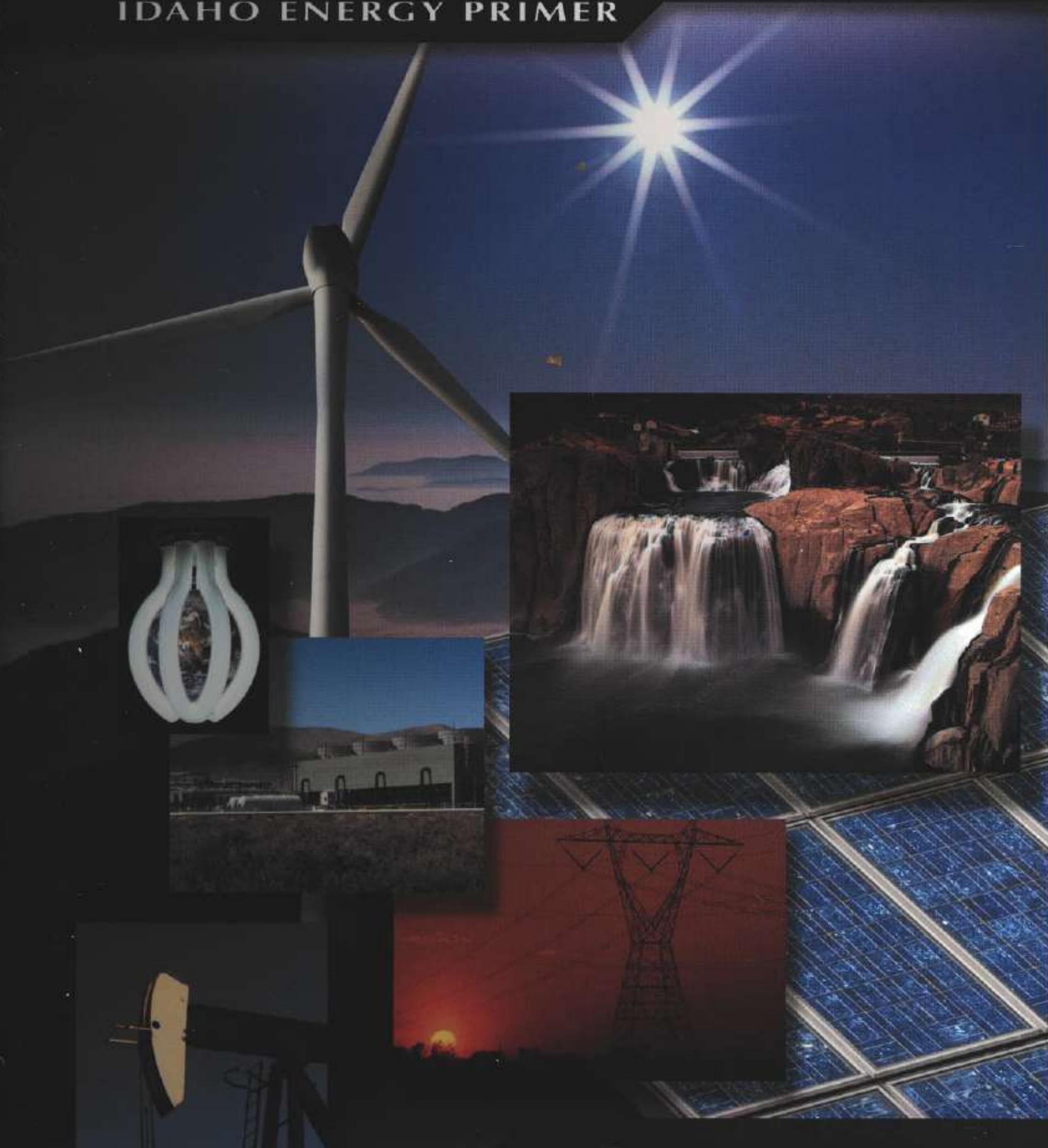
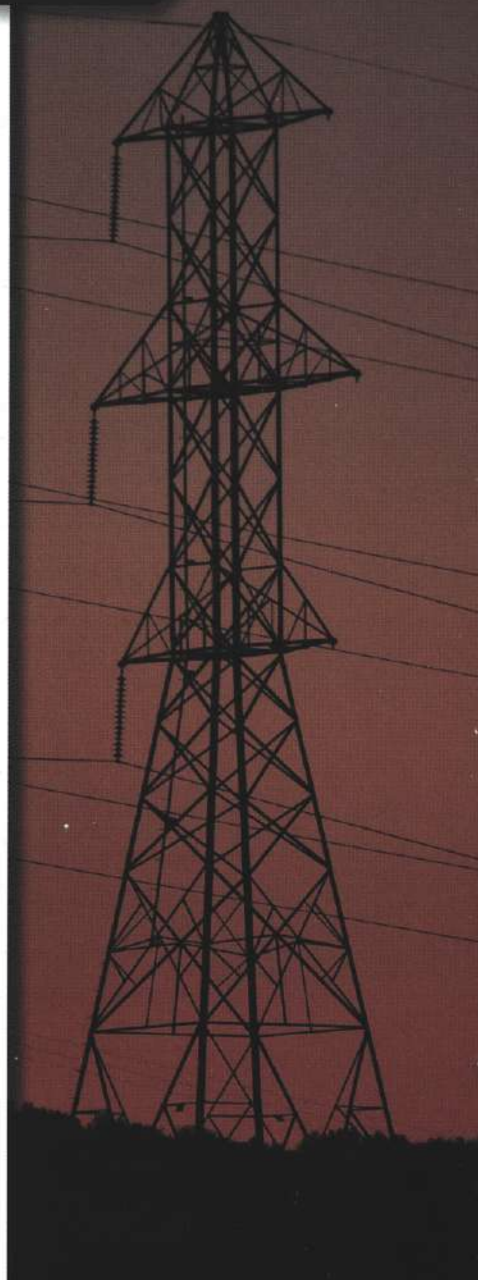
IDAHO ENERGY PRIMER



IDAHO STRATEGIC ENERGY ALLIANCE

Published January 2011
By the Idaho Strategic Energy Alliance



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IDAHO STRATEGIC ENERGY ALLIANCE

The purpose of the Alliance is to enable the development of a sound energy portfolio for Idaho that includes diverse energy resources and production methods, that provides the highest value to the citizens of Idaho, that ensures quality stewardship of environmental resources and that functions as an effective, secure and stable system.

NOTES

IDAHO ENERGY SNAPSHOT

Energy powers our homes, businesses, industry and vehicles in various forms including electricity, space heating, heat for industrial processes and transportation fuels.

- Idahoans use over 500 trillion BTUs of energy each year - this is the equivalent of about 86 million barrels of oil per year.

- Idahoans use about 350 million BTUs per person each year, which places the state 23rd in per capita energy use.

- Idaho is rich in renewable energy resources, but has few fossil energy reserves.
- Idaho has no commercial gas or oil wells.

- Idaho only generates about half the electricity it uses; the rest is imported primarily from coal-fired plants in neighboring states.
- On average, 80 percent of the electricity generated within the state is hydroelectric.

Cabinet Gorge

Despite Idaho's heavy reliance on energy imports, its overall energy prices remain among the lowest in the nation.

- Electricity consumption in Idaho is growing at 1.8 percent per year.
- Idaho ranks in the top 5 among U.S. states in terms of lowest carbon emissions per capita, largely due to the abundant hydroelectric energy.[1]
- Idaho's economy is among the more energy intensive as compared to other states, ranking in the top twenty in energy consumed per dollar of gross state product generated.
- As one of about a dozen states without a refinery, Idaho residents pay relatively high prices for gasoline (6th highest in the nation).

Information obtained from U.S. Energy Information Administration
[1] For example, see:
www.americanprogress.org/issues/2008/10/emissions_interactive.html and
www.eredux.com/states/index.php?sortBy=carbon_percapita_rank&sortOrder=ASC&rows=228

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IDAHO STRATEGIC ENERGY ALLIANCE

All energy generation options carry costs, risks and impacts - there is no free lunch. Our responsibility as citizens is to balance these costs, risks and impacts against the desired outcome in a fair and equitable fashion.

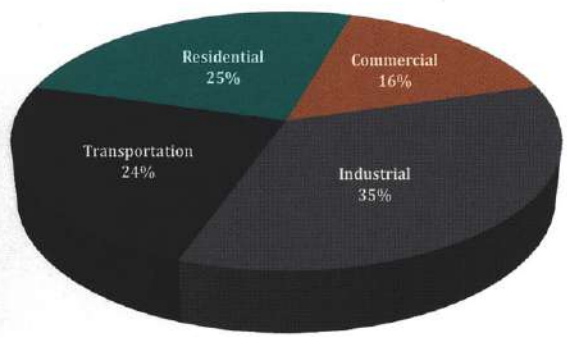
NOTES

IDAHO ENERGY USE

Idaho is a net importer of energy. About half of the state's electricity and about 80 percent of Idaho's total energy comes from sources outside the state.

Idaho uses about 500 trillion BTUs of energy each year. (Generation of 1 kWh of electricity requires about 10,000 BTUs of thermal energy; 1 gallon of gasoline ≈ 125,000 BTUs). Idaho's total energy consumption is low when compared to other states; however, the total population is also low and as a result, per capita energy consumption is close to the national average. Idahoans use a little more than 350 million BTUs per person each year, which places the state 23rd in terms of per capita energy use. The energy consumed in Idaho is divided into four categories[2]:

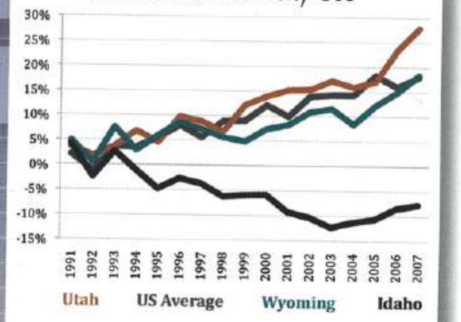
Idaho Energy Use by Sector (2008)



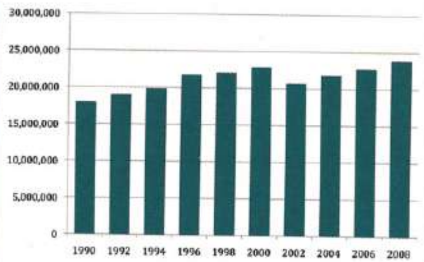
[2] U.S. Energy Information Administration

Residential Electricity Consumption

Residential Electricity Use



Idaho Retail Sales of Electricity in Megawatt-Hours



Source: U.S. Energy Information Administration

Although residential sector electricity consumption is increasing, consumption per customer in Idaho has declined from levels in the early 1990's. This may be due to a switch from electricity to natural gas and propane for heating and hot water. However, since 2003, consumption per customer has been increasing again and usage typically has been trending upward in the rest of the United States.

Even with significant energy efficiency and conservation measures, electricity consumption in Idaho continues to increase with increased population and economic activity.

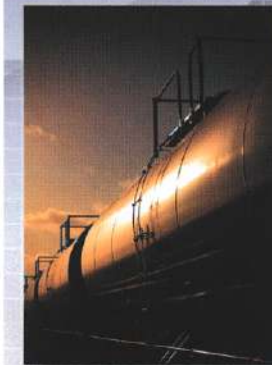
Idaho's electricity consumption rose nearly 15 percent from 2002 to 2007, and is expected to grow at about 2 percent per year in the future. While Idaho's electricity consumers can and should use electricity more efficiently, there is no doubt that new sources of electrical supply will be required to power Idaho's future.

