Green Energy: How will it shape Rural American Communities?

Presented at

CFAES Vice President's Agricultural and Policy Outlook

Columbus, Ohio – October 27, 2008

_____

Mark Partridge (with help from Ayesha Enver, OSU)

Swank Professor in Rural-Urban Policy

The Ohio State University

www.aede.osu.edu/programs/swank

Swank Program in Rural-Urban Policy

1

For more details of the decline of Alternative Energy, see Krauss, Clifford, "Alternative Energy Suddenly Faces Headwinds." New York Times, October, 20, 2008 http://www.nytimes.com/2008/10/21/business/21energy.html?em

More details can be found in the paper: "Dissension in the Countryside: Bridging the Rural-Urban Divide with a New Rural Policy" co-authored with Rose Olfert. The paper can be found at my web site at Ohio State. The chapter will soon be published as part of an edited volume by the University of Seoul press. Much of this includes background for those who have not thought about place-based policy.

We thank many comments of readers without any attribution including Jill Clark, Christine Gosselin, Robert Greenwood, Maureen Kilkenny, and Darrel Pack. We also thank Infrastructure Canada for their support in funding part of this research under a grant entitled: "Mapping the Rural-Urban Interface: Partnerships for Sustainable Infrastructure Development." We also thank the Canada Rural Revitalization Foundation and the Federation of Canadian Municipalities for their support in this project, in particular Robert Greenwood.

Motivation

- My underlying commitment (passion) is for strong rural American communities that are prosperous and have a high quality of life.
  - But I provide advice as an Economist—we don't pander and we aren't cheerleaders.
- What reflects prosperous communities:
  - Job growth is key
  - Good schools in a knowledge economy
  - Clean environment and high quality of life
  - Low poverty and shared prosperity. (normative)
  - Rural development experts are mainly interested in industries as far as they contribute to these goals.

Motivation

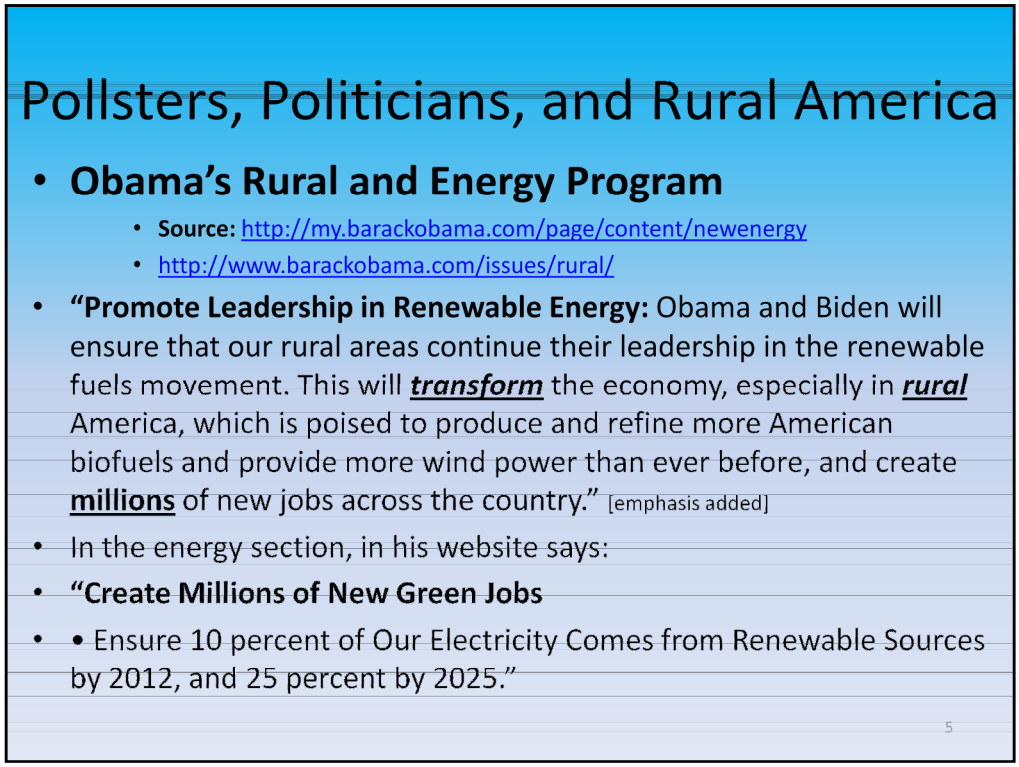
- This talk will focus on how biofuels and the broader "Green Economy" will affect the prosperity of rural Americans and their communities.
  - Need to understand what a sustainable green energy economy would look like.
    - To really compete with the fossil-fuel economy, it must compete with fossil-fuels in terms of cost effectiveness.
    - It has to compete with fossil fuels or our standard of living will decline and all Americans will be worse off.

3

Motivation

- Once we understand the underlying economic fundamentals, we can draw clear conclusions on numbers of jobs and effectiveness.
- Going forward, I will:
  - Discuss what politicians say
  - Discuss the economics of fossil fuels—and conclude what a healthy green economy means
  - Discuss the structure of rural American economies
  - Discuss green energy's impact on rural economies

4



Also, see Krauss, C. NYT article referenced in the notes to Slide 1.
Sourse BEA: 2007 motor vehicles, bodies and trailers, and parts manufacturing employment= 995,700.

