

CLEAN ENERGY MINNESOTA

Developing an Advanced Biofuels Industry in Minnesota

Technology to transform cellulosic biomass (plant fibers) into biofuels, such as ethanol, is rapidly entering the marketplace. Minnesota is uniquely positioned to be at the forefront of this emerging industry. Done correctly, advanced biofuels will not only move us towards greater energy independence, but can also reduce global warming pollution, improve water quality, expand wildlife habitat and drive broad based rural economic development.

DEVELOP A SUSTAINABLE PERENNIAL BIOMASS SUPPLY AND STANDARDS

Establish a Reinvest in Minnesota - Clean Energy Program that will provide long-term contracts to farmers for sustainable production of perennial, native bioenergy crops on agricultural lands.

- *Technical Committee.* To establish standards for biomass production that ensure public benefits including water quality, soil health, reduction of chemical inputs, soil carbon storage, biodiversity and wildlife habitat.
- *Easement Payments.* To help spur bioenergy crop production by reducing farmer risk and supporting crop production systems that provide important public benefits.
- *Capital Equipment Loans.* A revolving loan fund to support investment in capital equipment required for bioenergy crop establishment, harvest or transport as part of a supply development strategy.

PROVIDE FUNDING FOR DEMONSTRATION/PILOT PROJECTS

- *A Production Incentive.* To energy facilities using perennial, native bioenergy crops harvested from agricultural lands following production.
- *Cellulosic Biofuels Incentives.* To provide stepped incentives for biofuels converted from a feedstock primarily comprised of cellulose, hemicellulose, and/or lignin to facilities with significant farmer ownership.

ESTABLISH A CELLULOSIC BIOFUELS TARGET

- Clean Energy Minnesota proposes that one-quarter of the Minnesota Renewable Fuel Standard be designated for cellulosic transportation biofuels.

PROVIDE MONITORING, RESEARCH, AND TECHNICAL ASSISTANCE

- Funding for technical assistance and research/monitoring to verify water quality, soil carbon storage, biological diversity, wildlife and habitat impacts and benefits of biomass production, and to permit periodic revisions of biomass incentive programs, guidelines, and standards.

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BIOFUELS BASICS

The nation's vast appetite for liquid fuels to power our cars, trucks, trains and airplanes dominates energy issues in the United States. Currently, transportation fuels are almost exclusively derived from oil; yet, biofuels are occupying a growing share of the market. The United States now has the capacity to produce 5.5 billion gallons of ethanol per year, with an additional 6 billion gallons per year under construction or planned for expansion. If all planned facilities are completed, the ethanol production would still be only a small percentage of our nation's current gasoline consumption. Advanced biofuels made from "cellulosic" feedstocks can propel the biofuel production potential to 60 billion gallons per year.

Cellulosic ethanol represents the best opportunity for replacing petroleum with a renewable fuel while improving national, economic and environmental security. And if combined with significant advances in auto sector energy-efficiency and transportation planning, there is the real possibility of eliminating US dependence upon petroleum.

Biofuels: Liquid fuels that have been derived from organic, renewable resources—typically plants. Ethanol is the dominant biofuel, but others such as biodiesel made from animal fat or vegetable oil, are also available.

Ethanol: Ethanol is a two-carbon alcohol. Throughout history it has been used as a beverage with intoxicating properties. After a short-lived role as a fuel in the early 20th Century, it is again growing as a significant renewable fuel for motor vehicles. Virtually all U.S. ethanol is produced from starch found in grains, mostly corn. Sugar cane, sugar beets, wheat and milo (sorghum) are also used for ethanol production.

Cellulose: Cellulose is a complex carbohydrate that is the dominant component of the cell wall of green plants. In most plants the cellulose is also found interlinked with hemi-cellulose and lignin. Cellulosic feedstocks are diverse and include perennial energy crops, such as switchgrass and prairie grass mixtures; trees, especially fast growing varieties such as poplars and willow; crop and forest residues, including straw, corn stalks, and tree trimmings; and residues from food and industrial processing such as grain hulls and sawdust. While all of these sources are expected to be used for biofuel production, energy crops promise the highest potential benefit from both an energy production and environmental perspective, as these crops can also sequester carbon, reduce water pollution and erosion, and enhance biodiversity.

Cellulosic ethanol: Ethanol is ethanol. Cellulosic ethanol is simply ethanol produced from cellulose rich plant fiber rather than starch rich grains or simple sugars. Technologies to produce cellulosic ethanol are now on the verge of widespread commercialization.

In order to ensure that biofuels retain their "green" attributes, advanced energy crop development should be introduced in conjunction with sustainability standards for their growing, harvesting, and processing. If stewardship criteria are not integrated from the beginning, the threat exists that energy crops may not provide the expected environmental and local community benefits that they have the potential to deliver.