The Business Council for Sustainable Energy

BCSE ENERGY POLICY ANALYSIS – EXECUTIVE SUMMARY

In August 2008, SAIC assisted the Business Council for Sustainable Energy (BCSE) with an energy policy analysis using a modified version of the Energy Information Administration's (EIA) National Energy Modeling System (BCSE-NEMS). The purpose of the analysis was to model the impacts of accelerating the deployment of existing clean energy technology – such as renewable energy and energy efficiency – in the period between 2009 and 2020. The Council used EIA's Annual Energy Outlook 2008 (AEO2008) as the comparative "Reference Case" (RC) for the analysis of the "BCSE Scenario."

BCSE SCENARIO DESCRIPTION

The BCSE Scenario incorporates the following assumptions into BCSE-NEMS:

- Residential, Commercial and Industrial demand sectors incorporate *high technology* assumptions developed by EIA that specify earlier availability, lower costs, and/or higher efficiencies for more advanced equipment
- National Renewable Portfolio Standard (NRPS) is implemented, which requires electricity providers to meet specified renewable resource targets -- based on the 2007 EIA study "Impacts of a 15-Percent Renewable Portfolio Standard" as requested by Senator Jeff Bingaman
- Updated cost and performance values for all power generation technologies – Capital and operating costs, capacity factors, efficiencies, construction lead times, and commercialization years based on a 2008 Lazard assessment
- Updated world oil price estimate based on NYMEX WTI futures pricing through 2016 while maintaining the 2016 price for through 2030 with adjustment for the projected inflation rate.

KEY FINDINGS

A comparison of the BCSE Scenario results with those of the RC yields the following major conclusions.

Economy-Wide Energy Demand

Total domestic energy consumption decreases annually under the BCSE Scenario relative to the RC by approximately *3.7% in 2020*, and *4.7% in 2030*. Energy savings in the demand sectors are driven primarily by efficiency improvements, not by a reduction in demand.

Economy-Wide CO_2 Emissions

The BCSE Scenario results in a significant reduction in CO_2 emissions relative to the RC due to reduced energy demand, increased use of renewable resources, and greater consumption of natural gas versus coal for electricity generation. *The annual CO_2 emissions reduction in 2020 is projected to be 7.2% and 8.8% in 2030.*

Natural Gas (NG) Demand & Prices

In the initial years of the forecast (through 2019), efficiency gains in the demand sectors contribute to a decrease in NG demand, resulting in a *cumulative consumption approximately 2% lower than that projected in the RC*. With continued growth in NG-fueled electricity generation, this trend is reversed in the 2020-2030 period, compensating for the lower demand sector consumption, and resulting in an overall increase in demand of approximately 12% over the RC in 2030.

The BCSE Scenario projects average NG prices to be approximately *3.7% higher in 2020 than the RC*, notwithstanding decreased demand, due to the correlation between gas and the higher crude oil prices. In 2030, the relative dominance of gas sales to the power sector results in an average gas price that is *only marginally higher* than projected in the RC.

Electricity Demand & Prices

Under the BCSE Scenario, demand for electricity is projected to decrease in all sectors from 2008 through 2030 relative to the RC. *Total annual electricity consumption is projected to drop 3.8% in 2020 and 5.4% in 2030.* These reductions may be attributed in large part to the availability, costs, and efficiencies of end-use appliances and equipment.

Contrary to lower consumption, average end-use electricity prices are projected to be higher for all sectors in the BCSE Scenario*. The average end-use price is 5.8% higher in 2020 and 7.3% higher in 2030.* This is due to: 1) higher projected natural gas prices, 2) higher power generation technology costs, 3) technology commercial introduction time-frame; and 4) the national RPS.

Electricity Generating Capacity

In 2020, the BCSE Scenario projects a *large shift from coal to renewables generation*, with a smaller increase projected for natural gas-based generation. In 2030, the model projects an even larger shift from coal, with natural gas generation increasing market share by 63%. *Implementation of the RPS contributes to a relative increase in renewables' capacity of about 41% over that projected in the RC.*

Energy Efficiency

Residential sector energy intensity, expressed in Million Btu's per Household, improved by approximately *3.7% over the RC in 2020*, and by *6.9% in 2030*. *Commercial sector* energy intensity, expressed in thousands of Btu's per square foot, showed an aggregate improvement of approximately *5.3% in 2020* and *8.9% in 2030* relative to the RC. *Industrial sector* energy intensity, expressed in thousands of Btu's per dollar of shipments, showed an improvement of approximately *2.5% in 2020*, and *7.3% by 2030* over the RC.

Overall, the model projects higher growth in GDP than occurs under the RC. This happens in spite of significantly higher supply-side technology costs and higher oil prices.

Combined Heat and Power (CHP)

Total end-use power generation, accounting for both industrial and commercial CHP, is projected to grow significantly under the BCSE Scenario throughout the projection period. Relative to the RC, the model projects an increase in CHP generation of 29% and 37% by 2020 and 2030, respectively. Growth occurs for all fuel types, but particularly for natural gas and renewables.

Renewables Electricity Generation

Electricity generation from renewable sources increases under the BCSE case relative to the RC, showing a 35% increase in 2020, and 31% in 2030. The vast bulk of the growth in renewable generation comes from biomass because the model sees biomass co-firing as the least expensive renewables choice to meet the RPS. Relative to the RC, biomass generation increases by 177% in 2020, and 122% in 2030.

Wind generation falls approximately 38% lower than that reported in the RC because the capital and fixed O&M costs for onshore wind technology are significantly higher than EIA's input values. Similarly, geothermal generation is not as cost competitive under the BCSE Scenario, and generation is consequently reduced.