Motor vehicle and parts dealers is irrelevant, but that is 2,156,900 for 2007. mostly auto sales people.

Let's evaluate if a Green Economy and Biofuels can deliver such promises

- Alternative Green energy has tremendous advantages: less carbon, replace fossil fuels, limit dependence on foreign sources. **This strikes me as very worthwhile.**
- **But what do we want, A or B:**
- A. **Efficient 21st Century Green Energy** that helps the environment and maintains U.S. competitiveness.
- B. **A bloated Soviet Jobs Program** aimed to provide goodies to entrenched special interests.
  - Such a program will hurt our competitiveness, not help the environment, and we will eventually have to pull the plug on it—*á la* Oil Shale of the late 1970s.

6

No free lunch

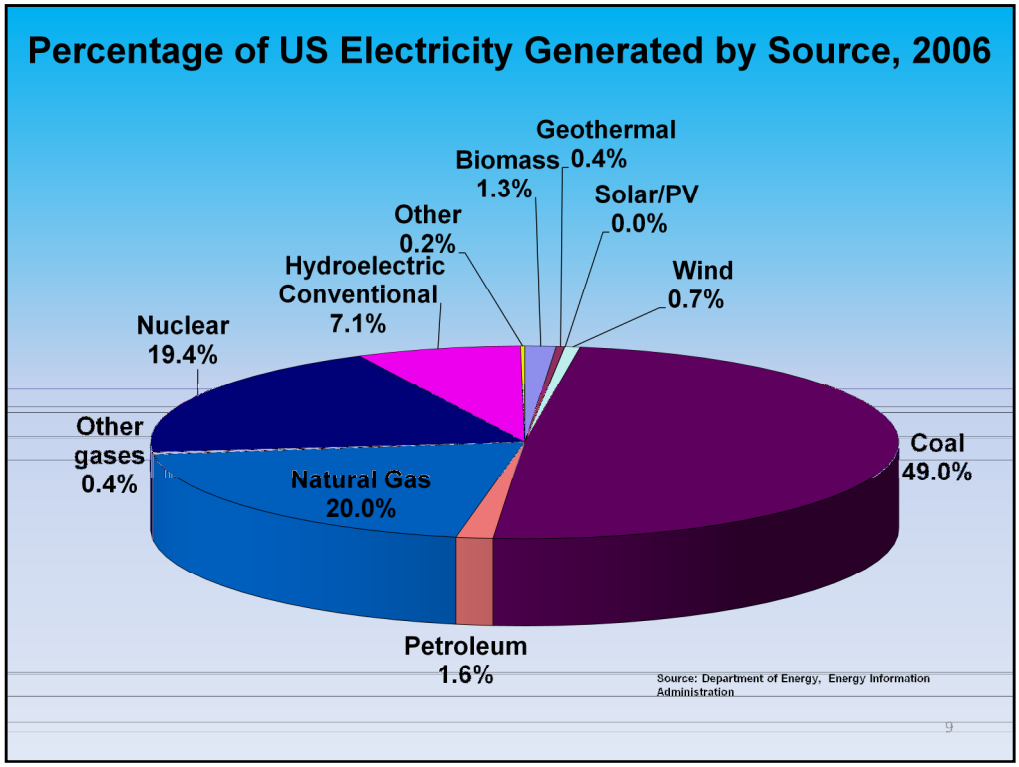
Let's evaluate if a Green Economy and Biofuel can deliver—cont.

