



# Energizing Rural America

*Local Ownership of Renewable  
Energy Production Is the Key*

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# **ENERGIZING RURAL AMERICA**

**LOCAL OWNERSHIP OF RENEWABLE ENERGY  
PRODUCTION IS THE KEY**

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## Executive Summary

This year offers a rare historical opportunity for our nation to marry energy and agricultural policy objectives. The new 110th Congress will be revisiting the 2005 energy bill and reauthorizing the 2002 farm bill, giving congressional leaders the chance to link increased rural prosperity and energy security. The key ingredient in such a strategy: Maximize local ownership of the rapidly expanding biofuels and wind-energy industries.

Historically, policy makers have approached renewable energy as an energy security or environmental issue, with agricultural implications. This year, Congress needs to recognize the dramatic benefits of clean, renewable energy on rural communities and then ensure these benefits inform and guide our energy and agricultural policies.

Displacing a quarter of our nation's vehicular transportation energy with biofuels—a key national security imperative—would require the cultivation and harvesting of substantial amounts of plant matter, massively benefiting American farmers. It would also require the construction of some 2,500 biorefineries throughout the nation, which, if predominantly locally owned, would utterly transform rural America. If wind energy then supplied 15 percent of the nation's electricity, more than 100,000 new wind turbines might be required—an investment requirement exceeding \$400 billion. If these wind-energy production facilities were mostly local-owned enterprises, then even more renewable energy profits would flow back into the American heartland.

Ensuring that these positive investments in rural America are realized, and the benefits widely shared, should be a high national priority. To date, however, public policy has focused principally on simply achieving the quantitative goal of expanding renewable energy production. Qualitative goals such as maximizing economic development in rural communities through the promotion of renewable energy have largely been overlooked.

One reason may be that policy makers assume a rising tide of renewable energy will lift all agricultural boats, but a century of empirical evidence reveals that farmers gain modestly, and in most cases, only temporarily from an increased demand for their crops. Until the end of 2006, no statistically significant correlation could be found between the increased demand for ethanol and the price of corn. The current frenzy of investment in ethanol plants clearly is affecting corn prices. But the price spike is also spurring a dramatic increase in corn acreage. This, coupled with increased yields, could dissipate the price spike in two years—unless Congress significantly boosts the level of the biofuels production mandate.

While the link between increased demand for biofuels and increased rural prosperity has been overstated, the link between local ownership and rural prosperity has been overlooked. Farmers gain handsomely and enduringly when they own a share in processing and manufacturing facilities. They may earn up to 10 times more per bushel from ethanol-related dividends than they do from the increased price of their crop resulting from the opening of an absentee-owned biorefinery.

The same correlation between ownership and rural prosperity may be seen in the harvesting of wind energy. Farmers can earn five-to-10 times more if they own a share of a wind turbine than they can from leasing their land for an absentee-owned wind turbine.

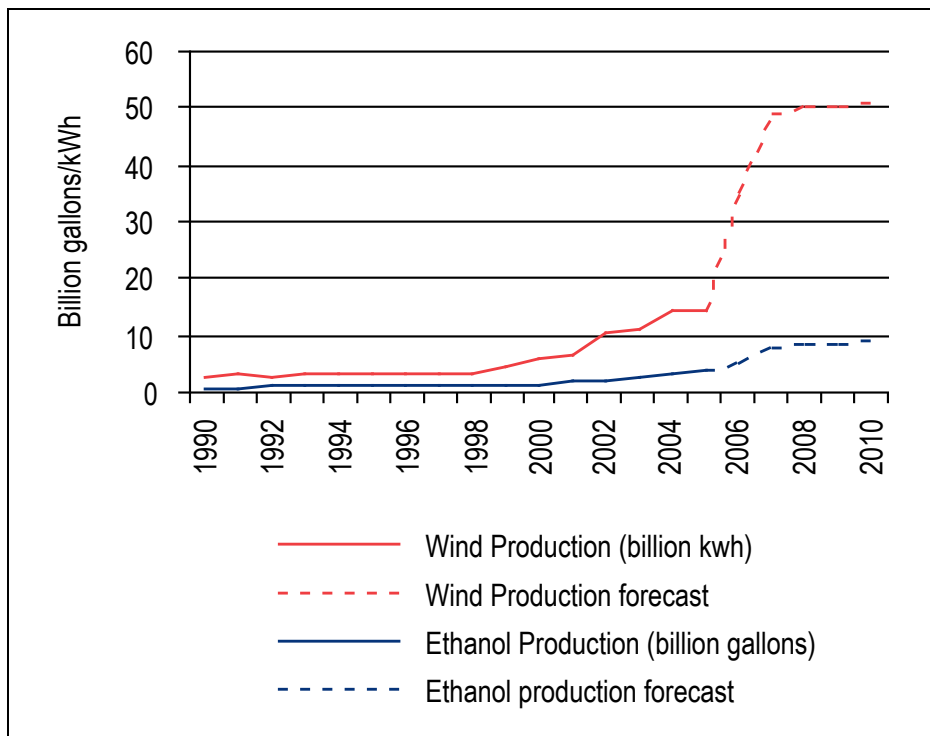
This paper will examine in detail why this link between local ownership and rural prosperity is so critical to the prosperity of America's farming communities and then offer comprehensive policy prescriptions for Congress to consider. This progressive legislation offers a smart, pragmatic way to boost the incomes of traditional American farmers and secure our nation's future energy needs in small communities across the heartland.

## Rural Energy Investment Comes of Age

After 20 years of slow but steady growth, rural energy sources such as wind and plant matter are now the darlings of Wall Street. In 2006 alone, more than \$7 billion was invested in wind energy and biofuels. The production of electricity generated from wind has doubled in the last three years and may double again by 2010. Thirty-one states now host wind farms.

Ethanol production also doubled over the last three years, and is expected to double again by 2008. Indeed, according to the Environmental Protection Agency, if all ethanol plants under construction, planned or proposed as of September 2006 were to become operational the nation would boast more than 310 plants producing 20 billion gallons of ethanol by 2012!

**Figure 1—Ethanol Production and Wind Generation, 1990-2010**



As of late 2006, 21 states had at least one ethanol refinery. With the emergence of cellulosic ethanol, biorefineries may be located in at least twice that many states given the expanded agricultural range of cellulosic plant matter

Biodiesel, a late entry in the renewable energy field, is growing at a feverish clip. Over the past year, three new biodiesel plants came on-line each month. Capacity has soared to 400 million gallons by late 2006 from 25 million gallons in 2004. At projected growth rates, biodiesel production could reach 1 billion gallons by 2010.



These are heady days for wind and biofuel advocates and investors, yet these industries are still almost entirely dependent on public policy. Key rules and regulations today channel scientific ingenuity, entrepreneurial energy and investment capital into these sectors. By some accounts, over half of the new wind-energy investments is the result of state mandates to produce clean wind energy. Twenty-three states and the District of Columbia have so called Renewable Portfolio Standards that all but guarantee wind a growing share of the electricity market.<sup>1</sup> And a significant portion of the recent surge in ethanol production is a result of the enactment, in August 2005, of a federal mandate (alongside key tax incentives) for the United States to produce 7.5 billion gallons of biofuels by 2012.<sup>2</sup>

Ethanol receives a federal tax incentive (first enacted in 1978) that currently stands at 51 cents per gallon. The owners of wind turbines today receive a 10-year federal incentive of 1.9 cents per kWh, an incentive that rises with inflation. And the biodiesel industry last year was granted a \$1-per-gallon tax incentive if the biodiesel is made from virgin vegetable oil, or 50 cents a gallon if made from recycled oils and greases.

