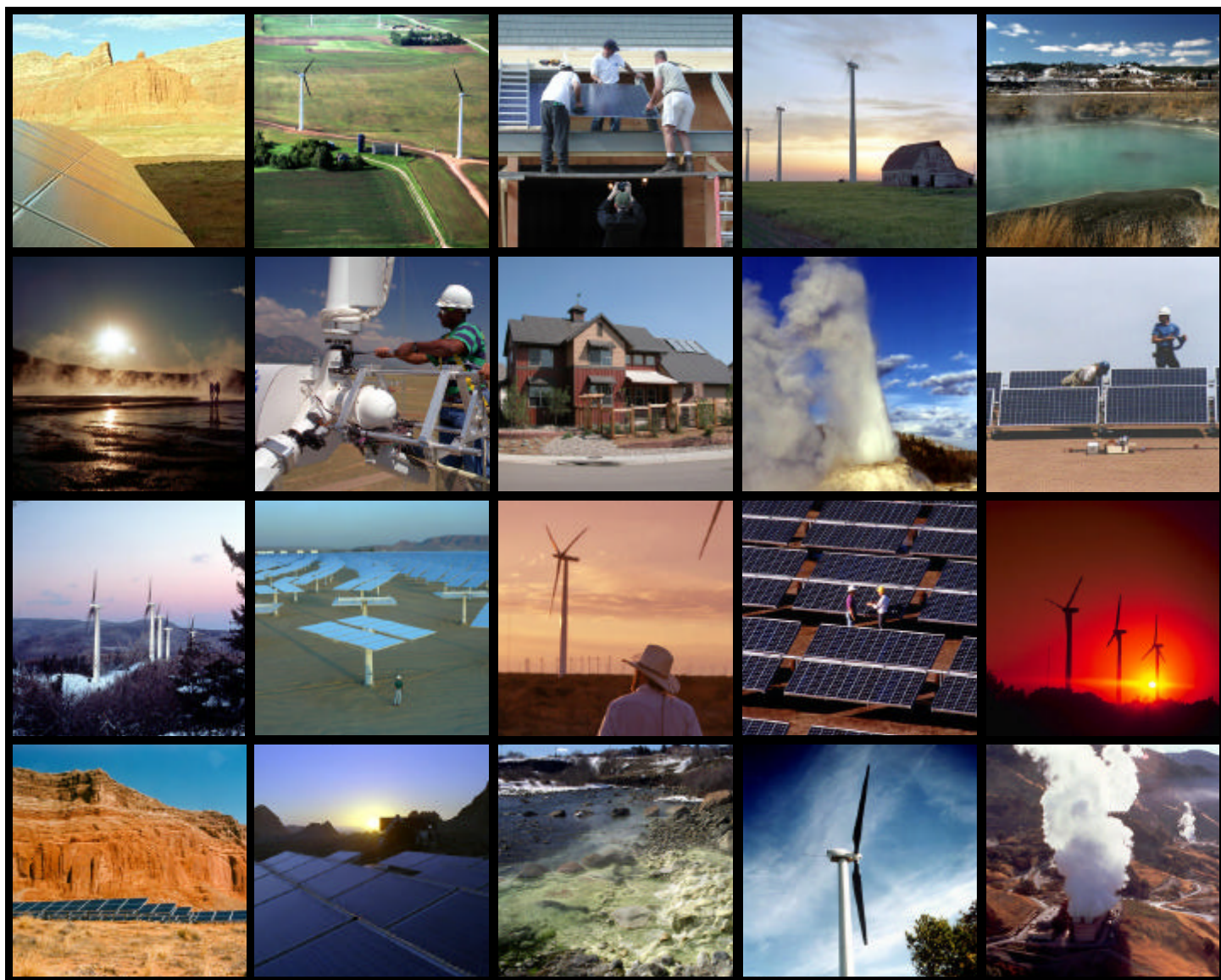


REDIRECTING ILLINOIS'S ENERGY

The Economic and Consumer Benefits of Clean Energy Policies



February 2005

Illinois PIRG Education Fund



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The author would like to thank Marisa London, Richa Bhala, and Patrick Greuter for their research assistance. He also would like to thank Katherine Morrison for her research contributions, Alison Cassidy for her research and editorial assistance, and Shannon Ryan for designing the report. Finally, he would like to thank Economic Research Associates for their analytical support and tireless efforts in developing this report.

In addition, the author would like to thank Bruce Biewald at Synapse Energy Economics for providing editorial review of the report.

Special thanks to the Energy Foundation for making this report possible.

The author alone is responsible for any factual errors. The opinions expressed in the report are those of the Illinois PIRG Education Fund and do not necessarily express the views of our funders.

All photographs are courtesy of the Department of Energy/National Renewable Energy Laboratory (DOE/NREL), unless otherwise noted.

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EXECUTIVE SUMMARY

Illinois's current reliance on coal, oil, gas, and nuclear power for electricity generation has left the state with a legacy of environmental and public health problems. This legacy also includes volatile price fluctuations, costing consumers dearly on electricity bills. We can help solve these problems by reducing demand through energy efficiency and diversifying our electricity mix with renewable energy sources. Fortunately, investing in clean energy policies also would generate new high-paying jobs, save consumers and businesses billions of dollars, and boost Illinois's economy while reducing power plant pollution.

Over the past 50 years, the federal government has provided more than \$500 billion in subsidies to the fossil fuel and nuclear industries, investing a fraction of that in energy efficiency and renewable sources of energy such as wind, solar and geothermal. As a result, coal, nuclear power, oil and gas provide more than 99 percent of Illinois's electricity. This dependence on fossil fuels carries severe public health consequences, including asthma attacks, respiratory disease, heart attacks, and premature deaths. Moreover, fossil fuels, such as coal and oil, pollute the environment from the point of extraction to combustion in the form of global warming, acid rain, oil spills and runoff pollution. At the same time, nuclear power has left us with a nuclear waste problem for which no safe solution exists.

Despite the environmental and public health implications of relying on fossil fuels and nuclear power to meet our energy needs, the federal government continues to push energy policies that would offer more of the same. Last year's federal energy proposals included billions of dollars in new and extended tax breaks for oil and gas drilling, loan guarantees and federal subsidies for building new coal plants, and incentives to build the first new nuclear power plants in 30 years. In total, the 2004 federal energy proposals provided more than \$35 billion in new subsidies for fossil fuels and nuclear power, which would have cost Illinois's taxpayers \$1.9 billion. These proposals offered \$900 million—half as much—to fund energy efficiency and renewable energy programs.

This continued investment in fossil fuels and nuclear energy ignores recent research documenting the potential to meet more of our electricity needs with energy efficiency and renewable sources of energy. In fact, the technical potential of wind, clean biomass, and geothermal resources in the United States is four times greater than our current total electricity consumption. Here in

Illinois, we could generate eight times our current electricity usage from renewable energy sources such as wind and clean biomass. Additionally, conservative estimates suggest that energy efficiency programs could reduce our electricity use in Illinois by 28 percent.

Why then does the federal government continue to subsidize fossil fuels and nuclear power and leave renewable energy sources as peripheral contributors to the country's electricity mix? Proponents of the status quo contend that investing in fossil fuels and nuclear power are essential for a healthy and vibrant economy and that diverting investment to renewables and efficiency will cost us jobs and increase costs to consumers. A growing body of literature, however, shows that investing in energy efficiency and technologies such as wind and solar power boosts local economies and creates jobs. Moreover, investing in renewables and energy efficiency helps to diversify the electricity market and reduces consumer dependence on coal and natural gas, thereby saving consumers money and shielding them from fluctuations in market prices.

This brings us to the central question of this report: what would be the economic and consumer impacts of pursuing clean energy policies? How would a shift in federal policy away from fossil fuels and nuclear power and toward renewable energy and energy efficiency affect the economy, consumers, and the environment in Illinois?

Specifically, we examined the economic and consumer impacts of pursuing two policies:

- Enacting a 20 percent national renewable energy standard, commonly referred to as a renewable portfolio standard or RPS, which would require the U.S. to generate 20 percent of its electricity from clean energy by the year 2020; and
- Shifting the amount it would cost Illinois to subsidize fossil fuels and nuclear power under last year's federal energy proposals, \$1.9 billion, toward renewable energy and energy efficiency.



Passing a 20 percent national renewable energy standard would electricity generation from wind energy. Photo courtesy DOE/NREL.

We found that implementing these two policies would greatly benefit the economy and consumers in Illinois while reducing air pollution from power plants.

In Illinois, investing in these clean energy policies would:

- Create 7,566 net jobs in 2020 and a net annual average of 4,637 jobs between 2005 and 2020;
- Increase wages by \$162 million in 2020;
- Increase Illinois's gross state product (GSP) by an annual average of \$75 million between 2005 and 2020;
- Save all consumers—residential, commercial, and industrial—\$794 million on natural gas bills in 2020;
- Save consumers \$865 million on electricity bills in 2020;
- Reduce global warming carbon dioxide emissions from power plants by 32 percent of 2002 levels; smog-forming nitrogen oxide emissions by six percent of 2002 levels; and soot-forming sulfur dioxide emissions by seven percent of 2002 levels, all by 2020.

Moreover, the clean energy policies evaluated in this report would create more jobs, raise wages higher, and save consumers in Illinois more money than last year's federal energy proposals.

The findings of this report—and hence the title—underscore the benefits of *Redirecting Illinois's Energy*. Strong support for energy conservation and efficiency, coupled with increased emphasis on the development of renewable energy, can help solve our current energy problems, provide a significant boost to the economy and move us towards a safer, healthier energy future.

These findings lead us to the following three recommendations:

1. Implement a Renewable Energy Standard

The federal government should implement a national clean energy standard, known as a renewable portfolio standard, to increase the amount of electricity generated from renewable sources of energy to 20 percent of power generation nationally by 2020. In Illinois, rather than waiting for federal action, we should set a strong enforceable standard of five percent renewable electricity generation by 2010 and 15 percent by 2020.