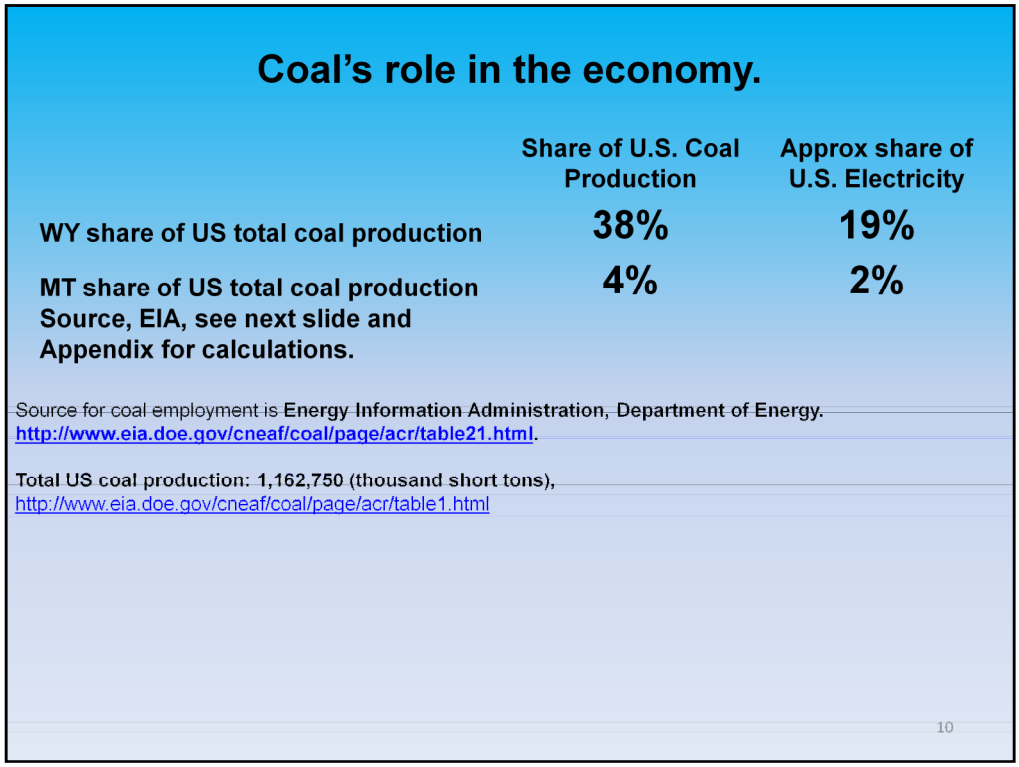
- We first need to understand opportunity costs
  - *OC: "what we give up when we make a decision"*
  - So, if "green" energy is expensive, the opportunity cost is that we could have used lower-cost fossil fuels and helped maintain our competitiveness.
    - After we account for net environmental costs.
    - Higher incomes allow us to mitigate the effects of (say) climate change.
  - Why not just subsidize green energy to lower costs for the end user?
    - There are still opportunity costs in the form of higher taxes, less spending on healthcare, infrastructure, education, the military, etc. Higher taxes lower our competitiveness—unless you believe that the tooth fairy and Santa Claus will pay these subsidies.

7

Fossil Fuels: Coal-based Electricity

- We need an assessment of fossil fuel productivity to grasp what is needed for Green energy.
- Whatever the source, we will have some sort of distribution network. So, I will focus on the base source.
- Montana & Wyoming Coal Mining—why, these are **rural** areas and I grew up in that region.
  - It makes my main point.
- Then compare this briefly to wind turbines and then ethanol in more detail.


Percentage of US Electricity Generated by Source, 2006
Geothermal 0.4%
Biomass 1.3%
Solar/PV 0.0%
Other 0.2%
Wind 0.7%
Hydroelectric Conventional 7.1%
Nuclear 19.4%
Other gases 0.4%
Natural Gas 20.0%
Coal 49.0%
Petroleum 1.6%
Source: Department of Energy, Energy Information Administration



See Appendix table for calculation.

Coal's role in the economy—cont.

	#Employees in coal 2006*	Total State employees 2006	% total that are in coal mining
Montana	942	630,288	0.15%
Wyoming	5,837	375,047	1.56%
U.S.	82,959	177,815,600	0.05%

*Includes all employees engaged in production, preparation, processing, development, maintenance, repair shop, or yard work at mining operations, including office workers,
Source: Energy Information Administration http://www.eia.doe.gov (including energy production)
http://www.eia.doe.gov/cneaf/coal/page/acr/table21.html
Total state and U.S. employment is from the U.S. Bureau of Economic Analysis.

11

Fossil Fuels vs. Green Energy

- Only, 6,800 coal miners produce coal that supplies 21% of U.S. electricity!
  - A key reason that we are 'addicted' to fossil fuels is that we are so remarkably productive at it.
- Green energy needs to be at least 'nearly' as productive to be sustainable.
    - We cut it slack if it is 'clean'—i.e., properly pricing carbon.
  - But, the numbers of jobs should be thought of in the tens of thousands, not the millions.
  - We need a green-energy sector that employs few workers, not one that employs 'millions' of workers. The latter is not sustainable.

12

Sustainable Green Energy needs

- **A punch line of this talk is that green energy cannot be nor should it be some sort of a major jobs creator if it is to be sustainable.**
- Those who claim otherwise have either not thought through what a 21st Century Green Economy would have to be to be competitive.
  - Or, they are special interests that would benefit or they are letting pollsters set the agenda.
- **A national energy policy is not the same as good local economic development policy!**

13

Wind energy

- **Efficient** wind energy is good energy policy, but I am not even sure if *inefficient* wind energy would create large numbers of jobs.
- Why?
- We have had a similar capital-intensive technology—e.g., cell phones. (another good idea)
  - But after the constructions of scores of cell towers, what has been the employment effects of cell towers. Well, not much—its too capital intensive
- Why wouldn't the same apply for wind turbines if it is capital intensive?

14

Does ethanol cause local growth?

