

# Carbon Capture and Storage Program's NEPA Compliance

by Arnold W. Reitze Jr.

Arnold W. Reitze Jr. is Professor of Law, S.J. Quinney College of Law, University of Utah and member of the University of Utah's Institute for Clean & Secure Energy; J.B. and Maurice Shapiro Professor Emeritus of Environmental Law, The George Washington University.

---

## Summary

NEPA is a legal tool that can be used to slow or prevent the development and use of energy in the United States. It is also a tool that can be used to help a federal agency make wise decisions and help prevent actions that damage the environment. Several NEPA requirements are related to the funding of carbon capture and storage (CCS) projects, and NEPA environmental impact statements for CCS projects may allow NEPA to aid the decisionmaking process. This Article focuses specifically on NEPA compliance by the U.S. Department of Energy and its National Energy Technology Laboratory.

---

The electric power industry burned coal to generate 45% of the 4.105 billion megawatt hours (MWh) of electricity produced in the United States in 2011.<sup>1</sup> Coal is the most important domestically produced source of energy in the United States, and the nation has an estimated 249-year supply of recoverable coal at present levels of consumption.<sup>2</sup> However, the use of coal may be limited by the cost of complying with laws applicable to conventional air pollution emissions, as well as the evolving laws designed to reduce the emissions of greenhouse gases (GHGs).<sup>3</sup> Carbon dioxide (CO<sub>2</sub>) emissions were responsible for 82.83% of U.S. GHG emissions in 2009,<sup>4</sup> and 94.6% of the CO<sub>2</sub> was emitted from fossil fuel combustion.<sup>5</sup> Electric power generation was responsible for over 41% of the CO<sub>2</sub> emissions from fossil fuel combustion sources.<sup>6</sup> Because CO<sub>2</sub> is an end product of combustion, the options for reducing emissions are limited. One option is to not burn fossil fuel, but that means limiting the use of inexpensive and readily available coal to generate electricity. Improving the fuel efficiency of the electric generating process is another option, and it is pursued on a continuing basis, but major improvements are unlikely and are offset by increased demand for electricity.<sup>7</sup> Carbon capture and storage (CCS),<sup>8</sup> however, is a potential technology that

---

*Author's Note: This material is based upon work supported by the U.S. Department of Energy under Award Number DE-NT0005015. This Article originally was prepared as a report sponsored by an agency of the U.S. government. Neither the U.S. government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. government or any agency thereof. The views and opinion of the author expressed herein do not necessarily state or reflect those of the U.S. government or any agency thereof.*

1. Coal, U.S. Energy Information Administration, <http://www.eia.gov/electricity/data.cfm#generation> (last visited May 5, 2012).
2. U.S. Energy Information Administration, [http://www.eia.gov/energyexplained/index.cfm?page=coal\\_reserves](http://www.eia.gov/energyexplained/index.cfm?page=coal_reserves) (last visited May 5, 2012).
3. See generally Arnold W. Reitze Jr., *Electric Power in a Carbon Constrained World*, 34 WM. & MARY ENVTL. L. & POL'Y. REV. 821 (2010); Arnold W. Reitze Jr., *Federal Control of Greenhouse Gases*, 40 ENVTL. L. 1261 (2010).
4. STACY C. DAVIS ET AL., TRANSPORTATION ENERGY DATA BOOK 30th ed. 11-4, tbl. 11.3 (calculated from data) (Oak Ridge Nat. Lab. June 2011).
5. U.S. Environmental Protection Agency (EPA), INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2009, Executive Summary 5, tbl. ES-2 (Apr. 2011) (calculated from data).
6. *Id.*
7. See Arnold W. Reitze Jr., *Federal Control of Carbon Capture and Storage*, 41 ELR 10796, 10797 (Sept. 2011).
8. CCS is also known as carbon capture and sequestration.

could allow coal to be burned without releasing CO<sub>2</sub> to the atmosphere.

CCS is a four-step process used to prevent CO<sub>2</sub> from being emitted to the atmosphere through its capture, compression, transport, and storage.<sup>9</sup> Carbon capture can occur prior to or after combustion. The sequestration of CO<sub>2</sub> from conventional fossil-fueled power plants requires post-combustion capture to separate CO<sub>2</sub> in the flue gas from the nitrogen, particulates, sulfur dioxide, and other contaminants.<sup>10</sup> After capture, CO<sub>2</sub> is compressed to a supercritical fluid and then transported by pipeline to a geological storage site where it is injected into underground formations with the expectation that it will remain permanently sequestered.<sup>11</sup>

Pre-combustion capture is applicable primarily to gasification plants. Integrated gasification combined cycle (IGCC) is the gasification technology that is commercially operational.<sup>12</sup> The process converts fossil fuel to a synthesis gas that is a mixture of hydrogen (H<sub>2</sub>) and carbon monoxide (CO) and other gases. The CO is then converted to CO<sub>2</sub> and sequestered, while the hydrogen is used as fuel.<sup>13</sup>

Another approach to pre-combustion capture is to use oxy-fuel technology. It is applicable to new supercritical power plants, but the process can be retrofitted on existing coal-fired or oil-fired power plants.<sup>14</sup> The oxy-fuel system uses relatively pure oxygen rather than air for combustion. An on-site unit separates air into nitrogen and oxygen prior to combustion.<sup>15</sup> This is both costly and energy-intensive.<sup>16</sup> The nitrogen is released to the atmosphere, and the oxygen is sent to the boiler to support combustion. Because nitrogen is removed prior to combustion, much less nitrogen oxide is produced by this technology.<sup>17</sup>

Regardless of the technology used to combust fossil fuel, the CO<sub>2</sub> in the flue gas must be concentrated and pressurized before it is sequestered. Because oxy-combustion produces a flue gas with higher concentrations of CO<sub>2</sub> than conventional combustion, its capture costs are reduced,

but this technology has relatively high energy and capital costs.<sup>18</sup> Moreover, the flue gas still contains numerous contaminants, which may need to be removed from the CO<sub>2</sub> stream prior to its being transported to prevent corrosion of pipelines and to comply with the likely specifications for sequestration.<sup>19</sup>

CO<sub>2</sub> injection is widely used by the oil and gas industry to enhance product recovery and is used to force methane out of coal beds for recovery and use.<sup>20</sup> For this reason, a body of state law has developed, primarily concerned with property rights, to regulate enhanced oil recovery (EOR) practices.<sup>21</sup> However, large-scale injection of CO<sub>2</sub> to achieve permanent geological storage is still in the nascent stage. CCS technology has not been demonstrated at the scale required for use at electric power plants. The existing technology requires large parasitic loads of steam and power that decrease net power generation by about one-third.<sup>22</sup> The costs of CCS are high, with the U.S. Department of Energy (DOE) estimating the cost at \$116/MWh to \$151/MWh, depending on whether the facility is new or an existing plant being retrofitted.<sup>23</sup> The capital costs of adding CCS technology to a new IGCC plant is estimated to be \$400 million, and post-combustion capture CO<sub>2</sub> is estimated to require \$900 million in capital cost.<sup>24</sup> Overall CCS costs for electric power plants are estimated at \$60 per ton of CO<sub>2</sub> for a new IGCC facility, \$95 per ton for a new traditional pulverized coal facility, \$114 per ton for a new natural gas facility, and \$103 per ton for retrofit to an existing coal-fired plant.<sup>25</sup>

The high cost of CCS means that its adoption by the electric power industry requires either a significant cost imposed on releases of CO<sub>2</sub> or these emissions must be limited by the legal system or the cost of installing and using CCS technology must be significantly reduced or heavily subsidized or some mix of these options be utilized. In 2009, it appeared that cap-and-trade legislation might be enacted that would impose significant costs on CO<sub>2</sub> emissions, but in 2012, there is no realistic expectation that such legislation will be passed by the U.S. Congress. However, the increasing stringency of environmental laws concerning conventional pollutants is placing the utility industry under a continuous need to evaluate its use of coal.<sup>26</sup> CCS technology will be necessary in order to build new coal-fired electric power plants if the proposed new

9. U.S. Department of Energy (DOE), National Energy Technology Lab., *DOE/NETL Carbon Dioxide Capture and Storage Roadmap* 6 (Dec. 2010).

10. *Id.*

11. *Id.* at 9.

12. MASSACHUSETTS INSTITUTE OF TECHNOLOGY, *THE FUTURE OF COAL* 32 (2007).

13. *Id.* at 7.

14. See generally Jared P. Ciferno et al., *Technology Integration Challenges*, 107 *CHEMICAL ENGINEERING PROGRESS* 8:34 (Aug. 2011).

15. Air contains 76.85% nitrogen by weight and 79.0% nitrogen by volume. BABCOCK & WILCOX CO., *STEAM ITS GENERATION AND USE* 4-4, tbl. 3 (1960).

16. See generally Hamid Farzan et al., Babcock & Wilson Co., *State of the Art of Oxy-Coal Combustion Technology for CO<sub>2</sub> Control From Coal-Fired Boilers*, Presented to the Third International Technical Conference on Clean Coal Technologies for Our Future 3 (May 15-17, 2007), available at [http://www.icac.com/files/public/B&W\\_Br\\_1793\\_Farzan.pdf](http://www.icac.com/files/public/B&W_Br_1793_Farzan.pdf).