Yet wind energy and biofuels are competitive in some cases even without tax incentives. The recent run-up in oil prices and, to a lesser but significant extent, in electricity prices makes unsubsidized ethanol derived from corn competitive when corn costs \$2.75 a bushel and oil hits \$60 a barrel. As this paper went to press, corn future prices stood at \$3.70 per bushel and oil prices at \$53 a barrel. Wind energy is competitive when the price of competing electricity exceeds 5.5 cents per kilowatt-hour.<sup>3</sup>

Still, federal incentives will be needed for renewable energy for the foreseeable future. Few additional investments would be made if profitability depended solely on highly volatile fossil-fuel prices. But federal renewable energy incentives can and should be redesigned. One goal should be to protect the producer if the price of oil or natural gas plunges or the price of the feedstock, such as corn, soybeans, or cellulose, soars. A second goal should be to protect taxpayers from underwriting large renewable energy subsidies when the biofuels industry no longer needs them.

Currently, the existing wind energy tax incentive phases out when national electricity prices reach 9.8 cents per kWh. This should be the case with ethanol and biodiesel incentives, too, which can be done by indexing the ethanol and biodiesel tax incentives to energy and agricultural commodity prices. The index would be based on the price of wholesale gasoline or diesel and the cost of the agricultural feedstock. There is some precedent for structuring an incentive in this way. Congress based the royalty paid by oil companies to the federal government for offshore drilling on the market price of crude oil.

Restructuring federal renewable energy incentives in this manner would be both equitable and fiscally prudent. Congress this year has the opportunity to consider more fundamental changes, including a significant change in the purpose of the federal biofuels incentives. The ideal objective: To more closely link rural economic development with national energy security objectives. It is to that issue we now turn our attention.

## 2007: A Historic Opportunity

A number of factors may make 2007 a watershed year for renewable energy policymaking. Consider the following legislative and regulatory initiatives up for review or renewal this year:

- The incoming 110th Congress enthusiastically embraces energy independence as an urgent national goal, which means the 2005 Energy Policy Act will be re-opened this year. Specifically, that Act authorized some \$2 billion to commercialize cellulosic ethanol, but no money was appropriated. Appropriations will be debated in the upcoming session
- The 2002 Farm Bill is up for its five-year reauthorization, with dramatic changes to be considered given the increased interest in cellulosic ethanol, the desire to diversify sources of farm income, and the increasing role of U.S. agriculture incentives in international trade controversies.
- Federal wind and biodiesel tax incentives expire in 2008. They will be extended, but could also be redesigned to be more effective. Ethanol's tax incentive does not expire until 2010 but is likely to be reviewed and extended in 2007 as well.
- The existing federal ethanol production mandate will probably be increased, since the 2012-mandated production level will be exceeded by 2008. A biodiesel production mandate will also be debated.
- A national renewable electricity standard will be seriously considered.

So far, the public policy debate has focused almost entirely on the quantitative goal of expanding renewable energy. Qualitative goals that maximize the benefit to rural communities and farmers have been largely overlooked.

Congress, though, has not been silent on the importance of qualitative goals. Case in point: The 2005 Energy Policy Act explicitly requires that the executive branch craft its policy making with rural economic and community development in mind when implementing provisions related to the commercialization of cellulosic ethanol. Under the Act, the expenditure of research-and-development money for cellulosic ethanol requires priority for projects “that include agricultural producers or cooperatives of agricultural producers as equity partners in the ventures; and...have a strategic agreement in place to fairly reward feedstock suppliers.”

The Secretary of Energy is directed to “ensure that small feedstock producers and rural small businesses are full participants in the development of the cellulosic biofuels industry.” Priority must also be “given to projects that: 1) demonstrate outstanding potential for local and regional economic development; 2) include agricultural producers or cooperatives of agricultural producers as equity partners in the ventures; and 3) have a strategic agreement in place to fairly reward feedstock suppliers.”<sup>4</sup>





Despite these clear directives, when the Department of Energy issued a series of Requests for Proposals to implement these provisions it ignored qualitative factors. There was little public reaction. Why? Policy makers assume a rising tide of biofuels will lift all agricultural boats. They take for granted that expanding biofuels consumption, will automatically improve rural economies.

It will, but only to a limited extent. Through more than 150 years of bitter experience, farmers have learned that when demand softens, they cannot restrict national and international production the way more highly concentrated industrial sectors can. Yet, when prices rise farmers within months can and do expand acreage and therefore increase supply, which eventually drives prices back down.

Case in point: The cash price of corn was no higher in mid-2006 than it was in the mid-1970s, although it did surge dramatically in the final four months of 2006. In 1974, a bushel of corn could buy about 5 gallons of gasoline. Today, even at the higher price reflected in 2007 futures markets, a bushel of corn can buy only a little more than a gallon of gasoline.

Some studies have concluded that the increase in national ethanol consumption from zero gallons to 4 billion gallons between 1980 and 2006 raised the price of corn by a modest 10 cents to 15 cents per bushel. A recent study by the Institute for Local Self-Reliance found no statistically significant correlation between ethanol demand and corn prices at the national, state or even county level.<sup>5</sup>

The run-up in corn prices in late 2006—briefly exceeding \$4 per bushel from a low of \$2.10 earlier in the year—is undoubtedly a result of the enormous spurt in ethanol plant construction, greatly amplified by feverish speculation in futures markets. These higher prices, however, will bring an additional 8 million acres of corn into cultivation next year, or enough to manufacture more than 3 billion gallons of ethanol and add a significant volume of corn byproducts.<sup>6</sup>

Unless Congress significantly increases the 2012 biofuels production mandate, increased supply will drive prices down. If Congress does increase the biofuels mandate, the price could remain high for an additional three-to-five years, but the same ultimate dynamic may unfold, especially as cellulosic ethanol becomes competitive with corn-derived ethanol.

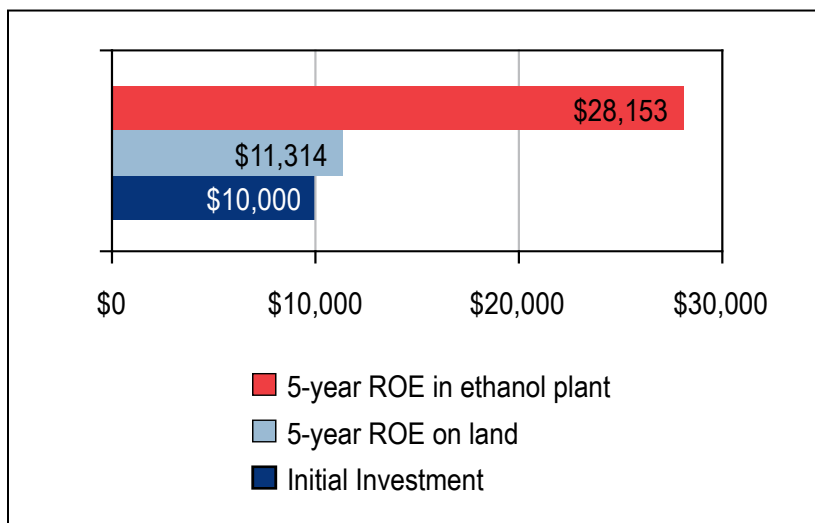
## Time For a New Approach

The link between increased demand and increased rural prosperity clearly has been overstated, yet the link between local ownership and increased rural prosperity has been largely ignored. Farmers gain modestly and in most cases only temporarily, from increased demand for biofuels, but they gain handsomely and possibly enduringly when they own a share in the biorefinery.