- The direct impact: ethanol plant hires workers instead of shipping the product elsewhere.
  - But, as of late 2007, there are only 3,100 direct jobs in U.S., or 0.01% of rural U.S. employment.
  - A 100 million gallon plant has $46m-$51m in tax credits—or $1million+ per job each year.
    - If jobs are a central goal, there are much less expensive ways to create about 45 jobs at a big plant. Aha **Opportunity costs**
  - Take ethanol subsidies in the U.S. Heartland? Have they transformed rural American economies even in the construction boom? **Ans, no**

15

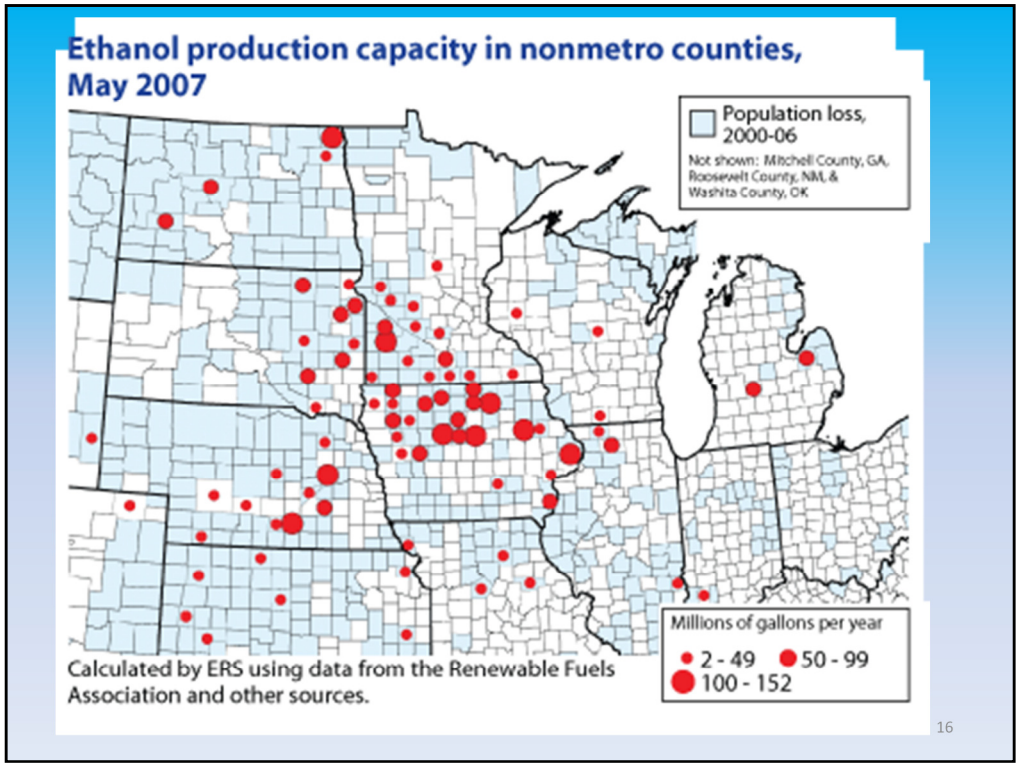
Rural=nonmetropolitan in this discussion.

Ethanol boom is busting as few new plants are being constructed:

See: "Ethanol Is Dream Deferred for Farming Towns Too Late to Biofuel"

http://www.bloomberg.com/apps/news?pid=email_en&refer=home&sid=azPOyrCia8Nc. Sept 12. 2008.

Other sources are on the next slide.



Source, USDA, ERS, *Rural America at a Glance, 2007 Edition.* Available at: http://www.ers.usda.gov/publications/eib31/eib31.htm (downloaded, Feb 20, 2008).

Opportunity costs of subsidies, $46 million for a 100 million gallon plant per year?

"Direct employment in the plants is not large, typically averaging about 35 jobs per plant. The 88 nonmetro plants employ about 3,100 workers. Seventy percent of the nonmetro ethanol plants in operation are located in counties that declined in population from 2000 to 2006, whereas just half of all nonmetro counties lost population. Of new ethanol plants under construction, nearly four-fifths (67) are in nonmetro counties and 75 percent of these are in counties with declining population. (In economic development, weigh the opportunity cost of the subsidy vs. other things that could be done in rural America. Is this a net gain?)." From Rural America at a Glance.

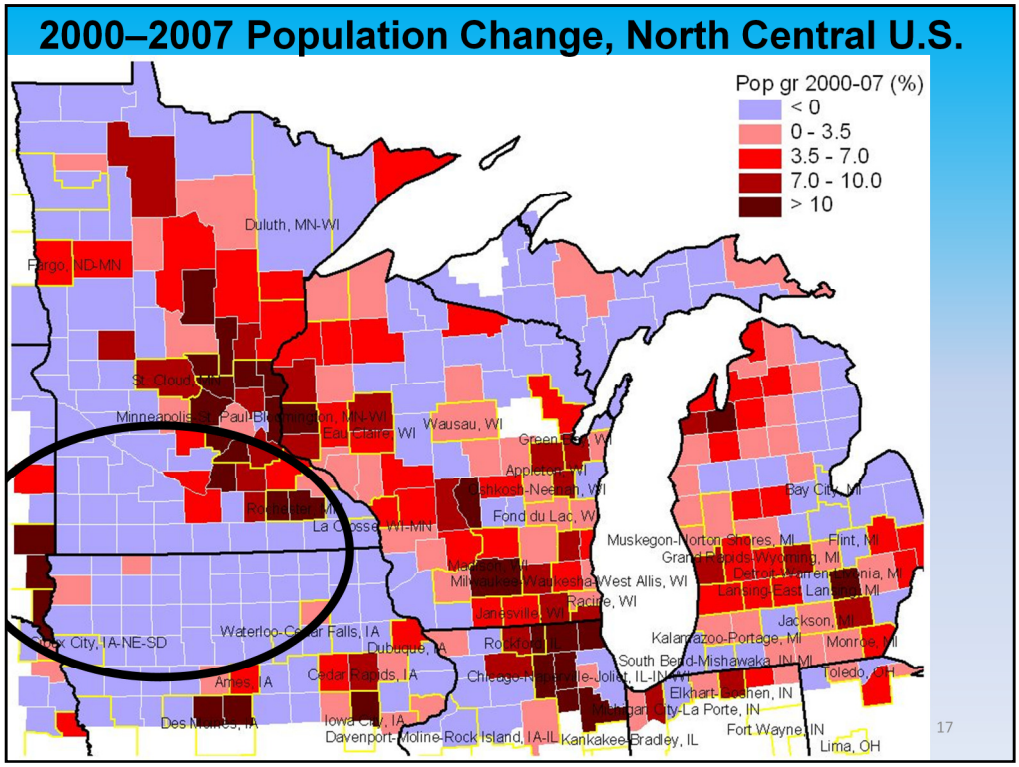
Of 26 million jobs, 3,100 nonmetro jobs represents 0.01% of total rural employment.