2. Strengthen Energy Efficiency Standards

To save consumers and businesses money and reduce our reliance on fossil fuels and nuclear power, the federal government should raise efficiency standards for key appliances. Minimally, regulators should implement stronger federal standards for residential furnaces and boilers, commercial air conditioners, and distribution transformers. In Illinois, rather than waiting for federal regulators, we should work at the state level to ensure that common products, such as ceiling fans, exit signs, torchiere lighting fixtures, traffic signs, and air conditioners, meet modern energy efficiency standards, similar to the standards recently enacted in Maryland and New Jersey.

3. Shift Energy Subsidies Away from Fossil Fuels and Nuclear Power Toward Renewables and Energy Efficiency

Policy-makers should shift federal subsidies toward renewable energy and energy efficiency in order to provide the necessary market incentives to stimulate development and implementation of these technologies.



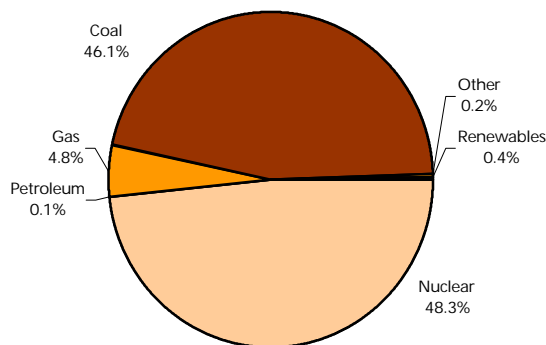
Investing in clean energy policies would boost the economy and create new jobs. Photo courtesy DOE/NREL.

OUR CURRENT ENERGY STATUS

The Electricity Mix in Illinois

In 2002, Illinois generated more than 99 percent of its electricity from fossil fuels and nuclear power and less than one percent from renewable energy sources. (See Figure 1).¹ The state relies on coal for almost half of its electricity generation. Illinois also is one of the most nuclear-dependent states—third only to New Hampshire and South Carolina—generating nearly half of its electricity from six nuclear power plants.

Figure 1. Illinois's Electricity Mix by Sector: 2002



Public Health and Environmental Impacts of Our Current Electricity Mix

Illinois's reliance on fossil fuels and nuclear power has environmental and public health impacts—both within the state and beyond our borders. Today, 159 million Americans, including almost nine million Illinoisans and Hoosiers residing in the Chicago-Gary metropolitan area, live in places where the air is literally unsafe to breathe, in large part because of emissions from energy production and consumption.² Although the past 30 years have produced significant advances in reducing harmful emissions from power plants and cars, increased consumption has eroded many of these gains, leaving the public vulnerable to the severe health and environmental impacts of burning fossil fuels.

Mercury

Coal-fired power plants are the nation's largest unregulated source of mercury pollution, contributing 41 percent of all U.S. mercury emissions in 1999.³ Mercury is so prevalent that Illinois has issued mercury advisories for all of its lakes and rivers, warning people to limit their consumption of fish caught in these waterways.⁴

Mercury bioaccumulates in the tissue of fish and other aquatic animals and persists in the environment, magnifying its public health impacts. Even at low levels, mercury can cause serious neurological damage to developing fetuses, infants and children. The neurotoxic effects of low-level mercury poisoning are similar to the effects of lead in children. In 2004, the Environmental Protection Agency's scientists estimated that one in six women of childbearing age in the U.S. has levels of mercury in her blood that are sufficiently high to put 630,000 of the four million babies born each year at risk of learning disabilities, developmental delays, and problems with fine motor coordination, among other problems.⁵

Smog

Ground-level ozone, commonly known as smog, is our nation's most prevalent air contaminant. In 2003, air quality monitors in Illinois recorded exceedances of the health standard for ground-level ozone on 11 days.⁶ Ground-level ozone forms when nitrogen oxides (NOx) mix with volatile organic compounds (VOCs) in the presence of sunlight. Ground-level ozone is most common in the summer months, when the sun is the strongest. In 2002, power plants alone emitted 174,247 tons of NOx in Illinois, the equivalent of the annual emissions of nine million average cars.⁷

Inhaling ground-level ozone can be extremely dangerous. The ozone gas inflames and burns through sensitive lung tissue. The swelling and associated scarring decreases oxygen intake and can lead to asthma, bronchitis, emphysema, and other respiratory problems.⁸ For vulnerable populations, such as children, the elderly and people with respiratory problems, ground-level ozone can pose an immediate and severe health threat.

Fine Particulate Matter

Sulfur dioxide (SO₂), another byproduct of energy production and use, is a primary component of fine particulate matter, or "soot." In 2002, power plants alone emitted 353,696 tons of SO₂ in Illinois.⁹ Fine particles, such as those that result from power plant emissions, can bypass the lung's defense mechanisms and become lodged deep in the lungs where they can cause a variety of health problems. An extensive body of evidence indicates that exposure not only causes respiratory damage leading to asthma and bronchitis, but also causes lung cancer and cardiac effects, increasing the risk of heart attacks.¹⁰

In Illinois in 2002, particulate matter from power plants caused an estimated 2,300 non-fatal heart attacks and 1,350 deaths, including 150 deaths from lung cancer.¹¹ Power plant pollution also causes and exacerbates chronic health problems, such as asthma. Approximately 660,000 adults in Illinois suffer from asthma.¹² In 2002, particulate matter from power plants caused an estimated 34,000 asthma attacks and 195,500 lost work days.¹³

Nuclear Waste

Our reliance on nuclear power causes a different set of problems. Aside from the risk of a reactor meltdown and explosion, as happened in Chernobyl in 1986, the nuclear industry lacks a proven system for safely storing irradiated nuclear fuel rods, the most radioactive material on earth and most toxic substance ever produced by mankind. As of 2003, 49,000 metric tons of spent fuel sat in temporary storage in the U.S.¹⁴ By 2011, the 11 reactors in Illinois are projected to have produced 6,949 metric tons of high-level radioactive waste.¹⁵ Whether this waste is stored on site or shipped to Yucca Mountain by rail or road, the risk of catastrophic events and leakage of radioactive material into our environment poses great threats to public health. Radiation causes death, cancer, genetic and chromosomal instabilities, developmental deficiencies in the fetus, hereditary disease, and accelerated aging.¹⁶

Global Warming

Burning fossil fuels releases heat-trapping global warming pollution into the atmosphere, which alters the climate of the planet and throws weather systems out of balance. According to the Intergovernmental Panel on Climate Change (IPCC), an officially appointed body of the world's climate experts, if we do nothing, atmospheric carbon dioxide (CO₂) concentrations will at least double and could triple by the end of the 21st century.¹⁷ The emissions already released will remain in the atmosphere for many decades to centuries. Therefore, even if global warming concentrations are stabilized, global warming could persist for hundreds of years.

Evidence of global warming is all around us. Average temperatures are increasing at a rate that far exceeds the normal temperature swings for the past thousand years.¹⁸ Future climate scenarios show likely increases in temperature, heavy precipitation, and tropical storms such as hurricanes. Scientists fear that global warming will worsen the intensity and duration of these extreme weather events.¹⁹

The United States is responsible for a quarter of all global warming pollution released worldwide and emits more carbon dioxide than China, India and Japan combined.²⁰ Power plants in the U.S. are responsible for 39 percent of all domestic carbon dioxide emissions.²¹ In



Reliance on fossil fuels generates pollution from the point of extraction to combustion. Photo courtesy DOE/NREL.

2002, power plants alone emitted 100 million tons of CO₂ in Illinois, the equivalent of the annual emissions of 17 million average cars.²²

Oil Drilling & Spills

In addition to the environmental consequences of burning fossil fuels, extracting and transporting fossil fuels can cause problems as well. Our dependence on oil and natural gas is increasing calls for more drilling on America's public lands and along our protected coastlines, including the Great Lakes. Drilling rigs on and offshore leave more than a footprint, releasing toxic chemicals into often delicate ecosystems, disturbing wildlife and marine life, and potentially causing devastating oil spills. For coastal states dependent on tourism, new oil and gas drilling could mar the beaches and waters that attract visitors.

Between 1973 and 1993, 200,000 oil spills occurred in U.S. waters, spilling more than 230 million gallons of oil, or an average of 31,000 gallons every day.²³ The impacts of these spills, ranging from the smothering of plant and animal life to the contamination of drinking water, vary depending on the specific habitat affected and the chemical composition of the oil.

Coal Mining

Coal mining, especially mountaintop removal mining, harms local ecosystems and threatens public health. One mountaintop removal operation can strip up to ten square miles and dump enough waste to fill twelve valleys, each up to 1,000 feet wide and one mile long.²⁴ A draft study by the U.S. Office of Surface Mining found that without more stringent regulation, future mountaintop removal coal mining could obliterate 230,000 acres of ecologically diverse hills and hollows in West Virginia, western Virginia, eastern Kentucky and Tennessee. Already, between 1985 and 1999, at least 562 miles of Appalachian streams were buried under mining waste from mountaintop removal.²⁵

Consumer Costs of Our Electricity Mix

Beyond these environmental and public health problems, our energy system has proven unreliable and expensive—unnecessarily costing consumers and the economy billions of dollars. Altogether, the total energy bill for Illinois consumers and businesses topped \$12 billion in 2000.²⁶

A decade of electric industry restructuring has led to few benefits for the majority of consumers, and any benefits consumers have experienced are likely to be short-lived. Mandatory rate reductions and rate caps that benefited consumers in many states with retail deregulation are scheduled to be removed over the next several years. In Illinois, rate caps are scheduled to come off in 2007, which could mean higher prices for consumers. The removal of rate caps in New Jersey in 2003 led to an immediate 19 percent increase in rates.²⁷

Restructuring and wholesale competition also have placed unprecedented strain on the electric grid, challenging the reliability of the system. The most visible manifestation of the problems facing the grid was the August 2003 blackout, which affected 50 million consumers from New York to Michigan and cost consumers and businesses billions of dollars.²⁸ From costly experience, including the heat wave of 1995, Illinoisans know that power outages caused by strained electric systems can lead to extreme hardship and unnecessary costs for people and businesses.



