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Impacts of a 25-Percent Renewable Electricity Standard as Proposed in the American Clean Energy and Security Act Discussion Draft

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Energy Information Administration
Office of Integrated Analysis and Forecasting
U.S. Department of Energy
Washington, DC 20585

Preface and Contacts

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The Office of Integrated Analysis and Forecasting prepared this report. General questions concerning the report can be directed to John J. Conti (john.conti@eia.doe.gov, 202/586-2222), Director of the Office of Integrated Analysis and Forecasting, and J. Alan Beamon (joseph.beamon@eia.doe.gov, 202/586-2025), Director of its Coal and Electric Power Division. Specific questions about the report can be directed to the following analysts:

Renewables.....Chris Namovicz (cnamovicz@eia.doe.gov, 202/586-7120)
Marie LaRiviere (marie.lariviere@eia.doe.gov, 202/586-1475)
Electricity.....Jeffrey Jones (jeffrey.jones@eia.doe.gov, 202/586-2038)

For ordering information and questions on other energy statistics available from EIA, please contact EIA's National Energy Information Center at:

National Energy Information Center, EI 30
Energy Information Administration
Forrestal Building
Washington, DC 20585

Telephone: 202/586-8800
TTY: 202/586-1181
FAX: 202/586-0727
E-mail: infoctr@eia.doe.gov
World Wide Web Site: http://www.eia.doe.gov/
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Executive Summary

This report responds to requests from Chairman Edward Markey, for an analysis of a 25-percent Federal renewable electricity standard (RES). The RES proposal analyzed in this report is included in the discussion draft of broader legislation, the American Clean Energy and Security Act (ACESA) of 2009, issued on the Energy and Commerce Committee website at the end of March 2009.[1] The two request letters and the relevant section of the ACESA discussion draft are provided as Appendices A, B, and C of this report.

While Chairman Markey's original letter asked that sensitivities with alternative greenhouse gas policies be prepared, his subsequent letter released the Energy Information Administration (EIA) from that requirement. Consequently, the analysis presented here does not consider the interactions of the RES provisions contained in ACESA with other key provisions of that legislation, although the report does include some qualitative discussion of how the RES might interact with other key provisions in ACESA.

The analysis presented in this report starts from an updated version of the *Annual Energy Outlook 2009* reference case that reflects the projected impacts of the American Recovery and Reinvestment Act (ARRA), enacted in February 2009, and revised economic assumptions. ARRA has a significant impact on the projected growth of renewable energy over the next 5 years, so it is important to account for its enactment in considering the projected impacts of an RES requirement. The development of the updated reference case is described in a recent EIA report *An Updated Annual Energy Outlook 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook.*[2] As noted in that report, EIA intends to use this updated baseline in its analyses of proposed changes in laws and regulations, including the RES analysis presented in this report. Therefore, the term "reference case" in this report means the updated reference case presented in the aforementioned report.

The RES program in the ACESA discussion draft includes provisions that may allow credits for qualified State energy efficiency programs to satisfy up to 20 percent of the RES requirement, but the availability of these credits is tied to implementation of the energy efficiency resource standard (EERS) program that is also included in ACESA. As

[1] An earlier version of the RES proposal was introduced as H.R. 890, the American Renewable Energy Act (AREA) of 2009.

[2] Energy Information Administration, *An Updated Annual Energy Outlook 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook*, SR/OIAF/2009-03 (Washington, DC, April 2009), http://www.eia.doe.gov/oiaf/servicerpt/stimulus/index.html.

the baselines for and details of the yet-to-be-established EERS program are unknown, the extent to which States would have access to efficiency credits for purposes of the RES is not clear. In order to assess how different outcomes might affect the projected impacts of the RES, EIA analyzed two RES policy cases. The RES with Full Efficiency Credits (RESFEC) case assumes that the maximum level of efficiency credits, up to one-fifth of the credits in the target in any given year, are claimed. This is reflected as a 20-percent reduction in the effective target for eligible renewable generation. The RES with No Efficiency Credits (RESNEC) case assumes that States cannot qualify for, or elect not to use, efficiency credits.

Key findings include:

- While the nominal target sales share for renewables eligible for the RES is 25 percent in 2025, exempting the small retailers lowers the effective target to 22 percent of total electricity sales. The effective target is lowered further to 21 percent when the generation from hydroelectric power and municipal solid waste is removed from the sales baseline. If States are able to, and elect to, take full advantage of the energy efficiency credits for compliance, the effective share of renewables required could drop to approximately 17 percent of total electricity sales.

- Power sellers will turn to a mix of renewable fuels to comply with the RES. In absolute terms, the key fuels are projected to be biomass and wind, but other renewable fuels including solar and geothermal are also projected to grow significantly in percentage terms.

- Most of the projected increase in wind generation is due to existing State renewable portfolio standard programs and the passage of ARRA. This occurs in both the reference case and the RES cases. Total wind generation in the two RES cases is projected to increase from 32 billion kilowatthours in 2007 to between 208 billion kilowatthours and 249 billion kilowatthours in 2030. Total biomass generation increases from 39 billion kilowatthours in 2007 to between 438 billion kilowatthours and 577 billion kilowatthours in 2030 in the two RES cases. The renewable provisions of ARRA do not have as large an impact on biomass as on wind, because the production subsidies provided for the co-firing of biomass are smaller and because new dedicated biomass plants generally take longer to develop than would be required to meet the deadline to qualify for production subsidies under ARRA.

- The higher renewable generation stimulated by the Federal RES leads to lower coal and natural gas generation. In the two RES cases, coal generation ranges between 182 billion kilowatthours (8 percent) and 257 billion kilowatthours (11 percent) below the reference case level. Similarly, natural gas generation in the two RES cases in 2030 is between 55 billion kilowatthours (6 percent) and 150 billion kilowatthours (15 percent) below the level projected in the reference case.

- Given the amount of eligible renewable generation projected in the reference case, the RES is not expected to affect national average electricity prices until after 2020. As

the required RES share increases to its maximum value in 2025, the value of RES credits increases, and impacts on national average electricity prices become evident. The peak effect on national average electricity prices, 2.7 percent in the RESFEC case and 2.9 percent in the RESNEC case, occurs as the required renewable share ramps up more rapidly than the demand for electricity is growing. In the later years of the projections, the impact on national average electricity prices is smaller, as the impact of the RES requirement on the cost of coal and natural gas, fuels whose use is reduced by added renewables, is increasingly reflected in electricity prices. By 2030, electricity prices are projected to be little changed from the reference case in both RES cases, with 2030 prices less than 1 percent higher than in the reference case.

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- Electricity price impacts vary from region to region, with renewable–resource-rich regions like the northern Great Plains States and the northwest States potentially seeing prices decline from reference case levels, while other regions see price increases ranging from 1 percent to 6 percent above reference case levels between 2025 and 2030.

- Because of the level of renewables projected in the reference case, renewable credits have no value before 2020. After 2020, they rise to the 5-cent-per-kilowatthour cap in 2024 as the renewable requirement grows more rapidly than electricity sales. In the last few years of the projections, they begin to fall as electricity demand and fossil fuel prices continue to grow.

- The increased use of renewables stimulated by the RES leads to lower electricity sector carbon dioxide emissions. Electricity sector carbon dioxide emissions in 2030 are between 196 million metric tons (7 percent) and 307 million metric tons (12 percent) below the reference case level in the two RES cases.

- EIA's modeling of the RES in the ACESA discussion draft was a standalone analysis that did not consider interactions with other key programs in the ACESA discussion draft. While EIA cannot develop an integrated analysis until there are clearer insights into how some of the other ACESA programs would actually be implemented, interactions among the elements of ACESA could be significant.

    - In previous analyses of economy-wide policies to limit or reduce emissions of greenhouse gases, EIA has generally found that a cap-and-trade program for greenhouse gases leads to significant growth in the use of renewable energy for electricity generation, which becomes more attractive when the cost of using fossil fuels goes up. Where there are multiple targets that can be satisfied with the same energy resources and projects, the target that sets the upper limit on the use of the resource will generally absorb all of the incremental costs from that resource, making compliance with the non-binding goal appear to be costless. To the extent that the proposed cap and trade program induces more renewable resources than required by the concurrent RES proposal, one might expect

a reduction in apparent RES compliance costs, since those costs would already be reflected in the value of carbon dioxide allowances.

- The potential interactions of an RES policy with other policy instruments such as an EERS or a cap–and-trade program for limiting or reducing greenhouse gas emissions could also impact the findings. If the EERS and other energy efficiency policies are successful in leading to falling demand for electricity, reducing the need for capacity additions of any kind, it could be very difficult to stimulate utilities to invest in new renewable capacity. While previous EIA analyses have found that increased investment in renewables would be attractive under a greenhouse gas emission reduction policy, successful development of competing "clean" technologies such as nuclear and fossil plants with carbon capture and storage equipment could hamper renewable development.

- Numerous uncertainties exist in this analysis. Key unknowns include:

  - Future fuel and technology costs are highly uncertain. Lower-than-expected fossil fuel prices would make it more difficult to stimulate investments in renewables, while higher fossil fuel prices would have the opposite impact. With regard to technology costs, this analysis generally assumes that technology costs and performance will improve as technologies penetrate the market, but insurmountable hurdles could arise.

  - With respect to biomass co-firing at existing coal plants, powerplant operators may be reluctant to make the necessary investments if they believe they may have to retire or reduce the utilization of their plants under a greenhouse gas emission reduction policy.

