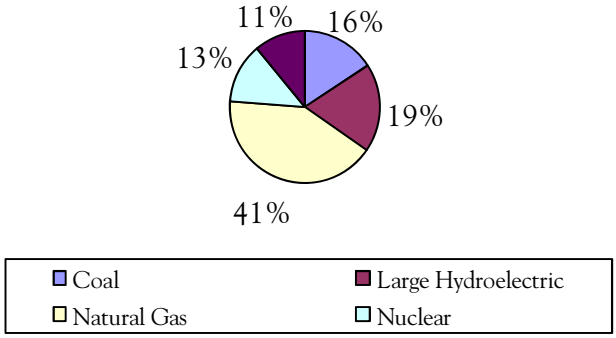


FIGURE 3[53]

California Electricity Usage by Fuel Type

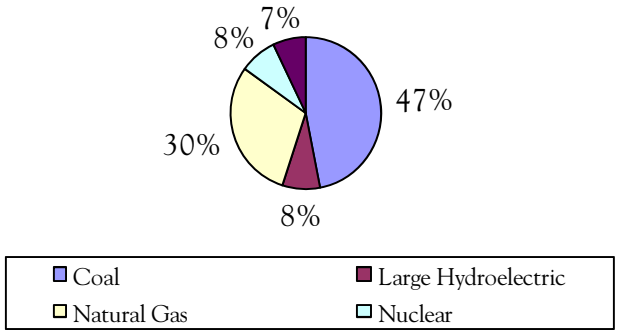


52. U.S. ENERGY INFO. ADMIN., ELECTRIC POWER ANNUAL 2006, at 2 (2007), *available at* http://www.eia.doe.gov/cneaf/electricity/epa/epa.pdf.

53. 2007 INTEGRATED ENERGY POLICY REPORT, *supra* note 40, at 26.

FIGURE 4[54]

LA DWP Electricity Usage by Fuel Type



In contrast to the energy mix comparison, with respect to greenhouse gas emission *growth* between 1990 and 2006, California and the U.S. look more similar to one another while the DWP is the outlier. The Air Board has recently issued its inventory of California greenhouse gases emitted between 1990 and 2004[55] in order to implement the AB 32 rollback to 1990 levels. During that time frame California emissions rose approximately 12.5 percent overall.[56] Emissions from the electricity sector rose more slowly, just over 6 percent over the same time frame.[57] U.S. greenhouse gas emissions growth shows a similar trend. Total emissions have grown 14 percent from 1990 to 2006.[58] In comparison, DWP carbon dioxide emissions were approximately 19.3 million tons of CO_2 in 1990; by 2006 emissions had declined by 8.6 percent below 1990 amounts to 17.7 million tons, despite a 14 percent growth in electricity generation during the same time frame.[59]

54. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 22.

55. *See* Cal. Air Res. Bd., Draft California Greenhouse Gas Inventory—By IPCC Category (2007), *available at* http://www.arb.ca.gov/cc/inventory/data/tables/rpt_inventory_IPCC_sum_2007-11-19.pdf.

56. Total California emissions in 2004 were 479.74 million metric tons of carbon dioxide compared with 426.6 million metric tons of carbon dioxide in 1990. *Id.* at 22.

57. Total emissions from "Main Activity Electricity and Heat Production" grew from 115.84 million metric tons in 1990 to 123.20 million metric tons in 2004. *Id.* at 1.

58. ENVT. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2006, at 2-1 (2008), *available at* http://www.epa.gov/climatechange/emissions/downloads/08_CR.pdf.

59. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 24–25.

