USDA NRCS Natural Resources Conservation Service

December 2005

Energy Use Reduction

Conservation Activity Job Sheet ***(NJEnergy07)***

Participant _____ Crop Year_____

Energy consumption in agriculture grew steadily during the 1960s and 1970s, peaking in 1978, due to increased mechanization, use of confinement housing and expanding farm size. High energy prices during the 1970s and 1990s caused farmers to find ways to reduce their energy costs—agricultural consumption was reduced by 41 percent from 1978 to 1998. This was primarily accomplished by reducing energy use or taking actions to use energy more efficiently while still achieving the same outcome.

Besides modifying tillage operations and fertilizer use, farmers reduced energy by:

- Switching from gasoline powered to more fuel efficient diesel powered engines
- Shifting to larger multiprocessor machines
- Using energy saving methods for drying and irrigating crops
- Replacing old machinery with more energy-efficient equipment
- Using new seed varieties to reduce energy-intensive chemical requirements
- Insulating farm buildings
- Using energy efficient irrigation systems

There are opportunities for energy conservation in almost every application or operation on the farm. Energy conservation can be achieved from simple management changes, such as shifting energy consuming irrigation to hours of low evapo-transpiration or conscientiously completing scheduled maintenance so that systems work at optimal levels[1].

The advantages of energy conservation include reducing air pollutants, reducing global greenhouse gas emissions, reducing dependence on petroleum based products, and slowing escalation of energy costs due to lower demand. USDA is promoting energy efficiency and conservation through CSP so that farmers and ranchers can effectively respond to energy price and availability fluctuations and achieve environmental benefits.

CSP provides an annual payment for energy reduction to applicants who enroll in the program. The payment is based on reduction rates of 5 percent, 10 percent, and 20 percent of total British Thermal Units (BTU's)[2] consumed on the farm. The attached "BTU Conversions," can assist with converting a variety of energy measurement units into BTU's.

Documentation Required: Receipts documenting average annual energy reduction compared with the established baseline or completed energy worksheet (see attached).

I certify that I reduced energy use on my farm as specified on this job sheet, by _____% over the documented energy use at the start of my contract.

_____ _____

Signature Date

[1] Reliable, Affordable, and Environmentally Sound Energy for America's Future, Report of the National Energy Policy Development Group, Office of the White House, 2002

[2] A British thermal unit is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at sea level.

BTU Conversions

For the purpose of this guide sheet, *total energy use* means use of grid electricity, natural gas, and fuels used for stationary motors and pumps. To calculate energy use reduction under the Fossil Fuel Reduction Interim Standard, participants may need to convert a variety of energy sources to the same measurement unit. In the U.S., the unit of measurement most commonly used for comparison is the British Thermal Unit (BTU).

BTU Conversion Tables

The British thermal unit is an English unit of measurement equal to the amount of heat required to raise the temperature of one pound of water at its maximum density by 1°F. One BTU is approximately equivalent to following 251.9 calories or 0.0002928 kilowatt-hours.

The following record-keeping and tables are provided to assist producers in keeping track of their total energy use and energy reductions and converting all fuel sources to BTU's.

BTU Conversion Table

Energy Source	Unit	Conversion Factor
# 2 Fuel Oil[2/]	Gallon	139,000
Coal	Pound	10,550
Diesel	Gallon	138,694
Electricity	Kilowatt hour	3,413
Ethanol	Gallon	84,400
Gasohol (10% ethanol)	Gallon	120,900
Gasoline	Gallon	125,000
Kerosene	Gallon	135,000
Methanol	Gallon	62,800
Natural Gas	Therm	100,000
Propane/LPG	Gallon	95,475
Residual Fuel Oil	Gallon	149,690
Wood	Standard Cord	21,000,000

ENERGY WORKSHEET (BTU Conversions):

NAME: **BASELINE DATE:** **AFTER DATE:**

Baseline					
Energy Consumption	Energy Source	Units	Energy Use	Conversion Factor	BTU's
Total Energy Used Baseline				A	
After Changes					
Energy Consumption	Energy Source	Units	Energy Use	Conversion Factor	BTU's
Total Energy Used with changes				B	
Total Energy Reduction				A-B	
Energy Reduction (%)				(A-B)/A x100	

Instructions and Example: A row will be completed for each energy-using activity. For example, heating the shop with a natural gas furnace is one energy consumption activity "Source" is the type of energy used and is taken from the first column in the BTU Conversions Table. "Units" are the units of measurement described in the second column of the BTU Conversions Table. In the case of natural gas, Therm is the unit of measurement. The "Energy Use" is the number of units used in the evaluation period. The next column, "Conversion Factor", is taken from the third column in the BTU Conversions Table. In the case of natural gas the conversion factor is 100,000.The BTU's are computed by multiplying the energy use by the conversion factor. The sum of all energy consumption activities entered on the sheet is entered in the BTU's column as A. The same process is used to complete the "after changes" section. The total BTU's "after changes" is entered in the BTU's column as B. A-B represents the energy use reduction. (A-B)/A x100 is the % energy use reduction.

Example:

Energy Consumption	Energy source	Energy Units	Energy Use	Conversion Factor	BTU's
Baseline					
Natural Gas Furnace	Natural Gas	Therm	30	100,000	3,000,000
Grain Dryer	Electricity	kWh	10,000	3,413	34,130,000
Lights	Electricity	kWh	500	3, 413	1,706,500
Others					
Others					
Total Energy Use	NA	NA		A	38,836,500
After Changes					
Natural Gas Furnace (insulation installed)	Natural Gas	Therm	25.5	100,000	2,550,000
Grain Dryer (dryeration)	Electricity	kWh	9,000	3,413	30,717,000
Lights	Electricity	kWh	500	3,413	1,706,500
Others					
Others					
Others					
Others					
Total Energy Used with changes	NA	NA		B	34,973,500
Total Energy Reduction	NA	NA		A-B	3,863,000
Energy Reduction (%)	NA	NA		(A-B)/A x100	9.9%