

# Notes and Sources

## Table Notes and Sources

**Note:** Tables indicated as sources in these notes refer to the tables in Appendixes A, B, C, and D of this report.

**Table 1. Estimated fuel economy for light-duty vehicles, based on proposed CAFE standards, 2010-2015:** National Highway Traffic Safety Administration, *Average Fuel Economy Standards: Passenger Cars and Light Trucks Model Years 2011-2015*, Notice of Proposed Rulemaking, 49 CFR Parts 523, 531, 533, 534, 536, and 537 [Docket No. NHTSA 2008-2009], RIN 2127-AK29 (Washington, DC, April 2008), pp. 14-15, web site [www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.43ac99aefa80569eea57529cd8a046a0](http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.43ac99aefa80569eea57529cd8a046a0).

**Table 2. State appliance efficiency standards and potential future actions:** Appliance Standards Awareness Project, web site [www.standardsasap.org](http://www.standardsasap.org), and various State web sites.

**Table 3. State renewable portfolio standards:** Energy Information Administration, Office of Integrated Analysis and Forecasting. Based on a review of enabling legislation and regulatory actions from the various States of policies identified by the Database of State Incentives for Renewable Energy (web site [www.dsireuse.org](http://www.dsireuse.org)) as of November 2008.

**Table 4. Key analyses from “Issues in Focus” in recent AEOs:** Energy Information Administration, *Annual Energy Outlook 2008*, DOE/EIA-0383(2008) (Washington, DC, June 2008); Energy Information Administration, *Annual Energy Outlook 2007*, DOE/EIA-0383(2007) (Washington, DC, February 2007); Energy Information Administration, *Annual Energy Outlook 2006*, DOE/EIA-0383(2006) (Washington, DC, February 2006).

**Table 5. Liquid fuels production in three cases, 2007 and 2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LP2009.D122308A, and HP2009.D121108A.

**Table 6. Assumptions used in comparing conventional and plug-in hybrid electric vehicles:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Table 7. Conventional vehicle and plug-in hybrid system component costs for mid-size vehicles at volume production:** Electric Power Research Institute, *Advanced Batteries for Electric-Drive Vehicles*, 1009299 (Palo Alto, CA, May 2004), web site [www.spinovation.com/sn/Batteries/Advanced\\_Batteries\\_for\\_Electric-Drive\\_Vehicles.pdf](http://www.spinovation.com/sn/Batteries/Advanced_Batteries_for_Electric-Drive_Vehicles.pdf). Note that this is one cost estimate among several that were used in the analysis and that PHEV system costs increase as the all-electric range of the vehicle increases.

**Table 8. Technically recoverable resources of crude oil and natural gas in the Outer Continental Shelf, as of January 1, 2007: Undiscovered Resources:** U.S. Department of the Interior, Minerals Management Service, Offshore Minerals Management Program, *Report to Congress: Comprehensive Inventory of U.S. OCS Oil and Natural Gas Resources* (Washington, DC, February 2006), web site [www.mms.gov/revaldiv/PDFs/FinalInvRptToCongress050106.pdf](http://www.mms.gov/revaldiv/PDFs/FinalInvRptToCongress050106.pdf). Table values reflect removal of intervening

reserve additions between January 1, 2003, and January 1, 2007. **Proved Reserves:** Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2007 Annual Report*, DOE/EIA-0216(2007) (Washington, DC, February 2009), web site [www.eia.doe.gov/oil\\_gas/natural\\_gas/data\\_publications/crude\\_oil\\_natural\\_gas\\_reserves/cr.html](http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/crude_oil_natural_gas_reserves/cr.html). **Inferred Reserves:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Table 9. Crude oil and natural gas production and prices in two cases, 2020 and 2030:** Tables A12, A14, and D14.