B. The DWP's Greenhouse Gas Emissions Reduction Initiatives

The state's Air Board has yet to enact most of the measures necessary to comply with AB 32's emissions cap, and as a result we do not yet know the share of the total cut for which the DWP will be responsible. Nonetheless, for quite some time the DWP has been committed to reducing greenhouse gas emissions to 1990 levels or lower and has outlined its strategy for doing so. Between 1995 and 2000 the agency participated in a U.S. Department of Energy program to maintain emissions levels at 1990 levels, and it apparently succeeded.[60] In 2000, DWP committed to reducing its emissions to 5 percent below 1990 levels by 2012,[61] a commitment reaffirmed in 2006.[62] The result of these programs is that the DWP now begins its effort to meet AB 32 targets in comparatively good shape. Indeed, by DWP's own reporting, as of 2006 its carbon dioxide emissions are approximately 8.6 percent lower than emissions in 1990.[63]

However, to achieve emissions at or below 1990 rates by 2020, the DWP will face significant pressure. The utility faces large projected increases in population and energy demand in Los Angeles. Los Angeles County is expected to grow by 1.65 million people by 2020 and by another 3.5 million by 2050.[64] Energy usage has grown at about 1.4 percent annually since 1994; new projections are that usage in the DWP service area is projected to increase by 1.1 percent annually between 2007 and 2025, requiring DWP to increase its energy supply by 30 percent during that time frame.[65] Currently the state estimates that in order to meet AB 32's goals, statewide electricity emissions are likely to need to be cut by 29 percent below the projections of what the state would emit by 2020 under a business as usual scenario.[66]

The result is that despite DWP's progress in reducing greenhouse gas emissions, the utility faces daunting challenges in continuing to do so given increasing population and electricity demand. In addition, not only does the utility face the AB 32 cap, but in May 2007 Los Angeles Mayor Antonio

60. *See* CAL. CLIMATE ACTION REGISTRY, LOS ANGELES DEPARTMENT OF WATER AND POWER ANNUAL EMISSIONS REPORT 5 (2005), *available at* http://www.climateregistry.org/CARROT/public/reports.aspx (choose 'Los Angeles Department of Water and Power' under Entity Name).

61. *Id.*

62. DRAFT 2006 INTEGRATED RESOURCE PLAN, *supra* note 18, at 3.

63. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 24.

64. *See* Heim & Martindale, *supra* note 3. Not all of this increase in population will be served by the DWP since the population projections cover all of Los Angeles County, not simply the City of Los Angeles, which is the DWP's customer base.

65. DRAFT 2006 INTEGRATED RESOURCE PLAN, *supra* note 18, at 1, 17.

66. 2007 INTEGRATED ENERGY POLICY REPORT, *supra* note 40, at 1.

Villaraigosa committed the city to reducing greenhouse gas emissions to 35 percent below 1990 levels by 2030.[67] The governor's Executive Order commits the state to an even more aggressive 80 percent reduction below 1990 levels by 2050.[68]

III. DWP STRATEGY AND CHALLENGES

DWP has set forth, at least on a preliminary basis, how it intends to comply with the AB 32 cap in its 2007 Integrated Resource Plan (IRP). The IRP sets forth the utility's five-year strategy to meet its customers' energy needs while also complying with environmental requirements, maintaining service reliability, and doing so at "a competitive price."[69] In this Part, I outline the DWP's strategy and describe likely challenges that will make meeting each of the goals difficult at best.

The DWP's five-year strategy set forth in its IRP is multipronged, but central to it is an increase in energy generation from renewable resources from 7 percent in 2006 to 20 percent in 2010.[70] In addition, the DWP will focus on reducing demand through energy efficiency and other demand-side strategies.[71]

The utility also has plans to increase the operating efficiency of its natural gas facilities.[72] In the long term, the DWP has already indicated it will not renew its contract to import coal-generated energy.[73] The contract expires in 2027. Thus, the utility will need to alter its sources of generation dramatically given that almost half of its current generation comes from coal. Moreover, it will very likely need to do so much earlier than the expiration of the coal contract in order to meet AB 32 goals, because coal is much more greenhouse-gas-intensive than any of the DWP's other energy sources. Presumably the shift will require the DWP to increase its reliance on natural gas in addition to renewable energy and also to implement demand-side reductions. The bottom line is that meeting the DWP's longer term goals will be even tougher than its current five-year plan. All of the utility's strategies—shifting to renewable resources, improving the efficiency of

67. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 5.
68. Cal. Exec. Order No. S-3-05 (June 1, 2005), *available at* http://gov.ca.gov/index.php?/executive-order/1861.
69. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 9.
70. *Id.* at 22.
71. *Id.* at 27.
72. *Id.*
73. *Id.* at D-2.

natural gas plants, and eliminating its reliance on coal—raise serious challenges. I address those challenges below.

