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Assumptions to the Annual Energy Outlook 2010

Table 1.1. Summary of *AEO2010* Cases

Case name	Description	Integration mode
Reference	Baseline economic growth (2.4 percent per year from 2008 through 2035), world oil price, and technology assumptions. Complete projection tables in Appendix A.	Fully integrated
Low Economic Growth	Real GDP grows at an average annual rate of 1.8 percent from 2008 to 2035. Other energy market assumptions are the same as in the Reference case. Partial projection tables in Appendix B.	Fully integrated
High Economic Growth	Real GDP grows at an average annual rate of 3.0 percent from 2008 to 2035. Other energy market assumptions are the same as in the Reference case. Partial projection tables in Appendix B.	Fully integrated
Low Oil Price	More optimistic assumptions for economic access to non-OPEC resources and OPEC behavior than in the Reference case. World light, sweet crude oil prices are $51 per barrel in 2035, compared with $133 per barrel in the Reference case (2008 dollars). Other assumptions are the same as in the Reference case. Partial projection tables in Appendix C.	Fully integrated
High Oil Price	More pessimistic assumptions for economic access to non-OPEC resources and OPEC behavior than in the Reference case. World light, sweet crude oil prices are about $210 per barrel (2008 dollars) in 2035. Other assumptions are the same as in the Reference case. Partial projection tables in Appendix C.	Fully integrated
Extended Policy	Begins with the Reference case and selectively extends PTC, ITC, and other energy efficiency tax credit policies with sunset provisions, and promulgates new efficiency standards as they satisfy the EERE consumer-related cost effectiveness criteria. Introduces new CAFE and tailpipe emissions proposal. Partial projection tables in Appendix D	Fully integrated
No Sunset	Begins with the Reference case and extends all energy policies and legislation with sunset provisions, except those requiring additional funding (e.g., loan guarantee programs). Also extends the RFS requirement to the 36 billion by 2026 and continues increasing proportional to transport demand thereafter. Partial projection tables in Appendix D	Fully integrated
Residential: 2009 Technology	Future equipment purchases based on equipment available in 2009. Existing building shell efficiencies fixed at 2009 levels. Partial projection tables in Appendix D.	With commercial
Residential: High Technology	Earlier availability, lower costs, and higher efficiencies assumed for more advanced equipment. Building shell efficiencies for new construction meet ENERGY STAR requirements after 2016. Consumers evaluate efficiency investments at 7 percent real. Partial projection tables in Appendix D.	With commercial
Residential: Best Available Technology	Future equipment purchases and new building shells based on most efficient technologies available by fuel. Building shell efficiencies for new construction meet the criteria for most efficient components after 2009. Partial projection tables in Appendix D.	With commercial
Commercial: 2009 Technology	Future equipment purchases based on equipment available in 2009. Building shell efficiencies fixed at 2009 levels. Partial projection tables in Appendix D.	With residential
Commercial: HighTechnology	Earlier availability, lower costs, and higher efficiencies for more advanced equipment. Energy efficiency investments evaluated at 7 percent real. Building shell efficiencies for new and existing buildings increase by 17.4 and 7.5 percent, respectively, from 2003 values by 2035. Partial projection tables in Appendix D.	With residential
Commercial: Best Available Technology	Future equipment purchases based on most efficient technologies available by fuel. Building shell efficiencies for new and existing buildings increase by 20.8 and 9.0 percent, respectively, from 2003 values by 2035. Partial projection tables in Appendix D.	With residential
Industrial: 2010 Technology	Efficiency of plant and equipment fixed at 2010 levels. Partial projection tables in Appendix D.	Standalone
Industrial: High Technology	Earlier availability, lower costs, and higher efficiencies for more advanced equipment. Partial projection tables in Appendix D.	Standalone

Table 1.1. Summary of *AEO2010* Cases (cont.)

Case name	Description	Integration mode
Transportation: Low Technology	Advanced technologies are more costly and less efficient than in the Reference case. Partial projection tables in Appendix D.	Standalone
Transportation: High Technology	Advanced technologies are less costly and more efficient than in the Reference case. Partial projection tables in Appendix D.	Standalone
Transportation: Reference Case 2019 Phaseout With Base Market Potential	Modified Reference case incorporating lower incremental costs for all classes of heavy-duty natural gas vehicles and tax incentives for natural gas refueling stations and natural gas fuel beginning in 2011 and phased out by 2019. Partial projection tables in Appendix D.	Fully Integrated
Transportation: Reference Case 2027 Phaseout With Expanded Market Potential	Modified Reference case incorporating lower incremental costs for all classes of heavy-duty natural gas vehicles and tax incentives for natural gas refueling stations and natural gas fuel beginning in 2011 and phased out by 2027, with assumed increases in 2035 market shares for all classes of heavy-duty natural gas vehicles. Partial projection tables in Appendix D.	Fully integrated
Transportation: Low Oil Price Case 2019 Phaseout With Base Market Potential	Modified Low Oil Price case incorporating lower incremental costs for all classes of heavy-duty natural gas vehicles and tax incentives for natural gas refueling stations and natural gas fuel beginning in 2011 and phased out by 2019. Partial projection tables in Appendix D.	Fully integrated
Transportation: Low Oil Price Case 2027 Phaseout With Expanded Market Potential	Modified Low Oil Price case incorporating lower incremental costs for all classes of heavy-duty natural gas vehicles and tax incentives for natural gas refueling stations and natural gas fuel beginning in 2011 and phased out by 2027, with assumed increases in 2035 market shares for all classes of heavy-duty natural gas vehicles. Partial projection tables in Appendix D.	Fully Integrated
Electricity: Low Fossil Technology Cost	Capital and operating costs for all new fossil-fired generating technologies start 10 percent below the Reference case and decline to 25 percent below the Reference case in 2035. Partial projection tables in Appendix D.	Fully Integrated
Electricity: High Fossil Technology Cost	Costs for new advanced fossil-fired generating technologies do not improve over time due to learning from 2010. Partial projection tables in Appendix D.	Fully Integrated
Electricity: Low Nuclear Cost	Capital and operating costs for new nuclear capacity start 10 percent lower than in the Reference case and fall to 25 percent lower in 2035. Partial projection tables in Appendix D.	Fully Integrated
Electricity: High Nuclear Costs	Costs for new nuclear technology do not improve due to learning from 2010 levels in the Reference case. Partial projection tables in Appendix D.	Fully Integrated
Electricity: Nuclear 60 Year Life	All existing nuclear plants are retired after 60 years of operation. Partial projection tables in Appendix D	Fully Integrated
Renewable Fuels: Low Renewable Technology Cost	Levelized cost of energy for nonhydropower renewable generating technologies start 10 percent lower in 2010 and decline by 25 percent in 2035 from Reference case values. Partial projection tables in Appendix D.	Fully integrated
Renewable Fuels: High Renewable Technology Cost	New renewable generating technologies do not improve through learning over time from 2010. Partial projection tables in Appendix D.	Fully integrated
Oil and Gas: Slow Technology	The improvements in exploration and development costs, production rates, and success rates due to technological advancement are reduced 50 percent to reflect slower improvement than in the Reference case. Partial projection tables in Appendix D.	Fully integrated