Consider the following analysis by Iowa State University. In 2004, ISU estimated the 5-year average after-tax return for a typical ethanol dry mill at 23 percent. In comparison, ISU estimated that 70 percent of Iowa's counties averaged returns on farmland of 2.5 percent or less.

More generally, farmers annual return on investment from their fields over the past 15 years ranges from 30 cents to 75 cents per bushel, though in 2006 farmers' ROI was much higher. In comparison, over the past 15 years a farmer-owned ethanol plant could generate a 15 percent to 18 percent annual return.

**Figure 2—Land or Ethanol? Comparing 5-year Return on Equity**



This is especially the case when the dividends from a locally owned biorefinery go to local residents. A 100 million gallon absentee-owned ethanol plant may return to the farmers in a local area around the plant about \$13 million less than three farmer-owned plants producing 33 million gallons a year apiece. What's more, the portion of local earnings that remains in the local area boost local and regional economies; the profits of an absentee-owned plant travel a different and more distant trajectory.

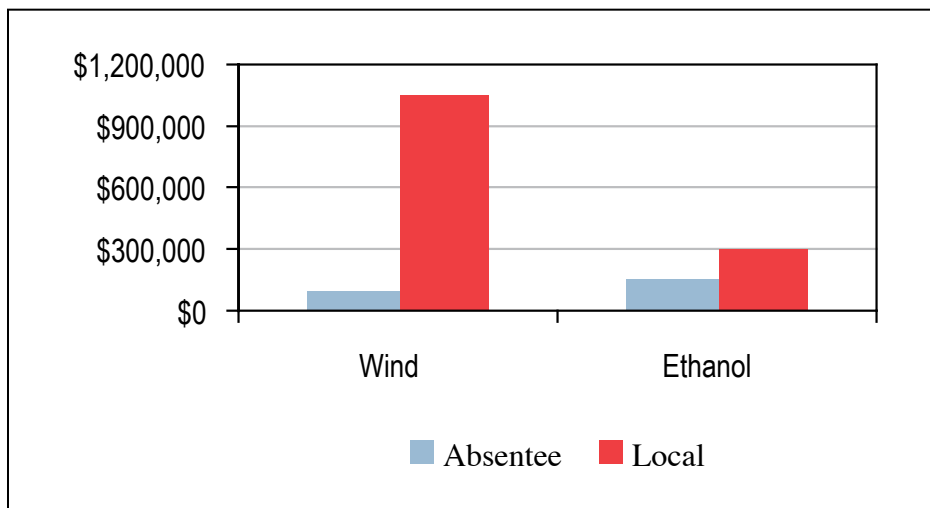
An analysis of the local impact of harnessing wind energy arrives at similar conclusions: local ownership generates greater local economic benefits. In the case of wind, of course, the landowner has no control over the supply. Nor does the supply depend on the price of energy. The wind will blow, or not blow, no matter what the price of electricity. The differential local economic impact stems from different ownership structures.

Conventional wind farms consist of dozens and even hundreds of individual turbines owned by outside corporate investors. Local landowners benefit by leasing a small portion of their land to these corporations to erect one or more turbines. A landowner might receive \$4,000 to \$5,000 a year per wind turbine sited.

If landowners own the wind turbine, however, they often receive more than they would in lease payments for the first 10 years and, after the debt is paid off (with the benefit of the federal 10-year tax incentive), they may earn more than \$100,000 a year. More often, several dozen community residents establish a limited liability corporation and invest in several wind turbines, thereby boosting their profits all the more.

From the perspective of a farmer or landowner, ownership of a biofuels facility or a wind turbine is a wise investment. From a community or regional vantage point, it is also attractive. Aside from the economic impact of localizing profit streams, locally owned enterprises tend to source locally more of their services needs, such as legal and accounting work, or printing and construction jobs. More money remains in the local area to bolster the local economy.

**Figure 3—20-year Net Local Income from Absentee and Local Ownership**

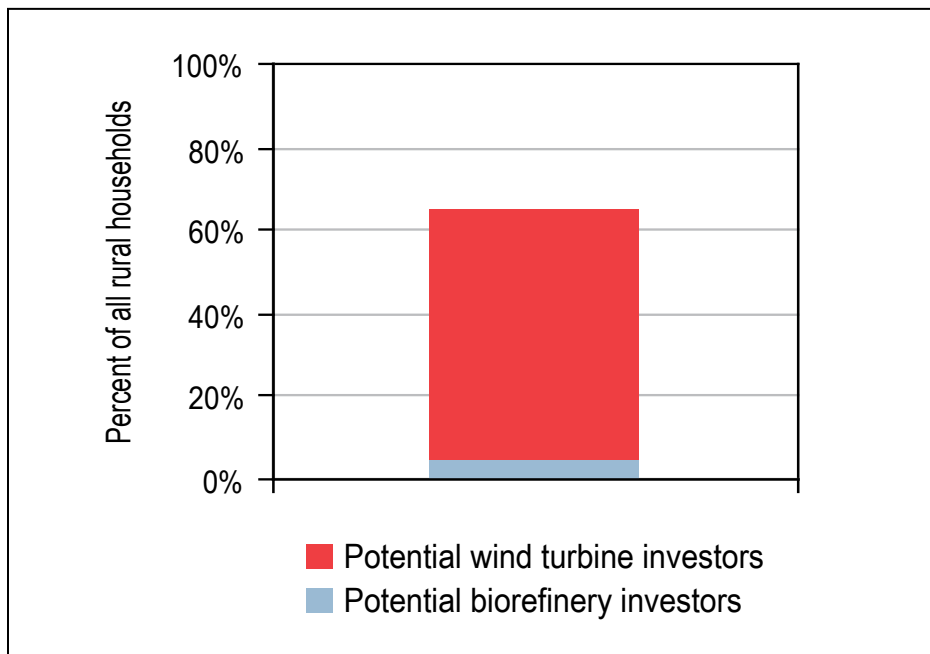


Despite the attractiveness of locally owned renewable energy projects to farmers and to rural areas, there are many barriers to local ownership. The reason: policy makers have viewed renewable energy as an energy security issue with agricultural implications. Congress this year has the opportunity to turn this view on its head, directing policy so that renewable energy is viewed as an agricultural or rural development issue with energy security implications. The potential positive results for our nation's rural areas and our farmers could dwarf the potential positive gains in national energy security.

In the long term, wind energy might significantly contribute to the nation’s electricity supply, and biofuels to the nation’s transportation fuel supply, yet the impact on the agriculture sector and the rural economy could be far more profound. Consider the following two examples:

- Displacing a quarter of all vehicular transportation energy with biofuels using current technology would require the cultivation and harvesting of more plant matter than is currently harvested for all purposes—food, feed, construction, paper, textiles, energy and chemicals.
- Establishing the 2,500 biorefineries to produce this required fuel might well involve 500 investors apiece in each locally owned plant, or 1.2 million new investors nationwide, exceeding the total number of commodity farmers in the nation.

**Figure 4—Percentage of Rural Households Potentially Investing in Wind and Biorefineries**



These are just two examples of why an aggressive and community-oriented rural energy policy could serve as the foundation for a redesigned, rejuvenated farm policy. And the case is much the same for wind energy. If wind energy supplied 15 percent of the nation’s electricity, significantly more than 100,000 additional wind turbines would be required. If each turbine had 150 local investors, there could be more than 15 million local investors nationwide, a not inconsiderable fraction of the nation’s rural households.<sup>7</sup>

These estimates, of course, are very rough. But they offer a sense of the magnitude of the potential impact on rural America of even a modest displacement of fossil fuels with renewable energy.