**Table 10. Estimated recoverable resources from oil shale in Colorado, Utah, and Wyoming:** U.S. Department of Energy, *Strategic Significance of America’s Oil Shale Resource, Volume II, Oil Shale Resources, Technology, and Economics* (Office of Naval Petroleum and Oil Shale Reserves, Washington, DC, March 2004), pp. 1-5, web site [www.fossil.energy.gov/programs/reserves/npr/publications/npr\\_strategic\\_significancev2.pdf](http://www.fossil.energy.gov/programs/reserves/npr/publications/npr_strategic_significancev2.pdf). Includes natural gas and natural gas liquids, which constitute 15 to 40 percent of the total recoverable Btu content, depending on the specific shale rock characteristics and the process used to extract the oil and natural gas.

**Table 11. Assumptions for comparison of three Alaska North Slope natural gas facility options: Gas Conversion Efficiency:** LNG facility efficiency does not include any LNG tanker losses while in transit; pipeline efficiency based on averages cited in documentation for the Alaska Gasline Inducement Act, web site <http://gov.state.ak.us/agia>; LNG and GTL losses based on levels cited in technical literature. Source: B. Patel, *Gas Monetisation: A Techno-Economic Comparison of Gas-To-Liquid and LNG* (Glasgow, Scotland: Foster Wheeler Energy Limited, 2005). **Capital Costs:** Gathering and treatment costs based on ConocoPhillips AGIA proposal costs. LNG capital costs based on liquefaction plant estimates provided by Robert Baron, a DOE Fossil Energy consultant, and prorated AGIA gas pipeline costs based on the mileage from the North Slope to Valdez, and escalated by 20 percent to reflect the cost of building over the Alaska Range mountains in a seismically active zone. GTL North Slope capital cost based on \$110,000 per daily stream barrel as cited in K. Nelson, “Legislators Told GTL a No-Go for ANS Gas,” *Petroleum News*, Vol. 12, No. 10 (March 11, 2007), web site [www.petroleumnews.com/pnads/786285153.shtml](http://www.petroleumnews.com/pnads/786285153.shtml). **Operating Costs:** Pipeline operating costs based on EIA’s NGTDM model values. LNG operating costs based on study by Robert Baron. GTL operating costs are based on EIA’s INGM model.

**Table 12. Average crude oil and natural gas prices in three cases, 2011-2020 and 2021-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LP2009.D122308A, and HP2009.D121108A.

**Table 13. Comparison of gasoline and natural gas passenger vehicle attributes:** Honda Motors, web site <http://automobiles.honda.com> (as of February 10, 2009). Data taken from Honda’s 2009-civic-sedan-fact.sheet.pdf and 2009-civic-gx-fact.sheet.pdf. Vehicle comparison based on 4-door sedans equipped with automatic transmission. The natural gas vehicle’s fuel gallon is “gasoline equivalent gallons” based on 3,600 pounds per square inch of natural gas cylinder pressure.

**Table 14. Summary projections for alternative GHG cases, 2020 and 2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008), web site [www.eia.doe.gov/aer](http://www.eia.doe.gov/aer). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, NORSK2009.D120908A, and CAP2009.D010909A.

**Table 15. Projections of annual average economic growth rates, 2007-2030: AEO2008 (reference case):** AEO2008 National Energy Modeling System, run AEO-2008.D030208F. **AEO2009 (reference case):** AEO2009 National Energy Modeling System, run AEO2009.D120908A. **IHSGI (November 2008):** IHS/Global Insight, Inc., *U.S. Macroeconomic 30 Year Trend Forecast* (Lexington, MA, November 2008). **OMB (June 2008):** Office of Management and Budget, *Mid-Session Review, Budget of the United States Government Fiscal Year 2009* (Washington, DC, June 2008). **CBO (January 2009):** Congressional Budget Office, *The Budget and Economic Outlook* (Washington, DC, January 2009). **INFORUM (December 2008):** INFORUM, email from Jeff Werling (December 8, 2008). **SSA (May 2008):** Social Security Administration, *OASDI Trustees Report* (Washington, DC, May 2008). **BLS (November 2007):** Bureau of Labor Statistics, *Macro Projections 2007*. **IEA (November 12, 2008):** International Energy Agency, *World Energy Outlook 2008* (Paris, France, September 2008). **Blue Chip Consensus (March 2008):** *Blue Chip Economic Indicators* (Aspen Publishers, March 10, 2008).

