Energy Information Report 2011

In its 2007 Session, the Iowa General Assembly passed, and Governor Culver signed into law, extensive and far-reaching state energy policy legislation. This legislation created the Iowa Office of Energy Independence and the Iowa Power Fund. It also required a report to be issued each year detailing:

- The historical use and distribution of energy in Iowa.
- The growth rate of energy consumption in Iowa, including rates of growth for each energy source.
- A projection of Iowa's energy needs through the year 2025 at a minimum.
- The impact of meeting Iowa's energy needs on the economy of the state, including the impact of energy production and use on greenhouse gas emissions.
- An evaluation of renewable energy sources, including the current and future technological potential for such sources.

Much of the energy information for this report has been derived from the on-line resources of the Energy Information Administration (EIA) of the United States Department of Energy (USDOE). The EIA provides policy-independent data, forecasts and analyses on energy production, stored supplies, consumption and prices. For complete, economy-wide information, the most recent data available is for the year 2008. For some energy sectors, more current data is available from EIA and other sources and, when available, such information has been included in this report.

Historical Use and Distribution of Energy in Iowa

Understanding Energy Use in Iowa

There are 3 key questions that must be answered to understand both current and historical use and distribution of energy in Iowa:

- How much energy do we use?
- How is that energy generated?
- How do we use the energy?

This report will also put these questions in a historical context and offer comparisons with national data, where that comparison is useful to understanding Iowa's energy situation.

Many factors can influence energy use and fuel mix. Trends in energy use in Iowa and the U.S. as a whole closely follow periods of economic expansion and contraction. Current EIA estimates predict that, once the numbers are in, all types of fuels will show a decline in use during 2008 and 2009.

Energy use is also tied very clearly to price signals. As the price of oil climbed during 2007, vehicle miles traveled decreased as people looked to alternatives such as public transportation, car pooling and simply making fewer car trips.

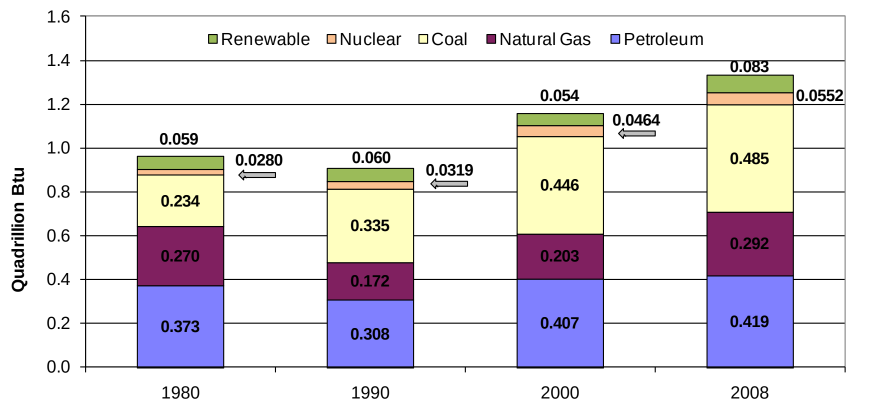
Energy use in total as well as the mix can be influenced by policy, such as the production tax credit for wind, the federal Renewable Fuels Standard and carbon-limiting regimes that have been implemented in several regions of the U.S.

Finally, advances in technology can lead to changes in fuel consumption patterns. As certain technologies become better and cheaper, they become a more economical choice and take a more dominant role in the energy mix.

How much energy do we use?

Graph 1 illustrates Iowa's energy use and fuel mix for 1980 through 2008. The EIA data shows that energy use in Iowa grew by 22.7% between 1980 and 2008 for a strong general upward trend. Table 1 shows the specific data on total energy use and the rate of change over the time period displayed in Graph 1. Energy use declined 13% between 1980 and 1990, increased 28% between 1990 and 2000 and increased an additional 14% between 2000 and 2008.

Graph 1: Iowa Primary Energy Consumption by Fuel Type 1980 - 2008



Source: US DOE EIA. "Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS) 2008. Released: June 30, 2010.

Table 1: Total Iowa Energy Consumption, Trillion BTU 1980-2008

	1980	1990	2000	2008
Total Energy Consumption	1,006.9	873.6	1,117.2	1,278.6
Change from Previous Period	N/A	-13.2%	27.9%	14.4%

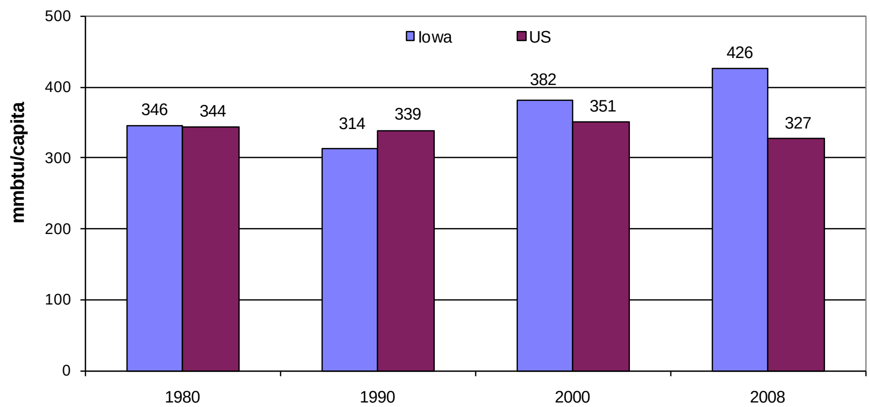
Source: US DOE EIA. "Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS). Released: June 30, 2010.
***Note:** Total is different from Graph 1 due to volume of electricity import/export and EIA adjustments.

Energy use per capita is another useful way to measure Iowa's energy use. In 2008, Iowa ranked 30th in terms of population and 29th in Gross State Product, but 6th in energy use per capita. Graph 2 compares national per capita energy use with Iowa's per capita energy use over time. For each person in Iowa in 2008, 426 mmbtu of energy was consumed. The national average was 327 mmbtu per person. The gap between Iowa and the rest of the country on this measure has grown steadily since 1980.

Comment [TWO1]: OEI: THE PRIMARY REASON FOR THIS DICHOTOMY IS THAT IOWA IS BECOMING MORE INDUSTRIALIZED (ETHANOL PLANTS AND BIODIESEL PLANTS) WHILE THE REST OF THE US ECONOMY IS BECOMING MORE SERVICE ORIENTED. THIS CHART "LOOKS" BAD BUT IN FACT RELFECTS A GROWING IOWA ECONOMY.

LATER DISCUSSION ADDRESSES THIS ISSUE

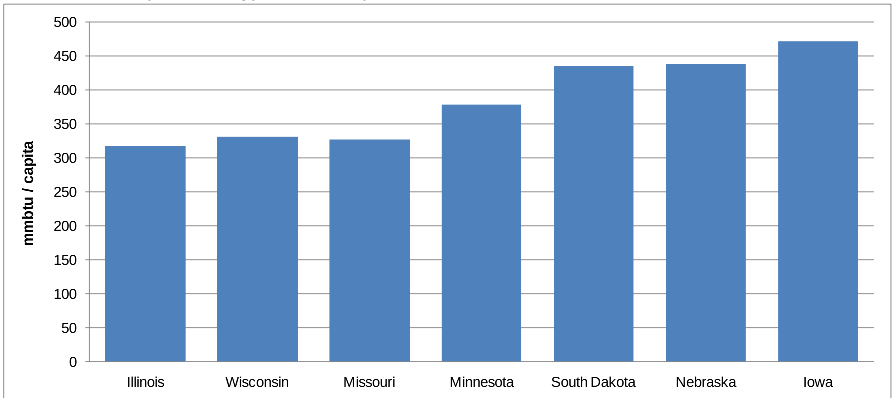
Graph 2: Iowa and U.S. Primary Energy Consumption per Capita, 1980-2008



Sources: (1) (a) US DOE EIA. "Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS). Released: June 30, 2010 (b) "Table 1.3 Primary Energy Consumption by Source, Selected Years, 1949-2009" (Quadrillion Btu). Annual Energy Review 2009. pp. 9. (2) (a) US Census. Population estimates for all states (Excel file) (b) "People QuickFacts."

It is also useful to compare this statistic within the Midwest. Illinois has the lowest total per capita energy use and Iowa the highest. (Graph 3) In general, the states with larger population centers appear to have lower energy usage per capita.

Graph 3: Energy Use Per Capita, Iowa and other Midwestern States, 2008

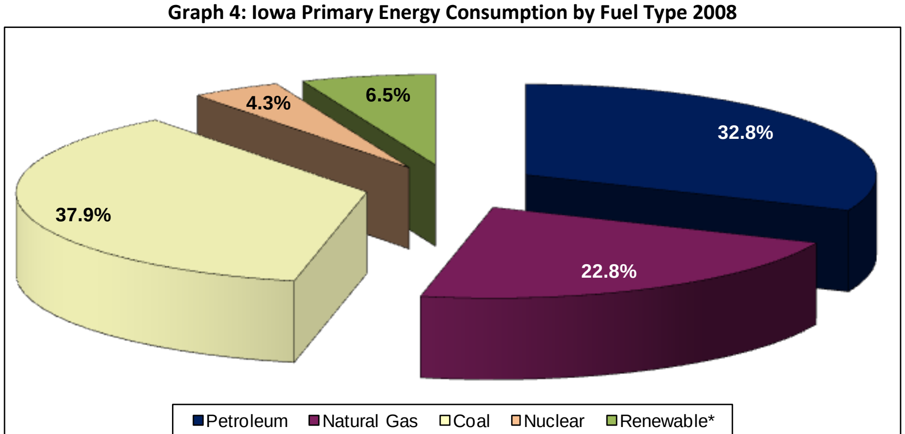


Source: (1) US DOE EIA State Energy Data System (SEDS) 2008 - Consumption (2) US Census Bureau

Where does Iowa's energy come from?

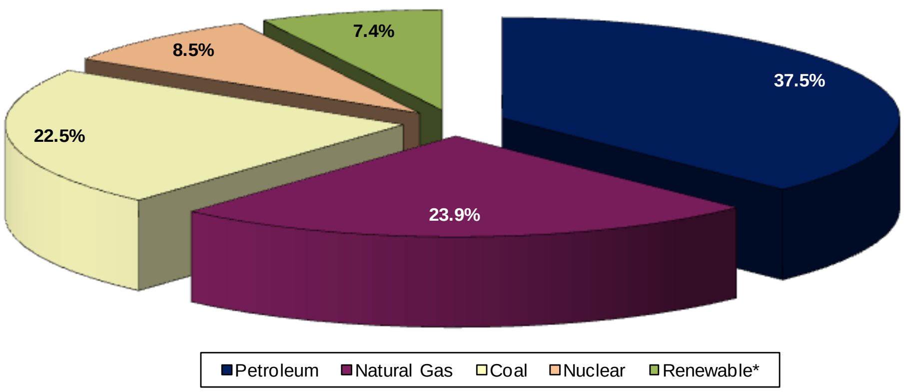
While energy use in Iowa, both overall and per capita, has trended generally upward since 1980, the fuel mix has been less predictable. The fuel mix supporting Iowa's 2008 energy consumption is displayed in percentage terms in Graph 3. Graph 4 breaks down U.S. energy consumption for comparison.

Graph 4: Iowa Primary Energy Consumption by Fuel Type 2008



Source: US DOE EIA. *State Energy Data System (SEDS) 2008: Energy Consumption by Source*
*Renewable energy includes hydroelectric, geothermal, wind, solar, biomass and ethanol
Note: percentages may not add to 100% due to EIA adjustment factors that correct for double counting in some consumption estimates.

Graph 5: U.S. Primary Energy Consumption by Fuel Type 2008



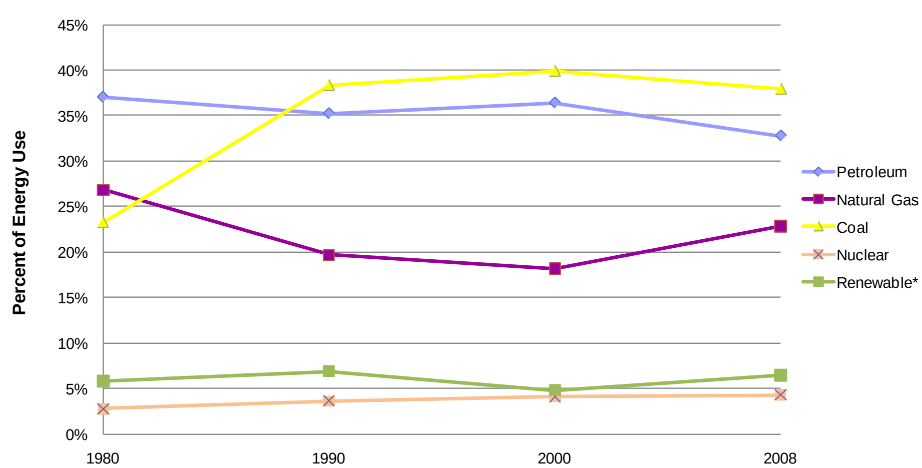
Source: US DOE EIA. "Table 1.3 Primary Energy Consumption by Source, Selected Years, 1949-2009" (Quadrillion Btu). Annual Energy Review 2009.
*Renewable energy includes hydroelectric, geothermal, wind, solar, biomass and ethanol

Of particular note:

- The role of **coal** in Iowa, which makes up a significantly larger proportion of the energy mix in the state than it does in the U.S. as a whole.
- In Iowa, **nuclear energy** contributes less than half what it does in the nation generally.
- **Renewable energy** consumption in Iowa is approximately the same as the national numbers.

Graph 6 and Table 2 show how the mix of energy resources that power the state has changed between 1980 and 2008.

Graph 6: Change in Iowa Primary Energy Consumption by Fuel Type, 1980-2008



Source: *US DOE EIA. "Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS). Released: June 30, 2010.*
*Renewable Energy includes hydroelectric, geothermal, wind, solar, biomass and ethanol

Table 2: Percent Change in Iowa Primary Energy Consumption by Fuel Type 1980 - 2008

Fuel	1980-1990	1990-2000	2000-2008	1980-2008
Petroleum	-17.5%	32.2%	3.0%	12.4%
Natural Gas	-36.3%	18.0%	43.8%	8.0%
Coal	42.9%	33.1%	8.8%	107.0%
Nuclear	13.9%	45.5%	19.0%	97.1%
Renewable	2.9%	-10.1%	52.5%	41.0%
Total	-13.2%	27.9%	14.4%	27.0%

Source: Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS). Released: June 30, 2010.

There are several noteworthy trends:

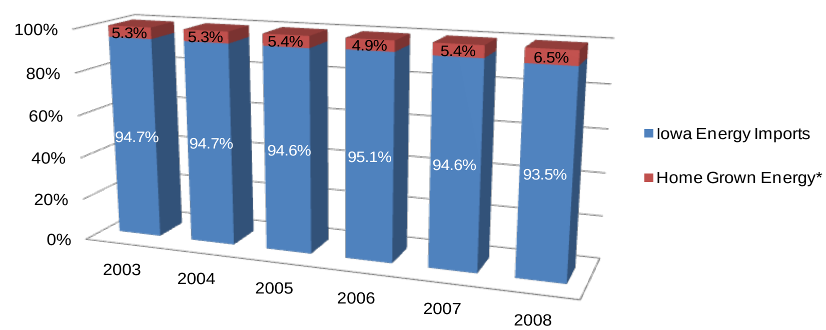
- Between 1980 and 2008, use of **coal** has doubled, both in terms of BTU consumption and as a percent of Iowa's energy mix. Coal use reached a peak in 2000 and then declined somewhat.
- **Natural gas** use has declined as a percentage of overall energy use in Iowa since 1980, but its total use has risen along with energy mix percentage, starting in 1990. (Table 1)
- **Petroleum** has maintained a relatively steady position in Iowa's fuel mix, accounting for around 35% of our energy use since 1980. Its use declined in the 80s at a rate somewhat slower than the decline of natural gas. Its comeback has been much more impressive, as its overall growth rate between 1980 - 2008 was 12.4%.

