THE EARTH'S BEST DEFENSE

NATURAL RESOURCES DEFENSE COUNCIL

Statement of

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Introduction

Thank you for the opportunity to share my views regarding S.987, the Biofuels for Energy Security and Transportation Act of 2007. My name is Daniel A. Lashof, and I am the science director of the Climate Center at the Natural Resources Defense Council (NRDC). NRDC is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has more than 1.2 million members and online activists nationwide, served from offices in New York, Washington, Los Angeles and San Francisco.

Mr. Chairman, as you know, U.S. energy policy must address three major challenges: reducing America's dangerous dependence on oil, reducing global warming pollution, and providing affordable energy services that sustain a robust economy. Biofuels have the potential to contribute significantly to all three of these goals. Sustainably produced biomass feedstocks, processed efficiently and used in efficient vehicles can reduce our dependence on oil for transportation, reduce emissions of heat-trapping carbon dioxide, and contribute significantly to a vibrant farm economy. Pursued without adequate guidelines, however, biofuels production carries grave risk to our lands, forests, water, wildlife, public health and climate. While S.987 addresses some of these concerns, in its current form it does not have adequate standards and incentives to ensure that biofuels are part of the solution, rather than part of the problem.

Accelerated corn cultivation for ethanol, for example, threatens to deplete water tables, magnify contamination by fertilizers, pesticides, and herbicides, and undermine vital conservation programs such as the Farm Bill's Conservation Reserve Program. On farms and in forests across the country and abroad, imprudent biomass harvesting would cause soil erosion, water pollution, and habitat destruction, while also substantially reducing the carbon sequestered on land. Advancing a biofuels policy that increases lifecycle greenhouse gas emissions would be a particularly perverse result for a policy that is intended, at least in part, to reduce global warming pollution.

The Need for Performance Standards

As introduced, S.987 distinguishes between "conventional biofuel," defined as ethanol derived from corn kernels, and "advanced biofuels," which is essentially fuel derived from any other form of biomass, other than old growth forests. The bill would limit the portion of the overall renewable fuels standard that can be satisfied with conventional biofuels to 15 billion gallons. Structuring the standard in this way to ensure the diversification of feedstocks used for biofuels production is very helpful, but is not an adequate substitute for explicit greenhouse gas performance standards and sustainable feedstock sourcing requirements.

In structuring an effective biofuels policy it is important to recognize that the choice of feedstocks is just one of many factors that influence the environmental impacts of biofuels production. Key factors to consider in addition to feedstock type are carbon emissions from converting land from other uses to feedstock production, tillage method, energy use for irrigation, fertilizer application rate, the source of thermal energy and electricity at the biorefinery, the overall efficiency of the biorefinery, and whether CO_2 produced during fermentation is sequestered or released into the atmosphere. Considering all of these factors it is possible to produce ethanol derived from corn in a way that produces less than half of the lifecycle greenhouse gas emissions of gasoline (per BTU of delivered fuel). Conversely it is possible to produce ethanol from cellulosic feedstocks in a manner that produces far more CO_2 than gasoline.

First consider a dry mill corn ethanol plant. Greenhouse gas emissions from corn production can be minimized by obtaining the corn from a farm that practices no-till cultivation. In addition, by collecting a portion of the corn stover along with the grain the ethanol plant can meet its thermal energy needs with this biomass energy source rather than fossil fuels. Finally, fermentation produces carbon dioxide in a pure stream that can be easily captured for geologic sequestration. Using Argonne National Laboratory's GREET model, we estimate that the lifecycle greenhouse gas emissions from ethanol produced at such a plant would be 7.5 pounds per gasoline gallon equivalent, or more than 70% lower than gasoline. NRDC has examined the greenhouse gas emissions from a wide variety of feedstock and conversion process combinations using the Argonne GREET model (see Figure 1 and Appendix). EPA conducted a similar analysis for a fact sheet released in conjunction with its final rule for implementing the Renewable Fuels Standard enacted in EPACT 2005.[1] EPA's results are shown in Figure 2 and are very similar to ours (note that EPA displays results relative to conventional gasoline, which is set to zero on their chart.)

