NRCS Energy Management Initiative

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Background

About 30 Percent of Agricultural Production costs are energy related

- Fuel $10.2 billion
- Electricity $3.3 billion
- Fertilizer and Pesticides $ 21.2 billion
Largest on-farm energy users:

- Irrigation
- Tillage
- Transportation
- Inorganic fertilizers
- Petroleum based pesticides
- Buildings and motors
- Grain drying
- Plastics
Direct and Indirect energy consumption by Agriculture (2002):

- 1.7 percent of energy consumed in the US
- 1.0 percent of gasoline
- 6.0 percent of diesel
- 2.3 percent of LP gas
- 0.25 percent of natural gas
- 1.0 percent of electricity
• Oil prices have increased from less than $30.00 per barrel in 2002 to around $60 a barrel in the fall of 2005.

• Nitrogen fertilizer prices have risen from around $200 per ton in the 1990’s to over $400 per ton in the fall of 2005.

• This fall’s nitrogen price is 22 percent higher than it was a year ago.
“Although the global economic expansion appears to have been on a reasonably firm path through the summer months, the recent surge in energy prices will undoubtedly be a drag from now on.”

Federal Reserve Chairman Alan Greenspan in a recent speech to Japanese business groups
Conservation Saves Energy!

- Drainage Water Management
- Conservation Tillage
- Digesters
- Manure Management
- Irrigation Water Management
- Rotational Grazing
Opportunity to expand adoption of conservation practices with links to energy conservation

- Residue Management
- Irrigation Water Management
- Nutrient Management
- Pesticide Management
- Drainage Water Management
- Rotational Grazing
Opportunity to expand adoption of conservation practices with links to energy conservation

Conservation Applied with NRCS Assistance In 2005

- Residue Management - 6.7 m ac planned, 4.5 m ac applied
- Irrigation Water Mgmt - 1.8 m ac planned, 1.2 m ac applied
- Nutrient Management – 8.6 m ac planned, 4.1 m ac applied
- Pesticide Management – 9.3 m ac planned, 3.9 m ac applied
- Prescribed Grazing – 24.0 m ac planned, 16.3 m ac applied
Fossil fuel energy can be conserved on-farm by...

- Reducing tillage operations
- Reducing trips to field
- Reducing fertilizer/pesticide/plastic inputs
- Being more conservative in grain drying
- Increasing irrigation efficiency
- Recycling
- Substituting renewable energy
- Moving to rotational grazing

NOTE: Many of these practices also conserve soil, water and air.
Saving energy and water

- Improve irrigation efficiency by:
  - Reducing crop water requirement
  - Reducing pump pressure
  - Increasing pump efficiency
  - Up-grading equipment (Variable frequency drives)

- Benefits:
  - Reduced energy costs
  - Reduced runoff
  - Reduce chemical inputs
Saving energy and reducing crop fertilizer requirements

Nutrient management includes:
- Crop rotations
- Cover crops
- Residue management
- Manure management
- Timing
- Application method
- Nitrogen inhibitors
- Soil tests
On-farm renewable energy technologies...

- Biogas (methane digesters)
- Wind turbines
- Bio-fuels
- Hydro
- Geothermal
- Solar
Crop Residue Management

- Can save at least 3.5 gallons of fuel per acre by going from conventional tillage to no-till
- On a farm with 1,000 acres of cropland, this adds up to 3,500 gallons of diesel fuel per year valued at $7,700.
Nutrient Management

- 2.7 million tons of manure-based nitrogen are applied on agricultural land.
- It takes 40,000 cubic feet of natural gas to produce a ton of commercial nitrogen fertilizer.
- Doubling the application of manure-based nitrogen could save approximately $1.2 billion worth of natural gas each year.
- Substituting manure for commercial fertilizer can reduce fertilizer costs as much as $85 per acre.
Energy Conservation

Irrigation Water Management

- 27 million acres are under sprinkler irrigation.
- 80% of these acres use center pivot systems.
- Converting from medium-pressure to low-pressure systems could save about $9.00 per acre.
- Converting from high-pressure to low-pressure systems could save up to $41 per acre.
Prescribed Grazing Systems

- Every month that cows can remain on pasture reduces energy costs by about $11.00 per cow.
- Reduces feeding costs
- Reduces manure handling costs
Energy Conservation

Windbreaks and Shelterbelts

- Windbreaks and shelterbelts can reduce wind-induced erosion and save heating and cooling costs associated with farmsteads.
- When properly placed to shield farm buildings from strong winds, windbreaks can lower heating and cooling costs by up to 20 percent.
Pesticide Management

