

Appendix A: Handling of federal and selected state legislation and regulation in the AEO

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Legislation	Brief description	AEO handling	Basis
Residential sector			
A. National Appliance Energy Conservation Act of 1987	Requires Secretary of Energy to set minimum efficiency standards for 10 appliance categories with periodic updates	Included for categories represented in the AEO residential sector forecast.	Public Law 100-12.
a. Room air conditioners	Sets standards for room air conditioners in 2014.	Require new purchases of room air conditioners to meet the standard.	Federal Register Notice of Final Rulemaking.
b. Central air conditioners and heat pumps	Sets standards for central air conditioners in 2015.	Require new purchases of other air conditioners to meet the standard.	Federal Register Notice of Final Rulemaking.
c. Water heaters	Sets standards for water heaters in 2015.	Require new purchases of water heaters to meet the standard.	Federal Register Notice of Final Rulemaking.
d. Refrigerators and freezers	Sets standards for refrigerators and freezers in 2014.	Require new purchases of refrigerators/freezers to meet the standard.	Federal Register Notice of Final Rulemaking.
e. Dishwashers	Sets standards for dishwasher in 2010.	Require new purchases of dishwashers to meet the standard.	Federal Register Notice of Final Rulemaking.
f. Fluorescent lamp ballasts	Sets standards for fluorescent lamp ballasts in 2005.	Require new purchases of fluorescent lamp ballasts to meet the standard.	Federal Register Notice of Final Rulemaking.
g. Clothes washers	Sets standards for clothes washers in 2011.	Require new purchases of clothes washers to meet the standard.	Federal Register Notice of Final Rulemaking.
h. Furnaces	Sets standards for furnaces in 2013.	Require new purchases of furnaces to meet the standard.	Federal Register Notice of Final Rulemaking.
i. Clothes dryers	Sets standards for clothes dryers in 2015.	Require new purchases of clothes dryers to meet the standard.	Federal Register Notice of Final Rulemaking.
j. Boilers	Sets standards for boilers in 2012.	Require new purchases of boilers to meet the standard.	Federal Register Notice of Final Rulemaking.
B. Energy Policy Act of 1992 (EPACT1992)			Public Law 102-486
a. Building codes	For the IECC 2006, specifies whole house efficiency minimums.	Assumes that all states adopt the IECC 2006 code by 2017.	Trend of states adoption to codes, allowing for lead times for enforcement and builder compliance.
b. Various lighting types	Sets standards for various lightig types in 2012.	Require new purchases of various lighting types to meet the standards.	Federal Register Notice of Final Rulemaking.
C. Energy Policy Act of 2005 (EPACT2005)			Public Law 109-58.
a. Torchiere lamp standard	Sets standard for torchiere lamps in 2006.	Requires new purchases of torchiere bulbs to meet the standard.	Federal Register Notice of Final Rulemaking.
b. Compact fluorescent lamp standard	Sets standard for fluorescent lamps in 20006.	Requires new purchases of compact fluorescent bulbs to meet the standard.	Federal Register Notice of Final Rulemaking.

Legislation	Brief description	AEO handling	Basis
c. Ceiling fan light kit standard	Sets standard for ceiling fans and ceiling fan light kits in 2007.	Reduce lighting electricity consumption by appropriate amount.	Number of ceiling fan shipments and estimated kWh savings per unit determine overall savings.
d. Dehumidifier standard	Sets standard for dehumidifiers in 2012.	Reduce dehumidifier electricity consumption by appropriate amount.	Number of dehumidifier shipments and estimated kWh savings per unit determine overall savings.
e. Energy-efficient equipment tax credit	Purchasers of certain energy-efficient equipment can claim tax credits in 2006 and 2007.	Reduce cost of applicable equipment by specified amount.	
f. New home tax credit	Builders receive \$1000 or \$2000 tax credit if they build homes 30 or 50 percent better than code in 2006 and 2007.	Reduce shell package cost for these homes by specified amount.	Cost reductions to consumers are assumed to be 100 percent of the builder's tax credit.
g. Energy-efficient appliance tax credit	Producers of energy-efficient refrigerators, dishwashers, and clothes washers receive tax credits for each unit they produce that meets certain efficiency specifications	Assume the cost savings are passed on to the consumer, reducing the price of the appliance by the specified amount.	Cost reductions to consumers are assumed to be 100 percent of the producer's tax credit.
D. Energy Independence and Security Act of 2007 (EISA 2007)			Public Law 110-140.
a. General service incandescent lamp standard	Require less wattage for bulbs in 2012-2014 and 2020.	Reduce wattage for new bulbs by 28 percent in 2013 and 67 percent in 2020.	Federal Register Notice of Final Rulemaking.
b. External power supply standard	Sets standards for external power supplies in 2008.	Reduce external power supply electricity consumption by appropriate amount.	Number of shipments and estimated kWh savings per unit determine overall savings.
c. Manufactured housing code	Require manufactured homes to meet latest IECC in 2011.	Require that all manufactured homes shipped after 2011 meet the IECC 2006	EISA 2007.
E. Energy Improvement and Extension Act of 2008 (EIEA 2008)			Public Law 110-343.
a. Energy-efficient equipment tax credit	Purchasers of certain energy-efficient equipment can claim tax credits through 2016.	Reduce the cost of applicable equipment by specified amount.	EIEA 2008.
b. Energy-efficient appliance tax credit	Producers of energy-efficient refrigerators, clothes washers, and dishwashers receive tax credits for each unit they produce that meets certain efficiency specifications, subject to an annual cap.	Assume the cost savings are passed on to the consumer, reducing the price of the appliance by the specified amount.	Cost reductions to consumer are assumed to be 100 percent of the producer's tax credit.

Legislation	Brief description	AEO handling	Basis
F. American Recovery and Reinvestment Act of 2009			Public Law 111-5.
a. Energy-efficient equipment tax credit	Increases cap to \$1500 of energy-efficient equipment specified under Section C(d) above. Removes cap for PV, wind, and ground-source heat pumps	Reduce the cost of applicable equipment by specified amount.	EPACT 2005 and ARRA 2009.
b. Weatherization and State Energy Programs	Increases funding for weatherization and other programs to increase the energy efficiency of existing housing stock.	Apply annual funding amount to existing housing retrofits. Savings for heating and cooling based on \$2600 per home investment as specified in weatherization program evaluation.	ARRA 2009.
G. Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010			Public Law 111-312.
a. Energy-efficient equipment tax credit	Extends tax credits for some energy-efficient equipment, generally to EISA 2007 amounts.	Reduce the cost of applicable equipment by specified amount.	
Commercial sector			
A. National Appliance Energy Conservation Act of 1987	Requires Secretary of Energy to set minimum efficiency standards for 10 appliance categories.	Included for categories represented in the AEO commercial sector forecast.	
a. Room air conditioners		Current standard of 9.8 EER increasing to 10.9 CEER in 2014.	Federal Register Notice of Final Rulemaking.
b. Other residential-size air conditioners (<5.4 tons)		10 SEER before 2006 for central air conditioning and heat pumps; 13 SEER in 2006; 14 SEER in 2015.	Federal Register Notice of Final Rulemaking.
c. Fluorescent lamp ballasts		Current standard of 0.90 power factor and minimum efficacy factor for F40 and F96 lamps based on lamp size and wattage, increasing to higher efficacy factor in 2005 that limits purchases to electronic ballasts.	Federal Register Notice of Final Rulemaking.
B. Energy Policy Act of 1992 (EPACT92)			
a. Building codes		Incorporated in commercial building shell assumptions. Efficiency of new relative to existing shell represented in shell efficiency indices. Assumes shell efficiency improves 6.9 and 15.0 percent by 2040 for existing buildings and new construction, respectively.	Based on Science Applications International Corporation commercial shell indices for 2003 developed for EIA in 2008 and 2011.
b. Window labeling	Designed to help consumers determine which windows are more energy efficient.	Incorporated in commercial building shell assumptions. Efficiency of new relative to existing shell represented by shell efficiency indices. Assume shell efficiency improves 6.9 and 15.0 percent by 2040 for existing buildings and new construction, respectively.	Based on Science Applications International Corporation commercial shell indices for 2003 developed for EIA in 2008 and 2011.
c. Commercial furnaces and boilers		Gas-fired furnaces and boilers: Current standard is 0.80% thermal efficiency. Oil furnaces and boilers: Current standard is 0.81% thermal efficiency for furnaces, 0.83% thermal efficiency for boilers.	Public Law 102-486: EPACT92. Federal Register Notice of Final Rulemaking.