Ground-level ozone, commonly known as smog, results in severe public health problems such as asthma, bronchitis, and other respiratory problems. Photo courtesy DOE/NREL.

In addition, electric industry restructuring has increased the country's reliance on natural gas, fueling a boom in the construction of natural gas power plants. As a result, natural gas prices have doubled since the mid-1990s. In fact, rising natural gas prices cost the U.S. economy an estimated \$111 billion over the last four years.²⁹ During the winter of 2000-2001 in Illinois, consumer gas bills doubled and then tripled as natural gas prices escalated. By winter's end, business and residential gas bills topped \$3.5 billion in Illinois, nearly triple the \$1.2 billion spent the previous winter.³⁰ Nationally, the high price of natural gas has forced several industries to move their plants overseas, costing Americans thousands of jobs.³¹

FEDERAL POLICIES: STUCK IN REVERSE

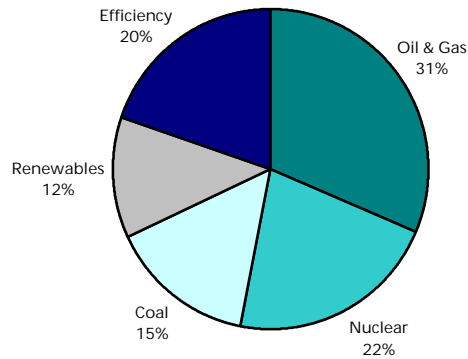


Despite the environmental, consumer, and public health impacts of our current energy system, the federal government is proposing more of the same. Over the past four years, Congress and the Bush administration have debated a national energy policy focused on increasing production of coal, nuclear power, oil and gas by providing more subsidies to these industries.

The oil and gas, coal and nuclear industries have received more than \$500 billion in federal subsidies over the past 50 years.³² Instead of moving in a new direction—one that would provide balance to Illinois’s electricity mix—last year, Congress proposed more than \$35 billion in new subsidies and tax breaks for these industries.³³ These federal proposals to subsidize the oil, gas, coal, and nuclear industries would cost Illinois’s taxpayers more than \$1.9 billion over the next ten years. (See Figure 2).³⁴

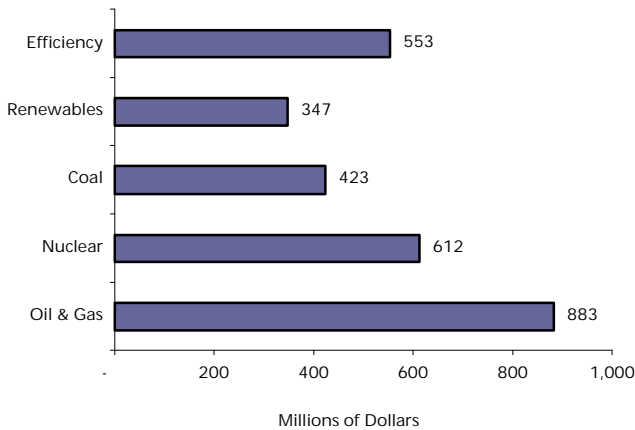
Moreover, these federal proposals provide only \$900 million—half as much—to renewables and energy efficiency; two out of every three dollars subsidize the coal, oil and gas, and nuclear industries. (See Figure 3).³⁵

Figure 3. Proposed Energy Subsidies and Tax Breaks by Sector



We describe on the following pages a few of the biggest federal subsidies for the nuclear, coal, oil and gas industries included in the 2004 federal energy proposals. (See Appendix 1 for a breakdown of these proposed subsidies). Later, we analyze what the consumer and economic impacts of these subsidies would be in Illinois and compare the results with alternative energy proposals such as shifting these subsidies towards renewable energy and energy efficiency.

Figure 2. Cost to Illinois’s Taxpayers of Proposed Energy Subsidies and Tax Breaks by Sector



Fossil fuels such as coal, oil, and gas received more than \$420 billion in subsidies between 1950 and 1997. The federal government has proposed increasing these subsidies. Photos courtesy DOE/NREL.



Nuclear Power

Federal Cost: \$11.3 billion
Cost to Illinois: \$612 million

Despite extensive and continuous government assistance to the nuclear power industry—including more than \$73 billion in taxpayer-funded research and development alone—no nuclear power plant has been ordered and built in the U.S. since 1973.³⁶ The decline of nuclear power is a result of several factors: the Three Mile Island disaster heightened public safety fears; nuclear waste remains a serious problem without a safe solution; and ultimately, investors have decided that nuclear power does not make economic sense. The federal government, however, has continued to provide the industry with tens of billions of dollars in support from indirect subsidies, such as the Price Anderson Act, which limits the industry's liability in the case of a severe accident, to direct support in the form of research and development subsidies and decommissioning tax breaks. Although nuclear power remains one of the most dangerous and expensive energy sources, last year's federal energy proposals attempted to establish new tax breaks and subsidies to bolster the industry. A few of the largest nuclear subsidies in last year's energy proposals are detailed below.

Production Tax Credit

Federal Cost: \$6 billion
Cost to Illinois: \$325 million

One of the primary obstacles to building new nuclear power plants in the U.S. is the large upfront capital cost of plants. With investors uninterested in bearing the financial risk of building new plants, proponents in the federal government have outlined various proposals to jumpstart the industry. These proposals include taxpayer funded loan guarantees that would cover up to 50 percent of the cost of building new plants. The Congressional Research Service estimated that this would cost taxpayers between \$14 billion and \$16 billion for six to eight plants.³⁷ Other proposals include power purchase agreements, whereby the federal government would purchase nuclear power from the newly-built plants, potentially at above markets rates.

Last year's energy proposals would have provided the nuclear industry with a production tax credit of 1.8 cents per kilowatt-hour—similar to a credit allocated to renewable energy sources such as wind and geothermal. A 1000 megawatt (MW) nuclear power plant could claim an annual credit of up to \$125 million over an eight year period for a total of \$1 billion in federal support. The proposal allowed for up to six 1000 MW plants to claim the credit, costing taxpayers as much as \$6 billion.

Decommissioning Tax Break

Federal Cost: \$1.4 billion
Cost to Illinois: \$80 million

Since Entergy bought the Pilgrim Nuclear Power Station in Plymouth, Massachusetts from Boston Edison Co. in July 1999, 13 nuclear reactors have been sold from rate-regulated to non-regulated owners.³⁸ When a utility buys another utility's nuclear reactor, the decommissioning fund—a fund paid into by ratepayers and earmarked to

cover the costs of dismantling the reactor when it closes—comes with the deal. These decommissioning funds generally run in the hundreds of millions of dollars. Under current law, merchant utilities, which are unregulated, would have to pay tax on the decommissioning fund. Although a state-regulated utility's decommissioning fund is exempt from taxes, the 2004 federal energy package would have extended this tax break to unregulated private nuclear entities. The proposal would not prevent these unregulated utilities from increasing rates to bridge a shortfall or from cutting corners on decommissioning costs in order to keep the surplus, rather than giving it back to ratepayers. This proposal would cost taxpayers \$1.4 billion over ten years.³⁹

Research & Development

Federal Cost: \$2.7 billion
Cost to Illinois: \$146 million

Between 1948 and 1998, the nuclear industry received more than \$73 billion in federal research and development subsidies, or nearly 60 percent of all federal energy research and development subsidies over that period (Figure 4).⁴⁰ These subsidies supported everything from increasing the efficiency of current plants to devising new reactor technologies.

Last year's energy proposals included funding for the Department of Energy's Nuclear Power 2010 program, which is a government-industry partnership to develop the next generation of nuclear reactors, and the Advanced Fuel Cycle Initiative, which would reverse nearly three decades of U.S. nuclear non-proliferation policies to attempt to reprocess waste from commercial nuclear reactors. These and other nuclear research and development programs would cost taxpayers \$2.7 billion over five years.⁴¹

Coal

Federal Cost: \$7.8 billion
Cost to Illinois: \$423 million

Between 1950 and 1997, the coal industry received more than \$70 billion in subsidies, or nearly \$1.5 billion per year.⁴² This has included research and development support, funding for the Clean Coal Program, and subsidies for mining activities. Global warming and public health concerns have called into question our dependence on coal, yet between 1995 and 1999, ten coal-fired power plants were built across the country. In the next few years, utilities are planning on building 100 additional plants.⁴³ A few of the largest coal subsidies in last year's energy proposals are detailed below.

Clean Coal Subsidies

Federal Cost: \$1.8 billion
Cost to Illinois: \$98 million

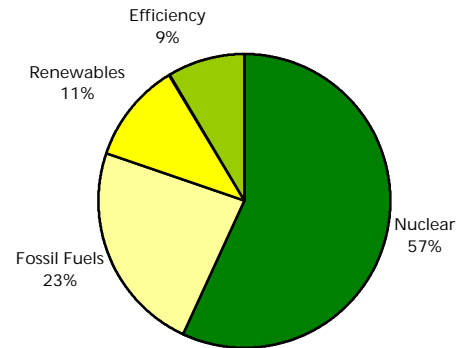
Since 1984, the federal government has spent billions of dollars on the Clean Coal Program to assist industry in developing so-called clean coal technologies. The Government Accountability Office (GAO) has repeatedly criticized this government-industry joint initiative for wasting and mismanaging taxpayer money.⁴⁴ In many cases, the GAO determined that existing technology would have been more effective than the technologies developed through this program. Nonetheless, the federal government has proposed spending another \$1.8 billion over the next nine years on clean coal.