For work of Caution on Ethanol, see…..

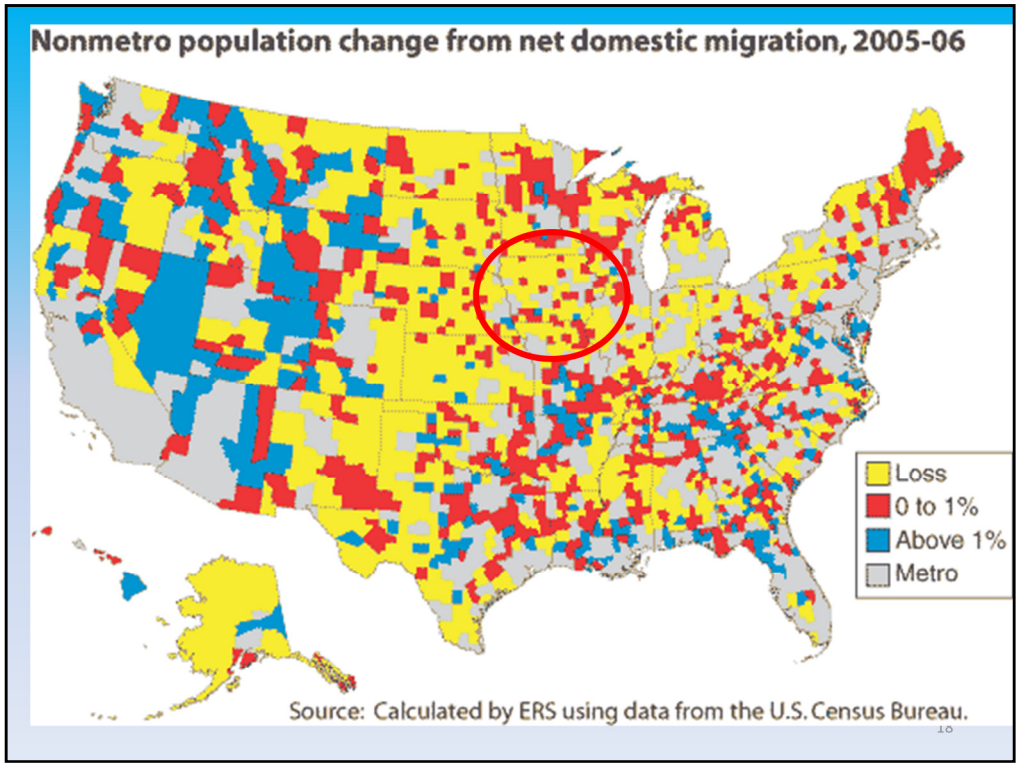
For more details of how ethanol affects the Iowa economy, see David Swensen, *The Economic Impact of Ethanol Production in Iowa* is available at: http://ideas.repec.org/p/isu/genres/12865.html

Here is the associated press release: from SSTI, 5015 Pine Creek Drive, Westerville, Ohio 43081
Phone: (614) 901-1690 http://www.ssti.org

Iowa Researcher Finds Limits to the Economic Impact of Ethanol
In recent years, Iowa, like many midwestern states, has experienced a boom in ethanol production. Iowa's natural competitive advantage in growing and processing corn has helped it to move to the forefront of the emerging biofuels industry. The state provides



