



Virginia Coastal Energy Research Consortium

Coastal Energy and Climate Change

WWW.VCERC.ORG
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Emissions of carbon dioxide from the combustion of fossil fuels is widely believed to trap heat in the atmosphere and contribute to a warming climate, as well as ocean acidification. Renewable energy technologies being researched by VCERC, such as offshore wind power and fuels derived from marine biomass, can assist in reducing these emissions.

The Virginia Coastal Energy Research Consortium (VCERC) continues to explore the potential of Virginia to supply a major portion of our electricity with offshore wind farms. Put in perspective, consider that a wind farm using available technologies that covers an area equal to that of Virginia Beach could satisfy 20% of the electricity demand of the Commonwealth. VCERC has also identified algal biodiesel as the most promising bio-fuel for Virginia. Cultivation of this marine biomass resource would have the lowest impact upon water and food supplies, and growing algae on only 5% of current U.S. agricultural land would supply enough biodiesel to fuel all the nation's transportation.



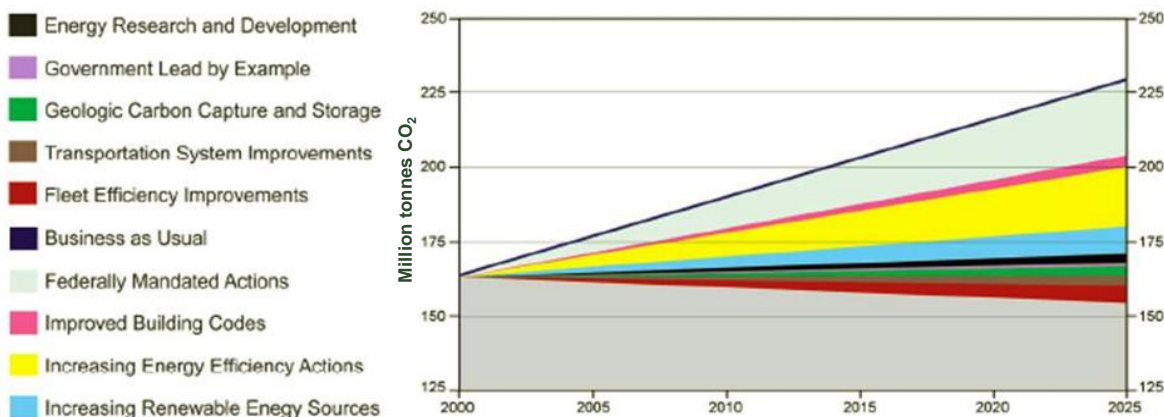
Middelgrunden Offshore Wind Farm, Denmark

In Virginia

In 2008, the Governor's Commission on Climate Change published their final report entitled *A Climate Change Action Plan*. The Commission recommend that Virginia reduce greenhouse gas emissions through accelerated research and development, by increasing the proportion of energy demands that are met with renewable sources, and by increasing the proportion of electricity generation provided by emissions-free sources of energy. All of these actions align well with VCERC research objectives.