- Pesticide production depends heavily on energy.
- Integrated Pest Management reduces energy use and environmental risk while maintaining product quality.
- For example, some cherry producers have abandoned traditional spraying schedules to spray based on in-the-field microclimate information obtained from monitoring equipment and scouting.
- Typical herbicide costs can be reduced by about $40 per acre with a 25 percent reduction of herbicide application.
Energy Estimator: Tillage

Energy Estimator for Tillage is the first of several tools from Natural Resources Conservation Service (NRCS)developed to increase energy awareness in agriculture. The tool estimates diesel fuel use and costs in the production of key crops in your area and compares potential energy savings between conventional tillage and alternative tillage systems. The crops covered are limited to the most predominant crops in 74 Crop Management Zones (CMZ). NRCS agronomists have identified these crops and estimated the fuel use associated with common tillage systems. Without including every crop and tillage system, the energy estimator gives you an idea of the magnitude of diesel fuel savings under different levels of tillage.

Step 1: Zip Code

Begin using this tool by entering your zip code, then click CONTINUE:

zip code #: 27674

Last Modified: 12/06/2005
Energy Estimator: Tillage

You are here: Home / Step 2: Crop Management Zone

These crops were identified as having the greatest harvested crop acreage in the crop management zone identified by your zip code using production data from the National Agricultural Statistics Service for 2004. They may not be the most common crops in your immediate neighborhood but are significant crops in the crop management zone indicated on the map.

Enter the number of acres you plant for each of these crops:

<table>
<thead>
<tr>
<th>Crops</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>75</td>
</tr>
<tr>
<td>Cotton</td>
<td>80</td>
</tr>
<tr>
<td>Peanuts</td>
<td>65</td>
</tr>
<tr>
<td>Soybeans</td>
<td>40</td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
</tr>
</tbody>
</table>

Start Over  Continue

Last Modified: 12/06/2005
Energy Estimator: Tillage

The fuel use estimates are based on per acre fuel uses found in the literature on typical cropping & tillage systems in your area. These estimates are based on field conditions that existed in test trials cited in the literature. An example of the literature which supplied fuel consumption usage is "Estimating Farm Fuel Requirements" by H.W. Hornsby and R.W. Harter (http://www.co.polk.iowa.us/COOL/ParMN579.pdf).

Total Farm Diesel Fuel Consumption Estimate (in gallons per year)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres</th>
<th>Conventional Tillage</th>
<th>Mulch-Till</th>
<th>Strip-Till</th>
<th>No-Till</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>75</td>
<td>401</td>
<td>394</td>
<td>318</td>
<td>300</td>
</tr>
<tr>
<td>Cotton</td>
<td>80</td>
<td>661</td>
<td>587</td>
<td>497</td>
<td>397</td>
</tr>
<tr>
<td>Peanuts</td>
<td>65</td>
<td>475</td>
<td>427</td>
<td>267</td>
<td>259</td>
</tr>
<tr>
<td>Soybeans</td>
<td>40</td>
<td>303</td>
<td>252</td>
<td>220</td>
<td>180</td>
</tr>
<tr>
<td>Total Fuel Use</td>
<td>1,542</td>
<td>1,610</td>
<td>220</td>
<td>1,141</td>
<td></td>
</tr>
<tr>
<td>Potential Fuel Savings over Conventional Tillage</td>
<td>228</td>
<td>83</td>
<td>705</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td>12%</td>
<td>4%</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* indicates that this alternative tillage system does not apply to this crop and that producers are assumed to continue to employ conventional tillage.

Fuel use estimates are based on average field and equipment conditions, average fertilizer and pesticide applications, and normal crop yields. They do not include fuel use associated with trips to your fields and farm-to-market transport, irrigation, and, grain drying. They also do not consider differences in fuel use associated with crop yields, soil texture, slope, field size and shape, implement width, tractor size, tire inflation or driving techniques. Your actual fuel use may vary significantly from the value presented.

To view the potential cost savings, enter your diesel fuel cost per gallon: $
Energy Estimator: Tillage
Forthcoming Energy Tools:

- Nitrogen
- Irrigation
- Integrated energy estimator
- Energy use Self-Assessment
NRCS Energy Management Initiative

Energy Management Initiative Goals:

1. Modify NRCS program and technology policy.
2. Develop tools and technologies.
NRCS Energy Management Initiative

Energy Management Initiative Goals:

3. Enhance existing and develop new partnerships.
4. Communicate critical information to NRCS personnel and the public.
5. Enhance NRCS’ energy conservation, renewable energy use, and bio-based products purchases.
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Energy Conservation
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