## **Policies that Marry Economic and Energy Objectives**

Congress very likely will recognize the need to develop renewable energy strategies that maximize the production of clean energy for the economic benefit of rural communities. But ensuring that farmers and local rural communities benefit directly from the actual production of renewable energy is easier said than done. Below we offer a few strategies and proposals.

### **Redesign existing federal tax incentives to encourage local ownership**

Local ownership strengthens local and regional economies, yet an increasing proportion of the nation's renewable energy capacity is absentee-owned. This should change.

The vast majority of America's wind turbines are absentee-owned, which has been the case since the emergence of utility-sized wind turbines in the early 1980s. Until very recently, though, America's biofuels industry was largely locally owned. In 2003, about half of all existing ethanol refineries and perhaps 80 percent of all proposed plants were majority owned by farmers. Today, more than 90 percent of new ethanol production is from absentee-owned plants. The structure of the infant biodiesel industry is also evolving rapidly in the direction of absentee ownership.

An absentee ownership structure weakens the link between ethanol production and agricultural prosperity and may also cause long-term problems. Absentee owners of wind turbines, for example, invest largely to make use of the tax benefits, which end after 10 years. Chances are absentee owners will not make the necessary follow-on maintenance investments after these tax benefits expire. Farmers, though, often view the investment as a way to provide ongoing supplemental revenue to keep them, and their sons and daughters, on the land.

Farmers invest in ethanol plants for two very different reasons. One is as a hedge against a possible drop in the price of corn. If the price of corn drops, the cost of production of ethanol drops and, all other things being equal, dividends should increase. For every 50 cent drop in the price of corn, on average a farmer may make back 35 cents to 50 cents as a result of increased dividends from his ownership in an ethanol plant.

The other reason farmers invest is for dividend income. As indicated above, they have received, on average, 15 percent to 18 percent per year on their investment in ethanol plants. Farmer-owners have largely ignored capital appreciation because their crop ties them to the plant and because they take a long-term view of their biorefinery investments.

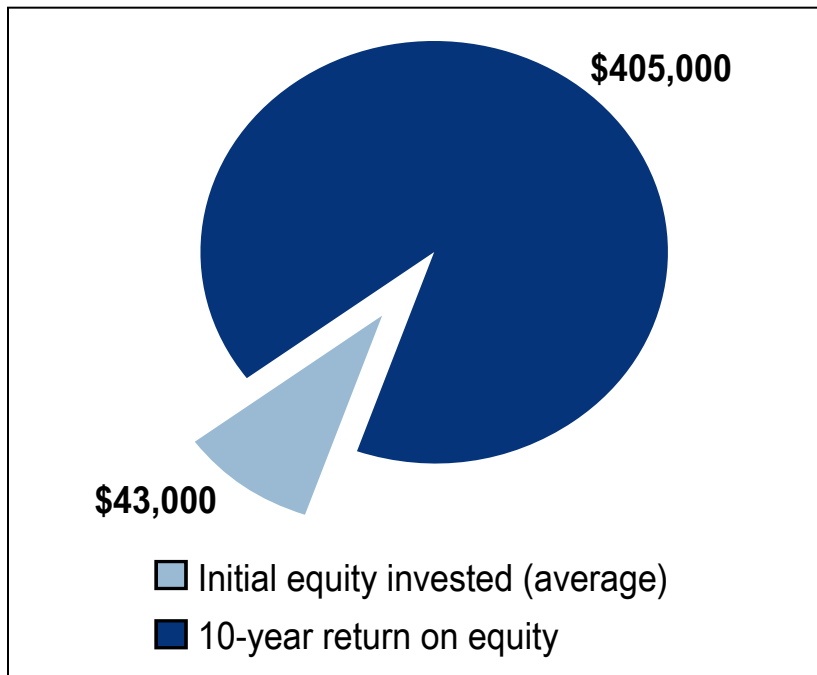
In fact, when ethanol prices were high last year, private equity investors on Wall Street offered farmers as high as 400 percent more for their shares in ethanol plants than the farmers had paid, yet only two of the 56 farmer-owned ethanol facilities sold out. Wall Street, however, focuses almost entirely on capital appreciation, then seeking to "exit" their investments through the sale of these assets to a wider population of absentee owners.

In contrast, farmer-owners of ethanol plants understand the importance of these production facilities above and beyond the opportunity to profit from quick capital appreciation. And local ownership will become even more important to farmers if, as expected, Congress takes three steps to boost renewable energy production mandates by increasing the national biofuels production mandate and enacting a biodiesel production mandate alongside a federal Renewable Portfolio Standard for electricity. With such production mandates in place, there would be much less justification for financial incentives.

Yet a justification for tax incentives for production would continue to exist, especially if they were designed to achieve qualitative objectives that help the economies of local rural communities. In designing these tax incentives, Congress could take a page from Minnesota’s playbook. In the mid-1980s, Minnesota transformed its partial state gas tax credit paid to blenders of ethanol and gasoline into a direct payment of between 13 cents and 20 cents per gallon to ethanol producers.

To qualify for the incentive the ethanol had to be produced inside the state. This married the public incentive to a public purpose, spurring rural development. What’s more, Minnesota decided that only the first 15 million gallons produced each year would receive a payment. This encouraged many ethanol facilities rather than a handful of very large ones, which in turn enabled local ownership. Payments to any producer ended after 10 years. This reduced the ongoing burden to the state taxpayer.

**Figure 5—Individual Farmer Return on Equity Invested in CVEC Ethanol Plant**



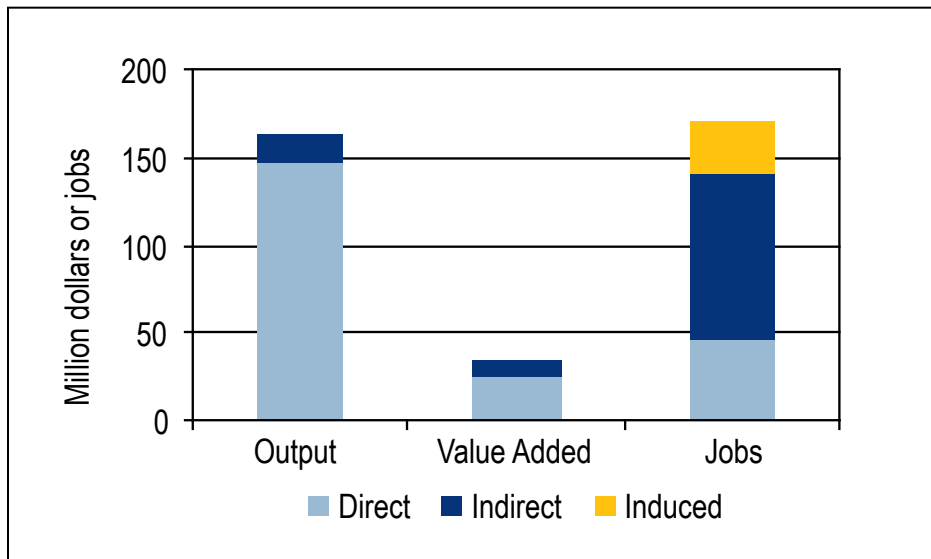
The redesign of Minnesota’s incentive ushered in what came to be known as the Minnesota Model—more than a dozen largely farmer-owned, small- and medium-scale biorefineries. The benefits have been very important, especially to outlying rural areas.