A. Growth in Renewable Resources

The DWP is aggressively pursuing increases in renewable resources, including issuing three major requests for proposals (RFPs) for renewable energy projects: one in 2001, another in 2004, and a third in 2005.[74] The 2001 RFP led to the adoption of two large projects. First, DWP is currently constructing a large wind project in the Tehachapis Mountains to the east of Los Angeles. DWP will also buy energy from a green waste digester project.[75] The Tehachapi project, known as the Pine Tree Wind Project, is projected to be online in 2009. The 2004 and 2005 RFPs brought about additional projects, the most promising of which include a number of additional wind projects located in the Tehachapi area.[76] In addition, the city has acquired land and announced plans to develop a geothermal project near the Salton Sea, approximately 150 miles southeast from downtown Los Angeles, which could produce a relatively large amount of renewable energy.[77] Finally, the utility is also already generating small amounts of renewable energy from landfills and is evaluating plans for solar projects.[78]

Despite the promise of these projects, at least three major problems confront the DWP in its shift to renewable sources, and similar challenges will likely confront virtually any utility seeking to offset conventional energy sources with renewable projects. The first is actually meeting the stated RPS goals in a very constrained time frame, particularly the goal of the 20 percent emissions reductions by 2010. As of now, 8 percent of DWP's generation in 2007 will come from renewable sources,[79] giving the agency just three years to increase its renewable generation by more than 100 percent. For the DWP, the time pressures are compounded by city-imposed ownership restrictions. The second and perhaps most daunting challenge is to build transmission lines to transmit energy from renewable resources—most of which are located well outside the boundaries of the city of Los Angeles. And developing the renewable resources themselves will create environmental

74. The 2005 RFP was issued by the Southern California Public Power Authority. *See* DRAFT 2006 INTEGRATED RESOURCE PLAN, *supra* note 18, at D-7 to D-8.
75. *See id.* at D-7.
76. *See id.* at D-11.
77. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at D-14.
78. *See id.* at D-14 to D-15.
79. *See id.* at D-13.

controversy. The utility will face other challenges as well, in meeting the RPS, including the intermittent nature of many renewable resources (for example, wind energy can only be generated when the wind blows). These issues will create complexities not faced with traditional energy sources.

1. Meeting the RPS Deadlines

California and the DWP are hardly alone in facing tough RPS goals: Twenty-five states have enacted such standards over the last several years.[80] The result may be intense competition for renewable resources and a potential increase in price for resources that to date are already more expensive than conventional sources of energy. The DWP also faces additional challenges. So far, despite proposals generated by the RFPs, the utility has entered into very few contracts for large-scale projects. As of December 2007, DWP has committed to the Pine Tree Wind Project, has entered into two small contracts for renewable landfill-based energy, and has acquired land to develop geothermal resources in Imperial County. The utility has also entered into a contract to buy a relatively large amount of wind energy from a project located in Millard County, Utah, and has a few other small contracts for renewable power.[81] DWP is still evaluating other projects that have come out of the RFPs.[82] The point, here, however, is that the process has been slow and makes meeting the 2010 deadline seemingly quite difficult.

DWP faces a particularly difficult time in entering into renewable energy contracts because under the terms of the city resolution establishing the RPS goals, the utility is required to give a preference to "projects that are located within the City of Los Angeles."[83] Under the resolution, the DWP must also own a relatively large percentage of renewable generation capacity. For renewable resource projects acquired before 2011, the city must own a minimum of 40 percent; beginning in 2011 that percentage increases to 75 percent.[84] These provisions were included in part due to heavy pressure from the DWP's unionized employees, who fear that the transition to

80. Pew Center on Global Climate Change, Renewable Portfolio Standards (2008), *available at* http://www.pewclimate.org/what_s_being_done/in_the_states/rps.cfm.

81. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at D-14 to D-15.

82. *See id.*

83. *Id.* at D-5 (setting forth the Los Angeles Department of Water and Power Renewables Portfolio Standard Policy (as amended April 2007)).

84. *Id.*

renewable resources will result in job losses.[85] The union opposes, for example, the DWP's purchases of existing renewable resources from private generators and argues that the utility should instead create new resources to be owned by the city.[86] Two of the largest projects to date, the Pine Tree Wind Project and the Salton Sea geothermal project, will be city owned.

My point is not to weigh the pros and cons of city ownership of renewable generation resources, but simply to suggest that union pressure and city ownership requirements seem likely to slow the DWP's progress in meeting its RPS goals, particularly the 20 percent emissions reductions by 2010 requirement. More broadly, labor issues and the desire to maintain utility jobs may complicate any transition away from traditional energy sources in many areas of the country, particularly for those utilities with unionized work forces.

2. Transmission Issues

In addition to the issues complicating DWP acquisition of renewable generation capacity, the utility currently lacks the transmission infrastructure necessary to transmit energy from distant renewable energy projects to its customers. As the agency's Integrated Resource Plan candidly acknowledges, "the current transmission system was not primarily designed with [renewable] resources in mind."[87] Thus, the DWP's plan is to construct the necessary lines. To date the utility has identified at least three large and necessary transmission projects. The most controversial, the Green Path North Project, would bring geothermal, wind, and solar energy approximately 150 miles from the Salton Sea to Los Angeles. The wind resources being developed in the Tehachapi area to the northeast of Los Angeles also need new transmission infrastructure and upgrades to existing lines. Finally, DWP contemplates accessing wind, geothermal, and biomass renewable resources located out-of-state and

85. Telephone Interview With Mary Nichols, Former President, L.A. Dep't of Water and Power (Jan. 17, 2008); *see also* Western Area Power Admin., *LADWP Explores O&M Options for Utility-Owned Wind Facilities*, 26 ENERGY SERV. BULL. 4, 4 (2007), *available at* http://www.wapa.gov/es/pubs/esb/2007/nov/nov072.htm ("It was at the request of its union, the International Brotherhood of Electrical Workers Local 18, that LADWP decided to keep the operation and maintenance of the wind farm in-house."); Press Release, Int'l Bhd. of Elec. Workers, Local 18, Los Angeles Power Purchase Threatens to Betray City's Environmental Leadership (Aug. 15, 2006), *available at* http://www.ibewlocal18.org/pages/PressReleases/LosAngelesPowerPurchase.pdf (criticizing DWP for purchasing wind power rather than creating new sources of renewable energy).

86. Press Release, Int'l Bhd. of Elec. Workers, *supra* note 85.

87. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at D-10.

transporting energy from these resources to Los Angeles via the Southern Transmission System, part of the Intermountain Transmission System.[88]

The challenges facing the DWP in constructing the Green Path North Project are illustrative of transmission challenges associated with renewable power around the country. The DWP has proposed construction of transmission lines along a 330-foot-wide transmission path, which will traverse 85 miles of federal lands: The transmission project will utilize 100 to 200 foot tall, 30 to 45 foot wide transmission towers and will be built through several different communities, none of which will benefit from the renewable resources.[89] The utility acknowledges in its application to transport and transmit electricity across federal lands that as many as seventeen federal, state, and local agencies will be involved to provide input and approval for the project.[90]

Opposition to the construction of the transmission line is already fierce. The cities of Yucca Valley, Morongo Valley, and Twentynine Palms, through which the project is proposed to be built, have adopted resolutions opposing the project.[91] Several nonprofit groups have sprung up to fight the siting of the transmission lines, including Stop Greenpath North[92] and the California Desert Coalition.[93] Additionally, the local Republican congressman has expressed his opposition to the project.[94] Environmental groups including the Sierra Club and the National Parks Conservation Association oppose the current path of the transmission line because it will cut through the Big Morongo Canyon Reserve on the border of Joshua Tree National Monument.[95] The reserve contains a desert oasis and provides habitat for bighorn sheep.[96] Additionally the line will interfere with an extremely

88. *See id.* at D-11 to D-12.

