

The agricultural sector is one of the most energy-intensive sectors of our economy. When energy prices rise precipitously as they have over the past two years, farmers, ranchers, and the rural community at large feel the effects much more acutely than do most other sectors of the economy. Our energy problems are not restricted to the agricultural sector, however. The United States finds itself in an energy straightjacket, with tightness in all major energy supply markets, unable to turn to other conventional energy resources for relief. It will take several years at best to bring significant new supplies of conventional energy to market. This leaves us with energy efficiency and conservation as the only near-term resources that can respond to our immediate problems.

Energy is intertwined with all aspects of agriculture, both directly as diesel fuel, electricity and propane, and indirectly in energy-intensive products such as fertilizer, other agricultural chemicals, and animal feed. Fortunately there are a number of important steps that the agricultural community can take to reduce both direct and indirect energy use, including:

- Increased energy awareness
- More efficient farm vehicles and equipment
- Low-energy farming practices such as low-till/no-till, irrigation management, and improved confinement livestock lighting and ventilation

The agricultural sector is also uniquely positioned to realize a larger share of its energy efficiency and conservation potential. Most of these key efficiency and conservation measures are well understood by experts in agencies and universities who worked on these issues in the 1970s and '80s. The past fifteen years have seen this key information fall out of common usage. We need to re-teach energy awareness and efficient practices to the agriculture community. We are already seeing this beginning to happen, motivated by a demand by the agricultural community for this information.

An important asset that the agricultural community has is its unique educational infrastructure (including the land-grant universities, the extension service, and their partners in the agricultural community) that has developed over more than a century. This network allows new technology and practices to quickly get into the hands of farmers and ranchers who can make immediate practical use of them.

What we need to do now is mobilize this network to focus on energy again, repackage and update existing educational materials, and get these materials into the hands of the educators so that they can begin responding to the demand that we are already seeing in the agricultural community.

ACEEE believes that the federal government has an important leadership role to play in responding to the energy crisis facing the agricultural sector. We recommend that Congress take the following immediate steps to re-fund the agricultural sector's educational and implementation infrastructure, including:

- o Fund Sec. 9005 of the 2002 Farm Bill. Congress has never appropriated funding for this provision of the farm bill.

- o Continue full funding of Sec. 9006 of the 2002 Farm Bill. Now is not the time to de-fund provisions like this.

- o Continue full support for the Conservation Security Program.

- o Expand funding for Rural Development to provide the technical support and financing that is needed to enable farmers and ranchers to realize their energy efficiency and conservation opportunities.

- o Refund the extension and experiment station network that remains the frontline in working with farmers, ranchers, and rural small businesses to help them meet the challenges of the current energy crisis.

The committee should also begin thinking strategically about the role of energy in the agricultural sector, and what additional energy provisions are needed in the 2007 Farm Bill.

Introduction

ACEEE appreciates the opportunity to provide comments to the Committee on the important subject of the impact of the current energy crisis on the agricultural sector. The agricultural sector is one of the most energy-intensive sectors of our economy, next to the energy-intensive manufacturing industries such as aluminum, chemicals, and paper manufacturing. Thus, when energy prices rise precipitously as they have over the past two years, farmers, ranchers, and the rural community at large feel the effects much more acutely than do most other sectors of the economy. Their ability to deal with these costs is also more limited, in part, because of their already tight profit margins. In addition, negative economic impacts on the agricultural community ripple throughout the entire economy affecting every household because these increased farm energy costs are passed through to the consumer in higher food and other agricultural product costs.

The good news is that the agricultural sector is already responding to this by improving its energy efficiency and diversifying its energy sources. It is uniquely positioned to respond with even greater energy efficiency and conservation that will not only manage costs for the sector, but will also offer the potential to benefit the economy as a whole by reducing pressure on energy markets.