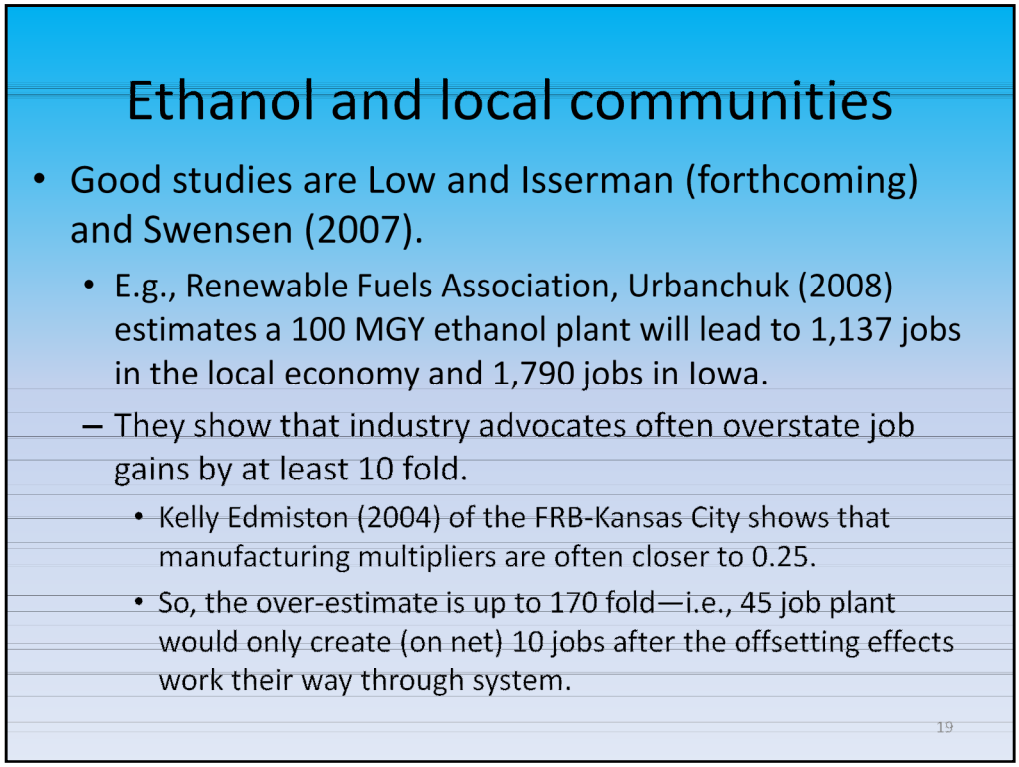
Circle shows concentration of ethanol and wind turbines. Note despite Iowa becoming a corn importer and wind turbines, population loss is still persistent. Growth likely to be greater during construction phase as well. Other factors driving pop change.



Voting with their feet: Are more people moving in than moving out as economists best signal of whether a place is prospering in terms of economic and quality of life.

I picked a year period where bio-fuels rage was going quite strong. Note in the red 'circle' of the greatest intensity of ethanol plants that there is still broader out-migration in rural America—even during the construction phases. Also, this reaffirms that ethanol may be an excellent farm/energy/environmental policy, but it does not substitute for a rural policy.

Note the yellow patterns in the Great Plains and the red/blue growth near urban areas and high amenity areas. Those trends overwhelm other demand shocks.



Low, Sarah A. and Andrew M. Isserman (forthcoming). "Ethanol and the Local Economy: Industry Trends, Location Factors, Economic Impacts, and Risks." *Economic Development Quarterly.*

Swensen, David. "**Understanding Biofuels Economic Impact Claims."** Iowa State University, Department of Economics, April, 2007.

Edmiston, *Kelly D*. (2004). "The Net Effects of Large Plant Locations and Expansions on. County Employment," *Journal of Regional Science*, 44 (2), 289 – 319.

Some of the other most frequent errors made in modeling the impact of ethanol pointed out by Swenson include:

•Corn Production – Models often include the corn grown for ethanol as a new activity. In most cases, this corn is already being produced. In cases in which new corn would have to be grown, that land would have previously been used to produce other crops.

•Transportation – Many models include new jobs in transportation and trucking, under the assumption that ethanol plants will need new supply lines. Farmers, however, already use trucking companies to move their corn. In fact, by building local ethanol plants, the state may even see a reduction in the demand for transport services.

•Regional Offsets – Other industries that compete for many of the same input resources, such as hog and poultry producers, will have to pay more for resources and services. Also, the cost of corn-based feeds will increase for these industries.

Since corn production in Iowa – and any other state – is naturally limited by the availability of land and other resources, the number of ethanol plants a state can accommodate is finite. According to Swenson, even if Iowans were able to produce two billion bushels of corn, the state would still only require 55 plants averaging 90 MGY in size. In 2005, the state grew only 400 million bushels. In 2009, 42 ethanol plants will already be operational, and the state appears to be approaching its ceiling for ethanol production and employment.

Swenson does not propose ending state support for the biofuels industry, but he does suggest that some of the state's justifications for its ethanol programs are based on misleading employment indicators. The overall impact may be smaller than expected in the state, even though Iowa has long been a national leader in biofuels production. For other states, with even less land dedicated to corn production and with less focus on ethanol, the employment impact may be even more limited.

Other factors for ethanol

- New corn production overestimated
- New transport jobs are overestimated
- Other regional offsets from higher input costs though there could be feeder lots
  - Source: Swenson (2007)
- Water treatment also varies considerably in cost and availability. High taxes causes local job losses.
  - A large, 100 MGY plant consumes the amount of water used by a community of 15,000 people.
    - Source: Low and Isserman (forthcoming)
- There could be noise, dust, and transport infrastructure costs.