IDAHO STRATEGIC ENERGY ALLIANCE

Our energy systems and choices should be sustainable and consider economic, environmental and social impacts.

ENERGY SOURCES

Sources of energy include fossil energy, renewable energy and nuclear energy. These energy sources must first be converted to forms that are practical to use in our daily lives such as electricity, transportation fuels and process heat.



Transportation Fuel

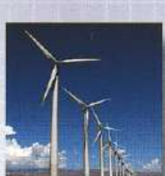
All of Idaho's petroleum-based fuels come from out of state due to a lack of substantial fossil fuel sources within its borders. Idaho does have fuel ethanol and biodiesel production capacity. Idaho tends to have high gasoline prices, ranking 6th highest in the U.S. in August 2010. Idaho's gasoline taxes are 5 cents per gallon lower than the 30 cent national average, but this price advantage is offset by the added cost of shipping transportation fuels to Idaho, which has no oil refineries and has to import gasoline and diesel by pipeline or truck.

Heating Fuel

There are many different sources of heating fuel in Idaho. Some of the most common sources include: natural gas, electricity, geothermal and biomass (wood).

Idaho is favorably located between two major natural gas supply basins and has historically benefited from natural gas prices that are well below the national average. All of Idaho's natural gas supplies are imported, meaning Idaho derives little economic benefit from the dollars that are spent on natural gas; however, the availability and affordability of natural gas is critical to industry in the state.

Idaho has several geothermal district heating systems that provide inexpensive, efficient heating.



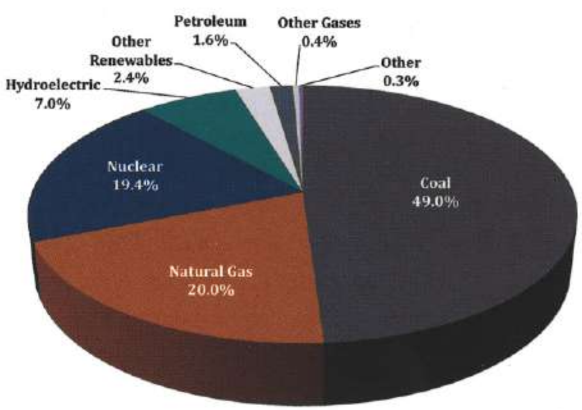
Types of Energy

Power plants generate electricity using a fuel or energy source such as coal, natural gas, water, biomass or uranium. Power plants are grouped by the type of fuel or energy source they use:

Coal, natural gas and refined oil products are classified as fossil fuels. Fossil fuels supply about 70 percent of the nation's electrical generation needs.

Renewable sources of electricity include wind, water, solar, geothermal and biomass (such as wood, wood waste and landfill gases). The image below shows the national mix of energy sources.[3]

National Electric Generation Mix



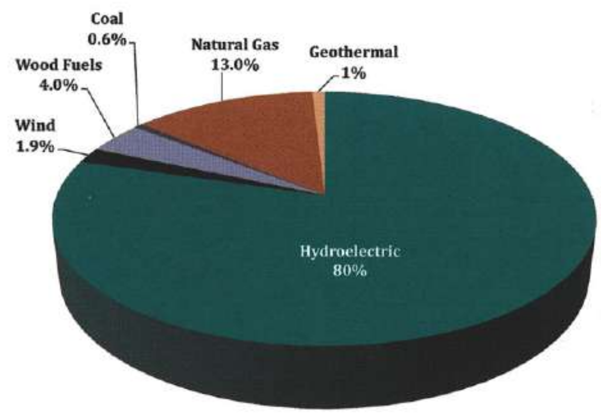
[3] U.S. Energy Information Administration, Form EIA-906, "Power Plant Report;" and Form EIA-920 "Combined Heat and Power Plant Report," 2006 data released 10/07

Electricity in Idaho

Though lacking in fossil fuels, Idaho is rich in renewable resources. In a typical year, about half of Idaho's electricity is generated in-state using renewable energy (primarily hydroelectricity). The other half comes primarily from coal-fired power plants located in neighboring states.

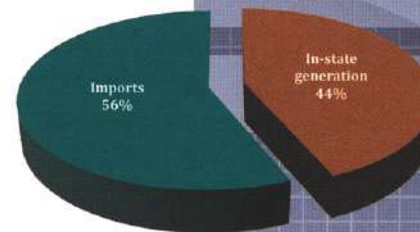
As shown in the chart below, the majority of electricity generated in Idaho is through hydroelectric dams. This results in cheaper rates and a clean and renewable source of energy in the state. On the national level, hydroelectricity is used as a source for only 7 percent of electricity generation. Idaho is well above the average in its utilization of renewable, efficient energy.[4]

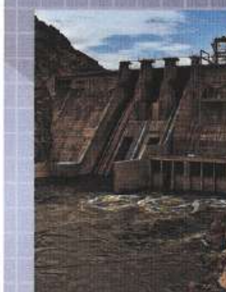
Idaho In-State Electricity Generation Mix (2009)



[4] Institute of Energy Research

Idaho's Electricity Supply 2007 Data

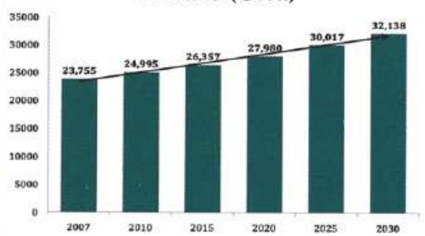




ABOVE: Hells Canyon Dam
BELOW: Idaho Falls Power's Gem State Project

Forecasting

Historic & Forecasted Electricity Sales in Idaho (GWh)



As shown in the graph, electricity use in Idaho is expected to continue to increase.[5]

Potential resources available to Idaho to meet our growing electricity needs include wind, geothermal, small hydropower and biomass energy, coupled with increased imports of natural gas for electricity generation, imported electricity and potential new sources such as solar and nuclear.

The investor-owned utilities develop 20-year Integrated Resource Plans to identify sufficient resources to reliably serve the growing demand for energy from their customers. Various stakeholders including customers, regulators, governmental officials and the environmental community participate in the process. Planning goals include:

- Identifying sufficient resources to meet growing energy demand
- Selecting resource portfolios that balance risk, costs and environmental concerns
- Considering both supply-side (generation) and demand-side (conservation and energy efficiency)
- Involving the public in a meaningful way

Planning begins with a forecast of customer demand, which is compared with existing resources, demand-side management performance and transmission capability. A financial analysis is performed for various potential resource portfolios that can provide both energy and capacity requirements. Ultimately a preferred portfolio is selected, along with action steps to begin implementing the plan.

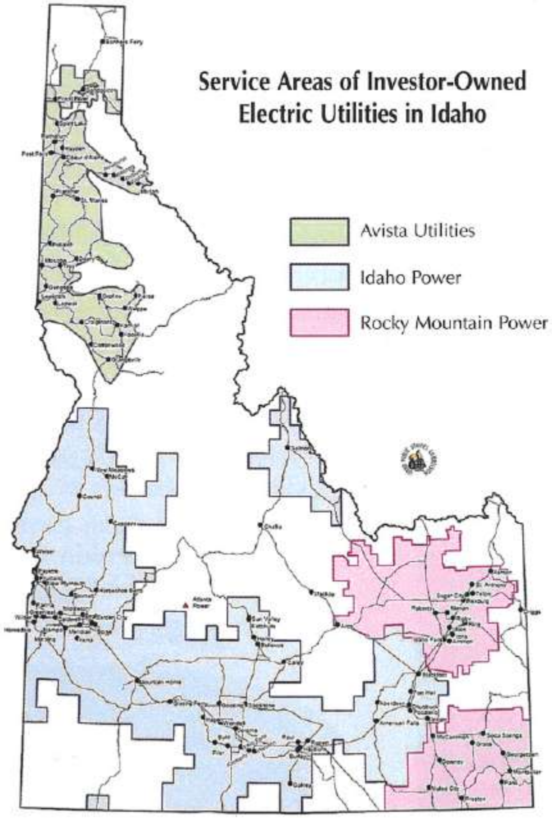
[5] Information gathered from Montana Wind Report February Final and from sources such as various FERC Form 1 documents, the CEC Demand Staff Forecast and SNL Financial

IDAHO STRATEGIC ENERGY ALLIANCE

Economic factors include capital and financing costs, operations & maintenance costs, fuel cost and price variability, dispatchability (intermittency), capacity factor and integration costs.

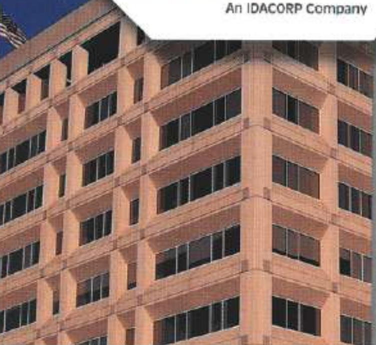
ENERGY PROVIDERS IN IDAHO

Idaho is served by three investor-owned electric utilities (IOU's), 11 municipal utilities and 17 rural electric cooperatives.[6] The service areas of the investor-owned electric utilities, which together serve over 85% of the electric customers in Idaho, are shown on the map below.



Source: http://commerce.idaho.gov/assets/content/docs/BigBook_Final_All.pdf

[6] 2007 Idaho Energy Plan



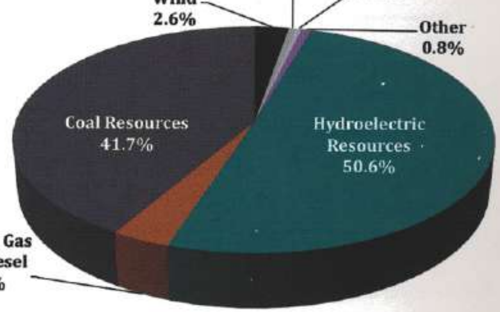
Idaho Power was founded in 1916 when five companies combined assets, including water rights and hydroelectric facilities on the Snake River. Today, Idaho Power employs approximately 2,000 people to provide reliable, responsible, fair-priced energy services across a 24,000 square-mile service area in southern Idaho and eastern Oregon.

With 17 low-cost, emission-free hydroelectric projects as the core of its generation portfolio, Idaho Power is one of the nation's few investor-owned utilities with a significant hydroelectric generating base. The company's three-dam Hells Canyon Complex is the heart of this system.

Headquartered in Boise, Idaho Power is the largest provider of electricity in the state. Its 490,000 residential, business and agricultural customers pay some of the nation's lowest prices for electricity.

The estimated fuel mix for Idaho Power's resource portfolio under 2009 actual water conditions is shown below:

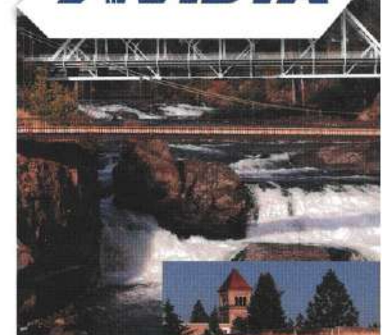
Idaho Power Electricity Generation (2009)

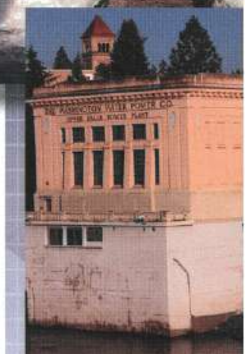


Learn more at:

www.idahopower.com

Founded in Spokane, Washington in 1889, the Washington Water Power Company served electric and gas customers in North Idaho, Washington and Oregon for 110 years before changing its name to ***Avista Corporation*** in 1999. The company was an innovative pioneer, constructing what were, at the time, the world's longest high-voltage transmission line, providing service to Idaho's Silver Valley in 1903 and the world's largest hydroelectric power station at Long Lake in 1915.

