

Burning Bio News

Adding Clarity and Understanding to all things Bio

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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 1 The 'Scorecard' of commercial bioenergy adoption

Happy New Year! What an adventure 2009 is turning out to be! Bioenergy project activity has come to a screeching halt relative to what was happening in 2007. Even the costless 'proposed' projects are happening with less frequency. It isn't all gloom and doom though. Although a record number of ethanol plants are filing for bankruptcy, new ones are still coming on line. The rate of progress is more like a trickle than the torrent of 2006 and 2007. Still there is forward progress to offset some of the discouraging negative economic contraction.

I missed sending a newsletter in January. Now, I am going to mash a bunch of really good material into this newsletter. It is a bit humbling to begin a third year of *Burning Bio News*. Even though these newsletters are a bit random in timing, this is the 19th edition of *Burning Bio News* (all of which are available at <http://www.biomassrules.com/BBNarchive.html>).

These are exciting economic times, no doubt. I am not teaching macro economics these days, but what a time to learn economics! Unemployment, inflation, recession, the Federal Reserve activities; are all misbehaving as we try to keep our shrinking financial resources from disappearing. Each new day seems to bring more discouraging economic news.

Yesterday, February 12, 2009, the pundits announced their surprise at a 1 percent growth in consumer spending (retail sales) for January. The traditional economic relationships are not working, and all the best analysts can do is scratch their heads. The general lack of economic confidence is creating more economic instability. There is no historical price data on the bioeconomic frontier. Frontier economics is no replacement for more sophisticated economics, but it has been good training for navigating the current economic chaos.

We will get through this economic crisis. As we cling to the few pennies we have left, we still have to buy food and clothes and replace equipment and houses. We can not hold our breath (and our spending) forever. And as we move toward recovery (still months away), if we learn to spend our money more carefully and efficiently, then good for us!

Some good news is that the same strategy that the federal and state governments have been using to jump-start the bioeconomy is a similar philosophy behind the policies intended to jump-start the larger US economy. The billions of dollars already available for cellulosic research and commercial development will still promote economic growth in the recession. They may not have the same level of impact that was envisioned when they were prepared, but the bioeconomy (biofuels, bioenergy, waste remediation for energy and other bio-based sectors) is already benefitting from those incentives.

BioProjects and the Bioeconomy

Biomass Energy Project Activity from 2008¹

The clock is ticking on the renewable fuel standards (RFS) that were signed into law in 2007. The industry and government are spending billions of dollars on commercializing a cellulosic and advanced biofuel industry. As of the end of 2008, I counted 27 companies and projects that are racing to commercialize a new biofuels technology. That translates into more than 400 million gallons of advanced biofuels production. The timing is good, too, because that is about the mandated level the nation must be at to meet the 2010 RFS.

The new technologies rely on different feedstocks to succeed. About 20 percent of the 400 million gallons will be derived from MSW. Twenty-three percent will come from wood. The remaining 57 percent will be generated from agricultural residues and crops. The emerging technologies often produce more than cellulosic ethanol including butanol, pyrolysis bio oil, and naphtha. These numbers do not include the 29 algae biofuel developers that I published in the last issue of *Burning Bio News*.

¹ Derived in part from the January 2009, *BioCycle*, Biomass Energy Outlook Column, Vol. 50, No. 1, Taking Stock in 2008.

<http://www.jgpress.com/archives/free/001795.html#more>

Bio News (Vol. 2, Number 7). Thanks to those of you who sent additions and corrections to my algae list. Progress on these algal developments continues to make the news each week.

EPA in their Landfill Methane Outreach Program (LMOP) data reported an additional 119.9 MW of landfill gas (LFG) electricity generation in 2008. Also, an additional 50.2 million standard cubic feet per day (mmscfd) were installed. Out of 57 new projects, 39 generated electricity and 35 generated gas for industrial fuel supply. Eighteen projects supplied both. In Table 1, the average generation capacity per electrical generation facility was 3.1 MW in 2008. In 2007, it was 3.4 MW in generation capacity.