89. *See* L.A. Dep't of Water & Power, Application for Transportation and Utility Systems and Facilities on Federal Land (Dec. 27, 2006), http://www.stopgreenpath.com/first/LADWP-BLM%20Application.pdf.

90. *See id.* at 3.

91. *See* Stop Green Path North, Green Path North Faces Stiff Opposition, http://www.stopgreenpath.com/resolutions.html (last visited Mar. 16, 2008).

92. Stop Green Path North Home Page, http://www.stopgreenpath.com (last visited Mar. 16, 2008).

93. California Desert Coalition Home Page, http://www.cadesertco.org/index.html (last visited Mar. 16, 2008).

94. Lauren McSherry, *Desert Debate: Sierra Club Joins Forces Against Plan*, THE SUN (San Bernadino, Cal.), Feb. 21, 2008.

95. *Id.*

96. *Id.*

valuable wildlife corridor that connects Joshua Tree with the San Bernadino Mountains, providing habitat for twenty-three plant and animal species.[97]

The DWP has yet to begin its environmental review, but the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) environmental review processes promise to be long and hard fought. The project will likely generate litigation. It is also unclear whether the project will create Endangered Species Act problems given the sensitive habitat involved.

The state of California has begun to address the problem of inadequate transmission lines for renewable resources by creating a Renewable Energy Transmission Initiative (RETI) that includes representatives from key constituent groups involved in energy transmission issues. The RETI will attempt to identify and to coordinate the transmission projects necessary to meet the state's RPS.[98] The RETI does not, however, satisfy or replace existing legal requirements pertaining to the siting of transmission lines.

One possible solution to the legal obstacles to transmission line siting is to consolidate the approval process in one agency. Yet such a solution would likely be controversial. The federal government's attempt to accelerate the process for traditional electricity transmission line siting has been extremely controversial. Under Section 1221 of the Energy Policy Act of 2005,[99] the Secretary of Energy has the authority to study whether areas of the country are experiencing excess congestion in electricity delivery. After conducting such a study, the Federal Energy Regulatory Commission (FERC) can then designate National Interest Electric Transmission Corridors. Applicants for permits to construct transmission projects within designated corridors can receive overriding federal permitting approval if a state has failed to issue a construction permit within a year after corridor designation.[100] The FERC recently designated two large transmission corridors, one across the mid-Atlantic states and one in the southwest.[101] The designations immediately led to political

97. *See* Letter From Michael Cipra, California Desert Program Manager, Nat'l Parks Conservation Ass'n, to Antonio Villaraigosa, Mayor, City of L.A. (Feb. 28, 2008), *available at* http://www.cadesertco.org/news/npca%20letter%20to%20la%20mayor.pdf.

98. *See* California Renewable Energy Transmission Initiative Mission Statement (Apr. 25, 2008), http://www.energy.ca.gov/reti/MISSION_STATEMENT.PDF.

99. 16 U.S.C.A. § 824p (2008).

100. *See id.*

101. *See* Press Release, U.S. Dep't of Energy, DOE Designates Southwest Area and MidAtlantic Area National Interest Electric Transmission Corridors (Oct. 2, 2007), *available at* http://www.doe.gov/news/5538.htm.

opposition and to the introduction of legislation to block the corridors.[102] The Wilderness Society filed suit in March 2008 against the designations.[103]

The challenges the DWP faces in constructing transmission lines will likely occur throughout the United States. Large swaths of the Midwest and Texas are excellent sites for wind energy, for example, but customers for the energy generated are likely to be located in urban centers far from the energy source. The early opposition to the Green Path North Project is therefore likely to repeat itself across the country as the demand for renewable energy increases.