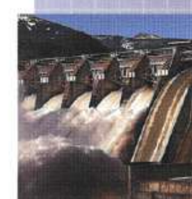




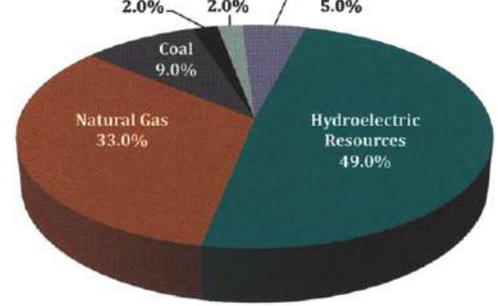
Currently, Avista serves over 200,000 electric and natural gas customers in Idaho's north and central regions, and is the second largest electricity provider in the state. Electric customers receive a mix of hydroelectric, natural gas, coal and biomass generation delivered over 2,100 miles of transmission line and 17,000 miles of distribution line. Natural gas is delivered over 6,100 miles of natural gas distribution mains.

About half of Avista's electricity comes from hydropower resources that provide a significant price benefit for its customers. Avista's predominant combination of hydropower, biomass and natural-gas-fired generation, makes it the greenest (lowest carbon emission) investor-owned utility in the Northwest and one of the greenest utilities in the nation.

ABOVE: Upper Falls Power Plant
BELOW: Noxon Rapids Dam



Avista Electricity Generation (2010)



Learn more at:

www.avistautilities.com

Almost 65,000 Idahoans are served by

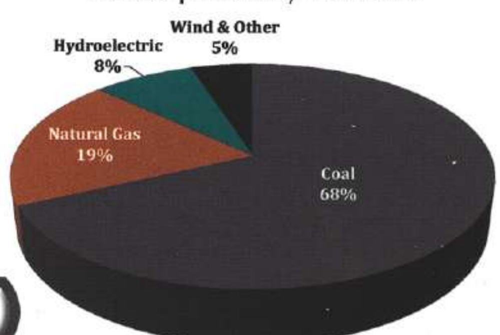
Rocky Mountain Power,

a business unit of PacifiCorp. The company formed in 1984 when its electric utility, natural resource development and telecommunications businesses grew into full-fledged enterprises. One of the lowest-cost electricity producers in the U.S., PacifiCorp provides 1.7 million customers with reliable, efficient energy. Their service area covers 136,000 square miles and they own 78 generating plants capable of 10,483 MW of net generation capacity. PacifiCorp operates as Pacific Power in California, Oregon and Washington. PacifiCorp operates as Rocky Mountain Power in Utah, Wyoming and Idaho. PacifiCorp is part of MidAmerican Energy Holdings Company.

Rocky Mountain Power dates back to 1881, when Salt Lake City became the fifth city in the world to have central station electricity. Formerly known as Utah Power & Light (UP&L), the company itself was formed in 1912 from several small electric companies in Utah, Idaho and western Colorado.

Rocky Mountain Power is headquartered in Salt Lake City, Utah. Rocky Mountain serves customers in southeastern Idaho.[7]

PacifiCorp Electricity Generation



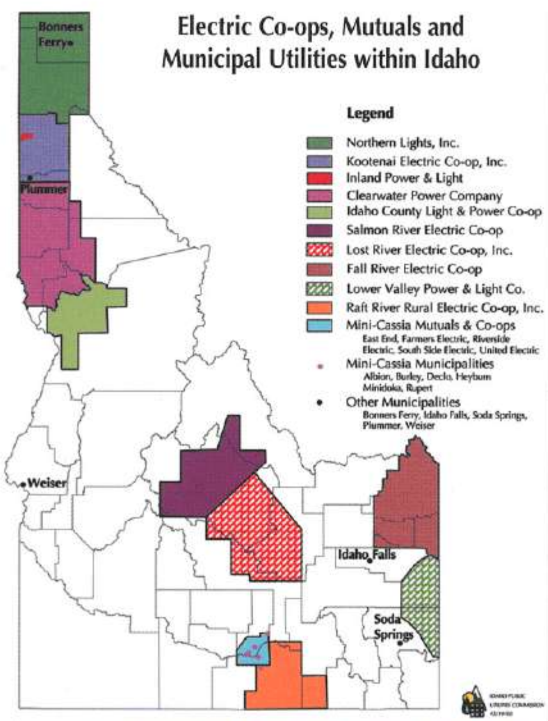
Learn more at:

www.rockymountainpower.net

[7] PacifiCorp website

Electric Cooperative, Mutual and Municipal Utilities in Idaho

There are 11 municipal utilities and 17 rural electric cooperatives in the state of Idaho. Eleven cities have their own electricity operations in Idaho, most of which are powered by Bonneville Power Administration, which provides transmission to rural communities. The service areas of some of the electric co-ops, mutuals and municipal utilities in Idaho are shown below.



Source: http://commerce.idaho.gov/assets/content/docs/BigBook_Final_All.pdf

Congress created

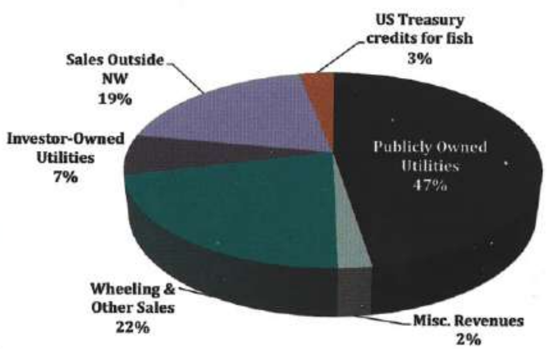
Bonneville Power Administration

(BPA) in 1937 to deliver and sell the power from the Bonneville Dam in Washington State. It was intended to bring power to rural communities for the lowest possible price. BPA also provides transmission to direct-service industries and public and private utilities. BPA provides reliable, low-cost power to markets throughout the West.[8]

Although BPA is part of the U.S. Department of Energy, it is self-funding and sells its products and services at cost. BPA markets wholesale electrical power from 31 federal hydroelectric projects in the Columbia River Basin, one non-federal nuclear plant and several other small non-federal power plants, including a significant amount of wind generation. The hydroelectric projects are operated by the U.S. Army Corps of Engineers and the Bureau of Reclamation.

About one-third of the electric power used in the Northwest comes from BPA. BPA also operates and maintains about three-fourths of the high-voltage transmission in its service territory. BPA's service territory includes Idaho, Oregon, Washington, western Montana and small parts of eastern Montana, California, Nevada, Utah and Wyoming.

BPA Revenue Sources



[8] Bonneville Power Administration website - History

Learn more at:

www.bpa.gov

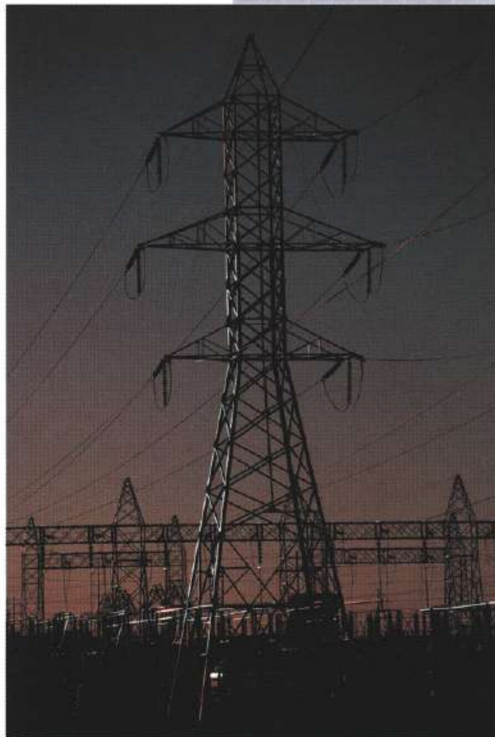
IDAHO STRATEGIC ENERGY ALLIANCE

Environmental factors include air emissions, water use and emissions, land use, effect on wildlife and noise & visual impacts.

NOTES

TRANSMISSION OF ENERGY

Idaho is an energy transmission crossroad linking critical conventional energy centers in the western energy corridor and substantial renewable energy generation resources with urban economic hubs in the west. This makes Idaho a critical link in the nation's economic and national security fabric. As energy demands increase in Idaho, the need for modern infrastructure to transport the energy supply also increases. The state of Idaho does not have conventional energy resources like coal, oil and natural gas. As a result, Idaho is heavily dependent on other states to supply its energy. Idaho's homes and businesses therefore depend greatly on the ability of energy suppliers to bring in energy from outside the state. The energy delivered to Idaho by oil and gas pipelines, tanker trucks and transmission lines is essential for Idaho's economy to function. Though new sources of energy are being sought, it is likely that much of the most affordable electricity supplies will continue to come from outside the state. These imports from neighboring states will continue to play a large role in Idaho's energy supply picture.



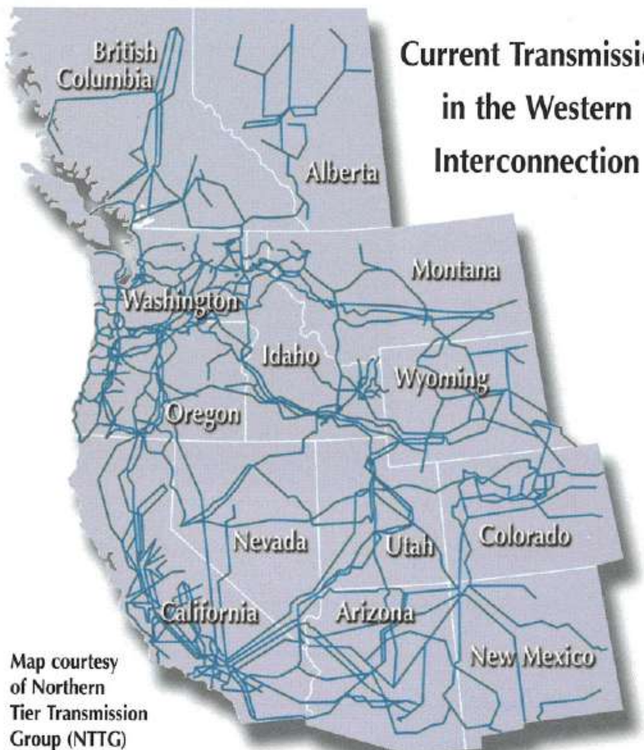
For additional information about electrical transmission in the West, including proposed lines and constrained paths, please visit:

www.wecc.biz

Major Transmission Lines

Electrical transmission capacity in Idaho is operating at near-full capacity during periods of peak electricity demand. As a result, Idaho will require additional transmission capacity to keep up with growth. A half-dozen or more new electric transmission line projects have been proposed that would stretch into or through the state of Idaho. The lines will help relieve congestion and thereby strengthen Idaho's electrical grid and provide access to secure, affordable energy supplies.