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d. Commercial air conditioners and heat pumps		Air-cooled air conditioners and heat pumps less than 135,000 Btu: 2001 standard of 8.9 EER. Air-cooled air conditioners and heat pumps greater than 135,000 Btu: 2001 standard of 8.5 EER.	Public Law 102-486: EPACT92.
e. Commercial water heaters		Natural gas and oil: EPACT standard 0.78-percent thermal efficiency increasing to 80-percent thermal efficiency for gas units in 2003.	Public Law 102-486: EPACT92. Federal Register Notice of Final Rulemaking.
f. Lamps		Incandescent: 16.9 lumens per watt. Fluorescent 75 and 80 lumens per watt for 4-and 8-foot lamps, respectively.	
g. Electric motors	Specifies minimum efficiency levels for a variety of motor types and sizes.	End-use services modeled at the equipment level. Motors contained in new equipment must meet the standards.	Public Law 102-486: EPACT92.
h. Federal energy management	Requires federal agencies to reduce energy consumption 20 percent by 2000 relative to 1995.	Superseded by Executive Order 13123, EPACT05, and EISA07.	Superseded by Executive Order 13123.
i. Business investment energy credit	Provides a permanent 10-percent investment tax credit for solar property.	Tax credit incorporated in cash flow for solar generation systems. Investment cost reduced 10 percent for solar water heaters.	Public Law 102-486: EPACT92
C. Executive Order 13123. Greening the Government Through Efficient Energy Management	Requires federal agencies to reduce energy consumption 30 percent by 2005 and 35 percent by 2010 relative to 1985 through life-cycle cost-effective energy measures.	Superseded by EPACT05 and EISA07.	Superseded by EPACT05 and EISA07.
D. Energy Policy Act of 2005 (EPACT05)			
a. Commercial package air conditioners and heat pumps	Sets minimum efficiency levels in 2010.	Air-cooled air conditioners/heat pumps less than 135,000 Btu: standard of 11.2/11.0 EER and heating COP of 3.3. Air-cooled air conditioners/heat pumps greater than 135,000 Btu: standard of 11.0/10.6 EER and heating COP of 3.2.	Public Law 109-58: EPACT05.
b. Commercial refrigerators, freezers, and automatic icemakers	Sets minimum efficiency levels in 2010.	Set standard by level of improvement above stock average efficiency in 2003.	Public Law 190-58: EPACT05.
c. Lamp ballasts	Bans manufacture or import of mercury vapor lamp ballasts in 2008. Sets minimum efficacy level for T12 energy saver ballasts in 2009 and 2010 based on application.	Remove mercury vapor lighting system from technology choice menu in 2008. Set minimum efficacy of T12 ballasts at specified standard levels.	Public Law 102-58: EPACT05.
d. Compact fluorescent lamps	Sets standard for medium base lamps at ENERGY STAR requirements in 2006.	Set efficacy level of compact fluorescent lamps at required level.	Public Law 109-58: EPACT05.

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e. Illuminated exit signs and traffic signals	Set standards at ENERGY STAR requirements in 2006.	Reduce miscellaneous electricity consumption by appropriate amount.	Number of shipments, share of shipments that currently meet standard, and estimated kWh savings per unit determine overall savings.
f. Distribution transformers	Sets standard as National Electrical Manufacturers Association Class I Efficiency levels in 2007.	Effects of the standard are included in estimating the share of miscellaneous electricity consumption attributable to transformer losses.	Public Law 109-58: EPACT05.
g. Pre-rinse spray valves	Sets maximum flow rate to 1.6 gallons per minute in 2006.	Reduce energy use for water heating by appropriate amount.	Number of shipments, share of shipments that currently meet standard, and estimated kWh savings per unit determine overall savings.
h. Federal energy management	Requires federal agencies to reduce energy consumption 20 percent by 2015 relative to 2003 through life-cycle cost-effective energy measures.	The federal “share” of the commercial sector uses the 10-year Treasury note rate as a discount rate in equipment purchase decisions as opposed to adding risk premiums to the 10-year Treasury note rate to develop discount rates for other commercial decisions	Public law 109-58: EPACT05. Superseded by EISA07.
i. Business investment tax credit for fuel cells and microturbines	Provides a 30-percent investment tax credit for fuel cells and a 10-percent investment tax credit for microturbines installed in 2006 through 2008.	Tax credit incorporated in cash flow for fuel cells and microturbines.	Public Law 109-58: EPACT05. Extended through 2008 by Public Law 109-432. Extended through 2016 by EIEA08.
j. Business solar investment tax credit	Provides a 30-percent investment tax credit for solar property installed in 2006 through 2008.	Tax credit incorporated in cash flow for solar generation systems. Investment cost reduced 30 percent for solar water heaters.	Public Law 109-58: EPACT05. Extended through 2008 by Public Law 109-432. Extended through 2016 by EIEA08.
E. Energy Independence and Security Act of 2007 (EISA07)			
a. Commercial walk-in coolers and walk-in freezers	Requires use of specific energy efficiency measures in equipment manufactured in or after 2009.	Set standard by equivalent level of improvement above stock average efficiency in 2003.	Public Law 110-140: EISA07.
b. Incandescent and halogen lamps	Sets maximum allowable wattage based on lumen output starting in 2012.	Remove incandescent and halogen general service lighting systems that do not meet standard from technology choice menu in 2012.	Public Law 110-140: EISA07.
c. Metal halide lamp ballasts	Sets minimum efficiency levels for metal halide lamp ballasts starting in 2009.	Remove metal halide lighting systems that do not meet standard from technology choice menu in 2009. Set minimum system efficiency to include specified standard levels for ballasts -ranging from 88 to 94 percent based on ballast type.	Public Law 110-140: EISA07.
d. Federal use of energy-efficient lighting	Requires use of energy-efficient lighting fixtures and bulbs in federal buildings to the maximum extent possible starting in 2009.	Increase proportion of sector using 10 year treasury note rate for lighting purchase decisions to represent all existing and new federal floorspace in 2009.	Public Law 110-140: EISA07.

