

Ethanol From Biomass



America's 21st Century Transportation Fuel

Recommendations

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Governors' Ethanol Coalition
www.ethanol-gec.org



The Governors' Ethanol Coalition believes that the nation's dependence on oil is a major risk to our energy, economic, and environmental security. National security is linked to energy through the dependence of this country and many others on imported oil — much of it located in politically troubled parts of the globe. As such, the potential for large-scale failures in the global production and distribution system presents a real threat. The combination of political tensions in major oil-producing nations along with oil demand growth from China and India has set in motion the pattern of energy price volatility witnessed in recent years — creating periodic drags on the economy, increasing the trade deficit, and setting the stage for far more serious consequences.

The safest and cheapest way to mitigate these risks is to set and achieve a goal of providing at least 5 percent of the nation's transportation fuel from ethanol by 2010, and to produce at least 8 billion gallons of ethanol a year by 2012. As soon as practical thereafter, the nation should produce at least 10 percent of its transportation fuel from ethanol and biodiesel, including at least 1 billion gallons a year from biomass-derived ethanol.

While the ethanol industry is growing rapidly and on target to produce roughly 5 billion gallons a year by 2007 and can meet the 8 billion gallon goal by 2012 with encouragement, production significantly above that amount may impact corn prices and livestock feed costs. Therefore, to ensure an increasing share of the nation's transportation fuel needs are met with ethanol the Coalition believes that the industry should be aided in establishing additional sources of production that include the use of lower-value, higher-availability biomass feedstocks so that the nation can meet and even exceed this 10 percent long-term goal.

The use of ethanol, particularly biomass-derived ethanol, can produce significant savings in carbon dioxide emissions. This approach offers a no regrets policy that reduces the potential future risks associated with climate change and has the added benefit of economic development. In fact, ethanol's power to bring economic growth to small farms, agricultural cooperatives, and larger agribusiness concerns is already being realized in some rural areas of the nation. Continuing the growth trend through the production of biomass-derived ethanol can make current production more efficient and diversify feedstocks to include such sources as corn stover, wood waste, municipal solid waste, and grasses—offering the potential for ethanol production in every region of the nation.



The Role of the Governors' Ethanol Coalition

The Governors' Ethanol Coalition, determined to meet the challenge of significantly expanding ethanol production from biomass, assembled a group of experts from industry, government, and the research community. Over the past four months, the group aided the Coalition in developing a set of recommendations aimed at achieving the goal of producing at least 8 billion gallons of ethanol a year by 2012, and, in order to meet a growing share of our transportation fuel needs over the long term, move toward production of at least 1 billion gallons of biomass-derived ethanol each year. The Coalition believes that a national commitment to implementing the recommendations, summarized below, will result in ethanol replacing significant amounts of petroleum derived from unstable regions around the globe over the next 10 years.



The Coalition's recommendations include:

National Security Renewable Fuels Act and Performance-based Incentives

Enact a renewable fuels standard requiring the use of at least 8 billion gallons a year of ethanol and biodiesel by 2012. As soon as practical thereafter, the nation should move toward production of at least 10 percent of its transportation fuel from ethanol and biodiesel relying on a growing share of that production from biomass-derived ethanol. This standard, in conjunction with a significant increase in applied research and production incentives, will



make the goal of reducing our dependency on imported oil a reality. It also offers the potential for the industry to provide even greater production in all regions of the nation over time.

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provide additional per gallon incentives for biomass-derived ethanol, based on the energy efficiency of the production process and the resulting carbon emissions. This system should be designed in a manner that does not penalize existing corn ethanol production by reducing incentives for those processes, but rather encourages innovation by rewarding the development and use of feedstocks and processes with superior lifecycle energy and emissions profiles. This approach also aids in avoiding backsliding on air quality issues.