**Table 16. Projections of world oil prices, 2010-2030: AEO2008 reference case:** AEO2008 National Energy Modeling System, run AEO2008.D030208F. **AEO2008 high price case:** AEO2008 National Energy Modeling System, run HP2008.D031808A. **AEO2009 (reference case):** AEO2009 National Energy Modeling System, run AEO2009.D120908A. **DB:** Deutsche Bank AG, e-mail from Adam Sieminski (November 4, 2008). **IHSGI:** IHS/Global Insight, Inc., *U.S. Energy Outlook* (Lexington, MA, September 2008). **IEA (reference):** International Energy Agency, *World Energy Outlook 2008* (Paris, France, September 2008), Reference Scenario. **IER:** Institute of Energy Economics and the Rational Use of Energy at the University of Stuttgart, e-mail from Markus Blesl (December 4, 2008). **EVA:** Energy Ventures Analysis, Inc., e-mail from Roger Avalos (January 7, 2009). **SEER:** Strategic Energy and Economic Research, Inc., e-mail from Ron Denhardt (February 6, 2009).

**Table 17. Projections for energy consumption by sector, 2007 and 2030: AEO2009:** AEO2009 National Energy Modeling System, run AEO2009.D120908A. **IHSGI:** IHS/Global Insight, Inc., *U.S. Energy Outlook* (Lexington, MA, September 2008).

## Figure Notes and Sources

**Note:** Tables indicated as sources in these notes refer to the tables in Appendixes A, B, C, and D of this report.

**Figure 1. Total liquid fuels demand by sector: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 2. Total natural gas supply by source: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 3. New light-duty vehicle sales shares by type: History, Light Trucks:** Energy Information Administration, Office of Integrated Analysis and Forecasting using data from National Highway Traffic Safety Administration. **History, Passenger Cars:** National Highway Traffic Safety Administration, *New Passenger Car Fleet Average Characteristics*, web site [www.nhtsa.gov/cars/rules/CAFE/NewPassengerCarFleet.htm](http://www.nhtsa.gov/cars/rules/CAFE/NewPassengerCarFleet.htm). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, NORSK2009.D120908A, and CAP2009.D010909A.

**Figure 4. Proposed CAFE standards for passenger cars by vehicle footprint, model years 2011-2015:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 5. Proposed CAFE standards for light trucks by vehicle footprint, model years 2011-2015:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 6. Average fuel economy of new light-duty vehicles in the AEO2008 and AEO2009 projections, 1995-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **AEO2008 Projections:** AEO2008 National Energy Modeling System, run AEO2008.D030208F. **AEO2009 Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 7. Value of fuel saved by a PHEV compared with a conventional ICE vehicle over the life of the vehicles, by gasoline price and PHEV all-electric driving range:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 8. PHEV-10 and PHEV-40 battery and other system costs, 2010, 2020, and 2030:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 9. Incremental cost of PHEV purchase with EIEA2008 tax credit included compared with conventional ICE vehicle purchase, by PHEV all-electric driving range, 2010, 2020, and 2030:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 10. PHEV fuel savings and incremental vehicle cost by gasoline price and PHEV all-electric driving range, 2030:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 11. PHEV fuel savings and incremental vehicle cost by gasoline price and PHEV all-electric driving range, 2010 and 2020:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 12. PHEV annual fuel savings per vehicle by all-electric driving range:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 13. U.S. total domestic oil production in two cases, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009

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National Energy Modeling System, runs AEO2009.D120908A and OCSLIMITED.D120908A.