- **Renewable energy** use dropped between 1990 and 2000, mainly due to decreased use of biomass. The large growth in renewable energy between 2000 and 2008 can largely be attributed to wind energy and then ethanol.
- Although **nuclear energy** makes up quite a small portion of Iowa's energy consumption, its use has grown by 97% since 1980.

Iowa's Energy Balance

It follows that Iowa's current reliance on fossil energy sources also means that Iowa continues to rely heavily on energy imported from other states and nations (Graph 7).

Graph 7: Iowa Imported vs Home Grown Energy Consumption, 2003-2008

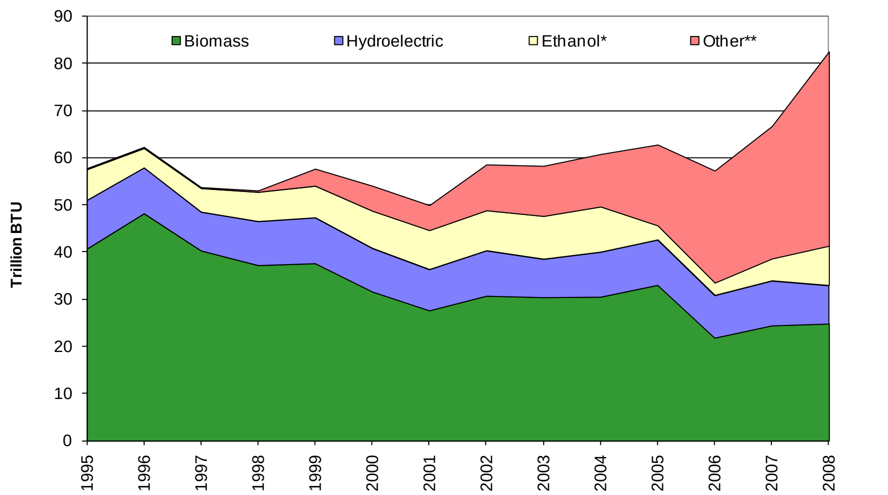


Source: US DOE EIA. "Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS). Released: June 30, 2010.

Iowa imported energy includes petroleum, coal, natural gas, and nuclear power.
*Home Grown Energy includes biomass, hydroelectric power, ethanol, geothermal, solar and wind power.

The EIA estimates that 93.5% of energy consumed in Iowa in 2008 was produced from resources coming from outside the state. Homegrown energy consumption has fluctuated within the range of 5 to 7% from 2003 to 2008. Increase consumption of wind energy is almost solely responsible for this increase, as Graph 8 illustrates.

Graph 8: Composition of Renewable Energy Consumption in Iowa, 1995-2008



Source: US DOE EIA. "Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS) 2008. Released: June 30, 2010. http://www.eia.doe.gov/emeu/states/hf.jsp?incfile=sep_use/total/use_tot_iacb.html&mstate=IOWA
*There is discontinuity in data between 2004 and 2005 because EIA changed estimation methodology.
**"Other" includes wind, photovoltaic, geothermal and solar thermal energy.

Iowa's "energy balance" - the amount of "domestic" energy consumed out of the total used - is an important measure of progress toward the goal of energy independence. (Graph 7)

While the majority of the energy consumed in Iowa still comes from out-of-state resources, it is important to note that Iowa's **production of homegrown energy has grown rapidly** in the last several decades. According to EIA SEDS 2008, wind production has increased from 1.21 to 40,242 billion Btu from 1997 to 2008; production of fuel ethanol increased from 833 thousand barrels in 1981 to 56 million barrels by 2008.

How does Iowa use Energy?

The EIA breaks down how we use energy into four sectors: the residential, industrial, commercial and transportation sectors. The Iowa industrial sector, which includes agriculture, is the largest user of energy in Iowa, accounting for 46.2% of all energy consumed in 2008. (Table 3) The next highest energy-using sector is transportation with a 21.9% share. Residential energy use was 17.6%, and the commercial sector used 14.3% of all energy consumed in Iowa in 2008.

Table 3: Iowa Energy Use by Economic Sector, 1980 - 2008								
	1980		1990		2000		2008	
Sector	Trillion Btu	%	Trillion Btu	%	Trillion Btu	%	Trillion Btu	%
Residential	242	24.0%	199	21.3%	228	19.4%	249	17.6%
Commercial	125	12.4%	130	14.0%	166	14.1%	202	14.3%
Industrial	402	39.9%	368	39.5%	511	43.4%	654	46.2%
Transportation	238	23.6%	236	25.3%	271	23.1%	309	21.9%
Total	1,007	100.0%	933	100.0%	1,175	100.0%	1,414	100.0%
US DOE EIA. Energy Consumption Estimates by Sector, Selected Years, 1960-2008, Iowa. State Energy Data System (SEDS) 2008. Released: June 30, 2010.								

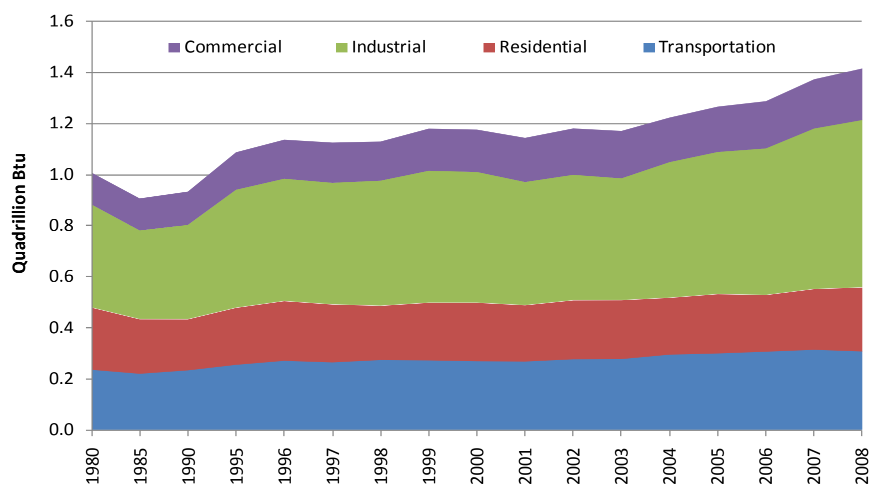
The commercial sector has remained fairly steady as a percentage of total energy use in Iowa over the period, while the transportation sector has modestly declined. Residential usage as a percentage has steadily declined and Industrial usage has increased, in particular since 1990.

Table 4: U.S. Primary Energy Consumption by Economic Sector, 1980 - 2008								
	1980		1990		2000		2008	
Sector	Trillion Btu	%	Trillion Btu	%	Trillion Btu	%	Trillion Btu	%
Residential	15,760	20.2%	16,982	20.1%	20,446	20.7%	21,606	21.7%
Commercial	10,590	13.6%	13,365	15.8%	17,218	17.4%	18,411	18.5%
Industrial	32,077	41.1%	31,894	37.7%	34,756	35.1%	31,358	31.5%
Transportation	19,696	25.2%	22,419	26.5%	26,548	26.8%	28,027	28.2%
Total	78,123	100.0%	84,660	100.0%	98,968	100.0%	99,402	100.0%
US DOE EIA. Table 2.1a Energy Consumption by Sector, Selected Years, 1949-2009 (Trillion Btu). Annual Energy Review 2009. pp. 40. Released: Aug 2010.								

In 2008, Iowa's residential and commercial sectors consumed relatively less energy on a percentage basis than those sectors consumed in the U.S. as a whole. Iowa's transportation and industrial sectors made up a relatively larger proportion of total energy consumed in the state than the U.S. as a whole. (Table 4) In fact, Iowa's industrial sector energy usage has increased almost 70% from 1990 while the U.S. as a whole has been essentially flat. This outcome is due to the emergence of different industrial trends in Iowa and the rest of US. In the U.S. Industrial sector, imports of both durable and non-durable goods from energy-intensive manufacturing processes, growth of the service sector in the US, and competitiveness of manufacturing industries in other countries are just a few factors contributing to the flat, if not declining, energy consumption from this sector of the U.S. economy. In Iowa, however, agriculture, which had averaged 4 percent of the state's GDP from 1997 to 2003 saw an increase to 6 percent during the 2004-2008 period. The rise of Iowa's agriculture sector has also been coupled with the construction of a number of biorefineries in the state. In 2008, the production of 56 million barrels of ethanol required approximately 214 trillion btus.

In absolute terms, Iowa's energy consumption has increased in every sector except the residential sector in the 1980-2008 timeframe. (Graph 10 and Table 5) The commercial and industrial sectors in Iowa have increased energy use far more than other sectors, using 62% and 63% more energy in 2008 than in 1980.

Graph 9: Iowa Primary Use by Sector, 1980-2008



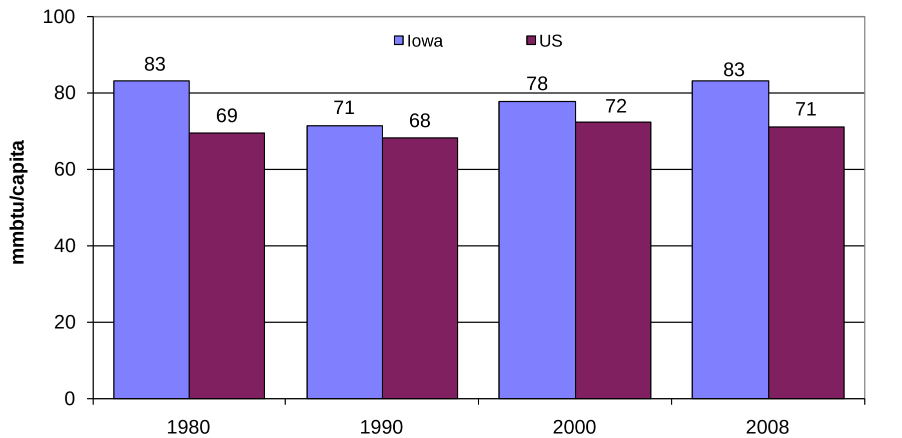
Source: US DOE EIA. Energy Consumption Estimates, Selected Years, 1960-2008, Iowa by Sector. State Energy Data System (SEDS) 2008.

Table 5: Iowa and U.S. Energy Consumption Growth by Sector, 1980-2008		
	Iowa	**U.S.**
Residential	2.9%	37.1%
Commercial	61.6%	73.9%
Industrial	62.6%	-2.2%
Transportation	30.0%	42.3%
Total	40.4%	27.2%

Source: (1) US DOE EIA. Energy Consumption Estimates by Sector, Selected Years, 1960-2008, Iowa. State Energy Data System (SEDS) 2008. Released: June 30, 2010 (2) US DOE EIA. Table 2.1a Energy Consumption by Sector, Selected Years, 1949-2009 (Trillion Btu). Annual Energy Review 2009. pp. 40. Released: Aug 2010.

Iowa's energy consumption has grown at a much slower rate than the nation as a whole in every sector except industrial use. As noted earlier, the likely primary factor leading to the higher industrial usage in Iowa is the rapid growth in the construction and operation of ethanol plants in Iowa, in particular from 2000 to today. Iowa's residential use is especially notable when viewed in terms of overall use and compared to the U.S. as a whole. However, it is also important to break down the residential data further to understand it better. Residential use in Iowa decreased by nearly 15% between 1980 and 1990, then grew by nearly that same amount between 1990 and 2008.

Graph 10: Iowa and U.S. Residential Energy Consumption per Capita, 1980-2008

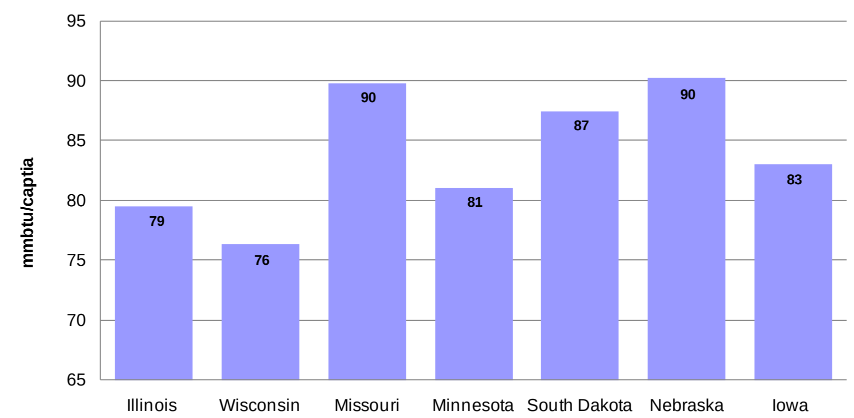


Source: US DOE EIA. (US) Annual Energy Review 2009, (Iowa) State Energy Data System (SEDS) 2008.

Iowa's per capita residential energy use dropped dramatically between 1980 and 1990, while the U.S. average dropped only a small amount. From 1990 onward, national residential use per capita has remained at a fairly steady level while Iowa's use has increased by almost 10%. Graph 10 illustrates the growing gap between Iowa and U.S. per capita energy use in the residential sector since 1990.

Compared to other Midwestern states, however, Iowa compares a bit more favorably on this metric. Iowa's per capita residential energy use in 2008 was higher than Illinois, Wisconsin, and Minnesota, but lower than Missouri, South Dakota, and Nebraska. (Graph 11)

Graph 11: Residential Energy Use per Capita, Iowa and other Midwestern States, 2008

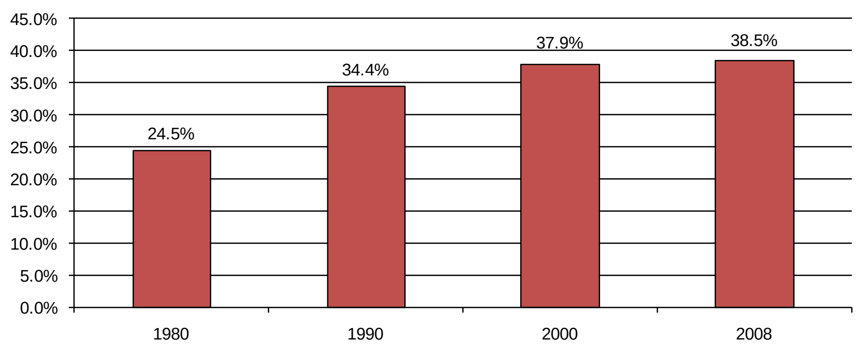


Source: US DOE EIA. Consumption, British Thermal Units, 1960-2008. Data Files, All States and All Years. Consumption, Price, and Expenditure Estimates. State Energy Data System (SEDS). Released: June 30, 2010.