	MW Capacity	LFG Flow (mmscfd)
2008, Installed capacity	119.9	50.2
2008, projects by use	39.0	35.0
2008, average capacity	3.07	1.43
2007, Installed capacity	153.2	87.0
2007, projects by use	45.0	41.0
2007, average capacity	3.40	2.12

This is an economic challenge for conventional farm manure digesters. The return on investment is currently much higher for LFG projects than for manure digesters. For an investment of perhaps 3 to 4 times more capital, the landfill gas power plant delivers about ten-times the power. While there is concern that landfills will try to create more methane by loading more carbon into the landfills, this is a very inefficient strategy for biomass utilization.

With increasing frequency manure digesters are getting larger and beginning to supply methane for either direct industrial use, or cleaning it up for use in pipe-line quality natural gas. The Environmental Power Corporation began operation of its Stephenville, Texas plant in 2008. They had some difficulties initially, but by the end of the year they began delivering renewable natural gas to PG&E with whom they have a contract.

The Stephenville, TX project is reported to produce 635,000 MMBTUs (million btus). They have seven more similar very large manure and industrial waste projects scheduled. The total energy reported for these eight digester projects is over 4,000,000 MMBTUs, which would be equivalent to about 50 MW if it was converted to electricity. Interest in farm digesters continues to grow as does interest in municipal wastewater digesters. At this pace, non-landfill gas methane production (and destruction) approaches the installation rate of landfill gas methane projects.

In 2008, fuel pellet projects were proposed to create a production capacity of over 2 million tons of fuel pellets. Nearly 1 million tons of fuel pellet capacity (900,000 tons) actually began production in 2008. Extremely high prices for oil last summer created hoarding of pellets in the Northeast. This year, every pellet project looks like a good investment. That may change by next year.

Biomass power plants are also on the rise. In 2008 over 800 MW generating capacity were proposed. Those were mostly from wood, but also included biomass materials from yard waste, biosolids and solid manure.

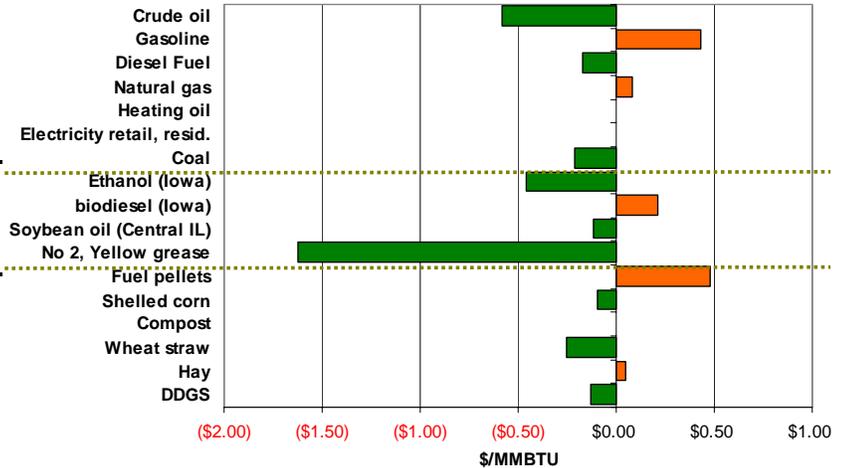
Conventional power plants are beginning to realize that regulated Clean Air Act emissions can be significantly lowered by adding biomass. Small biomass power plants being built today need to identify local conventional power plants. A decision five years out for much larger coal plant to add biomass could inhale local biomass supplies. If 5 percent of a 700 MW power plant is fed biomass that requires the same biomass supply as a 35 MW biomass power plant.

So, the economy is in the tank and there is no shortage of finger-pointing going around. Remember that all of our economic leadership is guiding an economy that we do not completely understand. There are traditional economic reasons to finance a stimulus/bailout package in the trillion dollar price range. There are also just as many traditional economic reasons *not* to finance a trillion dollars worth of stimulus/bailout government programs. The bottom line is the only way we are all going to get through this is together. And if using a trillion dollars of our children's future to finance economic recovery is a good idea, then we are already on point in with the federal stimulation of the fledgling bioeconomy. That funding is already flowing.