**Figure 14. U.S. total domestic dry natural gas production in two cases, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384 (2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A and OCSLIMITED.D120908A.

**Figure 15. Average internal rates of return for three Alaska North Slope natural gas facility options in three cases, 2011-2020:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 16. Average internal rates of return for three Alaska North Slope natural gas facility options in three cases, 2021-2030:** Energy Information Administration, Office of Integrated Analysis and Forecasting.

**Figure 17. Ratio of crude oil price to natural gas price in three cases, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LP2009.D122308A, and HP2009.D121108A.

**Figure 18. Cumulative additions to U.S. electricity generation capacity by fuel in four cases, 2008-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, FRZCST09.D121108A, INCCST09.D121208A, and DECCST09.D121108A.

**Figure 19. Electricity generation by fuel in four cases, 2007 and 2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384 (2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, FRZCST09.D121108A, INCCST09.D121208A, and DECCST09.D121108A.

**Figure 20. Electricity prices in four cases, 2007-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, FRZCST09.D121108A, INCCST09.D121208A, and DECCST09.D121108A.

**Figure 21. Installed renewable generation capacity, 1981-2007:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384 (2007) (Washington, DC, June 2008).

**Figure 22. Installed renewable generation capacity in two cases, 2007-2030: 2007:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A and PTC09.D010709A.

**Figure 23. Cumulative additions to U.S. generating capacity in three cases, 2008-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, NORRSK2009.D120908A, and CAP2009.D010909A.

**Figure 24. U.S. electricity generation by source in three cases, 2007 and 2030: 2007:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, NORRSK2009.D120908A, and CAP2009.D010909A.

**Figure 25. U.S. electricity prices in three cases, 2005-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, NORRSK2009.D120908A, and CAP2009.D010909A.

**Figure 26. Carbon dioxide emissions from the U.S. electric power sector in three cases, 2005-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, NORRSK2009.D120908A, and CAP2009.D010909A.

**Figure 27. Average annual growth rates of real GDP, labor force, and productivity in three cases, 2007-2030:** Appendix B, Table B4.

**Figure 28. Average annual inflation, interest, and unemployment rates in three cases, 2007-2030:** Appendix B, Table B4.

**Figure 29. Sectoral composition of industrial output growth rates in three cases, 2007-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, HM2009.D120908A, and LM2009.D120908A.

**Figure 30. Energy expenditures in the U.S. economy in three cases, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, HM2009.D120908A, and LM2009.D120908A.

**Figure 31. Energy expenditures as a share of gross domestic product, 1970-2030: History:** U.S. Department of Commerce, Bureau of Economic Analysis, and Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 32. World oil prices in three cases, 1980-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LP2009.D122308A, and HP2009.D121108A.

**Figure 33. Unconventional resources as a share of the world liquids market in three cases, 2007 and 2030: 2007:** Derived from Energy Information Administration, *International Energy Annual 2005* (June-October 2007), Table G.4, web site [www.eia.doe.gov/iea](http://www.eia.doe.gov/iea). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LP2009.D122308A, and HP2009.D121108A.

**Figure 34. World liquids production shares by region in three cases, 2007 and 2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LP2009.D122308A, and HP2009.D121108A.

**Figure 35. Energy use per capita and per dollar of gross domestic product, 1980-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 36. Primary energy use by end-use sector, 2007-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** Appendix A, Table A2.

**Figure 37. Primary energy use by fuel, 1980-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 38. Residential delivered energy consumption per capita in three cases, 1990-2030: History:** Energy Information Administration, “Consumption, Price, and Expenditure Estimates” (November 2008), web site [www.eia.doe.gov/emeu/states/\\_seds.html](http://www.eia.doe.gov/emeu/states/_seds.html), and *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, BLDFRZN.D121008A, and BLDHIGH.D121008A.