[1] http://www.epa.gov/otaq/renewablefuels/420f07035.htm

Figure 1. NRDC Lifecycle Greenhouse Gas Analysis

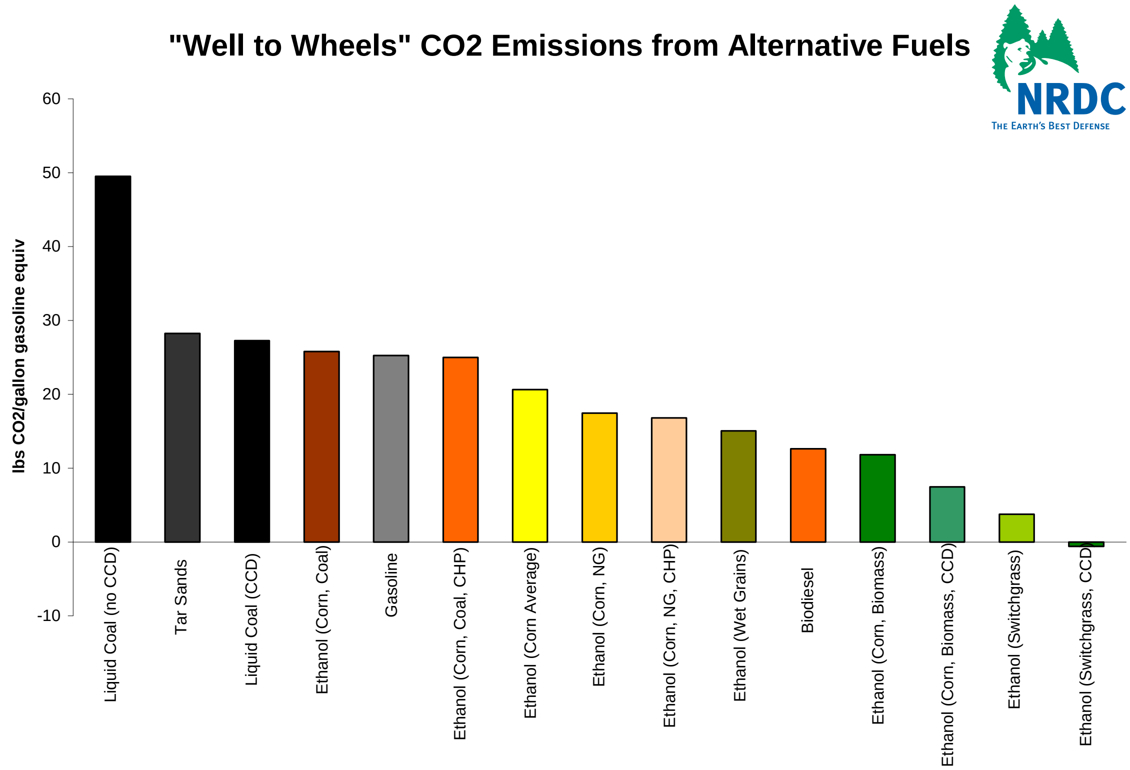
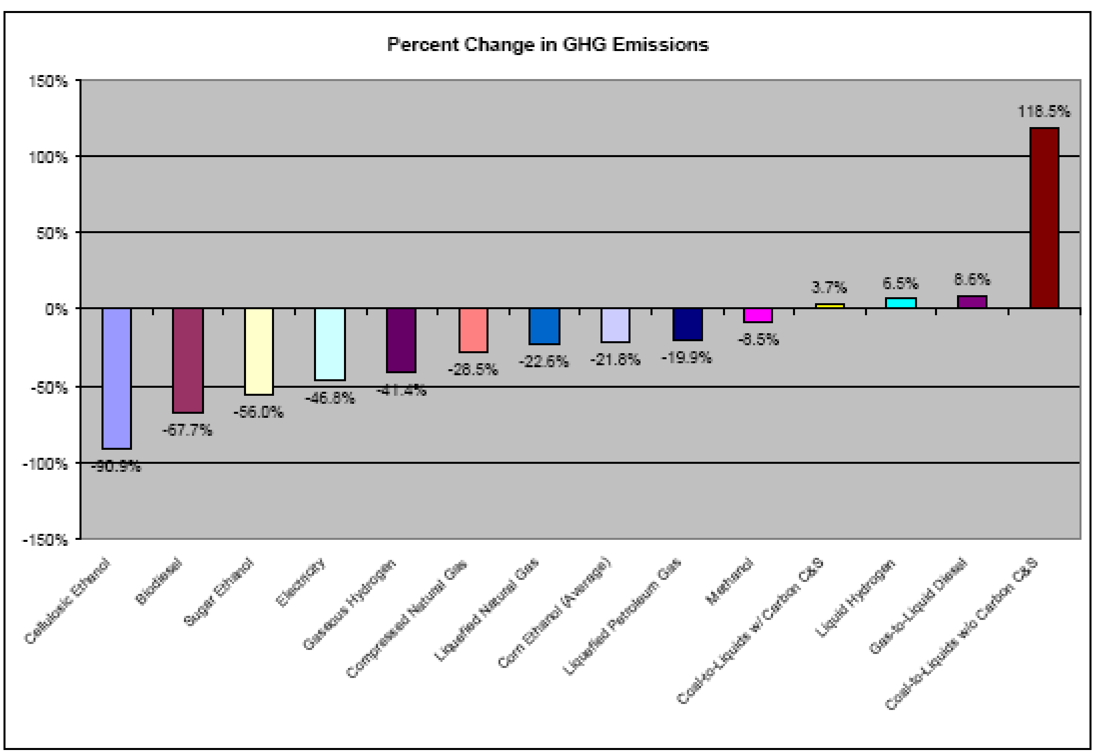