3. Site-Specific Opposition to Development of Renewable Facilities

All of the opposition to the DWP's proposed Green Path North Project has arisen before the DWP has even developed the renewable resources intended to be transmitted by the line. Environmental objections to the development of specific renewable projects may also arise. Wind farms, for example, which the DWP believes it can develop in the Salton Sea area for which the Green Path North Project is proposed, raise aesthetic concerns as well as problems with bird and bat kills and potential interference with habitat.[104] Large-scale solar projects using current technology require large swaths of land, which is likely to raise concerns about the destruction of sensitive desert habitat. Geothermal plants emit trace elements of regulated heavy metals and also raise concerns about interference with sensitive habitat.[105] At a minimum, development of these energy sources will require CEQA review; NEPA may also be triggered, along with the Endangered Species Act and other federal and state statutes. The larger point is that the review process along with potential opposition to the projects will further delay the DWP's compliance with the RPS standard.

102. Dan Miller, *Proposed Power Line Corridors Sparks Counties' Ire*, COUNTY NEWS (Wash., D.C.), June 4, 2007, at 1.

103. Press Release, The Wilderness Society, Lawsuit Aims to Correct Errors in DOE's Transmission Corridor Designations: Wild Places and Historic Battlefields Endangered by Department of Energy's Rash Decisions to Deny Rehearing and Ignore National Environmental Laws (Mar. 14, 2008), *available at* http://www.wilderness.org/NewsRoom/Release/20080314.cfm.

104. *See* COMM. ON ENVTL. IMPACTS OF WIND ENERGY PROJECTS, NAT'L RESEARCH COUNCIL, ENVIRONMENTAL IMPACTS OF WIND-ENERGY PROJECTS (2007).

105. ELAINE SISON-LEBRILLA & VALENTINO TIANGCO, CAL. ENERGY COMM., CALIFORNIA GEOTHERMAL RESOURCES 12 (2005), *available at* http://www.energy.ca.gov/2005publications/CEC-500-2005-070/CEC-500-2005-070.PDF.

B. Natural Gas Plants and Clean Water Act Compliance

Renewable energy poses a set of environmental and labor challenges discussed above; the provision and generation of natural gas creates its own issues. Natural gas currently comprises approximately 30 percent of the DWP's energy mix, and all of its generating capacity is located within the Los Angeles basin.[106] Part of the DWP's strategy for integrating renewable resources into its power system is to repower the two of its four natural gas power plants that have not yet been repowered with newer and more efficient, cleaner generating units.[107] This repowering can increase overall efficiency, reduce air pollution, and increase the flexibility of the power system to integrate renewables, which cannot be stored and controlled in the way that conventional fossil fuels can.[108]

The DWP's greenhouse gas reduction strategy, then, is highly reliant on the continuing existence and upgrading of its natural gas facilities. Three of the utility's facilities, however, face significant regulatory issues under the Clean Water Act because of the process they use to cool their electrical generation. The Haynes, Scattergood, and Harbor Generating Systems, like virtually all relatively old natural gas facilities located on the coast, take in large amounts of water from the Pacific Ocean, use the water to cool their facilities, and then release the water back into the ocean.[109] This process, called once-through cooling, causes significant environmental harm both in taking in the necessary water—which can kill fish and destroy small aquatic organisms—and in releasing warmed water back into natural water bodies.[110]

The 1972 amendments to the Clean Water Act directed the U.S. Environmental Protection Agency (EPA) to regulate cooling water intake structures, but its first regulatory efforts were struck down in 1977 by the Fourth Circuit Court of Appeals.[111] After years of litigation the EPA finally issued two phases of regulations, the first phase in 2001 for new power plants, and the second in 2004 for existing ones.[112] Both phases of regulations have

106. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 18, A-1.

107. *Id.* at 46–48.

108. *Id.* at 46.

109. For a description of once-through cooling, see *RiverKeeper v. EPA* (*RiverKeeper II*), 475 F.3d 83, 91 n.3 (2d Cir. 2007).

110. *See, e.g.*, Cal. State Lands Comm'n, Resolution by the California State Lands Commission Regarding Once-Through Cooling in California Power Plants 1 (Apr. 13, 2006), *available at* http://www.energy.ca.gov/siting/documents/2006-04-13_SLC_PROPOSED_COOLING.PDF.