  - For wind, solar, and biomass technologies, the level of development called for with the proposed RES may require developers or grid operators to pay to build or upgrade long transmission lines from the remote areas with ample wind resources to the areas with significant electricity demand.

Table ES-1. Summary Results

	2007	2020			2025			2030		
Generation (billion kilowatthours)	**Reference**	**Reference**	**RESFEC**	**RESNEC**	**Reference**	**RESFEC**	**RESNEC**	**Reference**	**RESFEC**	**RESNEC**
Coal	2021	2198	2160	2090	2202	2076	2005	2311	2129	2054
Petroleum	66	49	49	49	49	50	49	50	50	50
Natural Gas	892	714	709	672	908	839	774	976	921	826
Nuclear	806	876	876	869	882	881	872	890	876	859
Conventional Hydropower	248	299	298	297	299	298	297	300	298	298
Geothermal	15	22	23	26	22	25	28	24	25	31
Municpal Waste	16	24	26	28	24	27	28	24	28	28
Wood and Other Biomass	39	139	178	263	197	359	460	218	438	577
Solar	1	20	20	20	21	22	23	23	30	31
Wind	32	203	204	227	207	207	248	208	208	249
Other	22	28	28	28	29	29	28	29	29	28
Total Generation	4159	4573	4571	4571	4840	4813	4813	5055	5032	5031
Prices (cents per kilowatthour)										
Credit Price	0.0	0.0	0.6	1.7	0.0	5.0	5.0	0.0	2.5	3.5
Electricity Price	9.1	9.3	9.3	9.3	9.5	9.7	9.8	10.1	10.1	10.1
RPS Compliance										
Total Electricity Sales (billion kilowatthours)	3747	4127	4124	4125	4348	4327	4320	4527	4500	4495
Covered Baseline[1]	NA	NA	3355	3357	NA	3358	3352	NA	3731	3727
Credits Required (percent of total sales)	0.0	0.0	11.4	14.2	0.0	16.5	20.6	0.0	16.5	20.7
Credits Achieved (percent of total sales)	0.0	0.0	11.2	14.0	0.0	14.9	18.3	0.0	16.3	20.4
Eligible Generation Achieved (percent of total electricity sales)	0.0	0.0	10.9	13.7	0.0	14.8	18.2	0.0	16.2	20.4
Electricity Sector Carbon Dioxide (million metric tons)	2,433	2,466	2,426	2,341	2,533	2,382	2,287	2,639	2,444	2,333

[1]Defined as total electricity sales minus sales from exempt small retailers, minus hydroelectric generation and minus non-landfill gas municipal solid waste generation.
Source: Energy Information Administration, National Energy Modeling System runs, STIMULUS.D041409A, WAXRPS.D041609A, AND WAXRPSNE.D041609C.

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Introduction

This report responds to requests from Chairman Edward Markey, for an analysis of a 25-percent Federal renewable electricity standard (RES). The RES proposal analyzed in this report is included in the discussion draft of broader legislation, the American Clean Energy and Security Act (ACESA) of 2009, issued on the Energy and Commerce Committee website at the end of March 2009.[3] The two request letters and the relevant section of the ACESA discussion draft are provided as Appendices A, B, and C of this report.

While Chairman Markey's original letter asked that sensitivities with alternative greenhouse gas policies be prepared, his subsequent letter released the Energy Information Administration (EIA) from that requirement. Consequently, the analysis presented here does not consider the interactions of the RES provisions contained in ACESA with other key provisions of that legislation. An analysis of these interactions will not be possible until some open issues in the ACESA discussion draft are resolved. However, this report does provide a qualitative discussion of potential interactions with an energy efficiency resource standard (EERS) and a cap-and-trade program for greenhouse gases, two other programs that are also included in the ACESA discussion draft.

Background

An RES, also known as a renewable portfolio standard (RPS), is a policy that requires covered electricity retailers to supply a specified share of their electricity sales from qualifying renewable energy resources. As of the end of 2008, 28 States and the District of Columbia had enacted an RPS or similar renewable energy requirement. The Federal RES analyzed here would apply to electricity retailers on a nationwide basis, establishing a target level for the market share of qualifying renewable resources that grows from 6 percent in 2012 to 25 percent in 2025 and beyond.

To stimulate an increase in the use of renewable resources to generate electricity, an RES requires that a specified share of the power sold must be produced from qualifying renewable facilities. Companies that generate power from qualifying renewable facilities are issued credits that they can hold for their own use or sell to others. To meet the RES requirement, each covered electricity seller must generate their own qualifying renewable power or purchase renewable energy credits from others. For example, a covered electricity retailer with 100 billion kilowatthours of retail electricity sales in a year with a

[3] An earlier version of the RES proposal was introduced as H.R. 890, the American Renewable Energy Act (AREA) of 2009.

25-percent RES requirement would have to generate or purchase credits representing a combined total of 25 billion kilowatthours of qualifying renewable power for that year. In a competitive market, the price of renewable energy credits should rise to the level needed to stimulate powerplant developers to construct the amount of qualifying renewable capacity needed to meet the RES requirement while allowing the market to determine the most economical renewable compliance options to develop.

The RES program analyzed in this report has the following characteristics:

- The program begins in 2012 with the required renewable share starting at 6 percent and growing in scheduled increments to 25 percent in 2025. The program sunsets in 2040.

- Power sellers with retail sales of at least 1 billion kilowatthours (1,000,000 megawatthours) are covered. Entities with retail sales below this level are exempt.

- Generation from existing hydroelectric and municipal solid waste (MSW) facilities are not included in the base electricity sales but also do not earn compliance credits.

- The total amount of qualifying renewable generation required each year is calculated by multiplying the base (total electricity retail sales minus existing hydroelectric and MSW generation and sales by exempt small retailers) by the required share.

- Qualifying renewable facilities include all new and existing nonhydroelectric renewable generation facilities, including co-firing modifications to existing coal plants[4] that are placed in service on or after the enactment date of the legislation. Qualifying fuels include incremental hydropower[5], geothermal, solar, wind, ocean, landfill gas, and certain biomass feedstocks.

- Generation from distributed renewable generation resources, i.e., customer-sited facilities such as roof-top photovoltaics and small wind turbines, earns three credits for every kilowatthour of generation through 2014, with a discretionary adjustment possible after 2014.[6] For purposes of this analysis, it is assumed that the credit will be reduced to one credit per kilowatthour after 2014, because the affected distributed generation resources show significant growth prior to 2014 when they receive triple credits and continue to grow slowly after 2014, indicating that have approached competitiveness in some markets.

[4] Generation from a co-firing facility is counted in proportion to the renewable fuel used in the facility.
[5] Hydroelectric dams entering starting in 2001 are eligible. This includes new generation capacity at existing non-electric dams and certain improvements to existing hydroelectric dams.
[6] The Secretary of Energy is required to review the credit multiplier in 4-year increments and adjust it to ensure that distributed energy resources only get enough of a credit to ensure competitiveness with other renewable resources. The credit multiplier cannot exceed three, nor fall below one.

- Credits are granted for qualified State energy efficiency programs to satisfy up to 20 percent of the RES requirement upon petition of the governor of any State provided that the State is in compliance with the EERS provisions of the bill.

- The market value of credits used for compliance is capped at 5 cents per kilowatthour, adjusted annually for inflation. Power sellers may purchase an unlimited number of alternative compliance credits from the Federal government at this "safety-valve" credit value, allowing them to meet their program obligations without providing additional renewable generation. Revenue from the sale of government-issued credits will be returned to retail suppliers in proportion to the credits they submit.

- The program does not affect any State-level RES requirements or similar obligations.

Analysis Cases

The analysis presented in this report starts from an updated version of the *Annual Energy Outlook 2009* (*AEO2009*) reference case that reflects the projected impacts of the American Recovery and Reinvestment Act (ARRA), enacted in February 2009, and revised economic assumptions. ARRA has a significant impact on the projected growth of renewable energy over the next 5 years, so it is important to take account of its enactment in considering the projected impacts of an RES requirement. For example, overall targets for renewable generation in this RES proposal, on a credits-earned basis, are below projected renewable generation in the updated reference case through 2015.

The development of the updated reference case is described in a recent EIA report *An Updated Annual Energy Outlook 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook.*[7] As noted in that report, EIA plans to use this updated baseline in its analyses of proposed changes in laws and regulations, including the RES analysis presented in this report. Therefore, the term "reference case" in this report means this updated reference case unless otherwise stated.

The RES proposal that is the subject of this report contains a provision requiring the Secretary of Energy to adjust the credit multiplier for distributed renewable generation to maintain it at a level "no higher than the Secretary determines is necessary to make distributed generation facilities cost competitive with other sources of renewable electricity generation." Enforcement of this provision will require significant discretion

[7] Energy Information Administration, *An Updated Annual Energy Outlook 2009 Reference Case Reflecting Provisions of the American Recovery and Reinvestment Act and Recent Changes in the Economic Outlook*, SR/OIAF/2009-03 (Washington, DC, April 2009), http://www.eia.doe.gov/oiaf/servicerpt/stimulus/index.html.

from the Secretary, which EIA is unable to analyze. Based on the market response of distributed renewable resources in the reference case, EIA has assumed that distributed renewable resources will be assigned a multiplier of one beyond 2014, the earliest date for adjustment of the initial multiplier of three in the two RES policy cases analyzed in this report.