Figure 2. EPA Lifecycle Greenhouse Gas Analysis



Now consider a cellulosic ethanol plant. While such plants are often considered to be environmentally superior to corn ethanol plants, this is not necessarily the case, depending on how the cellulosic feedstock is produced. For example, if the biomass for the cellulosic ethanol plant is obtained by converting to biomass production land that had been enrolled in the conservation reserve program (CRP), then the forgone conservation benefits and carbon benefits must be accounted for. The CRP has enrolled more than 1 million acres in forest cover, including hardwoods, longleaf pine, and other softwoods. While these are secondary, rather than old growth, forests, they nonetheless provide important ecological services and sequester a substantial amount of carbon. Converting such lands to biofuels production would not only rapidly return to the atmosphere the carbon sequestered since the trees were planted, but would also forgo future carbon sequestration on this land. The net result would be CO_2 emissions to the atmosphere many times greater than the annual greenhouse gas benefits from cellulosic ethanol production on this land.

Land conversion need not be this direct to undermine the environmental benefits of biofuel production. Devoting an increased share of U.S. agricultural output to fuel production rather than grain exports will result in increased demand for animal feed from sources abroad. If any significant portion of this additional feed is obtained by converting mature forests into pasture or cropland the CO_2 emissions from this land use change could greatly exceed the emission reductions from the use of biofuels.

Biofuels Environmental Performance Principles

Fortunately, the benefits of biofuels can be realized, and the potential pitfalls avoided, through carefully crafted policy. Here I outline key principles that should be incorporated into S.987 through a combination of more robust limitations on what qualifies as a renewable fuel and incentives to promote voluntary management practices that protect ecological values. These principles were endorsed by twelve leading environmental organizations in a letter sent to Congress on March 27th, which is attached to my testimony for the record.

- *The use of bioenergy must reduce greenhouse gas emissions.*

To assure benefits, new incentives and requirements for increased use of biofuels need to be tied to significant reductions in the greenhouse gas intensity of these fuels. As discussed above, this requires explicit greenhouse gas performance standards rather than an implicit assumption that certain feedstocks will produce greater benefits than others. I suggest that conventional biofuels be required to achieve at least a 15% reduction in lifecycle greenhouse gas emissions compared to conventional gasoline. This level of performance can easily be achieved with efficient corn ethanol plants as shown in Figure 1. Advanced biofuels should achieve at least a 50% reduction in lifecycle greenhouse gas emissions, which can be accomplished through several different feedstock and conversion process combinations. In addition to these minimum requirements, incentives for continuous improvement should also be established by requiring progressive reductions in the average greenhouse gas emissions of all transportation fuels.