Iowa's Electric Sector

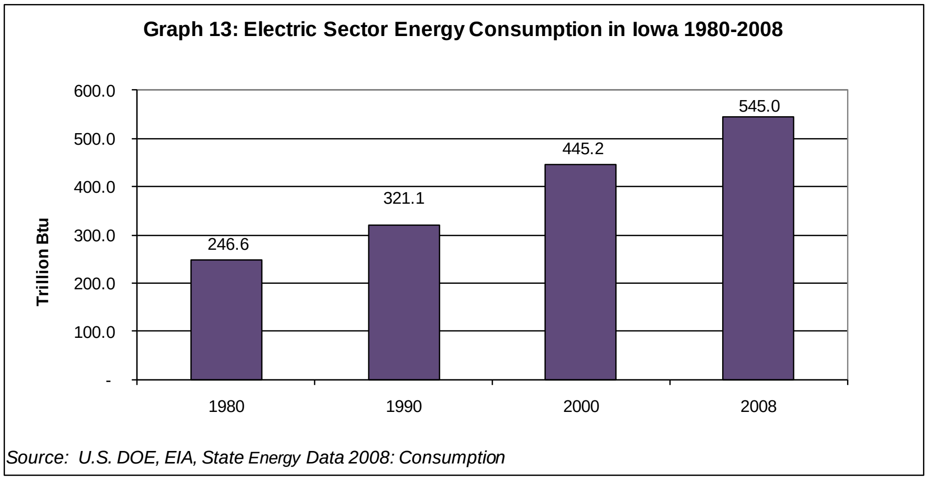
In 2007, about 39% of energy consumed in Iowa took the form of electricity. That percentage has been increasing since 1980. (Graph 12)

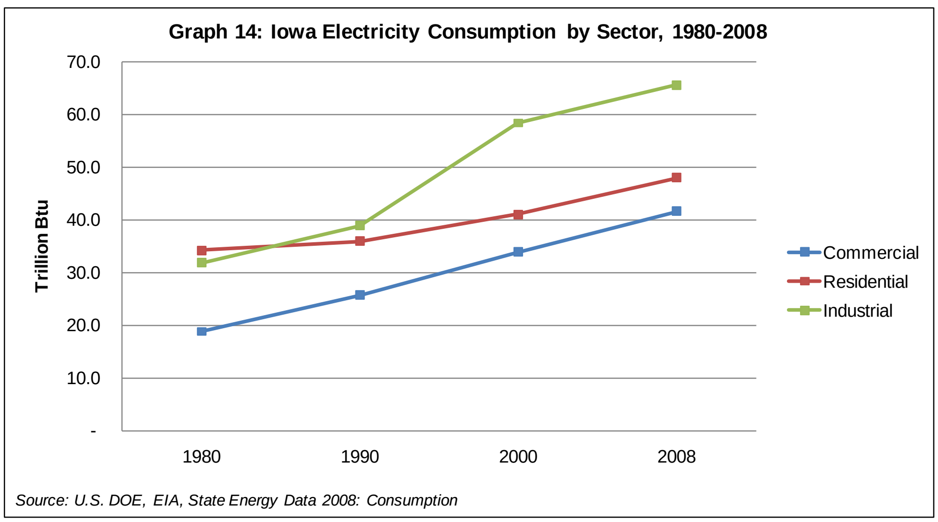
Graph 12: Electric Sector Consumption as Percentage of Total Energy Use 1980-2008



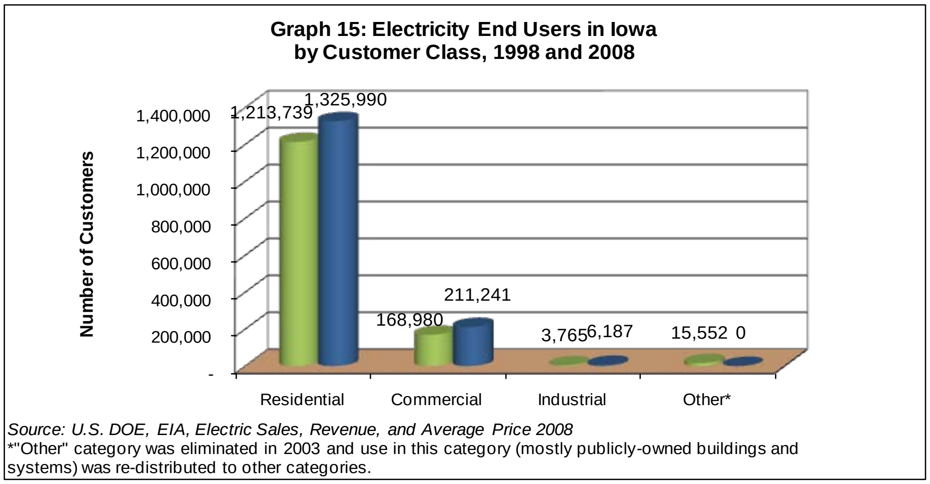
Source: U.S. DOE, EIA, State Energy Data 2008: Consumption

Total electricity consumption in Iowa has also risen over time, by about 121% or 4.3% per year. (Graph 13)

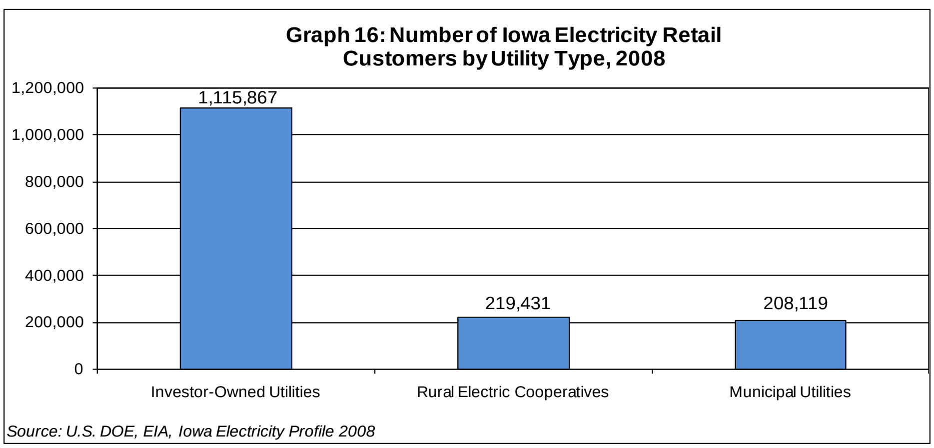




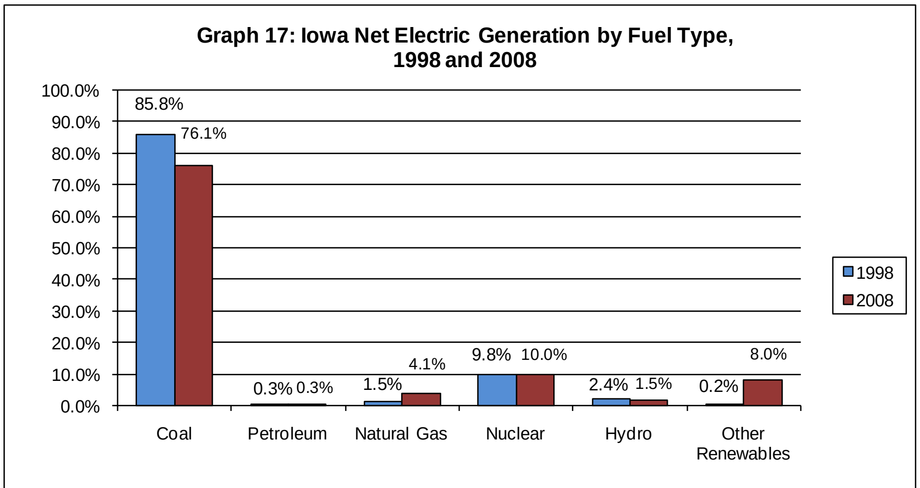
The rise in electric consumption has been driven by demand in the commercial and industrial sectors. Between 1980 and 2008, electricity consumption in the commercial sector rose by over 120% and use in the industrial sector grew by 106%. Graph 14 illustrates Iowa's electricity consumption by sector for 1980 to 2008. The transportation sector in Iowa does not use any electricity, so only the commercial, residential and industrial sectors are displayed.



Utilities generally view those they serve in terms of "customer classes," including charging different rates to these different types of customers. The largest customer class in Iowa is residential electricity users. The number of customers in all classes has increased over time, though growth in industrial customers has led the way, increasing by 64% between 1998 and 2008. (Graph 15)



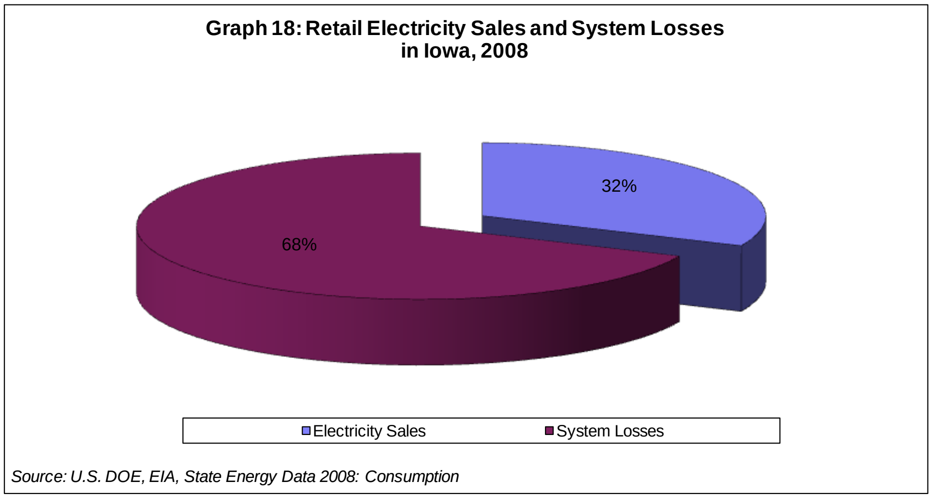
The very large majority of electric customers in Iowa are served by Investor-Owned Utilities, or IOUs. The IOUs in Iowa that sell electricity include MidAmerican Energy and Alliant Energy (or Interstate Power and Light). The other types of electricity providers in the state are municipally-operated utilities and electric co-operatives. (Graph 16) The IOUs are for-profit businesses, with rates that are regulated by the Iowa Utilities Board (IUB). The municipals are non-profit, government entities and the co-ops owned by their membership and both types of utilities set their own electric rates.



Source: U.S. DOE, EIA, State Energy Data 2008: Consumption

Electricity generation in Iowa is heavily coal-based. Natural gas and renewable generation has increased over the last 10 years, as use of coal has decreased. However, Iowa still relies on coal for more than three quarters of electric generation in the state. (Graph 17)

Although electricity is a very handy carrier of usable energy, its generation and distribution leaves something to be desired in terms of efficiency. Only around one-third of the Btu inputs into an electric generation facility actually make it through to the end user, with most of the remaining energy lost as heat in the combustion process. (Graph 18)

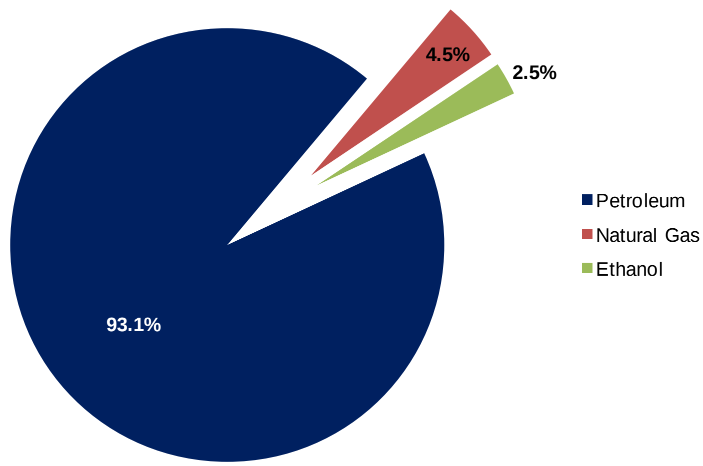


Iowa's Transportation Sector

Predictably, energy use in Iowa's transportation sector is dominated by petroleum. (Graph 20) Natural gas and ethanol are the two other fuels that make an appearance, but together they make up only 7% of energy consumed in Iowa's transportation sector[1]. More data on total energy consumption in the transportation sector can be found in Tables 3 and 4 of this report.

Graph 19: Iowa Transportation Sector Energy Consumption, 2008

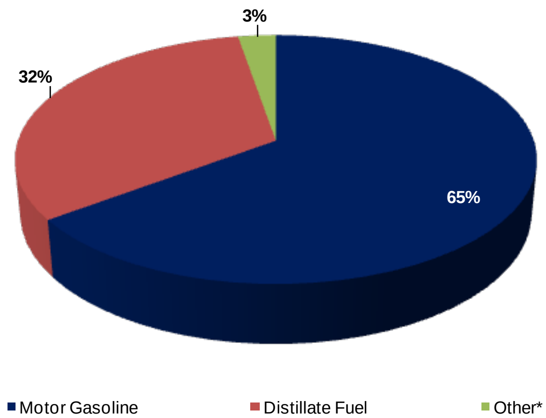
[1] Natural gas used for natural gas pipeline compressor stations is included in the transportation sector



Source: US DOE EIA. "Table 11. Transportation Sector Energy Consumption Estimates, Selected Years, 1960-2008, Iowa. State Energy Data System 2008. Released: June 30, 2010.

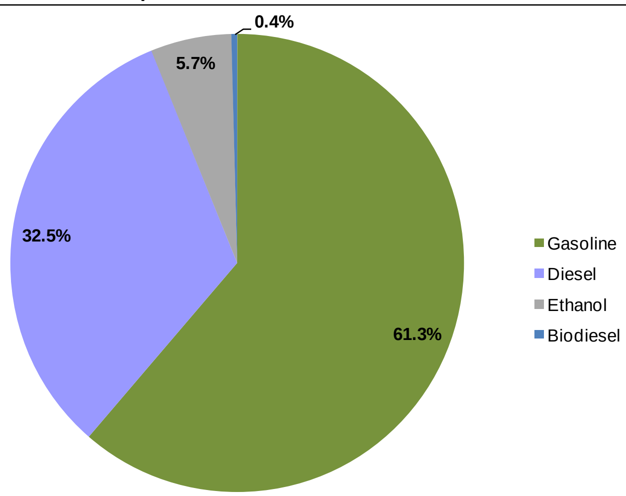
The petroleum consumed in the state is about two-thirds gasoline and one-third distillate fuel (diesel). (Graphs 20 and 21)

Graph 20: Petroleum Consumption in Iowa's Transportation Sector, 2008



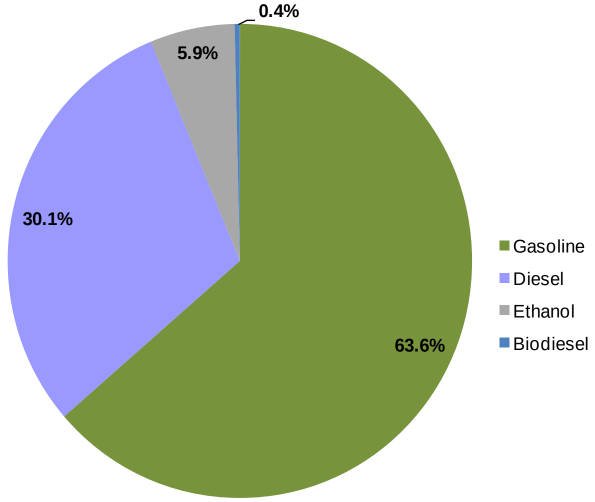
Source: US DOE EIA. "Table 11. Transportation Sector Energy Consumption Estimates, Selected Years, 1960-2008, Iowa. State Energy Data System 2008. Released: June 30, 2010.

Graph 21a: Consumption of Biodiesel and Ethanol in Iowa, 2008



Source: Iowa Dept. of Revenue. Table 1: Iowa Biofuel Sales 2008 Statewide Summary (as filed). Iowa Department of Revenue, 2008 Retailers Motor Fuel Gallons Annual Report. Published: April 2009.