Clean Air Coal Subsidies

Federal Cost: \$2 billion
Cost to Illinois: \$108 million

The federal government is also proposing another \$2 billion over nine years as part of the Clean Air Coal Program, which would assist the coal industry in retrofitting existing plants and developing new technologies. The stated purpose of this program would be to "mitigate financial risks, reduce the cost, and increase the marketplace acceptance of the new clean coal technologies."⁴⁵ While duplicating the efforts of the Clean Coal Program, this program would use taxpayer dollars to assist the coal industry to meet public health standards. However, the proposal states that any emission reductions achieved or technologies developed would not be considered achievable by other plants. As a result, even if the program succeeded, federal regulators would be unable to require other plants to install pollution-reduction technologies developed under this program.

Figure 4. Energy Research and Development Spending by Sector (1948-1998)



Investment and Retrofit Tax Credits

Federal Cost: \$2.1 billion
Cost to Illinois: \$114 million

Over the past few years, the federal government has proposed new tax breaks, including a production tax credit and an investment tax credit for building new facilities. Last year's proposals included more than \$2 billion in tax breaks for the coal industry, such as investment tax credits and deductions for investing in pollution control equipment. Under these proposals, coal companies could deduct 15 percent of the cost of upgrading old plants or building new plants that qualify as clean coal technologies; advanced clean coal plants can claim as much as 17.5 percent of the investment costs. Moreover, these proposals would allow plants to deduct all investments in pollution control devices over a shorter time, even for the most polluting plants that date back prior to 1975.

Oil & Gas

Federal Cost: \$16.3 billion
Cost to Illinois: \$883 million

Since the early 20th century, the federal government has offered special tax breaks for the production of oil and gas. In fact, the oil and gas industry has always been the biggest beneficiary of federal energy subsidies. Between 1950 and 1997, the oil and gas industry received more than \$350 billion in federal subsidies, or 60 percent of all federal energy subsidies.⁴⁶ Despite this long-term support and record high oil prices, the federal government is proposing to increase federal support for the oil and gas industry by creating new tax breaks and subsidies. A few of the largest oil and gas subsidies in last year's proposals are detailed below.

Geological and Geophysical Tax Break

Federal Cost: \$2.2 billion
Cost to Illinois: \$119 million

Under current law, oil and gas companies can deduct the geological and geophysical costs of exploring for new deposits only if nothing is found, in which case costs can be deducted as a loss. In instances where fossil fuel deposits are found and the property is retained, companies cannot claim a loss or deduct the cost of purchasing and surveying the land, which is viewed as a capital investment. In last year's energy proposals, the federal government planned to allow companies to deduct all geological and geophysical costs incurred in connection with oil and gas exploration—even when deposits are found—over two years. This tax break would cost taxpayers \$2.2 billion.



Extracting and transporting fossil fuels can cause problems such as oil spills like the Argo Merchant spill seen here. Photo courtesy of the Office of Response and Restoration, National Ocean Service, National Oceanic and Atmospheric Administration.

The synfuel industry, on the other hand, only developed because of a loophole in the tax credit. Spurred by various news reports of abuse, the IRS investigated the synfuel industry in 2003 for fraudulently claiming the credit. Reports arose that manufacturers were simply spraying regular coal with latex, asphalt derivatives and pine-tar resin to claim the credit.⁴⁹

Section 29 Tax Break for Non-Conventional Fuels

Federal Cost: \$3 billion
Cost to Illinois: \$163 million

The Section 29 credit was established in 1980 as a tool for increasing development of “alternative” domestic energy sources. The credit applies to fuels such as oil produced from shale or tar sands; synthetic fuels (synfuels) produced from coal; gas produced from pressurized brine; and coalbed methane, all of which were deemed “uneconomical” for conventional production.

The two primary beneficiaries of the credit are companies that develop coalbed methane and synfuels, which have collected billions of dollars in tax credits. However, according to the Congressional Research Service, “virtually all of the added gas output has substituted for domestic conventional natural gas rather than imported petroleum, meaning that the credit has basically not achieved its underlying energy policy objective of enhancing energy security.”⁴⁷ Moreover, coalbed methane has become so profitable that the credit is unnecessary and only serves to increase profits, according to some of the producers themselves.⁴⁸

Last year's federal proposals would extend the credit to 2007 and enable additional fuels to qualify for the credit. This proposal would cost taxpayers \$3 billion over the next ten years.

Fossil Fuel Research & Development

Federal Cost: \$4.9 billion
Cost to Illinois: \$266 million

In addition to tax breaks, fossil fuel industries, including oil, gas and coal, benefit from billions of dollars in research and development support. Between 1948 and 1998, fossil fuel industries received \$30 billion in federal research and development subsidies, or nearly 23 percent of all federal energy research and development subsidies over that period. (See Figure 4).⁵⁰ The 2004 federal energy proposals included funding for fossil fuel research and development at a cost of \$4.9 billion over five years. While the proposals did not specify what percentage of those funds would support oil and gas research or coal research, the funds were intended to be used for “research, development, demonstration and commercial application on oil and gas,” and to “facilitate production and generation of coal-based power.”⁵¹

TOWARD A NEW ENERGY FUTURE



Strong support for energy conservation and efficiency, coupled with increased emphasis on the development of renewable energy, can help solve our energy problems and move us toward a safer, healthier energy future.

Energy Efficiency

Energy efficiency is the quickest, cheapest, cleanest way to reduce energy consumption and save consumers money. Energy conservation and efficiency measures should always be our first response to potential supply/demand imbalances; they have the same effect as increasing supply without the negative consequences of increased energy production and use. In most cases, efficiency measures are also cheaper and faster to implement than supply-side options. For example, large gas-fired power plants take two to five years to get online; savings from conservation measures can be realized in days or months.⁵²

There are great opportunities for energy conservation and energy efficiency improvements in each of the main sectors of electricity use—industrial, commercial and residential. Several reports have documented the potential of existing and future technologies to make our homes, offices and appliances more energy efficient, thereby saving consumers and businesses billions of dollars.⁵³ Indeed, existing energy efficiency measures have already saved businesses and consumers money. For example, if the U.S. had not dramatically reduced its energy intensity over the past 27 years, energy use in 2000 would have equaled about 171 quadrillion Btus instead of the 99 quadrillion Btus actually consumed. Consumers and businesses would have spent at least \$430 billion more on energy purchases in 2000 had this 72 quadrillion Btus of savings not occurred. About 60

percent of this decline in energy intensity is attributable to real energy efficiency improvements (the other 40 percent is due to structural changes in the economy and fuel switching).⁵⁴ However, we have only scratched the surface in terms of implementing energy efficiency measures. In fact, conservative estimates suggest that we still have the potential to reduce our electricity use in Illinois by 28 percent by 2020.⁵⁵

To realize these long-term benefits, consumers and businesses need incentives to offset the initial upfront costs of new energy-efficient equipment. While the federal government has supported energy efficiency measures to a certain degree, much more is required to fully realize the benefits of these technologies. Outlined below are three of the primary policies that decision-makers should support to increase development and use of energy efficiency technologies.

Tax Incentives

To increase the energy efficiency of our homes, buildings and appliances, the federal government should provide tax relief to consumers and businesses that invest in energy efficient technologies. These tax incentives should include credits for the builders of new energy-efficient homes; credits to produce energy-efficient clothes washers and refrigerators; credits for high efficiency heat pumps, furnaces, and central air conditioners; and credits for businesses to invest in fuel cells and efficient combined heat and power projects. To stimulate investment in these technologies, the incentives should be guaranteed to exist over the long term.

Efficiency Standards

To reduce electricity demand, the federal government should raise efficiency standards for key appliances. For the last three years, the Department of Energy has named efficiency standards for residential furnaces and boilers, commercial air conditioners, and distribution transformers as its “high priorities,” yet during that period the agency has missed its own target deadlines and fallen even further behind the legal deadlines. If the federal government enacted these standards, by 2030 they could eliminate the need for more than 70 new power plants and reduce the demand for natural gas by enough to heat one out of every ten U.S. homes that rely on natural gas heating.⁵⁶

In Illinois, our policy-makers should set new energy efficiency standards for everyday items such as ceiling



Energy efficiency has the potential to save consumers billions of dollars on electricity bills while displacing the need for more power plants. Photo courtesy DOE/NREL.

fans, torchiere lamps, traffic signals, vending machines, clothes washers, air conditioners and heaters, similar to the standards recently passed in Maryland and New Jersey. By 2020, we would save more energy than is used by Springfield and Naperville combined. By 2030, Illinois's consumers and businesses would save more than \$1.7 billion on electric and natural gas bills. These new standards also would eliminate the need for three average size power plants by 2020.⁵⁷

Research and Development

While the federal government has provided more than \$100 billion in research and development funding to the fossil fuel and nuclear industries over the past 50 years, it has only invested \$11 billion in efficiency technologies, or nine percent of all federal energy research and development subsidies over that period. (See Figure 4).⁵⁸ Despite the many benefits of efficiency programs, spending on state and utility-sponsored energy efficiency programs decreased by approximately 38 percent between 1993 and 2000.⁵⁹ Several efficiency technologies are on the verge of making a breakthrough, while others have the potential to save substantial amounts of energy in the future. Federal investment is needed to ensure that these and other newer technologies live up to their promise.

Renewable Energy

Although Illinois has the technical potential to generate eight times its current electricity usage from renewable energy, only about 0.4 percent of the state's electricity comes from renewable resources.⁶⁰ The technical potential of wind, biomass, and geothermal resources in the United States is four times greater than our current total electricity consumption.⁶¹ The wind that blows in just four states—North Dakota, South Dakota, Kansas and Nebraska—is enough to meet the electricity needs of the entire country.⁶² The amount of light energy that hits the surface of the Earth every minute is greater than the total amount of energy that the world's human population consumes in a year.⁶³ We only harness a fraction of that power, but solar and wind have the potential to significantly relieve our energy problems.