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 2/6/09. The last column of the table represents the calculated \$/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.

Fossil Fuels	Date	Market Price	\$/MMBTU
Crude oil	1/30/09	\$41.73 \$/Barrel	\$7.19
Gasoline	2/2/09	\$1.892 \$/Gallon	\$15.14
Diesel Fuel	2/2/09	\$2.246 \$/Gallon	\$17.45
Natural gas	2/4/09	\$4.94 \$/MMBtu	\$4.94
Liquid Propane (Gulf)	1/30/09	\$0.80 \$/Gallon	\$8.70
Heating oil	1/30/09	\$1.448 \$/Gallon	\$10.49
Electricity retail, resid.	Nov-08	11.47 ¢/kWh	\$33.62
Coal	1/30/09	\$55.00 \$/ton	\$2.33
Liquid Fuels			
Ethanol (Iowa)	2/6/09	\$1.47 \$/Gallon	\$19.28
biodiesel (Iowa)	2/6/09	\$2.98 \$/Gallon	\$25.21
Soybean oil (Central IL)	2/6/09	29.80 ¢/Lb	\$17.53
No 2, Yellow grease	2/6/09	\$15.50 \$/cwt	\$10.06
Solid Fuels			
Fuel pellets	2/6/09	\$276.97 \$/Ton	\$17.31
Shelled corn	2/6/09	\$3.59 \$/Bushel	\$7.87
Compost	2/6/09	\$25.00 \$/cu. yard	\$3.63
Wheat straw	1/26/09	\$86.00 \$/Ton	\$5.81
Grass hay (lg rnd bale)	1/26/09	\$34.17 \$/Ton	\$2.28
DDGS	2/3/09	\$127.50 \$/Ton	\$6.78



Week Ending 2/6/09

Bioscience (science and technology)

What do you fill an economic newsletter with when the economic is standing still? Cool new bioscience and data, of course! It just looks a bit different than the usual summary of projects, policies and technologies. There is no shortage of excellent information. I am going to entertain you with summaries of some excellent economic reports and data evaluations.

USDA Releases the 2007 Census of Agriculture

The USDA National Ag Statistics Service (NASS) released the 2007 Census of Agriculture data - in its entirety! They found that compared to the last Census (2002) there were increases in the smallest and largest-sized farm numbers, while farms in the mid-size class, decreased. They counted 2,204,792 farms, on 922,095,840 acres for an average farm size of 418 acres.

NASS administers the Census of Agriculture for USDA. They inherited the Census in 1997, from the Department of Commerce that conducts most of the other census tools at the federal government. I became an advisor to the Census of Agriculture Advisory Committee in 1995 as they were preparing for the 1997 Census of Agriculture, and worked with NASS on the 2002 Census of Agriculture even after it was released in 2004. This is the first Census in about 15 years I haven't had a ring-side seat for the Census. *It is purely coincidental that without me this is the fastest and most complete Census that has ever been produced!* The 2007 Census refers to the production year of 2007 - which ended about 13 months ago.

The 2007 Census of Agriculture is located at http://www.agcensus.usda.gov/Publications/2007/Full_Report/index.asp All the data is now available as either a text or pdf file. They will make it available in database and spreadsheet formats in time. There will also be some additional data tabulations produced.

