RENEWABLE ENERGY FROM FARMS

Building on the Principles of Sustainable Agriculture to Achieve Sustainable Energy

A Position Paper of the
Midwest Sustainable Agriculture Working Group (MSAWG)

June, 2002

About MSAWG

The Midwest Sustainable Agriculture Working Group (MSAWG) is a network of more than 30 farm, sustainable agriculture, environmental, food religious and rural organizations working together to develop a sustainable food and agriculture system.

How this position paper was developed

This paper was developed through a series of meetings by the MSAWG Renewable Energy Committee. Carl Nelson of The Minnesota Project was the chief author and coordinated the meetings. Other members that participated in developing the paper include: Bob Gronski (*National Catholic Rural Life Conference*), Brad Redlin (*Center for Rural Affairs*), Brett Hulsey (*Sierra Club*), Dana Jackson (*Land Stewardship Project*), Dave Butcher (*Rural Renewable Energy Alliance*), Debbie Neustadt (*Sierra Club Agriculture Committee*), Erin Jordahl (*Iowa Sierra Club*), Jane Forrest Redfern (*Ohio Citizens Action*), John Hall (*Michael Fields Agricultural Institute*), Loni Kemp (*The Minnesota Project*), Mark Muller (*Institute for Agriculture and Trade Policy*), Martha Noble (*Sustainable Agriculture Coalition*), Martin King (*Illinois Stewardship Alliance*), Niel Ritchie (*Institute for Agriculture and Trade Policy*), Robert Warrick (*Sierra Club Agriculture Committee*), Teresa Opheim (*MSAWG*)

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MSAWG members endorsing this position paper

as of July 2002

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Minnesota Food Association
Missouri Farmers Union
National Catholic Rural Life Conference
Nebraska Wildlife Federation
Ohio Ecological Food and Farm Association
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Introduction

America's energy policy has once again come under close scrutiny. Heightened national security concerns have revealed the vulnerability of our highly centralized electricity system, as well as the necessity of reducing our reliance on foreign sources of oil. The burning of fossil fuels for electric power and transportation is also resulting in enormous environmental and health costs – emissions from fossil fuels are the primary cause of global warming, and a major contributor to mercury deposition in our lakes. The evidence is continuing to mount on the damage of particulate matter emissions, with one estimate of 30,000 deaths per year from US power plants.[1] Concerns about terrorist threats on nuclear power plants, not to mention the problems with nuclear waste transport and permanent storage, make this an unsavory option for meeting our future electrical energy needs.

Reducing fossil fuel dependence is the challenge of our generation. This challenge is one of political will, because we have the technological ability to economically and significantly reduce our emissions, as numerous government-sponsored studies have shown.[2] In some cases, renewable energy is cost-competitive with fossil-based sources of energy even without including environmental benefits. In other cases, cost-competitiveness is years away, but still possible (especially if environmental costs and benefits are included in the calculation). For these technologies, policy initiatives will be necessary for stimulating their development.

There are, however, multiple paths to achieving a renewable energy future, some of them more desirable than others. Policy options must be evaluated in light of public values.

Many forms of renewable energy involve farmers and rural landowners, either in the growing of crops to produce energy, or in producing the energy on farmer's land, such as wind turbines. Here principles of sustainable agriculture can come into play. We refer to sustainable agriculture as ***a creative system of practices that are economically viable, locally managed, ecologically sound and socially responsible***.

Farm-based renewable energy offers opportunities for community enhancement and local self-reliance. It can strengthen rural communities through diversified income streams. Compared to central station generation plants, renewable energy projects can create a more de-centralized, local, distributed form of energy production than our current system. And they can offer environmental benefits to the land as well as to the air.

It should be recognized that not all renewable energy choices are sustainable energy choices, according to our broader definition. The large hydroelectric dams constructed

[1] See the latest report from the Intergovernmental Panel on Climate Change (IPCC), the authoritative group of the worlds pre-eminent climate scientists, www.ipcc.ch. A recent study by Abt Associates estimates that coal plants are responsible for over 30,000 premature deaths per year; see www.cleartheair.org.

