2012 Idaho Energy Plan

October 14, 2011

Prepared by the Idaho Legislative Council's Interim Committee on Energy, Environment and Technology with the assistance of The Idaho Strategic Energy Alliance

Submittal Letter

To: The Idaho Legislature

The Interim Committee on Energy, Environment and Technology ("Committee") respectfully submits this 2012 Idaho Energy Plan in compliance with HCR 013 passed during the 2007 Legislative session of the Idaho Legislature. This legislation adopted the State Energy Plan written by the Committee in response to HCR 062 passed during the 2006 session and required that the Legislature update the plan at a minimum of once every five years.[1] The Committee worked in partnership with the Idaho Strategic Energy Alliance, (ISEA) comprised of nearly 200 volunteers from state, local, and federal interests as well as profit and non-profit private sectors. Governor Otter created the ISEA to allow a broad range of related stakeholders to work together to identify and analyze options, opportunities and risks associated with advanced energy production technologies, energy efficiency and conservation, and energy business in the state. In addition, the Committee provided opportunities for citizens to comment on the Plan. The Committee members, members of the ISEA, and other public stakeholders worked diligently to create the policy basis for necessary debate as our energy opportunities evolve.

The policy guidance and recommendations of this Energy Plan are based on a factual understanding and assessment of present energy markets, technologies, and systems. Idaho's existing energy resource base has resulted in some of the lowest electricity and natural gas prices in the nation, providing enormous benefit to Idaho consumers. However, new energy resources are becoming increasingly costly, and there is considerable policy, technology, and resource uncertainty in national energy markets in general. These risks will influence options and opportunities for Idaho's citizens and businesses. Given these realities, the Committee found that increasing focus on secure, stable and cost -effective energy supply heightened outreach to enhance a broad and comprehensive knowledge concerning energy issues and opportunities, and a concerted effort between government and private sectors to capture energy-related economic development opportunities will be critical in reaching our stated energy objectives. At the same time, our policy guidance takes steps to ensure that energy suppliers will continue to have access to conventional energy resources to keep our energy costs as low as possible while achieving environmental and economic objectives. This represents, we believe, a pragmatic, common-sense approach to preserving the advantages Idahoans have enjoyed over the years while better positioning the state to meet the challenges of the future.

Energy issues are a foundational part of lives, and will continue to increase in importance; touching almost every aspect of our lives, and for which our State has a great deal of regulatory responsibility. We strongly recommend that the Legislature and other state policy-makers maintain vigilant oversight of the implementation of this Energy Plan and stay abreast of energy issues by frequently revisiting these recommendations to ensure that they continue to advance Idaho's interests.

Respectfully submitted,

Senator Curt McKenzie	Representative George Eskridge
Interim Committee Co-Chair	Interim Committee Co-Chair

[1] http://legislature.idaho.gov/legislation/2007/HCR013.html. Note that HCR 062 (2006 session) required the Interim Committee to write the Idaho Energy Plan while HCR 013 (2007 session) adopted the plan written by the IC as the State Energy Plan and also required that it be updated a minimum of once every five years

Committee Membership

LEGISLATIVE MEMBERS OF ENERGY, ENVIRONMENT AND TECHNOLOGY INTERIM COMMITTEE

Sen. Curt McKenzie, Co-chair
Sen. Patti Anne Lodge
Sen. Russell Fulcher
Sen. Steve Bair
Sen. John Tippets
Sen. Elliot Werk
Sen. Dan Schmidt (Ad Hoc)

Rep. George Eskridge, Co-chair
Rep. Maxine Bell
Rep. Bert Stevenson
Rep. Eric Anderson
Rep. Jeff Thompson
Rep. Reed DeMordaunt
Rep. Wendy Jaquet
Rep. Brian Cronin (Ad Hoc)

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Executive Summary

In 2007, the Idaho Legislature's Interim Committee on Energy, Environment and Technology ("Committee") submitted for consideration to the Idaho Governor and Legislature the first integrated energy plan ("2007 Plan"), with an accompanying Minority Report. This plan was adopted by the Legislature and Governor. As part of the 2007 Plan, the Committee recommended (and HCR 013 [First Regular Session 2007] required) that the Legislature revisit the Idaho Energy Plan every five years in an effort to assure the facts and recommendations contained in the Plan continue to reflect the best interests of Idaho businesses and citizens. This 2012 update to the 2007 Plan is intended to accomplish this goal.

As in 2007, today the Committee finds that Idaho citizens and businesses continue to benefit from stable and secure access to affordable energy (electricity, fuels for transportation, and space and process heat). Additionally, since 2007 Idaho energy stakeholders have made substantial progress in integrating in-State renewable energy in our energy networks, and have made notable achievements in the area of energy efficiency, both areas of strategic focus called out in the 2007 Plan.

Looking to the future, we see that even with significant energy efficiency and conservation measures, energy consumption in Idaho is expected to increase substantially as our population increases and economic activity increases. Meanwhile we see global, national and regional energy market landscapes characterized by uncertainty and change. We recognize that most of the energy that we consume in the State (approximately 70%)[2] is produced outside Idaho's border, creating a degree of vulnerability from policy decisions made in other states and countries and therefore outside of our control; we recognize opportunities and risks afforded rapid advances in energy generation, transmission and use technologies; and we recognize the risks and opportunities associated with siting, licensing, and environmental impacts associated with our energy systems. These are formidable challenges that will impact energy options, choices, costs and opportunities in Idaho.

With this recognition, this 2012 Idaho Energy Plan re-emphasizes the core objectives of the 2007 energy plan – to set the policy framework that will help enable a secure, reliable, affordable energy supply network while protecting public health and safety and enhancing economic competitiveness, and establish the process by which sound data and debate is regularly engaged to help Idaho stakeholders respond to energy challenges and opportunities.

