Mission: Guide the strategic utilization of all biomass; create new markets for food, fiber and fuels; and streamline regulations.

Burning Bio News: Volume 3, Number 5 The *'Scorecard'* of commercial bioenergy adoption

If you know of anyone looking for a **Biomass Systems Economist**, please forward my information to them. My résumé can be found at http://www.biomassrules.com/Jenner2009resume.pdf. I am exploring all the options. Thanks!

The economy and biomass energy projects are beginning to move forward while economic experts stumble over what is going to happen next. Economic signals continue to improve, but the US and global economies are not exactly 'snapping' back. One of the greatest challenges to our transition to a renewable, bioeconomy is the direction and speed of the development of our US carbon policies. EPA sent conflicting signals on priorities of energy independence, GHG emissions and economic growth with their revised renewable fuel standard rule (RFS2).

The US has borrowed trillions of dollars against our children's future in bailouts. This in itself is not the end of the world. But it does mean that economic growth now includes an additional service-on-the-debt cost. The pressure to create new economic growth is even higher with that additional cost. As the EPA, Congress, and the President wrestle with the emerging carbon policies, it is easier and quicker to create economic friction rather than growth. Such policies threaten our ability to recover in time for our children to take over.

It is not all bad news, though. Recently, I recall loading five news links onto my news blog on day that were all about new projects (www.biomassrules.com/BurningBioNews). Usually, I might load three or four project news stories to my website each week. Last year it seems like I was loading three or four project news stories per month. While these stories are not really a 'measure' of anything, it is encouraging to see economic excitement in biomass investments begin to grow again.

BioProjects and the Bioeconomy

700 Million Gallons of Cellulosic Biofuels Planned Figure 1 shows the location, relative size, and source of feedstock for 55 planned cellulosic ethanol projects in the continental US (48 states).

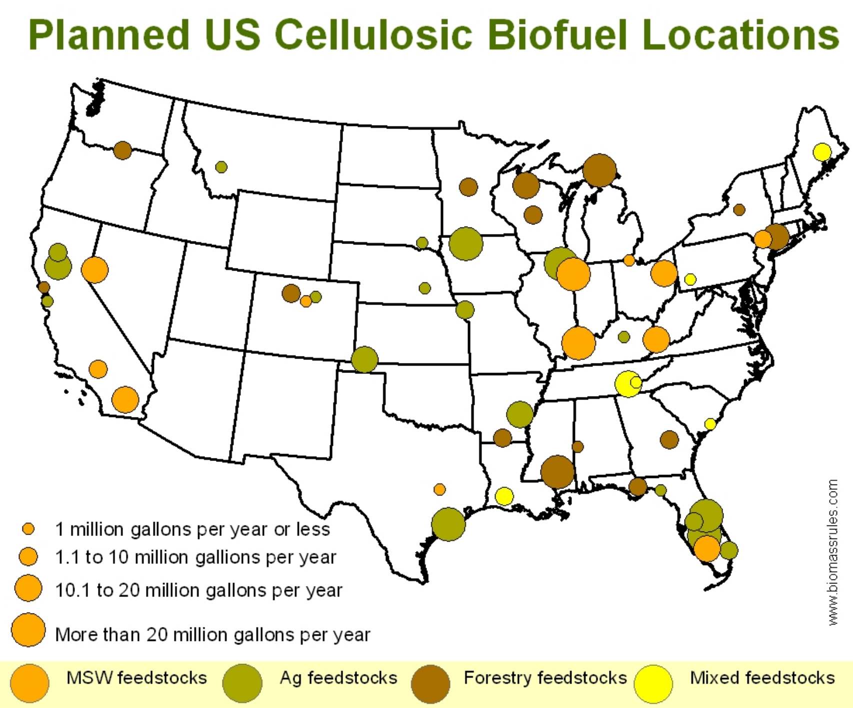

Figure 1 Proposed US cellulosic biofuels projects (www.biomassrules.com).

Like every number associated with the emerging bioeconomy, there are things that they mean as well as things they do not mean.