**Figure 39. Residential delivered energy consumption by fuel and service, 2007, 2015, and 2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 40. Efficiency gains for selected residential appliances in three cases, 2030:** Energy Information Administration, *Technology Forecast Updates—Residential and Commercial Building Technologies—Advanced Adoption Case* (Navigant Consulting, Inc., September 2007); and AEO2009 National Energy Modeling System, runs AEO2009.D120908A, BLDFRZN.D121008A, and BLDBEST.D121008A.

**Figure 41. Residential market penetration by renewable technologies in two cases, 2007, 2015, and 2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A and BLDFRZN.D121008A.

**Figure 42. Commercial delivered energy consumption per capita in three cases, 1980-2030: History:** Energy Information Administration, “Consumption, Price, and Expenditure Estimates” (November 2008), web site [www.eia.doe.gov/emeu/states/\\_seds.html](http://www.eia.doe.gov/emeu/states/_seds.html), and *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, BLDFRZN.D121008A, and BLDHIGH.D121008A.

**Figure 43. Commercial delivered energy consumption by fuel and service, 2007, 2015, and 2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 44. Efficiency gains for selected commercial equipment in three cases, 2030:** Energy Information Administration, *Technology Forecast Updates—Residential and Commercial Building Technologies—Advanced Adoption Case* (Navigant Consulting, Inc., September 2007); and AEO2009 National Energy Modeling System, runs AEO2009.D120908A, BLDFRZN.D121008A, and BLDBEST.D121008A.

**Figure 45. Additions to electricity generation capacity in the commercial sector in two cases, 2008-2016:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A and AEO2009NO.D121108A.

**Figure 46. Industrial delivered energy consumption by application, 2007-2030: History:** Energy Informa-

tion Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 47. Industrial energy consumption by fuel, 2000, 2007, and 2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 48. Cumulative growth in value of shipments for industrial subsectors in three cases, 2007-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, HM2009.D120908A, and LM2009.D120908A.

**Figure 49. Cumulative growth in delivered energy consumption for industrial subsectors in three cases, 2007-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, HM2009.D120908A, and LM2009.D120908A.

**Figure 50. Delivered energy consumption for transportation by mode, 2007 and 2030: 2007:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** Appendix A, Table A7.

**Figure 51. Average fuel economy of new light-duty vehicles in five cases, 1980-2030: History:** U.S. Department of Transportation, National Highway Traffic Safety Administration, *Summary of Fuel Economy Performance* (Washington, DC, January 2008), web site [www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/Vehicle%20Safety/Articles/Associated%20Files/SummaryFuelEconomyPerformance-2008.pdf](http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/Vehicle%20Safety/Articles/Associated%20Files/SummaryFuelEconomyPerformance-2008.pdf). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, AEO2008.D112607A, TRNLOW.D011409A, TRNHIGH.D011409A, HP2009.D121108A, and LP2009.D122308A.

**Figure 52. Sales of unconventional light-duty vehicles by fuel type, 2007, 2015, and 2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 53. Sales shares of hybrid light-duty vehicles by type in three cases, 2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 54. U.S. electricity demand growth, 1950-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A.

**Figure 55. Electricity generation by fuel in three cases, 2007 and 2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, NORSEK20009.D120908A, and CAP2009.D010909A.

**Figure 56. Electricity generation capacity additions by fuel type, 2007-2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 57. Levelized electricity costs for new power plants, 2020 and 2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 58. Average U.S. retail electricity prices in three cases, 1970-2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LM2009.D120908A, and HM2009.D120908A.

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**Figure 59. Electricity generating capacity at U.S. nuclear power plants in three cases, 2007, 2020, and 2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LM2009.D120908A, and HM2009.D120908A.

**Figure 60. Nonhydroelectric renewable electricity generation by energy source, 2007-2030: 2007:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** Appendix A, Table A16.

**Figure 61. Grid-connected electricity generation from renewable energy sources, 1990-2030:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 62. Nonhydropower renewable generation capacity in three cases, 2010-2030:** Appendix D, Table D10.