One key difference between the RES proposal contained in H.R. 890 and the RES in the ACESA discussion draft that is the focus of this report is that the latter provides for the inclusion of credits for qualified State energy efficiency programs to satisfy up to 20 percent of the RES requirement upon petition of the governor of any State provided that the State is in compliance with the EERS provisions of the bill. As the baselines for and details of the yet-to-be-established EERS program are unknown, the extent to which States would have access to efficiency credits for purposes of the RES is not clear. In order to assess how different outcomes regarding the application of efficiency credits might affect the projected impacts of the RES, EIA analyzed two RES policy cases. The RES with Full Efficiency Credits (RESFEC) case assumes that the maximum level of efficiency credits, up to one-fifth of the credits in the target in any given year, are claimed. This is reflected as a 20-percent reduction in the applicable target for eligible renewable generation. The RES with No Efficiency Credits (RESNEC) case assumes that States cannot qualify for, or elect not to use, efficiency credits, so that the RES targets stated in the proposal are used as the actual targets for eligible renewable generation.

This report provides an analysis of the RES provisions in the ACESA discussion draft on a standalone basis. The impact of the EERS on the overall growth in electricity load, which could also affect the projected effects of an RES, is also not clear. A cap-and trade program for greenhouse gas emissions could also affect RES impacts. These interactions are beyond the scope of the analysis in this report, but they are addressed qualitatively.

Results

Required Level of Renewables

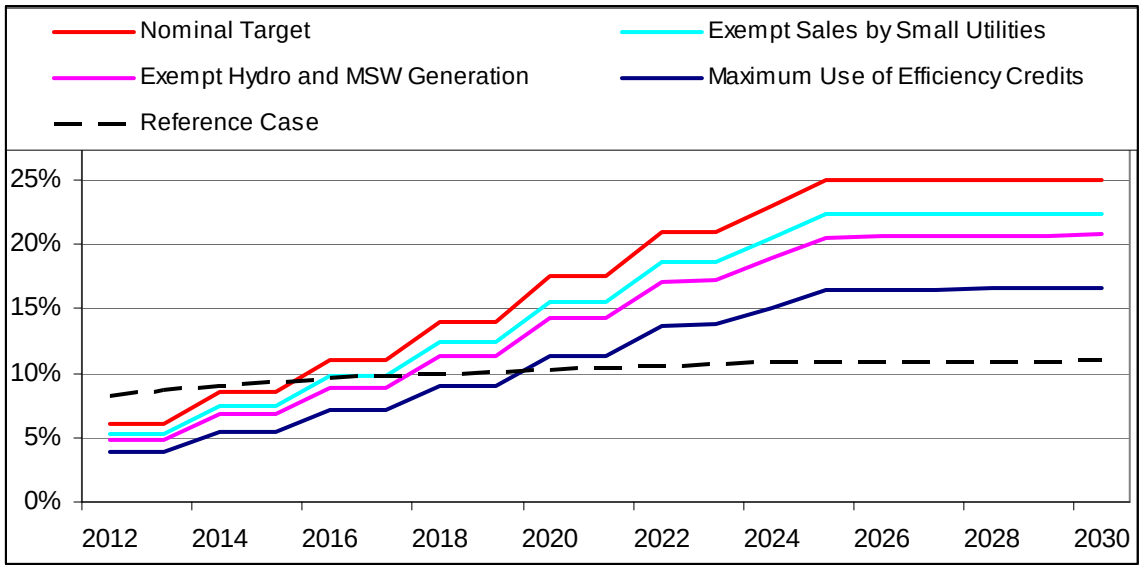
The level of renewables required to comply with the RES will be lower than the nominal target because of the exemptions and baseline adjustments. Figure 1 illustrates the derivation of the overall share of renewables required when these factors are taken into account. While the nominal share in 2025 is 25 percent, exempting the small retailers lowers the effective target to 22 percent of total electricity sales. The effective target is lowered further to 21 percent when the generation from hydroelectric power and municipal solid waste is removed from the sales baseline. The effective target will be lowered still further by the degree to which qualifying energy efficiency credits are used. If States are able to take full advantage of the energy efficiency credits, using them to meet up to 20 percent of the RES requirement, the effective share of renewables required could drop to approximately 17 percent of total electricity sales. These values are both greater than the 11-percent share of total electricity sales achieved by eligible renewables in 2025 in the reference case in this report.

Electricity Sector Results

Under both the RES simulations prepared, generation from renewable resources increases relative to the reference case (Figure 2). However, the growth in renewable generation, particularly for wind, stimulated by State RES programs and ARRA in the

Figure 1: Share of Renewables Required

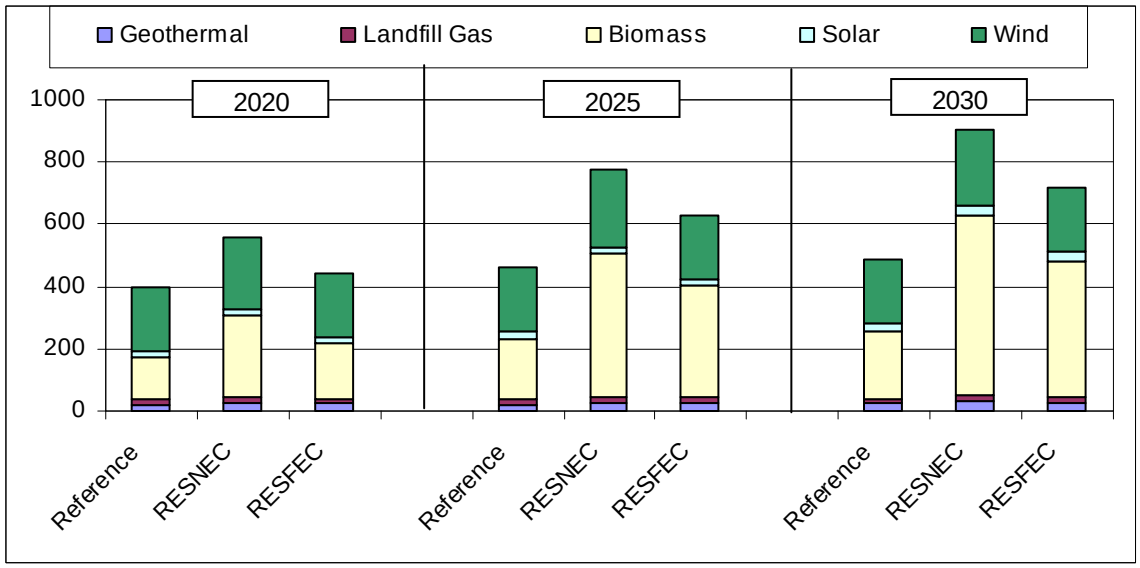
(share of total electricity sales)



Source: Energy Information Administration, Office of Integrated Analysis and Forecasting.

Figure 2: Generation by Fuel

(billion kilowatthours)



Source: Energy Information Administration, National Energy Modeling System runs, STIMULUS.D041409A, WAXRPS.D041609A, and WAXRPSNE.D041609C.

reference case plays a major role in compliance with the Federal RES. For example, in the reference case, wind generation increases from 32 billion kilowatthours in 2007 to 208 billion kilowatthours in 2030. This increase in wind generation accounts for a significant share of the increase in renewable generation require with the Federal RES. In the cases analyzed in this report, biomass generation, both from dedicated biomass plants and existing coal plants co-firing with biomass fuel, also plays a major role in compliance with the Federal RES, with biomass generation more than doubling from 218 billion kilowatthours in the reference case to 438 billion kilowatthours in the RESFEC case and 577 billion kilowatthours in the RESNEC case (Table 1). Unlike for wind, the renewable provisions of ARRA did not have as large an impact on biomass because the co-firing of biomass only receives half the credit available to new wind plants and new dedicated biomass plants generally take longer to develop than the period of the credit extension in ARRA.

Wind generation in the RESFEC case reaches the same level (208 billion kilowatthours) as in the reference case by 2030, but in the RESNEC case wind generation increases to 249 billion kilowatthours. Although total solar generation does not reach the level of wind, it has a higher percentage increase than wind by 2030, when compared to the reference case. Solar generation, including utility-owned solar thermal and photovoltaics and customer-sited distributed generation, increases from 23 billion kilowatthours in 2030 in the reference case to 30 billion kilowatthours in the RESFEC and 31 billion kilowatthours in the RESNEC case, an increase of 30 percent and 35 percent, respectively.

The increase in renewable generation stimulated by the Federal RES leads to lower projected coal and natural gas generation. In the two RES cases, coal generation ranges between 182 billion kilowatthours (8 percent) and 257 billion kilowatthours (11 percent) below the reference case level. Similarly, natural gas generation in the two RES cases in 2030 is between 55 billion kilowatthours (6 percent) and 150 billion kilowatthours (15 percent) below the level projected in the reference case.

Given the amount of eligible renewable generation projected in the reference case, the RES is not expected to affect national average electricity prices until after 2020. As the required RES share increases to its maximum value in 2025, the value of RES credits increases and impacts on national average electricity prices become evident. The peak effect on national average electricity prices, 2.7 percent in the RESFEC case and 2.9 percent in the RESNEC case, occurs as the required renewable share ramps up more rapidly than the demand for electricity is growing. In the later years of the projections, the impact on national average electricity prices is smaller, as the impact of the RES requirement on the cost of coal and natural gas, fuels whose use is reduced by added renewables, is increasingly reflected in electricity prices. By 2030, electricity prices are projected to be little changed from the reference case in both RES cases, with 2030 prices less than 1 percent higher than in the reference case.