Research and Development

From existing federal research funds, including those from the Departments of Defense, Energy, Agriculture, and Transportation, as well as the Environmental Protection Agency, provide a targeted, substantial investment in research, applied fundamentals, and innovation to address the recalcitrance of biomass, expand co-products, and make



advances in feedstock production. In the near-term, technology improvements derived from research activities can be incorporated into existing ethanol plants, utilizing cellulose associated with the kernel of corn and corn stover to make ethanol production more efficient, leverage investments in existing production facilities and feedstock logistics, and increase farm income. This approach offers a cost-effective and efficient transition model to expand production of ethanol from other biomass materials. The Coalition recommends \$800 million in research and development funding for biomass ethanol production over 10 years. This is an amount equivalent to only four days of U.S. oil imports, or a modest \$80 million, on average, each year for this critical research.

Commercialization and Production Incentives

One of the most significant barriers to commercialization of biomass ethanol technology is the unproven nature of the technology in large-scale commercial facilities. The Governors' Ethanol Coalition recommends that the Federal Government offer market-based incentives for commercial demonstration and technology application to support large-scale operations resulting in production of 1 billion gallons



a year of biomass-derived ethanol at a cost that is competitive with gasoline and diesel. The production incentive program should reduce but not eliminate private sector risk to capital. The approach favored by the Coalition would utilize a “reverse auction” that requires developers to bid for a package of incentives. This auction



approach, already utilized by some state governments, requires would-be developers to compete for production incentives through an open bidding process that provides incentives to the bidder that delivers production at the least cost while meeting all other eligibility requirements. Over time, the assistance level would decline as technologies improve and cost of private capital drops. The Coalition recommends \$800 million for these incentives. In addition, the Coalition recommends that the federal tax code should be revised to provide an investment tax credit designed to drive private capital toward new biomass ethanol projects in a manner that allows participation by smaller farms, cooperatives and large-scale operations.

Implementation of any one of the above recommendations, alone, will not achieve the goal of significant expansion of renewable, domestically produced ethanol and a real reduction in the risks to our national security. Based upon the expert input provided to the Governors’ Ethanol Coalition, as well as the States’ own experiences in fostering ethanol production, the Coalition believes a strong national policy commitment and integrated implementation of each of these recommendations is needed. The recommendations summarized above are discussed in greater detail in the following section.

Coalition Recommendations and Considerations

The Governors’ Ethanol Coalition three key recommendation areas — National Security Renewable Fuels Act and Incentives, Research and Development and Commercialization and Production Incentives — are interrelated. These recommendations should be implemented in a coordinated fashion to achieve the goal of providing at least 5 percent of the nation’s transportation fuel from



ethanol by 2010, and to produce at least 8 billion gallons of ethanol a year by 2012. As soon as practical thereafter, the nation should produce at least 10 percent of its transportation fuel from ethanol and biodiesel, including at least 1 billion gallons a year from biomass-derived ethanol at a cost competitive with gasoline and diesel. Each of the recommendation areas requires some additional effort to refine approaches and clearly define means of implementation. The Coalition's ongoing consultation with many energy, environmental, agriculture, industry, and government officials convinces us that these details can be fully and rapidly addressed based upon existing information and experiences. The recommendations are described in greater detail below.

National Security Renewable Fuels Act and Performance-based Incentives



With needed research and incentives to make significant production of biomass derived ethanol possible over time, the adoption of a renewable fuels standard is essential to ensure that the nation reduces its dependence on imported oil. A National Security Renewable Fuels Act would enhance economic development in rural areas, reduce our vulnerability to oil price spikes or potential supply disruptions, reduce the "energy" trade deficit, enhance environmental quality, and set a clear path to expand domestic production of ethanol and other biofuels from a range of agricultural and non-agricultural domestic resources in all regions of the nation.

The Coalition recommends enacting a National Security Renewable Fuels Act requiring the use of at least 8 billion gallons a year of ethanol and biodiesel by 2012. As soon as practical thereafter, the nation should move toward production of at least 10 percent of its transportation fuel from ethanol and biodiesel relying on a growing share of that production from biomass-derived ethanol. This standard, in conjunction with a significant increase in applied research and production incentives, will make the goal of reducing our dependency on imported oil a reality. It also offers the potential for the industry to provide even greater production in all regions of the nation over time.

The Coalition recognizes that certain technical issues associated with ethanol use may have the potential to impact some air quality goals. We believe that the goal of developing renewable



transportation fuels should not be pursued at the expense of local air quality and that reasonable policies can and should be put in place to protect against backsliding on air quality issues.