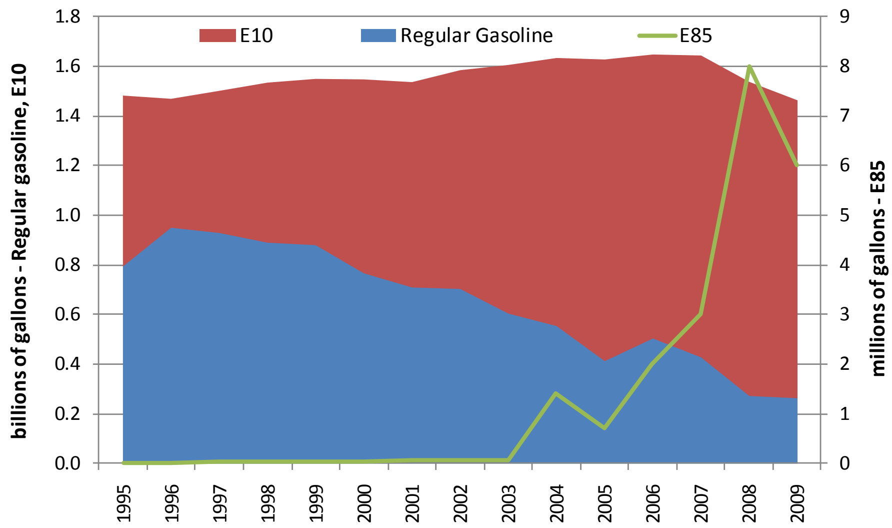
Graph 21b: Consumption of Biodiesel and Ethanol in Iowa, 2009



Source: Iowa Dept. of Revenue. Table 1: Iowa Biofuel Sales 2009 Statewide Summary (as filed). Iowa Department of Revenue, 2009 Retailers Motor Fuel Gallons Annual Report. Published: April 2010.

An analysis by the Iowa Department of Revenue, released in April 2010, estimated consumption of renewable fuels in the state through reporting from retail and wholesale fuel operations. The report found that 82% of gasoline-type fuel was blended at either the E10 or E85 level. The percentage of clear (on-road) diesel fuel blended at some level with biodiesel was 36.7% while 17.2% of dyed (off-road) diesel was blended with biodiesel. The component of gasoline and diesel-type fuel consumption in Iowa that was pure biofuel was about 6%. (Graph 21) Ethanol-blended gasoline has increased as a share of Iowa gasoline sales over the past 13 years, with E10 increasing steadily over the decade while E85 experienced the largest increase between 2005 and 2008. (Graph 22)

Graph 22: Iowa Gasoline Consumption - Regular and E10 Ethanol Mix, 1995-2008



Source: Iowa Department of Revenue. 2009 Retailers Motor Fuel Gallons Annual Report. pp. 3. Released: April 2010.

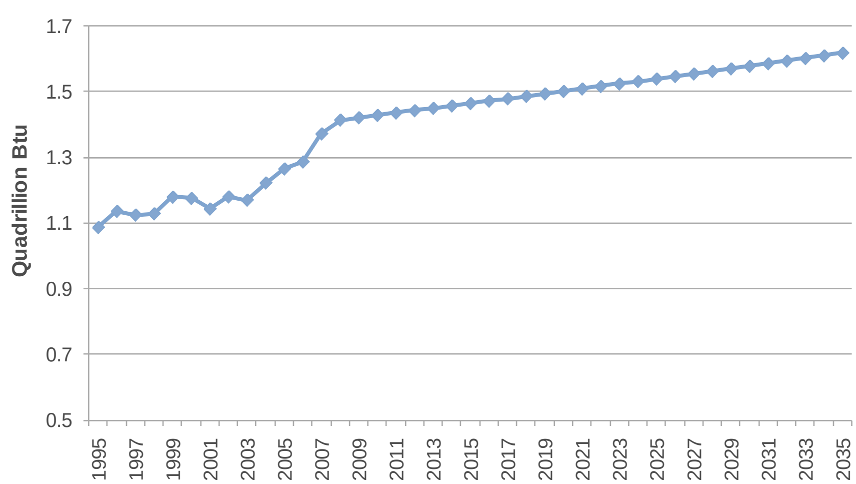
Projecting Iowa's Future Energy Needs

It is important to be aware that the precision and usefulness of long-term energy projections is often quite low. Estimates are based on business as usual, since it is nearly impossible to predict how demographic, technological, economic and political factors will shape future energy consumption and generation patterns. Even very recent events, such as the economic recession and subsequent funding through energy programs in the American Recovery and Reinvestment Act may have altered the path of projections in ways that haven't yet been quantified. The policies detailed in Iowa's Energy Independence plan are also designed to alter these projections from business as usual so that the state would reach its 2025 target. Each year, Iowa hopes to see these projections change as we bring the state closer to the goals of energy independence.

Recent EIA energy projections through 2035 for the U.S. as a whole predict slow growth of energy-intensive industries, such as chemical production and food processing. The EIA also projects a decline in energy use per dollar of gross domestic product (GDP). Petroleum projections by the EIA predict that efficiency gains will drive down consumption of petroleum as a percentage of GDP. The range of oil prices used in their projections range from 50 to 210 USD per barrel in 2030. The EIA projects an increasing share of liquid fuels will come from unconventional sources, such as biofuels and Canadian oil sands. If oil prices are low, the EIA projects less than 10% of liquid fuels will be unconventional. This increases to around 21% in the high oil price scenario.

The EIA projects that total energy consumption will increase by 0.5% per year in the 2008-2035 timeframe. Between their 2008 and 2009 reports, the EIA reduced their projection from 0.7% per year to 0.5% due to the expanded scale and slow recovery projections of the current economic recession. This figure remains unchanged in the *Annual Energy Outlook 2010*, as the service sector is expected to grow much faster than an energy-intensive sector such as manufacturing. Graph 23 illustrates how that growth rate would apply to Iowa's energy consumption. A 0.5% annual growth rate would mean an increase in energy consumption in Iowa of 28% in the 30-year span between 2005 and 2035. This is a reduction from the 40% growth in energy consumption that took place in Iowa between 1985 and 2005. It should be noted however that energy consumption in Iowa may increase at a higher rate than the EIA forecasts for the U.S. overall if there are continued development of biorefineries in Iowa due to requirements to meet the federal Renewable Fuel Standard under the Energy Independence and Security Act (EISA) of 2007.

Graph 23: Growth Projections for Iowa Primary Energy Consumption through 2035

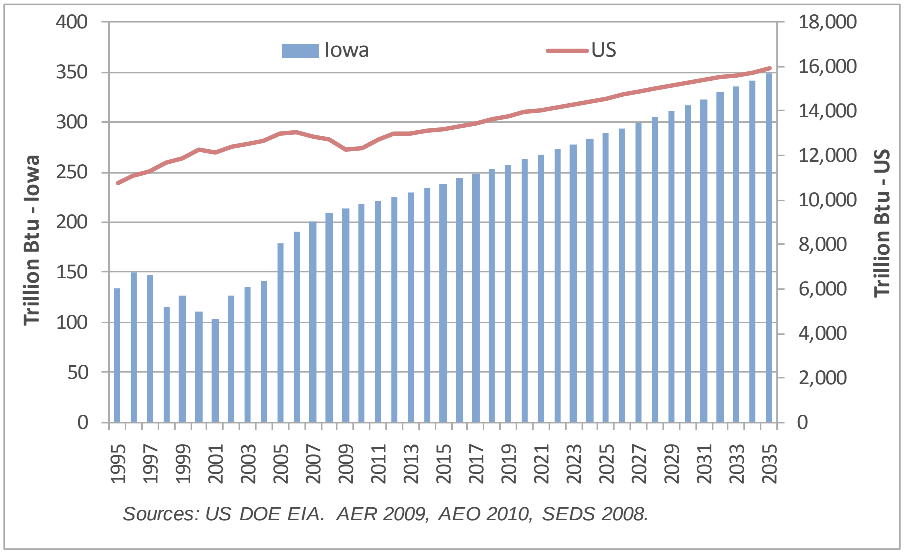


Sources: US DOE EIA. "Table 7b. Energy Consumption Estimates by Source, Selected Years, 1960-2008, Iowa (trillion btu)." State Energy Data System (SEDS). Released: June 30, 2010.

Comment [JC2]: OEI: Need instructions from you as to whether forecasts for Iowa should be carried forward to 2035. Current forecast is now done just through multiplication of a factor.

The EIA projects that consumption of electricity in the U.S. will increase by 1.0% per year. The Center for Climate Strategies, on behalf of the Iowa Climate Change Advisory Council, projected that Iowa's electricity demand will increase by 1.9% per year through 2050. (Graph 24)

Graph 24: Iowa and U.S. Projected Energy Use for Power Generation through 2035



Sources: US DOE EIA. AER 2009, AEO 2010, SEDS 2008.

This means that the EIA is projecting that energy use will shift to electricity, away from other forms of energy, such as liquid fuels. The U.S. growth rate would mean a 22% increase in electricity consumption between 2005 and 2035. The Iowa rate of growth would result in an overall growth rate of 95% during the same 30-year time span. However, a simulation run by staff at the Great Plains Institute for Sustainable Development (GPISD) on the Energy Choice Simulator model, developed to evaluate policy options for the Midwestern Governor's Association's Energy and Climate Stewardship Roadmap, projected that Iowa's electricity demand will increase by 24% between 2005 and 2025, an average of 1.1% per year.[2] This very large difference in projections for the state supports the disclaimer heading this section that future energy demand is very difficult to predict.

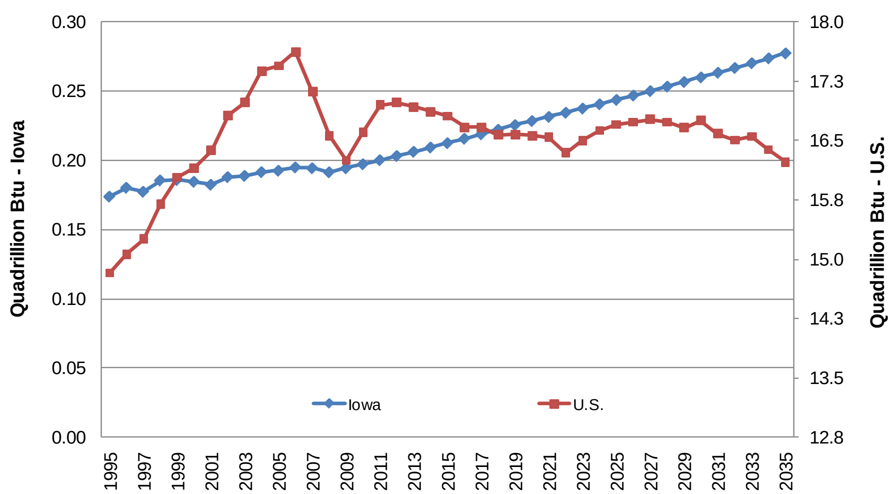
Comment [JC3]: CANNOT UPDATE THESE PROJECTIONS UNTIL FURTHER EXAMINATION OF THE REPORT IS MADE POSSIBLE.

The EIA projects that gasoline use in the U.S. will decline over the next 17 years as small diesel vehicles come into more common use, alternative fuels use increases along with the Federal Renewable Fuel

[2] "Energy Choice Simulator results are critically dependent on assumptions made about highly uncertain variables such as the expected price paths of oil and coal and estimates of growth in demand for electricity and fuel. While the results of the model are therefore useful for illustrating the complexity of economic response to a given policy or policies, they should not be interpreted as predictions about absolute levels of impact unless accompanied by extensive sensitivity analysis around these uncertain but influential variables. This document does not provide such sensitivity analysis, and presents the model results to illustrate the dynamics of the response and the relative impact of policy efforts rather than to predict the absolute magnitude of impact." – Midwest Energy Security and Climate Stewardship Roadmap, 2009, page 7.

Standard and hybrid cars make up an increasing share of the vehicle fleet. However, the Center for Climate Strategies projected that gasoline use in Iowa will increase by 1.5% per year. (Graph 25)

Graph 25: Projected Motor Gasoline use in Iowa and the U.S. through 2035



Sources: (1) US DOE EIA. "Table 11. Transportation Sector Energy Consumption Estimates, Selected Years, 1960-2008, Iowa. State Energy Data System 2008. Released: June 30, 2010. (2) US DOE EIA. "Table 46. Transportation Sector Energy Use by Fuel Type within a Mode." AEO 2010. Released: May 11, 2010. (3) Center for Climate Strategies. "Final Iowa Greenhouse Gas Inventory and Reference Cas Projections 1990-2025." Released: October 2008.

If both projections are correct, the result would be a decrease in U.S. gasoline consumption of 4% between 2005 and 2025, while gasoline use in Iowa increases by 27% over that time period. The EIA number reflects lower projections due to improved fuel economy standards and penetration of alternative-fuel vehicles in the transportation sector, which could account for a portion of the discrepancy between the U.S. and Iowa projections. In addition, the Center for Climate Strategies study was released in October, 2008, just as the U.S. and Global economy was reeling from extremely high petroleum prices followed by the major recession. The assumptions in that study may have been based on pre-recession economic outlooks.

Comment [TWO4]: OEI: IT MAY BE WORTH SEEING IF THERE IS AN UPDATE TO THE CCS STUDY, OR LOOK INTO WHAT GROWTH RATE EIA FORECASTS FOR THE CENTRAL MIDWEST CENSUS REGION.

The Impact of Meeting Iowa's Energy Needs

If an analysis of Iowa's projected future energy needs is fraught with uncertainty, determining the economic and environmental impact of meeting those needs is even more questionable. There are many inputs on both sides of the energy balance ledger that could impact Iowa's economy. Status quo thinking about energy ties economic development to growth in energy use. Instead, economic development is really tied to a **critical suite of energy services** that may not necessarily mean increased expenditures on btus, but could be expenditures related to energy efficiency, transmission and distributed generation that contribute to Iowa's energy independence and economic prosperity.

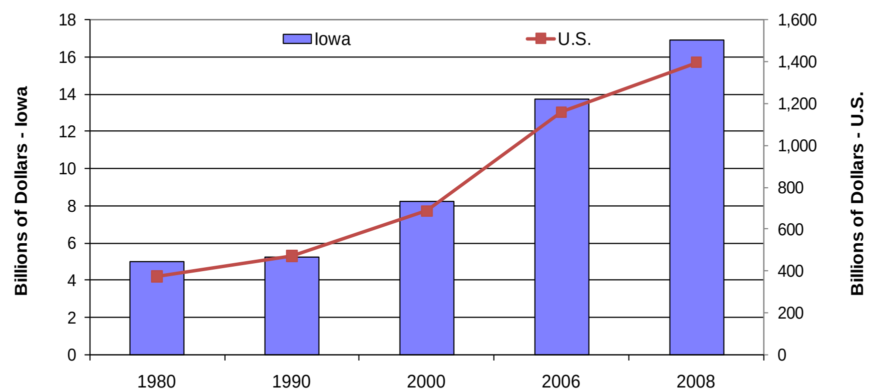
Increasing expenditures on renewable, Iowa-produced energy could have a positive economic impact on the state. Investments in energy efficiency that reduce overall energy expenditures could also be a positive, increasing consumers' ability to spend money on non-energy goods. The impacts of global warming and likely future greenhouse gas (GHG) regulation bring additional considerations to the equation.

In their 2010 Annual Energy Outlook, the EIA projects that energy expenditures will increase substantially in every sector between now and 2035. This projection is based on business as usual, and the projections for Iowa detailed in the previous section reflect the same premise of continued higher consumption along with higher prices.