The Chippewa Valley Ethanol Corporation in Minnesota is a good example. CVEC is located in Benson, Minn., population 3,400. The ethanol plant employs 45 full-time workers, with a payroll of more than \$2 million. Its 650 farmer-owners have earned, on average, a return of 25 percent on their investment since the plant opened in 1996, generating more than \$4 million per year in local dividends.

On a statewide basis, a Minnesota legislative auditor’s report found that \$3 of additional economic activity was generated for every dollar of state incentives.<sup>8</sup> A similarly structured program at the national level through a federally mandated program could well reap equally impressive returns to the nation’s rural economy.

A direct payment to producers is a more effective incentive for production since part of the existing incentive is eaten up by middlemen. That’s why it is critical that the producer payment is structured to encourage local ownership. Yet it is equally important that producers qualify for the federal incentive for only 10 years, the same term used for Minnesota’s ethanol incentive, and the federal wind-energy incentive.

**Figure 6—Economic Impact of CVEC Ethanol Plant**





Consequently, Congress should consider the following policy recommendations:

**Recommendation:**

*Establish a two-tiered, indexed production payment that favors local ownership.*

Congress should enact tax incentives for both absentee-owned and locally owned biorefineries, but with a higher incentive for locally owned plants. The incentive should also encourage smaller facilities.

For illustrative purposes, an absentee-owned plant might be paid 15 cents per gallon for the first 30 million gallons produced each year for 10 years, but a majority local-owned plant might receive 25 cents per gallon. Congress could also insert a recapture provision to ensure that any local owners who sell to absentee investors within a certain time period would have to repay the Treasury the difference in the payment levels they had received as local owners.

The plant financing would likely coincide with the term of the producer payments; when the latter ends, the debt is paid off. This would reduce production costs by about 15 cents per gallon, a benefit to the bottom line almost as large as the original tax incentive.

Ethanol or biodiesel plants operational by the end of 2008 would be paid the full producer payment, dependent on their ownership status. By that time Congress should have in place a mechanism that indexes the payment to a combination of the wholesale price of gasoline (or diesel) and the wholesale price of corn (or soybeans or cellulose).

Again, for illustrative purposes, a full producer payment would be distributed when wholesale gasoline prices are \$1.77 a gallon and corn prices are \$2.25 a bushel—up to a point where the gasoline prices are \$2.36 and corn prices are \$2.50 a bushel. These prices translate roughly into a compound return on equity to an absentee investor in an ethanol plant of 17 percent to 26 percent, or 20 percent to 27 percent for a local investor. When the combination of gasoline and feedstock prices vary such that the return on equity drops below 17 percent or climbs above 27 percent then producer payments would fall rapidly, perhaps reaching zero when the ROE climbed above 35 percent.

Another way to do this would be to establish a set return on equity as a benchmark and then establish a formula based on oil and corn prices.<sup>9</sup> This sliding public subsidy for ownership and return on equity is both equitable to the ethanol producer and equitable to the taxpayer. And it offers far more to rural areas than the current incentive design.

This redesign could reduce federal subsidies even if ethanol production triples. The incentive itself, at 15 cents and 25 cents per gallon, is less than half the current 51 cents per gallon. Currently, about 110 ethanol plants produce about 5 billion gallons. All are eligible for the existing incentive. Under the new design, only 30 million gallons per plant, for a total of 3.3 billion gallons, would be eligible. Thus, the overall budgetary burden would drop by more than two thirds. The reduction would be even greater if oil prices remain very high and feedstock prices moderate. Moreover, the incentive's duration per plant is only for 10 years.



**Recommendation:**

*Establish a two-tiered, wind-energy producer payment that favors local ownership.*

Minnesota's experience might again help inform policy makers. In the late 1990s, Minnesota created a producer payment for locally owned wind turbines similar to that offered ethanol facilities—a 10-year producer payment to facilities under a certain size. Local is defined in the statute.

In 2005, the state stopped paying the incentive from the general fund, thus avoiding biennial budget battles, and established a utility tariff that encourages locally owned wind enterprises. It does this by front-loading payments. Although owners receive the same amount of money over the life of the contract, they receive a higher payment in the early years, which helps cash flow.<sup>10</sup>

Currently there is about 200 MW of so-called Community Based Energy Development wind projects in Minnesota. By 2010 an anticipated 800MW will be on line. Congress should offer a higher 10-year payment to majority locally owned wind-turbine enterprises than it does to absentee-owned turbines, perhaps in the range of 2.5 cents per kWh. Local might be defined as investors living within 75 miles of the wind turbine. The tax credit should be made refundable.

**Recommendation:**

*Allow on-site wind turbines that serve on-site demand to be eligible for the federal wind energy producer payment.*

Congress should also revise the existing production tax credit for wind by making on-site generation for on-site use eligible. Currently, the production tax credit is eligible only for wind energy sold into the commercial grid system. Wind energy consumed on-site has the same, or an even superior, impact than the same amount of wind energy exported into the grid. Congress should allow these turbines, which would usually be much smaller than existing utility sized turbines, to be eligible for incentives.

**Recommendation:**

*Broaden the local capital pool available for financing wind turbines by allowing tax credit to be taken against ordinary income rather than only passive income.*

A proliferation of locally owned wind turbines requires tapping a vastly larger pool of local capital. Currently that pool is limited because of the design of the production tax credit. This credit can only be taken against tax liability from “passive income,” which is defined by the Treasury Department as rental income or income from businesses in which the individual participates only as an investor. Passive income does not include wage income or interest income or farm income.

This restriction has forced advocates of local ownership to create complex ownership structures that enable, over the long term, local ownership while attracting large amounts of outside investors with sufficient tax liability from passive income. The arrangement is known as a “flip” structure. The outside investors use all of the tax liability and receive most of the revenue generated from the sale of the wind energy during the first 10 years, and then sell the facility to local residents for a small amount of money in the 11th year, after which all the revenue goes to the local owners.



This is a cumbersome arrangement, and middlemen often absorb a significant portion of the federal incentive. Also, national investment pools prefer to invest in large wind farms, which limits the ability of locally owned wind turbines from attracting such financing.

If farmers and other local residents were able to use the wind incentive to reduce their tax liability on ordinary income, then the base of potential local investors would grow dramatically.

**Recommendation:**

*Require any company developing technology with public money to license it to locally owned renewable energy facilities.*

There is another way that Congress can encourage local ownership and that is through the way it structures R&D expenditures. Currently, the federal government often awards a private company an exclusive license or patent on any new technique or technology developed with public money. Contracts should be redesigned to require any company developing such technology to license it on demand and at a reasonable price to locally owned renewable energy facilities. For example, advances in cellulosic conversion technology or in corn fractionation that are publicly financed should be made available for locally owned plants to improve their productivity.

**Recommendation:**

*Redesign federal programs to encourage community-based and modestly scaled production facilities.*

Smaller production systems enable local ownership. They also encourage larger numbers of facilities, creating the foundation for a more competitive marketplace and continual innovation by designers and construction companies.

So far, the federal government has only rarely taken scale into consideration when fashioning renewable energy programs. As a result of a Congressional directive, the Commodity Credit Corporation did design a program that offered about \$150 million a year in surplus corn and soybeans to ethanol and biodiesel producers that were expanding capacity. The CCC designed its program to provide higher incentive to smaller plants.<sup>11</sup> This is a model Congress can work from this year.