Our focus is centered on three pillars of Idaho's energy future: 1) Secure, stable, cost-effective supply of electricity, transportation fuels, and energy for industrial, process and space heating; 2) Opportunities for economic development associated with energy production as well as in serving global energy markets through manufacturing and services; and 3) Enhancing our collective "energy IQ" – which is critically important for helping our citizens, businesses and policy leaders make informed decisions while exerting national leadership regarding complex energy issues. In the following pages, the Committee provides data to establish a common basis for policy direction; provides an assessment of options and opportunities, and for risks and lessons-learned that can guide policy debate and decisions; provides a look-ahead at technology and policy issues

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[2] Energy Information Administration SEDS, 2009 State Energy Data System Idaho (139.9 TBTUs production, 509 TBTUs consumption)

that have the potential to significantly impact our energy well-being; and offers policy guidance and implementation processes that will help ensure an ongoing, structured, informed and productive public discourse on our energy future.

Significant findings and recommendations include a continued desire to integrate in-state renewable energy, particularly renewable-electric, in balance with economic and systems stability considerations; continued aggressive pursuit of energy efficiency mechanisms; development of mechanisms to assist local authorities in energy facility siting decisions; increased direct use of natural gas where economically beneficial; increased focus on pursuing options and opportunities related to transportation fuels and systems (including end-use conservation); enhanced partnerships between government and non-governmental stakeholders including congressional representatives to focus and accelerate economic development activities related to the energy sector; and enhanced outreach and dialogue regarding energy-related options and opportunities for Idaho, both in the State and regionally. For implementation, we recommend that this Plan be assessed and maintained yearly with the assistance of responsible State agencies and their stakeholder groups.

Energy Plan Objectives

1. ***Ensure a secure, reliable and stable energy system for the citizens and businesses of Idaho***
2. ***Maintain Idaho's low-cost energy supply and ensure access to affordable energy for all Idahoans***
3. ***Protect Idaho's public health, safety and natural environment and conserve Idaho's natural resources***
4. ***Promote sustainable economic growth, job creation and rural economic development***
5. ***Provide the means for Idaho's energy Policies and Actions to adapt to changing circumstances***

Recommended Policies and Actions

Electricity

RESOURCES

Policies

1. Enable robust development of a broad range of power generation and energy efficiency resources within environmentally sound parameters that are cost-effective.
2. Establish cost-effective conservation, energy efficiency and demand response as a high priority electricity resource for Idaho.
3. The IPUC and Idaho's municipal and cooperative utilities should ensure that their orders and actions are consistent with the policies and objectives listed in the Idaho Energy Plan.

Actions

E-1. Idaho utilities should continue to acquire resources that are reliable, that promote diversity, are cost-effective and environmentally sound to meet their customers' short and long-term electricity needs.

E-2. Idaho investor-owned electric utilities should continue to conduct formal Integrated Resource Planning, or the individual, board-accepted equivalent for public utilities, to assess the relevant attributes of a diverse set of supply-side and demand-side resource options and to continue to provide an opportunity for public input into utility resource decisions.

E-3. Idaho's electric utilities should continue evaluating transmission as a resource option in their Integrated Resource Plans filed every two years with the Idaho PUC and should continue participating in the development of local, sub-regional, and regional transmission plans in order to construct transmission facilities that are needed to provide reliable, low-cost energy service to their customers, access to regional markets, and access to a diverse set of current and new resources in the most cost-effective and efficient manner practicable.

RENEWABLE GENERATION RESOURCES

Actions

E-4. Idaho should encourage cost-effective investment in renewable generation and combined heat and power facilities.

E-5. Energy project financing by the Idaho Energy Resources Authority should be encouraged to promote energy and economic development.

E-6. Idaho utilities should provide customers with the information and choices that enable them to more effectively manage their electricity consumption.

E-7. In accordance with federal law, the Idaho PUC should continue to administer its responsibilities under the Public Utility Regulatory Policy Act.

E-8. The Idaho PUC, utilities, municipalities, and cooperatives should ensure non-discriminatory policies for interconnection and net metering of customer-owned generation.

E-9. Idaho utilities should continue to report annually to their retail customers their sources of electricity (their "fuel mix").

CONVENTIONAL GENERATION RESOURCES

Actions

E-10. The Idaho PUC and the Office of Energy Resources and the Department of Environmental Quality should monitor the status advanced energy generation technologies in order to stay aware of opportunities and risks.

E-11. Idaho leaders, electric utilities and other energy-related companies, economic development professionals, universities, other stakeholders and the Idaho National Laboratory should work cooperatively to assess opportunities and risks associated with development of commercial nuclear power and nuclear energy-related services in Idaho and provide related recommendations.

E-12. Idaho should encourage the efficient use of water resources in all energy generation facilities with a focus on efficient cooling.

TRANSMISSION

Actions

E-13. Idaho should continue participating in regional efforts aimed at increasing the capability of the western transmission grid and bringing to Idaho the benefits of cost-effective remote resources.

E-14. Energy project financing by the Idaho Energy Resources Authority should be encouraged to promote low-cost financing for transmission or distribution projects that benefit Idaho citizens and promote economic development.

Natural Gas

Policies

4. Encourage the most effective use of natural gas and ensure that Idaho consumers have access to a reliable supply from diverse and varied resources.
5. Support responsible exploration and production of natural gas supplies and the expansion of the transmission, storage and distribution infrastructure.

Actions

NG-1. Idaho should encourage investments in non-traditional natural gas supply resources, including landfill methane, anaerobic digesters, and biomass methane.

Petroleum and Transportation Fuels

Policies

6. Promote the production and use of cost-effective and environmentally-sound alternative fuels.
7. Promote conservation and efficiency as a means of reducing the burden of transportation fuel expenditures, improving the reliability and cost of Idaho's transportation fuel supply, and reducing transportation-related emissions.
8. Support responsible exploration and production of petroleum supplies and the expansion of transmission, storage and distribution infrastructure benefiting Idaho.