By 2030, natural gas prices, measured as the average wellhead price, have decreased 1 percent in the RESFEC case and 4 percent in the RESNEC case, relative to the reference

case. Also by 2030, average minemouth coal prices relative to the reference case have decreased 2 percent in the RESFEC case and 4 percent in the RESNEC case.

Renewable credit prices do not rise above zero in either RES proposal until 2020. The RESNEC case generally results in a higher credit price than the RESFEC case. In both cases, credit prices reach a maximum of 5 cents per kilowatthour in 2024 and maintain this price through 2028, after which time the price begins to drop as electricity demand grows enough to absorb the required growth in renewables. In 2030, the RESFEC case results in a credit price of 2.5 cents per kilowatthour and the RESNEC case results in a credit price of 3.5 cents per kilowatthour.

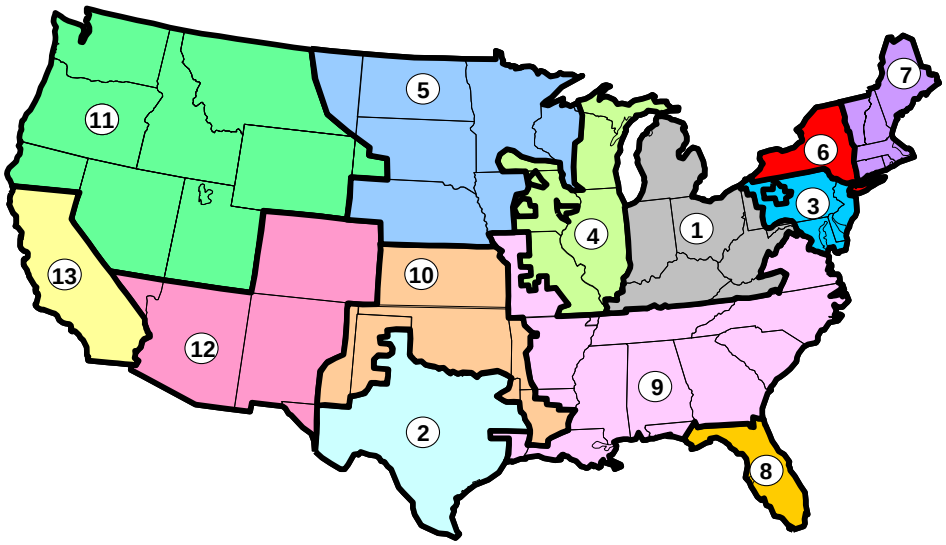
Regional Results

Compliance with RES targets can vary significantly by region. Although all regions do provide some significant fraction of their required renewable generation from in-region sales, some tend to over-comply and thus are able to sell credits to other regions, and other regions tend to under-comply and need to purchase credits to achieve compliance. Several factors contribute to a region's overall tendency to be a net credit importer or exporter, including:

- Cost and availability of renewable resources. Regions with low-cost and/or abundant resources may be able to comply more economically or to a greater extent than other regions. Some regions may also be able to access lower cost resources in an adjacent region, with additional investment in transmission improvements.
- Cost of alternative generation options. Regions that rely on more expensive conventional generation options, such as natural gas, will see reduced compliance costs, even with relatively expensive or limited renewable resources, as credit prices are a function of the spread between the cost of the renewable and the cost of the displaced generation.
- State incentives for renewable generation. Some regions may have State RES requirements in excess of the net Federal requirement for that region and, as a result, will necessarily over-comply with the Federal RES.

Because of regional differences in electricity market structure, State RES requirements, and ability to utilize resources, regional compliance surpluses or deficits may have differing price impacts, as shown in Figures 3 through 5. In regions dominated by traditional cost-of-service regulation, the net cost increases or decreases from RES compliance are generally passed through to consumers; in regions with more open electricity market structures, these changes in costs will only be passed through to consumers to the extent that market forces allow and will otherwise by absorbed by the industry. In cases where one region may be building dedicated renewable energy resources in an adjacent region, costs and benefits may be shared between the two regions, as the host region will realize the local economic benefits such as employment and land-owner payments, but also local costs such as any undesirable land uses, and the

Figure 3. National Energy Modeling System Electricity Regions

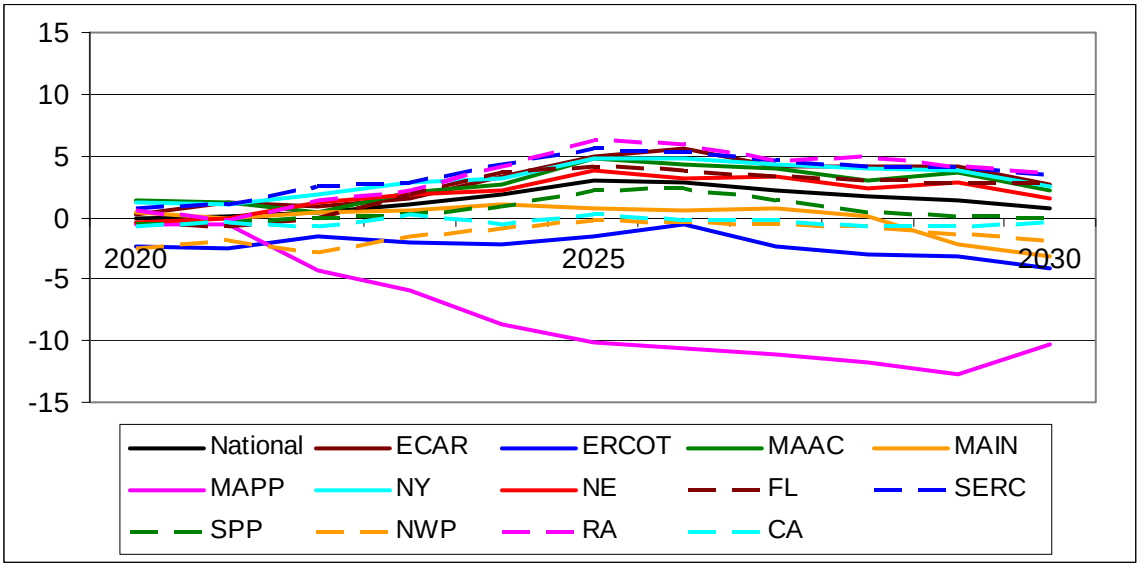


1 East Central Area Reliability Coordination Agreement (ECAR)
2 Electric Reliability Council of Texas (ERCOT)
3 Mid-Atlantic Area Council (MAAC)
4 Mid-America Interconnected Network (MAIN)
5 Mid-Continent Area Power Pool (MAPP)
6 New York (NY)
7 New England (NE)
8 Florida Reliability Coordinating Council (FL)
9 Southeastern Electric Reliability Council (SERC)
10 Southwest Power Pool (SPP)
11 Northwest Power Pool (NWP)
12 Rocky Mountain Power Area, Arizona, New Mexico, and Southern Nevada (RA)
13 California (CA)

Source: Energy Information Administration

Figure 4: Regional Price Impacts in the RESNEC Case

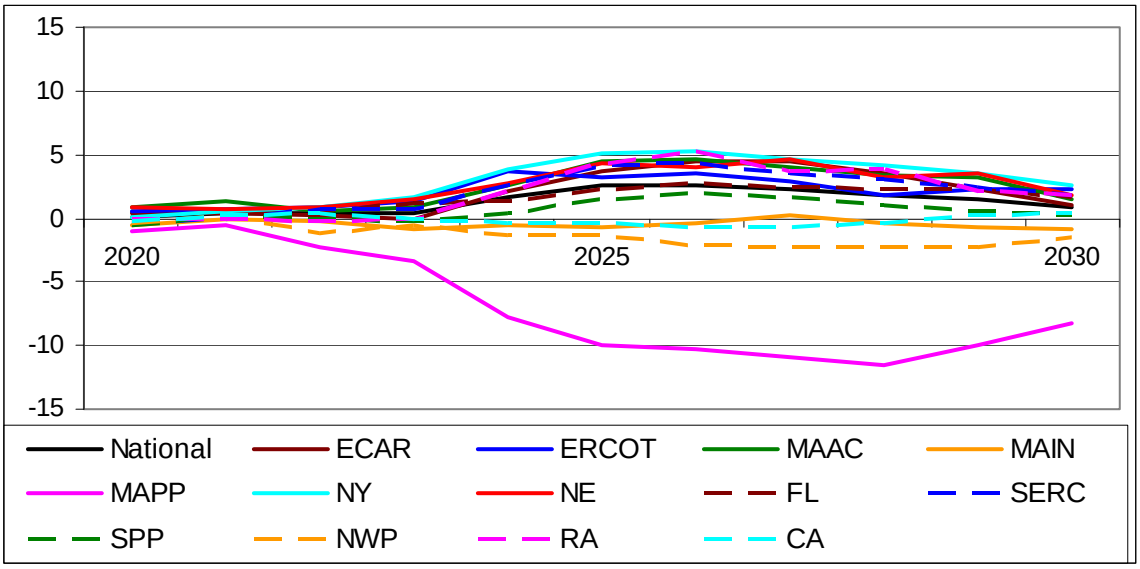
(percent change from reference case)



Source: Energy Information Administration, National Energy Modeling System runs, STIMULUS.D041409A AND WAXRPSNE.D041609C.

Figure 5: Regional Price Impacts in the RESFEC Case

(percent change from reference case)



Source: Energy Information Administration, National Energy Modeling System runs, STIMULUS.D041409A AND WAXRPS.D041609A.