Current Transmission in the Western Interconnection

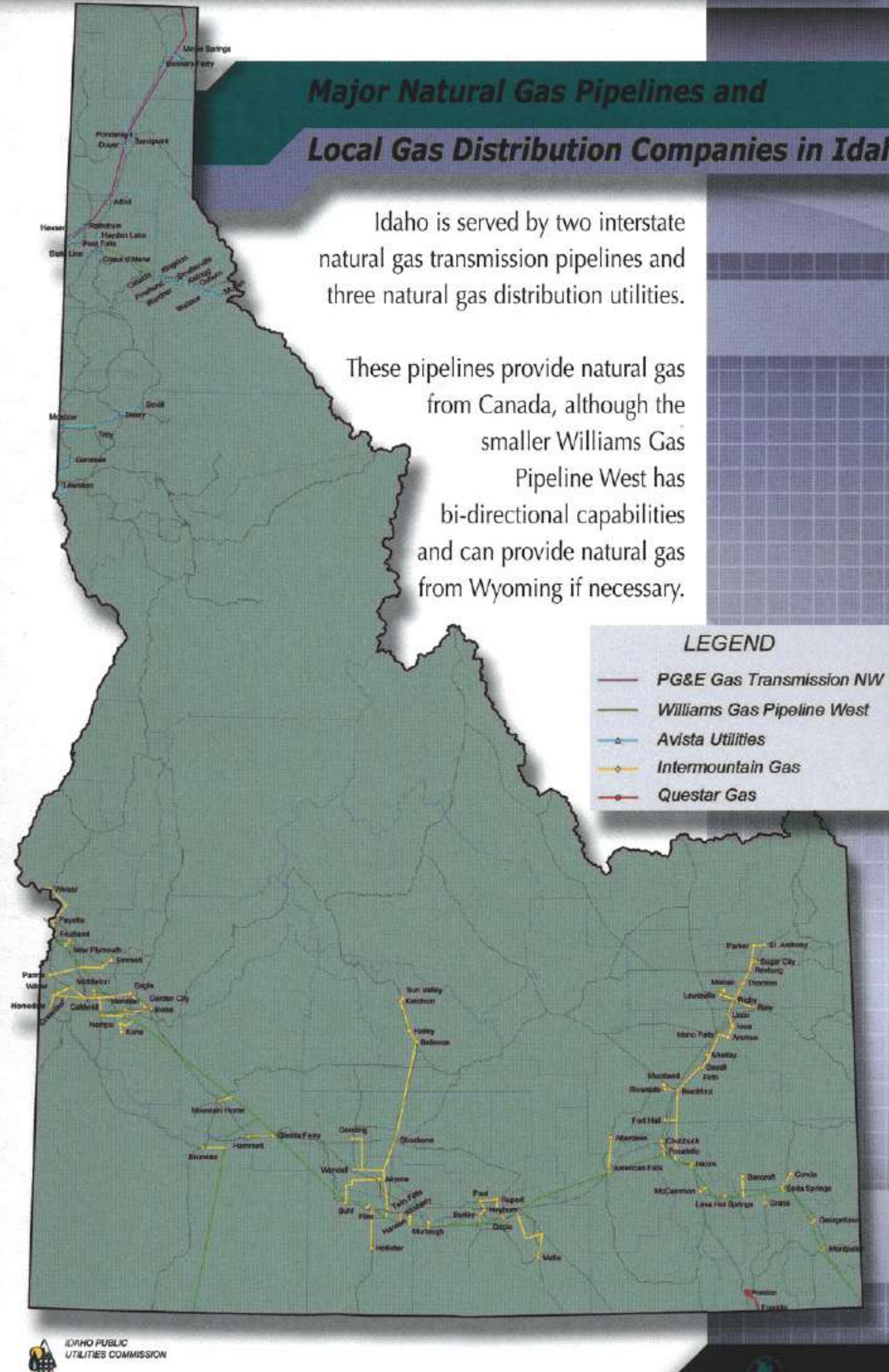


Map courtesy of Northern Tier Transmission Group (NTTG)

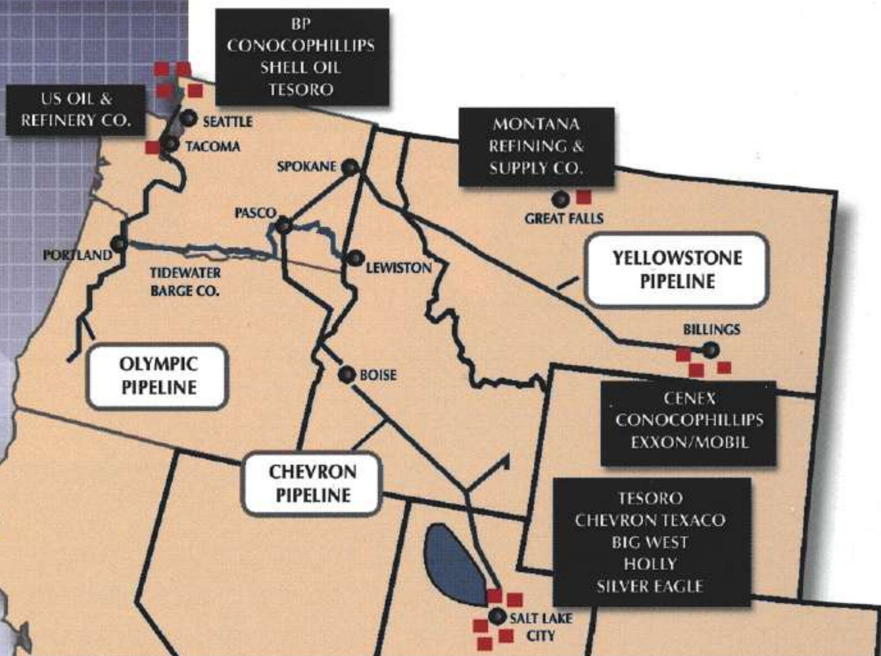
Major Natural Gas Pipelines and Local Gas Distribution Companies in Idaho

Idaho is served by two interstate natural gas transmission pipelines and three natural gas distribution utilities.

These pipelines provide natural gas from Canada, although the smaller Williams Gas Pipeline West has bi-directional capabilities and can provide natural gas from Wyoming if necessary.



All gasoline and diesel fuel used in Idaho is imported into the state by truck, rail or pipeline. Most Idaho markets receive petroleum-based fuels from refineries in Montana and Utah via two pipelines, one owned by ConocoPhillips (Yellowstone Pipeline) and the other by Chevron. These pipelines generally operate at capacity on at least a seasonal basis, during the late spring and summer months when the demand for gasoline and diesel is at its highest.



Idaho's Petroleum Products Pipelines
(red squares are refineries whose owners are listed in the blue boxes)
Source: 2007 Idaho State Energy Plan

IDAHO STRATEGIC ENERGY ALLIANCE

Social factors of sustainability include affordability, optimal resource use and societal preferences.

NOTES

POLICY AND PRICING

Idaho Energy Policy

The Idaho Office of Energy Resources was established to help maintain Idaho's energy advantages and implement a pragmatic, common-sense approach to meeting the energy challenges of the future.

The Idaho Legislature during its 2006 session passed House Concurrent Resolution No. 62, which directed the Legislative Council Interim Committee on Energy, Environment and Technology to "develop an integrated state energy plan that provides for the state's power generation needs and protects the health and safety of the citizens of Idaho and to report back to the Governor and the Legislature its findings and recommendations." The product of this effort was the 2007 Idaho Energy Plan that considered all of Idaho's energy systems and developed 18 energy plan policies and identified 44 actions to help achieve the committee's objectives of ensuring a reliable, low-cost energy supply, protecting the environment and promoting economic growth.

The energy plan can be accessed online at this address:

www.energy.idaho.gov/informationresources/d/energy_plan_2007.pdf

Idaho's Public Utilities Commission

Under state law, the Public Utilities Commission supervises and regulates Idaho's investor-owned public utilities to ensure that customers receive adequate service at just and reasonable rates. The Legislature has granted the Commission quasi-legislative and quasi-judicial authority in Titles 61 and 62 of the Idaho Code. In its quasi-legislative capacity, the Commission sets rates and makes rules governing utility operations. In its quasi-judicial capacity, the Commission conducts hearings and decides cases brought before the Commission. The Commission regulates electric utilities, natural gas utilities, telecommunication companies and water utilities. The Commission also exercises safety authority over pipelines and railroads, but does not regulate municipal or cooperative utilities.

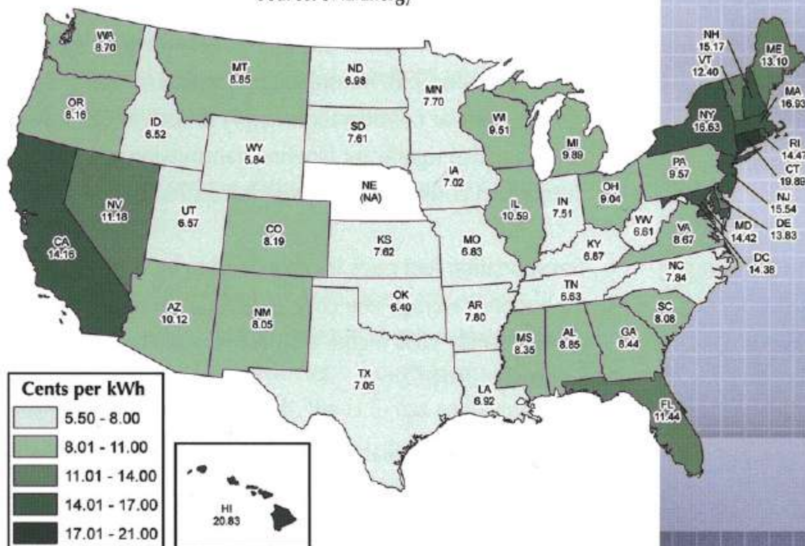
The three commissioners are statutory officers appointed by the Governor and confirmed by the State Senate. No more than two commissioners may be of the same political party. The commissioners serve staggered six-year terms. Commission operations are funded by fees assessed on the utilities and railroads it regulates. The Legislature sets the Commission's annual budget and then the Commission collects the proportional assessments from each utility and railroad within limits set by law.

The Commission employs a professional staff of approximately fifty persons: engineers, rate analysts, accountants, investigators, economists, policy analysts, safety inspectors and other support personnel. When a utility requests a rate increase, the staff examines the revenues, expenses and investments of the utility to determine the amount needed for the utility to reasonably recover its costs and earn a fair return on its investment. In other cases, the staff audits the utility's books, determines the cost effectiveness of conservation and cogeneration programs, evaluates the adequacy of utility services and frequently helps resolve individual customer complaints. The staff also develops computer models of utility operations and reviews utility forecasts of energy usage and the need for new facilities.

Energy Prices

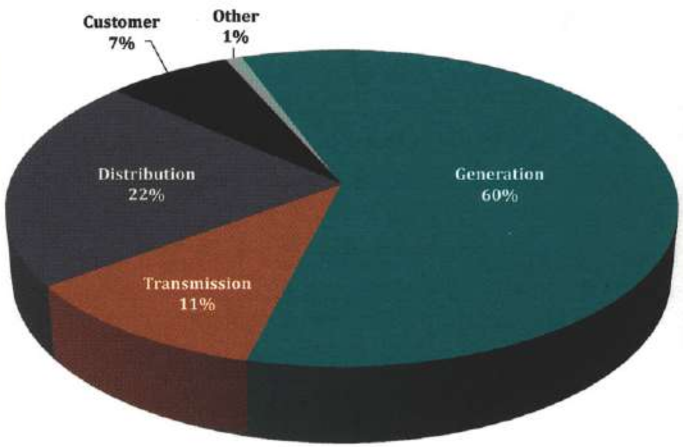
The average residential monthly electric bill in Idaho is 30% less than the national average (see map below for average electricity price information by state) while residential natural gas prices are 2/3 of the national average.[9] The affordability of energy in Idaho is a foundation of economic competitiveness and a significant factor in affordable living.