Beyond the obvious environmental benefits, increasing electricity generation from renewable energy would help boost local economies and create jobs. Currently, most states import energy from other places, so money spent on petroleum and coal, for example, flows from the local economy to other states or even other countries.⁶⁴ Some economists estimate that 80 percent of every dollar spent on energy bills leaves the state economy.⁶⁵ Renewable energy, on the other hand, redirects dollars spent on energy into local economies. Farmers and ranchers especially benefit from increased renewable energy use,



The technical potential of wind, biomass, and geothermal resources in the U.S. is four times greater than our current total electricity consumption. Photo courtesy DOE/NREL.

with some developers paying as much as \$2,000 per year to people who install a wind turbine on their land.⁶⁶ Here in Illinois, under a 20 percent national renewable energy standard, farmers and rural landowners could receive \$21 million in lease payments from wind power by 2020.⁶⁷

We are starting to take advantage of our extensive renewable energy potential. However, we still have a ways to go and need to start investing in renewable technologies now in order to transform our energy system and reap the benefits. Outlined below are a few of the primary renewable energy policies and programs that decision-makers should support.⁶⁸

Renewable Energy Standard

We should create state and national renewable energy standards, commonly referred to as a renewable portfolio standard or RPS, to require that a certain percentage of electricity be generated from renewable energy. Arizona, California, Connecticut, Colorado, Hawaii, Iowa, Maine, Maryland, Massachusetts, Minnesota, Nevada, New Jersey, New York, New Mexico, Rhode Island, Texas, and Wisconsin already have passed state renewable energy standards to encourage development of clean energy technologies.

Here in Illinois, we should set a strong enforceable standard of five percent electricity generation from renewables by 2010 and 15 percent by 2020. While states must continue their efforts to generate more electricity from renewable sources, we also need national standards to ensure that all Americans can enjoy the benefits of renewable electricity. At the national level, decision-makers should set a standard requiring that 20 percent of the country's electricity comes from renewable energy by 2020.

Production Tax Credit

Section 45 of the Internal Revenue Code is a production tax credit intended to develop specified renewable

energy sources and to promote competition between renewable energy sources and conventional energy sources. The production tax credit is critical to making renewable energy price-competitive with conventional energy sources, such as oil, coal and nuclear, which are heavily subsidized by the federal government. The federal government recently extended the tax credit, which will enable the renewable energy industry to develop and improve its technology, drive costs down even more and provide Americans with clean electricity generation. Unfortunately, the credit is set to expire in December 2005 and should be extended on a long-term basis.

Residential Tax Credit

Although solar power currently represents a small portion of installed renewable electricity capacity, it is expanding quickly and has potential for rapid development in the coming decade. Worldwide photovoltaics electricity production grew by 29 percent from 1990 to 2000.⁶⁹ If the U.S. photovoltaic capacity continues to grow at its current annual rate of 18 percent,⁷⁰ it could play a large role in meeting our energy needs. The federal government has proposed extending a tax credit for the purchase of alternative energy systems using wind and solar energy to power, heat and cool homes. This tax credit makes small scale renewable technologies like solar panels more affordable for homeowners and increases the role these technologies play in our energy future.

Research and Development

Renewable energy programs have been chronically under-funded for several years. Between 1948 and 1998, the federal government spent \$128.5 billion on energy research and development, with more than \$100 billion, or 80 percent, going to nuclear and fossil fuels and only \$14 billion, or 11 percent, going to renewables. (See Figure 4).⁷¹ Despite this, renewable energy has become increasingly cost competitive. The American Wind Energy Association estimates that the cost of electricity from utility-scale wind systems has dropped by more than 80 percent over the last 20 years.⁷² While last year's federal energy proposals included some money for further development of these technologies, much more is needed.



Renewable energy redirects dollars spent on energy into local economies. Photo courtesy DOE/NREL.



To improve the energy efficiency of our homes and buildings, the federal government should provide tax relief to consumers and businesses that invest in energy efficient technologies. Photo courtesy DOE/NREL.



FINDINGS: AN ECONOMIC BOOST

Proponents of the status quo contend that investing in fossil fuels and nuclear power are essential for a healthy and vibrant economy and that diverting investment to renewables and efficiency will cost us jobs and increase costs to consumers. Our analysis evaluates the credibility of these assertions by comparing the economic and consumer impacts of three different energy policies.

Specifically, we examined the effect of three energy scenarios on jobs, wages, gross state product (GSP), natural gas and electricity savings, and power plant emissions of nitrogen oxides (NO_x), sulfur dioxide (SO₂), and carbon dioxide (CO₂) in Illinois between 2005 and 2020. Although we evaluated three national energy scenarios, all of the results are state-specific and based on the impacts on Illinois's economy and consumers.

We evaluated and compared the impacts of these three energy scenarios:

SCENARIO 1: 2004 FEDERAL ENERGY PROPOSALS

We examined the national and state-level economic and consumer effects of the 2004 federal energy proposals detailed earlier in the report, which contain \$52 billion in subsidies. Of this total, \$35 billion benefits fossil fuels and nuclear power, with the remaining portion going to renewable energy and energy efficiency programs. These proposals would cost Illinois's taxpayers \$2.8 billion, with \$1.9 billion going to fossil fuels and nuclear power. (See Appendix 1 for a breakdown of these subsidies).

SCENARIO 2: 20 PERCENT RENEWABLE ENERGY STANDARD (RPS)

We examined the national and state-level impacts of passing a federal renewable energy standard requiring 20 percent of the nation's electricity come from renewable sources by 2020.⁷³ This scenario does not include any of the federal subsidies proposed in 2004.

SCENARIO 3: CLEAN ENERGY PACKAGE

We examined the national and state-level impacts of passing a 20 percent renewable energy standard while also shifting the \$1.9 billion in proposed subsidies for fossil fuels and nuclear power into energy efficiency and renewable energy.⁷⁴

We found that in Illinois, Scenario 3—the clean energy package—would:

- Create 7,566 net jobs in 2020 and a net annual average of 4,637 jobs between 2005 and 2020;
- Increase wages by \$162 million in 2020;
- Increase Illinois's GSP by a net annual average of \$75 million between 2005 and 2020;
- Save all consumers—residential, commercial, and industrial—\$794 million on natural gas bills in 2020;
- Save consumers \$865 million on electricity bills in 2020;
- Reduce global warming carbon dioxide emissions from power plants by 32 percent of 2002 levels; smog-forming nitrogen oxide emissions by six percent of 2002 levels; and soot-forming sulfur dioxide emissions by seven percent of 2002 levels, all by 2020.

What is most revealing about the findings is not that investing in clean energy generates significant economic and consumer benefits, rather that the clean energy package (Scenario 3), on the whole, provides greater economic and consumer benefits than the 2004 federal energy proposals (Scenario 1). (See Table 1 & 2 for comparison of results for Illinois and nationally).

	Scenario 1	Scenario 2	Scenario 3
Net Job Increase in 2020 (actual)	3,138	1,356	7,566
Net Increase in Wages in 2020 (millions of 2001\$)	55	97	162
Avg. Annual Increase in GSP 2005-2020 (millions of 2001\$)	61	151	75
Annual Elec. Savings in 2020 (millions of 2001\$)	382	N/A	865
Avg. Annual Elec. Savings 2005-2020 (millions of 2001\$)	252	N/A	405
Natural Gas Savings in 2020 (millions of 2001\$)	164	640	794
Avg. Annual Natural Gas Savings 2005-2020 (millions of 2001\$)	85	241	308

	Scenario 3
Net Job Increase in 2020 (actual)	215,308
Net Increase in Wages in 2020 (millions of 2001\$)	6,823
Net Increase in GDP in 2020 (millions of 2001\$)	4,507
Avg. Annual Increase in GDP 2005-2020 (millions of 2001\$)	5,929
Annual Elec. Savings in 2020 (millions of 2001\$)	16,226
Avg. Annual Elec. Savings 2005-2020 (millions of 2001\$)	7,427
Natural Gas Savings in 2020 (millions of 2001\$)	11,084
Avg. Annual Natural Gas Savings 2005-2020 (millions of 2001\$)	4,460

Note: All results are above projected levels in the given year or time frame.

The clean energy package (Scenario 3) creates more jobs, raises wages higher, saves consumers more money, and provides a comparable boost to Illinois's GSP as last year's federal energy proposals (Scenario 1).

In fact, Scenario 2—the 20 percent renewable energy standard without any federal subsidies—would provide similar economic benefits as last year's federal energy proposals. We found that a renewable energy standard alone (Scenario 2)—which would cost Illinois's taxpayers \$2.8 billion less than Scenario 1—would result in a comparable increase in wages and jobs while generating larger natural gas savings for consumers and a significantly larger increase in Illinois's GSP.

Although Illinois has the potential to significantly increase its production of renewable energy, even if we only generated 12 percent of our electricity from renewables (as conservatively estimated in Scenario 2), we would still enjoy these economic and consumer benefits.

Overall, Scenario 3—the combination of federal investment and a renewable energy standard—provides the greatest benefit to Illinois's economy.

Jobs and Wages

Under the clean energy package (Scenario 3)—enacting a national renewable energy standard of 20 percent and shifting the proposed federal subsidies away from fossil fuels and nuclear power—Illinois could generate 7,566 net jobs and a \$162 million net increase in wages above projected levels in 2020. Between 2005 and 2020, the clean energy package (Scenario 3) would create a net average increase of 4,637 jobs and \$151 million in wages above projected levels each year. While all three scenarios analyzed do produce a net positive impact on employment levels, Scenario 3 is the most beneficial. In fact, Scenario 3—the clean energy package—would result in 4,428 more jobs and a \$107 million increase in wages in 2020 when compared with Scenario 1—the 2004 federal energy proposals. (See Figures 5 & 6 and Appendices 8 & 9).