Energy Expenditures

From an historical perspective, Iowa has been largely on track with the nation as a whole in terms of energy expenditures since the 1980s. Iowa energy expenditures grew by 14% per year between 1995 and 2008 while the U.S. averaged a growth rate of 13% per year. (Graph 26)

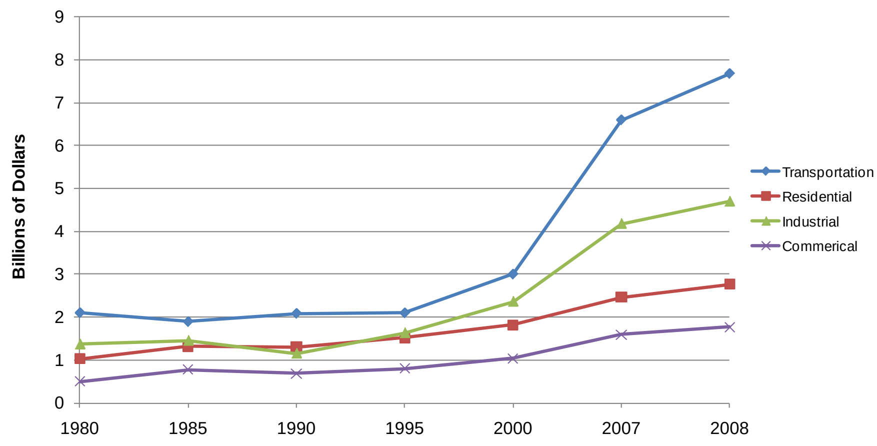
Graph 26: Iowa and U.S. Primary Energy Expenditures 1980-2008



Sources: US DOE EIA. "Table 3.6 Consumer Expenditure Estimates for Energy by End-Use Sector, 1970-2007 (million dollars)." AER 2009. pp. 79. Released: Aug. 2010; US DOE EIA. Tables 2 to 5. Energy price and expenditure estimates by sector, selected years, 1970-2008, Iowa. pp. 122-125.

Note: 2007 is used as a reference year because it is the most current expenditure data available for the U.S. as a whole.

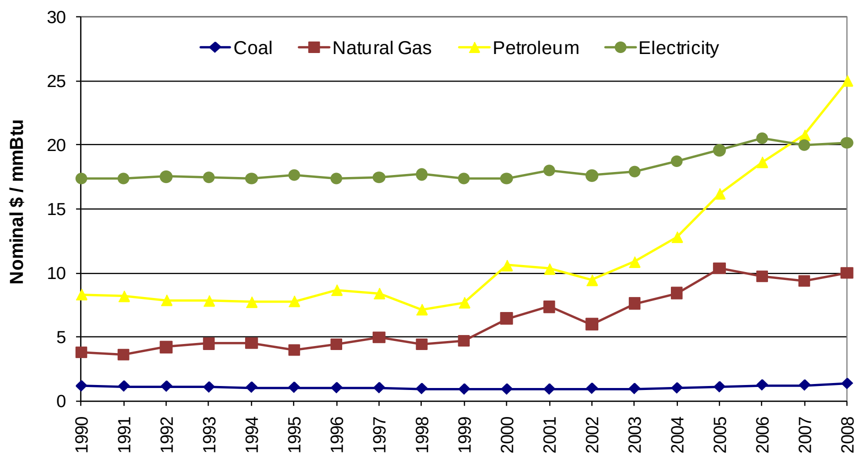
Graph 27: Iowa Energy Expenditures by Sector, 1980 - 2008



Source: US DOE EIA. Tables 2 to 5. Energy price and expenditure estimates by sector, selected years, 1970-2008, Iowa. pp. 122-125.

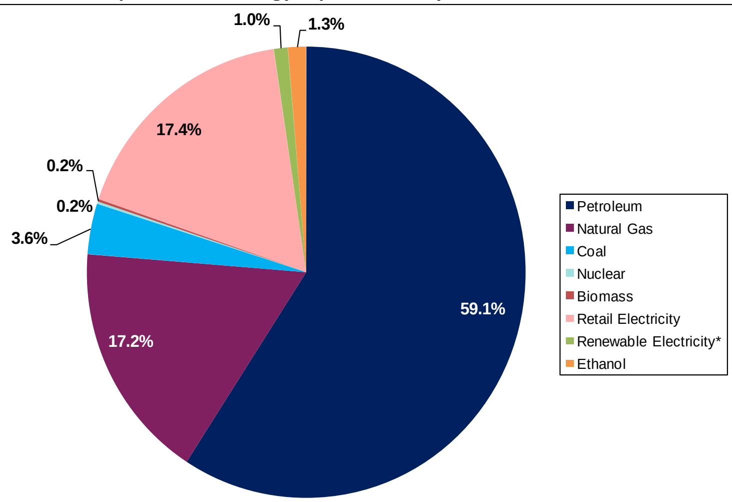
Although transportation was the largest expenditure class throughout the time period examined in Graph 27, it pulled away from the other sectors between 2000 and 2008, increasing by 156% over that time period while the other sectors increased, on average, about 82%. Most of that increase can be explained by higher than normal petroleum prices that occurred during the 2007-2008 period. (Graph 28) The volatility of energy prices add to the difficulty of projecting the economic impact of meeting Iowa's energy needs.

Graph 28: Iowa Energy Prices 1990-2008



Source: US DOE EIA. "Energy Price and Expenditure Estimates by Source, Selected Years, 1970-2008, Iowa." State Energy Data System (SEDS) 2008. Released: June 30, 2010.

Graph 29: Iowa Energy Expenditures by Fuel Source, 2008



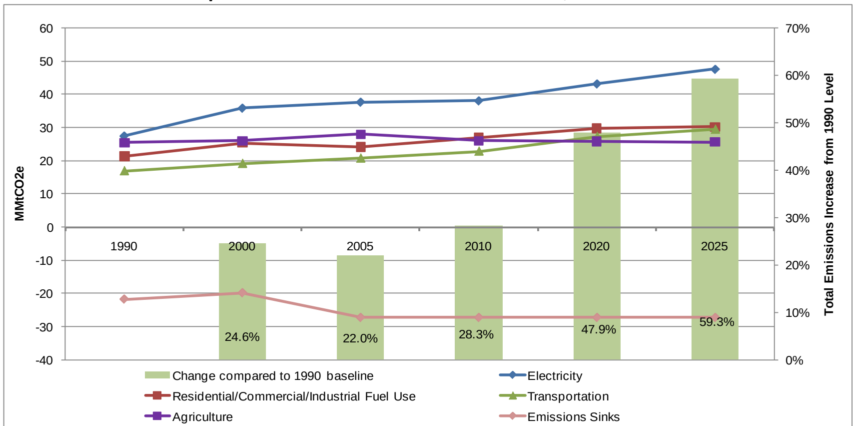
Sources: U.S. DOE EIA. "Table S1b. Energy Expenditure Estimates by Source, 2008 (Million Dollars). State Energy Data System 2007 (SEDS 2007).
Note: Data of expenditures on ethanol and renewable electricity from 2007.

The large majority of funds spent on energy in Iowa go towards the purchase of petroleum products. (Graph 29) The next highest expenditure categories are electricity and natural gas, which account for around 17% of energy expenses apiece. Coal expenditures in this data set look small because little coal is used for energy directly – most coal use in the state falls under the electricity category.

Iowa's 2008 energy expenditures totaled $16.9 billion, about 12.5% of state GDP in that year. If Iowa follows the projected national trend of 2.9% expenditure growth per year[3] from 2008-2035 through 2030, expenditures would reach $31.7 billion by 2030. This means that, per capita, **energy spending in Iowa would nearly double from $5,633 in 2008 to $10,713 in 2030**, while the state's **population is projected to decline by 1.6%** over that same time period[4].

Regulation of greenhouse gas emissions is another variable that will impact future energy production and expenditures. Climate Strategies, on behalf of the Iowa Climate Change Advisory Council, showed Iowa's emissions taking a generally upward trend between 1990 and 2025, except for a slight decrease in emissions between 2000 and 2005. (Graph 30) The gray bars are tied to the right-hand axis, representing the percent increase compared to 1990 levels. Each line represents a major emitter category, except the pink line at the bottom, which represents the estimated carbon sinks in the state, such as soils and trees. The smallest categories of emitters are not represented on the graph, for the purpose of simplification. Those groups are: the fossil fuel industry, industrial processes, and waste management. Together, they represent about 8% of gross emissions, while the 4 categories in the graph capture 92% of emissions. The sectors with the largest emissions profiles will be most heavily impacted by GHG regulation and have the largest reduction potential.

Graph 30: Iowa Greenhouse Gas Emissions, 1990 - 2025



Source: Final Greenhouse Gas Inventory and Reference Case Projections 1990-2025, Center for Climate Strategies, Iowa Climate Change Advisory Council

[3] US DOE EIA. "Table 3. Energy Prices by Sector and Source (2008 dollars per million Btu, unless otherwise noted)."
[4] US Census. Population Projections to 2030. http://www.census.gov/population/projections/SummaryTabA1.pdf

Economic Impacts of Iowa's Energy Use and Meeting Future Energy Needs

Iowa faces multiple potential energy futures. Much of what will determine the make-up of future expenditures and their economic impact depends upon regulations and incentives that will shape energy industries and determine technological development for those industries over the coming decades. A series of policy decisions will determine whether Iowa's energy expenditures are recycled into the Iowa economy and produce positive job and wealth impacts or are exported, along with a majority of the economic benefits, to other states or nations.

Energy produced outside of the state, or produced from fuels (like coal and oil) that come from out of state can still have some positive economic benefit when transportation, generation and other infrastructure is located in Iowa and employs Iowans. Daniel Otto and Mark Immerman at Iowa State University issued a study in April of 2006 that estimated the "leakage" of energy expenditures to other states and countries for electricity, natural gas and petroleum.[5] The study found that natural gas accumulates the least benefit in-state, while electricity production keeps the most money in Iowa.

When the leakage rates in the Iowa State study are applied to 2007 EIA energy expenditures, results show that about **$5.25 billion, or 37% of Iowa's energy expenditures, accumulated to economies of other states or countries.** The money Iowans spent on renewable energy including wind, hydropower and ethanol, amounted to a total of $427.6 million. Assuming that all renewable electricity produced in Iowa is consumed here, and that there is no out-of-state leakage related to renewable electricity and ethanol, **using Iowa-based energy resources kept $133.5 million circulating in the state economy** that would have gone elsewhere if it had been used to purchase fossil energy.

Comment [TWO5]: **OEI:** VERY DIFFICULT TO DETERMINE HOW THIS PARAGRAPH WAS DEVELOPED.
NO OUT OF STATE LEAKAGE OF ETHANOL MEANS (I THINK) THAT THE STUDY ASSUMES ALL THE ETHANOL PRODUCED IN IOWA IS CONSUMED IN IOWA. NOT LOGICAL.

There are 2 main ways to keep more of the dollars currently spent on energy in the Iowa economy:

- Increase Iowa's use of in-state energy resources (renewable energy)
- Reduce Iowa's overall energy use

Increasing Use of Renewable Energy

Wind Energy

Iowa is the 10th windiest state in the country, with an estimated 551 billion kWhs per year of wind generation potential, according to the American Wind Energy Association (AWEA). The incentive for Iowa's first wind energy development was a 105 MW renewable requirement for the investor-owned utilities (IOUs), enacted in 1983. This level of capacity was met more than 10 years ago. In 2007, Governor Culver established a voluntary goal of 1,000 MW of wind capacity by 2010. As of the 3rd quarter of 2010, SNL Financial reported that Iowa has 3,673 MW of installed capacity – second in the country, surpassed only by the state of Texas.. Graph 31 shows Iowa's wind energy in terms of MWhs generated since the first turbines went online in 1994.

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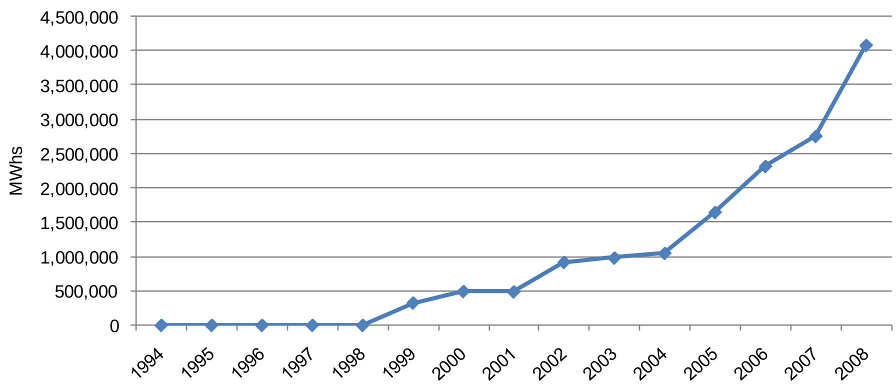
[5] Otto and Imerman, "Analysis of Energy Supply and Usage in the Iowa Economy," April, 2006, http://www.econ.iastate.edu/research/webpapers/paper_12493_06001.pdf

Graph 31: Iowa Wind Energy Generation, 1994 - 2008



Source: U.S. DOE, EIA Electric Power Annual, 2008, State Data Tables, Net Generation by State

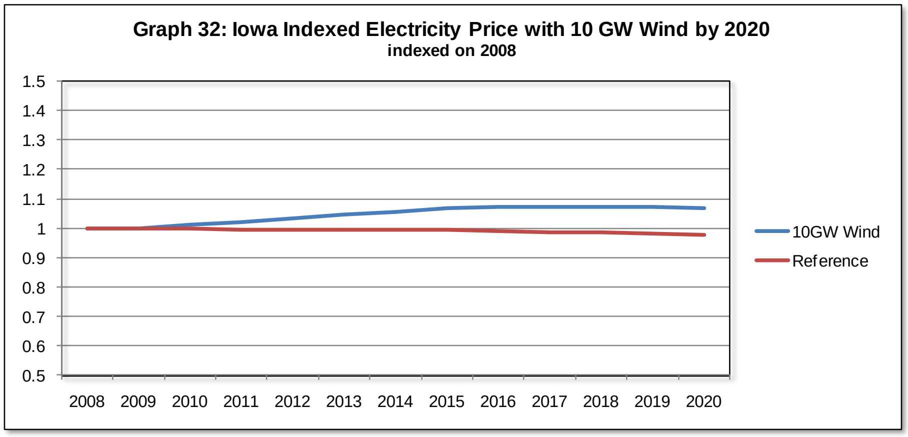
In 2008, 4.1 million MWHs of wind energy were generated – 7.7% of total electric generation in Iowa that year. A 2009 report by the Iowa Policy Project estimated that wind energy now comprises about 15% of electric generation in the state.[6] In November, 2009, the Iowa Utilities Board approved 1,001 additional Megawatts of wind capacity to be built by MidAmerican Energy, the largest current owner of wind capacity in the state.

The Department of Energy's National Wind Power Goal, meeting 20% of national energy needs with wind energy by 2030, sets the goal for Iowa at 20 GW. Development of 10 GW of wind capacity by 2020 is an appropriate midterm goal for Iowa. Current and planned wind capacity, with the approved MidAmerican expansion, would move the state to meeting almost 45% of this nearer-term goal. An analysis performed for the state of Iowa by Navigant Consulting at the beginning of 2009 estimates that, with the right incentives, wind power could amount to 62% of total in-State electricity demand by 2025, with a large portion being exported to other states.[7]

Of course, new generation capacity is not free, and building out wind will come at some cost. The Energy Choice Simulator Model projects that a build-out of 10 GW of wind power in Iowa by 2020 would raise electric rates by 9.2%, or 0.83 cents per kWh compared to current rates. (Graph 32)

[6] Galuzzo, Teresa, and Osterberg, David, "A Windfall of Green Energy", Publication of the Iowa Policy Project, April, 2009, http://www.iowapolicyproject.org/2009docs/090413-windproduction.pdf

[7] Kinross, Andrew, "Policy/Strategy Option Descriptions Final Report, Presented to Iowa Office of Energy Independence," January 30, 2009.