ALTERNATIVE FUELS

Actions

T-1. Idaho should ensure that its state vehicle procurement rules promote purchases of high-efficiency, flex-fuel, and alternative-fuel vehicles where cost-effective.

T-2. Idaho should encourage the purchase of efficient, flex-fuel and alternative fuel vehicles.

T-3. Idaho should encourage investments in retail and wholesale alternative fuel supply infrastructure.

T-4. Idaho should promote research and development and business-university partnerships to speed the commercialization of alternative fuel technologies.

Conservation and Energy Efficiency

Actions

CE-1. All Idaho utilities should fully incorporate cost-effective conservation, energy efficiency and demand response as priority resources in their Integrated Resource Planning.

CE-2. The Idaho PUC should encourage investor owned utilities (IOUs) to pursue cost effective conservation in their service territories.

CE-3. The Idaho PUC should establish and continue to periodically update an avoided-cost benchmark for each utility to be used in evaluating the cost-effectiveness of conservation and renewable resource investments and in calculating payments to Qualifying Facilities under the Public Utility Regulatory Policy Act (PURPA).

CE-4. The Idaho PUC should seek to eliminate disincentives that stand as barriers to implementing cost-effective conservation measures. The PUC should consider appropriate methods to avoid the disincentives associated with investor owned utility conservation efforts. Options may include, but are not limited to:

i. Recovery of revenues lost due to reduced sales resulting from conservation investments;

ii. Capitalization of conservation expenditures;

iii. A share of the net societal benefits attributable to the utility's energy efficiency programs.

CE-5. The Idaho PUC should support market transformation programs that provide cost-effective energy savings to Idaho citizens.

CE-6. The Idaho PUC and Idaho utilities should continue to adopt rate designs that encourage more efficient and effective use of energy.

CE-7. Idaho's municipal and cooperative utilities should annually report their estimates of conservation in their service territories and their estimated savings in electrical energy (MWh) and peak capacity (kW) during the lifetime of the measures implemented.

CE-8. Idaho should encourage investments in energy efficient technologies to the extent practical.

CE-9. State Government will:

i. Demonstrate leadership by promoting energy efficiency, energy efficient products, use of renewable energy and fostering emerging technologies by increasing energy efficiency in State government;

ii. Ensure that public facility procurement rules allow full implementation of cost-effective energy efficiency and small-scale generation at public facilities;

iii. Collaborate with utilities, regulators, legislators and other impacted stakeholders to advance energy efficiency in Idaho's economy;

iv. Work to identify and address barriers and disincentives to increased acquisition of energy conservation and efficiency; and

v. Educate government agencies, the private sector and the public about the benefits and means to implement energy efficiency.

Energy Facility Siting

Policies

9. The Committee reiterates the recommendation from the 2007 Plan that Idaho state agencies play a role in providing technical assistance to support local energy facility siting decisions and that local jurisdictions make a reasonable effort to hear testimony about the impact of proposed energy facilities from citizens and businesses in neighboring jurisdictions.

Actions

S-1. The Office of Energy Resources should ensure local officials are aware of the Act and the opportunity to establish Energy Facility Site Advisory Teams to provide technical assistance when requested by local jurisdictions.

S-2. Sponsors of new transmission line projects in Idaho should consider adopting best practices from the siting of other transmission lines in the Western Interconnection.

Economic Development

Policies

10. Pursue regional energy dialogue with neighboring states, with the goals of pursuing common energy market economic development interests and managing energy-related policy risk

11. Continue to promote energy-related jobs and career opportunities for Idaho citizens.

Actions

ED-1. Encourage a broader engagement with the Center for Advanced Energy Studies (CAES) to advance energy-related technology commercialization, efficiency, and research and deployment.

Energy Outreach and Education

<u>Policies</u>

12. Idaho should raise the awareness of energy challenges and opportunities in Idaho through education and outreach.

<u>Actions</u>

EE-1. Encourage schools to provide courses or workshops on energy technologies, issues, and approaches.

EE-2. The Office of Energy Resources, including the Idaho Strategic Energy Alliance, should engage in public outreach and education and work with Idaho energy stakeholders to promote a reliable, diverse, cost-effective and environmentally-sound energy system for the benefit of Idaho citizens and businesses.

EE-3. The Office of Energy Resources will report to the Legislature as requested on the progress of Idaho state agencies, energy providers and energy consumers in implementing the recommendations in this Energy Plan.

EE-4. The Interim Committee recommends that the Legislature revisit this Energy Plan and develop a process and approach to continually update data and access opportunities and risks on a yearly basis and perform a complete revision of the Plan on at least a five year basis.

1. Introduction, Background and Context

1.1. INTRODUCTION

In 2007, the Idaho Legislature's Interim Committee on Energy, Environment and Technology ("Committee") submitted the first integrated Idaho Energy Plan to the Idaho Governor and Legislature for consideration, with an accompanying Minority Report. This Plan ("2007 Plan") was adopted by the Legislature and Governor. The 2007 plan provided an overview of the "energy picture" in Idaho, provided an overview of Idaho's future energy supply under existing plans, and provided recommendations regarding policy, actions, and associated implementation that would help assure Idaho citizens' access to affordable, secure, sustainable energy while fostering economic growth in the State. As part of the 2007 Plan, the Committee recommended (and HCR 013 [2007 session] required) that the Legislature revisit the Idaho Energy Plan every 5 years in an effort to assure that the facts are accurate and current and that the recommendations contained in the Plan continue to reflect the best interests of Idaho businesses and citizens. This 2012 update to the 2007 Plan is intended to accomplish this goal.