**Recommendation:**

*Reduce the maximum level of small ethanol producers eligible for an additional federal incentive back to 30 million gallons.*

Since the early 1980s, there has been a 10-cent per gallon additional federal incentive for “small” ethanol producers. Initially restricted to capacities below 10 million gallons, in the 1990s the qualification level was raised to 30 million gallons and in 2005 to 60 million gallons. In 2006 the definition of small producer encompasses a plant larger than the average plant now operating. Congress should reduce the definition of small back to 30 million gallons, and investigate whether the money spent might be allocated toward the two-tiered production payment discussed above.



Federal programs often discriminate against small producers, in large part because the federal government prefers to work with large corporations. This reduces the oversight burden and in theory accelerates market development since these enterprises have the capacity to rapidly and extensively market a new technique or technology. Yet studies consistently show that smaller companies deliver new technologies to the market more rapidly than larger ones. Indeed, many larger companies enter a market by first purchasing a smaller company that has innovated in that market.

Federal renewable energy research-and-development programs also erect a barrier to small-business investment by requiring a 50 percent match by the recipient, another barrier to small business involvement. The consequences of this on small business should be reviewed.

### **Recommendation:**

*Eliminate the high minimum production capacities required for a cellulosic ethanol facility to receive federal funding.*

The 110th Congress plans to accelerate the commercialization of cellulosic ethanol. When doing so, Congress should reassess the level of scale required in the Energy Policy Act for a company that wants federal assistance to enter this market.

To qualify for a loan guarantee a cellulosic ethanol plant must have a production capacity of 30 million gallons per year. To qualify for direct grants requires a production capacity of 18 million gallons per year. There is no reason to have such a high minimum for the first generation of a new technology. The nation would be better served by assisting many smaller plants demonstrating at a small but commercial scale a diversity of production technologies.

### **Recommendation:**

*As Congress appropriates money for the cellulosic ethanol R&D provisions of the Energy Policy Act, direct the Department of Energy more explicitly to favor local and farmer ownership.*

The Energy Policy Act contains directives to the Department of Energy to encourage farmer ownership and maximize the benefit to rural communities as it implements the provisions regarding the commercialization of cellulosic ethanol. The Act also includes a production mandate for 250 million gallons of cellulosic ethanol by the end of 2012. Given this mandate, it is unlikely that any of the financial incentives contained in the Act will result in an appreciable reduction in the timetable for producing this 250 million gallons.

The cellulosic ethanol sections of the Act authorize about \$2 billion in incentives.<sup>12</sup> But in 2006, Congress appropriated no money to carry out these sections. As Congress debates the appropriate level of expenditures for these sections, it should clarify and reaffirm its directive that the Department of Energy take into account qualitative objectives.

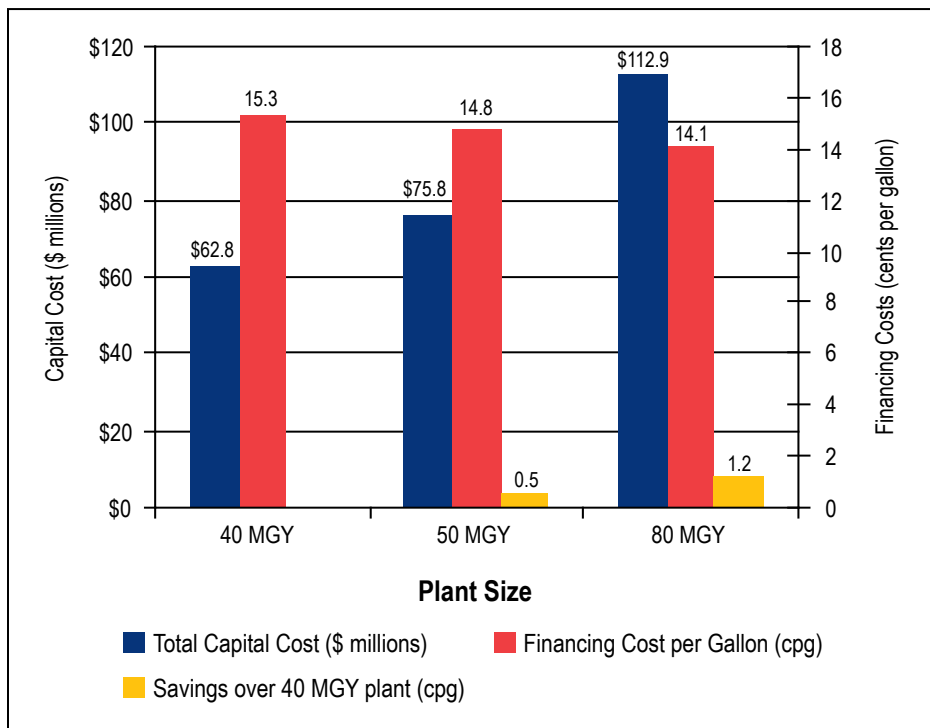
For illustrative purposes, Congress might direct the Energy department to use the Act’s seed grants to nurture many geographically dispersed farmer or locally owned pilot plants (with 500,000 gallons per year of capacity) that rely on a variety of feedstocks and technologies. Congress might also direct that direct incentives, such as reverse auction or grants, nurture many small commercial scale plants of, say, 5 million to 10 million gallons of capacity. Here too priority should be given to majority farmer- or locally-owned plants and feedstock, technological and geographic diversity. And finally, the Energy Department should use the Act’s loan guarantees to facilitate larger plants producing 25 million to 35 million gallons per year, again encouraging farmer or locally owned facilities.

**Recommendation:**

*Redesign renewable energy tax and regulatory incentives to encourage small-scale production*

Smaller plants are criticized, justifiably, because of their higher unit cost of production. But the vast proportion of engineering economies of scale are captured at surprisingly modest scales. Up to 90 percent of the decreased cost stemming from an increase in the capacity of an ethanol plant from 10 million to 100 million gallons is gained when the plant’s output rises from 10 million gallons to 40 million gallons. Only about 10 percent of the decrease, perhaps 2 cents to 3 cents a gallon, is gained from the plant’s size rising further to 100 million gallons.

**Figure 7—Economy of Scale in Ethanol Plant Construction**





Very large plants, however, can also experience diseconomies of scale. Transportation costs, for example, may rise, offsetting the decreased unit cost of production. Feedstock must be brought in from further away and the end product sent to more distant customers.

In the case of wind energy, the size of a locally owned turbine may be similar to that of an absentee-owned turbine because engineering economies of scale are very large.<sup>13</sup> Large wind farms benefit from being able to spread overhead costs, such as management salaries and maintenance expenses, over many turbines. But many of these same savings can be gained when the owners of many community wind turbines cooperate to contract out maintenance and other overhead costs to a single entity. The other advantage of large wind farms is easier access to capital, an advantage that well-executed public policy can largely overcome.

The production cost factors of biofuels and wind energy tends to encourage concentration of production facilities. With biofuels, the costs of the feedstock are 60 percent to 75 percent of production costs. This encourages the vast majority of existing and proposed plants to locate in states with large corn and oilseed production. The lower cost of the local feedstock offsets the longer distance of the final product to market.

But with the coming of cellulosic ethanol, the very real possibility exists for a dramatic dispersion of production, with many modest-size facilities setting up nearer the ultimate customer. More than half the states have regions within them that could produce at least 4 million tons of biomass by 2015, sufficient to supply five to 10 ethanol plants.<sup>14</sup>

Similarly, since the output of wind turbines varies dramatically with small changes in the wind speed, there is a significant cost advantage to locating clumps of wind turbines in remote locations boasting high wind speeds. This cost advantage, however, is offset by having to build massive high voltage transmission lines to transport the electricity to distant population centers.