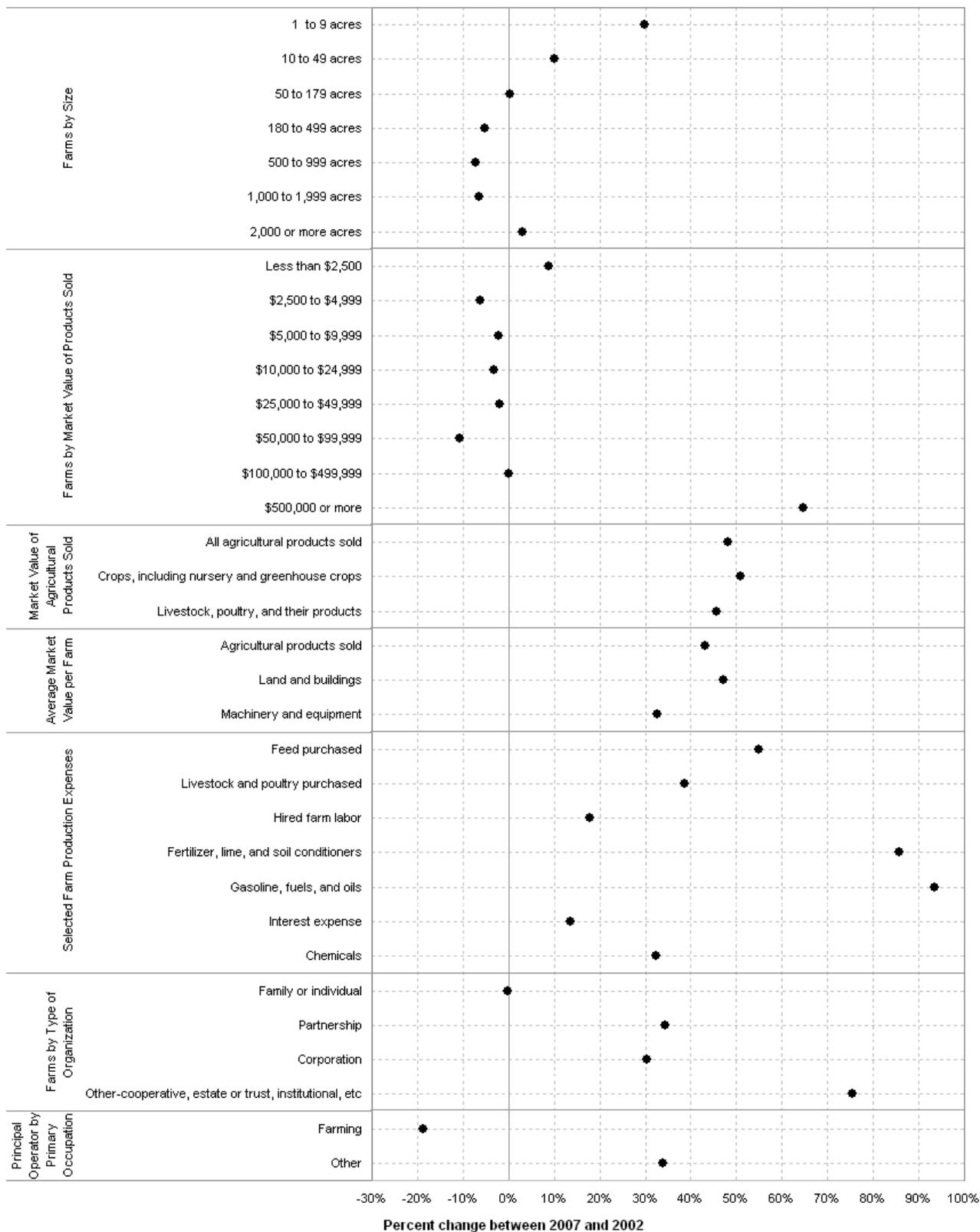
The USDA statistical folks are fierce protectors of the data confidentiality of their farm respondents. While on staff at the American Farm Bureau Federation, I help NASS strengthen some of the communication of their very strong policies. Now I'd like access to the data myself. Oops.

The Census of Agriculture is a rare source of relevant, accurate data at the county-level about production agriculture. Sometimes if large producers stand out, or there are too few farms in a county, NASS will block out the data. For the most part, though it is still the best county-level snap shot of farming and rural America.

Volume 1, Part 51 is the Big Book of the Census. It contains the US and State-level data (no county data or outlying areas like Puerto Rico or Guam). Volume 51 is a 700-page 'catalogue' of available data. I use it to identify the data items I need

in digital form. One of the cool new charts in Volume 51 is Figure 1 below. At a glance it shows the major changes between the 2007 Census and the 2002 Census. It is available at the following web site.
http://www.agcensus.usda.gov/Publications/2007/Full_Report/usv1.pdf.