17. See BABCOCK & WILCOX CO., *OXY-COAL COMBUSTION OVERVIEW 1* (2007), available at [http://www.icac.com/files/public/B&W\\_Oxycomb\\_Overview\\_031507.pdf](http://www.icac.com/files/public/B&W_Oxycomb_Overview_031507.pdf). The use of oxygen rather than air to support combustion will cause the combustion temperature to exceed the design capability of the furnace. For this reason, some CO<sub>2</sub> in the flue gas is returned to the boiler to lower the temperature of combustion. New furnaces could potentially be designed to function at the higher temperatures of a pure oxygen environment, but such furnaces would require the use of new materials and new designs for heat transfer. *Id.*

18. *Carbon Dioxide Capture and Storage Roadmap*, *supra* note 9, at 24.

19. BABCOCK & WILCOX, *supra* note 17.

20. See generally Alexandra B. Klass & Sara E. Bergan, *Carbon Sequestration and Sustainability*, 44 *TUL. L. REV.* 237 (2008).

21. See generally Owen Anderson, *Geologic CO<sub>2</sub> Sequestration: Who Owns the Pore Space?*, 46 *ROCKY MTN. MIN. FOUND. J.* 357 (2009); Elizabeth J. Wilson & Mark A. de Figueiredo, *Geologic Carbon Dioxide Sequestration: An Analysis of Subsurface Property Law*, 36 *ELR* 10114 (Feb. 2006); Alexandra B. Klass, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 *U. ILL. L. REV.* 363 (2010); Victor B. Flatt, *Paving the Legal Path For Carbon Sequestration From Coal*, 19 *DUKE ENVTL. L. & POL'Y F.* 211 (2008-2009).

22. *Carbon Dioxide Capture and Storage Roadmap*, *supra* note 9, at 7.

23. *Id.* at 24.

24. *Id.*

25. *Id.*

26. See Arnold W. Reitze Jr., *The Intersection of Climate Change and the Clean Air Act*, ARIZ. ST. L.J. (2012) and the articles cited in footnote 3.

source performance standards announced March 27, 2012, are finalized in a form similar to what has been proposed.<sup>27</sup> Nevertheless, even if CO<sub>2</sub> emission reductions are mandated, commercial acceptance of CCS will require that the costs of this technology be significantly reduced or economic incentives to utilize CCS must be provided or coal will not play its traditional role of fueling electric power generation.<sup>28</sup> For this reason, the federal government has been playing an important role in working to move CCS to commercial viability.

## I. DOE's Role in CCS Technology Development

DOE and its predecessor agencies have funded research and development projects to advance coal technologies through the proof-of-concept stage since the early 1970s.<sup>29</sup> On February 3, 2010, President Barack Obama established an Interagency Task Force on Carbon Capture and Storage, co-chaired by DOE and the U.S. Environmental Protection Agency (EPA), with the responsibility to develop a plan to overcome the barriers to the use of CCS.<sup>30</sup> Federal efforts to advance CCS technology have been primarily the responsibility of DOE's Fossil Energy Office's Coal Research Program, and are implemented by DOE's National Energy Technology Laboratory (NETL).<sup>31</sup> DOE's fiscal year (FY) 2012 budget is about \$29.5 billion.<sup>32</sup> DOE's fossil energy program is budgeted at about \$520.7 million,<sup>33</sup> of which the CCS and Power Systems program is allocated about \$291.358 million.<sup>34</sup> The CCS demonstration programs are zero budgeted for FY 2012,<sup>35</sup> but previously appropriated funds are available.<sup>36</sup>

DOE/NETL's Coal Research Program has 10 program areas that contribute to its CCS research and development efforts.<sup>37</sup> The most important programs related to the focus of this Article are the innovations for existing plants program, which focuses on carbon-capture technologies and advanced compression technology, and the carbon sequestration program.<sup>38</sup> Carbon-capture projects involve pre-combustion capture and post-combustion capture

and oxy-combustion capture.<sup>39</sup> The sequestration program involves injecting millions of tons of CO<sub>2</sub> into geologic formations to demonstrate the formations capacity and to validate the potential of key storage locations to permanently sequester CO<sub>2</sub>.<sup>40</sup>

The Energy Independence and Security Act of 2007 directs DOE to carry out a program to demonstrate technologies for large-scale capture of CO<sub>2</sub> from industrial sources.<sup>41</sup> The American Recovery and Reinvestment Act of 2009<sup>42</sup> appropriated \$3.4 billion to DOE for fossil energy research and development, and much of this money is being used to provide financial assistance to CCS projects.<sup>43</sup> Large-scale use of CCS by industrial sources was funded with \$1.5 billion, and in September 2010, DOE selected 24 additional CCS industrial projects funded with \$635 million in Recovery Act funds.<sup>44</sup> On August 25, 2011, DOE announced the selection of 16 projects, valued at \$41 million over three years, to develop post-combustion combustion technologies for capturing CO<sub>2</sub>.<sup>45</sup>

NETL's Clean Coal Power Initiative (CCPI) Program was established in 2002 as a government and private-sector partnership to advance clean coal technologies to commercialization using federal funds.<sup>46</sup> Congress provided guidance for the funding of CCPI projects in the Energy Policy Act of 2005.<sup>47</sup> The aim is to "advance efficiency, environmental performance, and cost-competitiveness well beyond the level of technologies that are in commercial service."<sup>48</sup>

NETL's efforts at advancing CCS technology now involve improving the technology through the pilot stage, so that full-scale demonstrations can begin by 2020 and broad commercial deployment can begin by 2030.<sup>49</sup> To date, the CCPI program has held three rounds of funding opportunities. Round 1 funded projects that demonstrate advanced technologies for power generation and improvements in plant efficiency, economics, and environmental performance. Round 2 involved projects that would improve mercury controls and gasification technology. Round 3 of NETL's research and developments efforts involves projects to advance CCS technology and is directed toward projects that: (1) operate at 90% efficiency for CO<sub>2</sub> capture; (2) limit the increase in the cost of electricity from new pulverized coal plants using CCS to 35%

27. Standards of Performance for Greenhouse Gas Emissions For New Stationary Sources, 77 Fed. Reg. 22392 (proposed Apr.13, 2012)..

28. See generally U.S. DOE, *Strategic Sustainability Performance Plan* (Sept. 2010).

29. U.S. DOE, Hydrogen Energy California's Integrated Gasification Combined Cycle Project, Kern County, CA—Notice of Intent to Prepare an Environmental Impact Statement and Notice of Potential Floodplain and Wetland Improvement, 75 Fed. Reg. 17397, 17398 (Apr. 6, 2010).

30. See U.S. DOE, *Interagency Task Force on Carbon Capture and Storage*, [http://www.fe.doe.gov/programs/sequestration/ccs\\_task\\_force.html](http://www.fe.doe.gov/programs/sequestration/ccs_task_force.html) (last visited May 6, 2012).

31. NETL's FY 2012 budget request is \$584.460 million. See U.S. DOE, *FY 2012 Congressional Budget, Laboratory Table 1*.

32. U.S. DOE, *Funding Highlights*, available at <http://m.whitehouse.gov/sites/default/files/omb/budget/fy2012/assets/energy.pdf>.

33. U.S. DOE, Office of Fossil Energy, *Budget in Brief* 6 (2011).

34. *Id.* at 6.

35. *Id.*

36. *Carbon Dioxide Capture and Storage Roadmap*, *supra* note 9, at 2.

37. *Id.*

38. *Id.* at 11.

39. *Id.*

40. *Id.*

41. Pub. L. No. 110-140, §703 (2007).

42. Pub. L. No. 11-5, 123 Stat. 115 (2009).

43. 75 Fed. Reg. at 32172.

44. *Carbon Dioxide Capture and Storage Roadmap*, *supra* note 9, at 15.

45. U.S. DOE, *Department of Energy Announces \$41 Million Investment for Carbon Capture Development*, [http://www.fossil.energy.gov/news/techlines/2011/11048-Carbon\\_Capture\\_Projects\\_Selected.html](http://www.fossil.energy.gov/news/techlines/2011/11048-Carbon_Capture_Projects_Selected.html) (last visited May 6, 2012).

46. U.S. DOE, American Electric Power Service Corporation's Mountaineer Commercial Scale Carbon Capture and Storage Project: Mason County, WV; Notice of Intent to Prepare an Environmental Impact Statement and Potential Floodplain and Wetlands Involvement, 75 Fed. Reg. 32171, 32172 (June 10, 2010). The program was created pursuant to Pub. L. No. 107-63 (Nov. 2001).