[2] For example, the so-called "Five-Labs" study (for the 5 national energy laboratories that wrote the report) showed how the U.S. could cost-effectively meet Kyoto obligations through energy efficiency: www.ornl.gov/ORNL/Energy_Eff/CEF.htm.

on the relatively flat lands of Manitoba have resulted in the flooding of thousands of acres of lands and displacement of the homes and livelihoods of indigenous people who formerly lived on those lands. The energy source, water, may be renewable but it is not necessarily sustainable. Likewise, energy crops, just like conventional food crops, can be grown in ways damaging to the environment.

Our organizations will work hard to push for a renewable energy future that is sustainable for the land and the people on that land. This document is a roadmap for how to accomplish that. It starts out with general principles that we feel ought to underlie our country's energy policy. Next we present our vision of a sustainable energy future, followed by the incremental steps that may be necessary to achieve this vision. Finally, we present our recommendations for policy actions.

General Principles for Sustainable Agriculture and Energy

Our fundamental premise is that the US energy system needs to fundamentally shift away from fossil fuels towards clean, sustainable, renewable energy. Virtually every nation in the world except the United States is committing to the emission reduction goals of the Kyoto Protocol on Climate Change. Not only are oil supplies dwindling, but continued fossil fuel use is having disastrous consequences for our environment and public health. Given that we must pursue an energy transition, MSAWG supports the following principles:

1. **The immediate priority of any energy policy is to manage current energy usage through conservation and energy efficiency.** Reducing unnecessary use of energy is common sense, saves money, and helps the environment. Likewise, numerous studies have shown that improving the efficiency with which energy is used is the cheapest and quickest energy "source".

2. **Development of new energy sources should not only be ecologically sound, but socially responsible and locally managed when possible.** A farm-based sustainable energy system has great potential to be naturally responsive to the economic needs of rural communities and family farmers. The public good of a farm-based energy system must meet the same criteria of a sustainable agriculture system: economically viable, locally managed, ecologically sound and socially responsible. The appropriate scale of new renewable energy systems must be considered.

3. **All energy developments, including renewable energy, should go through individual site and environmental review to insure that ecological impacts are minimized.** Impacts need to be considered on: 1) Parks and recreation areas; 2) wildlife and wetlands; 3) migratory bird patterns; 4) Landscape preservation; and 5) Other environmental issues of local concern.

4. **Biomass should generally go to the highest sustainable use, which may not be energy production.** Biomass (that is, plant material) that could be burned for energy can in some cases also have other uses, such as fertilizer or bio-products. Policies should avoid providing incentives for biomass energy production that does not prove to be a prudent environmental use.

5. **Biomass energy should be grown or produced in a sustainable way that provides net environmental benefits.** Biomass energy crops should be grown and harvested in a way that embodies best stewardship practices to maintain or improve air, water and soil quality. Criteria for judging sustainable biomass energy production includes:
    - **Impact on water quality.** Surface or ground water should not be polluted with sediments from erosion, with pesticides, with nutrients, or with any other waste products. It should not negatively affect the aquatic ecosystem. It should not consume water beyond replacement levels.
    - **Impact on soil quality.** Soil quality should not degraded. Soil organic content, water retention, and fertility should be improved.
    - **Effect on wildlife.** There should be no detrimental effect on wildlife on land where biomass is grown, compared to alternate uses for the land.
    - **Effect on air quality.** Biomass energy production should result in a net increase in air quality, from net reduction in such air pollutants as oxides of nitrogen, particulate matter and carbon dioxide.
    - **Net energy balance.** More energy should be released through biomass energy use than is consumed in producing it, over its life-cycle. This includes energy consumed from planting, cultivating, any fertilizer or pesticide application, harvesting and transporting to market.
    - **Diversity.** Biomass energy production must avoid the mono-culture trends of industrial agriculture. Crop rotations must be incorporated at the landscape scale in order to ensure sufficient diversity of species to attain soil quality, wildlife habitat, and ecosystem health.