Figure 1. Profile of the Nation's Agriculture



All the dots to the left of the “0%” vertical line indicate a decrease from the 2002 Census values. The dots to the left indicate an increase. If you recall, it was during the fall of 2007 that oil, gasoline, diesel, corn, beans, and fertilizers began to leave the realm of ‘normal’ for about 9 months before they came crashing back to low prices again mid-2008. Some of the excessively high prices will be reflected in the prices in the 2007 Census.

Combining Recent Innovations into Corn Production Systems For Higher Yields, Net Returns, Starch Energy and Lower Environmental Impact, by Jim Porterfield http://www.biomassrules.com/jim_porterfield.html

Jim Porterfield and his team conducted some demonstration trials on various tillage, fertility and seed genetics of corn production. In short, the data collected last year indicates that we can grow more corn using less nitrogen with technology that is already available. His study shows that,

Compared to normal farming practices, this study’s intensive management treatments boosted corn yields up to 21 percent, total starch and subsequent ethanol output per acre by up to 42 percent, net dollars per acre by up to 28 percent and reduced nitrous oxide (N₂O) emissions by 16.7 percent.

One of the key premises was that using hybrids that have been bred for higher starch content (high fermentable corn that yields higher ethanol volumes/bu); the traditional practices are no longer optimum. Jim has worked with emerging conservation technologies for years, so production systems were selected that captured compelling aspects of fertility, population and tillage. All the treatments were grown with each of three new hybrids. On an individual hybrid basis, the following observations can be made from this systems study for the 2008 growing season at Martinsville, IL:

- The use of the TerraStar soil imprinter (increases surface area) yielded more than plots that were not imprinted.
- Stabl-U plots (coated nitrogen beads) had equal or better yields than those with urea.
- For two hybrids, strip till banded Stabl-U yielded more than mulch till with broadcast nitrogen.
- \$ returns/ac were better for 100 LbN/ac and 42,000 seeds plots than Control (120 lbs N/ac, 35,000 seed population) and high rate (200 lbs/ac N, 60,000 seed population) plots.
- For each hybrid, the treatment that produced its highest starch content also produced its highest yield.
- Tillage, nitrogen type and placement had a large effect on two of the three hybrids.

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The State of Garbage in America: 16th Nationwide Survey of MSW Management in the US, Biocycle Magazine Volume 49, Number 12. http://www.jgpress.com/archives/_free/001782.html#more

Everyone operating on the frontier of biomass development needs to check out the excellent data provided in the, “State of Garbage” report at the above website. This report is based on a nationally administered survey. While some states keep public records on solid waste that is land filled, many others do not. The data presented in the December issue of BioCycle Magazine is the most comprehensive public data available. Here are some interesting findings:

- In 2006 (the most recent year examined) the US generated 413,014,732 tons of solid waste.
- This is a 25 million ton increase over the previous report two years ago.
- The average per capita production of solid waste is 1.38 tons/person/year. This is 2,760 lbs/year or over 7.5 lbs/day.
- The top three MSW-generating states per capita are Indiana (2.15 tons/year), Illinois (2.07 tons/year), and Tennessee (2.07 tons/year). More problematic is that Illinois has twice as many people as Indiana or Tennessee, so that means not only do we have more generation per person, we have lots of people (13 million in 2006).
- The amount of 2006 MSW recycled or composted is 28.6 percent, 118,207,659 tons.
- The amount of 2006 MSW that is combusted in Waste to Energy technologies is 6.9 percent, 28,394,109 tons.
- The amount of 2006 MSW that is land filled is 64.5 percent, 266,412,964 tons.

The State of Garbage covers many other dimensions: imported/exported, composition of MSW, banned materials. Check it out! It is a valuable resource.