Table 1.1. Summary of *AEO2010* Cases (cont.)

Case name	Description	Integration mode
Oil and Gas: Rapid Technology	The improvements in exploration and development costs, production rates, and success rates due to technological advancement are increased 50 percent to reflect more rapid improvement than in the Reference case. Partial projection tables in Appendix D.	Fully integrated
Oil and Gas: No Low Permeability Gas Drilling	No drilling is permitted in onshore, lower 48 low permeability natural gas reservoirs after 2009 (i.e. no new tight gas or shale gas drilling). Partial projection tables in Appendix D.	Fully Integrated
Oil and Gas: No Shale Gas Drilling	No drilling is permitted in onshore, lower 48 shale gas reservoirs after 2009 (i.e. no new shale gas drilling). Partial projection tables in Appendix D	Fully Integrated
Oil and Gas: High Shale Resource	Shale gas resources in the onshore, lower 48 are assumed to be higher than in the Reference case. Partial projection tables in Appendix D	Fully Integratefd
Oil and Gas: High LNG Supply	LNG imports into North America are set exogenously to a factor times the levels projected in the Reference case from 2010 forward. The factor starts at 1.0 in 2010 and increases linearly to 5.0 in 2035. Partial projection tables in Appendix D.	Fully integrated
Coal: Low Coal Cost	Productivity growth rates for coal mining are higher than in the Reference case, and coal mining wages, mine equipment, and coal transportation rates are lower. Partial projection tables in Appendix D.	Fully Integrated
Coal: High Coal Cost	Productivity growth rates for coal mining are lower than in the Reference case, and coal mining wages, mine equipment, and coal transportation rates are higher. Partial projection tables in Appendix D.	Fully integrated
Integrated Low Technology	Combination of the Residential, Commercial, and Industrial 2010 Technology cases and the Electricity High Fossil Technology Cost, High Renewable Technology Cost, and High Nuclear Cost cases. Partial projection tables in Appendix D.	Fully integrated
Integrated High Technology	Combination of the Residential, Commercial, Industrial, and Transportation High Technology cases and the Electricity Low Fossil Technology Cost, Low Renewable Technology Cost, and Low Nuclear Cost cases. Partial projection tables in Appendix D.	Fully integrated
No GHG Concerns	No greenhouse gas emissions reduction policy is enacted, and market investment decisions are not altered in anticipation of such a policy.	Fully Integrated

Table 1.2. Carbon Dioxide Emission Factors

(million metric tons carbon dioxide equivalent per quadrillion Btu)

Fuel Type	Carbon Dioxide Coefficient at Full Combustion	Combustion Fraction	Adjusted Emissions Factor
Petroleum			
Motor Gasoline (net of ethanol)	70.88	1.000	70.88
Liquefied Petroleum Gas			
Used as Fuel	63.01	1.000	63.01
Used as Feedstock	61.47	0.200	12.29
Jet Fuel	70.88	1.000	70.88
Distillate Fuel (net of biodiesel)	73.15	1.000	73.15
Residual Fuel	78.80	1.000	78.80
Asphalt and Road Oil	75.61	0.000	0.00
Lubricants	74.21	0.500	37.11
Petrochemical Feedstocks	69.85	0.392	27.40
Kerosene	72.31	1.000	72.31
Petroleum Coke	102.12	0.775	79.15
Petroleum Still Gas	64.20	1.000	64.20
Other Industrial	74.54	1.000	74.54
Coal			
Residential and Commercial	95.35	1.000	95.35
Metallurgical	93.71	1.000	93.71
Coke	114.14	1.000	114.14
Industrial Other	93.98	1.000	93.98
Electric Utility[1]	94.70	1.000	94.70
Natural Gas			
Used as Fuel	53.06	1.000	53.06
Used as Feedstocks	53.06	0.503	26.67

[1]Emission factors for coal used for electricity generation are specified by coal supply region and types of coal, so the average carbon dioxide contents for coal varies throughout the projection. The 2008 average is 94.70.

Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2008, DOE/EIA-0573(2008),* (Washington, DC, December 2009).