47. Pub. L. No. 109-58, §402(a) (2005).

48. *Id.*

49. *Id.* at 10.

or limit the increase in the cost of electricity cost from a new gasification plant using CCS to 10%; and (3) make progress toward capturing 50% of a facility's CO<sub>2</sub> output.<sup>50</sup> Because of the geographic variations in fossil fuel use and in the characteristics of potential geological storage sites, this requires a regional approach.<sup>51</sup> DOE's Round 3 funding led to 38 proposals, of which 25 responsive proposals meeting the minimum eligibility requirements were evaluated.<sup>52</sup> Five projects were then selected to undergo separate, independent, project-specific evaluation, which includes more-detailed NEPA analysis.<sup>53</sup> Three proposals were selected for funding.<sup>54</sup>

DOE is also implementing large-volume storage projects through seven regional public/private partnerships that involve more than 400 organizations covering 43 states and four Canadian provinces. These regional carbon sequestration partnerships (RCSPs) are to develop large-scale storage projects using the most promising storage formations in their regions.<sup>55</sup> The RCSPs are to implement field tests during the Development Phase in three stages. Stage 1 runs from 2008 through 2012 and involves site selection, well completion, and includes permitting and NEPA compliance. Stage 2 runs from 2010 through 2014 and focuses on reservoir behavior when subjected to prolonged injection. Stage 3 runs from 2012 into 2018 and involves site closure, post-injection monitoring, and project assessment.<sup>56</sup>

In addition to the projects to advance CCS technology, a viable national CCS program will require a pipeline infrastructure of a size and cost that is unknown at this time. Construction of a pipeline infrastructure sized to meet the needs of a large-scale CCS program could have significant environmental impacts, and because CO<sub>2</sub> is considered a hazardous liquid, the pipeline's contents could potentially have adverse impacts if released to the environment.<sup>57</sup>

For this reason, DOE is evaluating the implications of an expanded pipeline system.<sup>58</sup>

DOE's efforts to advance CCS technology require compliance with myriad federal and state laws. These requirements are discussed in prior publications by this author.<sup>59</sup> The application of NEPA requirements to energy development projects in the West also has been the subject of an article by this author.<sup>60</sup> This Article explores the role of DOE in meeting its obligations under the National Environmental Policy Act (NEPA)<sup>61</sup> for its CCS activities.

## II. Introduction to NEPA

NEPA requires an environmental impact statement (EIS) to be prepared whenever a proposal involves a major federal action that will significantly affect the quality of the human environment.<sup>62</sup> This has been modified by regulations promulgated to implement NEPA that provide for the use of a draft, final, and supplemental EIS and the use of "tiering" to avoid repetitive coverage of material covered in earlier statements.<sup>63</sup> The draft EIS has a recommended format.<sup>64</sup> Draft and final EISs must include consultation with agencies preparing studies mandated by specified environmental laws<sup>65</sup> and must include the comments of federal agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved.<sup>66</sup> An agency must comply with NEPA's documentation requirements before any irreversible and irretrievable commitment of resources is made.<sup>67</sup> At the time an agency makes its decision, a concise record of decision (ROD) must be prepared that states the decision, identifies the alternatives considered and the relevant factors used by the agency in making its decision, and the mitigation, monitoring, and enforcement measures selected to avoid environmental harm.<sup>68</sup>

To determine whether an EIS is required, federal agencies may prepare an environmental assessment (EA).<sup>69</sup> If, after completing an EA, the agency finds the proposed action will produce no significant impact on the environment, it can choose not to prepare an EIS by issuing a

50. *Id.*

51. *Id.* at 11.

52. U.S. DOE, *Record of Decision, Texas Clean Energy Project* 19 (Sept. 22, 2011).

53. U.S. DOE, *Mountaineer Commercial Scale Carbon Capture and Storage Project, Draft Environmental Impact Statement, Summary S-5* (Feb. 2011) [DOE/EIS-0445D].

54. *ROD*, *supra* note 52.

55. *Carbon Dioxide Capture and Storage Roadmap*, *supra* note 9, at 55 and 58. Four of the RCSPs are located in the western United States. The Big Sky Carbon Sequestration Partnership (BSCSP) includes parts of Wyoming, Montana, Oregon, Washington, and all of Idaho. The Plains CO<sub>2</sub> Reduction (PCOR) Partnership includes part of Montana and Wyoming, the plains states, and Canadian provinces. The Southwest Regional Partnership on Carbon Sequestration (SWP) includes the area from Arizona east to Texas and north to Colorado. The West Coast Regional Carbon Sequestration Partnership (WESTCARB) includes the West Coast from California into Canada. In the eastern United States, the Midwest Regional Carbon Sequestration Partnership (MRCSP) includes Indiana and the states to the east and north to New York and includes part of Kentucky. The Midwest Geological Sequestration Consortium (MGSC) includes Illinois and part of Kentucky. The Southeast Regional Carbon Sequestration Partnership (SECARB) includes the states from Arkansas to Florida and as far north as Virginia. It includes part of Texas. *Id.*

56. *Carbon Dioxide Capture and Storage Roadmap*, *supra* note 9, at 60.

57. *Id.* at 46.

58. *Id.* at 47.

59. Arnold W. Reitze Jr., *Federal Control of Geological Carbon Sequestration*, 41 ELR 10796 (Sept. 2011); Arnold W. Reitze Jr. & Marie Bradshaw Durrant, *Control of Geological Carbon Sequestration in the Western United States*, 41 ELR 10455 (May 2011); Arnold W. Reitze Jr. & Marie Bradshaw Durrant, *State and Regional Control of Geological Carbon Sequestration (Part 1)*, 41 ELR 10348 (Apr. 2011).

60. Arnold W. Reitze Jr., *The Role of NEPA in Fossil Fuel Resource Development and Use in the Western United States*, 39 BOS. COL. ENVTL. AFF. L. REV. 283 (2012).

61. 42 U.S.C. §§4321-4370f, ELR STAT. NEPA §§2-209.

62. 42 U.S.C. §4332(2)(C). "Major federal action" is defined at 40 C.F.R. §1508.18. "Significantly" is defined at 40 C.F.R. §1508.27.

63. *See Part V. infra.*

64. 40 C.F.R. §1502.10-.13.

65. 40 C.F.R. §1502.25.

66. 40 C.F.R. §1503.1(a)(1).

67. *Metcalf v. Daley*, 214 F.3d 1135, 1141, 30 ELR 20637 (9th Cir. 2000).

68. 40 C.F.R. §1505.2.

69. 40 C.F.R. §1501.4(b) & (c).

finding of no significant impact (FONSI).<sup>70</sup> The term “significantly” as used in NEPA is defined in the Council on Environmental Quality’s (CEQ’s) regulations, and is triggered easily.<sup>71</sup>

### A. DOE’s NEPA Regulations

Section 103 of NEPA<sup>72</sup> and the CEQ’s NEPA regulations require agencies to “review their policies, procedures, and regulations accordingly and revise them as necessary to assure full compliance with the purposes and provisions of the Act.”<sup>73</sup> The regulations require agencies to adopt implementing procedures that include identifying actions that normally require an EA or EIS and actions that normally do not require an EA or EIS.<sup>74</sup> DOE promulgated its NEPA compliance regulations on April 24, 1992.<sup>75</sup> They are found, as amended, at 10 C.F.R. Part 1021.<sup>76</sup> Subpart A of the regulations deals with the general applicability of NEPA to DOE’s actions.

Subpart B is applicable to DOE’s planning efforts, and it generally tracks the CEQ’s regulations. DOE’s regulations specify the type of review required for a project or action,<sup>77</sup> including research and development activities, rulemaking, adjudicatory proceedings, applications for permits, licenses, etc., and government procurement and financial assistance.<sup>78</sup> Subpart C deals with the procedures to be used to implement NEPA, including the preparation of an EIS or an EA, and the use of a categorical exclusion to avoid preparing these documents.<sup>79</sup> No decision may be made on a proposal covered by an EIS until 30 days after the release of a final EIS. Prior to action being taken, DOE must first publish a ROD in the *Federal Register*.<sup>80</sup> DOE’s regulations also cover the use of an EA, a FONSI, and a programmatic EA or EIS.<sup>81</sup> Mitigation action plans are also covered.<sup>82</sup> Subpart D covers the types of actions DOE typically addresses and the level of review provided for each. Subpart D, Appendix A, covers categorical exclu-

sions applicable to general agency actions, Appendix B covers the categorical exclusions applicable to specific agency actions, Appendix C covers classes of actions that normally require an EA but not necessarily an EIS, and Appendix D lists the classes of actions that normally require an EIS.

DOE’s NEPA obligations concerning CCS come primarily from its role in project funding. NEPA applies if federal funding involves significant federal control or influence over the use of funds.<sup>83</sup> NEPA also is triggered if DOE partly finances, assists, conducts, regulates, or approves a project or program.<sup>84</sup>

DOE on January 7, 2011, promulgated a proposed rule to establish new categorical exclusions from the NEPA review process.<sup>85</sup> The final rule was promulgated on October 13, 2011.<sup>86</sup> It creates 20 new categorical exclusions, and it removes two categorical exclusions, one environmental assessment category, and three EIS categories. Among the potential exclusions are experimental wells for injection of small quantities of CO<sub>2</sub>.<sup>87</sup> The regulation provides a categorical exclusion for experimental wells that inject small quantities of CO<sub>2</sub> and have: (1) a low potential for seismicity, subsidence, and contamination of freshwater aquifers; (2) the wells are otherwise in accordance with applicable requirements, best practices, and DOE protocols; and (3) the wells and associated drilling activities are sufficiently remote so that they would not have the potential to cause significant impacts related to noise and other vibrations. Wells may be used for enhanced oil or natural gas recovery or for secure storage of CO<sub>2</sub> in saline formations or other secure formations. The exclusion is limited to wells used to inject, in aggregate, less than 500,000 tons of CO<sub>2</sub> into the geologic formation.<sup>88</sup>

### B. NEPA Compliance Involving CCS Projects

The starting point for evaluating the application of NEPA to a particular activity such as CCS is the extent to which the NEPA process is utilized. Compliance with NEPA involves a substantial cost in time and money. A federal report in 2003 estimated that a typical EIS required six years to complete at a cost of \$250,000 to \$2,000,000. A typical EA required nine to 18 months to prepare and cost \$50,000 to \$200,000. It is often the applicant for a federal benefit that pays at least some of these costs, because the agencies attempt to shift the financial burden of compliance.<sup>89</sup>

An issue of particular interest is the extent to which an analysis of climate change-related impacts must be part

70. *Id.* at §1501.4(e). The U.S. Court of Appeals for the District of Columbia (D.C.) Circuit articulated four tests it uses to scrutinize an agency’s finding of “no significant impact.” The court will determine whether: (1) the agency took a hard look at the proposal; (2) whether the relevant areas of environmental concern were addressed; (3) whether the agency made a convincing determination the environmental impact was insignificant; and (4) if the impact is significant, whether the changes in the proposed project will sufficiently reduce the adverse environmental impact. *Sierra Club v. Peterson*, 717 F.2d 1409, 13 ELR 20888 (D.C. Cir. 1983). *See also* *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 19 ELR 20743 (1989); *Bering Strait Citizens for Responsible Resource Development v. Army Department*, 511 F.3d 1897 (9th Cir. 2008).