ACEEE brings a unique and diverse perspective on this issue. ACEEE is a nonprofit research organization dedicated to increasing energy efficiency as a means for promoting both economic prosperity and environmental protection. We were founded in 1980 and have developed a national reputation for leadership in energy efficiency policy analysis, research, and education. We have contributed in many ways to Congressional energy legislation adopted during the past 20 years, including, the National Appliance Energy Conservation Act of 1987; the Energy Policy Act of 1992; and the Energy Policy Act of 2005. We are also an important source of information for the press and the public on energy efficiency technologies, programs, and policies. In a previous position, I ran agricultural energy efficiency programs in North Carolina from the mid-1980s until the early 1990s, both as an extension agent and later working closely with extension and experiment station staff, as well as electric utility staff focusing on

efficiency in poultry, swine, and produce production.

As a result of our experience in energy efficiency and agriculture, ACEEE was asked to provide technical input into this Committee's crafting of the energy efficiency provisions of the 2002 Farm Bill. Subsequent to the signing of the bill, we provided input to the U.S. Department of Agriculture (USDA) on their implementation of the energy efficiency and renewable energy provisions in the farm bill. As part of this input, ACEEE initiated a survey of energy programs targeted at the agricultural sector. This information was reported on an ongoing basis to USDA and others in the community interested in this topic. Our survey work culminated early this year in the publication of a summary report. In addition, we undertook an analysis of how energy is used in the agricultural sector, building upon the wealth of information available from the USDA's Economic Research Service in Dr. Keith Collins' office, as well as many state entities. Based on this research, we have documented the significant savings opportunities still available in the agricultural sector from increased energy efficiency and conservation.

This work will all come together at our Forum on Energy Efficiency in Agriculture to be held next week in Des Moines, Iowa, co-sponsored by USDA and the Department of Energy, along with many state and regional groups. This event will bring together key players in the agricultural and energy efficiency communities throughout the country to discuss many of the issues being raised at this hearing. A copy of the "Ag Forum" conference agenda is attached to this testimony.

Before proceeding with the details of my testimony, I would like to recognize former Chairman Harkin and Senator Lugar for providing the leadership to this committee in including major new energy provisions in the 2002 Farm Bill. ACEEE was honored to assist the Senators and their staffs in crafting these important provisions, which can now be seen as anticipating the energy crisis facing the agricultural community before it was widely recognized. Not only have the energy provisions in the bill had important direct impacts, but the provisions motivated resurgence in interest in energy efficiency, conservation, and renewable energy in agriculture at the state and local levels across the country. These activities have leveraged the federal funding many times over.

Current Energy Markets and the Role of Energy Efficiency and Conservation

While the agricultural sector is ahead of many other sectors of the economy in beginning to respond to the current energy crisis, there is much more that needs to be done through appropriate education and support in order to realize the potential saving. Because of the important role that the USDA has in the agricultural community, it is critical that the Department continue to play a leading role in motivating national response to this crisis.

To understand the importance of energy efficiency and conservation in responding to this crisis, it is important to understand the underlying conditions that have led to the crisis. In the past, our nation's energy problems tended to be with a single energy source, be that gasoline, diesel fuel, natural gas, or electricity. This situation in the past allowed us to switch among energy sources to relieve tightness in a single market. What the United States faces now is tightness in all major energy supply markets, which has put the country in an energy straightjacket, unable to turn to other conventional energy resources for relief.

These problems have been many years in the making and should not have come as a surprise. Over the past decade, we have seen surging demand for energy fueled by low prices and a robust economy. During this same period, we underinvested in cost-effective technologies and practices to reduce energy use while at the same time underinvesting in our conventional energy supply infrastructure. In these ways, we forgot many of the lessons from our previous energy crises about investing in a diverse array of energy sources and using our energy resources wisely and efficiently. As a result of these choices, we now have a fundamental imbalance between consumer energy demand and the ability of the energy industry to meet our growing demands. While we anticipate that given enough time the energy industry will be able to increase supplies of energy resources sufficient to bring markets back into balance, unfortunately all these available supply resource options will take several years, if not longer, to come to market. These efforts will require major infrastructure investments that can't be quickly made. This leaves us with only energy efficiency and conservation as resources that can respond to our immediate problems.