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e. Federal energy management	Requires federal agencies to reduce energy consumption per square foot 30 percent by 2015 relative to 2003 through life-cycle cost-effective energy measures.	The federal “share” of the commercial sector uses the 10-year Treasury note rate as a discount rate in equipment purchase decisions as opposed to adding risk premiums to the 10-year Treasury note rate to develop discount rates for other commercial decisions.	Public Law 110-140: EISA07.
F. Energy Improvement and Extension Act of 2008 (EIEA08)			
a. Business solar investment tax credit	Extends the EPACT05 30-percent investment tax credit for solar property through 2016.	Tax credit incorporated in cash flow for solar generation systems. Investment cost reduced 30 percent for solar water heaters.	Public Law 110-343: EIEA08.
b. Business investment tax credit for fuel cells and microturbines	Extends the EPACT05 30-percent investment tax credit for fuel cells and 10-percent investment tax credit for microturbines through 2016.	Tax credit incorporated in cash flow for fuel cells and microturbines.	Public Law 110-343: EIEA08
c. Business investment tax credit for CHP systems	Provides a 10-percent investment tax credit for CHP systems installed in 2009 through 2016	Tax credit incorporated in cash flow for CHP systems.	Public Law 110-343: EIEA08.
d. Business investment tax credit for small wind turbines	Provides a 30-percent investment tax credit for wind turbines installed in 2009 through 2016.	Tax credit incorporated in cash flow for wind turbine generation systems.	Public Law 110-343: EIEA08.
e. Business investment tax credit for geothermal heat pumps	Provides a 10-percent investment tax credit for geothermal heat pump systems installed in 2009 through 2016.	Investment cost for geothermal heat pump systems reduced 10 percent.	Public Law 110-343: EIEA08.
G. American Recovery and Reinvestment Act of 2009 (ARRA09)			
a. Business investment tax credit for small wind turbines	Removes the cap on the EIEA08 30-percent investment tax credit for wind turbines through 2016.	Tax credit incorporated in cash flow for wind turbine generation systems.	Public Law 111-5: ARRA09.
b. Stimulus funding to federal agencies	Provides funding for efficiency improvement in federal buildings and facilities.	Increase the proportion of sector using the 10-year Treasury note rate for purchase decisions to include all existing and new federal floorspace in years stimulus funding is available to account for new, replacement, and retrofit projects. Assume some funding is used for solar generation, small wind turbine, and fuel cell installations.	Public Law 111-5: ARRA09.
c. State Energy Program funding and energy efficiency and conservation block grants	Provides grants for state and local governments for energy efficiency and renewable energy purposes. State Energy Program funding conditioned on enactment of new building codes.	Increase the proportion of sector using the 10-year Treasury note rate for purchase decisions to include all public buildings in years stimulus funding is available. Increase new building shell efficiency to 10 percent better than 2003 by 2018 for improved building codes. Assume some funding is used for solar generation and small wind turbine systems.	Public Law 111-5: ARRA09.
d. Funding for smart grid projects	Provides funding for smart grid demonstration projects.	Assume smart grid technologies cause consumers to become more responsive to electricity price changes by increasing the price elasticity of demand for certain end uses.	Public Law 111-5; ARRA09.

Legislation	Brief description	AEO handling	Basis
Industrial sector			
A. Energy Policy Act of 1992 (EPACT92)			
a. Motor efficiency standards	Specifies minimum efficiency levels for a variety of motor types and sizes.	New motors must meet the standards.	Standard specified in EPACT92. 10 CFR 431.
b. Boiler efficiency standards	Specifies minimum combustion efficiency for package boilers larger than 300,000 Btu/hr. Natural Gas boilers: 80 percent, oil boilers: 83 percent.	All package boilers are assumed to meet the efficiency standards. While the standards do not apply to field-erected boilers, which are typically used in steam-intensive industries, we assume they meet the standard in the AEO.	Standard specified in EPACT92. 10 CFR 431.
B. Clean Air Act Amendments (CAAA90)			
a. Process emissions	Numerous process emissions requirements for specified industries and/or activities.	Not modeled because they are not directly related to energy projections.	CAAA90, 40 CFR 60.
b. Emissions related to hazardous/toxic substances	Numerous emissions requirements relative to hazardous and/or toxic substances.	Not modeled because they are not directly related to energy projections.	CAAA90, 40 CFR 60.
c. Industrial SO ₂ emissions	Sets annual limit for industrial SO ₂ emissions at 5.6 million tons. If limit is reached, specific regulations could be implemented.	Industrial SO ₂ emissions are not projected to reach the limit (Source: EPA, National Air Pollutant Emissions Trends:1990-1998, EPA-454/R-00-002, March 2000, p. 4-3.)	CAAA90, Section 406 (42 USC 7651)
d. Industrial boiler hazardous air pollutants	Requires industrial boilers and process heaters to conduct periodic tune-ups or meet emissions limits on HAPs to comply with the Maximum Achievable Control Technology (MACT) Floor. Regulations finalized December 2012.	Costs of compliance that are not offset by efficiency gains (non-recoverable costs) modeled as an additional capital cost in the Macroeconomic Activity Module (MAM) based on proposed regulations as of September 2012.	U.S. Environmental Protection Agency, National Emissions Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers, Major Source (40 CFR 63, Subpart DDDDD) and Area Source (40 CFR 63 Part JJJJJ)
e. Emissions from stationary diesel engines	Requires engine manufacturers to meet the same emission standards as nonroad diesel engines. Fully effective in 2011.	New stationary engines meet the standards.	40 CFR Parts 60, 85, 89, 94, 1039, 1065, and 1068.
C. Energy Policy Act of 2005 (EPACT05)			
a. Physical energy intensity	Voluntary commitments to reduce physical energy intensity by 2.5 percent annually for 2007-2016.	Not modeled because participation is voluntary; actual reductions will depend on future, unknown commitments.	EPACT2005, Section 106 (42 USC 15811)
b. Mineral components of cement of concrete	Increase in mineral component of federally procured cement or concrete.	Not modeled.	EPACT2005, Section 108 (42 USC 6966).
c. Tax credits for coke oven	Provides a tax credit of \$3.00 per barrel oil equivalent, limited to 4000 barrels per day average. Applies to most producers of coal coke or coke gas.	Not modeled because no impact on U.S. coke plant activity is anticipated.	EPACT2005, Section 1321 (29 USC 29).