71. 40 C.F.R. §1508.27.

72. 42 U.S.C. §4333.

73. 40 C.F.R. §1500.6.

74. 40 C.F.R. §1507.3.

75. U.S. DOE, National Environmental Policy Act Implementing Procedures, 57 Fed. Reg. 15122 (Apr. 24, 1992).

76. *See, e.g.*, U.S. DOE, Compliance With Floodplain and Wetland Environmental Review Requirements, 68 Fed. Reg. 51429 (Aug. 27, 2003).

77. 10 C.F.R. §1021.200.

78. 10 C.F.R. §1021.212-.216.

79. 10 C.F.R. §1021.300-.311.

80. 10 C.F.R. §1021.315.

81. 10 C.F.R. §1021.321-.330.

82. 10 C.F.R. §1021.331.

83. 40 C.F.R. §1508.18(a).

84. *Id.*

85. U.S. DOE, National Environmental Policy Act Implementing Procedures, Proposed Rule, 76 Fed. Reg. 214 (Jan. 3, 2011).

86. U.S. DOE, National Environmental Policy Act Implementing Procedures, 76 Fed. Reg. 63764 (Oct. 13, 2011).

87. *Id.* at 63765, 63775, 63778.

88. 76 Fed. Reg. at 63795.

89. Neal McAliley, *NEPA and Assessment of Greenhouse Gas Emissions*, 41 ELR 10197 (Mar. 2011) (citing NEPA Task Force Report to CEQ, *Modernizing NEPA Implementation*, ch. 6 (Sept. 2003)).

of the NEPA process. The CEQ issued draft guidance on this subject on February 10, 2010.<sup>90</sup> If NEPA compliance requires an analysis of climate change impacts, especially if the analysis includes dealing with indirect effects as well as cumulative impacts, costs could increase substantially. DOE rarely discusses the effects of climate change on its projects in its NEPA documents, but it does address climate change in the EISs for its CCS projects, perhaps because CCS would not be pursued but for concern over climate change.<sup>91</sup>

EPA reports that since 2004, 4,345 EIS documents have been filed.<sup>92</sup> From 1999 through 2008, federal agencies have filed about 550 final EISs each year, with annual final EIS document production ranging from a low of 472 in 2000 to a high of 595 in 2004.<sup>93</sup> There were 59 EISs filed between January 1 and March 2, 2012.<sup>94</sup> The NEPA statute requires EISs for major federal actions significantly affecting the quality of the human environment.<sup>95</sup> Given the low threshold for triggering NEPA applicability, and the size and variety of actions undertaken by the federal government, the number of final EISs appears to be very low.<sup>96</sup>

DOE filed 124 final EISs from 1998 through 2008, with a low of zero in 2001 and a high of 21 in 1999.<sup>97</sup> DOE lists about 100 final EIS documents released in 1980 through 2011.<sup>98</sup> Some of these EISs were prepared in cooperation with other agencies, such as EPA, the Bureau of Land Management (BLM), the U.S. Army Corps of Engineers (the Corps), and, more recently, the U.S. Department of State for the Keystone pipeline project.<sup>99</sup> From the year 2000 through 2009, DOE's final EISs have fluctuated from two in 2000<sup>100</sup> to 10 in 2011.<sup>101</sup> DOE's NETL has issued 10 final EIS documents related to its CCPI funding program, but not all of the documents deal with CCS.<sup>102</sup> NETL also released about five final EAs dealing with carbon sequestration since 2002.<sup>103</sup>

Although the federal government does not produce EISs/EAs in the quantity that would appear to be required by the court interpretations defining what is a major federal action, the EISs that are prepared by federal agencies are frequently remanded, because of a failure to comply with the statute's requirements. For example, 16 recent U.S. court of appeals decisions involving NEPA compliance in energy cases resulted in nine losses for the federal government.<sup>104</sup>

### III. DOE/NETL's EISs

The material that follows evaluates DOE's EIS documents that relate to the CCS program.<sup>105</sup> DOE's NETL considers the environmental impacts of a proposed project, including an evaluation of the site, the electric generating plant, and linear facilities, including pipelines and electric transmission lines, the sequestration process, and cumulative impacts, which includes an analysis of GHG emissions and global warming.<sup>106</sup> An important requirement of NEPA is to analyze alternatives.<sup>107</sup> NETL has no regulatory authority over proposed projects. It interprets its authority as being limited to utilizing the competitive process for grants in order to provide financial support to projects that best meet NETL's program objectives, which includes environmental protection. DOE's NEPA regulations require an environmental critique to be prepared for each proposal, which leads to a full NEPA analysis for projects that are deemed suitable for selection.<sup>108</sup> Any alternatives under consideration by the applicant are evaluated, but NETL's position is that it does not have the authority to propose alternatives. Its "no action" alternative is to withhold financial support, which for many proposals means the project will not move forward.<sup>109</sup>

DOE begins its NEPA process with a preliminary examination of the full range of potential environmental impacts and uses a public scoping process to help ensure that all environmental issues are identified and properly evaluated.<sup>110</sup> DOE's preliminary list of potential environmental issues includes: air quality during construction and operation; the effects of groundwater withdrawals and use; the impacts of linear facilities, such as pipelines and transmission lines used to support the project; land use issues, including potential traffic effects; solid waste management issues; aesthetic impacts; wetland and floodplain impacts;

90. See Notice of Availability, Draft Guidance, "Consideration of the Effects of Climate Change and Greenhouse Gas Emissions," 75 Fed. Reg. 8046 (Feb. 23, 2010).

91. Avery Fellow, *Federal Agencies Vary Greatly in Considering Greenhouse Gas Emissions From Project*, 43 Env't. Rep. (BNA) 130 (Jan. 20, 2012).

92. U.S. EPA, *All EISs Since 2004 (by publication date)*, <http://yosemite.epa.gov/oeca/webeis.nsf/viEISO1?OpenView> (last visited May 30, 2012).

93. See the CEQ's data for calendar years at <http://ceq.hss.doe.gov/nepa/nepanet.htm> (last visited May 5, 2012).

94. *All EISs Since 2004*, *supra* note 92.

95. NEPA §102(2)(C), 42 U.S.C. §4332(2)(C).

96. See Reitze, *supra* note 60. See also 40 C.F.R. §§1508.14, .18, & .27.

97. CEQ data, *supra* note 93.

98. U.S. DOE, *Environmental Impact Statements (EIS)*, <http://energy.gov/nepa/environmental-impact-statements-eis> (last visited May 6, 2012).

99. See U.S. Dept. of State, *Keystone XL Oil Pipeline Project, Additional Information, Presidential Permit for the Proposed Construction, Connection, Operation, and Maintenance of a Pipeline and Associated Facilities at the United States Border for Importation of Crude Oil From Canada* (Sept. 2, 2011).

100. See <http://ceq.hss.doe.gov/nepa/nepanet.htm> (last visited May 5, 2012).

101. U.S. DOE, *Environmental Impact Statements (EIS)*, *supra* note 98.

102. U.S. DOE, Office of Fossil Energy, *NETL National Environmental Policy Act (NEPA) Documents*, <http://www.netl.doe.gov/publications/others/nepa/index.html> (last visited Mar. 6, 2012).

103. U.S. DOE, Office of Fossil Energy, *NETL Environmental Assessments*, <http://www.netl.doe.gov/publications/others/nepa/ea.html> (last visited May 6, 2012).

104. See Arnold W. Reitze Jr., *The Role of NEPA in Fossil Fuel Resource Development and Use in the Western United States*, BOS. COL. ENVTL. AFF. L. REV. (2012).

105. U.S. DOE, *NETL National Environmental Policy Act (NEPA) Documents*, *supra* note 102.

106. See, e.g., U.S. DOE, Hydrogen Energy California's Integrated Gasification Combined Cycle Project, Kern County, CA—Notice of Intent to Prepare an Environmental Impact Statement and Notice of Potential Floodplain and Wetland Improvement, 75 Fed. Reg. 17397, 17400 (Apr. 6, 2010).

107. 42 U.S.C. §§102(2)(c)(iii), 102(2)(E), 40 C.F.R. §§1501.2(c), 1502.2, 1502.10(e), 1502.14, 1505.1(e), 1505.2, 1507.2(d), 1508.25(b).

108. 75 Fed. Reg. at 17400.