Our energy supply challenges are likely to take years to address. While efficiency and conservation will not eliminate the need for new supplies (whether they are renewable, domestic conventional fuels, or imports), they will buy us time to plan for the best future fuel source mix. This also allows us time to develop domestic fuel sources, including renewables, which could allow the agricultural sector to meet much of its own energy needs while also providing important new domestic sources of energy to the economy.

We know that energy efficiency and conservation resources can be called upon to have immediate impact on energy prices. Look at the impact that they had on energy markets in California and New York in 2001. These states were able to quickly call upon energy efficiency and conservation resources to address energy market imbalances. A review of the response in California in 2001 found that energy efficiency efforts led by the state government and utilities were able to reduce electricity demand by 6 percent with an initiative that was rolled out in a matter of weeks. In addition, these resources are inexpensive and, as was seen in California in 2001, they can protect the economy from many of the adverse impacts of soaring energy prices. Reviews of energy efficiency programs by ACEEE show that savings are readily available for less than 4¢ per kilowatt-hour for electricity.

In addition, ACEEE research has shown that in very tight energy markets, only small changes in energy demand are needed to have large reductions in prices. Our analysis based on a May 2004 natural gas market forecast has shown that modest energy efficiency investments at the national or regional level could have dramatic impacts on natural gas prices (see Figure 1). This phenomenon is likely to be even more pronounced in today's even tighter markets. We witnessed the opposite of this phenomenon this year when small reductions in supply coupled with small increases in demand resulted in dramatic increases in prices.

Figure 1. Impact of Reduced Natural Gas Consumption for Energy Efficiency on Wholesale Natural Gas Prices

Role of Energy in Agriculture and the Efficiency Potential

Energy use is entwined with most aspects of the agricultural sector, making energy critical to the sector. Energy is used to run our farms and ranches; to operate trucks and other equipment;

to pump water, run ventilation fans, and cool agricultural products; and to provide light for workers, greenhouses, and livestock. Energy is also used to produce most of the fertilizer used to grow crops, along with the pesticides, herbicides, and pharmaceuticals that have become essential to farm operations. Our transportation infrastructure is critical to get these products to our farms and ranches, and to transport the products of agriculture to each and every consumer. However, this infrastructure relies upon plentiful and affordable energy to operate.

We have experienced recent increases in all energy prices, but the dramatic increases in diesel fuel and natural gas prices are causing the most pain to the agricultural sector. Diesel is critical to operating vehicles and equipment throughout the agricultural sector and there are few lower-cost options. Soaring natural gas prices have not so much affected the farms directly, but rather indirectly through the increased cost of nitrogenous fertilizers that are predominately made from natural gas.

Fortunately there are a number of important steps that the agricultural community can take to reduce both direct and indirect energy use. Among these opportunities for energy efficiency and conservation are:

- ? Increased energy awareness -- being aware of how energy is used on farms and ranches, teaching techniques to reduce energy waste;
- ? Selecting more efficient farm vehicles and equipment -- as documented by the National Center for Appropriate Technology (NCAT), the community responded to the crises of the 1970s by switching almost all of its fleet from gasoline to more efficient diesel. Better choices for more efficient and more fuel-flexible vehicles are needed, as well as other options such as bio-diesel that decouple the sector from volatile conventional energy markets.
- ? A shift to low-energy farming practices such as:
 - Low-till and no-till -- these practices reduce the use of diesel fuel required for field equipment while also reducing the use of herbicides and in some cases reducing the need for irrigation.
 - Change in crop rotation practices and introduction of alternative crops -- these shifts in cropping practices can reduce the need for fertilizer and herbicides, while also reducing tillage requirements.
 - Improved irrigation -- use of soil moisture monitoring and improved irrigation techniques and scheduling can reduce not only the energy required for pumping water, but also reduce the use of water, itself a precious commodity.
 - Change in confinement livestock practices -- shifting to more efficient lighting, and improved ventilation and bio-security can not only reduce the energy required in the operations but also can reduce animal stress, improving animal growth and reducing the need for pharmaceuticals. Improved feed conversion not only saves energy on the farm but reduces the energy needed to produce feed -- another energy-intensive agricultural product.
 - Change in livestock grazing practices -- applying principles of cell grazing to increase carrying capacity and to improve the health of land while reducing costs. Practitioners such as Ranching for Profit report reductions in fuel costs as grazing operations "get out of farming" (which refers to a rancher not having to grow (farm) feed like alfalfa because stock are grazing "natural grass"), thereby saving on a major controllable expense.
 - Change in markets -- shift to more local markets that reduce the distance needed to haul products to markets. With freight charges escalating due to higher diesel prices, reducing the

distance that agricultural products need to be hauled to market will reduce the energy used in freight and reduce the squeeze on farmers' and ranchers' margins.

As noted above, many of these measures can also yield significant non-energy benefits to the farms and ranches that implement them, such as better yields, reduced water usage, higher value markets, and more stable prices.

Realizing the Efficiency Potential in Agriculture

The agricultural sector is uniquely positioned to realize a larger share of its energy efficiency and conservation potential. How efficiency and conservation can be realized in these operations is not rocket science. Most of the key efficiency and conservation measures are well understood by experts in agencies and universities. Many of us worked in the 1970s and '80s to develop the knowledge needed by farmers to realize these benefits. The past fifteen years have seen this key information fall out of common usage. We need to re-teach energy awareness and efficient practices to the agriculture community. We are already seeing this beginning to happen, motivated by a demand by the agricultural community for this information.

An important asset that the agricultural community has is its unique educational infrastructure that has been developed over more than a century to allow new technology and practices to quickly get into the hands of farmers and ranchers who can make immediate practical use of them. This network is made up of:

- ? The USDA extension program
- ? The land-grant university system and experiment station system
- ? Electric utilities and rural electric coops
- ? State energy programs
- ? State departments of agriculture
- ? Agricultural suppliers and dealers
- ? Farm and ranch communities where everyone helps their neighbor

What we need to do now is mobilize this network, repackage and update existing educational materials, and get these materials into the hands of the educators so that they can begin responding to the demand that we are already seeing in the agricultural community. Many good educational programs, such as those offered by the Samuel Roberts Noble Foundation in southeastern Oklahoma and west Texas, augment specific regional needs, but we have seen widespread hunger for efficiency and conservation information around the country as we have planned our upcoming "Ag Forum." Farmers and ranchers, agricultural program leaders, and the agricultural press have sought us out for information on what can be done now.

In addition, other important USDA programs (such as Rural Development, Conservation Security Program, FSA, and Sections 9005 and 9006 of the 2002 Farm Bill) could play an important role in a comprehensive national response that encourages energy efficiency and conservation.

Policy Recommendations

ACEEE believes that the federal government has an important leadership role to play in responding to the energy crisis facing the agricultural sector. We recommend that Congress take the following immediate steps to re-fund the agricultural sector's educational and

implementation infrastructure, including:

- o Sec. 9005 of the 2002 Farm Bill -- This provision called for funding of energy efficiency, conservation, and renewable energy assessments for farms and ranches. Congress has never appropriated funding for this provision of the farm bill.
- o Continued full funding of Sec. 9006 of the 2002 Farm Bill -- This provision has been providing energy efficiency and renewable energy grants and loans to farmers and ranchers. The presence of this program has been a major motivator for state and local energy efficiency and renewable energy initiatives, far surpassing the amount of money invested in this program. Now is not the time to de-fund provisions like this.
- o Continued full support for the Conservation Security Program -- This program has been important in encouraging sound land management practices that minimize the need for energy-intensive activities such as tillage, herbicides, and fertilizer, while preserving the quality of our agricultural land.
- o Expand funding for Rural Development -- RD and the field offices play a critical role in providing the technical support and financing that is needed to enable farmers and ranchers to realize their energy efficiency and conservation opportunities.
- o Refund the extension and experiment station network -- The county agent remains on the frontline in working with farmers, ranchers, and rural small businesses to help them meet the challenges of the current energy crisis. This unique infrastructure has been the key to rapid dissemination of practical information for a century, and a critical part of what has made the U.S. agricultural sector successful. These key market players are essential to successfully realizing the energy efficiency and conservation savings available in the rural communities of this country.

The Committee should also begin thinking strategically about the role of energy in the agricultural sector by:

- o Commissioning a National Academy study on the role of energy in agriculture --A national academy study would allow the Committee to better understand the role of energy use in agriculture and identify what additional energy provisions should be incorporated into the 2007 Farm Bill. These could include expanded energy efficiency and conservation provisions, as well as provisions that allow the agricultural sector to be both more energy self-sufficient and to make contributions to our national energy portfolio as a producer of energy products and feedstock.
- o Gaining a better understanding of the role of freight in the agricultural sector --As the costs of transporting products needed or produced by farmers become an increasing factor in the costs of those products to the consumer, the farm community may need to consider some shifts toward sources and markets closer at hand. Information, analysis, and policies to facilitate that shift where appropriate could be an important governmental role. According to the Leopold Center for Sustainable Agriculture at Iowa State University, a "conventional" food distribution system that supplied Iowa with produce from national sources would use 4 to 17 times more

fuel than an Iowa-based regional system would use.

o Initiating the development of more efficient light-duty trucks -- The agricultural community has much to gain from improved vehicle fuel economy from both heavy and light trucks. While there has been much made of the importance of keeping the purchase price of work-trucks low, the need to reduce fuel expenditures by increasing the efficiency of those vehicles has somehow taken a back seat. A 12-mile-per gallon pickup driven 15,000 miles per year on \$3 per gallon diesel costs \$3,750 for fuel alone. Raising the fuel economy to just 15 mpg would save \$750 annually. This 25% improvement in fuel economy is well within reach using currently available technologies and at a very modest cost to the farmers or ranchers. In fact, ACEEE analysis shows that technology exists to raise pickups' fuel economy by 60% in a cost-effective manner.

In addition, the farm community stands to benefit from the rapid development of one particular vehicle efficiency technology: hybridization. In particular, pickup trucks lag behind smaller passenger vehicles with respect to the appearance of hybrid versions in the marketplace; pickups marketed as hybrids to date achieve fuel economies only 1-2 miles per gallon higher than their conventional counterparts. Tax credits for hybrids in the Energy Policy Act of 2005 will help, but hybrid versions of pickups could get the short end of this opportunity by virtue of the short time frame and/or per manufacturer caps in the tax credit provision.

o Accelerating the development of more efficient heavy-duty trucks -- Similarly, the potential to improve fuel economy of heavy-duty trucks is large. As noted earlier, while the fuel costs for long-distance transport of agricultural products are not always paid directly by the farmer, they are a major determinant of the cost of these products to the consumer, and hence the demand. As a result, increased freight costs due to fuel price increases can end up squeezing farmers' and ranchers' margins. The common wisdom is that, because fuel is such a major expense for shippers and carriers, all efficiency technologies that exist for heavy trucks make their way into the fleet in short order. But the reality is quite different, and numerous currently available technologies are not currently used to the full extent possible. The biggest fuel users among heavy-duty trucks are the Class 7&8 trucks (over 26,000 lbs. gross vehicle weight -- largely tractor-trailers). For these vehicles, DOE's 21st Century Truck program foresees a potential to double fuel economy. In fact, Wal-Mart announced last month that it intends to raise the fuel economy of its trucks by 25% in three years and to double it within 10 years. ACEEE has found that existing technologies could increase the fuel economy of tractor trailers by about 60% over the next decade. Getting a fuel economy test procedure in place for heavy-duty vehicles would be a useful first step and should be given high priority.