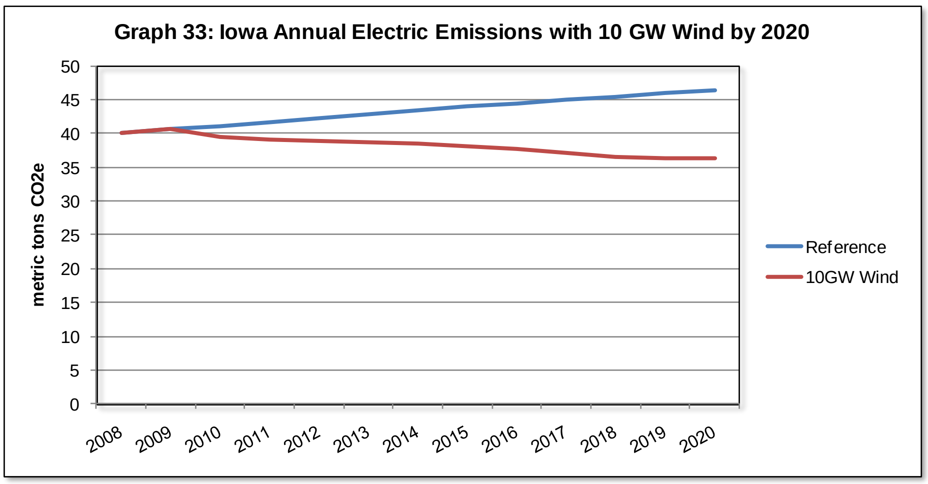
There are also significant positive economic benefits projected from increasing Iowa's wind energy capacity. Currently, nine wind turbine manufacturers are located in Iowa. Estimates indicate that 2,300 Iowans are employed directly by the wind industry. Two hundred companies in 26 counties are supplying wind turbine components, resulting in increased revenues of $50 million annually. The DOE estimates economic impacts in Iowa, over the 20-year life of the 20 GW goal, to be $21 billion, including $53 million per year in landowner payments and $759 million per year in local economic benefit during the turbines' operation phase. Jobs impacts are estimated at 63,000 construction-phase and 9,000 permanent direct and induced jobs.[8] These job and economic impacts do not include the manufacture of turbines and components locally. An NREL study showed that increasing the local manufacture of turbines and components by as little as 10% can increase economic benefits for a state as much as 58% during construction.[9]

The study performed for the State of Iowa by Navigant Consulting projected cumulative economic benefits of $3.2 billion between 2010 and 2020 as Iowa works toward the 10 GW goal. The Navigant study also projects that wind manufacturing jobs will rise from the current estimated 2,300 jobs to 4,366 between now and 2012. Construction jobs are projected to employ between 500 and 1,000 Iowans between now and 2025, with operations and maintenance jobs employing 174 people in 2010, rising to 436 people in 2020. These are direct jobs and do not include any induced impacts.

Another economic impact of wind energy is price stabilization for natural gas. As more wind energy is produced, demand for natural gas is reduced, making the market more predictable and less prone to price spikes.[10]

[8] "Wind Energy and Green Jobs", Governors' Wind Energy Coalition, February, 2009.
[9] "Wind Energy and Green Jobs".
[10] "20% Wind Energy by 2030 Report", U.S. DOE, July, 2008, Appendix A

The major environmental benefit of increasing wind capacity to 10 GW by 2020 is reduction of greenhouse gas emissions in the electric sector. The Energy Choice Simulator's business as usual reference case for Iowa projects electric sector emissions will increase by 12.7% between 2010 and 2020. Under the 10 GW scenario, that projection is reduced by 21.7%, for an overall reduction in electricity emissions of 7.8% over this 10-year period. (Graph 33) The 2009 Navigant study predicts even greater reduction in GHGs, projecting that moving toward 10 GW of wind energy would help to avoid an estimated 28% of electricity-related emissions by 2020.



Another environmental benefit of increased wind generation is decreased water usage. Fossil energy generation is water-intensive. If Iowa were to meet the DOE's goal of 20 GW of wind capacity by 2030, Iowa would save 1.64 trillion gallons of water.[11] Wind generation also avoids other negative environmental consequences of fossil electricity, including air pollution with mercury and other heavy metals, the emissions related to extracting and transporting fossil fuels, and the production of toxic slurries and other wastes.

One barrier to increased wind generation in Iowa includes a lack of large transmission lines to carry renewable electricity to major load centers like Chicago. The largest barriers to installation of adequate transmission are determining who pays for new transmission and where that transmission is sited. Another barrier is the lack of consistency in federal incentives for wind. The federal production tax credit (PTC) for wind is typically extended for a limited period of time, creating uncertainty among investors. The PTC was extended for 5 years in the American Recovery and Reinvestment Act of 2009, but many in the wind energy industry would like to see the credit put into the tax code permanently. The need for development of advanced turbine technology to improve capacity and performance is another barrier

[11] "Renewable Energy and Economic Potential in Iowa, Kansas, Nebraska, South Dakota," Center for Rural Affairs, August, 2009, http://files.cfra.org/pdf/Renewable-Energy-and-Economic-Potential.pdf

that must be overcome to fully develop this resource. Finally, wind presents the challenge of balancing generation and load over time with a resource that is “non-dispatchable,” or cannot be readily accessed on-demand.

Solar Energy

Although they are probably the most commonly known form of solar energy, solar photovoltaics (or solar PV - solar cells that produce electricity) are not the only solar technology. Solar thermal technologies, like hot water heaters, are currently both cost-effective and common applications of solar energy. Passive solar building design, which utilizes architecture and materials to control the solar energy entering the building, reduces heating and cooling costs. Solar space heating and cooling is another emerging solar technology application.

However, in 2008 the U.S. Solar Energies Industry Association (SEIA) reported 20,500 systems in the entire U.S., while 1 in 10 households in China used solar water heat. The SEIA reported that at the end of 2008, there were 9,183 MW of solar capacity in the U.S.[12] This included a 58% increase in PV and 40% increase in solar hot water heat compared to 2007. The SEIA also reported that solar manufacturing in the U.S. grew by 60% in 2008, in spite of unfavorable economic conditions overall.

Although the U.S. currently lags Germany, China and Japan in terms of overall solar installations, state-level policies have begun to boost solar installations. The United States is expected to surpass these countries to become the dominant market for solar photovoltaics over the next 4 years, according to a December, 2009 study by GTM Research, a greentech market research firm.[13] The report estimates that demand for grid-connected solar cells will rise by 48% per year between 2008 and 2012. New solar demand will be mostly in the residential and state and local government sectors. Iowa is not among the states expected to lead in PV demand. According to the Database for State Incentives for Renewables and Efficiency (DSIRE) website, 15 of the 16 states that the study projects to be solar development leaders in the near-term have a renewable portfolio standard. Florida is the exception.

A map developed by the National Renewable Energy Laboratory (NREL) provided in the SIEA report illustrates that Iowa has significantly better solar capacity than Germany, current the world leader in solar generation.[14] Solar hot water heaters are becoming more common in Iowa as education about their use expands and more contractors offer sales and installation services. While Iowa universities have undertaken some solar technology development and one home-grown Iowa company, PowerFilm, has emerged as a player in the solar industry, overall, Iowa has not been a leading state in promoting and utilizing solar power.

Improving Iowa’s solar status could help Iowa capture the economic benefit of being a center for a high-tech industry, comparable to the engineering, manufacturing, skilled labor and logistics jobs that have

[12] “U.S. Solar Energy Industry Association 2008 Year in Review,” http://www.seia.org/galleries/pdf/2008_Year_in_Review-small.pdf.

[13] Kann, Shayle and Englander, Daniel, “The United States PV Market: Project economics, Policy, Demand and Strategy through 2013,” report summary: http://www.gtmresearch.com/report/the-united-states-pv-market-project-economics-policy-demand-and-strategy

[14] http://www.seia.org/galleries/default-file/PVMap_USandGermany.pdf

followed large-scale wind development into the state. The high end of solar PV development in Iowa examined in the Navigant study was 30 MW of installed capacity. At this level, solar PV would generate about 50,000 MWhs of electricity and reduce greenhouse gases by approximately 28,000 tons per year. This is negligible in the context of Iowa's overall electricity generation and greenhouse gas emissions.

Market barriers to adoption of solar have hindered its development. In fact, much of the near-term solar projects and projected solar growth is expected to be utility-scale and/or utility-owned. Although the cost of solar PV has declined steadily since 1998, from $10.5 per W to $7.6 per W in 2007, it remains the most expensive form of new electric generation. The Navigant study done for Iowa estimated the current price of solar PV at $0.42 per kWh, compared to $0.073 for large, land-based wind and between $0.11 and $0.15 for biomass. However, Navigant also projected that the price of solar will fall to $0.13 per kWh by 2025.

Solar energy, similar to wind, is also a resource that is non-dispatchable, requiring that idle baseload generation be available to provide stable load when the sun is not shining.

Much of the future economic viability of solar in Iowa will depend upon utility-scale investment, technological advances, government incentives and greenhouse gas regulation that would make the cost of solar competitive with other energy generation.

Biofuels

According to the EIA's State Energy Data System (SEDS) on production of different fuels by state from 1960-2008, Iowa ranks first in the nation in production of ethanol with 25% of all ethanol manufactured in the US. According to the Renewable Fuel Association's *2010 Ethanol Industry Outlook*, operating ethanol capacity in Iowa stood at 3.2 billion gallons per year (bgy) at the end of 2009, with roughly 300 mgy additional capacity that was either under construction or undergoing expansion. According to Monte Shaw, Director of IRFA, ethanol production in Iowa was 3.1 billion gallons in 2009,, or over 95% of 2009 capacity.

Biodiesel production capacity in Iowa is about 325 million gallons per year (mgy), which also ranks first in the nation. However, Iowa biodiesel producers produced about 85 million gallons from 9 refineries operating (out of 12 total biodiesel production facilities), according to the Iowa Biodiesel Board, during the same time period. Biodiesel facilities have been under significant pressure due to high feedstock costs coupled with expiration of the federal excise tax for biodiesel blending on December 31, 2009. This has led to low utilization or closure of biodiesel production facilities in the state and nationwide.

The Federal Renewable Fuels Standard (RFS) has been a major driver for ethanol demand. The revised RFS (often called "RFS2") included in the Energy Independence and Security Act of 2007 (EISA 2007) extended the standard through 2022 and added requirements for biodiesel and "advanced" biofuels, including cellulosic ethanol. According to the Notice of Proposed Rulemaking of the 2011 Standards for the Renewable Fuel Standard Program (RFS2), the requirements for 2011 are: 5 to 17.1 million gallons of cellulosic biofuels, (any type of biofuels derived from cellulose, hemicelluloses, lignin, or any type of renewable biomass that has lifecycle GHG emissions at least 60% less than the gasoline or diesel fuel replaced), 0.80 billion gallons of biodiesel, (biodiesel or non-ester renewable diesel made from renewable biomass, excluding any kind of petroleum feedstock, and has lifecycle GHG emissions that are at least 50% less than the diesel fuel replaced), 1.35 billion gallons of advanced biofuels (renewable fuel other than corn-starch-derived ethanol with lifecycle GHG emissions that are at least 50% less than the gasoline or diesel replaced) and 14 billion gallons of total renewable fuels (any fuel derived from renewable biomass to displace fossil fuels designated as transportation fuel) including corn ethanol. Corn ethanol's contribution to the RFS maxes out in 2015 at 15 billion gallons. The biodiesel requirement ramps up to 1 billion gallons starting in 2012 and the requirement for advanced biofuels increases to 21 billion gallons in 2022, for a total of 36 billion gallons of renewable fuels required in that year. As with the 2011 proposed rulemaking, EPA will evaluate the yearly RFS2 goals based on estimated capability of the marketplace to meet the goals. For example, while the cellulosic standard for 2011 has been set lower than the original RFS2 stipulation based on lower available capacity in 2011, the biodiesel requirement was set at 800 million gallons based on available capacity.

Another major change in the RFS2 was the addition of standards for lifecycle greenhouse gas emissions, including indirect land use change (ILUC). Existing ethanol facilities were "grandfathered" and do not need to meet this requirement. The concept behind ILUC is that increasing demand for crops for fuels increases overall commodity prices, subsequently increasing demand for land to grow these profitable crops and leading to de-forestation in other countries, such as Brazil. The inclusion of ILUC in the lifecycle calculations is highly controversial among both policymakers and scientists. The EPA's draft rules implementing the RFS2 have thus far not resulted in favorable results for conventional biofuels. This controversy has delayed implementation.

According to Iowa Department of Revenue's May 2010 publication on Iowa income tax credits regarding the use, sale, and production of fuels, the Iowa legislature passed the Ethanol Blended Gasoline Tax Credit, which created tax credits for service stations in which ethanol blended gasoline consisted of 60% of total gasoline sold. This tax credit expired at the end of 2008. What came in its place was the Ethanol Promotion Tax Credit, which offers tax credits, based ***only*** on the amount of ethanol gallons sold. The retail dealer must meet a certain threshold regarding the percentage of biofuels blended in the fuel sold, and sell a certain amount of motor fuel each year to be eligible for the tax credit. Retailers that can market more than 200,000 gallons of motor fuel in 2009 must sell at least 10% biofuels by volume in 2009, increasing to 25% by 2019 to qualify for the maximum tax benefit. This tax credit would be repealed on January 1, 2021. In addition to these tax credits, retail dealers that sell E85 gasoline are eligible for tax credits at certain amounts, starting back from Jan 1, 2006. For the year 2011, the tax credit is 10 cpg of E85 gasoline sold. For retail dealers whose total sales volume of diesel consists 50% or more of biodiesel, a tax credit of 3 cpg of biodiesel blended fuel (B2 or higher) is available.

Comment [TWO6]: OEI: THIS PARAGRAPH MAY BE MORE DETAILED THAN DESIRED, BUT WE WANTED TO BE CLEAR ON ALL INCENTIVES FOR BIOFUELS.

The Otto and Imerman study[15] on economic leakages related to energy use in Iowa did not specifically calculate the out-of-state leakage from the biofuels industry, but the study did indicate that 55% of the ethanol input stream comes from in-state resources. Similar information was not given for biodiesel production.

[15] Otto, Daniel, Imerman, Mark. "Analysis of Energy Supply and Usage in the Iowa Economy." Iowa State University Department of Economics. December 19, 2005.

There are a variety of comprehensive economic impact analyses related to biofuels in Iowa. The IRFA estimates that biofuels add $12 billion to Iowa GSP and supports 83,000 jobs in the state. A study performed by consultant John Urbanchuk in January 2010 estimated that, based on 85 million gallons of biodiesel produced in 2009, $471.2 million was added to the Iowa GSP. (This includes impact from spending to purchase feedstocks and produce, transport and sell 85 million gallons of biodiesel.) Urbanchuk estimates that 2,911 permanent jobs were supported and household income increased by $103 million 2009 USD. [16] The same report estimated the total impact of the entire biofuels industry in Iowa (including biodiesel, ethanol, and new plants under construction) amounted to an addition of $11.5 billion to the Iowa GSP, $2.3 billion in household income and 70,181 jobs.

Comment [TWO7]: OEI: THE URBANCHUK STUDY COUNTS THE REVENUE FROM ETHANOL SALES, AND ALSO THE COST OF THE RAW MATERIALS TO PRODUCE THE ETHANOL. SO WHILE THE "FARMER" EARNS THE INCOME FROM THE ETHANOL REFINERY FOR THE CORN THEY HAVE SUPPLIED, THE STUDY IGNORES THE FACT THAT THE NET REVENUE FOR THE ETHANOL PRODUCER MUST REFLECT WHAT THEY HAD TO PAY FOR THE CORN.