Our Vision for a Sustainable Energy Future

We envision a transformation of our energy system from a fossil and nuclear-based system to a renewables-based system. Aging coal plants and nuclear plants will gradually be phased out in favor of wind, biomass, solar and other renewable technologies. In the coming decades, biofuels will increasingly substitute for petroleum fuels. After that, dependency on petroleum will be virtually eliminated as we move towards hydrogen-based fuel cells to power our transportation network.

This transformation will drastically reduce air emissions, mitigating global warming impacts, and significantly improving public health and the environment. Energy crops will be grown in a way that improves soil quality and reduces the need for heavy fertilizer, pesticide and herbicide application.

The ownership of renewable generation technologies will shift to more individuals and local entities such as farmer cooperatives. Even under utility ownership, renewable energy projects will benefit local economies, such as through lease payments to farmers for wind turbines on their land. The scale of the renewable projects will be suitable for the local circumstances.

In the Midwest, wind and biomass will play the largest roles in generation of renewable energy. According to assessments of the technical potential of wind and biomass, the Midwest could easily provide for 100 percent of its electric needs through renewable sources (see table below).

Technical Potential of Renewable Electric Generation in Midwestern States[3]

State	***Wind*** *(Megawatts of Capacity)*	***Biomass*** *(Megawatts of Capacity)*	***Wind and Biomass Generating Potential as a Percent of Total State Electric Usage***
Illinois	43,963	6,690	112%
Iowa	356,147	6,564	2,384%
Kansas	677,668	4,332	4,761%
Michigan	30,410	2,512	88%
Minnesota	387,143	4,319	1,707%
Missouri	33,762	4,006	151%
Nebraska	550,334	4,355	5,762%
North Dakota	575,072	4,292	16,513%
South Dakota	486,301	3,264	15,189%
Wisconsin	37,479	3,079	173%

SOURCE: Compiled by Union of Concerned Scientists

Energy efficiency and energy conservation is the best source of new energy
Cutting down on wasteful energy use, and using energy more efficiently is the most environmentally-preferable and cost-effective solution. The Environmental Law and Policy Center estimates that if aggressive energy efficiency policies were implemented in the Midwest, it would eliminate the need for the electrical output of about 100 average-sized (500 MW) coal plants.

Energy audits can identify ways to use energy more efficiently. In rural areas, farmers can be responsible for a large percentage of the total electricity used, so on-farm audits are especially important. Economic incentives for energy efficiency are also important.

[3] Biomass potential is calculated based on data from Walsh, M.E, et. al. Biomass Feedstock Availability in the United States: 1999 State Level Analysis. (Updated 2000) online at: http://bioenergy.ornl.gov/pubs/econ_assess.html. Includes urban wood residues, mill residues, forest residues, agricultural residues, and energy crops (switchgrass) by state for $50 per ton and under. Wind potential is calculated from National Renewable Energy Laboratory data of class 3 and higher windy land area within 20 miles of existing transmission lines, excluding all urban and environmentally sensitive areas, 50% of forest land, 30% of agricultural land, and 10% of range land. The total percentage is calculated from 2000 electricity sales.

Wind energy has great potential and is commercially ready

A government study has shown that the Midwest has enough wind resources to produce 100 percent of America's energy needs, if those wind resources were fully developed.[4] While that may not be desirable, it gives an idea of the vast potential of wind power to meet our energy needs in an environmentally-friendly way. Generally, there are virtually no environmental impacts of wind electricity generation if it is carefully sited. Wind's zero emissions and cost-competitiveness make it a very attractive option for renewable energy generation. The cost of large wind turbines has fallen from over 15 cents per kilowatt-hour (kWh) in the mid-1980s to around 4.5 cents per kWh today, and continues to fall. Although some early wind farms had problems with impact on raptor and migratory bird populations, these problems can be avoided through proper siting and design.