- *Biomass used for bioenergy has to be renewable.*

Biomass must be regrown on site, recapturing its released carbon, so that it is genuinely sustainable – unless it is the by-product of activity with independent, over-riding social utility (like removal of vegetation immediately around wildland-interface homes). Greenhouse gas emissions from land-use change associated with biofuels production, both directly and indirectly, must be accounted for to ensure that biofuels are genuinely renewable and produce net environmental benefits. If wastes are used, care must be taken to prevent combustion of any toxic materials, such as pressure treated or painted wood products. In addition, material such as post-consumer waste paper should be recycled rather than converted to fuel in order to reduce the pressure on forests for virgin fibers.

- *Bioenergy feedstocks must not be grown on environmentally sensitive lands*.

The exclusion of biomass from old growth forests in S.987 is a start, but this exclusion should be expanded to cover wilderness study areas; roadless areas on national forests; native grasslands; important wildlife habitat; ecosystems that are intact, rare, high in species richness or endemism, or exhibit rare ecological phenomena.

- *Conversion of natural ecosystems must be avoided*.

Habitat loss from the conversion of natural ecosystems represents the primary driving force in the loss of biological diversity worldwide. Activities to be avoided include those that alter the native habitat to such an extent that it no longer supports most characteristic native species and ecological processes.

- *Exemptions and waivers from environmental rules must not be used to promote biomass production or utilization*.

Trading one serious environmental harm for another is poor policy. Our environmental laws and regulations act as a fundamental system of checks and balances to guard against just such collateral damage and the promotion of bioenergy production and utilization must in no way be exempted.

- *Conservation and Wetland Reserve Programs supported by the Farm Bill must be managed for their conservation benefits.*

These programs protect marginal lands, water quality, soil, and wildlife habitat. Enrolled lands need to be managed principally for these important values, not bioenergy feedstocks.

- *Independent certification, market incentives, and minimum performance requirements are necessary to ensure that bioenergy feedstocks are produced using sustainable practices.*

Certification standards for biomass from private lands must address key environmental and social objectives, such as protection of wildlife habitat, prevention of erosion, conservation of soil and water resources, nutrient management, selection of appropriate feedstock species, and biologically-integrated pest management. New policies are needed to ensure that producers, refiners and distributors adhere to minimum performance requirements and have incentives to maximize environmental performance at each step.

- *Stringent safeguards must be established for bioenergy production from feedstock derived from federal land.*

Federal lands, including wildlife refuges, BLM lands, national forests and grasslands, are held subject to the public's interest in their non-commodity values. They are not appropriate for large-scale, sustained biomass sourcing.

Implementing a Renewable Fuels Standard

Earlier this week EPA issued its final rules to implement the renewable fuels standard (RFS) enacted as part of the 2005 Energy Policy Act. Congress appropriately assigned this responsibility to EPA as it has the authority to regulate transportation fuels under the Clean Air Act as well as experience with implementing credit trading programs. Any expansion of the RFS should similarly be implemented by EPA and should be on the system of Renewable Identification Numbers (RINs) established by EPA to implement the existing program.

EPA has also already explored how the RIN system could be expanded to track environmental practices in biofuel feedstock production as well as lifecycle greenhouse emissions. While some may argue that there is insufficient information available to implement a program based on lifecycle greenhouse gas emissions this is not the case. Statewide data on average yields, energy and fertilizer use for different crops can be combined with specific information for individual biorefineries to arrive at reasonable estimates of lifecycle greenhouse gas emissions for each batch of biofuels. Indeed, although the administration ultimately rejected it, EPA proposed to use lifecycle greenhouse gas emissions as the equivalency factor for different biofuels under the RFS as well as in a labeling program. Hence EPA has already done most of the policy and methodological development needed to implement an expanded RFS that includes greenhouse gas performance standards and incentives for management practices that protect ecological values.

An expanded RFS should also be updated to accommodate renewable electricity used for transportation in emerging vehicles, such as Plug-in Hybrid Electric Vehicles (PHEVs). This can be accomplished by allowing electricity providers to opt into the program as fuel providers as long as they use smart meters to track separately renewable electricity supplied for transportation purposes. With the emergence of PHEVs and other electric vehicles, renewable electricity can be an important additional option to augment renewable biofuels to supply non-petroleum, low greenhouse gas fuels for transportation.

Conclusion

Biofuels holds great promise as a tool for reducing global warming pollution, breaking our dangerous oil addiction, and revitalizing rural economies, as long as appropriate standards and incentives are used to shape the nascent bioenergy industry to provide these benefits in a sound and truly sustainable fashion. I look forward to working with the Committee to improve S.987 to accomplish this important goal.