109. *Id.*

110. See 40 C.F.R. §§1500.4(g), 1501.1(d), 1501.4(d), 1501.7, 1502.9(a), 1506.8(a).

ecological impacts, including impacts on endangered species and sensitive habitat; safety and health impacts created by the construction and operation of the facility; community impacts, including noise, traffic patterns, impacts on public services, and environmental justice considerations; impacts on cultural and archaeological resources; and cumulative effects, which includes impacts on climate.<sup>111</sup>

### A. The W.A. Parish Project

On November 14, 2011, DOE published a notice of intent to prepare an EIS for the W.A. Parish Post-Combustion CO<sub>2</sub> Capture and Sequestration Project in Fort Bend County, Texas.<sup>112</sup> The project involves the construction of a commercial-scale CO<sub>2</sub> capture facility at the existing W.A. Parish Generating Station that will capture 90% of the CO<sub>2</sub> from one unit of the plant. Approximately 1.6 million tons per year of captured CO<sub>2</sub> will be transported about 80 miles in a new pipeline to the West Ranch oil field in Jackson County, Texas, for use in enhanced oil recovery operations. DOE does not have regulatory authority over the project. Its role is to supply funding for about 42% of the \$845 million cost.<sup>113</sup> Public scoping meetings were held in November and December 2011.<sup>114</sup>

### B. The Lake Charles Project

On April 29, 2011, DOE published a notice of intent to prepare an EIS for the Lake Charles Carbon and Sequestration Project at the Lake Charles Cogeneration Gasification Facility located in Calcasieu Parish, Louisiana.<sup>115</sup> Approximately 4 million tons of CO<sub>2</sub> per year is to be captured from two acid gas removal units and transported through a new pipeline to an existing pipeline where it will be transported to the Hastings oil field south of Houston, Texas, to be used for enhanced oil recovery operations. DOE plans to finance about 60% of the estimated \$434.6 million cost.<sup>116</sup> As of May 15, 2012, no schedule for EIS completion has been released.<sup>117</sup>

### C. The FutureGen 2.0 Program

On May 23, 2011, DOE published a notice of intent to prepare an EIS for the FutureGen 2.0 program that

involves federal funding of about \$1 billion.<sup>118</sup> The program involves repowering the existing Meredosia Power Station in west-central Illinois with clean coal technologies (oxy-combustion) that will be integrated with a pipeline that would transport CO<sub>2</sub> to a sequestration site where it will be injected into a deep storage reservoir. The sequestration site will be in Illinois. The exact location had not been determined, but the drilling of a characterization well in Morgan County indicated geology that is suitable for CO<sub>2</sub> storage.<sup>119</sup> Ten public scoping meetings were scheduled during June 2011, but the schedule for release of a draft EIS was under development.<sup>120</sup>

FutureGen 2.0 is substantially revised from the prior proposed FutureGen program. Originally, FutureGen was to be a new IGCC facility with CCS located near Mattoon, Illinois.<sup>121</sup> The cost of the project, however, became unacceptable, and the project was abandoned.<sup>122</sup>

### D. The AEP Mountaineer Commercial-Scale CCS II Project

On June 10, 2010, DOE announced its intent to prepare an EIS for American Electric Power's (AEP's) Mountaineer Commercial Scale Carbon Capture and Storage Project located at AEP's existing 1,300 MW pulverized coal-fired Mountaineer Power Plant in Mason County, West Virginia, along the Ohio River.<sup>123</sup> The project would capture 90% of the CO<sub>2</sub>, approximately 1.5 million metric tons of CO<sub>2</sub> annually, from a 235 MW portion of the 1,300 MW plant's flue gas emissions using a chilled ammonia process. The CO<sub>2</sub> would then be compressed and transported by pipeline to a sequestration site about 12 miles from the plant where it would be injected approximately 1.5 miles below ground into a saline formation.<sup>124</sup> DOE proposed to provide up to \$334 million, which is about one-half of the estimated capital cost and one-half of the operating cost during the 46-month demonstration period. DOE has no regulatory authority over the project, so its NEPA obligations are based on its role in providing funding.<sup>125</sup>

On March 11, 2011, DOE provided formal notice of the availability of the draft EIS for the project.<sup>126</sup> The document analyzed the following environmental issues: "air quality and climate; greenhouse gases; and flood-

111. See, e.g., 75 Fed. Reg. at 17401.

112. U.S. DOE, Notice of Intent to Prepare an Environmental Impact Statement and Notice of Potential Floodplain and Wetlands Involvement for the W.A. Parish Post-Combustion CO<sub>2</sub> Capture and Sequestration Project, Southeastern TX, 76 Fed. Reg. 70429 (Nov. 14, 2011).

113. *Id.*

114. U.S. DOE, Office of NEPA Policy and Compliance, *Schedule of Key Environmental Impact Statements* (May 15, 2012).

115. U.S. DOE, Notice of Intent to Prepare an Environmental Impact Statement for the Lake Charles Carbon Capture and Sequestration Project, Lake Charles, LA, U.S. DOE, Notice of Intent to Prepare an Environmental Impact Statement, 76 Fed. Reg. 24007 (Apr. 29, 2011).

116. *Id.*

117. *Schedule of Key Environmental Impact Statements*, *supra* note 114.

118. U.S. DOE, Notice of Intent to Prepare an Environmental Impact Statement and Notice of Potential Floodplain and Wetlands Involvement for the FutureGen 2.0 Program, 76 Fed. Reg. 29728 (May 23, 2011).

119. See <http://www.futuregenalliance.org> (last visited May 16, 2012).

120. *Schedule of Key Environmental Impact Statements*, *supra* note 114.

121. See *infra* Part 3.H.

122. 76 Fed. Reg. at 29729.

123. U.S. DOE, American Electric Power Service Corporation's Mountaineer Commercial Scale Carbon Capture and Storage Project: Mason County, WV; Notice of Intent to Prepare an Environmental Impact Statement and Potential Floodplain and Wetlands Involvement, 75 Fed. Reg. 32171, 32172 (June 10, 2010).

124. *Id.*

125. *Id.*

126. U.S. DOE, Notice of Availability of the Draft Environmental Impact Statement for the Mountaineer Commercial Scale Carbon Capture and Storage Project: Mason County, WV, 76 Fed. Reg. 13396 (Mar. 11, 2011).

plains; biological resources; cultural resources; land use and aesthetics; traffic and transportation; noise; materials and waste management; human health and safety; utilities; community services; socioeconomic; and environmental justice.<sup>127</sup>

The draft EIS included an evaluation of a “No Action Alternative,” which DOE believes would mean the project would not continue, and DOE’s goal of accelerating commercial development of CCS through this project would not occur.<sup>128</sup> DOE has no regulatory authority over the projects it funds. It may only fund or not fund a project; therefore, the agency’s position is that its alternative analysis is limited to accepting a proposal or adopting a no-action alternative.<sup>129</sup> The agency limits its evaluation to selecting the projects that best fit its funding goals from the project proposals that are submitted. DOE does use the NEPA process to mitigate adverse environmental impacts. In this case, it considered a number of potential injection well sites to determine the locations that would minimize environmental impacts.<sup>130</sup> The no-action alternative was rejected because it would not contribute to DOE’s mission of advancing CCS technology development. It would also forgo the environmental benefits of reducing emissions of CO<sub>2</sub> to the atmosphere.<sup>131</sup>

This proposed project appears to be uncontroversial. It is similar to the project currently operating at the Mountaineer Plant, but would be about 12 times larger.<sup>132</sup> Only seven members of the public attended the scoping meeting, and only two made comments. Only one person made formal comments, which were general observations that concluded with the hope the project would be successful.<sup>133</sup> Nevertheless, DOE performed a thorough environmental analysis, including an analysis of the impacts associated with the CO<sub>2</sub> capture facility, the pipelines used for CO<sub>2</sub> transport, the injection wells, and the geological monitoring program.<sup>134</sup> The draft EIS concluded that most environmental impacts would be negligible or minor. However, the construction of the capture facility would have the potential of having a moderate impact on the biological resources found on 33 acres of low-quality habitat.<sup>135</sup> It would also have a moderate impact, during construction, on vehicle traffic volumes on the state road serving the facility, on local noise levels, and would involve storing chemicals on site.<sup>136</sup> The draft EIS evaluated potential cumulative effects and concluded there would be no effects

of significance.<sup>137</sup> It did not consider mitigation measures, because there are no significant environmental problems to mitigate. The draft EIS concluded that there would be no significant environmental impacts, and there seems to be no evidence of environmental opposition.