Legislation	Brief description	AEO handling	Basis
D. The Energy Independence and Security Act of 2007 (EISA2007)			
a. Motor efficiency standards	Supersedes EPACT1992 Efficiency Standards no later than 2011.	Motor purchases must meet the EPAAct1992 standards through 2010; afterwards purchases must meet the EISA2007 standards.	EISA2007
E. The Energy Improvement and Extension Act of 2008 (EISA2008)			
a. Combined heat and power tax incentive	Provides an investment tax credit for up to 15 megawatts of capacity in combined heat and power systems of 50 megawatts or less through 2016	Costs of systems adjusted to reflect the credit.	EIEA2008, Title I, Sec. 103
Transportation sector			
A. Energy Policy Act of 1992 (EPACT92)	Increases the number of alternative fuel vehicles and alternative fuel use in federal, state, and fuel provided fleets.	Assumes federal, state and fuel provided fleets meet the mandated sales requirements.	Energy Policy Act of 1992, Public Law 102-486-Oct. 24, 1992.
B. Low Emission Vehicle Program (LEVP)	The Clean Air Act provides California the authority to set vehicle criteria emission standards that exceed federal standards. A part of that program mandates the sale of zero-emission vehicles by manufacturers, other nonattainment states are given the option of opting into the federal or California emission standards.	Incorporates the LEVP program as amended on August 4, 2005. Assumes California, Connecticut, Maine, Massachusetts, New Jersey, New York, Rhode island, Vermont, Oregon, and Washington adopt the LEVP program as amended August 4, 2005 and that the proposed sales requirements for hybrid, electric, and fuel cell vehicles are met.	Section 177 of the Clean Air Act, 42 U.S.C. sec. 7507 (1976) and CARB, California Exhaust Emissions Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles, August 4, 2005.
C. Corporate Average Fuel Economy (CAFE) Standard for Light Duty Vehicles	Requires manufacturers to produce vehicles that meet a minimum federal average fuel economy standard, promulgated jointly for model years 2012-2016 and 2017-2025 with an average greenhouse emissions standard; cars and light trucks are regulated separately.	CAFE standards are increased for model years 2011 through 2016 to meet the final CAFE rulemakings for model year 2011 and 2012 to 2016, respectively. CAFE standards are increased for model years 2017 to 2025 to meet final CAFE joint rulemakings for model year 2017 to 2022 and to meet augural CAFE standards for model year 2023 to 2025, which will undergo a midterm evaluation to finalize. CAFE standards are held constant through the end of the projection.	Energy Policy Conservation Act of 1975; Title 49 United States code, Chapter 329; Energy Independence and Security Act of 2007, Title 1, Section 102; Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011; Federal Register, Vol. 74, No. 59, March 2009; Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, Final Rule, Federal Register, Vol. 75, No. 88, May 2010; 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards Federal Register, Vol. 77, No. 199, October 2012.

Legislation	Brief description	AEO handling	Basis
D. Electric, Hybrid, and Alternative Fuel Vehicle Tax Incentives	Federal tax incentives are provided to encourage the purchase of electric, hybrid and or alternative fuel vehicles. For example, tax incentives for hybrid vehicles in the form of a \$2,000 income tax deduction.	Incorporates the federal tax incentives for hybrid and electric vehicles.	IRS Technical Publication 535; Business Expenses.
E. Plug-in Hybrid Vehicle Tax Credit	EIEA2008 grants a tax credit of \$2,500 for PHEVs with at least 4kWh of battery capacity, with larger batteries earning an additional \$417 per kWh up to a maximum of \$7,500 for light-duty PHEVs. The credit will apply until 250,000 eligible PHEVs are sold or until 2015, whichever comes first.	Incorporates the federal tax credits for PHEVs.	Energy Improvement and Extension Act of 2008, H.R.6049.
F. State Electric, Hybrid, and Alternative Fuel Vehicle Tax and Other Incentives	Approximately 20 states provide tax and other incentives to encourage the purchase of electric, hybrid and or alternative fuel vehicles. The tax incentives are in the form of income reductions, tax credits, and exemptions. Other incentives include use of HOV lanes and exemptions from emissions inspections and licensing fees. The incentives offered and the mix varies by state. For example, Georgia offers a tax credit of \$5,000 for electric vehicles and Oklahoma offers a tax credit of \$1,500 for hybrid and alternative fuel vehicles.	Does not incorporate state tax and other incentives for hybrid, electric, and other alternative fuel vehicles.	State laws in Arizona, Arkansas, California, Colorado, Delaware, Florida, Georgia, Iowa, Kansas, Louisiana, Maine, Maryland, Michigan, New Hampshire, New York, Oklahoma, Pennsylvania, Utah, Virginia, and Washington.
G. HD National Program; Greenhouse Gas Emissions and Fuel Consumption Standards for Heavy-Duty Vehicles	Requires on-road heavy-duty vehicle manufacturers to produce vehicles that meet a minimum federal average greenhouse gas emission standard, issued by the EPA, for model years 2014-2018. NHTSA established voluntary fuel consumption standards for MY 2014-2015, and mandatory fuel consumption standards for MY 2016 and beyond for on-road heavy-duty trucks and their engines; vocational and combination engines are regulated separately.	HD National program standards begin for MY 2014 as set by the GHG emissions portion of the rule with the assumption that the vehicles comply with the voluntary portion of the rule for fuel consumption. The model allows for both the engine and chassis technologies to meet the standards.	Section 202 of the Clean Air Act; Title 49 United States code, Chapter 32902[k]; Energy Independence and Security Act of 2007, Title 1, Section 102; Federal Register, Vol. 76, No. 179, September 2011.

Electric power generation

A. Clean Air Act Amendments of 1990 (CAAA90)	Established a national limit on electricity generator emissions of sulfur dioxide to be achieved through a cap-and-trade program.	Sulfur dioxide cap and trade program is explicitly modeled, choosing the optimal mix of options for meeting the national emissions cap.	Clean Air Act Amendments of 1990, Title IV, Sections 401 through 406, Sulfur Dioxide Reduction Program, 42 U.S.C. 7651a through 7651e.
	Set boiler-type-specific nitrogen oxide emissions limits for electricity generators.	Assumes each boiler installs the options necessary to comply with their nitrogen oxide emissions limit.	Clean Air Act Amendments of 1990, Title IV, Sections 407, Nitrogen Oxide Emission Reduction Program, 42 U.S.C. 7651f.

Legislation	Brief description	AEO handling	Basis
	Requires the EPA to establish national ambient air quality standards (NAAQS). In 1997, EPA set new standards for ground level ozone and fine particulates. EPA is currently determining which areas of the country are not in compliance with the new standards. Area designations were made in December 2004. States submitted their compliance plans, and have until 2009-2014 to bring all areas into compliance.	These standards are not explicitly represented, but the Clean Air Interstate Rule is incorporated (described below) and was developed to help states meet their NAAQS.	Clean Air Act Amendment of 1990, Title I, Sections 108 and 109, National Ambient Air Quality Standards for Ozone, 40 CFR Part 50, Federal Register, Vol 68, No 3, January 8, 2003. National Ambient Air Quality Standards for Particulate Matter, 40 CFR Part 50, Federal Register, Vol. 62, No. 138, July 18, 1997.
B. Clean Air Interstate Rule (CAIR)	CAIR imposes a two-phased limit on emissions of sulfur dioxide and/or nitrogen oxide from electric generators in 27 states and the District of Columbia.	Cap and trade programs for SO ₂ and NO _x are modeled explicitly, allowing the model to choose the best method for meeting the emission caps.	Federal Register, Vol. 70, No. 91 (May 12, 2005), 40 CFR Parts 51, 72, 73, 74, 77, 78 and 96.
C. Mercury and Air Toxics Standards (MATS)	MATS sets standards to reduce air pollution from coal and oil-fired power plants greater than 25 megawatts. The rule requires plants achieve the maximum achievable control technology for mercury, hydrogen chloride (HCl) and fine particulate matter (PM 2.5).	The EMM assumes that all coal-fired generating plants above 25 megawatts will comply beginning in 2016. Plants are assumed to reduce mercury emissions by 90 percent relative to uncontrolled levels. Because the EMM does not model HCl or PM 2.5 explicitly, to meet those requirements, coal plants are required to install either an FGD or a dry sorbent injection system including a full fabric filter.	Environmental Protection Agency, "Mercury and Air Toxics Standards," website epa.gov/mats.
D. Energy Policy Act of 1992 (EPACT92)	Created a class of generators referred to as exempt wholesale generators (EWGs), exempt from PUHCA as long as they sell wholesale power.	Represents the development of Exempt Wholesale Generators (EWGs) or what are now referred to as independent power producers (IPPs) in all regions.	Energy Policy Act of 1992, Title VII, Electricity, Subtitle A, Exempt Wholesale Generators.
E. The Public Utility Holding Company Act of 1935 (PUHCA)	PUHCA is a federal statute which was enacted to legislate against abusive practices in the utility industry. The act grants power to the U.S. Securities and Exchange Commission (SEC) to oversee and outlaw large holding companies which might otherwise control the provision of electrical service to large regions of the country. It gives the SEC power to approve or deny mergers and acquisitions and, if necessary, force utility companies to dispose of assets or change business practices if the company's structure of activities are not deemed to be in the public interest.	It is assumed that holding companies act competitively and do not use their regulated power businesses to cross-subsidize their unregulated businesses.	Public Utility Holding Company Act of 1936.