By 2020, when the RES targets first start to result in significant new capacity builds above reference case levels, most regions start to see an increase in electricity prices, with most regions seeing an increase of 2 to 5 percent above reference case levels through 2025. After 2025, prices begin to return to reference case levels, and by 2030 they are generally 1 percent to 3 percent higher than projected in the reference case. In a few regions, especially the MAPP region (covering the northern Great Plains States), with abundant and low-cost renewable resources, prices fall below the reference case level. In the RESNEC case, ERCOT (covering most of Texas) also sees a significant decrease in electricity prices compared to the reference case, as a result of the significant wind resources of Texas and also because of the significant reliance of that region on natural gas as a generation fuel. The RES leads to lower natural gas use and prices, which benefits regions that rely heavily on natural gas.

Carbon Dioxide Emissions

This analysis is of the RES portion of the ACESA discussion draft and does not account for the various carbon-reduction policies that affect other markets outside of the electric power sector. Within the electric power sector, the RES is projected to result in reductions in carbon dioxide emissions relative to the reference case (Figure 6). In the RESFEC and RESNEC case, electricity sector carbon dioxide emissions in 2030 are projected to be 2,444 million metric tons and 2,333 million metric tons respectively, compared to 2,639 million tons in the reference case and 2,433 million tons estimated in 2007.

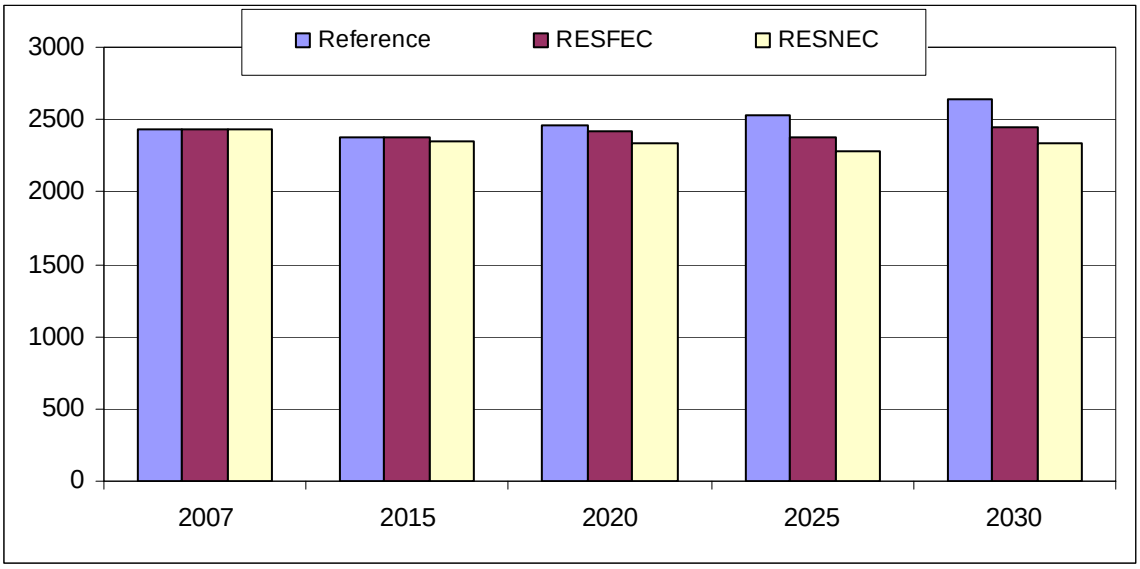
Table 1. Summary Results

	2007	2020			2025			2030		
Generation (billion kilowatthours)	**Reference**	**Reference**	**RESFEC**	**RESNEC**	**Reference**	**RESFEC**	**RESNEC**	**Reference**	**RESFEC**	**RESNEC**
Coal	2021	2198	2160	2090	2202	2076	2005	2311	2129	2054
Petroleum	66	49	49	49	49	50	49	50	50	50
Natural Gas	892	714	709	672	908	839	774	976	921	826
Nuclear	806	876	876	869	882	881	872	890	876	859
Conventional Hydropower	248	299	298	297	299	298	297	300	298	298
Geothermal	15	22	23	26	22	25	28	24	25	31
Municpal Waste	16	24	26	28	24	27	28	24	28	28
Wood and Other Biomass	39	139	178	263	197	359	460	218	438	577
Solar	1	20	20	20	21	22	23	23	30	31
Wind	32	203	204	227	207	207	248	208	208	249
Other	22	28	28	28	29	29	28	29	29	28
Total Generation	4159	4573	4571	4571	4840	4813	4813	5055	5032	5031
Prices (cents per kilowatthour)										
Credit Price	0.0	0.0	0.6	1.7	0.0	5.0	5.0	0.0	2.5	3.5
Electricity Price	9.1	9.3	9.3	9.3	9.5	9.7	9.8	10.1	10.1	10.1
RPS Compliance										
Total Electricity Sales (billion kilowatthours)	3747	4127	4124	4125	4348	4327	4320	4527	4500	4495
Covered Baseline[1]	NA	NA	3355	3357	NA	3358	3352	NA	3731	3727
Credits Required (percent of total sales)	0.0	0.0	11.4	14.2	0.0	16.5	20.6	0.0	16.5	20.7
Credits Achieved (percent of total sales)	0.0	0.0	11.2	14.0	0.0	14.9	18.3	0.0	16.3	20.4
Eligible Generation Achieved (percent of total electricity sales)	0.0	0.0	10.9	13.7	0.0	14.8	18.2	0.0	16.2	20.4
Electricity Sector Carbon Dioxide (million metric tons)	2,433	2,466	2,426	2,341	2,533	2,382	2,287	2,639	2,444	2,333

[1]Defined as total electricity sales minus sales from exempt small retailers, minus hydroelectric generation and minus non-landfill gas municipal solid waste generation.
Source: Energy Information Administration, National Energy Modeling System runs, STIMULUS.D041409A, WAXRPS.D041609A, AND WAXRPSNE.D041609C.

Figure 6: Electricity Sector Carbon Dioxide Emissions

(million metric tons)



Source: Energy Information Administration, National Energy Modeling System Runs, STIMULUS.D041409A, WAXRPS.D041609A, AND WAXRPSNE.D041609C.

Interactions Between the RES, the EERS, and the Cap-and-Trade Program for Greenhouse Gas Emissions in the ACESA Discussion Draft

EIA's modeling of the RES in the ACESA discussion draft was a standalone analysis that did not consider interactions with other key programs in the ACESA discussion draft. While EIA cannot develop an integrated analysis until there are clearer insights into how some of the other ACESA programs would actually be implemented, interactions among the elements of ACESA could be significant.

In previous analyses of economy-wide policies to limit or reduce emissions of greenhouse gases, EIA has generally found that a cap-and-trade program for greenhouse gases leads to significant growth in the use of renewable energy for electricity generation, which becomes more attractive when the cost of using fossil fuels goes up. Where there are multiple targets that can be satisfied with the same energy resources and projects, the target that sets the upper limit on the use of the resource will generally absorb all of the incremental costs from that resource, making compliance with the non-binding goal appear to be costless. To the extent that the proposed cap and trade program induces more renewable resources than required by the concurrent RES proposal, one might expect a reduction in apparent RES compliance costs, since those costs would already be reflected in the value of carbon dioxide allowances.

In contrast, an EERS, which reduces or eliminates projected growth in electricity load, and therefore the need for additional generation capacity, makes it more likely that a given RES target will require that generation from new eligible renewable capacity replace generation from existing capacity rather than from other types of new capacity.

The cost penalty associated with backing out existing capacity, whose capital cost is already sunk, is typically much larger than the cost penalty associated with backing out alternative types of new capacity. The EERS in the ACESA discussion draft calls for a 15-percent reduction in load relative to the EERS baseline between 2012 and 2020, with further reductions beyond 2020 to be established through a rulemaking process. Although the relationship between the EERS baseline and the updated *AEO2009* reference case is far from clear, projected electricity demand growth in the updated *AEO2009* reference case, before application of an EERS, is only about 1.0 percent per year from 2008 through 2030. If the EERS program in fact leads to a significant reduction in projected demand growth relative to the updated *AEO2009* baseline, many regions would likely have little if any need for new capacity, so new generation from eligible renewables required to meet the RES target would be backing out generation from existing capacity.

Uncertainties

As with any long-term projections, there are considerable uncertainties in these results. Among the key uncertainties are projections of the growth in the demand for electricity, future fuel prices, and the cost and performance of new generating equipment, both renewable and nonrenewable technologies. Future energy and environmental policy is also a key uncertainty.

Future coal and natural gas prices are important in determining the credit price needed to make new renewable electricity competitive with other generation options. If coal and natural gas prices turn out to be lower than are projected in this report, the renewable energy credit price needed to make renewables competitive would be larger. Conversely, it would be lower if coal and natural gas prices turn out to be higher than expected.

Projections of the future cost and performance of new generating equipment are always difficult, particularly for technologies that currently have little or no market experience. Nonhydroelectric renewable technologies currently produce about 3 percent of the power generated in the United States. Spurring the market penetration of these technologies with an RPS might allow developers to make reductions in their costs and improve their performance through mass production techniques and learning by doing. These types of improvements are assumed to occur and are incorporated in the National Energy Modeling System (NEMS), EIA's long-term domestic energy model.

However, it could turn out that the current relatively low market shares for these technologies result from high costs that cannot be easily reduced. In addition, even if renewable technology developers are successful in improving the cost and performance of their technologies, their ability to penetrate the market will depend on the relative costs and performance of nonrenewable technologies. If renewable and nonrenewable technologies improve by similar amounts, the relative advantage that nonrenewable technologies have today would likely remain. If renewable technology improves at a faster rate than assumed, compliance costs could be less than projected.