20

Conclusions

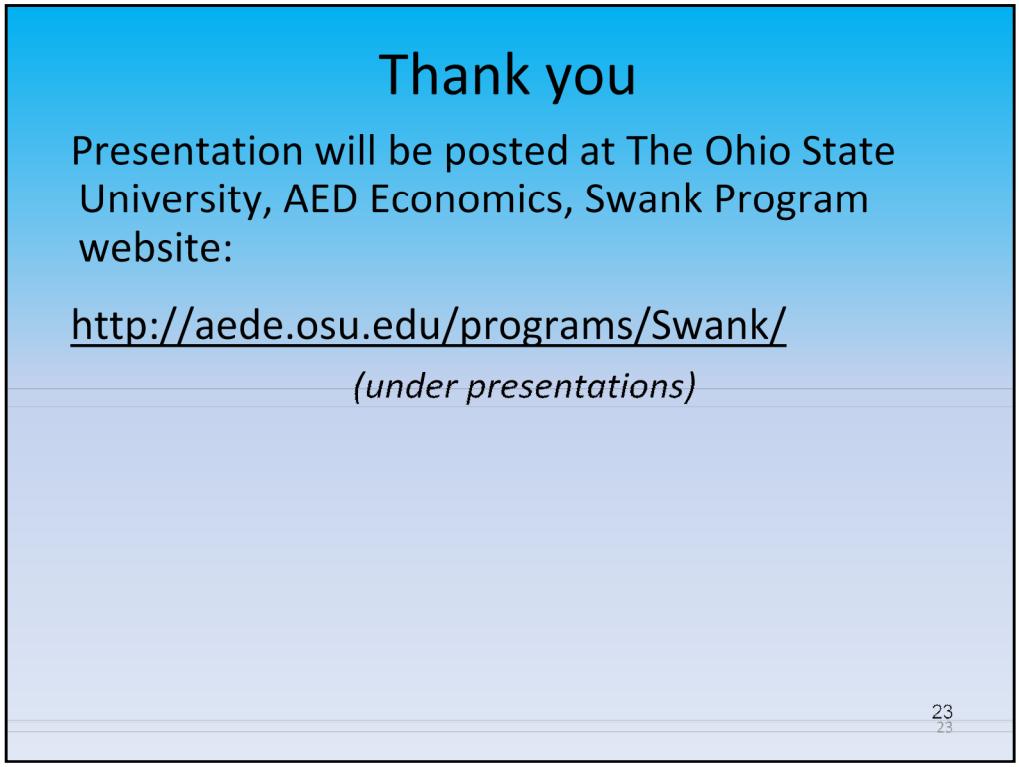
- My underlying goal is a commitment for prosperous rural American communities and green energy that is sustainable in the 21st Century.
- Others appear to view Green Energy as an "Inefficient Jobs Program" with goodies for special interests.
- Fossil fuels are very efficient—not a jobs program.
- To be competitive and sustainable, green energy can't employ large numbers of workers.
- **A punch line is that green energy cannot be nor should it be some sort of a major jobs creator if it is to be sustainable.**

21

Conclusion

- Wind energy and ethanol are also unlikely to be large job creators even in local communities.
  - They need to be justified for other reasons: energy independence, environmental, energy policy, agricultural support, etc.
- **The problem for rural America is that green energy distracts us from what really needs to be done to ensure a prosperous future for rural America**
- I believe this confusion underlies why many believe overstated claims regarding green energy.

22



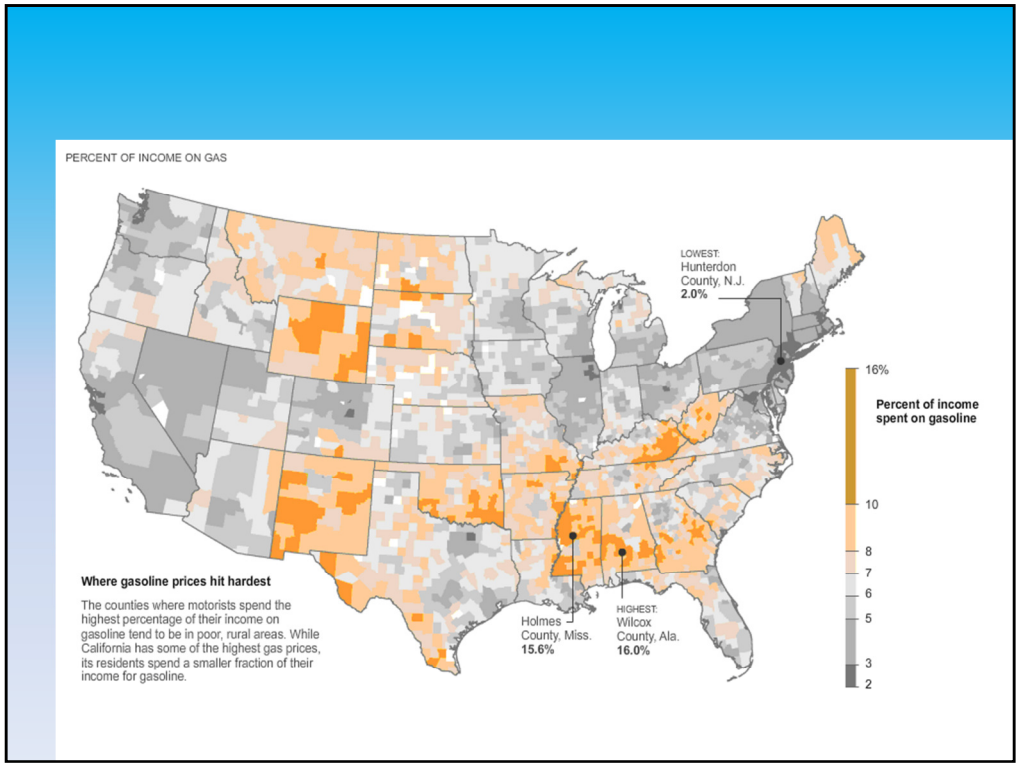
To conclude, I want to reaffirm what a pleasure it has been here today. I hope this presentation has stimulated you, not only for the remainder of this workshop, but also to go back and to your communities and try new innovative solutions.