**Figure 63. Regional growth in nonhydroelectric renewable electricity generation, including end-use generation, 2007-2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 64. Lower 48 wellhead and Henry Hub spot market prices for natural gas, 1990-2030: History: Lower 48 wellhead prices:** Energy Information Administration, *Natural Gas Annual, 2006*, DOE/EIA-0131(2006) (Washington, DC, June 2008). **Henry Hub natural gas prices:** Energy Information Administration, *Short-Term Energy Outlook Query System*, Monthly Natural Gas Data, Variable NGHHMCF. **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 65. Lower 48 wellhead natural gas prices in five cases, 2007-2030: History:** Energy Information Administration, *Natural Gas Annual 2006*, DOE/EIA-0131(2007) (Washington, DC, June 2008). **Projections:** AEO-2009 National Energy Modeling System, runs AEO2009.D120908A, HM2009.D120908A, LM2009.D120908A, OGHTEC09.D121408A, and OGLTEC09.D121408A.

**Figure 66. Natural gas production by source, 1990-2030: History:** Energy Information Administration, Office of Integrated Analysis and Forecasting. **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 67. Total U.S. natural gas production in five cases, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, HP2009.D121108A, OGHTEC09.D121408A, LP2009.D122308A, and OGLTEC09.D121408A.

**Figure 68. Net U.S. imports of natural gas by source, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 69. Lower 48 wellhead prices for natural gas in two cases, 1990-2030: History:** Energy Information Administration, *Natural Gas Annual 2006*, DOE/EIA-0131(2006) (Washington, DC, June 2008). **Projections:** AEO-2009 National Energy Modeling System, runs AEO2009.D120908A and NOAK09.D121408A.

**Figure 70. Domestic crude oil production by source, 1990-2030: History:** Energy Information Administration, Office of Integrated Analysis and Forecasting. **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 71. Total U.S. crude oil production in five cases, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, HP2009.D121108A, OGHTEC09.D121408A, LP2009.D122308A, and OGLTEC09.D121408A.

**Figure 72. Liquids production from gasification and oil shale, 2007-2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 73. Liquid fuels consumption by sector, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 74. RFS credits earned in selected years, 2007-2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 75. Biofuel content of U.S. motor gasoline and diesel consumption, 2007, 2015, and 2030:** AEO-2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 76. Motor gasoline, diesel fuel, and E85 prices, 2007-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO-2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 77. Net import share of U.S. liquid fuels consumption in three cases, 1990-2030: History:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008). **Projections:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, LP2009.D122308A, and HP2009.D121108A.

**Figure 78. Coal production by region, 1970-2030: History (short tons): 1970-1990:** Energy Information Administration, *The U.S. Coal Industry, 1970-1990: Two Decades of Change*, DOE/EIA-0559 (Washington, DC, November 2002). **1991-2000:** Energy Information Administration, *Coal Industry Annual*, DOE/EIA-0584 (various years). **2001-2007:** Energy Information Administration, *Annual Coal Report 2007*, DOE/EIA-0584(2007) (Washington, DC, September 2008), and previous issues. **History (conversion to quadrillion Btu): 1970-2007: Estimation Procedure:** Energy Information Administration, Office of Integrated Analysis and Forecasting. Estimates of average heat content by region and year are based on coal quality data collected through various energy surveys (see sources) and national-level estimates of U.S. coal production by year in units of quadrillion Btu, published in EIA's *Annual Energy Review*. **Sources:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008), Table 1.2; Form EIA-3, "Quarterly Coal Consumption and Quality Report, Manufacturing Plants"; Form EIA-5, "Quarterly Coal Consumption and Quality Report, Coke Plants"; Form EIA-6A, "Coal Distribution Report"; Form EIA-7A, "Coal Production

Report”; Form EIA-423, “Monthly Cost and Quality of Fuels for Electric Plants Report”; Form EIA-906, “Power Plant Report”; Form EIA-920, “Combined Heat and Power Plant Report”; U.S. Department of Commerce, Bureau of the Census, “Monthly Report EM 545”; and Federal Energy Regulatory Commission, Form 423, “Monthly Report of Cost and Quality of Fuels for Electric Plants.” **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A. **Note:** For 1989-2030, coal production includes waste coal.