Horns Rev Offshore Wind Farm, Denmark

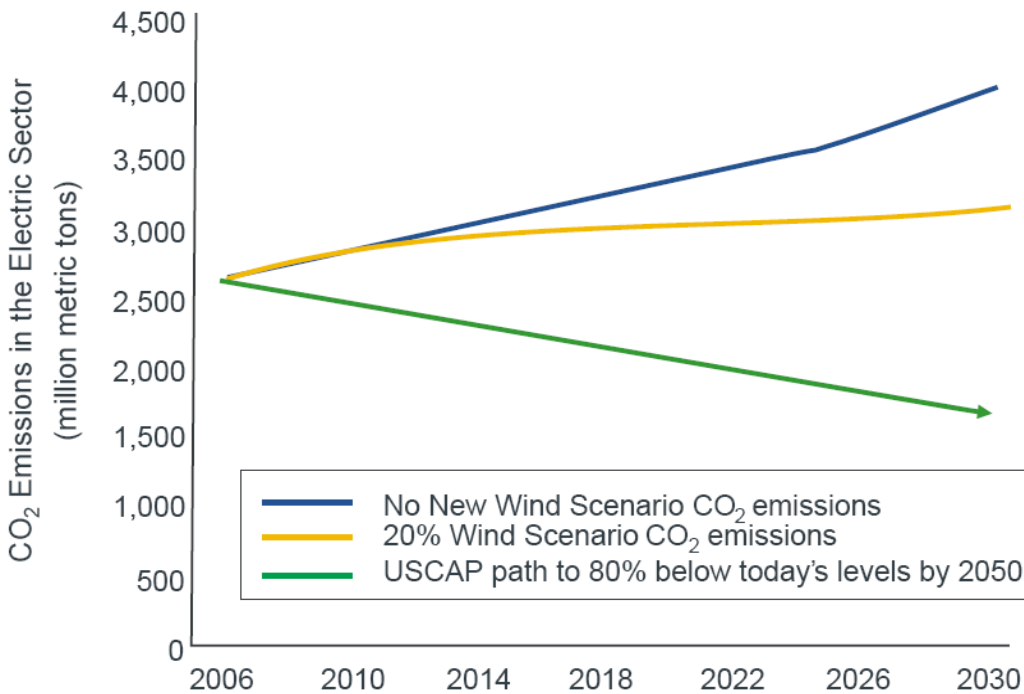


Virginia reductions in greenhouse gas emissions have been estimated for eight sets of actions, and the savings attributable to each of these actions are shown in the above wedge diagram. The pale blue wedge does not yet include the substantial reductions that could be achieved by algal biodiesel and offshore wind power on Virginia's outer continental shelf (from A Climate Change Action Plan).

Nationally

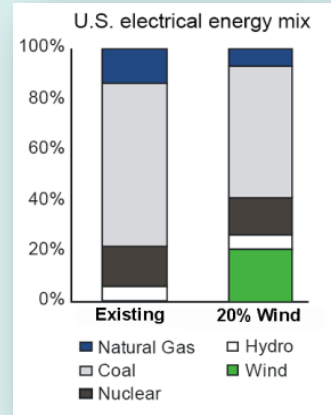
The U.S. Department of Energy issued a report in 2008 entitled *20% Wind Energy by 2030* that presents a scenario describing how the United States can generate 20% of its electricity with wind power by 2030. This scenario assumes the installation of 54,000 megawatts of offshore wind off our coastlines, much of it along the outer continental shelf of the Atlantic Ocean. The shallow waters off our coast make Virginia one of the prime states for locating a large share of new offshore wind capacity. VCERC research indicates that nearly 4,000 megawatts can be located beyond the visual horizon (12 nautical miles offshore) off Virginia Beach while avoiding conflict with other ocean uses.

The realization of the 20% scenario would result in significant reductions in the combustion of coal and natural gas at power plants, thus reducing CO₂ emissions and contribute an additional large wedge toward meeting U.S. Climate Action Plan (USCAP) greenhouse gas reduction targets.

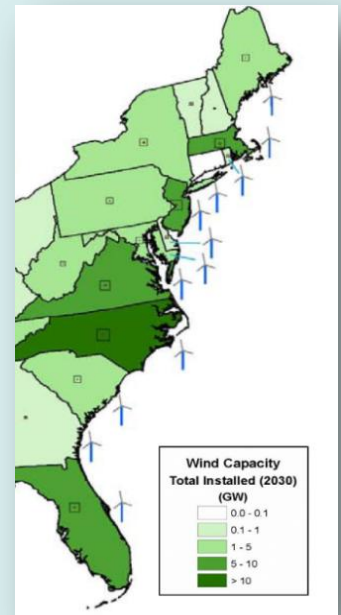


Virginia features over 3,300 miles of coastline and many low lying urban and industrial centers that are subject to flooding and erosion. Thus, global-warming-induced sea level rise and more extreme tropical storms and hurricanes are likely to have increasingly severe impacts. Already thirteen islands have disappeared this century.

There are many strategies available to reduce CO₂ in the atmosphere and thus slow the rate of global warming. The federal government has even proposed to place a cap on the amount of CO₂ that can be emitted and may consider instituting a tax on carbon emissions. Energy conservation and efficiency are the least expensive measures available to reduce CO₂ emissions, and in many cases yield a net economic benefit due to energy savings. In addition, renewable energy resources such as offshore wind and marine biofuels can generate electricity and fuel our transportation needs without adding new carbon emissions.



The 20% wind scenario suggests delivery of nearly 1.16 billion MWh of wind energy in 2030.



The 20% wind scenario envisions 54 GW of shallow offshore wind.



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