- For instance, these 55 facilities are nearly all in planning or construction phase (not ready by 2010). There is a current operational capacity of 'cellulosic' biofuels of less than 5 million gallons, based on publicly available data.
- The orange cellulosic projects in Figure 1 represent projects that utilize municipal solid waste (MSW). According to EPA's proposed RFS rule, this 170 million gallons/700 million gallons (24%) do not count. However it appears that if compressed natural gas was created from landfill gas (MSW), that would count in the RFS2 standards.
- If any of the forestry feedstocks are using biomass from federal lands, they can not be included either. EPA appears to acknowledge the federal cost of removing understory forest wood to control wildfires, but it is unclear from their proposed rule if these situations would qualify as exceptions.
- This map does not include Cello Biofuels, which EPA used as a prominent example of an industry leader, which was reported to have lost a lawsuit for biofuel fraud (www.reuters.com/article/earth2Tech/idUS166220908320090702).
- Advanced biofuels from the following sources ARE NOT included in the map, but should be:
  + Biodiesel from waste oils (which is pretty significant due to the high cost of virgin soybean oil the last few years).
  + Biofuels from algae (roughly 50 companies and projects under development).
  + Compressed natural gas from anaerobic digestion of biomass. There are nearly 500 landfill gas projects in the US with an ever-growing number of industrial digesters, municipal digesters, and farm digesters under development. Projects exist that are running their vehicles on methane or compressed natural gas.
- Also this map is drawn so it appears like there are some really big projects occurring across the US. This was necessary so that the small pilot projects would show up, and so that the naked eye could easily discern the different capacity categories. States like Florida and Connecticut are not going to be swimming in cellulosic biofuels. The largest proposed project is 100 million gallons. The illusion was not intentional.

BTUs and the Best Energy Value In the table below on the left are the energy values I posted on my site from the week ending 10/9/09. The last column of the table represents the calculated $/million btus ($/MMBTU) for each item. The chart on the right represents the change in energy value from the week before. My prices are averages of constructed numbers so any statistical implications are likely accidental.

The two lowest energy value products on this list at the current time are IL coal and natural gas. In the case of coal, the biofuels are at least two times higher in energy value (more costly). This is a real problem. Other forms of biomass in the table below (lower third) have a lower density so it takes many more times the volume of the light and fluffy biomass to deliver the same economic value of a denser fuel like coal.

Fossil Fuels	Date	Market Price	$/MMBTU
Crude oil	10/2/09	$69.80 $/Barrel	$12.03
Gasoline	10/5/09	$2.468 $/Gallon	$19.74
Diesel Fuel	10/5/09	$2.582 $/Gallon	$20.06
Natural gas	10/7/09	$3.47 $/MMBtu	$3.47
Liquid Propane (Gulf)	10/2/09	$0.94 $/Gallon	$10.32
Heating oil	10/2/09	$1.763 $/Gallon	$12.78
Electricity retail, resid.	Jul-09	11.96 ¢/kWh	$35.05
Coal	10/2/09	$40.00 $/ton	$1.69
Liquid Fuels			
Ethanol (Iowa)	10/9/09	$1.77 $/Gallon	$23.22
biodiesel (Iowa)	10/9/09	$2.93 $/Gallon	$24.83
Soybean oil (Central IL)	10/9/09	30.91 ¢/Lb	$18.18
No 2, Yellow grease	10/9/09	$19.00 $/cwt	$12.34
Solid Fuels			
Fuel pellets	10/9/09	$265.50 $/Ton	$16.59
Shelled corn	10/9/09	$3.52 $/Bushel	$7.71
Compost	10/9/09	$25.00 $/cu. yard	$3.63
Wheat straw	10/9/09	$80.00 $/Ton	$5.41
Grass hay (lg rnd bale)	10/9/09	$50.00 $/Ton	$3.33
DDGS	10/6/09	$104.00 $/Ton	$5.53