o Enhancing our nation's freight infrastructure -- We have recently seen the costs that disruptions to our freight infrastructure can cause. We need to better understand how best to use the different modalities available to us -- truck, rail, air, and water -- to most reliably bring needed resources to the agricultural community and take their products to market.

o Support for a National Energy Efficiency Resource Standard -- One of the leading sources of energy efficiency savings are incentive and technical assistance programs focused on utility customers and operated by utilities and/or states. These programs are most commonly funded through public benefits funds collected through small charges on utility bills. About 20 states

currently offer these programs, spending about \$1 billion annually. At crucial times, these programs can provide significant price relief and market stability. For example, these programs reduced peak electric demand by 11% and electricity sales by 6% during the 2001 California electricity crisis. Other leading states are achieving regular savings on the order of 1% of total electricity sales each year. Public benefits funds could be established in more states and at the federal level to expand the impacts of these programs.

Public benefits funds typically establish funding levels; energy savings in quantitative resource terms are a secondary consideration. However, it is also possible to base state efficiency programs on savings targets first and make funding considerations secondary. Establishing binding savings targets for utilities, as Texas and California have done, or including energy efficiency in a broader resource portfolio standard, as Pennsylvania has done, could expand the benefits of these kinds of programs. Financing for these programs could come from expanding public benefit funds or through regulated utility programs. The benefits of these programs are typically twice the level of program costs or greater, making them very cost-effective to consumers and businesses. Possible models for efficiency performance standards are contained in electricity legislation drafted in 2001 by the House Energy and Air Quality Subcommittee Chairman Joe Barton.

o Looking to strategies that allow the agricultural sector to better manage its energy use -- The agricultural sector is uniquely positioned to gain control of its energy future. By reducing demand through energy efficiency and conservation, it can meet a significant portion of its remaining energy needs from energy produced within the sector. We are already seeing this as rural communities turn to locally produced bio-diesel, and distributed generation systems using wind, solar, and biomass. By decoupling the sector from volatile energy markets, the agricultural sector can better manage risk by diversifying its energy sources.

Conclusion

While the potential for near-term damage to the agricultural sector from high energy prices is very real and the options for enough new supply resources to bring prices down are very limited, energy efficiency and conservation offer immediate opportunities to address the current energy crisis. Both can reduce costs by reducing demand and prices in order to bring markets back into balance. These energy market problems are not unique to the agricultural sector. However, the sector is disproportionately impacted by the price increases and uniquely positioned to realize energy savings because of the existing educational infrastructure and farmers' and ranchers' motivation to utilize all of the tools at hand.

ACEEE began planning our Forum on Energy Efficiency in Agriculture before the crisis reached its current level. However, we continually hear from farmers, ranchers, and others in the agricultural community that our agenda addresses many of the critical issues that they need to know more about today. Activating the agricultural education network now to communicate energy efficiency and conservation information is the most important response we can make. Education is not free; however, now is not the time to look for false savings by not fully funding the infrastructure.

Our energy problems will not be resolved in the immediate future. We need not only respond to this immediate crisis, but also take actions to address the structural problems that brought about

our current crisis. This response will require that we not only address increasing energy supplies from conventional sources, but also diversifying our energy portfolio to include sustainable energy supply options such as farm-based renewables and demand-side efficiency resources that can make the best use of these increasingly expensive energy supplies. We need to relearn the lessons of our past crises where efficiency changed market dynamics for a generation and we realized the benefits of these investments in wise use of energy.

We look forward to working with the Committee on these important issues. Thank you for the opportunity to share our views.