

Section 8.4: Electricity Generation and Carbon Dioxide Emissions

Topic / Issue Description

The U.S. electricity sector accounts for about 42% of U.S. primary energy consumption, 34% of fossil fuel consumption, and about 40% of carbon dioxide (CO₂) emissions. With end-use consumption of electricity growing faster than that of both petroleum and natural gas, it is not surprising that policy discussions related to energy and climate change focus on the electricity sector.¹

In Kansas, according to the most recent data, electric utilities generated 45.5 million megawatthours (MWh) of electricity in 2006, in response to total annual retail demand of 39.7 million MWh.² Seventy-five percent of the electricity generated between July 2006 and July 2007 came from coal-fired power plants (of course, generating units using other fossil fuels such as natural gas or diesel also released CO₂ into the atmosphere).³ The total greenhouse gas emissions associated with electricity generation in 2007 was 43,250,899 tons of carbon dioxide equivalent.⁴

Despite widespread agreement that the best way—that is, most environmentally effective and economically efficient way—to reduce greenhouse gas emissions is a national-level, economy-wide, market-based system,⁵ the federal government has yet to implement such a policy. Various proposals are currently under consideration in the U.S. Congress (see Section 2.3, Recommendation 1), most of which call for some sort of a cap-and-trade system and all of which include provisions to reduce emissions from electric generation.

It is almost a certainty that any federal policy to limit emissions of carbon dioxide and other greenhouse gases will target the electricity sector. In addition, the EPA (in the wake of the April 2007 Supreme Court ruling) is expected to issue its decision about CO₂ and other greenhouse gas emissions early in 2009 (see Section 2.3, Existing Policies and Programs).

In addition to implementing policies that increase the price of emitting CO₂ and other greenhouse gases, the federal government also has an important role to play in supporting basic scientific research and technological development of a low-cost alternative (or backstop) technology. Economic policy analysts generally agree that it is economically appropriate to subsidize activities such as invention, innovation, and education through government funding or tax credits (but to avoid subsidizing specific technologies or

¹ Paul L. Joskow, 2008, Challenges for Creating a Comprehensive National Electricity Policy, September 26, 2008 presentation to the Technology Policy Institute, available on Harvard Electric Policy Group web site: http://www.hks.harvard.edu/hepg/Papers/Joskow_Natl_Energy_Policy.pdf

² Energy Information Administration (EIA), 2007, Kansas Electricity Profile: Table 1, 2006 Summary Statistics (Kansas): http://www.eia.doe.gov/cneaf/electricity/st_profiles/kansas.html

³ KEC, 2008, Kansas Net Electrical Generation, Kansas Energy Chart Book: http://www.kec.kansas.gov/chart_book/ (accessed September 2008).

⁴ Will Stone, KDHE Bureau of Air and Radiation, personal communication, December 8, 2008; based on KDHE's voluntary survey of electric generating utilities.

⁵ See, for example, KEC staff report, Greenhouse Gas Emissions: Policy and Economics: http://www.kec.kansas.gov/reports/GHG_Review_FINAL.pdf.

activities in combating global warming).⁶ Given the potential enormity of the problems associated with climate change, low-cost technological breakthroughs are extremely valuable.⁷

Existing Policies and Programs

1. The April 2007 Supreme Court ruling stated that carbon dioxide and other greenhouse gas emissions fall unambiguously under the definition of air pollutants set out in the 1990 Clean Air Act. The Court directed the EPA to review its response to petitions from state and local governments asking for EPA regulation of carbon dioxide emissions—the EPA had previously held that they did not have jurisdiction to regulate such emissions. If the EPA finds that greenhouse gas emissions such as carbon dioxide lead to climate change, it is obligated by the Clean Air Act to regulate such emissions.⁸ Although the EPA has not released its decision regarding carbon dioxide emissions (as of December 2008), EPA’s Environmental Appeals Board recently blocked the Agency from issuing a permit for a proposed coal plant in Utah, based on the EPA’s Denver office failing to require controls for carbon dioxide emissions. This ruling stops the permitting process of perhaps 100 proposed coal plants. Because of this, the EPA is expected to make its decision regarding carbon dioxide and other greenhouse gases in early 2009.⁹
2. The Federal Production Tax Credit (PTC), recently extended through 2009, provides a subsidy for electricity produced from renewable sources. The PTC was originally introduced in the Energy Policy Act of 1992 at a rate of \$0.015/kWh and has since been automatically adjusted for inflation to a current rate of \$0.022/kWh. Use of the tax credit requires significant eligible tax liability, tending to make it attractive to large corporate developers.
3. The U.S. Department of Agriculture provides competitive grants up to \$250,000 for energy efficiency improvements or \$500,000 for renewable energy systems (not to exceed 25% of the total project cost). Loan guarantees are also available to a maximum of \$10 million.