For wind, solar, and biomass technologies, the level of development called for with the proposed RPS comes with some uncertainty. For example, developers or grid operators may have to pay to build or upgrade long transmission lines from the remote areas with ample wind resources to the cities with significant demand. In this analysis, costs are assumed to increase as developers turn to more costly sites such as those with higher interconnection costs, higher land costs, or more difficult terrain. However, there is significant uncertainty about the actual cost increases that might occur, and the actual costs may be more or less than projected.

Wind and solar power development may also be constrained by the intermittent nature of the resource which may lead to the need for additional capacity to ensure that consumers' need for electricity can be met at all times. At regional penetration levels seen for wind in this analysis, NEMS represents many of the most significant costs of accommodating wind intermittency, including costs for additional firm system capacity when needed, potential mismatch between load and wind-production peaks, and lost revenue during periods of excess wind production.

The solar resource development seen in this report would largely occur at the customer site, on the distribution rather than on the transmission system. Such a level of penetration may have minor or significant effects on system cost and reliability, largely depending on localized concentration of installations and the pre-existing condition of local distribution systems.

As with wind, data suggest that there are sufficient biomass resources to fuel the increased biomass generation projected in the RPS case. However, currently there are relatively few coal plants that co-fire with biomass. To achieve the level of biomass co-firing called for in the RPS case, the infrastructure to reliably gather, process, and deliver the available biomass to coal plants would have to be developed. Utilities with coal plants may also be resistant to investing in them to allow them to use biomass, if they believe that future climate policy may lead them to shut the plant down or reduce its utilization.

Finally, EIA assumes the use of biomass gasification technology for dedicated biomass generation plants. Based on current estimates, these plants trade off somewhat higher capital costs for significantly improved efficiency compared to direct-combustion technology, thus reducing operating costs. However, few commercial biomass gasification operations currently exist, and capital costs for this technology are highly uncertain.

Biomass generation, both in dedicated plants and in co-firing operations, is a significant compliance option in this report. A low carbon fuels standard may cause increased competition for the same biomass feedstocks on land that is projected to be used to meet this renewable electricity sector. Such competition for feedstocks/fuels could result in a shift in compliance strategy for the RES and/or an increase in renewable electricity credit prices and compliance costs. However, increased production of liquid fuels from

biomass may also result in increased electricity generation from biofuel production facilities, which may be able to burn biomass wastes from their production processes to produce electricity.

Appendix A

Follow-Up Analysis Request Letter

COMMITTEE
ENERGY AND COMMERCE
SUBCOMMITTEE ON
ENERGY AND ENVIRONMENT
CHAIRMAN

SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND
GLOBAL WARMING
CHAIRMAN

NATURAL RESOURCES

EDWARD J. MARKEY
7TH DISTRICT, MASSACHUSETTS

Congress of the United States
House of Representatives
Washington, DC 20515–2107

April 15, 2009

2108 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-2107
(202) 225-2836

DISTRICT OFFICES

5 HIGH STREET, SUITE 101
MEDFORD, MA 02155
(781) 396-2900

188 CONCORD STREET, SUITE 102
FRAMINGHAM, MA 01702
(508) 875-2900

http://markey.house.gov

Mr. Howard Gruenspecht
Acting Administrator
Energy Information Administration
1000 Independence Ave. SW
Washington, DC 20585

Dear Mr. Gruenspecht:

Earlier this year, I sent a letter to you requesting that the Energy Information Administration analyze the American Renewable Energy Act (H.R. 890), a bill establishing a national Renewable Electricity Standard (RES) that I introduced with Congressman Todd Platts.

Provisions based on H.R. 890 have been included in Title I of the American Clean Energy and Security Act (ACES) discussion draft that Chairman Waxman and I released on March 31. The principal difference between H.R. 890 and the provisions included in the ACES discussion draft is that the latter permits the Governor of any State to reduce the renewables targets for compliance entities within that State by up to one fifth, provided that retail electricity and natural gas distributors within the State are in compliance with the Energy Efficiency Resource Standard included in Title II of the discussion draft.

Assuming that all Governors availed themselves of this option, this would effectively reduce the required annual percentage of renewable generation to the following targets:

2012	4.8 %
2013	4.8 %
2014	6.8 %
2015	6.8 %
2016	8.8 %
2017	8.8 %
2018	11.2 %
2019	11.2 %
2020	14.0 %
2021	14.0 %
2022	16.8 %
2023	16.8 %
2024	18.4 %
2025-39	20.0 %

The House Energy and Commerce Committee intends to move energy and climate legislation, which may include the RES provisions included in the ACES discussion draft, during April and May of this year. Accordingly, I write to request that you adjust the analysis that I requested earlier this year to reflect the provisions, as modified, that have been included in the ACES discussion draft released on March 31. In addition, to facilitate expeditious completion of your analysis, I authorize you to defer work on the "sensitivity run" I had requested on the effect of including a price for greenhouse gas emissions from a national cap-and-trade policy.

Thank you for your attention to this matter. I ask that my staff be briefed prior to the release of information. Should you or your staff have any questions, please have your staff contact Jonathan Phillips with the Select Committee staff at (202) 225-4012.

Sincerely,

Ed Markey

Edward J. Markey
Member of Congress

Appendix B

Analysis Request Letter

Select Committee on
Energy Independence and Global Warming
U.S. House of Representatives

February 25, 2009

Mr. Howard Gruenspecht
Acting Administrator
Energy Information Administration
1000 Independence Ave. SW
Washington, DC 20585

Dear Mr. Gruenspecht:

As Congress considers proposals to increase the nation's energy independence and reduce the environmental impacts of energy production and use, Congressman Todd Platts and I recently introduced the American Renewable Energy Act (H.R. 890), which would establish a national Renewable Electricity Standard (RES). This legislation requires that an increasing percentage of the electricity supplied by certain electric utilities to consumers be generated from renewable resources. A copy of the bill is attached.

A national RES has passed both the House of Representatives and Senate on multiple occasions in previous Congresses. The Energy Information Administration has analyzed several of these earlier iterations, and I am requesting that you conduct a similar analysis on RES legislation that I recently introduced. The primary elements of this proposal include:

- The entities subject to the RES include electric service providers that sell electricity to retail consumers. Electric service providers with sales less than 1,000,000 megawatt hours per year are exempt.
- The base against which the renewable requirement is calculated is defined as all electric utility retail sales in a given calendar year, excluding electricity generated by existing hydroelectric facilities and by combustion of municipal solid waste.
- The definition of renewable energy is electricity generated at a facility that uses solar, wind, marine or hydrokinetic, geothermal, biomass, landfill gas, or qualified incremental hydropower.
- The RES includes a credit system in which one credit will be distributed for each kilowatt hour (kWh) of electricity generated from eligible resources. Electricity from qualified distributed generation receives 3 credits per kWh. (Distributed generation is defined to include any facility that generates electricity primarily for consumption at or near the facility site, is not greater than 2 megawatts in

capacity, and does not rely on combustion to generate electricity.) Credits can be traded or banked for up to 3 years for future use.

- Compliance can alternatively be achieved through a payment equal to the lesser of 200 percent of the average market value of a credit from the previous year or at an inflation-adjusted rate of 5 cents per kilowatt hour.

- The required annual percentage of renewable generation is:

2012	6.0 %
2013	6.0 %
2014	8.5 %
2015	8.5 %
2016	11.0 %
2017	11.0 %
2018	14.0 %
2019	14.0 %
2020	17.5 %
2021	17.5 %
2022	21.0 %
2023	21.0 %
2024	23.0 %
2025-39	25.0 %

- Although the first official compliance year is 2012, please ensure a smooth and gradual ramp-up of renewable electricity generation in years 2010 and 2011 to reflect the early preparation that electric providers will likely undertake. In addition, while the compliance targets stair step in order to provide additional flexibility, please ensure a smooth ramp up of renewable generation in your analysis, in order to better reflect the likely schedule of actual deployment.

In your analysis of this proposal, I ask that you specifically address:

- The impact on deployment of renewable energy technologies in terms of both type and scale, as well as the change in total generation mix to determine what resources renewable energy is displacing.

- The annual impact on electricity and natural gas prices throughout the forecast period, as well as the cumulative difference in consumer expenditures on natural gas and electricity through 2020 and 2030 compared to a business-as-usual baseline.

- The impact of the proposal on total U.S. greenhouse gas emissions and on power sector greenhouse gas emissions.

- The feasibility of achieving renewable targets and the anticipated use of the alternative compliance payment.

In addition, I request that your analysis include "sensitivity runs" that take account of certain important variables, including the following:

- more optimistic assumptions for renewable energy technologies, for example by using EIA's high renewable energy/low cost case assumptions;
- assuming more pessimistic assumptions for fossil fuels and nuclear, for example by using EIA's high plant cost and high energy price case assumptions; and
- including a price for greenhouse gas emissions based on future adoption of national cap-and-trade policy and existing State and regional policies, for example by using prices from one of EIA's recent analyses of legislation considered by the Senate in the last Congress.

Thank you for your attention to this matter. I ask that my staff be briefed prior to the release of information. Should you or your staff have any questions, please have your staff contact Jonathan Phillips with the Select Committee staff at (202) 225-4012.

Sincerely,

Edward J. Markey
Chairman

Appendix C

Discussion Draft

American Clean Energy and Security Act of 2009

Title I, Subtitle A

Renewable Electricity Standard

TITLE I—CLEAN ENERGY
Subtitle A—Renewable Electricity Standard
SEC. 101. FEDERAL RENEWABLE ELECTRICITY STANDARD.

