

Taking a long look at short supplies

Energy use on farms isn't a new topic for the Leopold Center. Although higher energy costs indicate a current crisis, there may be even more dramatic effects in the years ahead.

As we all know, modern industrial agriculture has achieved much of its success by replacing labor with energy and capital. This strategy worked remarkably well because we had ample supplies of cheap energy. However, agriculture's heavy reliance on petroleum as the primary source of energy is catching up with us.

The "petroleum era," as some geologists call it, is rapidly coming to a close. Being part of this era sometimes blinds us to how brief this period is compared to the rest of human civilization. The first American commercial oil well was drilled in 1859 in Titusville, Pennsylvania. According to an essay in the March 1999 issue of *Scientific American* by oil industry analysts Colin Campbell and Jean Laherrere, we have about eight years of "cheap oil" left. Recent increases in prices for diesel fuel, anhydrous ammonia and pesticides—all petroleum-dependent products—indicate that their prediction may be correct.

Campbell and Laherrere remind us that the problem is not that we will run out of oil anytime soon. Rather, our ability to acquire oil "cheaply" will end. They attribute the end of the "cheap oil" era to a combination of increasing demand and the fact that the "last bucket of oil" cannot be pumped from the ground as quickly as the first. They explain that the rate at which any well (or country) can produce oil "always rises to a maximum and then, when about half the oil is gone, begins falling back to zero." We are now on the other side of the "half-gone" oil.

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Some farmers, especially those producing corn, hope that biofuels have a bright future, both as a new source of cheap energy and as a new source of revenue. (In our most recent newsletter, we told you about burning switchgrass for fuel.) However, studies to assess the potential of various biofuel systems to meet all future energy needs yield mixed conclusions. Researchers Giampietro, Ulgiati and Pimentel report in *Bioscience* magazine, "large-scale biofuel production is not an alternative to the current use of oil and is not even an advisable option to cover a significant fraction of it."

I'm not suggesting that biofuels have no future. It may be that small-scale, on-farm biodiesel units and properly managed ethanol plants can fill some of our needs, at least while we move from petroleum to some other energy source. Biofuels, however, probably will not be the silver bullet that saves farmers from the coming energy crisis. Producing crops to burn for fuel also raises the troublesome prospect of diverting farmland to energy production, just as demographers warn us that we may not have sufficient land to produce enough food for an expanding population.

Energy conservation may be one fruitful avenue for farmers to pursue in the immediate future. We all learned that we could dramatically reduce our energy use during the energy crisis of the 1970s. This strategy, more than anything, helped us survive temporary energy shortages. Of course, farmers can't just shut down their tractors. But we can reduce tillage, judiciously use petroleum-based inputs and adopt better management practices to

decrease purchased inputs.

A 1993 North Dakota State University study comparing the performance of conventional, no-till and organic farms offered some interesting conclusions. It showed that when total energy flows were considered, no-till farms consumed 30 percent less energy than their conventional counterparts. Organic farms consumed 70 percent less energy than conventional farms, and yields were comparable for all three farms. No-till and organic management may not be for everyone, but this study supports the idea that farmers may be able to adopt practices that can curtail energy costs, conserve soil and water, and still produce optimum yields.

Midterm energy solutions will likely include a combination of energy conservation, new technologies and more diversified energy sources. These would include wind, solar, biofuels, hydro-electric, hydrogen, coal and natural gas.

Over the long haul, we need to develop technologies and systems that enable us to eliminate energy waste and use entirely "current" energy. Use of "borrowed" energy—solar energy that has been stored in the form of oil, coal and gas—must end.

Our food systems also must become more energy efficient. Four percent of our national energy budget is used to grow food, while 10 to 13 percent is required to put it on our plates. As energy costs go up, regional food systems will have a distinct competitive advantage.

Meanwhile, don't bet the farm on the price of diesel fuel going down anytime soon.