Meanwhile, a study performed by economist David Swenson at Iowa State University in January of 2008 estimated much more modest impacts. Focusing just on the ethanol industry, Swenson estimated a total job impact of 5,440 jobs.[17]

Although specific economic impact estimates differ significantly, it is clear that biofuels production and expansion continues to bolster the Iowa economy. A number of next-generation biofuels and bioproducts start-ups have also begun to contribute. For example, Poet Energy's Project Liberty in Emmetsburg, Iowa, is in the process of adding capacity to an existing ethanol plant. This new capacity will allow the facility to produce cellulosic ethanol from corn cobs. The current Poet facility employs 40 people. The expansion is expected to add 35 direct jobs and millions of dollars to the economy of the region in farm income and construction materials purchases.

Another positive economic impact of biofuels production was documented in a 2007 study by Xiaodong Du and Dermot Hayes at Iowa State's Center for Agriculture and Rural Development. Their analysis estimated that ethanol use in the Midwest depressed gasoline prices by $0.35 per gallon between 1995 and 2007.[18]

Comment [TWO8]: OEI: THE DIRECTION OF THE IMPACT OF ETHANOL USE ON MIDWEST AND US GASOLINE PRICES IS CORRECT IN THIS STUDY, BUT OVERSTATED. THE ANALYSIS DOES NOT RECOGNIZE THE ALTERNATIVE ACTIONS OF THE OIL INDUSTRY IF THEY DID NOT HAVE ETHANOL TO MEET DEMANDS.

Ethanol production has also been shown to have an upward price impact on corn prices in the region directly surrounding the plant. However, national and global commodities markets are much more complex and it is challenging to determine the exact impact of any one change in demand or supply on the overall price of commodities. T. Randall Fortenbery and Hwanil Park from the University of Wisconsin - Madison analyzed quarterly USDA data from 1995 through 2006 in an attempt to determine ethanol's impact on U.S. corn prices. They found that a 1% increase in ethanol production correlated with a 0.16% increase in the price of corn in the short run. They also concluded that, although livestock

[16] Urbanchuk, John M., " Contribution of the Biofuels Industry to the Economy of Iowa." January 20, 2010. http://www.ethanol.org/pdf/contentmgmt/2010IowaBiofuelsEconomicImpact.pdf

[17] Swenson, David, "The Economic Impact of Ethanol Production in Iowa," January, 2009, http://www.econ.iastate.edu/research/webpapers/paper_12865.pdf

[18] Xiaodong and Hayes, "The Impact of Ethanol Production on U.S. and Regional Gasoline Prices and on the Profitability of the U.S. Oil Refinery Industry," April, 2008, http://www.card.iastate.edu/publications/DBS/PDFFiles/08wp467.pdf

feed is still the number one use of corn in the U.S., increased demand for grain for ethanol was more significant in determining corn prices than increases related to feeding livestock or export demand.[19]

Using bushels of corn(grain) calculated from records of ethanol production during any given year from the Renewable Fuels Association, the percentage of corn(grain) allocated to ethanol production in the US was derived by dividing bushels of corn allocated to ethanol production in the US by the total quantity of corn(grain), measured in bushels, produced in the US. This figure was approximately 18 percent in 2007, but climbed to 27% and then 29% in 2008 and 2009, respectively. The 15 billion gallons of ethanol required by EISA 2007 will likely command about 35% of U.S. corn production. A USDA Economic Research Service (ERS)-issued study from November 2009[20] projects that the RFS will result in land shifting toward corn and soybean production and away from other crops, increasing prices for all commodity crops. Increased corn and soybean prices can negatively impact livestock producers in Iowa. The Midwest supplies 90% of livestock feedgrains in the U.S. About 14% of beef, hog and dairy operations use some biofuels co-products (mostly DDGS) as feed. The use of DDGS for animal feed is expected to increase, and, consequently, the price is expected to rise. High corn prices have already severely impacted the livestock industry, with farrow-to-finish hog operation profits dipping into negative territory starting in November of 2007.[21] Increasing biofuels production is expected to cause a small contraction in the livestock sector overall, but could also have the positive benefit of increasing demand for manure as a nutrient source for corn production.

Comment [JC9]: Need to validate these percentages from USDA.

Potential negative environmental impacts could stem from bringing additional land into agricultural production that may not be suitable, increased use of chemicals like pesticides and nitrogen-based fertilizers and increased greenhouse gas emissions related to energy inputs on new agricultural lands.

Improving yields or the efficiency of the biofuel conversion processes could mitigate some of these impacts. Other strategies to bolster the positive economic and environmental impact of biofuels in Iowa could include improving the efficiency of biofuels processes, such as increasing drying efficiency for DDGS, and improving the economic value of biofuels co-products. Using new feedstocks, such as perennial grasses, corn stover and algae could also help mitigate some demand-driven price increases and negative environmental impacts.

According to the 2009 Retailers Motor Fuel Gallons Annual report, released by the Iowa Department of Revenue in April 2010, 82% of gasoline sold in Iowa is blended with ethanol at either the E10 or E85 level. There are several barriers to increasing that percentage as well as overall biofuel sales in the state. First, federal regulations limit ethanol blends in conventional engines to 10%. The Environmental Protection Agency (EPA) has recently allowed the use of ethanol blends up to 15% ethanol in vehicles manufactured after 2007. However, this may not result in any significant immediate increase in ethanol

[19] Fortenbery, T. Randall and Park, Hwanil, "The Effect of Ethanol Production on the U.S. National Corn Price," April, 2008, http://www.aae.wisc.edu/renk/library/Effect%20of%20Ethanol%20on%20Corn%20Price.pdf
[20] Malcolm, Scott A., M. Aillery, and M. Weinberg. *Ethanol and a Changing Agricultural Landscape*, Economic Research Report 86, U.S. Dept. of Agriculture, Economic Research Service. Nov. 2009.
[21] Wisner, Robert, "Impact of Ethanol on the Livestock and Poultry Industries," Agricultural Marketing Resource Center Renewable Energy Newsletter, October, 2008.

blending since current ethanol blending economics (November, 2010) are unfavorable for blending into gasoline (even with the volumetric ethanol excise tax credit), and the concerns some consumers may have due to automobile manufacturer's engine warranties.

A lack of infrastructure for 85% ethanol is another barrier. The Iowa RFA reported that in September of 2009, there were 125 E85 pumps in the state, with 22 of those being "blender pumps" which can dispense any blend of ethanol and gasoline. The Iowa RFA also reported that there are 238 pumps dispensing biodiesel with less than a dozen of those being blender pumps. The EIA reported that there were 5,976 alternative fuel vehicles in Iowa in 2008. A total of about 5,170[22] of those vehicles can run on E85.

A 2006 analysis from Richard Ginder at Iowa State University explained the major infrastructure limitations for increasing production of ethanol, including crop production inputs and processing infrastructure, tank cars for rail transportation, and suitable transportation infrastructure for DDGS.[23] Shipping infrastructure for ethanol is further complicated by the fact that it cannot be shipped through conventional petroleum pipelines. However, Poet Energy, LLC and Magellan Midstream Partners LP announced in March of 2009 that they are studying the feasibility of building a dedicated ethanol pipeline starting in southeastern South Dakota and picking up product from plants in Iowa, Minnesota, Illinois, Indiana and Ohio for delivery to markets in the northeastern U.S. The pipeline is projected to cost around $4 billion. Recent statements by Magellan indicate that the project will need significant Federal loan guarantees to be able to move forward.[24]

Biomass

Iowa produces vast quantities of biomass each year. The largest biomass-based energy production in the state is in the form of biofuels. As Iowa's renewable electricity generation has increased over the last decade, biomass-based electric generation has remained flat. A 2005 NREL study found that Iowa has the best biomass resources of any state in the country, with the greatest amount of crop residues and the third-highest manure methane potential. The Navigant study estimated that Iowa's biomass electricity potential could be as much as 1.86 million MWhs of electricity each year. For comparison, total renewable generation in Iowa in 2007 was 2.9 million MWhs.

Biomass could be used in a variety of energy applications, including: co-firing in existing coal plants, combustion for electricity in dedicated biomass facilities, methane capture and combustion for heat and power and burning biomass in boilers to provide both heat and power to manufacturing facilities, cities or public buildings.

It is likely that in the initial years, agricultural by-products, such as corn stover and manure might be the most common fuels used to produce biomass power in Iowa. Using old materials in a new way will

[22] According to the US DOE EIA's estimated number of alternative fueled vehicles in use, by state and fuel type for 2008, this number excludes E85 vehicles used by private individuals (non-fleet users) because most of these are believed to be in use as traditional gasoline-powered vehicles.
[23] Ginder, Richard, "Potential Infrastructure Constraints on Ethanol Production in Iowa," November, 2006, http://www.extension.iastate.edu/ag/GinderPresent.indd.pdf
[24] http://money.cnn.com/2010/03/11/news/companies/ethanol_pipeline.fortune/?section=magazines_fortune

require new harvesting equipment, processing infrastructure and the technologies to perform these tasks. This aspect of biomass energy generation will create jobs in Iowa and the resulting technologies could be exported to other states and countries. Of course, benefits will also accrue to farmers and other landowners who will see new revenues from the sale of biomass materials.

The next generation of biomass power in Iowa could come from perennial biomass crops, such as switchgrass. These crops have the dual benefit of bolstering the Iowa economy and providing superior environmental benefits, including large projected greenhouse gas benefits and improvements to soil and water quality as fewer chemical inputs are required in the production of these crops. Additionally, a new USDA incentive, the Biomass Crop Assistance Program, was included in the 2008 farm bill that will pay farmers to start to grow and bring dedicated biomass crops to market.

Iowa's academic institutions have been leaders in biomass research. Iowa State University in the fall of 2009 opened the BioCentury Research Farm to examine, in part, the cropping, harvesting and processing practices that would be necessary to grow this new generation of energy crops. The University of Iowa has been using biomass byproducts from the Cedar Rapids Quaker Oats plant to provide 80% of the university's heating, cooling and electricity. Research is currently under way at the University of Northern Iowa to determine the best mixes of prairie hay to use for electric generation. These university efforts demonstrate that Iowa is moving to take a leadership role in biomass power.

Competition for valuable land resources will be one barrier to development of a strong biomass energy industry in Iowa. Corn stover does not create the same problem, but may have consequences both for farmers and the environment that must be considered. Corn stover is largely left in the field to enrich the soil and reduce soil erosion and run-off. Research is underway both in Iowa and around the country to determine how much stover can be removed without negative consequences to soil quality.

There are also still some technological barriers to biomass energy generation, including optimization of biomass combustion for electricity, the best way to use biogas as a utility-scale energy resource, and development of pre-processing technologies for biomass densification.

Some biomass energy applications involve a daunting up-front investment. An individual farmer wanting to install a methane digester often does not have the financial resources for such a large investment. However, building a new, biomass-only electric generation facility is estimated to be competitive with the cost of building a new coal or natural gas facility, according to the Navigant study. Co-firing biomass with coal is very inexpensive – only $0.017 per kWh – and would be an economical alternative for early use of biomass energy in Iowa. Table 6 summarizes all the new renewable and fossil electric generation costs discussed in this section.

Table 6: Estimated Levelized Cost of New Generation in Iowa, 2008 - 2025						
	2008		2015		2025	
Biomass Co-Firing	1.7		1.9		2.1	
Landfill Gas	3.6		4.8		5	
Large Land-Based Wind	7.3		7.8		7.6	
Biomass (BIGCC)	15.3		11.1		10.3	
Biomass - Fluid Bed	10.7		11.6		11.7	
Distributed Wind	28.7		25.3		25.3	
PV	42		23		13.6	
	Low	High	Low	High	Low	High
Coal	8.4	16	9.2	16.5	9.9	17.4
Natural Gas	6.5	12.6	6.9	13	7.3	13.3
Nuclear	7.4	8.7	9.7	11.6	11	13.2
Source: Policy/ Strategy Option Descriptions, Final Report, Navigant Consulting, January 2009						

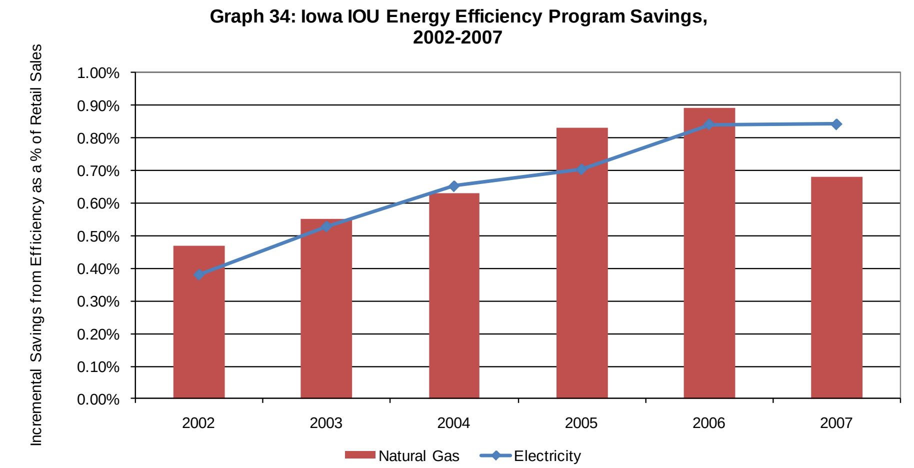
Reducing Iowa's Energy Use

A 2009 report sponsored by Chicago Council on Global Affairs, listed the primary efficiency opportunities in the Midwest as:

- Residential lighting, air conditioning and electronics
- Commercial lighting and equipment
- Industrial efficiency and co-generation, or combined heat and power (CHP)
- Improved vehicle fuel economy[25]

Toward the goal of reducing energy use, Iowa's IOUs are required to provide programs to help consumers reduce their use of both electricity and natural gas. Plans are submitted for approval to the Iowa Utilities Board every 5 years by the IOUs. The efficiency measures must be cost-effective from both the consumer and utility perspective, and the utilities recover related costs for the programs from consumers. Results of these efficiency efforts between 2002 and 2007 are shown in Graph32.

[25] Livingston, John et al, "Embracing the Future: The Midwest and a New National Energy Policy," 2009, The Chicago Council on Global Affairs, page 46.



Source: Iowa Utilities Board, Report to the Leigslature, January, 2009: Energy Efficiency in Iowa's Electric and Natural Gas Sectors

The IOUs steadily increased the amount of additional electricity saved as a percentage of retail sales each year up through 2006. Program success in percentage terms was flat between 2006 and 2007. Natural gas savings increased each year over the same timeframe, but dropped in 2007.

Consumer-owned utilities (cooperatives and municipal utilities) are required to file energy efficiency plans with the IUB every other year, but those plans are not subject to approval by the IUB. The Iowa Association of Electric Cooperatives's (IAEC's) most recent report on Iowa co-ops' efficiency initiatives showed that the co-op programs saved about 31,000 MWhs of electricity in both 2006 and 2007. Total co-op sales to retail customers amounted to 5.4 million MWhs in 2006 and 5.7 million in 2007. Efficiency reduced energy sales by about 0.58% in 2006 and 0.55% in 2007. The IAEC report projected efficiency savings in 2008 and 2009 of about 40,000 MWhs per year, an increase of about 30% over the 2006 and 2007 levels.