2009 Statewide Average Electricity Price
(Cents per kWh)
Source: SNL Energy



[9] U.S. Energy Information Administration

Component Costs of Electricity*
Idaho Power Company



*Per cost of service study approved in Case No. IPC-E-08-10

While costs associated with generation are the largest component of the cost of electricity, there are also significant costs associated with transmission, distribution and customer service. Similar considerations apply to natural gas utilities. There are also significant pipeline transmission costs and distribution costs associated with transportation fuels.

Transportation fuel costs in Idaho tend to be higher than the national average (the costs of gasoline and diesel were approximately 10% higher than the national average in September 2010).

Idaho's low-cost, reliable energy represents a competitive advantage for the state and provides enormous benefit to Idaho's industrial, commercial and residential customers.

Regulations

Below are some facts about Idaho's regulatory environment that may affect the cost of energy or the cost of using energy.

Idaho does not cap greenhouse gas emissions.

Idaho is an observer of the Western Climate Initiative (WCI), a regional agreement among some American governors and Canadian premiers to target greenhouse gas reductions. The central component of this agreement is the eventual enactment of a cap-and-trade plan to reduce greenhouse gas emissions 15 percent below 2005 levels by 2020. As an observer of the WCI, Idaho would not be bound to agreements made by WCI members.

Idaho does not mandate that utilities sell a certain percentage of electricity from renewable sources. However, in March 2006, Idaho established a 2-year moratorium on licensing or processing proposals for new merchant coal-fired power plants; all subsequent proposals to build coal-fired power plants in the state have been rejected.

Idaho does not require gasoline to be mixed with renewable fuels.

Idaho does not have fuel economy standards similar to California's, which include attempts to regulate greenhouse gas emissions from new vehicles. Though Idaho may not have state fuel economy standards, the U.S. has emissions standards on vehicles.

Idaho requires new residential and commercial buildings to meet energy efficiency standards. Residential and commercial buildings must comply with the 2006 International Energy Conservation Code (IECC). The IECC, developed by the International Code Council, is a model code that mandates certain energy efficiency standards. State buildings must also meet energy efficiency standards. House Bill 422, enacted in 2008, requires all major state projects to be designed, constructed and certified to be at least 10 to 30 percent more efficient than comparable buildings on similar sites.

Idaho does not mandate that state agencies purchase energy-efficient appliances.

Idaho allows electric utilities to "decouple" revenue from the sale of electricity, but *does not allow* natural gas utilities to decouple. Some states decouple revenue from actual sales, allowing utilities to increase their revenue by selling less electricity and natural gas to encourage energy efficiency investment.[10]

Idaho allows solar easements for the purpose of exposing a solar energy device to sunlight. The solar easement is presumed to be attached to the real property and is deemed to pass with the property when title is transferred to another owner. Only a few Idaho communities have passed solar easement ordinances.

[10] Information obtained from Institute of Energy Research and Idaho Code § 39-2901 et seq. (2009), www.legislature.idaho.gov/idstat/Title39/T39CH29.htm

IDAHO STRATEGIC ENERGY ALLIANCE

Availability of affordable and predictable energy is the foundation of sustainable economic growth, job creation and rural development.

NOTES

ENERGY GENERATION

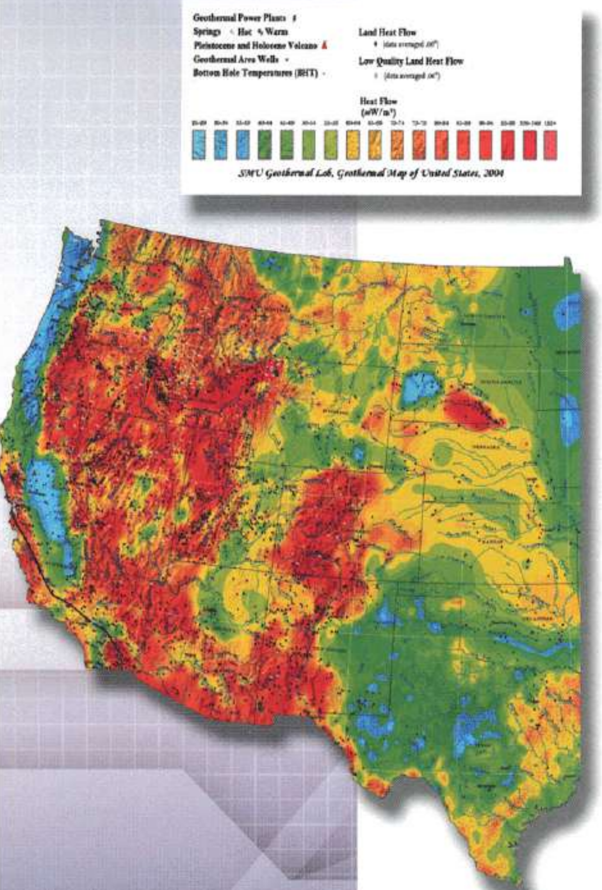
Increasing global energy demand makes the development of new, more efficient and effective energy generation options an economic necessity and opportunity. Idahoans are at the forefront of advanced energy research and development associated with fossil, renewable and nuclear energy and energy transmission technologies.

ENERGY GENERATION: RENEWABLE ENERGY

Geothermal

U.S. Geothermal's Raft River Power Plant

Idaho has some of the greatest potential in the country for geothermal energy production. The state uses geothermally heated water for generating electricity, heating buildings, growing fish, alligators and plants and also for recreation. Idaho is a prime candidate for additional geothermal energy development in the future because the state has vast, untapped and underused geothermal resources. Idaho has the first utility-scale geothermal power plant in the Pacific Northwest, U.S. Geothermal's Raft River Facility, which started providing baseload generation in January 2008.



Heating

Geothermal water heats homes and buildings throughout Idaho, ranging from the Idaho State Capitol to mobile homes. A well can supply heat for an individual home or multiple buildings connected to a system of distribution lines resulting in a district heating system. Several district heating systems are in operation in the state, including the Boise Warm Springs Water District, the oldest system in the United States.

Open- or closed-loop methods are employed to extract heat from geothermal water. In an open-loop system, water is withdrawn from a well, circulated through the building's heating system and discharged away from the residence or reinjected into the aquifer at a different site. The closed-loop system works by installing a metal piping system in the well to transfer heat to water inside the piping. The water circulates continually in a closed-loop.

Electricity

In a recent report, Idaho was ranked 3rd out of 12 western states in potential for new geothermal power generation by 2015.[11] Power generation uses a technology in which turbines are driven directly by steam (dry steam) or by steam that is produced either by "flashing" very hot geothermal water, or through the use of a secondary "working" fluid that is heated by the primary geothermal water to the flashing point. There is exploratory drilling under way within the state and Idaho welcomes geothermal exploration and power development.

Idaho has 15.8 MW of installed geothermal power generation capacity that produced 86,000 MWh of electricity in 2008, which is sufficient to power over 8,000 homes.[12]

[11] Source is the Western Governors' Association, 2006

[12] Information obtained from the Geothermal Energy Association and the U.S. Energy Information Administration

Well Drilling and Flow Testing at Raft River 2007 (Source: U.S. Geothermal)

For more information on geothermal energy in Idaho, please see the Idaho Strategic Energy Alliance Geothermal Task Force Report at:

www.energy.idaho.gov

Solar

Solar cells, also called photovoltaic (PV) cells, convert sunlight directly into electricity. PV gets its name from the process of converting light (photons) to electricity (voltage), which is called the PV effect. The PV effect was discovered in 1954, when scientists at Bell Telephone discovered that silicon (an element found in sand) created an electric charge when exposed to sunlight. Soon solar cells were being used to power space satellites and smaller items like calculators and watches. Today, thousands of people power their homes and businesses with individual solar PV systems. Utility companies are also using PV technology for large power stations which must be integrated into their electrical supply systems since the sun doesn't always shine.

Solar panels used to power homes and businesses are typically made from solar cells combined into modules that hold about 40 cells. A typical home will use about 10 to 20 solar panels. The panels are mounted at a fixed angle facing south, or they can be mounted on a tracking device that follows the sun, allowing them to capture the most sunlight. Many solar panels combined together to create one system is called a solar array.

For large electric utility or industrial applications, hundreds of solar arrays are interconnected to form a large utility-scale PV system.

The ISEA Solar Task Force indicates that the three investor-owned utilities in Idaho report a total of 148 grid-connected PV systems with a total capacity of 932 kW (not all of these systems may be in Idaho). They also report the rural electric cooperatives and municipal electric utilities in Idaho as having 19 grid-connected PV systems with a total capacity of 92 kW. While Idaho has a very good solar energy resource, particularly in the southwest portion of the state, the high current cost of solar PV systems results in limited installation.

Traditional solar cells are made from silicon, are usually flat-plate and generally are the most efficient. Second-generation solar cells are called thin-film solar cells because they are made from amorphous silicon or nonsilicon materials such as cadmium telluride. Thin-film solar cells use layers of semiconductor materials only a few micrometers thick. Because of their flexibility, thin-film solar cells can double as rooftop shingles and tiles, building facades, or the glazing for skylights.

Third-generation solar cells are being made from a variety of new materials besides silicon, including solar inks using conventional printing press technologies, solar dyes and conductive plastics. Some new solar cells use plastic lenses or mirrors to concentrate sunlight onto a very small piece of high efficiency PV material. The PV material is more expensive, but because so little is needed, these systems are becoming cost-effective for use by utilities and industry. However, because the lenses must be pointed at the sun, the use of concentrating collectors is limited to the sunniest parts of the country.

Concentrating Solar Power

Concentrating solar power (CSP) technologies use mirrors to reflect and concentrate sunlight onto receivers that collect the solar energy and convert it to heat. This thermal energy can then be used to produce electricity via a steam turbine or heat engine driving a generator.[13]

For more information on solar energy in Idaho, please see the Idaho Strategic Energy Alliance Solar Task Force Report at:

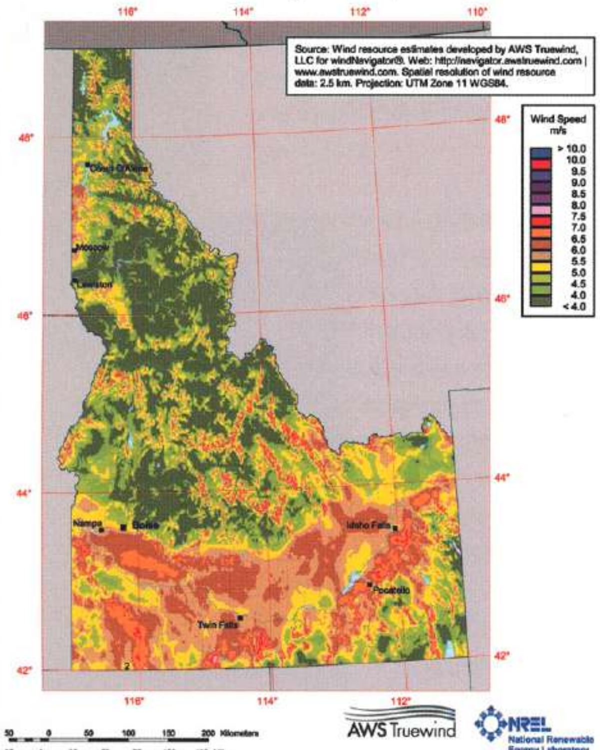
www.energy.idaho.gov

[13] Information obtained from NREL website

Wind

People have been harnessing the wind's energy for hundreds of years. From the Holland countryside to Midwestern American farms, windmills have been used for centuries to pump water or grind grain. Today, the windmill's modern equivalent-a *wind turbine*-can use the wind's energy to generate electricity.