Figure 5. Net Job Creation in Illinois Under Three Energy Scenarios

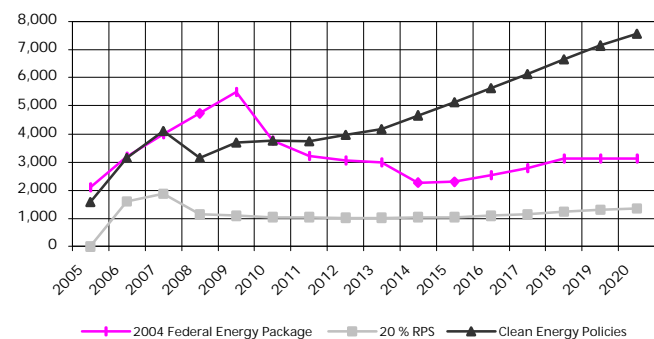
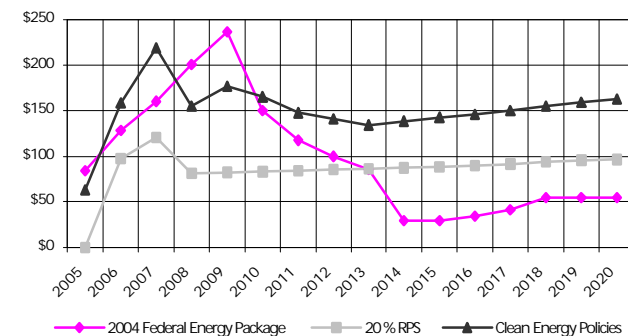


Figure 6. Net Wage Increase in Illinois Under Three Energy Scenarios (millions of 2001\$)



The majority of the new jobs created under clean energy policies would be well-paying jobs in the manufacturing, construction, finance, and agricultural sectors. (See Appendix 7 for net job impacts by sector). Clean energy policies produce more jobs because they stimulate these sectors, which are more efficient at creating jobs. In Illinois, for example, for every \$1 million invested in the agricultural sector, 18.7 jobs are created both directly and indirectly. Comparatively, investing \$1 million in the utilities sector only creates 4.6 jobs. (See Appendix 13 for the job capacity creation by sector in Illinois). Furthermore, homegrown renewable energy boosts the local economy instead of relying on other states or countries for our energy needs.

Nationally, Scenario 3 would generate 215,308 net jobs and a \$6.8 billion net increase in wages above projected levels in 2020. (See Appendices 2-6 for a complete analysis of the national impacts).

Economic Growth

By stimulating the construction and development of renewable energy facilities such as wind farms and solar panels, clean energy policies provide an important stimulus to the economy. Investments in energy efficiency programs help reduce energy costs, putting more money back into the consumer's pocket.

Scenario 3—the clean energy package—would provide a comparable boost to the overall economy as Scenario 1—the 2004 federal energy proposals. Between 2005 and 2020, Scenario 3 would result in a net average annual increase of \$75 million in Illinois's GSP. (See Appendix 10.)

Nationally, Scenario 3 would result in a net average annual increase of \$5.9 billion in the GDP between 2005 and 2020.

Interestingly, among the various proposals analyzed, Scenario 2—a 20 percent renewable energy standard alone—provides the greatest overall benefit to Illinois’s gross state product, resulting in a \$180 million increase above projected levels in Illinois’s economy by 2020. The renewable energy standard provides strong market incentives for efficient private investments in renewable energy, without requiring an increase in government or consumer spending.

Consumer Benefits

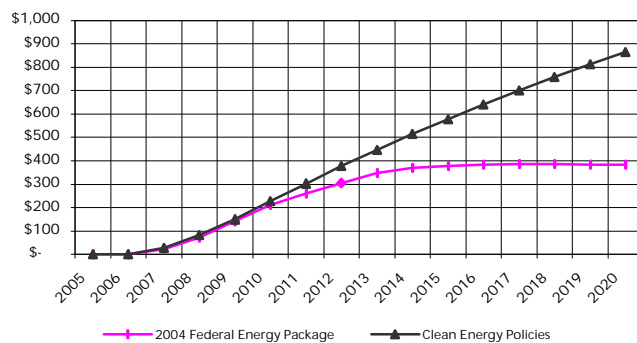
Consumers also would benefit from clean energy policies. Increased production of renewable energy would reduce demand for natural gas, resulting in lower natural gas prices, while stronger investments in energy efficiency help lower electricity bills for all consumers. Under the clean energy package (Scenario 3), as shown in Figure 7, all consumers—residential, commercial and industrial—would save \$794 million in natural gas costs in 2020, \$630 million more than under Scenario 1. Between 2005 and 2020, Scenario 3 would result in net annual average natural gas savings of \$308 million. (See Appendix 11).

Investments in energy efficiency programs also help reduce the cost of electricity for consumers, resulting in significant savings on electricity bills. Scenario 3, which invests more heavily in energy efficiency, would generate an annual electricity savings of \$865 million for Illinois consumers in 2020, and an average annual savings of \$405 million between 2005 and 2020. (See Figure 8 and Appendix 12).

Nationally, Scenario 3 would save consumers \$16.2 billion on their electricity bills and \$11 billion on natural gas costs in 2020.

These consumer savings—enjoyed across all sectors of the economy—are an important part in creating new jobs. The high price of natural gas in the past few years has forced several businesses to move their plants overseas,

Figure 8. Annual Electricity Savings in Illinois Under Federal Energy Proposals and the Clean Energy Package (millions of 2001\$)



Note: We assumed that Scenario 2 (20 percent RPS alone) would displace production but not reduce consumption and therefore does not generate electricity savings.

costing Americans thousands of jobs.⁷⁵ Because Scenario 3 lowers natural gas prices, it also reduces energy costs for businesses and helps stimulate job creation.

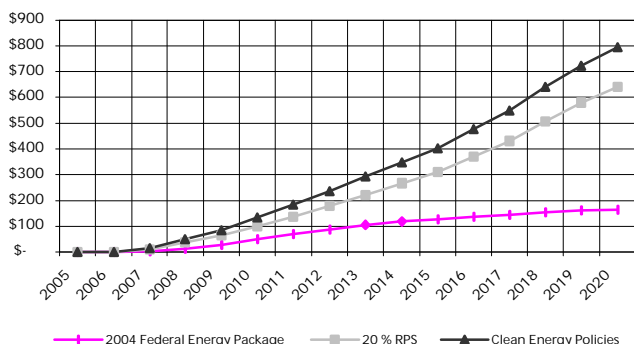
Public Health Benefits

In addition to economic and consumer benefits, investing in clean energy policies would produce public health and environmental benefits. Our analysis did not capture all of the environmental and public health benefits resulting from investments in clean energy, such as reducing nuclear waste production or eliminating the need for increased drilling on public lands. We did examine how each scenario would affect power plant emissions of CO₂, NO_x and SO₂.

In Illinois, the clean energy package (Scenario 3) would reduce CO₂ emissions from power plants by 29 million metric tons by 2020—equivalent to 32 percent of 2002 levels.

Similarly, Scenario 3 would reduce soot-forming SO₂ emissions from Illinois’s power plants by 25,000 short tons and smog-forming NO_x emissions by 10,000 short tons by 2020—equivalent to seven and six percent, respectively, of 2002 levels.

Figure 7. Natural Gas Savings in Illinois Under Three Energy Scenarios (millions of 2001\$)



CONCLUSION: REDIRECTING ILLINOIS'S ENERGY



Illinois's current energy choices are compromising public health, costing consumers and industry billions of dollars, and polluting the environment. To address these problems, we need an energy policy that moves away from fossil fuels and nuclear power and toward renewable energy and energy efficiency. As the analysis detailed in this report shows, shifting investment from fossil fuels and nuclear into renewables and energy efficiency programs would have a positive impact on the economy and consumers in Illinois. Enacting clean energy policies would generate new jobs, save consumers billions of dollars, boost Illinois's economy, and reduce air pollution from power plants. To realize these broad consumer, economic and environmental benefits, we offer the following three recommendations:

Implement a Renewable Energy Standard

Federal policy-makers should implement a national renewable energy standard to increase the amount of electricity generated from renewable sources of energy to 20 percent of power generation nationally by 2020. In Illinois, rather than waiting for federal action, we should set a strong enforceable standard of 5 percent by 2010 and 15 percent by 2020.

Strengthen Energy Efficiency Standards

Raising efficiency standards for appliances would save consumers money – including initial purchase cost – while saving energy. There is ample opportunity to greatly increase energy efficiency economy-wide. At minimum, the federal government should strengthen and expand efficiency standards for commercial air conditioners, furnaces and boilers, and distribution transformers, as well as household appliances such as refrigerators and washers. Strengthening these standards would decrease the nation's energy consumption and save consumers and businesses billions of dollars.

In Illinois, our policy-makers should set new energy efficiency standards for everyday items such as ceiling fans, torchiere lamps, traffic signals, vending machines, clothes washers, air conditioners and heaters, similar to the standards recently passed in Maryland and New Jersey.

Shift Energy Subsidies Away from Fossil Fuels and Nuclear Power

Between 1950 and 1997, the federal government spent nearly \$500 billion subsidizing the oil, gas, coal and nuclear industries. These long-standing subsidies are in large part responsible for our nation's dependence on these energy sources. As documented in our findings, shifting federal subsidies toward renewable energy and energy efficiency would provide the necessary market incentives to stimulate development and implementation of these important technologies, while creating more jobs and providing a boost to Illinois's economy.