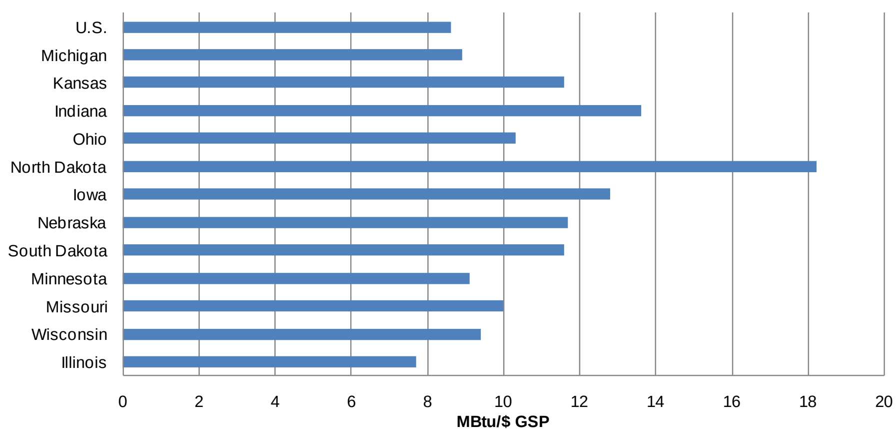
Efficiency data for the Iowa Association of Municipal Utilities was not aggregated for reporting purposes, so is not covered in this report.

Senate File 2386, passed during the 2008 Legislative Session, required consumer-owned utilities to make an initial report on their potential for energy efficiency by January 2009 and a final report by January 2010. The initial report from the municipal utilities found that reducing electricity consumption by 1.1% per year and natural gas consumption by 0.74% per year by 2012 would be an achievable goal. The initial report issued by the Iowa Association of Electric Cooperatives did not offer any initial estimates for potential savings.

In 2007, according to the IUB, Iowa ranked 3rd in the country for per capita spending on energy efficiency programs. However, results have not mirrored this high level of spending. Graphs 11 and 12 showed that Iowa has the highest residential energy use per capita of any state in the Midwest and that Iowa's per capita residential energy use is 9.6% higher than the national average.

Another useful method of comparison is the rate of Gross State Product (or Gross National Product, in the case of the U.S. as a whole) produced per unit of energy utilized in the industrial and commercial sectors. This is often referred to as energy intensity or energy productivity. Although transportation is also a major energy input for business, it is impossible to separate personal and business transportation expenditures, so it is not a part of the comparison in Graph 35.

Graph 35: Energy Use per Dollar Gross State Product in Midwestern States and U.S., 2008



Source: U.S. DOE, EIA: Total Energy Consumption, Gross Domestic Product (GDP), Energy Consumption per Real Dollar of GDP, Ranked by State, 2008

In this measure, Iowa is again at the top in terms of energy intensity in the Midwest and compared to the national average. (Graph 35) Iowa's energy use per dollar GSP is 89.4% higher than Nebraska, the closest state, 66% higher than Illinois, the most efficient state, and 49% higher than the U.S. average.

The Rocky Mountain Institute (RMI) in January, 2009 released a study comparing the energy productivity (in dollars of GSP her kWh input) of the economies of the 50 U.S. states. The study compared the 40 most energy-intensive states with the top 10 most efficient to find the "energy gap," or the potential savings that could be achieved if the average U.S. energy intensity reached the level of the top 10 states. The study corrected for regional climate considerations and state economic mix. The RMI found that this "productivity gap" amounted to 31% of 2005 energy expenditures across the U.S. According to RMI's analysis, Iowa ranks 32nd among the 50 states in terms of energy productivity, at $3.08 of GSP per kWh input. The average productivity among the top 10 states was $6.30 per kWh.[26] The RMI estimates that, to bring state productivity up to the level of the highest-achieving states within the next 10 years, Iowa would need to increase electric energy efficiency by 2% per year.[27]

There are both economic and technical limitations that determine how much energy efficiency is actually feasible. Iowa's IOUs have historically undertaken efficiency measures with a high cost-to-benefit ratio of around 1-to-2, meaning that for each dollar spent, $2 in energy expenditures was saved. The IAEC in their 2008 filing to the IUB estimated a cost-benefit ratio of 1-to-3.[28]

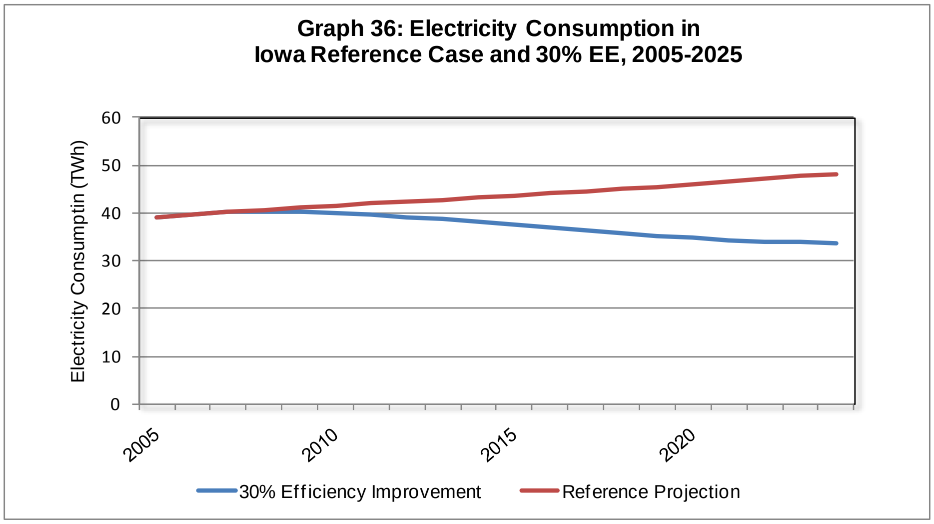
Evaluation of the cost-effectiveness of energy efficiency is changing as a greater emphasis is placed on reducing greenhouse gas emissions and as building new electric generation becomes more expensive. An analysis prepared by the Wisconsin Energy Center and American Council for an Energy Efficient Economy (ACEEE) for the MGA compiled various state studies on energy efficiency potential. The analysis found a range of potential savings of between 0.8 and 1.5% of retail sales per year, which many states are already achieving fairly easily. However, the authors argue that these estimates are conservative for several reasons, including:

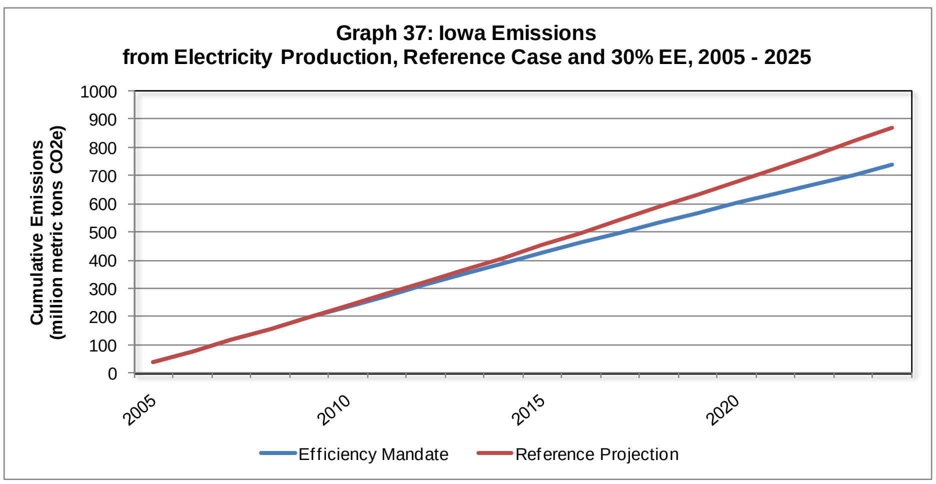
- Many reports do not reflect current increased fuel and new plant construction costs.
- Analyses do not include a price for carbon that would alter cost effectiveness calculations.
- Current estimates rely on current technology availability and pricing, which is necessary but does skew the results in a more conservative direction.
- Most studies include only incremental changes, not integrated, system-wide changes (such as zero- net energy buildings).

The report also argues that energy efficiency programs ought to be evaluated not in terms of how much consumers and utilities can afford, but how much energy efficiency is needed to meet economic and environmental goals, including future load growth and reduction of greenhouse gas emissions.

The Midwestern Governor's Association has called for a 2% increase in energy efficiency savings by 2015, followed by 2% per year incremental savings through 2025. This matches the goal laid out in the Iowa Energy Independence Plan to use efficiency to reduce electricity use by 30% by 2025. A projection produced by the Energy Choice Simulator model projects that this policy would cause energy demand to decline by 15.2% between 2005 and 2025, compared to the business as usual projection of 24% demand growth. (Graph 36)

[26] http://ert.rmi.org/cgu/index.htm
[27] http://ert.rmi.org/files/documents/CGU.RMI.pdf
[28] Goodale, Regi





New plans were approved for all of Iowa's IOUS in the spring of 2009 and implementation of those plans is currently under way. Midamerican's plan includes a goal to reduce electricity use by 1.5% beginning in 2010 and each year until the plan expires at the end of 2013. They estimate the cost-effectiveness of their overall program to be 2.5 to 1. Alliant's plan ramps up their electric efficiency goal from 0.9% in 2009 to 1.3% efficiency savings in 2013.[29]

[29] http://www.state.ia.us/government/com/util/board_activity/ga_reports.html

Energy efficiency efforts that reduced electricity use by 30% by 2030 would have a significant impact on greenhouse gas emissions, according to projections generated by the Energy Choice Simulator Model (Graph X). In this scenario, emissions are reduced 16% between 2005 and 2025 compared to business as usual. Also, as mentioned previously in this report, increasing Iowa's energy efficiency resource would help to avoid emissions of heavy metals, particulate matter and other pollutants associated with fossil energy generation.

The economic benefits of increasing energy efficiency efforts could be dramatic. A September 2009 study by the American Council for an Energy Efficient Economy (ACEEE) found the cost of electric efficiency in Iowa to be $0.017 per kWh saved.[30] For comparison, a coal plant that was proposed in 2009 by Alliant energy to be built in Marshalltown had a cost basis of between $0.083 and $0.092 per kWh according to a filing by Alliant Energy in the IUB docket evaluating the plant proposal. Other cost estimates for new generation construction can be found in Table 6. A comparison of these costs shows that efficiency efforts are nearly 5 times more cost effective than new coal generation. With future regulation of greenhouse gases likely, this discrepancy is slated to become even more dramatic.

Avoided cost for consumers and utilities is not energy efficiency's only economic benefit. Services, labor and goods are all required to perform energy efficiency upgrades. The study performed by Navigant Consulting recommended a 1.5% per year incremental efficiency savings goal for all utilities (including consumer-owned entities). The study estimated that between 2009 and 2018 this policy would create $136M in private investment, employ 1,353 people and help utilities in the state avoid building 260 MW of new fossil generation.[31] These jobs include occupations like electricians, truck drivers, welders, machinists, roofers, accountants, cashiers, software engineers, civil engineers, construction workers, and energy audit specialists. Because much of this work must be done on-site at facilities and homes, these are jobs that will be maintained in the local area and cannot be moved elsewhere.

The economic value of energy efficiency was clearly endorsed through the incentives in the American Recovery and Reinvestment Act of 2009 (ARRA), which is helping states invest in energy efficiency at unprecedented levels. Iowa received $80.8 million for low-income home weatherization, $40.5 million to fund grants through the State Energy Program and $21.2 million through the Energy Efficiency and Conservation Block Grant program to fund state, city and county investments to reduce energy use.[32] This funding will begin to filter through the Iowa economy in 2010, creating both jobs and investment in durable goods and materials. The ARRA legislation also included the requirement that states adopt the most recent International Energy Conservation Code for buildings and reach 90% compliance with the code within 8 years. The state is also required to work with the Iowa Utilities Board to ensure that utility financial incentives line up with customer incentives to use less energy. This could mean "de-coupling" which involves eliminating the connection between how much money utilities make and how much energy they sell.

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[30] http://aceee.org/pubs/u092.pdf?CFID=4367858&CFTOKEN=31396431
[31] Kinross, Andrew, page 18
[32] Pearson, Beth and Galluzzo, Theresa, "Lighting the Way: How Iowa Can Lead with Energy Funding in Federal Stimulus," May, 2009, Iowa Policy Project.

De-coupling would lower one structural barrier to robust implementation of energy efficiency. There are also market barriers to implementing energy efficiency - either a lack of up-front money available or adequate market incentive to implement efficiency. Finally, there is often not enough information available for consumers or utilities on the most effective energy efficiency measures and associated energy savings impacts.

Greenhouse Gas Regulation and Iowa

The Supreme Court declared in 2007 that the EPA must regulate greenhouse gases under the Clean Air Act, and the EPA has begun to move forward with rules that will implement that decision in the absence of any Federal legislation.

The Iowa Climate Change Advisory Council's report from 2008 included a full assessment of Iowa's greenhouse gas emissions and the costs of potential solutions. That report is a good resource for detailed analysis on Iowa's current and historical GHG emissions and potential reduction policies.[33]

The impacts of greenhouse gas regulation on the economy of the state are difficult to assess and no one study has looked comprehensively at all factors, including: potential for increased investments in renewable capacity, the lifecycle economic benefits of increased efficiency investments, the potential for on-farm carbon sequestration and methane reduction and the increased cost of energy, among many others. Most national studies on electricity price impacts project modest price increases for electric customers under the cap and trade proposal in the American Clean Energy and Security Act of 2008 (ACES). A study by Bruce Babcock at Iowa State University's Center for Agriculture and Rural Development found that, for agriculture, the bill would likely be mostly a wash for farmers, finding increased input prices and increased net farm income about equally impactful.

Some studies on the potential impacts of climate change in Iowa have been conducted over the past few years. The Union of Concerned Scientists (UCS) issued a study in 2004 projecting that Iowa can expect warmer, dryer summers, significantly warmer winters and more extreme weather events, such as periods of intense precipitation in the winter and spring and longer periods with precipitation during the summer months.[34] The study projects that Iowa's summers will resemble those of northern Kansas, in terms of rainfall and temperature, by 2030 and northwest Mississippi by 2100.

A December 2008 article by Professor Gene Tackle and Don Hoefstrand at Iowa State also laid out predictions for how climate change could impact Iowa. Their results were very similar to those found in the UCS study, including more intense precipitation events, especially in the spring. They also listed more freeze-thaw cycles, and higher day-to-day and year-to-year variability in temperatures. Among many other potential impacts listed in the article, there are two that may directly influence Iowa's

[33] Strait and Mullen et al, "Final Iowa Greenhouse Gas Inventory and Reference Case Projections, 1990-2025," Center for Climate Strategies, October, 2008, http://www.iaclimatechange.us/ewebeditpro/items/O90F20577.pdf
[34] Moser, Susanne, et al, "Climate Change in the Hawkeye State: Potential Impacts on Iowa Communities and Ecosystems," January, 2004, http://www.ucsusa.org/assets/documents/clean_energy/climate_change_in_iowa_-long-_final-_and_formatted.pdf

movement toward energy independence: reduced wind speeds and reduced solar radiation.[35] Of course, these changes could directly impact the Iowa economy, but it is nearly impossible to predict exactly how.

Conclusion

Reaching the goal of energy independence is within the very real realm of possibility for the state of Iowa. The potential benefits of reaching that goal offer a bright picture of a vibrant future economy for Iowa residents.

[35] Takle, Gene and Hoefstrand, Don, "Climate Change – Impact on Midwestern Agriculture," Agricultural Marketing Resource Center Renewable Energy Newsletter, November/December 2008. http://www.agmrc.org/renewable_energy/climate_change/climate_change__impact_on_midwestern_agriculture.cfm