### **Recommendation:**

#### *Amend production-tax-credit rules to encourage small-scale renewable energy production*

To encourage locally owned wind turbines, Congress should increase R&D expenditures directed to commercialize small wind turbines that produce between 2KW and 25 KW of power. Congress should also eliminate any current bias toward large-scale systems. For example, only wind turbines that produce electricity for the national commercial market are eligible for the production tax credit. A farmer who uses wind energy output to supply the farm is not eligible. Yet in both cases the environmental and energy security objectives of the production tax credit are satisfied. That tax credit should be extended to production for on-site use.



## Recommendation:

*Use transmission models to examine the potential for injecting dispersed power into the distribution and subtransmission systems to meet local demand.*

The federal government and state governments should more aggressively analyze the potential for dispersed wind turbines, which could reduce or eliminate the need to build new high-voltage transmission lines.

Since Congress deregulated wholesale electricity, the Federal Energy Regulatory Commission and the nation's utilities and state regulatory commissions have focused on developing policies and institutional structures to enable and encourage the transformation of the transmission system from a local, state and regional system into a national system capable of delivering ever-larger amounts of electricity over ever-longer distances.

More long-distance transmission may be necessary in the long term, but in the short term significant opportunities exist for distributed electricity generation that injects electricity into existing distribution and sub-transmission lines carrying under 115kV of power to serve local load demand.

This is true with both renewable-fuel and fossil-fuel power plants. On-site natural-gas-fired power plants, for example, can make use of the waste heat to achieve efficiencies of more than 80 percent, compared with the 35 percent-to-50 percent efficiencies achieved by conventional power plants. Moreover, they eliminate losses of up to 15 per cent resulting from the transmission and distribution of electricity. Similarly, distributed wind generation to meet local load demand can avoid distribution losses.

Private and public agencies currently are developing transmission studies that presume a nationwide network of many additional high-voltage transmission lines. Congress and the states should require that the models also examine the potential impact of dispersed power generators that meet local and regional demand.

Such studies would identify how much electricity could be injected into existing distribution and sub-transmission lines, how much of that electricity could be used locally and what impact this might have on the need for new peak and base load power capacity. Once again, Minnesota provides the model for such a study.

A preliminary analysis of Minnesota's existing distribution and sub-transmission capacity by the state's utility transmission engineers estimates that as much 1,000 MW of additional wind-generated electricity might be produced within one section of the state with very limited distribution system upgrades and without additional high voltage transmission capacity. Extrapolating this statewide reveals that as much as 6,000 MW of additional capacity might be built without the need for new high voltage transmission lines. That is about 7 times the current wind electricity output in Minnesota, a state with the nation's fourth-largest wind energy production.



## Recommendation:

*Redesign the farm bill to enable farm owners of energy-related production facilities to play a more important role in energy security*

In 2007, the five-year-old farm bill will be reauthorized, offering Congress the opportunity to insist that the section authorizing expenditures to farmers and farmer-owned enterprises that produce renewable energy is in fact implemented. Congress will also have a chance to fundamentally redesign the farm bill to establish renewable energy production as an integral component of the rural economic landscape.

Current high grain prices mask the slow but steady deterioration of local rural economies. Every year about seven percent of existing commodity-grain farmers exit agricultural production. Their acreage is then consolidated in larger farms. Non-commodity and commodity agriculture face increasing pressure from imports, with American farmers receiving an ever-smaller portion of the dollars spent on food in the U.S.

2007 offers an historic opportunity to reverse these debilitating trends by linking farm policy and energy policy. Consider that in 2002, federal subsidy payments to the nation's corn farmers totaled almost \$3 billion, falling to \$2.5 billion in 2004 and rising to \$6.2 billion dollars in 2005. Because of high commodity prices, incentives to corn farmers could drop below \$2 billion in 2007, yet these direct payments to farmers will always adjust according to market prices unless Congress eliminates direct payments to farmers, which were originally considered a transitional payment in the 1996 farm bill but were then extended in the 2002 farm bill.

Meanwhile, federal ethanol incentives are climbing dramatically. By the end of 2007, when some 7 billion gallons of ethanol may be produced, federal ethanol incentives will be running in excess of \$3.5 billion on an annual basis, up from about \$2 billion in 2005 and \$1 billion in 2002.

If existing direct payments to farmers and existing ethanol incentives remain in place, the federal government will be spending more, perhaps much more, on corn-derived ethanol incentives than it is paying to corn farmers in price supports.

Looked at another way, wholesale revenues from biofuels in 2006 will be about \$8 billion, and could reach \$14 billion by 2009, with a net income of more than \$3 billion. Wind energy sales will be a little less than \$1 billion in 2006 but could reach \$2 billion by 2010.



**Recommendation:**

*Shift farm policy from guaranteeing a fair return on the farmer's investment in land and crops to guaranteeing a fair return on the farmer's investment in biorefineries*

U.S. farm price supports should shift from maintaining commodity prices sufficient to allow farmers to remain farmers toward maintaining a return on equity in farmer-owned and locally owned biorefineries sufficient to allow farmers to remain farmers. If corn prices drop, all other things being equal, farmers who own a share in a biorefinery make up about one third of that drop in higher dividends. What's more, dividends to farmer-owners can easily exceed the profit farmers make on their crop.

**Recommendation:**

*Allocate \$2 billion to underwrite a portion of the farmers' equity investments in biorefineries.*

Assuming Congress significantly raises the biofuels mandate, crop prices should remain high for the five years following the reauthorization of the 2007 farm bill. That should allow Congress to experiment with a new program that makes farmers part-owners of the value-added biorefining process. To do so, Congress should provide \$2 billion to underwrite the equity portion of 100 additional biorefineries producing an additional 5 billion gallons of ethanol. If the appropriation had to be matched by farmers, at least double the number of biorefineries could be built. Or Congress might offer a loan guarantee to farmer and/or local owners. Local as well as farmer ownership may be appropriate because the farm bill's objectives include expanding rural economies as well as raising farmer incomes.<sup>15</sup>

**Recommendation:**

*Promote locally owned biorefineries meeting domestic energy demand as a way to dampen agriculture-related trade tensions and to promote rural prosperity from biofuels and wind energy worldwide*

American farmers are increasingly under attack by overseas competitors who complain that American farm policy allows them to market their product at below the cost of production.<sup>16</sup> By encouraging the production of biofuels the United States can answer those charges with policies that boost domestic farm income, reduce our nation's dependence on foreign oil and contribute to the global campaign against global warming.



## Conclusion

Congressional actions in 2007 in support of locally owned biorefineries and wind turbines would help the United States address simultaneously four of the most nettlesome problems facing the country today: global warming, yawning federal budget and trade deficits, and the possible collapse of multilateral free trade due to pervasive farm subsidies in the U.S. and other developed nations. America's gain would also be rural America's gain as more income from renewable energy would flow back into the real American heartland—local farming communities that today face an economic crisis.

Indeed, U.S. policies encouraging local- and farmer-owned renewable energy production facilities might also serve as a road map for the preservation of farming communities worldwide. The United States isn't the only country with energy security problems and struggling farm communities. If other nations—especially developing countries—followed America's lead then it is certainly possible to foresee rural communities worldwide growing and then producing their own renewable energy “down on the farm.”

Currently, developing nations aggressively promote agricultural exports in order to gain hard currency with which to purchase much-needed imports. Among these, for many countries, is petroleum. If agricultural production instead were used domestically to reduce the need for oil imports, it would have the same domestic impact. Indeed, one can argue that, by strengthening local economies by creating dramatically increased internal markets for agricultural materials, by fostering local ownership, and by reducing the flow of farmers to overcrowded cities, developing nations might well enthusiastically embrace such a program.