As in 2007, today the Committee finds that Idaho citizens and businesses continue to benefit from stable and secure access to affordable energy (electricity and fuels for transportation, space and process heat). Our State utilities and businesses have made notable progress in integrating abundant renewable energy into our energy networks, primarily in the form of renewable electric generation; which was a policy objective of the 2007 Plan. State government, businesses, and consumers have shown leadership in developing innovative ways to reduce energy consumption through energy efficiency measures. Of particular note are the efforts of utilities and State government to help consumers reduce energy consumption and efforts in the business sector to do the same. Non-governmental organizations operating in the State, our State universities, resident National Laboratory, and many businesses and private citizens have contributed significantly to advancing our collective knowledge concerning energy issues, thereby feeding a healthy debate. These actions and accomplishments speak well of broad recognition of the importance of energy issues on our economic and general well-being. However, this debate and engagement must continue to grow as the regional, national, and global energy markets quickly change and create opportunity and risk for Idaho.

Energy issues will continue to grow in importance and impact for all Idahoans. Even with significant energy efficiency and conservation measures, energy consumption in Idaho is expected to increase substantially as our population increases and economic activity increases. This growth combined with uncertainties inherent in national energy markets stemming from challenging demand patterns, resource availability, cost of infrastructure and technology, life-cycle considerations for present generation sources, energy delivery and transmission constraints, and environmental and other concerns creates both challenge and opportunity in our energy future. As in 2007, a substantial percentage of the energy consumed in Idaho (approximately 70%)[3] is produced outside Idaho's border; this fact is not necessarily a negative (it is imperative that Idaho businesses and citizens acquire the lowest cost supplies where the markets allow). However, this does open customers to a degree of vulnerability due to policy decisions outside of their control, a consideration for the policy approach for our State.

With this recognition, the 2012 Idaho Energy Plan re-emphasizes the core objectives of the 2007 energy plan – to set the policy framework that will help enable a secure, reliable, affordable energy supply network while protecting public health and safety and enhancing economic competitiveness. Our focus is on the 3 pillars of Idaho's energy future:

- **Secure, stable, cost-effective supply of electricity, transportation fuels, and energy for industrial, process and space heating;**
- **Opportunities for economic development associated with energy production as well as in serving global energy markets through manufacturing and services; and**
- **Enhancing our collective "energy IQ" – critically important for helping our citizens, businesses and policy makers in making informed decisions and exerting national leadership regarding complex energy issues.**

In the following pages, the Interim Committee provides data to establish a common basis for policy direction; provides an assessment of options and opportunities; examines risks and lessons-learned; provides a look-ahead at technology and policy issues that have the potential to significantly impact our energy well-being; and offers policy guidance and implementation processes that will help ensure an ongoing, structured, and productive public discourse on our energy future.

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[3] Energy Information Administration SEDS, 2009 State Energy Data System Idaho (139.9 TBTUs production, 509 TBTUs consumption)

This is the 2012 Idaho Energy Plan.

Table 1.1. Facts About Energy in Idaho

$4.9 billion	Approximate amount Idaho (residential, commercial, industrial and transportation sectors) spent on energy in 2009
$4,500	Approximate average amount each Idaho household spent on energy (including gasoline) in 2009
8th lowest	Idaho's average gasoline prices in 2009 compared to the national average
10%	Share of Idaho median household income spent on energy in 2009
2nd lowest	Idaho's rank among the fifty states for average electricity prices in 2009
31st	Idaho's rank in among all other states in percent of median household income spent on energy (household energy bills / household income) including transportation fuel
14th lowest	Idaho's rank among the fifty states for residential natural gas prices in 2009
1112%	Percent of increased energy efficiency and conservation savings by Idaho investor owned utilities since 2004
0	Total amount of coal, oil and natural gas produced in Idaho in 2009
52%	Share of Idaho's 2009 electric energy supply that was imported from out of state
50%	Share of Idaho's 2009 electricity fuel mix that came from hydroelectricity
38%	Share of Idaho's 2009 electricity fuel mix that came from coal-fired power plants
3.4%	Share of Idaho's 2009 electricity supply that came from non-hydro renewable energy sources
46.5%	Share of Idaho's 2020 electricity supply that is expected to come from non-hydro renewable energy sources based on 2011 Idaho utility resource plans
19th highest	Idaho's energy intensity as a share of the state economy compared to other states

Note: Sources for this data can be found as it is referenced within the text.

This Energy Plan presents a broad set of consensus recommendations, encompassing nearly every aspect of the Idaho energy industry. The recommendations range from general to very specific, reflecting the fact that state authority is both limited and uneven. In some areas, particularly with respect to investor owned electric utilities, the state's regulatory oversight affords a substantial degree of latitude to establish policy that will affect major decisions. As a result, the Committee's recommendations are very specific in this area and speak to both increasing the supply of electricity available to Idaho utilities and reducing the demand for electricity by Idaho consumers. In other areas, particularly with respect to petroleum, the state has limited ability to affect supply conditions, and the Committee's recommendations are limited to reducing demand and promoting conservation and other alternatives to petroleum-based fuels. In all cases, the recommendations of this Energy Plan are forward-looking, and are not meant to assign credit or blame for past performance. Rather, they represent the Committee's best effort to outline concrete steps that will achieve the objectives that it set out at the beginning of its investigation.

The Committee intends this 2012 Idaho Energy Plan to serve as a guide for all Idaho citizens and businesses in their decisions about energy production, delivery and consumption. The Committee recognizes that true success in achieving the energy policy objectives set out in this Energy Plan will occur only when all Idaho citizens and businesses take some initiative toward wise energy use on their own, rather than waiting for incentives or mandates from state government.