To encourage the most energy-efficient production of ethanol, the Coalition recommends amending the federal tax code to provide additional per gallon incentives, based on the energy efficiency of the production process and the resulting carbon emissions. This system should be designed in a manner that does not penalize existing corn ethanol production by reducing incentives for those processes, but rather encourages innovation by rewarding the development and use of feedstocks and processes with superior lifecycle energy and emissions profiles.

Flexible Fuel Vehicles. It is essential to link the National Security Renewable Fuels Act to more aggressive flexible fuel vehicle policies if we are to transform the transportation fuel market. The Coalition strongly encourages Congress to support policies that would transition to more uniform flexible fuel vehicle standards with the aim that all new vehicles are fuel flexible — up to 85% ethanol — over a reasonable period of time.

With nearly all new vehicles designed for the exclusive use of gasoline to which limited amounts of ethanol can be added, passenger vehicles capable of operating on higher ethanol blends will be needed to encourage larger market share of biofuels.

Research and Development



Public sector research and development funding has the responsibility of addressing opportunities where the potential benefits to society warrant a greater investment than the prospective returns, and where the size of the risk, or the length of the time horizon before potential gains can be realized dilute incentives for firms to conduct research. This defines the challenge before us with regard to significant expansion of biomass derived ethanol and the mitigation of the growing economic and national security threat that imported energy sources — oil and, in the near future, natural gas — present.

The Coalition found that of the many lauded studies on expanding cellulosic (biomass) biofuels nearly all reach the same conclusions including the need to: (1) dramatically increase funding for research, applied research, and integration of technologies and processes; and (2) invite creativity through broadly defined research and demonstration objectives rather than



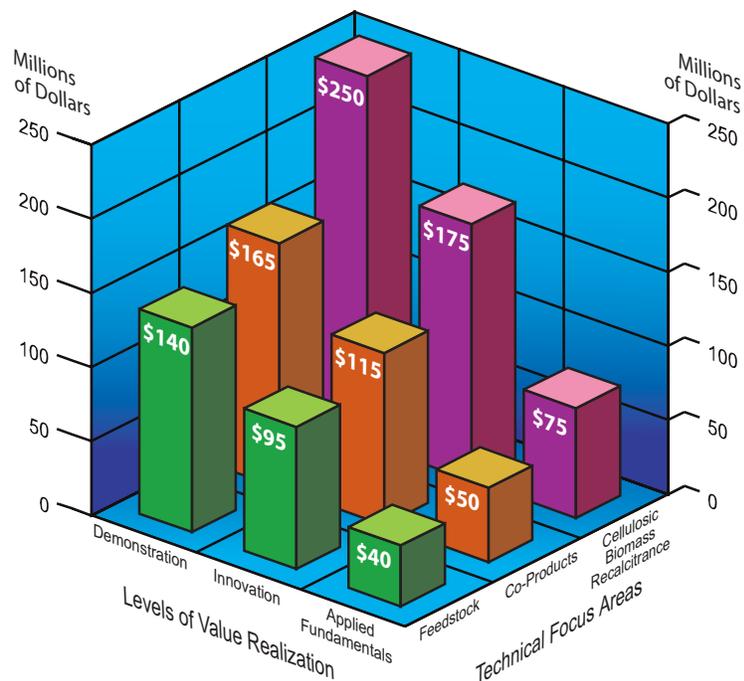
tight prescriptions. The studies also made clear that increased scale and low-cost financing alone would not achieve substantial production cost reductions. Research is needed. Thus, the Coalition recommends a targeted, substantial investment in research, applied fundamentals, and innovation to:

- Overcome the recalcitrance of biomass;
- Enable product diversification including fuels, animal feed protein, and chemicals; and
- Make advances in feedstock production.

Solicitations for research activities should have broadly defined technical objectives, including the above three areas, but generally not prescribe particular technologies. This will allow for a wide range of ideas to move forward and avoid government determining which technology or approach is best in an area where many combinations of technologies and processes will be needed. Creative, unforeseen solutions put forward by proposers are essential.