(a) IN GENERAL.—Title VI of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2601 and following) is amended by adding at the end the following:

''SEC. 610. FEDERAL RENEWABLE ELECTRICITY STANDARD.

''(a) DEFINITIONS.—For purposes of this section:

''(1) AFFILIATE.—The term 'affiliate' when used in relation to a person, means another person that directly or indirectly owns or controls, is owned or controlled by, or is under common ownership or control with, such person, as determined under regulations promulgated by the Secretary.

''(2) BIOMASS.—The term 'biomass' means each of the following:

‘‘(A) Crops, crop byproducts, or crop resi
dues harvested from actively managed or fallow
agricultural land that was cleared prior to the
date of enactment of this section and is nonfor
ested.
‘‘(B) Planted trees, brush, slash, and all
residues from an actively managed tree planta
tion located on land that was cleared prior to
the date of enactment of this section and is not
Federal land.
‘‘(C) Pre-commercial-sized thinnings, slash,
brush, and residue from milled trees, from for
ested land that is not—
‘‘(i) old-growth or mature forest;
‘‘(ii) identified under a State Natural
Heritage Program as rare, imperiled, or
critically imperiled; or
‘‘(iii) Federal land.
‘‘(D) Algae.
‘‘(E) Nonhazardous plant matter derived
from waste such as separated yard waste, land
scape right-of-way trimmings, or food waste
(but not municipal solid waste, recyclable waste
paper, painted, treated or pressurized wood, or
wood contaminated with plastic or metals).

‘‘(F) Animal waste or animal byproducts,
including products of animal waste digesters.
‘‘(G) Vegetative matter removed from
within 200 yards of any manmade structure or
campground.
‘‘(3) DISTRIBUTED GENERATION FACILITY.—
The term ‘distributed generation facility’ means a
facility that—
‘‘(A) generates renewable electricity other
than by means of combustion;
‘‘(B) primarily serves 1 or more electricity
consumers at or near the facility site; and
‘‘(C) is no larger than 2 megawatts in ca
pacity.
‘‘(4) FEDERAL ALTERNATIVE COMPLIANCE PAY
MENT.—The term ‘Federal alternative compliance
payment’ means a payment, to be submitted in lieu
of 1 Federal renewable electricity credit, pursuant to
subsection (c)(3).
‘‘(5) FEDERAL LAND.—The term ‘Federal land’
means land owned by the United States, other than
land held in trust for an Indian or Indian tribe.
‘‘(6) FEDERAL RENEWABLE ELECTRICITY
CREDIT.—The term ‘Federal renewable electricity
credit’ means a credit, representing one megawatt

hour of renewable electricity, issued pursuant to sub section (d).

''(7) FUEL CELL.—The term 'fuel cell' means a device that directly converts the chemical energy of a fuel and an oxidant into electricity by electro chemical processes occurring at separate electrodes in the device.

''(8) FUND.—The term 'Fund' means the Re newable Electricity Deployment Fund established under subsection (f).

''(9) QUALIFIED HYDROPOWER.—The term 'qualified hydropower' means—

''(A) electricity generated solely from in creased efficiency achieved, or additions of ca pacity made, on or after January 1, 2001 at a hydroelectric facility that was placed in service before that date; or

''(B) electricity generated from generating capacity added on or after January 1, 2001 to a dam that did not previously have the capacity to generate electricity, provided that the Com mission certifies that—

''(i) the dam was placed in service be fore the date of the enactment of this sec tion and was operated for flood control,

navigation, or water supply purposes and did not produce hydroelectric power before January 1, 2001;

‘‘(ii) the hydroelectric project installed on the dam is licensed by the Commission and meets all other applicable environ mental, licensing, and regulatory require ments, including applicable fish passage re quirements; and

‘‘(iii) the hydroelectric project in stalled on the dam is operated so that the water surface elevation at any given loca tion and time that would have occurred in the absence of the hydroelectric project is maintained, subject to any license require ments that require changes in water sur face elevation for the purpose of improving the environmental quality of the affected waterway.

‘‘(10) RENEWABLE ELECTRICITY.—The term ‘renewable electricity’ means electricity generated (including by means of a fuel cell) from a renewable energy resource.

‘‘(11) RENEWABLE ENERGY RESOURCE.—The term ‘renewable energy resource’ means each of the following:

‘‘(A) Wind energy.

‘‘(B) Solar energy.

‘‘(C) Geothermal energy.

‘‘(D) Biomass or landfill gas.

‘‘(E) Qualified hydropower.

‘‘(F) Marine and hydrokinetic renewable energy, as that term is defined in section 632 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17211).

‘‘(12) RETAIL ELECTRIC SUPPLIER.—

‘‘(A) IN GENERAL.—The term ‘retail electric supplier’ means, for any given year, an electric utility that sold not less than 1,000,000 megawatt hours of electric energy to electric consumers for purposes other than resale during the preceding calendar year.

‘‘(B) INCLUSIONS AND LIMITATIONS.—For purposes of determining whether an electric utility qualifies as a retail electric supplier under subparagraph (A)—

‘‘(i) the sales of any affiliate of an electric utility to electric consumers for

purposes other than resale shall be consid
ered to be sales of such electric utility; and
‘‘(ii) sales by any electric utility to an
affiliate, lessee, or tenant of such electric
utility shall not be treated as sales to elec
tric consumers.
‘‘(13) RETAIL ELECTRIC SUPPLIER’S BASE
AMOUNT.—The term ‘retail electric supplier’s base
amount’ means the total amount of electric energy
sold by the retail electric supplier, expressed in
terms of megawatt hours, to electric customers for
purposes other than resale during the relevant cal
endar year, excluding electricity generated by—
‘‘(A) a hydroelectric facility that is not
qualified hydropower; or
‘‘(B) combustion of municipal solid waste.
‘‘(14) RETIRE AND RETIREMENT.—The terms
‘retire’ and ‘retirement’ with respect to a Federal re
newable electricity credit, means to disqualify such
credit for any subsequent use under this section, re
gardless of whether the use is a sale, transfer, ex
change, or submission in satisfaction of a compliance
obligation.
‘‘(b) ESTABLISHMENT OF PROGRAM.—Not later than
1 year after the date of enactment of this section, the Sec-

retary shall, by regulation, establish a program to imple
ment and enforce the requirements of this section. In es
tablishing such program, the Secretary shall, to the extent
practicable—
‘‘(1) preserve the integrity, and incorporate best
practices, of existing State renewable electricity pro
grams;
‘‘(2) rely upon existing and emerging State or
regional tracking systems that issue and track non-
Federal renewable electricity credits; and
‘‘(3) cooperate with the States to facilitate co
ordination between State and Federal renewable
electricity programs and to minimize administrative
burdens and costs to retail electric suppliers.
‘‘(c) ANNUAL COMPLIANCE REQUIREMENT.—
‘‘(1) IN GENERAL.—Except as provided in para
graph (3), for each of calendar years 2012 through
2039, each retail electric supplier shall, not later
than April 1 of the following calendar year, submit
to the Secretary a quantity of Federal renewable
electricity credits equal to the retail electric sup
plier’s base amount for the calendar year multiplied
by the required annual percentage set forth in para
graph (2). The Secretary shall retire each Federal

renewable energy credit immediately upon submis-
sion under this section.
‘‘(2) REQUIRED ANNUAL PERCENTAGE.—For
each of calendar years 2012 through 2039, the re-
quired annual percentage shall be as follows:

‘‘Calendar year	Required annual percentage
2012	6.0
2013	6.0
2014	8.5
2015	8.5
2016	11.0
2017	11.0
2018	14.0
2019	14.0
2020	17.5
2021	17.5
2022	21.0
2023	21.0
2024	23.0
2025 through 2039	25.0

‘‘(3) EFFICIENCY COMPLIANCE OPTION.—The
Governor of a State (including, for purposes of this
section, the Mayor of the District of Columbia), may
petition the Secretary to reduce, by up to one fifth,
the required annual percentage under paragraph (2)
in any given year that shall be applied to the portion
of any retail electric supplier’s base amount that is
sold to electric customers located within such State
for purposes other than resale. The Secretary shall
grant such petition if the Secretary determines that
the entities within the State that are subject to the
Federal Energy Efficiency Resource Standard estab-

lished under section 611 of this Act are in compli
ance with such standard for such year.
‘‘(4) ALTERNATIVE COMPLIANCE PAYMENTS.—
A retail electric supplier may satisfy the require
ments of paragraph (1) (as modified, where applica
ble, under paragraph (3)) in whole or in part by
submitting in lieu of each Federal renewable elec
tricity credit that would otherwise be due, a payment
equal to the lesser of—
‘‘(A) 200 percent of the average market
value of a Federal renewable electricity credit
for the previous compliance year, as determined
by the Secretary; or
‘‘(B) $50, adjusted on January 1 of each
year following calendar year 2009 based on the
Gross Domestic Product Implicit Price
Deflator.
‘‘(5) USE OF PAYMENTS.—Alternative compli
ance payments submitted pursuant to paragraph (4)
shall be deposited in the Fund established under
subsection (f).
‘‘(d) FEDERAL RENEWABLE ELECTRICITY CRED
ITS.—
‘‘(1) IN GENERAL.—The regulations promul
gated under subsection (b) shall include provisions

governing the issuance, tracking, and verification of Federal renewable electricity credits. Except as provided in paragraphs (2), (3), and (4) of this subsection, the Secretary shall issue to each generator of renewable electricity, 1 Federal renewable electricity credit for each megawatt hour of renewable electricity generated by such generator. The Secretary shall assign a unique serial number to each Federal renewable electricity credit.