The Mountaineer Phase 2 project is now on hold. AEP has advised DOE that it is terminating its contract upon completion of the small pilot program that operated for two years (Phase 1). AEP officials said that the rejection by both West Virginia and Virginia of its request for full reimbursement of the pilot plant costs and the rejection by Congress of national CO<sub>2</sub> emissions standards means the company cannot afford to continue with the Phase 2 project.<sup>138</sup>

### E. The Texas Clean Energy Project

On June 2, 2010, DOE promulgated its notice of intent to prepare an EIS for the Texas Clean Energy Project (TCEP), located in Extor County, Texas.<sup>139</sup> DOE proposed to provide Summit Texas Clean Energy, LLC with \$350 million to fund about 20% of the cost of a coal-fueled IGCC 400 MW power plant that will put 130 to 213 MW into the grid and use the remainder for its industrial operations. The plant would co-produce sulfuric acid and urea. It would capture about 90% of the carbon in the coal fuel as CO<sub>2</sub> and would pipe it to a regional network of pipelines servicing Permian Basin oil fields where it will be injected for enhanced oil recovery (EOR).<sup>140</sup> It will be the first U.S. commercial clean coal power plant that combines IGCC with CCS.<sup>141</sup> The proposed project is located on 600 acres of arid, nonarable mesquite-lobebush-juniper that is located contiguous to oil-producing property.<sup>142</sup> The project would include the IGCC plant, a sulfur recovery plant, a chemical production plant and associated facilities.<sup>143</sup> The facility will require a CO<sub>2</sub> pipeline to connect with an existing pipeline, which is less than two miles to the nearest pipeline.<sup>144</sup>

In March 2011, DOE released a draft EIS<sup>145</sup> and published a notice of availability in the *Federal Register*.<sup>146</sup> The primary environmental issue seemed to be the concern over the use of water and the potential contaminated water discharges. In August 2011, DOE released a final EIS<sup>147</sup>

127. *Id.*

128. *Id.* at 13397.

129. U.S. DOE, *Mountaineer Commercial Scale Carbon Capture and Storage Project, Draft Environmental Impact Statement, Summary S-4* (Feb. 2011) [DOE/EIS-0445D].

130. *Id.* at S-6.

131. *Id.* at S-19.

132. *Id.* at S-7.

133. *Id.* at S-6.

134. *Id.* at S-7 and S-19 to S-33.

135. U.S. DOE, *Mountaineer Commercial Scale Carbon Capture and Storage Project, Draft Environmental Impact Statement, Summary S-23* (Feb. 2011) [DOE/EIS-0445D].

136. *Id.* at S-25 to S-27.

137. *Id.* at 31.

138. Matthew L. Wald & John M. Browder, *Utility Shelves Ambitious Plan to Limit Carbon*, N.Y. TIMES, July 13, 2011, [http://www.nytimes.com/2011/07/14/business/energy-environment/utility-shelves-plan-to-capture-carbon-dioxide.html?\\_r=2](http://www.nytimes.com/2011/07/14/business/energy-environment/utility-shelves-plan-to-capture-carbon-dioxide.html?_r=2) (last visited May 6, 2012).

139. U.S. DOE, Notice of Intent to Prepare An Environmental Impact Statement for Texas Clean Energy Project, Extor County, TX, 75 Fed. Reg. 30800 (June 2, 2010).

140. *Id.*

141. Texas Clean Energy Project (TCEP), <http://www.texascleanenergyproject.com/> (last visited May 6, 2012).

142. 75 Fed. Reg. at 30801.

143. *Id.*

144. *Id.* at 30802.

145. U.S. DOE, *Texas Clean Energy Project Draft Environmental Impact Statement* (Mar. 2011) [DOE/EIS-0444D].

146. 76 Fed. Reg. 15968 (Mar. 18, 2011).

147. U.S. DOE, *Texas Clean Energy Project Final Environmental Impact Statement* (Aug. 2011) [DOE/EIS-0444].

and provided notice of its availability in the *Federal Register*.<sup>148</sup> In preparing the EIS, mitigation of the impacts of the project was included in the discussion.<sup>149</sup> On September 22, 2011, DOE issued its ROD.<sup>150</sup> In the ROD, DOE increased its share of the project costs to \$450 million, which is 26% of the capital cost of \$1.73 billion. DOE found the EIS and the ROD “incorporates all practicable means to avoid or minimize environmental, social, or economic harm,” based on the use of avoidance and mitigation measures to be included in a Mitigation Action Plan.<sup>151</sup> The applicant must comply with 15 mitigation requirements included in the ROD that are conditions for continued funding by DOE.<sup>152</sup>

DOE’s environmental analysis considered “air quality including greenhouse gas emissions; climate; soils, geology, and mineral resources; ground water; surface water, floodplains and wetlands; biological resources; aesthetics; cultural resources; land use; socioeconomic and community services; environmental justice; utility services; transportation; materials and waste management; human health, safety, and accidents; and noise and vibration.”<sup>153</sup> The EIS found that the Texas project would increase criteria pollutant emissions, but would not cause air quality to exceed prevention of significant deterioration (PSD) increments or the national ambient air quality standards (NAAQS). While the project will capture at least 90% of the carbon in the CO<sub>2</sub> used in its fuels, CO<sub>2</sub> emissions will reach 300,000 tons per year.<sup>154</sup> The risks of adverse effects caused seismic activity will be low because oil and gas are withdrawn from reservoirs as CO<sub>2</sub> is injected, so fluid pressure within the reservoir should not increase.<sup>155</sup> At the sequestration site, there are no surface water resources, floodplains or wetlands, although there are a few acres of wetlands within pipeline corridors that will be required to be protected during construction.<sup>156</sup> Process water is expected to be treated wastewater from a municipal wastewater treatment plant. Discharged process water will go to the Monahans Draw. Other environmental problems are expected to be minimal.<sup>157</sup> DOE received comments on the final EIS from EPA, the Texas Parks and Wildlife Department, and others, but the comments did not demonstrate opposition to the project or raise any serious environmental issues.<sup>158</sup>

In January 2012, it was announced that the TCEP project, now projected to cost \$2.4 billion, would begin construction soon, but DOE’s contribution remains at \$450 million.<sup>159</sup>

148. 76 Fed. Reg. 47579 (Aug. 5, 2011).

149. U.S. DOE, *Record of Decision, Texas Clean Energy Project 7* (Sept. 22, 2011).

150. *Id.*

151. *Id.* at 8.

152. *Id.* at 9-15.

153. *Id.*

154. U.S. DOE, *Record of Decision, Texas Clean Energy Project 22* (Sept. 22, 2011).

155. *Id.* at 25.

156. *Id.* at 29.

157. *Id.* at 30-41.

158. *Id.* at 42.

159. Susanne Pagano, *Utility to Purchase Electricity From Plant in Texas With Carbon Capture Technology*, 43 *Env’t Rep.* (BNA) 141 (Jan. 20, 2012).

## F. The Hydrogen Energy California IGCC Project

DOE is proposing to provide partial funding of the costs of building a 400 MW IGCC facility in Kern County, California, and on April 6, 2010, the agency promulgated its notice of intent to prepare an EIS.<sup>160</sup> The facility proposed by Hydrogen Energy California LLC (HECA) would use blends of coal and petroleum coke as a feedstock for the facility and would include a commercial-scale CCS process. The fuel would be gasified to produce a synthesis gas that would be processed to produce a hydrogen-rich fuel that would power a combustion turbine. Emissions of air pollutants would be minimized compared to a conventional coal-fired power plant. Approximately 90% of the CO<sub>2</sub> will be captured, compressed, and carried by pipeline to the adjacent Elk Hills oil and gas field where it will be used for enhanced oil recovery. DOE is proposing to provide \$308 million, which is about 11% of the project’s total cost.<sup>161</sup> DOE’s role is limited to deciding whether to provide funding, but the project will require approval of the California Energy Commission, which has regulatory authority including the independent assessment of the project’s potential environmental effects.<sup>162</sup> Hydrogen Energy applied for a California Energy Commission certification on July 31, 2008, but revised the application to seek to build at a different location on May 28, 2009, because the original location had problems with endangered species habitat.<sup>163</sup> The California Energy Commission accepted the data as adequate on August 28, 2009.<sup>164</sup> On September 28, 2011, it was announced that SCS Energy, a developer of clean power, acquired the Hydrogen Energy California project from BP and Rio Tinto. SCS is modifying the plant’s design to allow the production of both electricity and fertilizer.<sup>165</sup> DOE’s public scoping period ended May 24, 2010.<sup>166</sup> The NEPA draft EIS is scheduled for completion in August 2012.<sup>167</sup>

## G. Kemper County, MS IGCC Project

On September 22, 2008, DOE promulgated its notice of intent to prepare an EIS for an IGCC facility to be constructed in Kemper County, Mississippi, by Mississippi Power Company, an affiliate of Southern Company.<sup>168</sup> The

160. U.S. DOE, Hydrogen Energy California’s Integrated Gasification Combined Cycle Project, Kern County, CA—Notice of Intent to Prepare an Environmental Impact Statement and Notice of Potential Floodplain and Wetland Improvement, 75 Fed. Reg. 17397, 17398 (Apr. 6, 2010).

161. *Id.*

162. *Id.*

163. California Energy Commission, *Hydrogen Energy California Power Plant Licensing Case* (July 18, 2011).

164. *Id.*

165. *SCS Energy Closes Deal to Acquire HECA Project in Kern County* (Sept. 28, 2011), <http://hydrogenenergycalifornia.com/news/scs-energy-closes-deal-to-acquire-heca-project-in-kern-county> (last visited May 6, 2012).

166. *Id.* at 17401.

167. *Schedules of Key Environmental Impact Statements*, *supra* note 114.