Idaho - Annual Average Wind Speed at 80 m



Source: U.S. Department of Energy - Idaho Wind Map

How It Works

Wind turbines, like windmills, are mounted on a tower to capture the most energy. At 100 feet or more above ground, they can take advantage of the stronger but less-turbulent wind. Turbines catch the wind's energy with their propeller-like blades. Usually three blades are mounted on a shaft to form the turbine's rotor.

A blade acts much like an airplane wing. When the wind blows, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade toward it, causing the rotor to turn. This is called *lift*. The force of the lift is actually much stronger than the wind's force against the front side of the blade, which is called *drag*. The combination of lift and drag causes the rotor to spin like a propeller, and the turning shaft spins a generator to make electricity.

Applications

Wind turbines can be used in stand-alone, small-scale systems that provide electricity to individual users. The user is also typically connected to the utility distribution system to assure that electricity is available at all times. In a grid-connected system the turbine is also connected into the utility grid so that it can provide power to either the user or the utility grid depending on conditions and demand. When the turbine cannot deliver the amount of electricity required by the user, the utility supplies the difference. When the wind system produces more electricity than the user requires, the excess is sent or sold to the utility. (Similar considerations also apply to small-scale solar PV systems). Grid-connected systems can be practical if the following conditions exist:

- The area has an average annual wind speed of at least 10 mph (4.5 m/s)
- Utility-supplied electricity is expensive in the area (about 10 to 15 cents per kilowatt-hour)
- The utility's requirements for connecting to the grid are not prohibitively expensive
- There are good incentives for the sale of excess electricity or for the purchase of wind turbines

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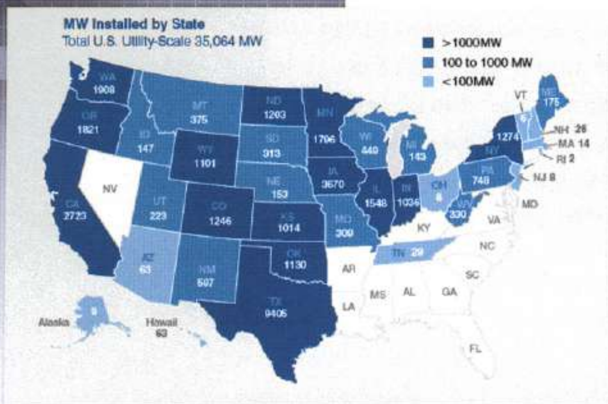


Federal regulations (specifically, the Public Utility Regulatory Policies Act of 1978 or PURPA) require utilities to connect with and purchase power from small wind and other types of energy systems.[14]

For utility-scale (megawatt-sized) sources of wind energy, a large number of wind turbines are usually built close together to form a *wind plant or wind farm*. Many electricity providers today use wind plants to supply power to their customers.[15] [16] Since wind energy is intermittent, wind farms must be integrated into the utilities' electrical supply system and other types of generation must be available to provide energy during times when the wind is not blowing.

For more information on wind energy in Idaho, please see the Idaho Strategic Energy Alliance Wind Task Force Report at:

www.energy.idaho.gov

The ISEA Wind Task Force reports that through early 2009 the utility-scale wind projects in Idaho had an installed capacity of almost 147 MW. In 2008, wind energy generated 207,000 MWh of electricity in Idaho, which was 1.7% of the total electricity produced in the state.[17]

[14] Information obtained from "Small Wind Electric Systems - An Idaho Consumer's Guide" - by the U.S. Department of Energy

[15] Information obtained from NREL website

[16] American Wind Energy Association U.S. Wind Industry Annual Market Report - Year ending 2009

[17] Information obtained from U.S. Energy Information Administration

Biomass

People have used biomass energy, or "bioenergy," the energy from plants and plant-derived materials, since people began burning wood to cook food and keep warm. Wood is still the largest biomass energy resource today, but other sources of biomass can also be used. These include food crops, grassy and woody plants, residues from agriculture or forestry, oil-rich algae and the organic component of municipal & industrial wastes. Even the fumes from landfills, which contain methane or natural gas, can be used as a biomass energy source.

Biomass can be used for fuels, power production and products that would otherwise be made from fossil fuels. In such scenarios, biomass can provide an array of benefits. Around the state there is research going on to develop and advance technologies for the following biomass energy applications:

- Biofuels - Converting biomass into liquid fuels for transportation
- Biopower - Burning biomass directly, or converting it into gaseous or liquid fuels that burn more efficiently, to generate electricity
- Bioproducts - Converting biomass into chemicals for making plastics and other products that typically are made from petroleum[18]

For more information on biomass energy in Idaho, please see the Idaho Strategic Energy Alliance Forestry/Biomass Task Force Report at:

www.energy.idaho.gov

In 2008, bioenergy used for electricity production had an installed capacity in Idaho of 63 MW and produced 455,000 MWh of electricity, which was 3.8% of the total electricity produced in the state.[19] With two major facilities, Idaho has 54 million gallons per year of ethanol production capacity.[20]

[18] Information obtained from the National Renewable Energy Laboratory website

[19] Information obtained from the U.S. Energy Information Administration

[20] Information obtained from the Renewable Fuels Association

Hydroelectric

Twin Falls

"Old Lower" Plant, 1930 turbine, Idaho Falls Power

The many rivers in Idaho provide a tremendous source of renewable electric power. Idaho has some of the greatest hydroelectric power resources in the nation and a great deal of energy is produced through the many dams. Hydroelectricity is a clean and inexpensive means of producing power. In 2008, Idaho had 2,346 MW of installed conventional hydroelectric capacity, which produced 9,363 MWh of electricity (78% of in-state electricity production).[21] Electricity can also be produced in small hydropower applications, using run of river power plants or hydrokinetic turbines in flowing water in rivers and irrigation canals.

How It Works

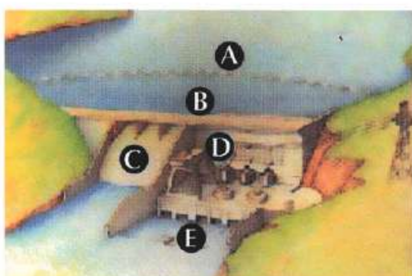
In order to generate electricity in a hydropower dam, water from the reservoir is released into a massive pipe called a penstock, where it enters the powerhouse deep within the dam. The force of this water striking the turbine causes it to rotate. The turbine is connected to the generator that also turns to produce electricity.

All of the water that goes into the turbine then drops into a draft tube and returns to the river downstream in the tailrace of the dam. Sometimes more water is available than the turbines can use. When that happens, the spillway releases large volumes of water through the dam's spillgates.[22]

More information can be found in the Hydropower Task Force report at:

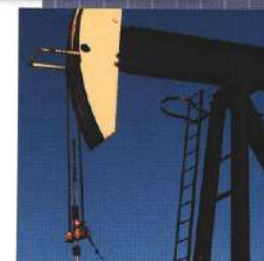
www.energy.idaho.gov

A. Reservoir
B. Penstocks
C. Spillway
D. Powerhouse
E. Tailrace



[21] Information obtained from the U.S. Energy Information Administration
[22] Image obtained from Idaho Power website

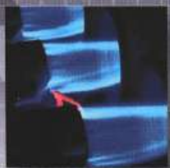
ENERGY GENERATION: FOSSIL ENERGY



In 2009 fossil fuels, primarily natural gas, coal and petroleum, provided about 2/3 of the nation's electricity.[23] Natural gas fueled 11.5% of the electrical generation in Idaho during 2008.[23] While there is no coal-fueled generation in Idaho, much of the electricity used in the state is imported from coal-fired plants in neighboring states. Natural gas is also a significant fuel source for space heating and industrial process heat; a small amount of coal is burned in Idaho for space heating and process heat.

Fossil energy, in the form of gasoline and diesel, provides the bulk of transportation fuel. Idaho's neighboring states, Montana, Wyoming and Utah, are among the most fossil-energy rich areas of the world.

[23] U.S. Energy Information Administration



Natural Gas

Natural gas is burned in combined-cycle combustion turbines (CCCT) or in simple-cycle combustion turbines (SCCT) to generate electricity by passing hot pressurized gases through a turbine connected to an electric generator. In 2008, electric utilities in Idaho generated over 230,000 MWh using natural gas.[24] CCCT plants have a gas turbine and generator combined with a heat recovery steam generator that is used to recover waste heat and produce additional electricity. CCCTs are typically used for baseload generation due to their higher efficiency while SCCTs are normally used to meet peak load requirements.

CCCT plants have a low initial capital cost compared to other baseload technologies, are highly reliable, offer considerable operating flexibility and have lower emissions than coal plants. The cost of the natural gas fuel and its price volatility is a major consideration in the operation of combustion turbines.

The industrial and residential sectors are Idaho's largest natural gas-consuming sectors. Close to one-half of households in Idaho use natural gas as their primary energy source for home heating.[25]

Coal

Coal-fired generation has been the primary source of commercial power production in the United States for many years. Pulverized coal plants provide a significant portion of electricity used in Idaho, but these plants are located in neighboring states. For example, Idaho Power owns 1,119 MW of coal-fired generation capacity located in Wyoming, Nevada and Oregon. In these plants, coal is pulverized to a dust-like consistency and burned to heat water, producing steam that drives a steam turbine and generator.

[24] U.S. Energy Information Administration
[25] U.S. Energy Information Administration

While coal power plants require significant capital commitments, they take advantage of low cost coal fuel and provide a reliable source of baseload electricity. As a result of emission concerns, controls have become increasingly important to help reduce harmful emissions and particulates. Coal-fired plants emit more carbon dioxide per kilowatt-hour produced than do natural gas-fired plants.

Petroleum

Petroleum products are used for transportation fuels, electricity production and heating fuels.

The primary use of petroleum for energy generation is in the transportation sector. 94% of the transportation energy in the United States is provided by petroleum products (gasoline and diesel fuel). In 2008, Idaho consumed 655 million gallons of gasoline and 374 million gallons of diesel fuel.[26] These fuels are burned in engines, producing expanding gases that provide mechanical forces that power the driveshaft and move the vehicle.

About 1% of the electricity generated in the United States uses petroleum as the fuel source, mainly in Hawaii where petroleum is the primary fuel source for electricity generation. In this application, petroleum is combusted in a boiler to produce steam that turns a steam turbine connected to a generator.

Petroleum, primarily as distillate fuel oil and liquified petroleum gases, is used for space heating, largely in the northeastern United States. It is also used for industrial process heat. In these applications, petroleum fuels are combusted in boilers to produce hot water or steam or burned directly to heat the air or a material being processed.

[26] U.S. Energy Information Administration

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IDAHO STRATEGIC ENERGY ALLIANCE

ENERGY GENERATION: NUCLEAR POWER

Nuclear

Today, 104 nuclear power plants provide about 20 percent of the United States' electricity.[27] There is increased national interest in building more nuclear power plants due to their potential to provide large quantities of baseload power with very low lifecycle greenhouse gas emissions. The federal Energy Policy Act of 2005 provided funds for the Idaho National Laboratory to conduct research and development activities on a possible "next generation" nuclear power plant in Idaho.

Although Idaho has no commercial nuclear power plant, Idaho National Laboratory, as the Department of Energy's lead laboratory for nuclear energy, has had a significant influence on every reactor designed in the United States. Laboratory researchers are currently working on several initiatives that will shape the future of nuclear energy worldwide.