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F. FERC Orders 888 and 889	FERC has issued two related rules: Orders 888 and 889, designed to bring low-cost power to consumers through competition, ensure continued reliability in the industry, and provide for open and equitable transmission services by owners of these facilities. Specifically, Order 888 requires open access to the transmission grid currently owned and operated by utilities. The transmission owners must file nondiscriminatory tariffs that offer other suppliers the same services that the owners provide for themselves. Order 888 also allows these utilities to recover stranded costs (investments in generating assets that are unrecoverable due to consumers selecting another supplier). Order 889 requires utilities to implement standards of conduct and a Open Access Same-time Information System (OASIS) through which utilities and non-utilities can receive information regarding the transmission system. Consequently, utilities are expected to functionally or physically unbundle their marketing functions from their transmission functions.	These orders are represented in the forecast by assuming that all generators in a given region are able to satisfy load requirements anywhere within the region. Similarly, it is assumed that transactions between regions will occur if the cost differentials between them make it economic to do so.	Promoting Wholesale Competition Through Open Access, Non-Discriminatory Transmission Services by Public Utilities; Public Utilities and Transmitting Utilities, ORDER NO. 888 (Issued April 24, 1996), 18 CFR Parts 35 and 385, Docket Nos. RM95-8-000 and RM94-7-001. Open Access Same-Time Information System (formerly Real-Time Information Networks) and Standards of Conduct, ORDER NO. 889, (Issued April 24, 1996), 18 CFR Part 37, Docket No. RM95-9-000.
G. New Source Review (NSR)	On August 28, 2003, the EPA issued a final rule defining certain power plant and industrial facility activities as routine maintenance, repair and replacement, which are not subject to new source review (NSR). As stated by EPA, these changes provide a category of equipment replacement activities that are not subject to Major NSR requirements under the routine maintenance, repair and replacement (RMRR) exclusion.[1] Essentially this means that power plants and industrial facilities engaging in RMRR activities will not have to get preconstruction approval from the state or EPA and will not have to install best available emissions control technologies that might be required if NSR were triggered.	It is assumed that coal plants will be able to increase their output as electricity demand increases. Their maximum capacity factor is set at 75 percent. No increases in the capacity of existing plants is assumed. If further analysis shows that capacity uprates may result from the NSR rule, they will be incorporated in future AEOs. However, at this time, the NSR rule is being contested in the courts.	EPA, 40 CFR Parts 51 and 52, Deterioration (PSD) and Non-Replacement Provision of the Vol. 68, No. 207, page 61248, Prevention of Significant Attainment New Source Review (NSR): Equipment Routine Maintenance, Repair and Replacement Exclusion; Final Rule, Federal Register, October 27, 2003.
H. State RPS Laws, Mandates, and Goals	Several states have enacted laws requiring that a certain percentage of their generation come from qualifying renewable sources.	The AEO reference case represents the Renewable Portfolio Standard (RPS) or substantively similar laws from 30 states and the District of Columbia. As described in the	The 30 states with RPS or other mandates providing quantified projections are detailed in the Legislation and Regulations section of this report.

Legislation	Brief description	AEO handling	Basis
I. Regional and State Air Emissions Regulations	The Northeast Regional Greenhouse Gas Initiative (RGGI) applies to fossil-fueled power plants over 25 megawatts in the Northeastern United States. The state of NJ withdrew in 2011, leaving 9 states in the program. The rule caps CO ₂ emissions and requires they account for CO ₂ emitted with allowances purchased at auction.	Renewable Fuels Module chapter of this document, mandatory targets from the various states are aggregated at the regional level, and achievement of nondiscretionary compliance criteria is evaluated for each region. The impact of RGGI is included in the EMM, making adjustments when needed to estimate the emissions caps at the regional level used in NEMS.	Regional Greenhouse Gas Initiative Model rule, www.rggi.org
	The California Assembly Bill 32 (AB32) sets GHG reduction goals for 2020 for California. A cap-and-trade program was designed to enforce the caps. The cap-and-trade program applies to multiple economic sectors including electric power plants, large industrial facilities, suppliers of transportation fuel and suppliers of natural gas. Emissions resulting from electricity generated outside California but consumed in the state are also subject to the cap.	The EMM models the cap-and-trade program explicitly for CO ₂ for California through an emission constraint that accounts for emissions from the other sectors. Limited banking and borrowing of allowances as well as an allowance reserve and offsets are incorporated as specified in the Bill.	California Code of Regulations, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, "California Cap and Market-Based Compliance Mechanisms," (Sacramento, CA: July 2011).
J. Energy Policy Act of 2005	Extended and substantially expanded and modified the Production Tax Credit, originally created by EPACT1992.	EPACT2005 also adds a PTC for up to 6,000 megawatts of new nuclear capacity and a \$1.3 billion investment tax credit for new or repowered coal-fired power projects. The tax credits for renewables, nuclear and coal projects are explicitly modeled as specified in the law and subsequent amendments.	Energy Policy Act of 2005, Sections 1301, 1306, and 1307
K. American Recovery and Reinvestment Act of 2009	Extends the Production Tax Credit (PTC) to wind facilities constructed by December 31, 2012 and to other eligible renewable facilities constructed by December 31, 2013. Allows PTC-eligible facilities to claim a 30-percent investment tax credit (ITC) instead of the PTC. Projects starting construction by the end of 2010 (subsequently extended to the end of 2011) may elect to take a cash grant equal to the value of the 30-percent ITC instead of either tax credit.	The extensions of the PTC and 30-percent ITC are represented in the AEO reference case as specified in the law. The AEO does not distinguish between the effects of the 30-percent ITC and the equivalent cash grant, and the cash grant is not specifically modeled.	American Recovery and Reinvestment Act of 2009, Division B, Title I, Sec. 1101, 1102, and 1603.