1.2. POLICY CONTEXT FOR 2012 IDAHO ENERGY PLAN

Idaho's last energy plan was developed in 2007 by the Idaho Legislature's Interim Committee on Energy, Environment and Technology in compliance with House Concurrent Resolution 62.[4] In compliance with HCR 013 requiring the Legislature to update Idaho's Energy Plan a minimum of every five years, the Committee took this opportunity to perform an in depth evaluation of Idaho's energy situation at this point in time. The legislative intent from HCR -062 refers to the need for "an integrated energy plan for the state of Idaho that provides for the state's power generation needs and protects the health and safety of the citizens of Idaho."

The Committee took this opportunity to gather updated information concerning a broad range of energy production, transmission, and use in Idaho, including electricity, natural gas, transportation fuels, energy facility siting, economic development and energy education. This information provides the basis for energy policy guidelines contained in this Plan as well as specific recommendations.

1.3. PROCESS USED BY THE COMMITTEE TO DEVELOP THE 2012 IDAHO ENERGY PLAN

The Committee made a request to The Office of Energy Resources and the Idaho Strategic Energy Alliance (ISEA) to assist in the review and updating of the 2007 Idaho Energy Plan. This request was accepted in a letter to the Committee Co-Chairmen on June 25, 2011. The ISEA Board discussed the process to provide this assistance in its Board meeting on July 8, 2011. Subsequently the ISEA reviewed the 2007 Plan contents and provided a draft update to the Committee on September 28, 2011.

The Committee reviewed the draft material provided by the ISEA and conducted a thorough public process in developing the recommendations of this Energy Plan. *Provide details on public hearing process used.*

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[4] http://www.legislature.idaho.gov/legislation/2010/HCR062.pdf

The Committee operated to the extent possible on a consensus basis. The goal of the Interim Committee Co-Chairs was to develop a consensus set of policy guidelines and specific recommendations that the Committee could forward to the Legislature, the Executive Branch, and various stakeholders. *Provide additional text as the plan is finalized and recommendations developed.*

1.4. ENERGY PLAN FINDINGS

The findings of the Committee are organized into three categories: Objectives, Policies and Actions. The Energy Plan *Objectives* provide high-level guidance by outlining broad goals that the Committee wishes to achieve for Idaho. *Policies* establish the direction that Idaho should pursue in specific topic areas in order to achieve the Objectives, and *Actions* are specific items that advance and implement the Policies. The Objectives, Policies and Actions are described below, and a complete list of Committee recommendations is provided in Chapter 6.

1.4.1. Energy Plan Objectives

The Committee established the Objectives for the Energy Plan at the outset of its efforts. The Committee's Objectives for this Energy Plan are to:

1. *Ensure a secure, reliable and stable energy system for the citizens and businesses of Idaho;*
2. *Maintain Idaho's low-cost energy supply and ensure access to affordable energy for all Idahoans;*
3. *Protect Idaho's public health, safety and natural environment and conserve Idaho's natural resources;*
4. *Promote sustainable economic growth, job creation and rural economic development; and*
5. *Provide the means for Idaho's energy policies and actions to adapt to changing circumstances.*

1.4.2. Accomplishments Since 2007

The 2007 Idaho Energy Plan[5] issued in March 2007 contains 18 policies and 44 recommended actions to assist in the implementation of stated policies. The policies and recommendations were organized in the following subject areas: Electricity, Natural Gas, Petroleum and Transportation Fuels, Energy Facility Siting, and Implementation. As required by one of the recommended actions, the Office of Energy Resources and the Idaho Public Utilities Commission jointly issued a report[6] in December 2009 to "report to the legislature every two years on the progress of Idaho state agencies, energy providers and energy consumers in implementing the recommendations." Of the 44 recommended actions, 34 deal with electricity, natural gas, facility siting, and implementation. Of this 34, only four have any real

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[5] Idaho Legislature, 2007 Idaho Energy Plan, Idaho Legislature, Energy, Environment and Technology Interim Committee, March 11, 2007 - http://www.legislature.idaho.gov/sessioninfo/2007/energy_plan_0126.pdf

[6] Idaho Office of Energy Resources and Idaho Public Utilities Commission, Report to the Idaho State Legislature December 2009, December 11, 2009.

impact on state funding, those related to tax incentives and those recommending incentives for investments in non-traditional natural gas supply resources.[7]

Table 1.2. Number of Recommended Policies and Actions in the 2007 Idaho Energy Plan

	Number of Recommended:	
Subject Area	**Policies**	**Actions**
Electricity	11	24
Natural Gas	2	3
Petroleum and Transportation Fuels	3	10
Energy Facility Siting	1	3
Implementation	1	4

It is recognized that the energy environment changes rapidly and that energy technology continually evolves. As such, recommendations made at any point in time can age quickly. While any assessment about whether or how recommendations were addressed is somewhat subjective, a fair judgment is that approximately 19 of the 44 recommendation actions were completed, partially completed, or are in progress; 25 of the recommended actions were not implemented, could not be implemented, or are the responsibility of others and not the party identified in the action. Attempts were not made to implement some actions, such as recommended incentives, due to changes in the economic situation not long after submission of the 2007 Idaho Energy Plan.

The 2007 Idaho Energy Plan recognized the importance of energy to the citizens, businesses, and industries in Idaho. Development of the plan and implementation of a portion of its recommendations is a positive step in helping to secure Idaho's energy future. The current plan builds upon this foundation and will consider recommendations and policy direction from the 2007 plan as well as propose new and revised recommendations.