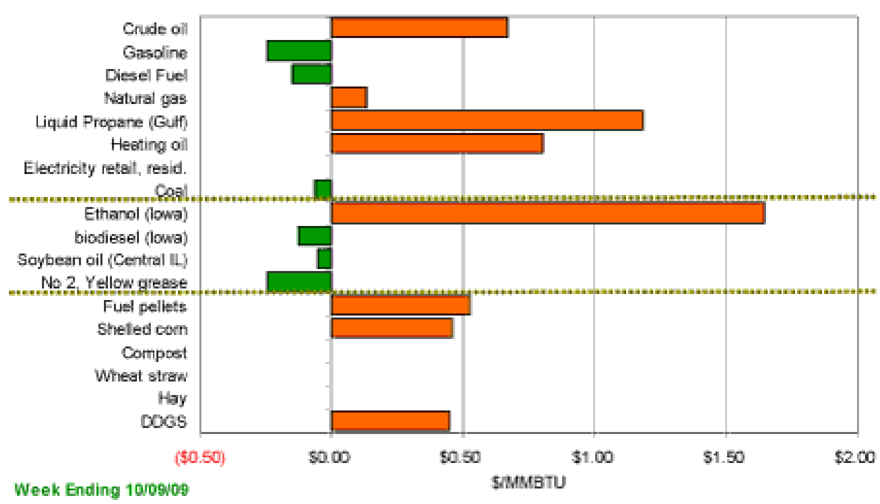

Figure 2 Energy values of selected commodities in $/million btus ($/MMBTU), 9/25/09, www.biomassrules.com.

Biomass Energy Values and Residential Heat Two newsletters ago www.biomassrules.com/eNews/BBNv3n3.pdf, I compared the diesel/biodiesel fuel related energy values in $/million btus ($/MMBTU) from June 2008 through May 2009.

This is a great time period because the 2008 prices peaked in July, so it captures the rise to the peak, the peak, the crash, and some of the stabilization – all in 12 months.

Then in the last issue of Burning Bio News www.biomassrules.com/eNews/BBNv3n4.pdf, I compared the energy values for the gasoline/ethanol related fuels. The intended pace of my newsletters has slowed, but the behavior of the residential heating energy values is just as interesting as the other two energy value series. For comparison with the other two series the residential heating energy values span the June 2008 to May 2009 period.

Figure 3 shows the energy values for wholesale heating oil, retail fuel pellets, shelled corn (Chicago), and IL high sulfur coal. Back in the summer of 2008, heating oil was approaching $4 per gallon. Fear of heating through the winter created a sort of rush on fuel pellets, particularly in New England. They never seemed to run out at the retail outlets, but folks seemed to buy up supplies about as fast as they arrived.

By November the energy value of heating oil was below the energy value of fuel pellets. But prices for pellets remained strong. Except for June 2008, the energy value of shelled corn is lower than either heating oil or fuel pellets. This means that while corn is too expensive to feed to livestock or to make ethanol out of, it is still a good energy value for providing a source of residential heat. And then there is coal… Coal went up during the energy price free-for-all in 2008, but has always remained the lowest cost (energy value) fuel.