Appendix. Basis for Figure 1.

Figure 1 compares the well-to-wheels (or full fuel cycle) emissions from alternative transportation fuels in pounds of CO2-equivalent per gallon of gasoline energy content equivalent. The basis for each bar is described briefly below:

Liquid Coal (no CCD): Fischer-Tropsch fuel produced from coal without carbon dioxide capture and disposal (CCD). Based on a stand-alone plant (R. Williams, Princeton University).

Tar Sands: Gasoline made from synthetic petroleum produced from Canadian tar sands. (Based on Oil Sands Fever, Pembina Institute, November 2005)

Ethanol (Corn, Coal): Ethanol produced from corn using coal for process energy at the ethanol plant. (Based GREET 1.7 beta as modified by Turner et al.)

Liquid Coal (CCD): Fischer-Tropsch fuel produced from coal with carbon dioxide capture and disposal (CCD) from the production plant and assuming a stand-alone plant. (R. Williams, Princeton University).

Gasoline: Conventional gasoline, including upstream emissions. (Based on GREET 1.7 beta)

Ethanol (Corn, Coal, CHP): Ethanol produced from corn using coal for process energy in a combined heat and power system at a new dry mill ethanol plant. (Based GREET 1.7 beta as modified by Turner et al.)

Ethanol (Corn Average): Estimate of the national average emissions rate from the current mix of fuel used for ethanol production and the current mix of dry and wet mills. (Based on GREET 1.7 beta as presented in Wang et al., "Life-Cycle Energy and Greenhouse Gas Emissions Impacts of Different Corn Ethanol Plant Types," presentation to 16th International Symposium on Alcohol Fuels, November 2006.)

Ethanol (Corn, NG): Ethanol produced from corn using natural gas for process energy at a dry mill ethanol plant. (Based GREET 1.7 beta as modified by Turner et al.)

Ethanol (Corn, NG, CHP): Ethanol produced from corn using natural gas for process energy in a combined heat and power system at a new dry mill ethanol plant. (Based on GREET 1.7 beta as presented in Wang et al., "Life-Cycle Energy and Greenhouse Gas Emissions Impacts of Different Corn Ethanol Plant Types," presentation to 16th International Symposium on Alcohol Fuels, November 2006.)

Ethanol (Wet Grains): Same as “Corn, NG,” except that plant sells wet distiller grains as a coproduct, saving the energy of drying the grains. (Based GREET 1.7 beta as modified by Turner et al.)

Biodiesel: Biodiesel derived from soy oil through fatty-acid methol-esterfication estimate including upstream emissions. (Based on GREET 1.7 beta)

Ethanol (Corn, Biomass): Same as Corn No Till, except that biomass is used for process energy. (Based GREET 1.7 beta as modified by Turner et al.)

Ethanol (Corn, Biomass, CCD): Ethanol produced from corn using biomass for process energy at a dry mill ethanol plant with capture and disposal of the CO2 produced from the fermentation process. Corn is grown with no-till practices and plant sells wet grains. (Based GREET 1.7 beta as modified by Turner et al. subtracting fermentation CO2 of 6.6 pounds of CO2 per gallon of ethanol per http://www.kgs.ku.edu/PRS/Poster/2002/2002-6/P2-05.html.)

Ethanol (Switchgrass): Ethanol produced from the cellulose in switchgrass using the lignin for process energy. (Based GREET 1.7 beta as modified by Turner et al.)

Ethanol (Switchgrass, CCD): Ethanol produced from the cellulose in switchgrass using the lignin for process energy with capture and disposal of the CO2 produced from the fermentation process. (Based GREET 1.7 beta as modified by Turner et al. subtracting fermentation CO2 of 6.6 pounds of CO2 per gallon of ethanol per http://www.kgs.ku.edu/PRS/Poster/2002/2002-6/P2-05.html.)

Sources:

The Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model, GREET 1, Version 1.7, developed by the UChicago Argonne, LLC as Operator of Argonne National Laboratory under Contract No. DE-AC02-06CH11357 with the Department of Energy (DOE).

Turner et al., “Creating Markets for Green Biofuels, Measuring and Improving Environmental Performance,” UC Berkeley Transportation Sustainability Research Center, publication pending.