1.4.3. Recommended Policies and Actions

ELECTRICITY

Idaho citizens and businesses have benefited from a stable, reliable and low-cost electricity supply, and this Energy Plan does not recommend major changes to the structure of Idaho's electricity industry. At the same time, the Committee recognizes that investments in new generating resources are becoming increasingly challenging due to volatile fuel costs and increasing environmental concerns, and that Idaho's current dependence on coal resources for nearly 40% of its electricity supply leaves the state vulnerable to likely carbon regulation. In addition, there can be advantages in cost-effective in-state resources (primarily renewable

[7] Snake River Alliance Idaho Energy Plan Review: http://www.snakeriveralliance.org/Portals/2/documents/Idaho%20Energy%20Plan%20Review_Snake%20River%20Alliance_July%202011_2.pdf

resources) and enhancing energy efficiency. Thus, enhancing energy conservation and efficiency measures and continuing to support the further development of cost-effective in-state renewable energy resources in order to reduce Idaho's dependence on imported coal-fired power are important aspects of Idaho policy.

To that end, this Energy Plan recommends that state government play an active role in facilitating the deployment of power generation and energy conservation resources that are both cost-effective and environmentally sound. It recommends establishing cost-effective conservation, energy efficiency, and demand response as high priority resources. The Committee notes that the PUC and Idaho's utilities have made substantial progress in their efforts to acquire cost-effective energy conservation and efficiency as well as renewable energy resources.

While the Energy Plan's principal focus is on boosting the development of cost-effective in-state energy conservation and efficiency, developing renewable energy, and balancing resources, the Committee recognizes that conventional resources such as coal and natural gas will continue to be needed to provide low-cost electricity service to Idahoans, and recommends that Idaho utilities continue to have access to a broad variety of resource options. This Energy Plan emphasizes resource diversity as a means of minimizing the risks associated with reliance on a particular fuel or resource type. For this reason, it endorses the Integrated Resource Planning process as the appropriate vehicle for evaluating diverse portfolios of resource options and providing for public involvement in utility resource decisions.

The Plan also encourages monitoring new energy technologies and cooperation between stakeholders to allow us to more quickly respond to possible opportunities and risks.

NATURAL GAS

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. However, all of Idaho's natural gas supplies are currently imported from out of state, meaning that Idaho derives little economic benefit from the dollars spent on natural gas, although our industries and consumers benefit greatly from the ready supply. Moreover, with growing demand in the Northwest and new pipeline capacity between the Rocky Mountains, lucrative markets in the Northeast are likely to erode Idaho's location-based price advantage over the next several years. This Energy Plan recommends that Idaho support responsible exploration and production of natural gas and expansion of the natural gas infrastructure that serves Idaho customers. It also recommends that Idaho reduce or defer the demand for imported natural gas by promoting investments in natural gas conservation as well as alternative sources of natural gas such as landfill methane and biogas from anaerobic digesters. Finally, the Energy Plan recommends that Idaho encourage the most effective use of natural gas.

PETROLEUM AND TRANSPORTATION FUELS

Petroleum fuels, the vast majority of which are used for transportation, constitute 39 percent[8] of Idaho's end-use energy consumption. Like natural gas, 100 percent of Idaho's petroleum fuels come from out of state.

Idaho's average gasoline prices ranked 8th lowest among U.S. states in 2009, but it must be noted that each state has a different state fuel tax and that gasoline price rankings can change rapidly and significantly (e.g., on 10/9/11, the price of regular gasoline in Idaho was significantly above the national average - $3.690 per gallon vs. $3.396 per gallon).[9]

Idaho's state gasoline tax rate is currently 25 cents per gallon, which has not increased since 1996.[10] Combined with local and federal taxes, Idaho's total gas tax is 43.4 cents per gallon, less than all surrounding states except for Montana and Wyoming. The average nationwide tax collected on each gallon of gasoline sold at the retail station is 49.5 cents. Of that total amount, 18.4 cents per gallon goes to the federal government; the rest ends up in state and local government coffers. The amount of total gasoline taxes collected by states can vary widely, from just 26.4 cents per gallon in Alaska, to as much as 65.8 cents per gallon in Hawaii.[11] Idaho has very little leverage over either the oil companies that supply Idaho's transportation fuel needs or the automakers that make the products responsible for the majority of petroleum consumption. As a result, the recommendations of this Energy Plan focus on reducing demand for imported oil by encouraging the purchase of high-efficiency and alternative-fuel vehicles, carpooling when possible, public transportation where practical, and encouraging the development of alternative-fuel infrastructure. In addition, the Energy Plan recognizes the economic development benefits of domestic production of biofuels (e.g., ethanol and biodiesel) and encourages development of domestic supplies.

There is considerable interest in using electricity as a transportation fuel with the first modern mass market plug-in electric passenger vehicles (with the hybrid-electric Chevrolet Volt and the full-electric Nissan Leaf) recently becoming available.   While plug-in electric vehicles are likely to be a small fraction of the market (estimated at about 1.4% of the global light duty vehicle market in 2017)[12] they have important potential implications on electrical generation, the transmission grid, and electricity costs. As such, plug-in electric vehicle penetration in Idaho and its effects should be monitored.

ENERGY EFFICIENCY AND CONSERVATION

The Committee finds that energy conservation and energy efficiency measures provide the greatest economic and environmental benefits for Idaho (and enhanced economic competitiveness for our businesses) and should be one of Idaho's highest-priority energy resources and thus it is a major focus of the 2012 Idaho Energy Plan. The Committee believes that increasing investments in energy conservation is in order to reduce Idaho's dependence on out-of-state energy sources. To this end, the Plan encourages Idaho utilities and the Idaho

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[8] Source: http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/total/use_tot_IDcb.html&mstate=Idaho

[9] AAA Daily Fuel Gauge Report, http://fuelgaugereport.aaa.com/

[10] http://www.idahogasprices.com/tax_info.aspx

[11] http://www.api.org/aboutoilgas/gasoline/ and http://www.idahogasprices.com/USA_Tax_Map.aspx

[12] Pike Research, Electric Vehicle Market Forecasts, 3Q 2011: http://www.pikeresearch.com/research/smart-transportation/electric-vehicles

PUC to pursue cost-effective energy efficiency measures to their full extent, and promotes the state leading this effort in several ways, including removing barriers and promoting education.