Investments in renewable energy would provide a boost to the economy, particularly in rural areas. Photo courtesy DOE/NREL.



If the U.S. photovoltaic capacity continues to grow at its current annual rate of 18 percent, it could play a large role in meeting our energy needs. Photo courtesy DOE/NREL.



METHODOLOGY

Most states do not have economic models that provide detailed projections of energy production and consumption patterns necessary to evaluate the impacts of alternative energy policies such as we describe here. For that reason, Illinois PIRG chose to develop its own state-specific energy and economic model that allows such a comparison. Completing this assessment involved three steps:

(1) We designed a state-specific economic model that reflects an accurate set of economic relationships and benchmarks the necessary energy, price, and investment variables to enable an appropriate evaluation of policy impacts. The starting point for this step was developing a set of economic accounts that describe the production and sale of goods and services among the various sectors within the local economy. This allowed us to set up a business model of the state economy. In this case we used the 2001 economic accounts provided by the IMPLAN database as the basis for the business model.⁷⁶

(2) We established a baseline regional forecast of relevant policy variables from the period 2005 through 2020, which we used to project regional technology cost and energy prices. For each regional model that we developed, we used key state energy and price variables published by the Energy Information Administration for the 2001 base year.⁷⁷ We then updated and projected each of these key variables out to the year 2020 using a combination of state economic forecasts from Woods and Poole⁷⁸ as well as regional energy forecasts from the Energy Information Administration.⁷⁹

(3) We developed each of the energy scenarios evaluated in the report. Each of the energy policies evaluated implies a change in technology and other investments, energy prices, energy expenditures, and program costs unique to Illinois. We first compiled the overall cost of the 2004 federal energy proposals (Scenario 1) and the specific level of proposed subsidies for each fuel and technology (nuclear power, coal, oil and gas, renewables, energy efficiency). We used estimates created by the Joint Committee on Taxation, which scores all congressional tax provisions included in proposed legislation, to determine the cost of the 2004 federal energy proposals. To then establish the state cost of the federal energy proposals, we used Internal Revenue Service data to determine Illinois's proportional contribution to federal income taxes. Since Illinois contributes 5.42 percent to federal taxes, we assumed that Illinois's taxpayers would in effect be paying for 5.42 percent of the proposed federal energy subsidies. In Scenario 3—the clean energy package—we analyzed the impact of shifting the proposed subsidies for fossil fuels and nuclear power, which would cost Illinois \$1.9 billion, toward renewables and energy efficiency. In our analysis, we shifted the total proposed subsidies evenly over the period of 2005-2020. With a full accounting for how each energy policy changes technology and other investments, energy prices, energy expenditures and program costs in Illinois, we mapped each of the policy scenarios into the state energy and economic model described in steps 1 and 2 above.

The models and resulting policy scenarios are generally consistent with a large number of state level studies that have been carried out previously.⁸⁰ This approach allows a meaningful comparison of baseline projections of energy consumption and prices with changes that would be driven by alternative energy policies or a different array of energy subsidies.⁸¹ For a more complete description of the state-specific models, including the economic assumptions and energy projections that underpin the baseline or reference case, see the short working paper, “Modeling State Energy Policy Scenarios,” available from Illinois PIRG.⁸²

APPENDICES



APPENDIX 1: COST ANALYSIS OF 2004 FEDERAL ENERGY PROPOSALS (MILLIONS OF DOLLARS)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
FOSSIL FUEL & NUCLEAR																	
tax breaks and subsidies	\$612	\$2,328	\$2,966	\$3,183	\$2,970	\$2,749	\$2,143	\$1,793	\$1,785	\$1,273	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$27,802
research & development	\$1,128	\$1,241	\$1,348	\$1,406	\$1,516	\$200	\$200	\$200	\$200	\$200							\$7,639
	\$1,740	\$3,569	\$4,314	\$4,589	\$4,486	\$2,949	\$2,343	\$1,993	\$1,985	\$1,473	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$35,441
RENEWABLES & ENERGY EFFICIENCY																	
tax breaks and subsidies	\$1,241	\$1,663	\$2,003	\$914	\$683	\$426	\$308	\$282	\$293	\$267							\$8,080
research & development	\$1,352	\$1,511	\$1,668	\$1,824	\$1,950	\$50	\$50	\$50	\$50	\$50							\$8,555
	\$2,593	\$3,174	\$3,671	\$2,738	\$2,633	\$476	\$358	\$332	\$343	\$317							\$16,635
TOTAL COSTS OF ALL SUBSIDIES	\$4,333	\$6,743	\$7,985	\$7,327	\$7,119	\$3,425	\$2,701	\$2,325	\$2,328	\$1,790	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$52,076

Note: Since Illinois contributes 5.42 percent to federal taxes, we assumed that Illinois's taxpayers would in effect be paying for 5.42 percent of the proposed federal energy subsidies.

SCENARIO 1: 2004 Federal Energy Proposals

SCENARIO 2: 20% National Renewable Energy Standard

SCENARIO 3: Clean Energy Package

Note: All results are above projected levels in the given year or time frame.

APPENDIX 2: NET ANNUAL INCREASE IN WAGES IN THE U.S. UNDER THREE ENERGY SCENARIOS (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$2,094	\$3,181	\$3,919	\$4,988	\$5,851	\$3,825	\$3,059	\$2,672	\$2,330	\$1,054	\$1,082	\$1,201	\$1,386	\$1,742	\$1,734	\$1,758	\$2,617
Scenario 2	\$0	\$3,703	\$7,594	\$4,753	\$4,955	\$5,085	\$5,215	\$5,249	\$5,372	\$5,447	\$5,563	\$5,604	\$5,757	\$5,778	\$5,917	\$5,918	\$5,119
Scenario 3	\$1,573	\$5,231	\$8,777	\$5,900	\$6,510	\$6,320	\$5,971	\$5,815	\$5,764	\$5,924	\$6,130	\$6,263	\$6,488	\$6,577	\$6,772	\$6,823	\$6,052

APPENDIX 3: NET ANNUAL INCREASE IN JOBS IN THE U.S. UNDER THREE ENERGY SCENARIOS

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	53,794	81,286	101,034	126,165	148,303	104,130	90,034	85,741	83,154	63,042	64,537	69,957	75,801	84,883	84,575	84,625	87,566
Scenario 2	0	78,311	153,831	85,562	84,321	82,242	80,424	77,083	75,591	73,317	71,719	70,231	70,875	70,679	71,956	69,696	75,990
Scenario 3	40,410	117,393	188,187	125,808	140,336	140,135	136,770	139,606	143,844	153,992	164,494	175,092	186,435	197,370	208,248	215,308	154,589

APPENDIX 4: NET ANNUAL CHANGE IN GDP (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$3,336	\$5,067	\$5,784	\$6,544	\$6,776	\$3,259	\$1,798	\$950	\$239	-\$1,142	-\$1,108	-\$875	-\$500	\$62	\$85	\$142	\$1,901
Scenario 2	\$0	\$4,723	\$9,952	\$6,849	\$7,400	\$7,842	\$8,276	\$8,576	\$8,982	\$9,323	\$9,716	\$9,970	\$10,360	\$10,539	\$10,883	\$11,089	\$8,405
Scenario 3	\$2,506	\$7,160	\$11,428	\$7,760	\$7,915	\$7,168	\$6,238	\$5,636	\$5,184	\$5,093	\$5,072	\$4,916	\$4,914	\$4,690	\$4,672	\$4,507	\$5,929

APPENDIX 5: ANNUAL NATURAL GAS SAVINGS IN THE U.S. (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$0	\$0	\$48	\$200	\$447	\$781	\$1,071	\$1,346	\$1,588	\$1,760	\$1,827	\$1,963	\$2,061	\$2,194	\$2,277	\$2,293	\$1,241
Scenario 2	\$0	\$0	\$157	\$592	\$1,017	\$1,551	\$2,120	\$2,726	\$3,327	\$3,937	\$4,524	\$5,324	\$6,139	\$7,193	\$8,156	\$8,938	\$3,481
Scenario 3	\$0	\$0	\$220	\$782	\$1,349	\$2,078	\$2,836	\$3,626	\$4,392	\$5,155	\$5,872	\$6,847	\$7,824	\$9,083	\$10,205	\$11,084	\$4,460

APPENDIX 6: ANNUAL ELECTRICITY SAVINGS IN THE U.S. (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$0	\$0	\$376	\$1,234	\$2,492	\$3,712	\$4,602	\$5,467	\$6,211	\$6,703	\$6,903	\$7,084	\$7,132	\$7,177	\$7,147	\$7,170	\$4,588
Scenario 3	\$0	\$0	\$493	\$1,458	\$2,645	\$4,008	\$5,339	\$6,714	\$7,983	\$9,293	\$10,590	\$11,850	\$12,962	\$14,133	\$15,134	\$16,226	\$7,427

APPENDIX 7: NET IMPACT OF CLEAN ENERGY PACKAGE (SCENARIO 3) ON JOBS, WAGE AND SALARY COMPENSATION, AND GSP IN 2010, 2015, AND 2020 IN DIFFERENT SECTORS OF THE ILLINOIS ECONOMY