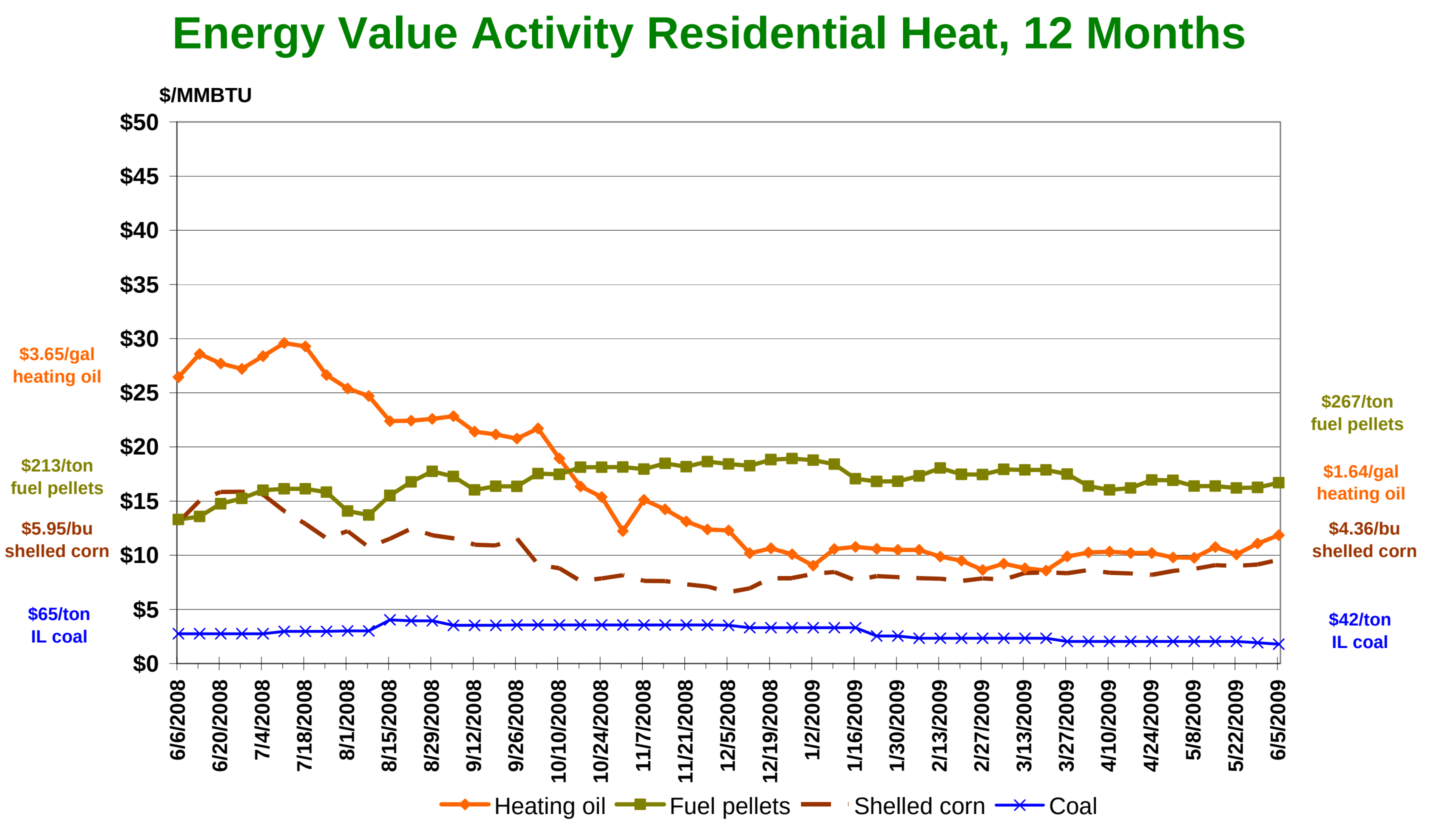

Figure 3 Energy value changes for residential heating fuels (June 2008 to June 2008)

Biopolicies (laws, policies and programs) ....

Sorting Priorities of Economic Growth, Energy, and Environment Since the last Burning Bio News, the EPA comment period has ended on the revised renewable fuel standard (RFS2). The RFS2 regulations are the implementation language of the 2007 Energy Independence and Security Act (EISA). At the same time Congress is trying to figure out GHG carbon policy.

The USDA and DOE continue to fund biomass energy projects, and EPA has just recently announced intentions to regulate carbon emissions under the Clean Air Act (CAA) – which, for those of you still trying to figure out all the different, conflicting laws – is different that greenhouse gas legislation (GHG). All of these agencies focus on the management of carbon, hydrogen, oxygen, nitrogen, phosphorus, and sulfur. These are the basic building blocks of life. Environmental compliance does not need to cost society. If the policies are structured correctly they can be neutral or contribute to economic growth (Table 1, I am available to guide lawmakers if there is an interest).

Table 1 Historical economic implications of the legislative economic impact

	Economic Impact		
	positive	neutral	negative
Energy Independence and Security Act (EISA)	X		
2008 Farm Bill	X		
Generic Cap and Trade legislation	?	X	?
Clean Air Act (CAA)			X
Clean Water Act (CWA)			X
Resource Conservation and Recovery Act (RCRA)			X

Basically the Energy Independence and Security Act is directed at creating economic growth by reducing US dependence on foreign energy. The 2008 Farm Bill is intended to strengthen food, feed, and fuel markets for US agriculture. It also has some environmental directives. Cap and Trade policy, in general, simulates a market based on liability aversion. Traditionally, like waste remediation, this is a cost minimizing economic driver. Participants are driven to the carbon sequestration market by the chance to reduce their carbon emission compliance costs. Carbon has a lot of value, so this can have either positive or negative economic impacts.

It appears that EPA and many of the legislators would like to see carbon emissions as the over-arching driver in carbon policies. This is fine; …just as long as economic growth has a *higher* priority. Economic growth and environmental quality is not an either-or proposition. Regulation of the environment without regard to any other objectives is a 1970 philosophy. This was an adequate, but innocent first step. We are beyond that today. We need a 2020 philosophy which includes recognition of the technical value of efficiency. The more thoroughly we utilize the inputs on the front end, or in reuse on the back end, the fewer residuals end up in the environment in the wrong place.