Appendix Slides

Source for electricity generated in from MT/WY coal.

Coal Production 2006 (Thousand Short Tons)	Number of Mines	Production
Wyoming	21	446,742
Montana	6	41,823
US. Total	1,438	1,162,750
WY share of US total coal production	0.38	
MT share of US total coal production	0.04	
Share of US electricity generated by coal, 2006	0.498	
US residential consumers of electricity, 2006	122,471,071	
share of electricity generated by WY coal	0.19	
share of electricity generated by MT coal	0.02	
# of residential consumers powered by WY coal	23,433,291	
# of residential consumers powered by MT coal	2,193,773	
Source: Energy Information Administration http://www.eia.doe.gov		

25



Source: Krauss, C. "Rural US Takes Worst Hit as Gas Tops $4 Average," *New York Times,* June 9, 2008. http://www.nytimes.com/2008/06/09/business/09gas.html

- Notes from Low, Sarah A. and Andrew M. Isserman (forthcoming). “Ethanol and the Local Economy: Industry Trends, Location Factors, Economic Impacts, and Risks.” *Economic Development Quarterly.*
- A large, 100 MGY plant consumes the amount of water used by a community of 15,000
- To ensure year-round supply, most plants pay a small per bushel price premium over local elevator prices, commonly 5 to 10 cents per bushel(Schill, 2007; Swenson, 2008)
- This price premium compensates producers to truck corn as far as 50 miles to the ethanol plant (Stuefen, 2005).

27

- 45% of Iowa farmland owners do not live on the land and 19% of Iowa farmland is owned by people living out-of-state
- In IMPLAN modeling language, the event being modeled is an increase in ethanol output within the county, an increase in farmland owners' income, an increase in corn acres, and an increase in livestock production.
- In the four case studies, there are 35 to 39 jobs at the plant and 99 to 250 after all the indirect and induced effects in the county are included.
- Increases in cattle operations, where feasible, could have large effects, but the effects depend on the technology to be used, its integration with the local economy, and its labor intensiveness.
- In a report for the Renewable Fuels Association, Urbanchuk (2008) estimates a 100 MGY ethanol plant will lead to 1,137 jobs in the local economy and 1,790 jobs statewide.

28

- Additional land brought into corn production in regions where corn is irrigated, as in Nebraska, might lead to thousands of acres of new irrigation unless water use is restricted. Overpumping can eventually exhaust aquifers and lead to irrigated farmland returning to dry land production, causing land values to fall – 30% to 60% in one estimate
- Water treatment also varies considerably in cost and availability. Often, the treatment infrastructure is provided by the municipality or another local government with costs borne by the community or shared with the plant.

29

- Based on interviews with industry professionals, Swenson (2007) takes another 1,943 jobs away from Urbanchuk's Iowa total because the utilities do not add jobs proportionately to their output increases. Swenson chips away further: 1,081 jobs stemming from transportation because the corn would have been transported to export without the ethanol plant and 351 jobs from petroleum refining unlikely to occur in Iowa. In the end, changing the assumptions reduced the estimated Iowa job impact from 27,205 to 5,431.
- An ethanol plant offers the same enticing benefits to the local economy as any manufacturing plant that employs 30 to 50 people and pays good wages.

30

- **Understanding Biofuels Economic Impact Claims,** David Swenson, Iowa State University, Department of Economics, April, 2007.
- A 50 million gallon per year (MGY) ethanol plant in Iowa requires 35 jobs. A 100 MGY per year plant only requires 45 jobs.

31

- Turnquist, Alan, T. Randall Fortenbery, Jeremy Foltz. (2008). "Progress or Devastation? The Effects of Ethanol Plant Location on Local Land Use." Department of Agricultural and Applied Economics, University of Wisconsin- Madison, *Selected Paper prepared for presentation at the American Agricultural Economics, Association Annual Meeting, Orlando, FL, July 27-29, 2008.*
- Construction of ethanol plants typically increases both truck traffic for feedstock inputs and train traffic to deliver the finished product to market in the communities where they locate.

32