Benefits of Grass Biomass

Purpose: The purpose of this publication is to describe the environmental and production advanantages of grass biofuel.

Worldwide Perspective

Biomass is currently the most important source of energy for the majority of human beings. From a total energy use standpoint, however, biomass provides a relatively small percentage of the world's current energy needs. Most of the total energy use is found in the more developed countries, not in the regions with large populations. Biomass has the potential to provide a much greater share of the world's energy, particularly in the USA.

Renewable biomass removes CO_2 from the atmosphere for biomass production and then releases this CO_2 back into the atmosphere when burned. This process has little impact on total greenhouse gas present in the atmosphere, as long as fossil fuel use during the production of biomass is minimized.

Perennial grass minimizes soil erosion and leaching

There is a list of traits that should be considered and valued when evaluating a potential solid biomass energy source. These traits are beneficial to society in general, or impact the suitability of biomass for a farm operation. Estimates of their relative value are in the Scoresheet included here.

Issues in Order of Relative Importance

Greenhouse gas emissions. Controlling greenhouse gas emissions is a global issue that impacts our future as a species on planet earth. This is the most significant global contribution of biomass energy, and the closer a biomass crop is to being greenhouse gas neutral, the better off we will all be.

Economic feasibility. The ability of a solid biomass crop to sustain itself without government subsidies is not essential but is a very worthwhile goal. Economic assessments of grass biomass to-date indicate that grass has the potential to be economically competitive with most fossil fuels.

Local energy security. Reliance on overseas energy will continue to become more problematic. Full credit for local energy security includes producing the crop locally, processing it locally, and using the energy locally. Processing and using an energy source is not very good local energy security if the feedstock cannot be purchased locally.

Energy conversion efficiency. The energy-out:energy-in ratio is critical, the more involved the biomass processing, the lower the ratio. The ratio for grass pelleting has been estimated at 14:1, compared to biodiesel at about 3:1.

Nutrient management benefits. Livestock farms in the USA will eventually all have mandated nutrient management plans. Perennial grass biomass can provide a site for animal manure application, as well as improving the overall farm nutrient balance by exporting nutrients off the farm.

Soil conservation. Perennial sod crops are also ideal for minimizing soil erosion and leaching, fullfilling a nationally-recognized practice.

Specific societal benefits. An example of this is ethanol meeting the need for a new safe additive for gasoline. Grass has the potential for ethanol conversion in the future.

Pollution potential. Particulate emissions are a severe problem in old wood stoves. Pellet stoves and boilers could be developed to specifically deal with non-wood combustion. Depending on grass composition, there will likely be some $N0_x$ emissions, as well as HCl and $S0_2$. In general, emissions increase with increased elemental content in the feedstock.

Rural development. Grass energy farming as a low-technology, small-scale energy system will result in rural jobs and economic diversification, absorbing excess production capacity and redirecting some funds from conventional energy into the local economy.

Grower acceptance. Biomass systems must be able to effectively integrate with existing farming systems. Most farmers already grow grass, all equipment needed is currently available. Harvest time is flexible to avoid other farm tasks.

Land suitability. If biomass production is not to interfere with existing crop production, the biomass must be able to grow on marginal lands not currently in production. Grass biomass can be produced on any agricultural land resource, much of which is not suitable for row crops.

Maintaining open spaces. Programs are currently in place in the Northeast USA to encourage practices that maintain open spaces. This is a particular problem where land is not suited to growing row crops and there is no incentive to maintain it as open space.

Pesticide usage. There is no reason to apply any herbicides or insecticides to cool-season grass biomass stands. This means such stands can easily be managed organically if desired.

Wildlife nesting. Government-funded research in the Northeast USA has demonstrated the positive impact of delayed hay harvesting on bird nesting. Grass biomass would be harvested late in the summer, well after such nesting is completed. Also, a one-cut system would allow regrowth to provide some winter and spring cover for wildlife, as well as make the cropping system more sustainable over time.

Encourage species diversity. Although maximum grass biomass production is likely to obtained using a single dedicated biomass species, there is no great advantage in controlling other species just to maintain a pure stand. Mixed stands in old meadows are acceptable for grass pelleting, but may have issues with emissions due to their composition.

Scoresheet

While it is likely that everyone has their own view of which characteristics are most important, here is one possible system for evaluating the usefulness of a potential solid biomass feedstock. Most of the characteristics below are not associated with any monetary value, but could be. Some will likely have monetary value in the future, such as carbon trading credits associated with greenhouse gas production.

Solid Biomass Scoresheet	Relative Importance	Grass Biomass	Your Favorite
Characteristic	(maximum pts.)		Biomass
Greenhouse gas emissions	15	14	
Economic feasibility	10	9	
Pollution potential	9	6	
Local energy security	8	8	
Energy conversion efficiency	8	8	
Nutrient management benefits	8	8	
Soil conservation	7	7	
Specific societal benefits	7	4	
Rural development	6	5	
Grower acceptance	6	6	
Land suitability	6	6	
Maintaining open spaces	4	4	
Pesticide useage	2	2	
Wildlife nesting/winter cover	2	1	
Encourage species diversity	2	1	
Total	100	89	

For more information

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