ENERGY FACILITY SITING

The Committee evaluated the possibility of establishing a state-level energy facility siting body, but a majority of Committee members favor retaining energy facility siting decisions at the local level. The Committee believes that a state-level energy facility siting body is unnecessary at this time.

At the same time, local officials may benefit from the technical expertise and information of state agencies when considering proposals to site large energy facilities in their communities. This Energy Plan therefore recommends that state resources be made available in the form of an Energy Facility Site Advisory Team, composed of key employees from a number of state agencies, to provide information and advice at the request of local officials. The state role would be advisory only; final decision-making authority should continue to rest with local jurisdictions.

ECONOMIC DEVELOPMENT

Economic development considerations related to energy are multi-faceted. First, there can be economic and jobs advantage in considering development of in-state generation and transmission. Possibly of greater import for Idaho in the near term are the opportunities associated with serving global energy markets with manufacturing and service industries for which Idaho is strategically well-placed. Third, the types of industries that we chose to invest in attracting to Idaho will have an influence on energy availability and cost in Idaho; a consideration that should be factored into both energy and economic policy decisions. Given these considerations, it is the policy of the State to support and encourage a fact-based dialogue on the costs, risks and benefits of various in-State generation options; to encourage and support focused economic development activities that leverage Idaho business strengths to build a strong and robust energy workforce and services and manufacturing industry; and to consider energy consumption profiles and impacts as a factor in prioritizing economic development incentives.

ENERGY OUTREACH AND EDUCATION

Energy production, manufacturing and research is a fast growing and important industry globally and reliable, affordable energy supplies are not only critical to the functioning of a modern economy, but are necessary to protect the public health and safety. Additionally, the extraction, production and distribution of energy generally has a large "footprint" in terms of land use, water use, and other impacts. In short, the nature of the energy industry necessitates a strong degree of public oversight, and state regulation of electric and natural gas utilities places the state in a very active role. Thus, the Committee believes that it is crucial for state policy-makers and the public to maintain consistent oversight of the energy industry and to stay educated about the latest technological and institutional developments.

To that end, the Committee recommends a number of steps to raise the profile of energy issues within state government and to promote and oversee implementation of the recommendations of this Energy Plan. The Committee believes that enhanced public education and outreach, and regular, organized public discourse on energy facts, opportunities, trends and risks will help position Idaho citizens, businesses, and policy makers respond to the changing energy landscape with the best information available, resulting in the highest value to all Idaho citizens.

The Committee also finds that it is important that the recommendations in this Energy Plan be subject to an organized review on a regular, scheduled basis to ensure that they continue to reflect the best interests of Idaho citizens and businesses. While the Committee cannot bind future Legislatures to a schedule for Energy Plan updates, the Committee recommends that the plan be revisited and new recommendations developed regularly (to match the rapid changes in energy-related opportunity and risk), and that the Legislatures maintain a close connection with the Idaho Strategic Energy Alliance in order to provide additional and regular expertise and information as needed.

1.4.4. Timeline for Implementing the Energy Plan Recommendations

The recommendations of this Plan include a variety of proposals aimed at a number of different parties in Idaho's energy space. The Committee's recommended timeline for implementation of these proposals varies depending upon the parties connected to the recommendations. The Committee expects that some elements of the Energy Plan will be implemented with legislative action during the 2012 Legislative Session. Actions involving the PUC and Idaho utilities can begin now, but may take somewhat longer to fully implement as new rules work their way through the PUC regulatory process and utilities update their IRPs and energy conservation programs. Recommendations aimed at Idaho consumers may take the longest to implement, as consumers are generally slow to change their behavior and efforts to transform markets for energy-consuming technologies can take many years. The Office of Energy Resource's biennial reports should inform the Legislature about the progress that stakeholders are making in implementing the recommendations of this Energy Plan.

2. Idaho’s Energy Status

2.1. OVERVIEW

Historical data shows that economic growth and energy consumption are strongly and positively correlated. As Idaho’s grows, so will the demand for energy. The St. Louis Federal Reserve Bank reports that Idaho gross domestic product over the 1997 to 2010 period grew 5.3 percent annually,[13] while the national gross domestic product grew only 2.3 percent[14] over the same period. The growing economy meant increasing energy use. Idaho energy consumption (transportation, heat, light and power) grew 1.2 percent annually[15] over the 1990 to 2009 period. By comparison, national energy consumption grew 0.6 percent annually[16] over the same period. Energy use in Idaho reflects both a growing economy and the nature of agriculture and industry within the state, along with the native climate. Consequently, the health of Idaho’s economy today depends on access to affordable energy resources.

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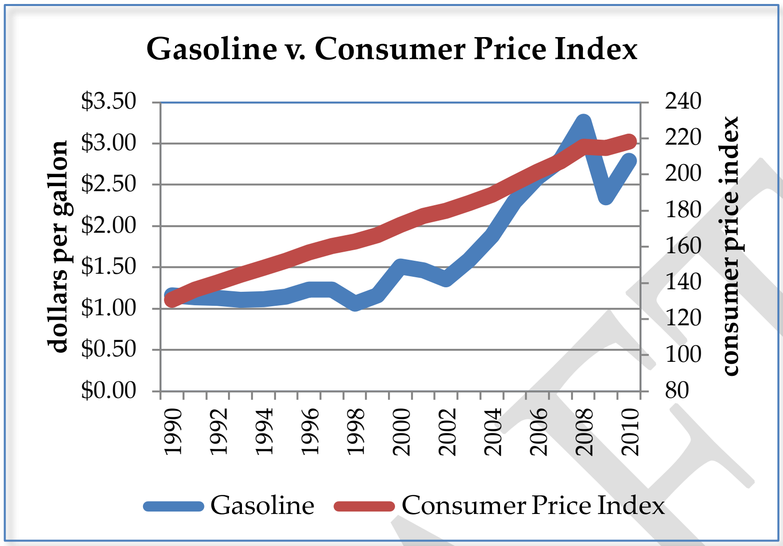
[13] http://research.stlouisfed.org/fred2/series/IDNGSP
[14] http://research.stlouisfed.org/fred2/series/USARGDPQDSNAQ
[15] U.S. Energy Information Administration, www.eia.gov/state/seds/hf.jsp?incfile=sep_use/total/use_tot_IDcb.html&mstate=Idaho
[16] U.S. Energy Information Administration, http://www.eia.gov/state/seds/seds-data-complete.cfm#ranking