[27] Information obtained from Nuclear Energy Institute website

How it Works

Nuclear power production is a mature and growing global industry. Over 430 power reactors operate in 44 countries producing almost 15% of the world's electricity. There are several different types of nuclear power reactors, including light water reactors, gas-cooled reactors, heavy water reactors and breeder reactors - each having certain attributes and characteristics. The power reactors in the United States are light water reactors, either pressurized water reactors (PWR) or boiling water reactors (BWR).

These reactors generate heat primarily from the splitting of atoms of Uranium-235 (an isotope of uranium making up about 0.72% of natural uranium) in a process known as nuclear fission. This heat is used to heat water and create steam, which turns a turbine connected to a generator to produce electricity. The energy released from a pound of uranium through nuclear fission is much greater than the energy produced from burning a pound of coal (2.5 million times more), making it possible to generate vast amounts of energy from a very small amount of material. The heat produced in a nuclear reactor can also be used for industrial process heat.

Idaho's Capitol:
Geothermal Heated

For more information on Energy Efficiency in Idaho, please see the Idaho Strategic Energy Alliance Energy Efficiency & Conservation Task Force Report at:

www.energy.idaho.gov

ENERGY GENERATION: ENERGY EFFICIENCY

Efficient practices on the farm, at home and in business and industry can save energy resources and money, as well as reduce dependence on foreign sources of energy. The State of Idaho and our Idaho utilities have options to assist consumers in making energy efficient choices.

The Idaho Strategic Energy Alliance recently formed the Industrial Energy Forum. This group, which is composed of members from a wide range of Idaho companies, utilities and Idaho National Laboratory, works to identify ways to reduce industrial energy usage through application of energy efficient technologies and demand-side management. Reduced energy use lowers costs, increases profits and helps create jobs.

In its K - 12 Energy Efficiency Project, the State of Idaho funded scoping audits on 894 classroom buildings to provide direction for HVAC system tune-ups and an optimized list of retrofit opportunities. "Smart software" was installed in 91 schools to track energy use, determine energy savings and provide a better understanding of how these buildings function. HVAC tune-ups were initiated and are anticipated to save Idaho districts about ten percent of their current annual energy budgets. In the project's final phase, approximately $9 million will be used for retrofit upgrades where the most benefit is anticipated in school districts throughout Idaho.

There are multiple state and federal incentives available for individuals who install energy efficiency retrofits. Individuals who produce their own renewable energy have the option to sell back to the grid, reduce their energy bill and receive multiple tax breaks. For a full listing of incentives visit **www.dsireusa.org**. Also, visit your utility website for local incentives.

IDAHO STRATEGIC ENERGY ALLIANCE

Sound energy policy should be capable of adapting to changing circumstances and should be based on the best available information and input from an engaged, well informed public.

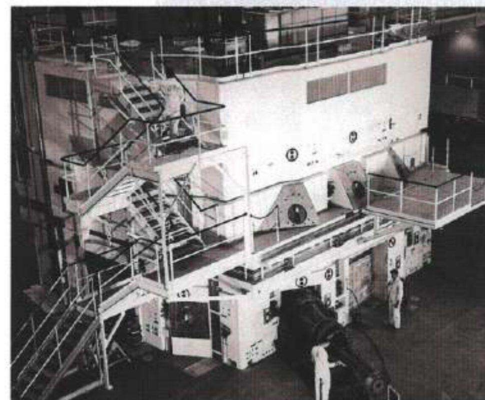
NOTES

ENERGY RESEARCH IN IDAHO

Idaho National Laboratory

Idaho National Laboratory occupies a unique niche at the nexus of energy supply and security. While it serves first as the U.S. Department of Energy's leading center for nuclear energy research, development, demonstration and deployment, INL also plays a significant role in a wide range of other national priority energy supply, security and sustainability initiatives.

Nuclear Leadership



Building on INL's unparalleled contributions to nuclear science and engineering and its legacy of nuclear energy leadership, its current nuclear mission is to develop advanced nuclear energy technologies that provide clean, abundant, affordable and reliable energy to the United States and the world. This work includes research and development in reactor design, fuel cycle management, nuclear safety and nuclear fuels and reactor life extension. Key to supporting these efforts is the Advanced Test Reactor, the world's premier materials test reactor.

A Diversified Energy Research Portfolio

INL scientists and engineers are also conducting crucial research in a robust non-nuclear energy portfolio directed at helping ensure U.S. energy security. Work is conducted in various renewable energy technologies including advanced bioenergy, geothermal, water power and wind as well as in integrated (hybrid) energy systems, advanced vehicle technologies, energy storage systems and unconventional fossil energy extraction. Employing 60 years of leadership in energy systems and technologies, INL works with government and industry to develop new technologies and approaches that address our national energy security challenges; creating new ways to enhance economic stability, environmental sustainability and resource security through clean energy research.

INL energy technologies that have recently gained international recognition for their significance include Precision Nanoparticles - a method that could boost the efficiency of solar cells among its many potential applications, Supercritical/Solid Catalyst - a system to produce high quality biodiesel from waste and the Compact High Efficiency Natural Gas Liquefier - a device that permits broader use of clean-burning liquefied natural gas. INL actively works with the private sector to help commercialize new technologies such as these.

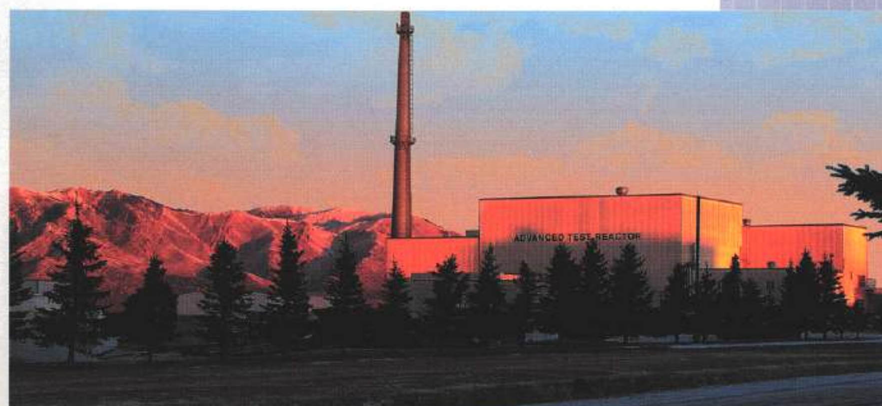
INL at a Glance

- **Management:** Battelle Energy Alliance
- **Location:** Southeast Idaho
- **Major facilities:** Advanced Test Reactor Complex, Materials & Fuels Complex, Research & Education Campus
- **Employees:** 4,300
- **Budget:** Over $1 Billion
- **Mission:** Ensure the nation's energy security with safe, competitive and sustainable energy systems and unique national and homeland security capabilities.

A Critical Link in National Defense

On the security side of the energy equation, INL is home to the unparalleled Critical Infrastructure Test Range. The range provides customers with access to remote, secure space complete with industrial-scale infrastructure components that can be used for conducting comprehensive interoperability, vulnerability and risk assessments. The laboratory's test range includes access to hundreds of infrastructure protection and cybersecurity experts, and assets such as an isolable transmission and distribution system and a comprehensive communications test bed.

Taken in total, Idaho National Laboratory is a resource of exceptional depth and breadth for a state, nation and world struggling to meet rapidly escalating demand for energy - securely delivered to the right place at the right time.



Idaho Universities

The universities in Idaho play a vital role in the research and exploration of new energy sources. There are multiple ways in which the universities collaborate and combine their talent in order to enhance their capabilities and energy-related research that are essential in keeping our energy production and transmission infrastructure secure.

The Center for Advanced Energy Studies (CAES) is a public/private partnership comprised of industry, Idaho National Laboratory and the three Idaho public universities: University of Idaho, Idaho State University and Boise State University. CAES delivers innovative, cost-effective, credible energy research leading to sustainable technology-based economic development.[28]

The Institute of Nuclear Science and Engineering (INSE) was established in 2003 with approval from the Idaho State Board of Education. This institute is also a collaborative entity among Idaho State University, University of Idaho and Boise State University. Under the INSE's administrative umbrella, the three universities jointly focus on nuclear science and engineering education at the combined Idaho Falls campus.[29]

Through collaboration and a myriad of independent research initiatives, the universities in Idaho have become key contributors to energy research within the state.

[28] Information obtained from CAES website
[29] Information obtained from the ISU website

IDAHO STRATEGIC ENERGY ALLIANCE

Idaho is a regional energy crossroads and is of critical importance for economic development of the region - transmission infrastructure is needed to deliver energy resources from where they are located to where they are used.

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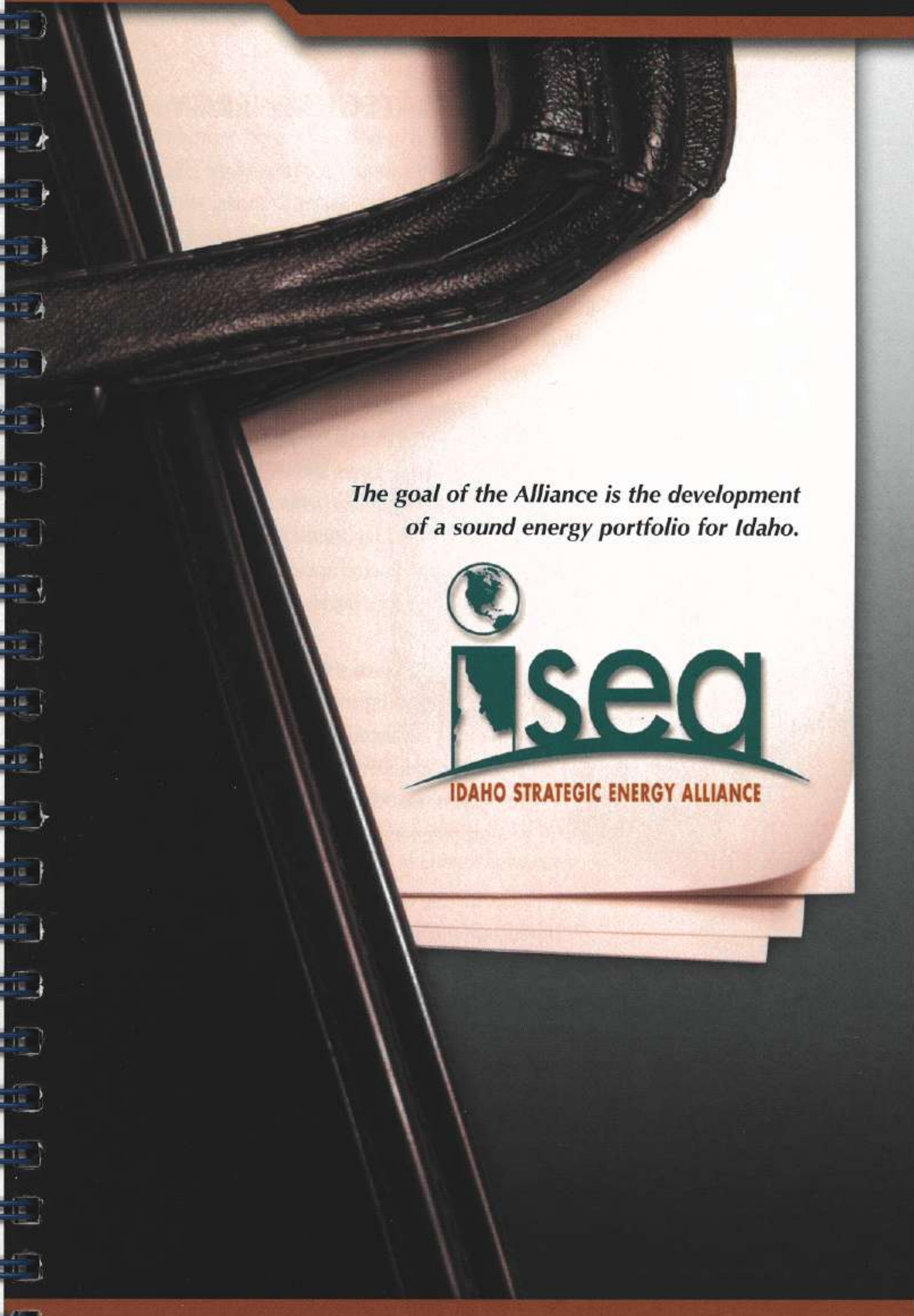
The goal of the Alliance is the development of a sound energy portfolio for Idaho.
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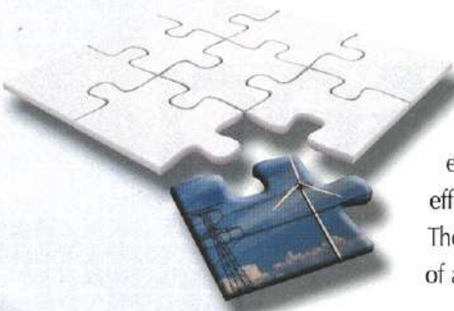
IDAHO STRATEGIC ENERGY ALLIANCE