111. Appalachian Power Co. v. Train, 566 F.2d 451 (4th Cir. 1977).

112. The history is set forth in *RiverKeeper II*, 475 F.3d at 91–94. The Phase I rules were struck down in part in *RiverKeeper v. EPA* (*RiverKeeper I*), 358 F.3d 174 (2d Cir. 2004).

faced legal challenge and have been struck down in part by the Second Circuit.[113] The second phase rules, which would have applied to the DWP natural gas plants, were struck down for being too lenient; generally speaking environmentalists successfully challenged the rules for not requiring the installation of closed-cycle systems, which recirculate water and only replace water that has evaporated or leaked.[114] The U.S. Supreme Court has granted certiorari to review the case.[115] Given that the rules are currently inoperative, the EPA has instructed its regional offices and states to use "Best Professional Judgment" in renewing individual power plant National Pollution Discharge Elimination system permits during the interim.[116]

Although the impact of future regulations is unknown, the DWP will clearly be required to do something other than continue to operate its natural gas plants using the once-through cooling process upon the renewal of its Clean Water Act permits. The utility may be required to make these changes earlier than expected, upon the repowering of the plants that the DWP has proposed in its 2007 Integrated Resource Plans. The DWP is currently evaluating appropriate methods for reducing the environmental impacts of once-through cooling, but its evaluation is hampered by the fact that the regulatory environment is in flux.[117] If DWP is required to implement a closed-cycle system, it will face huge practical and environmental questions. For example, closed-cycle systems require the installation of large cooling towers that cool intake water before recirculating it.[118] In the congested California coastal areas on which the DWP plants are located, the cost, as well as the environmental and aesthetic implications of the installation of such towers, are serious and perhaps even prohibitive. Even if the DWP could overcome these challenges, replacement cooling systems that reduce the environmental problems associated with once-through cooling raise independent environmental concerns. Most problematic for the DWP in its efforts to cut greenhouse gas emissions is that retrofitting the existing natural-gas-generation-facilities will decrease the plants' energy efficiency by reducing the efficiency of their cooling systems.[119] Thus, at a time when the utility needs to increase the efficiency of its natural gas plants, efficiency

113. The Phase II rule was struck down in part by *RiverKeeper II*, 475 F.3d at 130–31.
114. *RiverKeeper II*, 475 F.3d at 92–93.
115. Energy Corp. v. EPA, 128 S. Ct. 1867 (2008).
116. *See* 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at C-13.
117. *See id.*
118. *See* ELEC. POWER RESEARCH INST., ISSUES ANALYSIS OF RETROFITTING ONCE-THROUGH COOLED PLANTS WITH CLOSED-CYCLE COOLING 3–4 (2007), http://www.swrcb.ca.gov/water_issues/programs/npdes/docs/cwa316b/epri_retrofit_otc.pdf.
119. *See id.* at app. B (evaluating Scattergood retrofit).

will instead be reduced by complying with new Clean Water Act requirements. If it cannot meet this requirement at all due to environmental and other cost constraints, DWP could be forced to shut down its natural gas plants altogether. If so, the utility's carbon emissions reduction strategy would clearly be in jeopardy.

C. Problems With Carbon Sequestration From Coal

Though the DWP's Integrated Resources Plan does not directly discuss strategies for reducing the agency's heavy reliance on coal, the document does acknowledge that its long-term contract for coal energy from the Intermountain Generating Station facility in Utah expires in 2027.[120] Under the terms of California's SB 1368, the DWP will not be able to sign any new long-term contracts for baseload energy generation that is more greenhouse gas intensive than a highly efficient natural gas facility.[121] If the DWP has difficulty meeting its RPS goals, and if natural gas generation becomes problematic, it may prove quite difficult to wean the utility off of coal in a relatively short period of time.