Legislation	Brief description	AEO handling	Basis
	ARRA provided \$6 billion to pay the cost of guarantees for loans authorized by the Energy Policy Act of 2005. The purpose of these loan guarantees is to stimulate the deployment of conventional renewable and transmission technologies and innovative biofuels technologies. However, to qualify, eligible projects must be under construction by September 30, 2011.	AEO2013 includes projects that have received loan guarantees under this authority, but does not assume automatic award of the loans to potentially eligible technologies.	American Recovery and Reinvestment Act of 2009, Title IV, "Energy and Water Development", Section 406.
	ARRA provides \$4.5 billion for smart grid demonstration projects. These generally include a wide array of measurement, communications, and control equipment employed throughout the transmission and distribution system that will enable real-time monitoring of the production, flow, and use of power from generator to consumer.	In the electricity module, it was assumed that line losses would fall slightly, peak loads would fall as customers shifted their usage patterns, and customers would be more responsive to pricing signals.	American Recovery and Reinvestment Act of 2009, Title IV, "Energy and Water Development", Section 405.
	ARRA provides \$800 million to fund projects under the Clean Coal Power Initiative program focusing on capture and sequestration of greenhouse gases.	It was assumed that one gigawatt of new coal with sequestration capacity would come online by 2018.	American Recovery and Reinvestment Act of 2009, Title IV, "Energy and Water Development"
L. American Taxpayer Relief Act of 2012 (ATRA)	ATRA was passed on January 1, 2013 and included several provisions extending tax credits to the energy sector. Most significantly, it extended the PTC for wind by one year, and redefined the criteria for all qualifying projects to be based on 'under construction' by December 31, 2013 rather than in service by that same date, thus extending the credit for length of the typical construction period.	ATRA was passed too late to be incorporated in the AEO2013 Reference case, but a special case was prepared to analyze key provisions, including the renewable PTC extension. Results are presented in the AEO2013 Issues in Focus section.	American Taxpayer Relief Act of 2012, P.L. 112-240, Sections 401 through 412.
M. Nuclear Waste Confidence Rule	The U.S. Nuclear Regulatory Commission (NRC) Waste Confidence Rule originally determined that spent nuclear fuel can be safely stored onsite for 30 years without significant environmental impacts. A 2010 update amended this part of the rule to extend to 60 years. In June 2012, the U.S. Court of Appeals for the District of Columbia Circuit struck down the 2010 amendment, and the NRC subsequently issued an order that suspended actions related to issuance of operating licenses and renewals until the rule is revised.	Plants that have not yet submitted license renewal applications or new units that have not yet received an operating license may be delayed by the 2012 order. However, because the NRC expects to resolve the issues with the rule within two years, the AEO2013 assumes that the issuance of new operating licenses or license renewals will not be affected, as they occur further out in the forecast.	Federal Register, Vol. 49, No. 171 (1984), Vol. 55, No. 181 (1990), Vol. 75, No. 246 (2010), U.S. Nuclear Regulatory Commission, "CLI-12-16, Memorandum and Order" (August 7, 2012).

Oil and gas supply

A. The Outer Continental Shelf Deep Water Royalty Relief Act (DWRRA)	Mandates that all tracts offered by November 22, 2000, in deep water in certain areas of the Gulf of Mexico must be offered under the new bidding system permitted by the DWRRA. The Secretary of the Interior must offer such tracts with a specific minimum royalty suspension volume based on water depth.	Incorporates royalty rates based on water depth.	43 U.S.C. SS 1331-1356 (2002).
B. Energy Policy and Conservation Act Amendments of 2000	Required the USGS to inventory oil and gas resources beneath federal lands.	To date, the Rocky Mountain oil and gas resource inventory has been completed by the USGS. The results of this inventory have been incorporated in the technically recoverable oil and gas resource volumes used for the Rocky Mountain region.	Scientific Inventory of Onshore Federal Lands: Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to their Development: The Paradox/San Juan, Uinta/Piceance, Greater Green River, and Powder River Basins and the Montana Thrust Belt. Prepared by the Departments of Interior, Agriculture and Energy, January 2003.
C. Section 29 Tax Credit for Nonconventional Fuels	The Alternative Fuel Production Credit (Section 29 of the IRC) applies to qualified nonconventional fuels from wells drilled or facilities placed in service between January 1, 1980, and December 31, 1992. Gas production from qualifying wells could receive a \$3 (1979 constant dollars) per barrel of oil equivalent credit on volumes produced through December 31, 2002. The qualified fuels are: oil produced from shale and tar sands; gas from geopressurized brine, Devonian shale, coal seams, tight formations, and biomass; liquid, gaseous, or solid synthetic fuels produced from coal; fuel from qualified processed formations or biomass; and steam from agricultural products.	The Section 29 Tax Credit expired on December 31, 2002, and it is not considered in new production decisions. However, the effect of these credits is implicitly included in the parameters that are derived from historical data reflecting such credits.	Alternative Fuel Production Credit (Section 29 of the Internal Revenue Code), initially established in the Windfall Profit Tax of 1980.
D. Energy Policy Act of 2005.	Established a program to provide grants to enhance oil and gas recovery through CO ₂ injection.	Additional oil resources were added to account for increased use of CO ₂ -enhanced oil recovery.	Title III, Section 354 of the Energy Policy Act of 2005.

Natural gas transmission and distribution

A. Alaska Natural Gas Pipeline Act, Sections 101-116 of the Military Construction Hurricane Supplemental Appropriations Act, 2005.	Disallows approval for a pipeline to enter Canada via Alaska north of 68 degrees latitude. Also, provides federal guarantees for loans and other debt obligations assigned to infrastructure in the United States or Canada related to any natural gas pipeline	Assumes the pipeline construction cost estimate for the "southern" Alaska pipeline route in projecting when an Alaska gas pipeline would be profitable to build. With recent increased in cost estimates, well beyond \$18 billion, the loan guarantee is assumed to have a minimal impact on the build decision.	P.L. 108-324.
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Legislation	Brief description	AEO handling	Basis
	system that carries Alaska natural gas to the border between Alaska and Canada south of 68 degrees north latitude. This authority would expire 2 years after the final certificate of public convenience and necessity is issued. The guarantee will not exceed 1) 80 percent of the total capital costs (including interest during construction), 2) \$18 billion (indexed for inflation at the time of enactment), or 3) a term of 30 years.		
B. American Jobs Creation Act of 2004, Sections 706 and 707.	Provides a 7-year cost-of-investment recovery period for the Alaska natural gas pipeline, as opposed to the currently allowed 15-year recovery period, for tax purposes. The provision would be effective for property placed in service after 2013, or treated as such. Effectively extends the 15-percent tax credit currently applied to costs related to enhanced oil recovery to construction costs for a gas treatment plant on the North Slope that would feed gas into an Alaska pipeline to Canada.	The change in the recovery period is assumed to have a minimal impact on the decision to build the pipeline. The assumed treatment costs are based on company estimates made after these tax provisions were enacted.	P.L. 108-357.
C. Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011 and other previous laws and regulations on pipeline safety.	Provides for enhanced safety, reliability and environmental protection in the transportation of energy products by pipeline.	Costs associated with previously imposed pipeline safety laws are assumed to already be reflected in historical capital and operating cost data used in the model. Any additional costs associated with more recent legislation are assumed to be a small percentage of total pipeline costs and are partially offset by benefits gained through reducing pipeline leakage.	P.L. 112-90, 125 Stat. 1904
D. Energy Policy Act of 2005.	Allowed natural gas storage facilities to charge market-based rates if it was believed they would not exert market power.	Storage rates are allowed to vary from regulation-based rates depending on market conditions.	Title III, Section 312 of the Energy Policy Act of 2005.
E. Federal Motor Fuels Excise Taxes for Compressed Natural Gas and Liquefied Natural Gas in Vehicles	Taxes are levied on each gallon or gasoline-gallon equivalent of natural gas.	Federal motor fuels excise taxes on natural gas fuel for vehicles are included in retail prices and are assumed to be extended indefinitely at current nominal rates.	26 USC 4041.
F. State Motor Fuels Taxes for Compressed Natural Gas and Liquefied Natural Gas in Vehicles	Taxes are levied on each gallon, gasoline-gallon equivalent, or diesel-gallon equivalent of natural gas.	State motor fuels excise taxes on natural gas fuel for vehicles are included in retail prices and are assumed to be extended indefinitely at current nominal rates.	Determined by review of existing state laws.