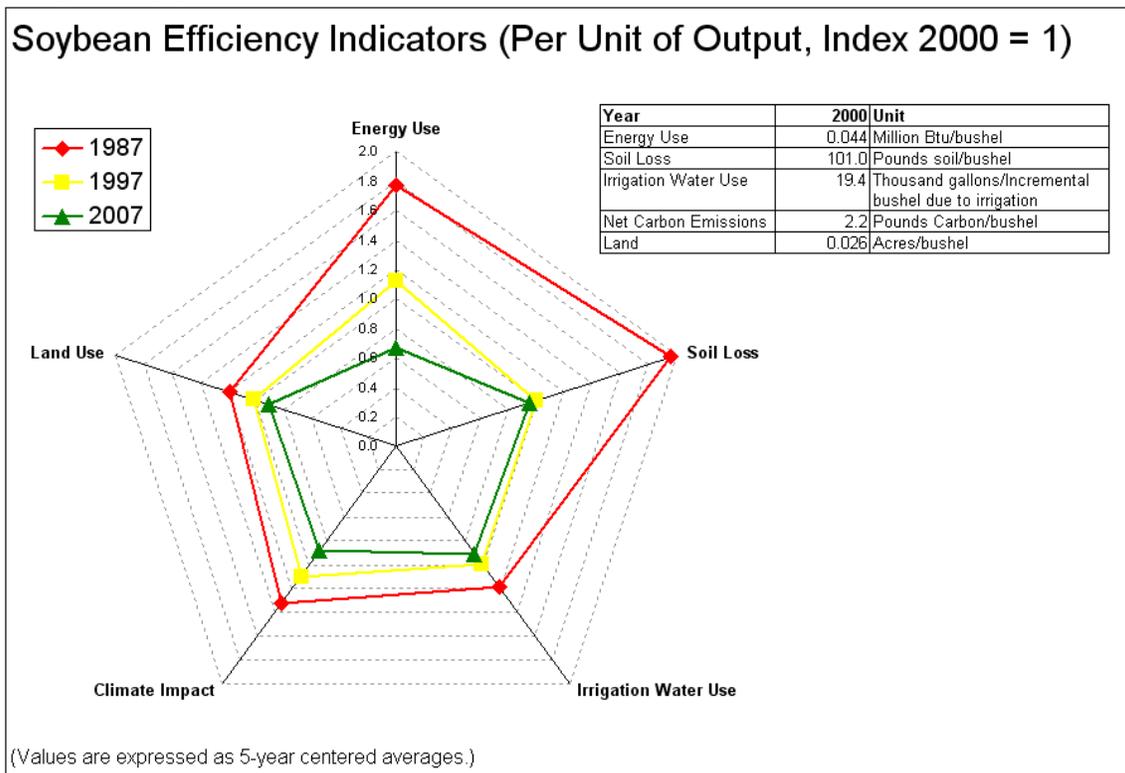
In recognition of 50 years of leadership in composting, recycling, and bioenergy industries, BioCycle Magazine in hosting an International Conference on Waste Diversion, Composting, and Renewable energy, April 27, 28, 29, and 30, 2009, in San Diego California. I plan to be there (and speak, actually). To register go to <http://www.biocycle50.com/>

Environmental Resource Indicators for Measuring Outcomes of On-Farm Production in the United States. Field to Market: The Keystone Alliance for Sustainable Agriculture. First Report, January 2009.

http://keystone.org/spp/env-sustain_ag.html

This innovative presentation of US crop production creates five indices: land use, soil loss, water, energy use, and climate impact. Once the indices were established they were applied to four crops: corn, cotton, soybeans and wheat; from 1987 to 2008. The message that is overwhelmingly clear is that crop production agriculture continues to increase efficiency and reduce wastes (inefficiencies).

This chart below is a spider web of the five indices representing three specific years: 1987, 1997, and 2007. The smaller the index number, the more efficient the production practices. With the index set = 1 in 2000, the year 1997 provides a visual benchmark for the index of 1. For soybeans in 1987, energy use and soil loss were nearly double 1997 levels. In 2007, the green inner pentagon, crop production is the most efficient.



It has typically been difficult to convey that production efficiency = environmental quality. There are many smart people who believe that intensive production systems degrade environmental quality. But don't take my word for it. Check out this Keystone study!

There is never a shortage of very interesting things happening. Thanks for taking a few minute to see what keeps me going.

I am here to serve all your biomass economic needs:

- as a biomass economic visionary
- an innovative regulatory/economic analyst
- providing access to real-time biomass project data, or
- as a provocative speaker to discuss agriculture's shift from a culture of 'compliance' to 'environmental profit'...

Call me!

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Remember, Manure is not a four-letter word!