An alternative, of course, would be to attempt to cut emissions from the Intermountain Generating Station, which currently provides virtually all of DWP's coal-based energy. To date, however, we simply lack the technology to reduce emissions significantly. The most promising method for dramatically reducing greenhouse gas emissions from coal fired plants is to capture and sequester the emissions underground.[122] No coal-generating plant in the United States currently sequesters carbon emissions; the environmental, legal, and engineering challenges remain daunting. A recently released Massachusetts Institute of Technology report on carbon emissions and coal concludes that "[a]t present government and private sector programs to implement on a timely basis the required large-scale integrated demonstrations to confirm the suitability of carbon sequestration are *completely inadequate*."[123] Moreover, the legal and regulatory questions necessary to put large-scale sequestration into place, including issues related to licensing, liability, and property rights, remain unanswered.[124] The capture of carbon

120. 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at D-2.

121. *See* discussion *supra* notes 26–30.

122. *See* GLOBAL ENERGY TECH. STRATEGY PROGRAM, CARBON DIOXIDE CAPTURE AND GEOLOGICAL STORAGE 13 (2006) [hereinafter CARBON DIOXIDE CAPTURE AND GEOLOGICAL STORAGE].

123. MASS. INST. OF TECH., THE FUTURE OF COAL: OPTIONS FOR A CARBON-CONSTRAINED WORLD, at xii (2007), http://web.mit.edu/coal/The_Future_of_Coal_Summary_Report.pdf (emphasis added).

124. *Id.*

emissions from existing power plants is also not currently possible and would require the installation of much more elaborate, expensive, and complex technology than exists today.[125]

The MIT authors do optimistically believe that technical limitations pertaining to large-scale sequestration appear to be manageable, and that sequestration may be safe, feasible, and competitively priced if carbon emissions are regulated.[126] To move toward large-scale carbon sequestration in the near future requires, however, a significantly ramped-up government-driven effort to fund necessary research and development. Absent such an investment, the DWP is unlikely to be in a position to reduce its emissions from coal usage before its contract with the Intermountain Generating Station expires in 2027.

CONCLUSION

In outlining the legal, political, and environmental obstacles the DWP may face in cutting carbon emissions to meet California's greenhouse gas emissions cap, I've omitted attending to in detail some obvious additional potential problems. For example, many renewable resources such as wind and solar energy create problems in ensuring the reliable provision of energy because they are intermittent in nature and often cannot be stored.[127] Perhaps more importantly, the shift to renewable resources, construction of transmission lines, upgrading of natural gas plants, and shift away from coal will place significant pressure on utility rates. DWP cannot raise its rates without city council approval. With a large, poor residential customer base in the city of Los Angeles, elected city council members may resist the rate increases necessary to bring the city into compliance with AB 32 emissions cuts. The larger point is that the implementation issues the DWP and other large emitters will face in complying with carbon emissions reductions may be at least as daunting as designing an initial regulatory scheme in California and at the federal and international levels.

It is not surprising that most of the legal and policy attention on climate change is currently focused on how to design the most effective and politically palatable local, federal, and international schemes to cut carbon emissions. But once such schemes are in place, the necessary policy and legal work will by no means be complete. Implementing emissions reductions will

125. *See* CARBON DIOXIDE CAPTURE AND GEOLOGICAL STORAGE, *supra* note 122, at 14.

126. *Id.* at 43.

127. For a discussion of the intermittent nature of these resources and the problems they can cause for the reliability of supply, see 2007 INTEGRATED RESOURCE PLAN, *supra* note 11, at 17, 41–44.

require us to address complex clashes of environmental values, frequently pitting local and immediate environmental concerns against global and long-term ones. Shifts away from reliance on coal to natural gas and renewable resources will raise serious concerns about local job losses and may create conflict between environmentalists and economic and labor groups. Increases in electricity costs will require tough political choices and raise complex distributional concerns for low-income communities. And these domestic battles I've described will be repeated world wide depending on the contours of any international agreement to reduce global carbon emissions.

My aim in this Essay is simply to raise implementation issues in order to begin a dialogue about them. Absent a focus on implementation we're likely to repeat the experience of implementing federal environmental statutes, where delay, lawsuits, more delay, and incremental success have been the norm. This focus on implementation should underscore a point that for many of us is already obvious: The longer we take to achieve consensus on how to reduce emissions dramatically, the less likely we are to stop dramatic climate change.