EPA did a herculean effort at trying to meet the EISA mandates for lifecycle analysis based on indirect land use in foreign countries. However their proposals interfere with successful execution of the EISA to provide energy independence and security. Adhering to an EPA specific mandate that causes the RFS2 standards to fail economically is a barrier to the Congressional intent. This *does not mean* renewable fuels standards can not be created that promote energy independence and reduce carbon emissions. It does mean that the EISA can not be implemented as written. The following is the introductory text to my comments to EPA.

Biomass Rules, LLC Comments to EPA on the revised Renewable Fuel Standards, RFS2 Docket ID No. EPA-HQ-OAR-2005-0161, September 24, 2009

EPA was required to write implementation regulations for the Renewable Fuels Standard as mandated in the 2007 Energy Independence and Securities Act. In the process a conflict arose between the development energy independence through economic growth and Greenhouse Gas (GHG) emission reduction. The two conflicting objectives can not be held to equal value. It is clear now that the US House, the US Senate, and the President requested standards with such narrow criteria that they are not possible to establish as prescribed in the EISA statute.

The current proposed EPA rule focuses first on emission reduction, second on fuel category definition, finally on energy independence and economic growth. This strategy restricts the development of biofuels to the point that it discourages energy independent, economic development of biofuels for the sake of GHG emissions reduction. The restriction of energy independence is a direct violation of the Energy Independence and Security Statute. Economically, when the economic opportunity is restricted from participation in the RFS program, available biomass will move into solid and gaseous fuel markets.

The standards as proposed by EPA in the Proposed Renewable Fuel Standards in May 2009 will violate the EISA statute by:

1. Interfering with the objective of energy independence through the technical and economic barriers created by the rule. The proposed rule fundamentally thwarts the successful development of hundreds of millions of dollars of funds that have been spent by the Department of Energy (DOE), the Department of Agriculture (USDA), and private investment that no longer fit the RFS definition by eliminating MSW and biomass from federal lands from participation in the revised Renewable Fuel Standards (RFS2).
2. Ignoring the fundamental principles of mathematics, which render EPA estimates meaningless. In a sincere effort to fulfill the statutory obligations EPA used the best available data to attempt to establish RFS standards. The best data

and methodologies do not meet quality necessary to serve the 'force of law.' Professionals in the life cycle assessment (LCA) field can not agree on the proper methodology. Therefore, no legally defensible LCA methodology exists. In addition EPA took coefficients developed from radically different models and created new models that create hypothetical results that are far beyond the boundaries of the underlying original data.

3. Arbitrary restrictions imposed by indirect land use analyses interfere with the challenge of participation in the RFS2 program. After months of debate, no defensible causality has been established between US biofuel policy influence and global land use decisions. EPA made a gallant effort, but gaping holes remain in the level of data required to develop a representative relationship. The result is that a forced effort to guess about indirect land use creates significant barriers to energy security without providing effective greenhouse gas safeguards.

This inability to establish defensible, transparent Renewable Fuel Standards is due to the conflicting criteria established in the EISA, not from EPA effort. EPA used a general methodology in this frontier-without-data, which has been used in other industries where decades of historical data have been available. The only workable solution to the RFS2 standards is to simplify the RFS so that the private sector can rise to the challenge of establishing this new industry sector.

Most of these challenges that have been debated for nearly all of 2009 are about the methodology choices made by EPA to establish the four fuel categories. The spirit of the EISA 2007 law can be met by establishing two categories for renewable fuels instead of four. The two categories would partition feedstocks that 1) competed for feed and food (corn and soybeans) from those feedstocks that 2) did not compete with food and fuel (cellulose, fiber, organic residuals, and biomass).

The percent reduction in GHG emissions is also arbitrary. If severe reductions do not allow the industry to rise to meet those standards, the law will fail far more completely than if the RFS standards are broadly inclusive to industry participation but the reductions are incremental. The conventional biofuel standards (starch-based ethanol) should include a 10 percent reduction in GHG emissions, while the advance renewable (biomass/cellulosic) fuels should include a 20 percent reduction.

These reduction targets should be treated as a safety valve rather than a prescriptive absolute. The very nature of biofuels and other renewable fuels is that they are innately more carbon efficient than conventional fossil fuels. As they become more common in the coming years their carbon efficiency will also increase. The current fixed percent reductions should serve only as a policy mechanism to keep technologies from commercialization that utilize more fossil fuels in the generation of biofuels than they create.