Specifically, the Coalition recommends that \$800 million be dedicated to research over the next 10 years — an amount equivalent to four days of U.S. oil imports. The chart below was developed based on valuable input provided to the Coalition and

**Focus Area-Value Realization Matrix:
A Useful Template**



suggests research categories and funding amounts covering the 10-year period. Given the need to operate in a deficit-constrained world, the Governors' Ethanol Coalition recommends that the biomass ethanol research budget be developed through the redirection of existing research funds from the Departments of Defense, Agriculture, Energy, and Transportation, as well as the Environmental Protection Agency.

A theme that should be stressed in research and development efforts is the expansion of ethanol production capability to all regions of the country through the use of a range of agricultural and non-agricultural biomass (e.g., corn stover, forest products waste, grasses, municipal solid waste). Diverse feedstocks and expanded co-products will enable the industry to significantly add to their technical capabilities, as well as overall ethanol production capacity.

Further, we should ensure that resources are provided to address the utilization of cellulose associated with the kernel of corn and corn stover. This will make ethanol production more efficient, leverage investments in existing production facilities and feedstock logistics, and increase farm income. It also offers a cost-effective and efficient transition model to expand production of ethanol from other cellulosic materials.

The Coalition recommends that research funds be delivered primarily through competitive solicitations implemented under the *Biomass R&D Development Act of 2000*, which was expanded by the groundbreaking Energy Title of the farm bill, and potentially in conjunction with the National Science Foundation to ensure most effective distribution of the funds possible.

Commercialization and Production Incentives



Research alone will not achieve the longer-term goal of producing 10 percent of our transportation fuel from domestic, renewable resources. One of the most significant barriers to commercialization of biomass ethanol technology is the unproven nature of the technology in large-scale commercial facilities and the inherent reluctance of the financial markets to risk capital. The Governors' Ethanol Coalition recommends that the federal government offer market-based production incentives for commercial demonstration and technology application to support large-scale operations resulting in production of 1 billion gallons of biomass-derived ethanol a year at a cost that is competitive with gasoline and diesel.



These incentives would provide support in the early years of the project while ensuring performance and retention of private sector due diligence. Recent state-level experience has demonstrated that a reverse auction for incentives protects the public interest and allows the marketplace to select “winners” during the crucial pre-commercial phase of technology development. Under the auction, the developer that offers the greatest potential for low-cost production and requires the least incentive, in addition to meeting all other criteria, would obtain the incentive. The overall cap on the incentive limits government risk, and the general orientation towards production maximizes the likelihood that the project will perform since government funds are provided only when the fuel is produced.

Additional details and refinement of the mix of production incentives and pre-commercial demonstration activities should be developed. Based upon input from industry, federal researchers, and other experts, the Coalition believes target areas and funding mixes are readily identifiable and should be integrated with research activities to the extent possible.

The Coalition recommends the establishment of an \$800 million fund to support the reverse auction for biomass ethanol production. A fund or similar mechanism is needed that sends a message to developers and the capital markets that the federal incentive commitment is real and will be provided over a fixed period. Moreover, the Governors’ Ethanol Coalition recommends that the federal tax code should be revised to provide an investment tax credit designed to drive private capital toward new biomass projects.

Next Steps and Collaboration

The Coalition’s concern for the nation’s energy, economic, and environmental security — our national security, led to the development of these recommendations. To meet the nation’s growing transportation fuel needs and reduce our vulnerability to imported oil we must set an aggressive course of action to expand ethanol use and production.

Our consultations with energy, agricultural, government, research, and environmental organizations has reinforced our belief in the need to provide policy makers at the state and federal levels



a greater understanding of energy and bioenergy issues. In particular, we believe it is vital to communicate the potential of ethanol produced from both agricultural and non-agricultural sources, and aid in informing the process of developing sound public policy.

As a next step in our efforts, we intend to work with a broad range of organizations to provide additional depth and detail to the Governors' Ethanol Coalition's national renewable fuel security standard, research and incentive recommendations. We will also coordinate with these organizations in the development of communications and outreach efforts to better inform the public about the benefits of renewable, domestically produced biofuels such as ethanol, and conduct outreach to policy makers and industry to promote collaboration.



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