168. U.S. DOE, Notice of Intent to Prepare an Environmental Impact Statement and Notice of Proposed Floodplain and Wetlands Involvement for the Kemper County IGCC Project, Kemper County, MS, 73 Fed. Reg. 54569 (Sept. 22, 2008).

project was selected for funding by DOE under the CCPI program, but it is a Round 2 project and does not meet the CCS criteria imposed for Round 3 projects. The proposed project is to demonstrate IGCC technology using lignite coal. DOE was considering providing \$294 million of the more than \$2 billion projected costs of the facility. DOE was also considering whether to provide a loan guarantee pursuant to §1703(a)(1) of the Energy Policy Act of 2005.<sup>169</sup> Unlike some of the projects discussed above, this project has significant potential environmental issues. The site includes wetlands. In addition to the construction of a 550 MW plant, a five-mile natural gas pipeline, a 60-mile CO<sub>2</sub> pipeline, and fuel-handling infrastructure would be built. A neighboring surface lignite coal mine would disturb 15,500 acres, and 4,000 acres would be used for temporary reservoirs, ponds, and stream diversions to produce approximately 3.8 million tons of lignite per year for the plant.<sup>170</sup> The mining would disturb uplands and wetlands and require stream diversions. On-site deep wells would provide six million gallons a day of nonpotable water for cooling water makeup and process water.<sup>171</sup> The project would require the construction of a 57-mile, 230 kilovolt (kV) transmission line and approximately nine miles of a 115 kV transmission line. In addition, 27 miles of existing power lines would need to be upgraded.<sup>172</sup> Only about 25% of the CO<sub>2</sub> would be captured, and it would be piped to be used for enhanced oil recovery, so the project was being considered for funding as an IGCC facility, and not as a CCS project.<sup>173</sup>

A draft EIS for the project was released in November 2009.<sup>174</sup> The final EIS was released in May 2010.<sup>175</sup> The plant, now designated at 582 MW, was seeking cost-sharing from DOE of \$293.75 million, a DOE loan guarantee, and a U.S. Department of Treasury loan through its Federal Financing Bank that would cover a portion of the plant's construction cost.<sup>176</sup> A public scoping meeting was held on October 14, 2008. DOE tabulated 245 individual comments from the many submitted. Some comments were concerned with the project's environmental impacts, and other comments involved a favorable view of the economic benefits of the project.<sup>177</sup>

After the draft EIS was released, another public hearing was held on December 1, 2009. Numerous comments were received dealing with a wide range of environmental concerns. DOE then updated the EIS to reflect project design changes, studies completed after publication of the draft EIS, and regulatory developments.<sup>178</sup> Among the

changes was a target of 67% CO<sub>2</sub> recovery, not the initial design target of a 25% recovery.<sup>179</sup> The CO<sub>2</sub> capture was considered to be an important means for Mississippi Power to manage its compliance with future regulation of GHG emissions.<sup>180</sup> Another change was that reclaimed water from Meridian's municipal system would be used for cooling water makeup, steam cycle makeup, and other processes.<sup>181</sup> The final EIS evaluated many potential impacts of the project, but none appeared to be unusual for a large industrial project.<sup>182</sup> Approximately 129 acres of wetlands would be lost or altered by the project, and mitigation measures would be required.<sup>183</sup> The environmental impacts of greatest concern include a minor reduction in air quality, beneficial reductions in GHG emissions, some adverse impacts on surface water that will require mitigation, and some other minor impacts.<sup>184</sup>

DOE issued its ROD on August 12, 2010.<sup>185</sup> DOE decided to provide Southern Company Services with \$270 million in cost-shared funding under DOE's CCPI program for the Kemper County project. The Mississippi Public Service Commission certified the project on June 3, 2010, and construction began shortly thereafter.<sup>186</sup>

#### H. FutureGen Project

The FutureGen Project was to be a coal-fueled electric power and hydrogen gas production plant designed to capture CO<sub>2</sub> and sequester it in an underground geologic formation. It was to be built by a nonprofit industrial consortium of major coal and electric utilities named the FutureGen Alliance. Four locations were identified as potential sites for the facility. They were: Mattoon, Illinois; Tuscola, Illinois; Jewett, Texas; and Odessa, Texas.<sup>187</sup> DOE published a Notice of Intent to Prepare an EIS for the project on July 28, 2006.<sup>188</sup> This ultimately led to a final EIS being released by DOE in November 2007.<sup>189</sup> The ROD was released in July 2009.<sup>190</sup> The EIS was a massive document of about 2,500 pages in four volumes. However, financial assistance for the FutureGen project was terminated by the George W. Bush Administration because of substantial increased project cost estimates. A substitute project designated FutureGen 2.0 subsequently was sup-

169. 73 Fed. Reg. at 54570 [42 U.S.C. §16513].

170. 73 Fed. Reg. 54571.

171. *Id.*

172. *Id.* at 54572.

173. *Id.* at 54571.

174. U.S. DOE in cooperation with U.S. Army Corps of Engineers, *Kemper County IGCC Project* (Nov. 2009) [DOE/EIS-0409D].

175. U.S. DOE in cooperation with U.S. Army Corps of Engineers, *Kemper County IGCC Project* (May 2010) [DOE/EIS-0409].

176. *Id.* at S-2.

177. *Id.* at S-3.

178. *Id.* at S-6.

179. *Id.* at S-7.

180. *Id.* at S-9.

181. DOE/EIS-0409, *supra* note 175, at S-11.

182. *Id.* at S-18 to S-23.

183. *Id.* at S-20.

184. *Id.* at S-24 to S-27.

185. U.S. DOE, *Record of Decision and Floodplain Statement of Findings Kemper County IGCC Project, Kemper County, MS* (Aug. 12, 2010).

186. Southern Company, *CO<sub>2</sub> Capture at the Kemper County IGCC Project* (Sept. 16, 2010) [2010 NETL CO<sub>2</sub> Capture Technology Meeting]. A video of the construction is available at <http://www.youtube.com/watch?v=jenc53P9dco> (May 31, 2011) (last visited May 6, 2012).

187. U.S. DOE, *FutureGen Project Final Environmental Impact Statement Summary 3* (Nov. 1, 2007) [DOE/EIS-0394].

188. U.S. DOE, Notice of Intent to Prepare an Environmental Impact Statement for FutureGen Project, 71 Fed. Reg. 42840 (July 28, 2006).

189. See U.S. DOE, *Final Environmental Impact Statement FutureGen Project* (Nov. 1, 2007) [EIS-0394].

190. Record of Decision, 74 Fed. Reg. 35174 (July 20, 2009).

ported by the Barack Obama Administration.<sup>191</sup> With the cancellation of the FutureGen project, its final EIS lost much of its usefulness, but it does contain a detailed evaluation of carbon sequestration.<sup>192</sup>

### I. Mesaba Energy Project

In November 2009, DOE released a final Impact Statement for the Mesaba Energy Project, a coal-based IGCC power plant that is to be constructed in northeastern Minnesota at an estimated cost of \$2.16 billion. DOE proposed to provide \$36 million in funding as part of the CCPI program.<sup>193</sup> The project would demonstrate the commercial readiness of an IGCC technology in a two-phase project of 600 MW per stage.<sup>194</sup> The EIS was developed with cooperating agencies because the project will impact wetlands (the Corps), air quality in wilderness areas (U.S. Department of Agriculture Forest Service), and is subject to the Minnesota Power Plant Siting Act (Minnesota Department of Commerce).<sup>195</sup> This project was to be co-funded pursuant to the competitive CCPI Round 2 program.<sup>196</sup> The analysis of alternatives was limited because the project design and siting were the responsibility of the applicant, and DOE's position is that it is limited to funding or not funding the project.<sup>197</sup> The project was to be designed to allow for future carbon capture if required, but the applicant, Excelsior Energy, Inc. (Excelsior), submitted a CCS plan to the Minnesota Public Utilities Commission as part of the state approval process.<sup>198</sup> The facility would produce the usual conventional air pollutants emitted by power plants, as well as CO<sub>2</sub> in substantial quantities from the sub-bituminous coal feedstock.<sup>199</sup> The primary concerns of the public that were expressed as comments to the draft EIS involved the project's impacts on air quality, water resources and water pollution, wetlands, and the adverse effect on fish and wildlife resources.<sup>200</sup> The environmental impacts of the project are summarized in Table S-8 of the EIS. The details of the environmental impacts were thoroughly evaluated in a massive EIS that includes extensive appendices. The quality of the EIS is somewhat irrelevant, however, because the project does not appear to be moving forward. As of April 2011, the project had neither a power purchase agreement nor investors. The developers were seeking state approval to allow the project to proceed as a natural gas plant, while keeping millions of dollars in "advanced energy" funds that it had received from the

state.<sup>201</sup> It has been more than two years since the EIS was issued, and DOE has not released a ROD and lists its release as uncertain.<sup>202</sup>

### J. Western Greenbrier Co-Production Demonstration Project

On June 3, 2003, DOE promulgated a notice of intent to prepare an EIS on its proposed funding of approximately \$107.5 million of the development costs of a 98 MW power plant and cement manufacturing facility located in Greenbrier County, West Virginia.<sup>203</sup> On December 4, 2006, DOE announced the availability of a draft EIS,<sup>204</sup> and on November 9, 2007, DOE published a notice of availability of the final EIS.<sup>205</sup> On April 29, 2008, DOE issued its ROD that provided the requested funding.<sup>206</sup> The applicant did not plan to sequester its CO<sub>2</sub> emissions, but DOE considered potential measures to reduce impacts on global climate change. The agency concluded that the proposed project will use a fluidized bed system that will result in a low-pressure, diluted CO<sub>2</sub> stream in the flue gas for which there is no capture technology that is economically feasible.<sup>207</sup>

The final EIS was a huge, three-volume document, with approximately 500 pages in volume one. It comprehensively covers the environmental issues. However, the quality of the final EIS is not particularly important, because the project was discontinued on June 14, 2008.<sup>208</sup>

## IV. Conclusion

DOE has not produced many NEPA documents dealing with CCS. In the 10 years beginning in 2002, DOE's NETL produced eight EAs and FONSI's dealing with sequestration<sup>209</sup> and about 10 EISs.<sup>210</sup> One unfortunate aspect of the NETL EIS process is the number of projects that are on hold or that have been cancelled after substantial resources were expended to produce the documents required by NEPA. This is not an easy issue to address

191. U.S. DOE, *FutureGen 2.0*, <http://www.fossil.energy.gov/programs/power-systems/futuregen/> (last visited May 6, 2012).