2010			
Sector	Net Gain in Jobs	Net Gain in Wage and Salary Compensation (Millions of 2001\$)	Net Gain in GSP (Millions of 2001\$)
Agriculture	10.58	\$0.07	\$0.40
Oil and Gas Extraction	(42.93)	(\$0.63)	(\$16.23)
Coal mining	(6.38)	(\$0.68)	(\$1.28)
Other Mining	0.22	\$0.02	\$0.03
Electric Utilities	(210.09)	(\$35.74)	(\$106.73)
Natural gas distribution	(109.85)	(\$15.19)	(\$32.77)
Construction	1,862.93	\$115.57	\$131.97
Manufacturing	173.66	\$13.93	\$22.75
Wholesale trade	65.25	\$5.16	\$9.49
Transportation & Public Utilities	(87.17)	(\$6.33)	(\$8.66)
Retail Trade	260.49	\$7.82	\$11.11
Services	1,248.55	\$44.48	\$87.28
Finance	324.73	\$23.01	\$44.02
Government	271.56	\$13.63	\$15.73
TOTAL	3,761.57	\$165.12	\$157.12
2015			
Sector	Net Gain in Jobs	Net Gain in Wage and Salary Compensation (Millions of 2001\$)	Net Gain in GSP (Millions of 2001\$)
Agriculture	61.95	\$0.43	\$2.32
Oil and Gas Extraction	(129.80)	(\$1.91)	(\$49.07)
Coal mining	(19.09)	(\$2.04)	(\$3.83)
Other Mining	2.24	\$0.22	\$0.35
Electric Utilities	(656.78)	(\$111.73)	(\$333.66)
Natural gas distribution	(331.27)	(\$45.80)	(\$98.82)
Construction	1,699.79	\$105.45	\$120.42
Manufacturing	469.28	\$37.65	\$61.48
Wholesale trade	164.64	\$13.02	\$23.94
Transportation & Public Utilities	(286.74)	(\$20.83)	(\$28.50)
Retail Trade	704.14	\$21.13	\$30.02
Services	2,587.43	\$92.17	\$180.88
Finance	532.66	\$37.75	\$72.21
Government	332.81	\$16.70	\$19.28
TOTAL	5,131.27	\$142.21	(\$2.97)
2020			
Sector	Net Gain in Jobs	Net Gain in Wage and Salary Compensation (Millions of 2001\$)	Net Gain in GSP (Millions of 2001\$)
Agriculture	133.18	\$0.92	\$4.98
Oil and Gas Extraction	(246.31)	(\$3.62)	(\$93.12)
Coal mining	(28.50)	(\$3.05)	(\$5.71)
Other Mining	4.90	\$0.49	\$0.76
Electric Utilities	(1,005.65)	(\$171.08)	(\$510.89)
Natural gas distribution	(651.55)	(\$90.09)	(\$194.37)
Construction	1,517.83	\$94.16	\$107.53
Manufacturing	899.89	\$72.20	\$117.90
Wholesale trade	322.08	\$25.47	\$46.84
Transportation & Public Utilities	(516.64)	(\$37.53)	(\$51.34)
Retail Trade	1,363.82	\$40.93	\$58.15
Services	4,727.32	\$168.39	\$330.47
Finance	617.91	\$43.79	\$83.77
Government	427.90	\$21.47	\$24.79
TOTAL	7,566.20	\$162.46	(\$80.24)

SCENARIO 1: 2004 Federal Energy Proposals

SCENARIO 2: 20% National Renewable Energy Standard

SCENARIO 3: Clean Energy Package

APPENDIX 8: NET ANNUAL INCREASE IN WAGES IN ILLINOIS UNDER THREE ENERGY SCENARIOS (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$84	\$128	\$161	\$201	\$237	\$150	\$118	\$100	\$85	\$30	\$30	\$34	\$41	\$55	\$54	\$55	\$98
Scenario 2	\$0	\$97	\$121	\$81	\$82	\$83	\$84	\$85	\$86	\$87	\$88	\$90	\$91	\$94	\$95	\$97	\$85
Scenario 3	\$63	\$159	\$219	\$155	\$177	\$165	\$148	\$141	\$135	\$139	\$142	\$146	\$150	\$155	\$159	\$162	\$151

APPENDIX 9: NET ANNUAL INCREASE IN JOBS IN ILLINOIS UNDER THREE ENERGY SCENARIOS

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	2,105	3,198	3,982	4,742	5,506	3,749	3,229	3,064	3,002	2,267	2,302	2,520	2,772	3,128	3,129	3,138	3,240
Scenario 2	0	1,608	1,880	1,125	1,079	1,054	1,037	1,032	1,029	1,033	1,035	1,081	1,131	1,225	1,305	1,356	1,126
Scenario 3	1,579	3,147	4,096	3,149	3,696	3,762	3,726	3,963	4,183	4,668	5,131	5,629	6,115	6,644	7,134	7,566	4,637

APPENDIX 10: NET ANNUAL CHANGE IN ILLINOIS'S GSP (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$147.1	\$223.4	\$258.1	\$286.4	\$295.3	\$129.0	\$59.6	\$17.9	-\$17.2	-\$86.3	-\$86.2	-\$76.5	-\$61.0	-\$36.6	-\$36.0	-\$33.8	\$61.4
Scenario 2	\$0.0	\$139.0	\$180.6	\$133.5	\$139.7	\$145.4	\$150.8	\$155.7	\$160.3	\$164.6	\$168.6	\$171.8	\$174.6	\$176.6	\$178.4	\$180.3	\$151.3
Scenario 3	\$110.3	\$246.5	\$315.9	\$212.1	\$206.4	\$157.1	\$101.2	\$65.0	\$29.2	\$12.9	-\$3.0	-\$19.3	-\$35.0	-\$50.7	-\$65.7	-\$80.2	\$75.2

APPENDIX 11: ANNUAL NATURAL GAS SAVINGS IN ILLINOIS (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$0	\$0	\$3.1	\$12.8	\$28.8	\$50.2	\$69.4	\$88.3	\$105.7	\$119.1	\$125.6	\$136.5	\$144.9	\$154.8	\$161.6	\$164.2	\$85.3
Scenario 2	\$0	\$0	\$10.0	\$37.8	\$65.4	\$99.8	\$137.4	\$178.8	\$221.5	\$266.4	\$310.9	\$370.3	\$431.4	\$507.7	\$578.6	\$640.1	\$241.0
Scenario 3	\$0	\$0	\$14.0	\$50.0	\$86.8	\$133.7	\$183.8	\$237.8	\$292.4	\$348.8	\$403.5	\$476.2	\$549.8	\$641.1	\$724.1	\$793.8	\$308.5

APPENDIX 12: ANNUAL ELECTRICITY SAVINGS IN ILLINOIS (MILLIONS OF 2001\$)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
Scenario 1	\$0	\$0	\$22	\$71	\$142	\$212	\$262	\$307	\$347	\$371	\$377	\$383	\$385	\$385	\$384	\$382	\$252
Scenario 3	\$0	\$0	\$28	\$84	\$151	\$229	\$304	\$377	\$446	\$514	\$578	\$640	\$700	\$758	\$813	\$865	\$405

APPENDIX 13: ILLINOIS MULTIPLIERS FOR KEY ECONOMIC SECTORS

Sector	Type I Multiplier for Employment (Per \$MM of Final Demand)	Type I Multiplier for Compensation (Per Dollar of Final Demand)
Agriculture	18.7	0.213
Oil and Gas Extraction	5.5	0.136
Coal mining	7.3	0.378
Other Mining	9.0	0.481
Electric Utilities	4.6	0.310
Natural gas distribution	4.9	0.230
Construction	14.9	0.595
Manufacturing	9.0	0.409
Wholesale trade	9.4	0.487
Transportation & Public Utilities	13.7	0.557
Retail Trade	23.5	0.575
Services	13.5	0.457
Finance	9.2	0.450
Government	18.1	0.833

Source: Minnesota IMPLAN Group, Stillwater, MN, based on 2001 input-output database for Illinois.

Note: Multipliers measure the change throughout the economy from a unit of change for a given sector.
 Type I Multipliers capture impacts from direct or initial spending and indirect spending (businesses buying and selling to each other).
 Type I Multipliers do not include induced spending—new spending resulting from money saved or earned.
 Type I Multiplier for Employment measures the number of direct and indirect jobs created in each sector for every million dollars spent in that sector.
 Type I Multiplier for Compensation measures the total change in wages and salaries in the economy for every dollar spent in that sector.



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⁷⁹U.S. Department of Energy, "Annual Energy Outlook 2004: With Projections to 2025", DOE/EIA-0383, January 2004, downloaded from <http://www.eia.doe.gov/oiaf/aeo/index.html>, 9 September 2004.

⁸⁰See e.g., Argonne National Lab and Environmental Protection Agency, *Engines of Growth: Energy Challenges, Opportunities, and Uncertainties In the 21st Century*, January 2004, downloaded from <http://www.4cleanair.org/members/committee/ozone/EnginesofGrowth.pdf>, 30 September 2004; Environment California, *Renewable Energy and Jobs: Employment Impacts of Developing Markets for Renewables in California*, July 2003; Kammen, D., and Kapadia, K., *Employment Generation Potential of Renewables to 2010*, 2002; Hewings, G., Yanai, M., Learner, H., et al., Environmental Law and Policy Center, *Job Jolt: The Economic Impacts of Repowering the Midwest*, 2002; Tellus Institute, *Clean Energy: Jobs for America's Future*, October 2001; Union of Concerned Scientists, *Renewing Where We Live: A National Renewable Energy Standard Will Benefit America's Economy*, 2002 and 2003.

⁸¹For an overview of how this methodology might be typically applied, see Laitner, S., Bernow, S., and DeCicco, J., "Employment and Other Macroeconomic Benefits of an Innovation-Led Climate Strategy for the United States." *Energy Policy*, Volume 26, Number 5, April 1998, pp. 425-433. For an example of a study that applies this same modeling exercise within a state level analysis, see, Nadel, S., Laitner, S., Goldberg, M., Elliott, N., DeCicco, J., Geller, H., and Mowris, R., "Energy Efficiency and Economic Development in New York, New Jersey, and Pennsylvania," Washington, DC: American Council for an Energy Efficient Economy, 1997.

⁸²"Modeling State Energy Policy Scenarios," a working document prepared for Illinois PIRG by Economic Research Associates, Alexandria, VA, January 2005.

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