**Figure 79. U.S. coal production in four cases, 2007, 2015, and 2030:** AEO2009 National Energy Modeling System, runs AEO2009.D120908A, CAP2009.D010909A, NORSEK2009.D120908A, LCCST09.D121608A, and HCCST09.D121608A. **Note:** Coal production includes waste coal.

**Figure 80. Average minemouth coal prices by region, 1990-2030: History (dollars per short ton): 1990-2000:** Energy Information Administration, *Coal Industry Annual*, DOE/EIA-0584 (various years). **2001-2007:** Energy Information Administration, *Annual Coal Report 2007*, DOE/EIA-0584 (2007) (Washington, DC, September 2008), and previous issues. **History (conversion to dollars per million Btu): 1970-2007:** Estimation Procedure: Energy Information Administration, Office of Integrated Analysis and Forecasting. Estimates of average heat content by region and year based on coal quality data collected through various energy surveys (see sources) and national-level estimates of U.S. coal production by year in units of quadrillion Btu published in EIA’s *Annual Energy Review*. **Sources:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008), Table 1.2; Form EIA-3, “Quarterly Coal Consumption and Quality Report, Manufacturing Plants”; Form EIA-5, “Quarterly Coal Consumption and Quality Report, Coke Plants”; Form EIA-6A, “Coal Distribution Report”; Form EIA-7A, “Coal Production Report”; Form EIA-423, “Monthly Cost and Quality of Fuels for Electric Plants

Report”; Form EIA-906, “Power Plant Report”; and Form EIA-920, “Combined Heat and Power Plant Report”; U.S. Department of Commerce, Bureau of the Census, “Monthly Report EM 545”; and Federal Energy Regulatory Commission, Form 423, “Monthly Report of Cost and Quality of Fuels for Electric Plants.” **Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A. **Note:** Includes reported prices for both open-market and captive mines.

**Figure 81. Carbon dioxide emissions by sector and fuel, 2007 and 2030: History: 1980-2006:** Energy Information Administration, *Annual Energy Review 2007*, DOE/EIA-0384(2007) (Washington, DC, June 2008), Table 12.2. **2007:** Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2007*, DOE/EIA-0573(2007) (Washington, DC, December 2008). **2030:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 82. Sulfur dioxide emissions from electricity generation, 1995-2030: History: 1995:** U.S. Environmental Protection Agency, *National Air Pollutant Emissions Trends, 1990-1998*, EPA-454/R-00-002 (Washington, DC, March 2000). **2000:** U.S. Environmental Protection Agency, *Acid Rain Program Preliminary Summary Emissions Report, Fourth Quarter 2004*, web site [www.epa.gov/airmarkets/emissions/prelimarp/index.html](http://www.epa.gov/airmarkets/emissions/prelimarp/index.html). **2007 and Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.

**Figure 83. Nitrogen oxide emissions from electricity generation, 1995-2030: History: 1995:** U.S. Environmental Protection Agency, *National Air Pollutant Emissions Trends, 1990-1998*, EPA-454/R-00-002 (Washington, DC, March 2000). **2000:** U.S. Environmental Protection Agency, *Acid Rain Program Preliminary Summary Emissions Report, Fourth Quarter 2004*, web site [www.epa.gov/airmarkets/emissions/prelimarp/index.html](http://www.epa.gov/airmarkets/emissions/prelimarp/index.html). **2007 and Projections:** AEO2009 National Energy Modeling System, run AEO2009.D120908A.