''(2) GENERATION FROM STATE RENEWABLE ELECTRICITY PROGRAMS USING CENTRAL PROCUREMENT AND FROM STATE ALTERNATIVE COMPLIANCE PAYMENTS.—Where renewable electricity is generated with the support of payments from a retail electric supplier pursuant to a State renewable electricity program (whether through State alternative compliance payments or through payments to a State renewable electricity procurement fund or entity), the Secretary shall issue Federal renewable electricity credits to such retail electric supplier for the proportion of the relevant renewable electricity generation that is attributable to the retail electric supplier's payments, as determined pursuant to regulations issued by the Secretary. For any remaining portion of the relevant renewable electricity genera-

tion, the Secretary shall issue Federal renewable electricity credits to the generator, as provided in paragraph (1), provided that in no event shall more than 1 Federal renewable electricity credit be issued for the same megawatt hour of electricity. In deter mining how Federal renewable electricity credits will be apportioned among retail electric suppliers and generators in such circumstances, the Secretary shall consider information and guidance furnished by the relevant State or States.

‘‘(3) CERTAIN POWER SALES CONTRACTS.—When a generator has sold renewable electricity to a retail electric supplier under a contract for power from a facility placed in service before the date of enactment of this section, and the contract does not provide for the determination of ownership of the Federal renewable electricity credits associated with such generation, the Secretary shall issue such Fed eral renewable electricity credits to the retail electric supplier for the duration of the contract.

‘‘(4) CREDIT MULTIPLIER FOR DISTRIBUTED GENERATION.—

‘‘(A) IN GENERAL.—Except as provided in subparagraph (B), the Secretary shall issue 3 Federal renewable electricity credits for each

megawatt hour of renewable electricity gen
erated by a distributed generation facility.
‘‘(B) ADJUSTMENT.—Except as provided
in subparagraph (C), not later than January 1,
2014, and not less frequently than every 4
years thereafter, the Secretary shall review the
effect of this paragraph and shall, as necessary,
reduce the number of Federal renewable elec
tricity credits per megawatt hour issued under
this paragraph, but not below 1, to ensure that
such number is no higher than the Secretary
determines is necessary to make distributed
generation facilities cost competitive with other
sources of renewable electricity generation.
‘‘(C) FACILITIES PLACED IN SERVICE
AFTER ENACTMENT.—For any distributed gen
eration facility placed in service after the date
of enactment of this section, subparagraph (B)
shall not apply for the first 10 years after date
of enactment. For each year during such 10-
year period, the Secretary shall issue the facil
ity the same number of Federal renewable elec
tricity credits per megawatt hour as are issued
to that facility in the year in which such facility
is placed in service. After such 10-year period,

the Secretary shall issue Federal renewable en
ergy credits to the facility in accordance with
the current multiplier as determined pursuant
to subparagraph (B).
‘‘(5) CREDITS BASED ON INCREMENTAL HY
DROPOWER.—For purposes of this subsection, the
number of Federal renewable electricity credits
issued for qualifying hydropower described in sub
section (a)(9)(A) shall be calculated—
‘‘(A) based solely on the increase in aver
age annual generation directly resulting from
the efficiency improvements or capacity addi
tions described in subsection (a)(9)(A); and
‘‘(B) using the same water flow informa
tion used to determine a historic average an
nual generation baseline for the hydroelectric
facility, as certified by the Secretary or by the
Commission.
‘‘(6) GENERATION FROM MIXED RENEWABLE
AND NON-RENEWABLE RESOURCES.—If electricity is
generated using both a renewable energy resource
and an energy source that is not a renewable energy
resource (as, for example, in the case of co-firing of
biomass and fossil fuel), the Secretary shall issue
Federal renewable electricity credits based on the

proportion of the electricity that is attributable to the renewable energy resource.

‘‘(7) PROHIBITION AGAINST DOUBLE-COUNTING.—Except as provided in paragraph (4) of this subsection, the Secretary shall ensure that no more than 1 Federal renewable electricity credit will be issued for any megawatt hour of renewable electricity and that no Federal renewable electricity credit will be used more than once for compliance with this section.

‘‘(e) TRADING, BANKING, AND MARKET OVERSIGHT.—

‘‘(1) TRADING.—The lawful holder of a Federal renewable electricity credit may sell, exchange, transfer, submit for compliance in accordance with subsection (c), or submit such credit for retirement by the Secretary.

‘‘(2) BANKING.—A Federal renewable electricity credit may be submitted in satisfaction of the compliance obligation set forth in subsection (c) for the compliance year in which the credit was issued or for any of the 3 immediately subsequent compliance years. The Secretary shall retire any Federal renewable electricity credit that has not been submitted under subsection (c) by the deadline for the

compliance year that is 3 years after the compliance year in which the credit was issued.

‘‘(3) OVERSIGHT.—The Commission, in consultation with the Secretary and relevant Federal agencies, may prescribe such rules as the Commissioner determines necessary to ensure the transparency, fairness, and stability of the market in Federal renewable electricity credits and any derivative instruments based on such credits.

‘‘(f) RENEWABLE ELECTRICITY DEPLOYMENT FUND.—

‘‘(1) IN GENERAL.—There is established in the Treasury of the United States a Renewable Electricity Deployment Fund.

‘‘(2) DEPOSITS.—All Federal alternative compliance payments submitted to the Secretary pursuant to subsection (c)(3) and civil penalties assessed under this section shall be deposited into the Fund.

‘‘(3) USE.—

‘‘(A) IN GENERAL.—Amounts deposited in the Fund shall be available exclusively for use by the Secretary, subject to appropriations, to make payments to retail electric suppliers in accordance with subparagraph (B).

‘‘(B) ALLOCATION.—Not later than May 1 of each year from 2013 through 2040, the Sec retary shall distribute amounts deposited in the Fund during the preceding 12-month period among the retail electric suppliers which have submitted Federal renewable electricity credits to the Secretary in total or partial compliance with their obligations under subsection (c) for the preceding calendar year. Each retail electric supplier shall receive a payment equal to the product of—

‘‘(i) the total payments made to all re tail electric suppliers under this subsection; and

‘‘(ii) the quotient obtained by dividing the quantity specified in subclause (I) by the quantity specified in subclause (II):

‘‘(I) The quantity of Federal re newable electricity credits submitted by the retail electric supplier for the preceding calendar year pursuant to subsection (c).

‘‘(II) The total quantity of Fed eral renewable electricity credits sub mitted by all retail electric suppliers

for the preceding calendar year pursu
ant to subsection (c).
‘‘(g) INFORMATION COLLECTION.—In accordance
with section 13 of the Federal Energy Administration Act
of 1974 (15 U.S.C. 772), the Secretary may require any
retail electric supplier, renewable electricity generator, or
such other entities as the Secretary deems appropriate, to
provide any information the Secretary determines appro
priate to carry out this section.
‘‘(h) ENFORCEMENT AND JUDICIAL REVIEW.—
‘‘(1) CIVIL PENALTY.—If any person fails to
comply with the requirements of subsection (c), such
person shall be liable to pay to the Secretary a civil
penalty equal to the product of—
‘‘(A) double the Federal alternative compli
ance payment calculated under subsection
(c)(3), and
‘‘(B) the aggregate quantity of Federal re
newable electricity credits (or equivalent Fed
eral alternative compliance payments) that the
person failed to submit to the Secretary in vio
lation of the requirements of subsection (c).
‘‘(2) ENFORCEMENT.—The Secretary shall as
sess a civil penalty under paragraph (1) in accord
ance with the procedures described in section 333(d)

of the Energy Policy and Conservation Act of 1954 (42 U.S.C. 6303).

''(3) JUDICIAL REVIEW.—Any person who will be adversely affected by a final action taken by the Secretary under this section, other than the assessment of a civil penalty under this subsection, may use the procedures for review described in section 336(b) of the Energy Policy and Conservation Act (42 U.S.C. 6306). For purposes of this paragraph, references to a rule in section 336(b) of the Energy Policy and Conservation Act shall be deemed to refer also to all other final actions of the Secretary under this section other than the assessment of a civil penalty under this subsection.

''(i) SAVINGS PROVISIONS.—Nothing in this section shall—

''(1) diminish or qualify any authority of a State or political subdivision of a State to—

''(A) adopt or enforce any law or regulation respecting renewable electricity, including programs that exceed the required amount of renewable electricity under this section, provided that no such law or regulation may relieve any person of any requirement otherwise applicable under this section; or

‘‘(B) regulate the acquisition and dispose
tion of Federal renewable electricity credits by
retail electric suppliers located within the terri
tory of such State or political subdivision, in
cluding the authority to require such retail elec
tric supplier to acquire and retire Federal re
newable electricity credits associated with elec
tric energy it sells to end-use customers; or
‘‘(2) affect the application of, or the response
bility for compliance with, any other provision of law
or regulation, including environmental and licensing
requirements.
‘‘(j) SUNSET.—This section expires on December 31,
2040.’’.
(b) TABLE OF CONTENTS AMENDMENT.—The table
of contents of the Public Utility Regulatory Policies Act
of 1978 (16 U.S.C. 2601 and following) is amended by
adding at the end of the items relating to title VI the fol
lowing:
‘‘Sec. 610. Federal renewable electricity standard’’.