Wind energy could also be the basis for a coming hydrogen economy many decades in the future. As fuel cell technology develops, wind turbines could easily produce the hydrogen that is the basic fuel for this technology. The concept is simple - electricity from the wind turbine can split water into its component parts, ciphering off the hydrogen for use either to produce electricity on demand, or for fuel cells used to power cars.

Based on the wind turbines that have already been installed, wind turbines benefit farmers and rural communities, even if farmers don't own them. Currently, farmers/landowners get around $2000 a year per large wind turbine that is installed on their land, and local governments receive tax dollars that fund schools and other public programs in rural areas.

Policies should promote financial arrangements that make sure farmers get a share of the profits, either through developing the turbines themselves, or through lease payments. Farmer cooperatives could also be a potential wind developer. We recognize that in order to fully develop wind resources, it may be necessary to build transmission lines; however, siting the transmission lines should be done in an equitable way, and the communities that the transmission lines go through should receive some of the economic benefits.

Sustainably-grown biomass for electricity

Biomass electricity can come from a variety of sources, including wood waste from the paper and lumber industries, dedicated crops grown for energy, anaerobic digestion of manure or other wastes, and crop residues. However, each source will need to be assessed according to the principles of sustainable agriculture, and thus determine each source's appropriateness for producing energy.

For example, switchgrass is an energy crop that can offer significant advantages in reduced fertilizer and pesticide use compared to conventionally-grown crops, has soil benefits by being a perennial crop, and is a moderately good wildlife habitat if harvest is

[4] D.L. Elliott and M.N. Schwartz, "Wind Energy Potential in the United States" Pacific Northwest Laboratory: Richland, WA, PNL-SA-23109, September 1993.

well-timed. In cases where switchgrass replaces conventional crops, it has the potential to offer significant benefits to soil and water quality, if produced in a sustainable manner. On the other hand, a project to burn turkey manure in Minnesota is example of what we consider an un-sustainable production of biomass electricity. In this case, the un-burned turkey manure is a valuable soil amenity in much demand by crop farmers, and can be best used as such, instead of for producing electricity.

Solar energy can provide for current and future generations

With proper design, solar energy can already provide most or all of the energy needed to heat buildings and water for homes, businesses and farms. Unfortunately, passive solar design principles are rarely incorporated into new construction or renovation.

Solar cells to produce electricity (photovoltaics) are currently the most expensive renewable energy option discussed here, but have already proven to be economical in some remote or off-the-grid applications. We see photovoltaics playing a small but growing role in meeting our energy generation needs. Costs continue to fall, however, as the technology and production methods continue to advance, and it could play a large role in meeting future energy needs. Photovoltaics have virtually no environmental impacts, especially those manufactured without using rare metals. Like wind turbines, photovoltaics could produce hydrogen to be used in fuel cells. The use of photovoltaics would also offset the need for more generation.

Public policy should ensure investing sufficient research and development dollars in photovoltaics in order to bring costs down. Policies should also encourage their use in specific applications where they make sense to create a growing market for photovoltaics. Government procurement of photovoltaics can also help to stimulate mass production, which will also bring costs down.

Biofuels

While corn ethanol and soy biodiesel fuels are the most advanced form of renewable energy production from agriculture, we envision moving away from producing all our biofuels from such high environmental impact crops as corn and soybeans and moving towards more environmentally beneficial sources, such as perennial crops that do not require annual tillage or heavy use of fertilizers and pesticides. In order for other crops to be used, a process for breaking down the cellulosic materials and turning it into ethanol needs to be demonstrated. Many believe that research is very close to making such technology available.

A critical quality of sustainable ethanol production is whether farmers are partners in the profits of the business, or mere commodity suppliers. States with significant farmer-owned cooperatives that own ethanol plants have found their farmers benefiting economically, while states that only sell corn to huge agribusinesses such as ADM find that the economic benefits do not accrue to the farmers or rural communities.