⁶ See William Nordhaus, 2008, *A Question of Balance: Weighing the Options on Global Warming Policies*, Yale University Press, p. 21–22.

⁷ As Yale economist William Nordhaus points out, “the economic benefits of a low-cost and environmentally benign backstop technology are huge in terms of net impacts, averted costs, averted damages, and benefit-cost ratio. We estimate that a low-cost technological solution would have a net present value of around \$17 trillion.” See Nordhaus, 2008, p. 199.

⁸ It should be noted that the EPA did not dispute that man-made greenhouse gases causes climate change while the case was being heard; see *Massachusetts et al. v. Environmental Protection Agency et al.*, 549 U.S. 497 no. 05-1120: <http://laws.findlaw.com/us/000/05-1120.html> (accessed December 2008).

⁹ See Josef Hebert, November 2008, Utah coal plant permit blocked by EPA panel, Associated Press story: http://www.google.com/hostednews/ap/article/ALeqM5gSt_gge-bueZU2rGVTx1SPZzbkAwD94ECPU04 (accessed December 2008).

4. The Energy Independence and Security Act of 2007 includes provisions directing the Department of Energy to fund research and development of renewable and advanced generation technologies (including advanced energy storage and carbon capture and storage). These include the Solar Energy Research and Advancement Act of 2007, the Advanced Geothermal Energy Research and Development Act of 2007, and the Marine and Hydrokinetic Renewable Energy Research and Development Act.¹⁰
5. Kansas, in 2001, adopted the Kansas Parallel Electric Generation Services Act (K.S.A. 66-1,184), a form of net metering that requires an electric utility to pay no less than 150% of the monthly average avoided cost of energy per kWh—essentially the fuel cost associated with producing the equivalent kWh's—to customers with excess energy to sell. The Kansas Corporation Commission has reviewed net metering and related metering issues in the following dockets: 04-GIME-080-GIE, 07-GIME-116-GIV, 07-GIME-104-GIV, 07-GIME-578-GIE.
6. Under K.S.A. 79-32 and K.S.A. 79-233 to 79-237, expenditures related to new construction or expansion of capacity in an existing biomass-to-energy plant receive an income tax credit. The credit is 10% of the taxpayer's qualified investment on the first \$250 million invested, and 5% of the taxpayer's qualified investment that exceeds \$250 million. In addition to the income tax credit, a taxpayer shall be entitled to a deduction from Kansas adjusted gross income of the amortizable costs of a new facility. Such deduction shall be equal to 55% of the amortizable costs of the facility for the first taxable year, and 5% for the next nine taxable years.
7. The Carbon Dioxide Reduction Act—K.S.A. 55-1636 to 55-1640, 79-233 and 79-32,256—provides incentives for sequestration of carbon dioxide through underground storage by allowing any carbon dioxide capture, sequestration, and utilization property and any electric generation unit which captures and sequesters all carbon dioxide and other emissions to be exempt from all property taxes for five years. It also provides for accelerated depreciation on carbon dioxide capture, sequestration, or utilization machinery and equipment. The Kansas Corporation Commission is responsible for developing the associated rules and regulations.
8. The Renewable Electric Cogeneration Facility income tax credit—K.S.A. 79-32,245 through 79-32,249—provides incentives for renewable cogeneration that are equal to 10% of taxpayer's qualified investment for the first \$50 million and an amount equal to 5% of the amount that exceeds \$50 million. The program applies to investments between January 1, 2007, and January 1, 2012. In addition to the income tax credit, a taxpayer shall be entitled to a deduction from Kansas adjusted gross income of the amortizable costs of a new facility, the deduction of which shall be equal to 55% of the amortizable costs of the facility for the first taxable year, and 5% for the next nine taxable years.

¹⁰ See Edison Electric Institute, December 2007, Summary of Electricity-Related Provisions in H.R. 6: The Energy Independence and Security Act of 2007: http://www.eei.org/industry_issues/electricity_policy/federal_legislation/nonav_timeline_hr6/HR6_EEIsu_mmary.pdf (accessed December 15, 2008).