Liquid Fuels Market

Legislation	Brief description	AEO handling	Basics
A. Ultra-Low-Sulfur Diesel (ULSD) regulations under the Clean Air Act Amendment of 1990	80 percent of highway diesel pool must contain 15 ppm sulfur or less starting in fall 2006. By mid-2010, all highway diesel must be 15 ppm or less. All nonroad, locomotive, and marine diesel fuel produced must contain less than 500 ppm starting mid-2007. By mid-2010 nonroad diesel must contain less than 15 ppm. Locomotive and marine diesel must contain less than 15 ppm by mid-2012.	Reflected in diesel specifications.	40 CFR Parts 69, 80, 86, 89, 94, 1039, 1048, 1065, and 1068.
B. Mobile Source Air Toxics (MSAT) Controls Under the Clean Air Act Amendment of 1990	Establishes a list of 21 substances emitted from motor vehicles and known to cause serious human health effects, particularly benzene, formaldehyde, 1,3 butadiene, acetaldehyde, diesel exhaust organic gases, and diesel particulate matter. Establishes anti-backsliding and anti-dumping rules for gasoline.	Modeled by updating gasoline specifications to most current EPA gasoline survey data (2005) representing anti-backsliding requirements.	40 CFR Parts 60 and 86.
C. Low-Sulfur Gasoline Regulations Under the Clean Air Act Amendment of 1990	Gasoline must contain an average of 30 ppm sulfur or less by 2006. Small refiners may be permitted to delay compliance until 2008.	Reflected in gasoline specifications.	40 CFR Parts 80, 85 and 86.
D. MTBE Bans in 25 states	23 states ban the use of MTBE in gasoline by 2007.	Ethanol assumed to be the oxygenate of choice in RFG where MTBE is banned	State laws in Arizona, California, Colorado, Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Rhode Island, South Dakota, Vermont, Washington, and Wisconsin.
E. Regional Clean Fuel Formulations	States with air quality problems can specify alternative gasoline or diesel formulations with EPA's permission. California has long had authority to set its own fuel standards.	Reflected in PADD-level gasoline and diesel specifications.	State implementation plans required by the Clean Air Act Amendments of 1990, as approved by EPA.
F. Federal Motor Fuels Excise Taxes	Taxes are levied on each gallon of transportation fuels to fund infrastructure and general revenue. These taxes are set to expire at various times in the future but are expected to be renewed, as they have been in the past.	Gasoline, diesel, and ethanol blend tax rates are included in end-use prices and are assumed to be extended indefinitely at current nominal rates.	26 USC 4041 Extended by American Jobs Creation Act of 2004
G. State Motor Fuel Taxes	Taxes are levied on each gallon of transportation fuels. The assumption that state taxes will increase at the rate of inflation supports an implied need for additional highway revenues as driving increases.	Gasoline and diesel rates are included in end-use prices and are assumed to be extended indefinitely in real terms (to keep pace with inflation).	Determined by review of existing state laws performed semi-annually by EIA's Office of Energy Statistics.
H. Diesel Excise Taxes	Phases out the 4.3 cents excise tax on railroads between 2005 and 2007.	Modeled by phasing out.	American Jobs Creation Act of 2004, Section 241.

Legislation	Brief description	AEO handling	Basis
I. Energy Policy Act of 2005 (EPACT05)			
a. Ethanol/biodiesel tax credit	Petroleum product blenders may claim tax credits for blending ethanol into gasoline and for blending biodiesel into diesel fuel or heating oil. The credits may be claimed against the federal motor fuels excise tax or the income tax. The tax credits are 51 per gallon of nonvirgin biodiesel, and \$1.00 per gallon of virgin biodiesel. The ethanol tax credit expires in 2010. The biodiesel tax credits expire after 2008.	The tax credits are applied against the production costs of the products into which they are blended. Ethanol is used in gasoline and E85. Virgin biodiesel is assumed to be blended into highway diesel, and nonvirgin biodiesel is assumed to be blended into nonroad diesel or heating oil.	26 USC 40, 4041 and American Jobs Creation Act of 2004. Biodiesel tax credits extended to 2008 under Energy Policy Act of 2005.
b. Renewable Fuels Standard (RFS)	This section has largely been redefined by EISA07 (see below); however, EPA rulemaking completed for this law was assumed to contain guiding principles of the rules and administration of EISA07.		Energy Policy Act of 2005, Section 1501.
c. Elimination of oxygen content requirement in reformulated gasoline	Within 270 days of enactment of the Act, except for California where it is effective immediately.	Oxygenate waiver already an option of the model. MTBE is assumed to phase out in 2006 resulting from the petroleum industry's decision to discontinue use. AEO projection may still show use of ethanol in gasoline based on the economics between ethanol and other gasoline blending components.	Energy Policy Act of 2005, Section 1504.
d. Coal gasification provisions	Investment tax credit program for qualifying advanced clean coal projects including Coal-to-Liquids Projects.	Two CTL units are available to build with lower capital costs reflecting the provision's funding.	Energy Policy Act of 2005, Section 1307.
J. Energy Independence and Security Act of 2007 (EISA07)			
a. Renewable Fuels Standard (RFS)	Requires the use of 36 billion gallons of ethanol per year by 2022, with corn ethanol limited to 15 billion gallons. Any other biofuel may be used to fulfill the balance of the mandate, but the balance must include 16 billion gallons per year of cellulosic biofuel by 2022 and 1 billion gallons per year of biodiesel by 2012.	The RFS is included in AEO2013, however it is assumed that the schedule for cellulosic biofuel is adjusted downward consistent with waiver provisions contained in the law.	
K. State Heating Oil Mandates	A number of Northeastern states passed legislation that reduces the maximum sulfur content of heating oil to between 15 and 50 ppm in different phases through 2016.	Due to time constraints, this was not incorporated in the LFMM for AEO2013, but will be included for AEO2014 and beyond.	Connecticut State Senate Bill 382, Maine State Legislature HP1160, NJ State Department of Environmental Protection, Amendment N.J.A.C. 7:27-9.2, New York State Senate Bill S1145C.
L. California Low Carbon Fuel Standard (LCFS)	California passed legislation which is designed to reduce the Carbon Intensity (CI) of motor gasoline and diesel fuels sold in California by 10 percent between 2012 and 2020 through the increased sale of alternative "low-carbon" fuels.	The LCFS is included in AEO2013 as legislated for gasoline and diesel fuel sold in California, and for other regulated fuels.	California Air Resources Board, "Final Regulation Order: Subarticle 7. Low Carbon Fuel Standard."