192. DOE/EIS-0394, *supra* note 189, at S-58 to S-70.

193. U.S. DOE in cooperation with Minnesota Department of Commerce, *Mesaba Energy Project Final Environmental Impact Statement S-1* (Nov. 2009) [DOE/EIS-0382].

194. *Id.* at S-2.

195. *Id.* at S-1, S-8.

196. *Id.* at S-4.

197. *Id.* at S-5.

198. *Id.* at S-9. See also Appendix A2, *DOE Analysis of Feasibility of Carbon Capture and Sequestration for the Mesaba Energy Project*.

199. DOE/EIS-0382, *supra* note 193, at S-11.

200. *Id.* at S-29 to S-36.

201. Ken Paulman, *Could Mesaba Energy Project Really "Convert" Back to Coal?*, MIDWEST ENERGY NEWS (Apr. 7, 2011), <http://www.midwestenergynews.com/2011/04/07/could-mesaba-energy-project-really-convert-back-to-coal/> (last visited May 6, 2012).

202. U.S. DOE, Office of NEPA Policy and Compliance, *Schedule of Key Environmental Impact Statements* (Nov. 15, 2011), *supra* note 114.

203. U.S. DOE, Western Greenbrier Co-Production Demonstration Project, Draft Environmental Impact Statement, 68 Fed. Reg. 33111 (June 3, 2003).

204. U.S. DOE, Western Greenbrier Co-Production Demonstration Project, Final Environmental Impact Statement, 71 Fed. Reg. 70371 (Dec. 4, 2006) [DOE/EIS-0361].

205. 72 Fed. Reg. 673579 (Nov. 9, 2007).

206. U.S. DOE, Record of Decision and Floodplain Statement of Findings: Western Greenbrier Co-Production Demonstration Project, Rainelle, Greenbrier County, WV, 73 Fed. Reg. 23214 (Apr. 29, 2008).

207. *Id.* at 23217.

208. U.S. DOE, Office of Fossil Energy, National Energy Technology Laboratory, *Project Facts, Western Greenbrier Co-Production Demonstration Project (Discontinued)* (Aug. 2008).

209. U.S. DOE, NETL Environmental Assessments, <http://www.doe.gov/nepa/nepa-documents> (last visited May 8, 2012).

210. *Id.*

because of a depressed economy and an uncertain business climate. Perhaps, it should be publicized that applicants that renege on projects after the funding process is completed will not be eligible for future funding.

NEPA requires an EIS to be prepared for major federal actions significantly affecting the quality of the human environment.<sup>211</sup> Whether a proposed action will have a significant effect on the environment requires consideration of context and intensity.<sup>212</sup> Context refers to the scope of the proposed action, including the interests affected.<sup>213</sup> Intensity includes consideration of the potential affects on the human environment and the degree of controversy concerning the proposal. Intensity concerns such factors as: (1) beneficial and adverse impacts; (2) effect on public health or safety; (3) unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, wetlands, or ecologically critical areas; (4) the degree to which the effects are likely to be highly controversial, i.e., disputed; (5) the degree to which the effects on the environment are highly uncertain or involve unique or unknown risks; and (6) the degree to which the action may establish a precedent for future actions.<sup>214</sup> It includes the cumulative effects, future effects, and the potential impact on endangered or threatened species or their habitat.<sup>215</sup> The cumulative impact is the impact on the environment that results from the proposal when added to other past, present, and reasonably foreseeable future actions, whether or not undertaken by the agency making a proposal.<sup>216</sup> Thus, even minor actions can over time aggregate to have cumulative impacts.<sup>217</sup> Uncertainty or controversy alone may be sufficient to require the preparation of an EIS.<sup>218</sup> Controversy is “where a substantial dispute exists as to the size, nature, or effect of the major Federal action rather than to the existence of opposition to a use.”<sup>219</sup> To date, the CCS projects have not been controversial, which might explain the limited number of NEPA documents.

From the inception of NEPA litigation, courts have rejected NEPA applicability to truly minor federal action. For example, in *City of Los Angeles v. National Highway Traffic Safety Administration*,<sup>220</sup> the court held that the plaintiff had standing to bring a NEPA case, but a one-mile-per-gallon change in the CAFÉ standard was not significant enough to trigger the need for an EIS. However, the threshold for determining what is a major federal action is low.<sup>221</sup> With DOE’s CCS and Power Systems budget in FY 2012 of over one-quarter billion dollars, it is difficult to believe there are only two or three projects a year that

are major federal actions that trigger NEPA.<sup>222</sup> Because of the small number of EISs produced by DOE/NETL, if environmentalists target CCS projects with NEPA-based litigation similar to the strategy being used to target fossil fuel projects based on alleged CAA violations, DOE will be vulnerable.<sup>223</sup> But because compliance with NEPA is costly and may not result in a better decision or result in environmental improvement, many agencies, including DOE, appear to resist using the NEPA process.

When DOE/NETL produces an EIS, it is substantial and thoroughly documented. CEQ regulations call for final EIS documents to be less than 150 pages.<sup>224</sup> Some DOE/NETL EISs exceed that limit, even though the treatment of alternatives is minimal. It could be argued that the EISs that are produced are too large to be useful to decisionmakers. To address the size of EISs, the CEQ on December 7, 2011, released draft guidance aimed at fostering efficiency and timeliness in conducting environmental reviews, but it is unlikely that such guidance will modify how federal agencies perform their NEPA obligations.<sup>225</sup> The production of excessively long EISs is unlikely to have any adverse affect on an agency, but the failure to address an issue can result in a court remanding the document. Therefore, NEPA documents can be expected to be verbose.

CEQ regulations require mitigation “to minimize impacts by limiting the degree or magnitude of the action and its implementation.”<sup>226</sup> NETL asserts it can only exert modest efforts to mitigate adverse impacts. Nevertheless, NETL often requires mitigation by project proponents in order to receive funding. Other federal and state agencies with regulatory authority may also impose mitigation measures. This mitigation authority provides NETL with another way to influence an applicant’s compliance with environmental requirements. Once project funding is provided, it is difficult to know how or whether the agency will enforce its mitigation requirements, since NETL usually has no ongoing regulatory power.

The most controversial aspect of federal agency NEPA compliance that leads to litigation is the alternative analysis. CEQ regulations require the agency to “(r)igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from the detailed study, briefly discuss the reasons for their having been eliminated.”<sup>227</sup> NETL’s final EIS documents minimize issues concerning the evaluation of alternatives, because the organization claims it has only very limited authority to influence the design of the project because it has no regulatory authority. Its major power is to refuse to fund a project. However, this argument is weak, and

211. 42 U.S.C. §4332(2)(c).

212. 40 C.F.R. §1508.27.

213. 40 C.F.R. §1508.27(a).

214. 40 C.F.R. §1508.27(b).

215. 508 F.3d at 1220. See also 40 C.F.R. §1508.27(b).

216. 40 C.F.R. §1508.7.

217. *Id.*

218. 40 C.F.R. §1508.27(b)(4) & (5).

219. *Foundation for N. Am. Wild Sheep v. Dept. of Agriculture*, 681 F.2d 1172, 1182, 12 ELR 20968 (9th Cir. 1982).

220. 912 F.2d 478, 21 ELR 20170 (D.C. Cir. 1990).

221. See 40 C.F.R. §1508.18.

222. *Budget in Brief*, *supra* note 32.

223. See generally Arnold W. Reitze Jr., *The Intersection of Climate Change and the Clean Air Act*, 43 ARIZ. ST. L.J. 901 (2011); Arnold W. Reitze Jr., *Federal Control of Greenhouse Gas Emissions*, 40 ENVTL. L. 1261 (2010); Arnold W. Reitze Jr., *Electric Power in a Carbon Constrained World* (2009), *supra* note 3.

224. 40 C.F.R. §1502.7.

225. CEQ, *Improving the Process for Preparing Efficient and Timely Environmental Reviews Under the National Environmental Policy Act* (Dec. 7, 2011).

226. 40 C.F.R. §1508.20.

227. 40 C.F.R. §1502.14(a).

ignores the power wielded by an agency that is positioned to provide significant financial support to private-sector businesses. Moreover, it also ignores the golden rule: whoever has the gold makes the rules.

The failure to discuss funding alternatives also hampers the agency's decisionmaking process. NEPA's purpose is "to foster excellent actions."<sup>228</sup> NETL has a limited amount of money to be used to improve the environment through project funding. NETL's approval of any project is a rejection

of alternative uses for the money. NETL's position prevents the public from knowing why a particular project was approved and could make its EISs subject to potentially successful attack. Using the NEPA process to evaluate alternative uses of the available funds could improve the agency's decisions, and making the decisions concerning the funding of projects more transparent, which might help the agency achieve the optimal environmental protection from the money it has to allocate.

---

228. 40 C.F.R. §1500.1(c).