Lowering the percent reduction goals will also relieve the responsibility on EPA for guessing about long term effects. EPA has made a valiant effort to comply with the EISA statute. If EPA does not have the authority to make adjustments in the RFS standards, then they need to send it back to the President and tell him that the EISA is not possible as written.

To create energy independence as intended by EISA 2007, the following must happen:

1. Monitor, but remove the indirect land use provisions from current RFS standards.
2. Create a conventional RFS for starch-based biofuels and a second one for fiber and residual based biofuels.
3. Build the standards around the market-based standard model (labeling standards like the USDA BioPreferred Program[1], not technology-based standards).
4. Recognize that technology is environment-enhancing. As technical efficiencies increase, fewer under-utilized components go into the environment. This is true from carbon emissions to nitrogen emissions to phosphorus emissions.

EPA rose to the challenge set forth in the EISA statute, but in the end can not legally or morally coordinate the broad, divergent statutory requests into a uniform law. These comments are provided in the spirit of constructive guidance based on 30 years of working at the interface between production agriculture, environmental quality, and renewable energy.

The entire text of my RFS2 comments can be found at: http://biomassrules.com/articles/CommentstoEPAdraftRFS2092409.pdf

Executive Order on Economics, Energy, and the Environment "President Obama signed an Executive Order on October 5, 2009 that sets sustainability goals for Federal agencies and focuses on making improvements in their environmental, energy and economic performance. The Executive Order requires Federal agencies to set a 2020 greenhouse gas emissions reduction target within 90 days; increase energy efficiency; reduce fleet petroleum consumption;

[1] USDA BioPreferred Program. The BioPreferred℠ program aims to increase the purchase and use of renewable, environmentally friendly biobased products while providing "green" jobs and new markets for farmers, manufacturers, and vendors. The BioPreferred program offers three major benefits: Climate Change Impact Reduction, Energy/Environmental Security, and Economic Development. http://www.biopreferred.gov/Default.aspx?SMSESSION=NO

conserve water; reduce waste; support sustainable communities; and leverage Federal purchasing power to promote environmentally-responsible products and technologies."

This is an interesting directive. It elevates the value of economic growth through carbon and energy conservation. The promotion of economic growth is fairly implicit. The fact that this directive is driven by the need for economic growth is very exciting. The fact that economic growth plays an implicit role is discouraging. Maybe the overall effect will be somewhere in between? The complete text can be found at www.whitehouse.gov/assets/documents/2009fedleader_eo_rel.pdf,

Bioscience (science and technology) ....

Interactive Biomass Maps on the Internet The Department of Energy and the EPA recently released a nifty internet mapping tool at http://rpm.nrel.gov/biopower/biopower/launch. The following maps were created on the new biomass energy utility. There are multiple layers, so these three data layers are not exhaustive. It is a great tool for getting a sense of what is already on the ground.

Figure 4 Biomass power plants

Figure 5 Landfill gas projects

Figure 6. All US power plants

These three maps were selected because of what they show. In the first map, it is interesting to note that the biomass power plants follow the timber-producing areas and that there are not many. Ag and forest fuels are land-based sources of biomass. In Figure 5, the landfill gas projects are approaching nearly 500 in number. It is difficult to get a sense of the project size by the units in these graphs. The landfill gas projects are clustered around population centers. Municipal wastewater and MSW fuels are people-centric. Policies and technologies for land-based biomass conversion will not necessarily operate the same as policies and technologies for people centric biomass.

The last map is telling because it shows all the power plants that EPA oversees. Any one of these power plants that decide to burn 5 percent biomass is a potential market for biomass feedstock sales. The existing power plants are fairly well distributed across the continental US.

I hope to see many of you at the 9th Annual BioCycle Conference On RENEWABLE ENERGY FROM ORGANICS RECYCLING, October 19, 20, 21, 2009, Minneapolis, Minnesota Ramada Mall Of America. To register go to http://www.jgpress.com/biocycle.htm.

Burning Bio News, Biomass Rules, LLC ....

I am here to serve all your biomass economic needs:

- As a biomass project economic visionary – *economic planning, feasibility studies, and due diligence reviews* – *technical planning, feedstock assessments, and coordination*
- An innovative regulatory/economic analyst – *biomass energy, climate, air emission, water quality regulations*
- Providing access to real-time biomass project data, – *current project location, US trends, and weekly energy values*
- As a provocative speaker to discuss agriculture's shift from a culture of 'compliance' to 'environmental profit'...

Call me!

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Manure is not a four-letter word!