Legislation	Brief description	AEO handling	Basis
M. California Assembly Bill 32 (AB32)	The California Assembly Bill 32 (AB32), the Global Warming Solutions Act of 2006, authorized the California Air Resources Board (CARB) to set GHG reduction goals for 2020 for California. A cap-and-trade program was designed to enforce the caps. The cap-and-trade program applies to multiple economic sectors including electric power plants, large industrial facilities, suppliers of transportation fuel and suppliers of natural gas. Emissions resulting from electricity generated outside California but consumed in the State are also subject to the cap.	The AB32 cap-and-trade was more fully implemented in AEO2013, adding industrial facilities, refineries, fuel providers, and non-CO ₂ GHG emissions to the representation already in the electrical power sector of NEMS. Also, limited banking and borrowing, as well as an allowance reserve and offset purchases, were modeled, providing some compliance flexibility and cost containment.	California Code of Regulations, Subchapter 10 Climate Change, Article 5, Sections 95800 to 96023, Title 17, "California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms," (Sacramento, CA: July 2011).
N. EPA ETS Waiver	EPA approved two waivers for the use of ethanol motor gasoline blends of up to 15 percent in vehicles 2001 and newer.	These two waivers were included and modeled in AEO2013 based on forecasted vehicle fleets and potential infrastructure and liability setbacks.	EPA-HQ-OAR-2009-0211; FRL-9215-5, EPA-HQ-OAR-2009-0211; FRL-9258-6.

Source: U.S. Energy Information Administration, Office of Energy Analysis.

Abbreviations:

AB: Assembly Bill
AB32: California Assembly Bill 32
ACI: Activated carbon injection
AEO: Annual Energy Outlook
AEO2012: Annual Energy Outlook 2012
AFUE: Average Fuel Use Efficiency
ANWR: Arctic National Wildlife Refuge
ARRA2009: American Recovery and Reinvestment Act of 2009
ASHRAE: American Society of Heating Refrigerating, and Air-Conditioning Engineers
Blue Chip: Blue Chip Consensus
BTL: Biomass-to-liquids
Btu: British Thermal Unit
CAFE: Corporate Average Fuel Economy
CAIR: Clean Air Interstate Rule
CARB: California Air Resources Board
CBECs: Commercial Building Energy Consumption Survey
CBO: Congressional Budget Office
CBTL: Coal- and biomass-to-liquids
CCS: Carbon capture and storage
CFR: Code of Federal Regulations
CHP: Combined heat and power
CI: Carbon intensity
CMM: Coal Market Module
CNG: Compressed natural gas
CO₂: Carbon dioxide
CO₂-EOR: Carbon dioxide-enhanced oil recovery
CSAPR: Cross-State Air Pollution Rule
CTL: Coal-to-liquids
DG: Distributed generation
DGE: Diesel gallon equivalent
DOE: U.S. Department of Energy
DOT: Department of Transportation
DSI: Direct sorbent injection
DWRRA: Deep Water Royalty Relief Act
E10: Motor gasoline blend containing up to 10 percent ethanol
E15: Motor gasoline blend containing up to 15 percent ethanol
E85: Motor fuel containing up to 85 percent ethanol
EERE: Energy Efficiency and Renewable Energy
EER: Energy Efficient Ratio
EIA: U.S. Energy Information Administration
EIEA2008: Energy Improvement and Extension Act of 2008
EISA2007: Energy Independence and Security Act of 2007
EOR: Enhanced oil recovery
EPA: U.S. Environmental Protection Agency
EPACT92: Energy Policy Act of 1992
EPACT05: Energy Policy Act of 2005
EUR: Estimated ultimate recovery
EV: Electric vehicle
EVA: Energy Ventures Analysis
EWGs: Exempt Wholesale Generators
FFV: Flex-fuel vehicle
FEMP: Federal Energy Management Program
FERC: Federal Energy Regulatory Commission
FGD: Flue gas desulfurization
HDV: Heavy-duty Vehicles
HERS: Home Energy System Rating
HVAC: Heating, Ventilation, and Air Conditioning
GDP: Gross domestic product
GHG: Greenhouse Gases

Abbreviations:

GTL: Gas-to-liquids
GVWR: Gross vehicle weight rating
HAP: Hazardous air pollutant
HB: House Bill
HCl: Hydrogen chloride
HD: Heavy-duty
HDV: Heavy-duty vehicle
HERS: Home Energy System Rating
HEV: Hybrid electric vehicle
Hg: Mercury
HVAC: Heating Ventilation, and Air Conditioning
ICE: Internal combustion engine
IDM: Industrial Demand Module
IEA: International Energy Agency
IECC2006: 2006 International Energy Conversion Code
IEM: International Energy Module
IHSGI: IHS Global Insight
INFORUM: Interindustry Forecasting Project at the University of Maryland
IOU: Investor-owned utility
IREC: Interstate Renewable Energy Council
ITC: Investment Tax Credit
kWh: Kilowatthour
LBNL: Lawrence Berkeley National Laboratory
LCFS: Low Carbon Fuel Standard
LDV: Light-duty vehicle
LED: Light-emitting diode
LFMM: Liquid Fuels Market Module
LNG: Liquefied natural gas
MARAD: Maritime Administration
MATS: Mercury and Air Toxics Standards
MAM: Macroeconomic Activity Module
MCF: Thousand Cubic Feet
MEF: Modified Energy Factor
mmt: Million metric tons
MMT_{CO₂e}: Million metric tons carbon dioxide equivalent
mpg: Miles per gallon
MSAT: Mobile Source Air Toxics
MSRP: Manufacturer's suggested retail price
MTBE: Methyl Tertiary-Butyl Ether
MY: Model year
NAICS: North American Industry Classification System
NEMS: National Energy Modeling System
NERC: North American Electric Reliability Corporation
NGL: Natural gas liquids
NGPL: Natural gas plant liquids
NGTDM: Natural Gas Transmission and Distribution Module
NGV: Natural gas vehicle
NHTSA: National Highway Traffic Safety Administration
NO_x: Nitrogen oxides
NRC: U.S. Nuclear Regulatory Commission
OASIS: Open Access Same-Time Information System
OECD: Organization for Economic Cooperation and Development
OMB: Office of Management and Budget
OPEC: Organization of the Petroleum Exporting Countries
P&G: Purvin & Gertz
PADD: Petroleum Administration for Defense District
PCs: Personal computers
PHEV: Plug-in Hybrid Electric Vehicles

Abbreviations:

P.L.: Public Law
PM: Particulate matter
PM25: Particulate matter less than 2.5 microns diameter
PMM: Petroleum Market Module
PPM: Parts Per Million
PTC: Production tax credit
PUHCA: Public Utility Holding Company Act of 1935
PV: Solar photovoltaic
RAC: U.S. Refiner Acquisition Cost
RECS: Residential Energy Consumption Survey
RFM: Renewable Fuels Module
RFS: Renewable fuel standard
RGGI: Regional Greenhouse Gas Initiative
RPS: Renewable portfolio standard
SB: Senate Bill
SCR: Selective catalytic reduction
SEER: Strategic Energy and Economic Research, Inc.
SEIA: Solar Energy Industries Association
SNCR: Selective noncatalytic reduction
SO₂: Sulfur dioxide
STEO: Short-Term Energy Outlook
TAPS: Trans-Alaska Pipeline System
TRR: Technically recoverable resource
UEC: Unit energy consumption
USLD: Ultra-Low-Sulfur Diesel
U.S.C.: United States Code
UPS: Uninterruptible power supply
USGS: United States Geological's Survey
VIUS: Vehicle Inventory and Use Survey
VMT: Vehicle miles traveled
WTI: West Texas Intermediate
ZEV: Zero Emission Vehicle