Policy Recommendations to Move us Towards the Vision

Achieving the vision may require incremental steps

No renewable energy solution, especially biomass, is perfect, or will meet all of the criteria laid out in the principles. Certain choices may make sense for the time being, but better options will emerge later, and economic conditions prevailing today may change in the future. For example, corn-based ethanol made sense for the construction of the ethanol industry from scratch, but other more environmentally beneficial crops may be substituted later. In some cases biomass production like switchgrass may be better than another cropping option such as monoculture corn, but may still entail unacceptable environmental side effects such as nutrient runoff. Some times economic considerations prevail today that may change in the future. For example, the creation of a carbon trading system could add profits to certain biomass options that are not profitable on their own. While we want to search for the most sustainable options possible, we may accept some less than perfect options along the way.

In order to achieve our vision step-by-step, governmental policies will be necessary. The following are policies we endorse to accomplish our vision. Some of the policies below were included in the 2002 farm bill.

1. **Renewable Energy Standard.** Adopt a Renewable Energy Standard for electricity, requiring an increasing percentage of electricity supplied by utilities to be derived from renewable sources, until it reaches 20% by 2020.

2. **Technical Assistance for Farm-Based Renewable Energy Development and Energy Efficiency Audits.** Provide funding for regional and state-based agencies, not-for-profit organizations, land-grant universities and tribal and historically black colleges to provide education and technical assistance to small and medium-sized farmers for assessment (including wind monitoring for landowners), development and marketing of renewable energy resources, especially wind, solar and biomass power, and for energy efficiency audits that can lead to improvements that will avoid wasteful energy use and save farmers money.

3. **Financial Assistance for Farm-Based Development of Wind Power and Other Renewable Energy Resources and for Energy Efficiency Improvements**. Provide financial assistance to farmers to develop wind power, solar energy, biomass energy and other renewable energy production, and to implement energy efficiency improvements identified in energy audits.

4. **New Farmer Wind and Solar Power Development Enterprises.** Expand funding and purposes of the Rural Business-Cooperative Service to make grants and loan guarantees to cooperatives, limited liability corporations, and other rural businesses to undertake financial feasibility studies and initiate wind and solar power development projects.

5. **Support Development of Wind Power by Rural Electric Cooperatives and Members.** Support Rural Electric Cooperatives to develop wind power and other renewable energy, through preferential loan treatment, reduced interest rates of the Rural Utility Service (RUS), standardized interconnection procedures and non-discrimination in transmission rates and services. Allow farmers and rural businesses access to lowest-rate RUS loans for on-farm renewable projects.

6. **Incentive Programs for Biomass.** Expand existing credit programs supporting bioenergy and adopt targeted new programs to encourage the use of appropriate agricultural biomass for the production of electricity.

7. **Fund Biomass Research and Development.** Priorities for biomass R&D should be those technologies and feedstocks that are consistent with principles of sustainable biomass production and usage.

8. **Equipment Testing for Biofuels.** Provide funding and assistance to equipment manufacturers to test and certify their engines to use biofuels in non-road equipment.

9. **Feasibility Studies for Value-Added Agricultural Enterprises.** Provide clear statutory authority for the Rural Business-Cooperative Service to include renewable energy projects in grant and cost-sharing programs for value-added agricultural enterprises.

10. **Farm-based Hydrogen Research**. Provide a competitive grant program to eligible entities to assess the viability of hydrogen and fuel cell technologies for remote or off-grid rural applications, and to power farm operations and energy needs.

11. **Extend and improve production tax credit**. Currently wind and some other renewables receive a production tax credit of 1.7 cents/kWh. While this has been key to supporting the wind industry, it is currently negociated on a year-to-year basis (although the latest extention of the PTC is for 2 years). This creates in-stability in the renewables markets, as potential builders cannot plan more than a year or so in advance. Also, giving a subsidy in the form of tax credits effectively keeps non-profit entitities that don't pay taxes out of the market, such as farmer cooperative and electric utility cooperatives. Making the PTC tradeable would solve this deficiency, allowing cooperatives to trade their credits with entities that have need for them.