Many years ago John Naisbitt, the author of *Megatrends*, talked about how we live in an age of parenthesis—an in-between time where we continue to live under rules fashioned in an earlier age to address far different problems. Today, we are increasingly aware that those rules in the agricultural and energy realms are ineffective and counterproductive to global economic and ecological prosperity. The twin crises in energy and agriculture today offer the opportunity to design policies that encourage a new ownership structure in farming communities, marrying the twin national goals of rural prosperity and energy security. Congress only needs to act.

## Summary of Recommended Policies

### *Redesign existing federal incentives to encourage local ownership:*

- Transform the federal ethanol incentive into a two-tiered, indexed direct producer payment, with a higher payment to locally owned facilities.
- Establish a two-tiered, wind energy producer payment that favors local ownership.
- Broaden the local capital pool available for financing wind turbines by allowing tax credit to be taken against ordinary income as well as passive income.
- Allow owners of wind turbines that meet on-site demand to be eligible for the production tax credit.
- Restore the 30-million-gallon limit on eligibility for the federal incentive to small ethanol producers.
- Shift farm policy from guaranteeing a fair return on the farmer's investment in land and crops to guaranteeing a fair return on the farmer's investment in biorefineries. Shift \$2 billion of farm payments from a guaranteed minimum return on the crop to a guaranteed minimum return on equity invested by local residents in biorefineries.
- Promote locally owned biorefineries to meet domestic energy demand as a way to dampen ag-related trade tensions and promote rural prosperity.

### *Redesign federal programs to encourage community based and modestly scaled production facilities*

- Eliminate the high minimum production capacities of 18 million to 30 million gallons required for a cellulosic ethanol facility to receive federal funding.
- As Congress appropriates money for the R&D provisions of the Energy Policy Act, affirm its existing directive to commercialize cellulosic ethanol in a way that maximizes the benefit to farmers and rural communities by directing the Energy Department to redesign its implementation program.
- Require any company developing technology with public money to license it to locally owned renewable energy facilities.
- Require transmission authorities to use their models to examine the potential for injecting large quantities of distributed wind energy into existing distribution and subtransmission lines to meet local demand, thereby reducing or eliminating the building of new high-voltage transmission lines.



## Endnotes:

- 1 These are renewable electricity mandates, but more than 90 percent is met by wind energy, with the rest met by biomass, geothermal and direct solar (photovoltaics).
- 2 Ethanol was also given a boost by the rapid phaseout of MTBE as a gasoline additive in early 2006 as evidence of its negative impact on water quality became widespread.
- 3 The comparative value of wind energy, because of its intermittency, with dispatchable electricity sources fueled by coal or natural gas, is a matter of much debate.
- 4 Energy Policy Act. Public Law 109-58.
- 5 The study did find a correlation between the carryover crop and the crop price. This was about 2 cents per bushel for each 100 million bushels reduced carryover, or 20 cents per 1 billion bushels. John Farrell, *Relationship between Corn Demand, Corn Carryover and Corn Prices*. Institute for Local Self-Reliance. 2007.
- 6 This may mean bringing previously uncultivated land into production, but most of the increase in corn acres will come from a reduction on soybean or other crop acreage. This may raise animal feed prices. It is unclear at this point what its environmental impact will be.
- 7 The Bureau of the Census defines an urbanized area as a continuously built-up area with a population of at least 50,000, comprising one or more places and adjacent densely settled areas. An urban cluster consists of densely settled territory that has at least 2,500 people but fewer than 50,000 people. Collectively, urbanized areas and urban clusters are referred to as urban areas. The Census defines "rural area" by exclusion; that is, it views all areas that it did not already identify as urbanized areas or urban clusters as "rural." Using this Census definition, based on the 2000 census, 59 million Americans, or about 24 million households, reside in rural areas, with slightly more than half of them residing within Metropolitan Statistical Areas.
- 8 *Ethanol Programs: A Program Evaluation Report*. Minnesota Office of the Legislative Auditor. #97-04. February 1997. The evaluation did not take into account the flow of dividends from these plants. Minnesota's program did enable local ownership, but it was also intended to demonstrate that small dry mill ethanol plants could compete. The production payment enabled the plants to attract debt financing from the Farm Credit Banks. Thus the program might be evaluated as a commercialization initiative rather than simply a business development initiative.
- 9 A possible starting point for discussion would be a benchmark 20 percent ROE. To achieve this, there would be a 1 cent increase from zero in the producer payment for every cent that ethanol prices fall below \$1.87 and an increase of .038 cents for every cent that corn prices exceed \$1.80 per bushel.
- 10 Minnesota Statutes 2006 §216B.1612 Community-Based Energy Development; Tariff.
- 11 Congress had the authority, although it chose not to exercise it, to use the program to favor farmer-owned plants.
- 12 The Energy Policy Act authorizes financing for several discrete yet overlapping commercialization strategies: direct grants (Sections 932, 1511, 1512); loan guarantees (Section 1510); direct purchasing via a reverse auction (Section 942); direct per gallon incentives (Section 942).
- 13 The output of a wind turbine varies by the square of the diameter of the rotor blade and by the cube of the increase in the wind speed. Therefore large turbines on high towers will dominate.
- 14 Burton, C. English, et al. "25% Renewable Energy for the United States by 2025: Agricultural and Economic Impacts." (University of Tennessee Agricultural Economics, November 2006), 37-40
- 15 Aside from the technical and administrative challenges involved in developing such a program are some practical problems. Only a minority of grain farmers own shares in biorefineries. Given the current dynamic of large, absentee-owned plants, it is unclear whether, without federal policy, this number will significantly grow. Even with federal programs, farmers will have to be convinced that an investment in a value-added facility makes sense. Also, farm programs currently pay for all covered crops grown by eligible farmers. Farmer owners of ethanol plants, on the other hand, sell only 25-60 percent of their crop to an ethanol plant or a biodiesel facility. Thus any federal policy that solely focuses on ownership will cover only a portion of the crop. However, given that an increased biofuels mandate will undoubtedly raise the price of the total crop over target levels, at least for the next five years, that problem should be able to be overcome in this farm bill.
- 16 According to Professor Darryl Ray, agricultural economist at the University of Tennessee, the redesign in the 1996 farm bill significantly changed the dynamics of corn pricing. After 1996, the farmer was paid the difference between the market price and the target price but was allowed to continue to sell the crop. By his calculations, this lowered by some 20 cents per bushel the average price of corn, resulting into a loss of revenue from the sale of the corn by the farmer of about \$2 billion. Given that farmers could sell their crop at below market prices and have the government make up the difference in incentive payments, the redesign also led farmers abroad to bring accusations of dumping before the World Trade Organization (WTO). Darryl Ray, "Two issues may shape the 2007 farm bill." Southwest Farm Press, 11/11/05

## About the Author

David Morris currently serves as Vice President of the 33-year-old Minneapolis-based Institute for Local Self-Reliance and directs its New Rules Project ([www.newrules.org](http://www.newrules.org)). He has been an energy consultant or advisor to the energy departments of Presidents Ford, Carter, Clinton and George W. Bush. He also advises state and local governments, utilities and private business on economic and business development strategies. From 2000 to 2006, David served on a Congressionally created advisory committee to the US DOE and USDA on biomass-related issues.

David is the author of four books and more than a dozen monographs on energy and biomass, including his 1992 report, *The Carbohydrate Economy*.

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