

# **Energy Efficiency on the Farmstead**

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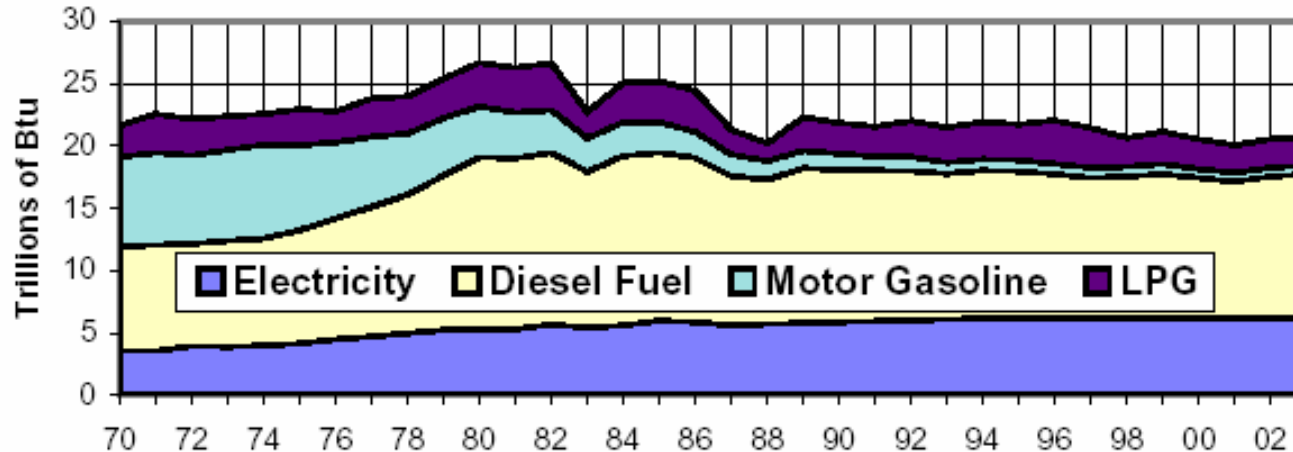
**GDS Associates, Inc.**  
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# Gas and Fossil Fuels

## Wisconsin Agricultural Energy Use, in Btu, by Type of Fuel, 1970-2003

(Trillions of Btu and Percent of Total)

Agricultural energy use has been nearly constant since the late 1980s due to offsetting increases in mechanization and automation and land taken out of production. End use energy used in Wisconsin agriculture is now almost 20 percent below the peak reached in 1980.



# Energy Use Shift

- **Energy use on dairys are shifting from electrical to gas and fossil fuel based**
  - Waterheating and drying systems
  - Electric conveyors to facers, skidsteers, and TMR feeders
  - Silo and silo unloader systems to bag or bunker systems
  - Horses to tractors (Back to horses in some areas!)
- **Reasons for energy shifts**
  - Reduced labor and maintenance
  - Increased mobility and speed
  - Tillage philosophies and practices



# New-Age Dairy Energy Efficiency

- **Equipment sizing**

- "Tractors use an average of only 55 to 60% of their maximum horsepower on a year round basis," (H.W. Downs and R.W. Hansen).
- Bigger is better mentality.
- Tractors are usually selected to do high-power operations, like tillage, but are also used for less demanding operations like seed bed finishing and planting
- A 100 PTO-horsepower rated tractor uses on average, 7.69 gallons of diesel fuel/hr.
- An 80 PTO-horsepower rated tractor will use only 6.1 gallons.



# New-Age Dairy Energy Efficiency

- **Farming practices (corn crop example)**

Conventional tillage system

- -Mowboard plowing, disking, seedbed finishing, planting, and cultivating
- -Six passes equal 3.88 gals/acre of diesel fuel consumption, \$12/ac. at today's fuel costs



Reduced tillage system

- Chisel plowing, disking, and planting
- Three passes equals 2.15 gals/acre of diesel fuel, \$6.66/ac.

No-till system

- Stalk chopping, no-till planting
- One or two passes, .35 to .65 gals/acre of diesel fuel, \$1.08-\$2.00/ac.



# New-Age Dairy Energy Efficiency

- **Manure handling (\$0.01-\$0.02 per gallon)**

Traditional daily spreading

- Electrical-mechanical barn cleaning and tractor spreading

Seasonal spreading, tanker system

- Gravity flow, flume, and flush systems
- Pto agitation and pumping
- Surface or injection application

Direct application/Irrigation

- Mechanical or physical solids separation
- Pto agitation and pumping
- Surface or injection application





# What to expect next.

- **Rising fuel costs**
- **Rising fertilizer costs**
- **Renewable and farm-based energy generation**
  - -Anaerobic digestion
  - -Peak load generation systems
- **Optimizing energy generation**
  - -Anaerobic digestion
  - -Electrical and heat production
- **Political interest**
  - -NRCS-Conservation Security Program, Green Tier, EMS
  - -On-farm energy auditing – Focus on Energy program



# Discussion

- **Are energy costs/concerns getting onto producers radar screen?**
- **Is there sustainable political backing for energy efficiency in the ag sector?**
- **How do we get there from here?**