IDAHO STRATEGIC ENERGY ALLIANCE

Background

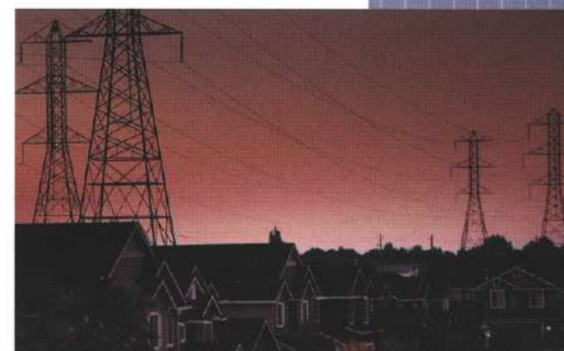
Citizens, businesses and state and local government in Idaho are all feeling the impact of higher energy prices and other energy challenges. Governor Otter established the Idaho Strategic Energy Alliance to help develop effective and long-lasting responses to these challenges. The Governor believes that developing options and solutions for our energy future should be a joint effort between local, tribal, state and federal governments, as well as the profit and non-profit private sectors, fostering coordinated approaches to energy development.



The Alliance is Idaho's primary mechanism for identifying and analyzing options for and enabling advanced energy production, energy efficiency and energy business in the state. The goal of the Alliance is the development of a sound energy portfolio for Idaho that:

- Includes diverse energy resources and production methods
- Provides the highest value to the citizens of Idaho
- Ensures quality stewardship of environmental resources
- Functions as an effective, secure and stable system

The Alliance consists of over a dozen task forces, staffed by volunteer experts working in areas including wind, biofuels, geothermal, hydropower and energy efficiency & conservation. The task forces provide research and analysis into the current situation, potential and barriers to energy development suggesting financial, policy and research alternatives to overcome barriers. The Alliance is governed by a board of directors comprised of representatives from Idaho stakeholders and industry experts. The primary purpose of the board is to provide options and support to the Governor's Council regarding energy and energy efficiency activities for Idaho. The workings of the Alliance are overseen by the Governor's Council, a group of cabinet members assigned responsibility by executive order to review suggestions from the board and interact directly with the Governor. The Council is led by the administrator of the Office of Energy Resources.



Through the Alliance, the state is working to achieve a secure, reliable and stable energy portfolio for Idaho. Availability of affordable and predictable energy is the foundation of sustainable economic growth, job creation and rural development. Ultimately the Governor expects that the Alliance and its teams of experts will provide the state with achievable and effective options for improving the energy future of Idaho.

Projects

The Idaho Strategic Energy Alliance works to provide objective information and analyses promoting clean energy and energy efficiency within the state. Recent examples include:

- Performing 894 K - 12 school energy audits that have the potential of saving over 200 million kWh annually in our state's schools.

- Acquiring federal funding to develop a national database of United States geothermal resources based at Boise State University.

- Working to attract ADAGE, the joint venture between AREVA and Duke Energy focusing on converting wood biomass into electricity and biopower.

- Sharing insights on energy through a series of experts to provide useful information to Idaho legislators.

- Providing assistance to several energy companies interested in locating in Idaho.

- Directing biogas, solar and biomass companies to our related task force chairs for assistance.

Thanks to more than 180 energy and environmental experts, ISEA has tackled issues such as the need for new transmission, the potential for increased clean energy production within the state and opportunities for greater energy efficiency and conservation. ISEA is progressing towards achieving its goal by being an unbiased information resource and a leader in the energy dialogue in the state.

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  Travis McLing, Idaho National Laboratory
- Communication & Outreach Task Force:
  John Kotek, Gallatin Public Affairs
- Conservation and Energy Efficiency Task Force:
  Kevin Van Den Wymelenberg,
  Integrated Design Lab/University of Idaho
- Economic/Financial Development Task Force:
  - **John Eustermann,** Stoel Rives, LLP
  - **Mike Louis,** Center for Advanced Energy Studies, Boise State University
- Forestry Task Force:
  Dr. Jay O'Laughlin, University of Idaho
- Geothermal Task Force:
  Dan Kunz, U.S. Geothermal
- Hydropower Task Force:
  David Hawk, E2A Energy Analysis & Answers
- Solar Task Force:
  Andy Tyson, Creative Energies
- Transmission Task Force:
  Kip Sikes, Idaho Power Company
- Wind Task Force:
  Clint Kalich, Avista
- Industrial Energy Forum:
  - **Stace Campbell,** McCain Foods
  - **Don Sturtevant,** J.R. Simplot Company

IDAHO STRATEGIC ENERGY ALLIANCE

Idaho can serve rapidly changing global energy markets through development of energy technology and manufacturing energy equipment and systems.

OTHER ENERGY INFORMATION

Energy-Saving Tips for Home and Work

When living in a typical U.S. home, appliances and home electronics are responsible for about 20 percent of energy bills. These appliances and electronics include everything from clothes washers and dryers, to computers, to water heaters. By turning off and/or unplugging appliances when they're not in use and by making some small adjustments a great deal of money can be saved on monthly energy bills.

Electronics

- Don't use a screen saver. Screen savers are not necessary on modern monitors and studies show they actually consume more energy than allowing the monitor to dim when not in use.
- Air dry dishes instead of using the dishwasher drying cycle.
- Turn down the brightness setting on computer monitors. The brightest setting on a monitor consumes twice the power used by the dimmest setting.
- Plug home electronics, such as TVs and DVD players, into power strips; turn the power strips off when the equipment is not in use (TVs and DVDs in standby mode still use several watts of power).
- Check software. Many computer games and other third-party software that run in the background will not allow the computer to go to sleep—even if they are paused or the active window is minimized.
- Don't over-dry clothes. If a machine has a moisture sensor, use it. Dry towels and heavier cottons in a separate load from lighter-weight clothes in order to minimize drying time.
- Clean the lint filter in the dryer after every load to improve air circulation.
- Use the cool-down cycle to allow the clothes to finish drying with the residual heat in the dryer.
- Unplug battery chargers when the batteries are fully charged or the chargers are not in use.

Heating and Cooling

- Install patio covers, awnings and solar window screens to shade your home from the sun. For additional future savings, use strategically planted trees, shrubs and vines to shade your home.
- Clean or replace filters on furnaces once a month or as needed.
- Use fans during the summer to create a wind chill effect that will make a home more comfortable. If using air conditioning, a ceiling fan will allow one to raise the thermostat setting about 4°F with no reduction in comfort.
- Turn off kitchen, bath and other ventilating fans within 20 minutes after cooking or bathing to retain heated air.
- Don't place lamps or TVs near a thermostat. The thermostat senses heat from these appliances, which can cause the air conditioner to run longer than necessary.
- Install a programmable thermostat that can adjust the temperature according to a set schedule.[30]

RESTORATION OF POWER

Ensuring reliable electrical service is the core concern of every utility, but there are some events that negatively impact service that our utilities are not able to control, such as severe weather, accidents and other unpredictable situations.

If the lights go out, crews respond immediately and do everything possible - including working around the clock - to get them back on quickly and safely.

During a power outage:

- First check fuses and circuit breakers. If the power failure is not caused inside the home or business, customers should report the outage. *(See utility contact information on pages 54-57.)*
- Never use kerosene or propane heaters inside without proper ventilation. They create dangerous fumes. Also, don't ever burn charcoal in your house or garage.
- Make sure generators are properly wired for your home or business, and don't connect a generator directly to your home's main fuse box or circuit panel. This can create a dangerous backfeed hazard for line crews.
- Don't operate a portable generator inside your home or garage. Always properly ventilate a portable generator. Gasoline-powered generators produce deadly carbon monoxide. As an added protection, ensure that carbon monoxide and smoke detectors are installed and working properly.
- Limit the time refrigerator doors and freezer doors are open. They will keep food and perishables inside cold for a longer period of time if not left open.
- Preserve body heat by wearing multiple layers of clothing. Add a hat and blanket to stay warm. Blankets and towels around windows and doors help keep the heat in.
- Protect your pipes during freezing weather by wrapping them with insulation. Also, leave faucets dripping so water won't freeze and crack the pipes.
- Turn on your porch light when power is back in service. After crews complete repairs, they patrol the area of the power failure to see if lights are on.

Key causes of power outages:

- Trees or branches knocked down onto power lines by wind, snow or ice
- Lightning strikes a transformer or other electrical facilities
- Car accidents in which utility poles are knocked over or sway enough to knock lines together and open up the circuit
- Equipment overload, especially on hot days when air conditioning is heavily utilized or during extremely cold weather when electric heaters are turned on across the system
- Digging too closely to underground lines or cutting a line
- In-home circuit overload
- Animal contact with the lines

[30] Information obtained from Idaho Power website and U.S. Department of Energy website

Before You Dig

If you're planning to dig or build near overhead or underground electrical lines, call Dig Line at the One Call Center. Idaho law says you must call for permission first to ensure your safety and electric service reliability.

You can call **811** from anywhere to reach the One Call Center.

To avoid the danger of accidentally cutting into underground power lines, and to ensure your compliance with the law, call the One Call Center at least two working days before you dig. A new national number, **811**, makes the notification process easier by reducing the problems created with having multiple numbers for different centers around the country. Calling **811** automatically routes the caller to the closest local One Call Center.

After providing the center with information about a digging project, operators will alert the appropriate utilities and send a crew to the job site to mark the locations of underground facilities free of charge. Locating these underground power lines and cables helps to prevent personal injury and costly damage to utility lines.

When you call, be prepared to supply the location, scheduled date, type of work and information about the company or contractor doing the work.[31]

Trees

Falling trees and tree limbs can cause high voltage wires to break or sag to the ground, in some cases causing life-threatening situations for motorists and pedestrians.

When tree branches come in contact with power lines they often cause outages. That happens most often in windy, stormy weather.

A large percentage of outages are caused by trees that fall onto power lines or limbs that come in contact with power lines.

Utilities regularly trim trees in order to keep power lines clear.

[31] Idaho Power website - About Us - Safety - Dig Line