While Idaho has some of the lowest electricity prices in the nation and the world[17], transportation fuel and natural gas prices tend to follow global and national markets. Over the past two decades the price of transportation fuel has risen at a pace similar to other prices.[18]

Figure 2.1. Gasoline Prices versus Consumer Price Index



Looking forward, the price of gasoline is expected to continue rising as the cost of production from deeper wells in increasingly remote locations pushes up prices and global demand increases significantly. These global supply and demand pressures will likely impact Idaho significantly.

In contrast, industry experts anticipate the future price of natural gas could rise at a slower pace than crude oil. New hydraulic "fracking" technology enables natural gas production at lower cost than historic norms, and has opened new supplies of natural gas that have increased U.S. proven reserves substantially. While new technology is expanding production, demand for natural gas is likewise expanding faster than was the case a decade ago. Across the nation power generation has driven up consumption of natural gas 3% annually for the last decade.[19] There are a number of reasons to believe this pattern will persist. Over the past decade natural gas power plants have been the primary resource to supply the nation's growing electricity needs. Additional natural gas power generation will be needed to replace retirements of old power plants that lack necessary environmental controls to meet government regulations.

The price of electricity is a function of both national and regional factors. As noted above, Idaho enjoys low electricity prices. This has been a historic advantage to Idaho that is expected to persist as the state continues energy policies consistent with the past. Regional power plants built in past decades, including hydro and coal-fired plants, continue to

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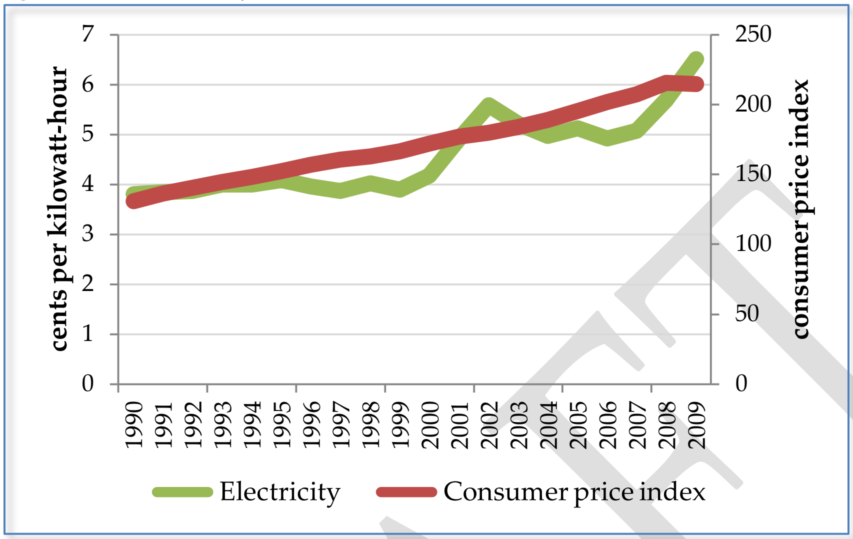
[17] SNL Energy Financial Focus, May 23, 2011, page 16.
[18] U.S. Energy Information Administration, www.eia.gov/petroleum/data.cfm#prices & U.S. Bureau of Labor Statistics
[19] New Projections for Oil and Natural Gas, Jason Stevens, Morningstar Stock Investor, July 2011, page 21.

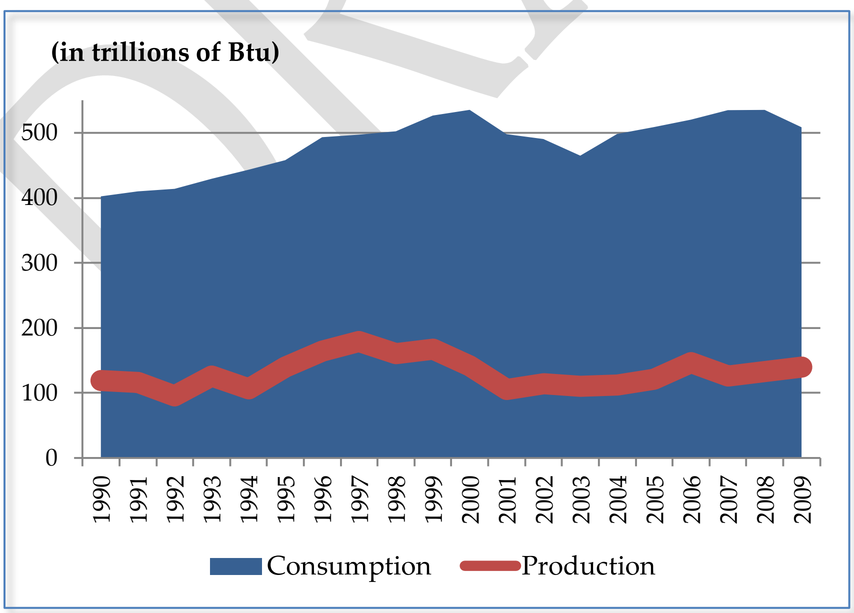
provide service at legacy prices. However, new power plants and power lines needed to serve growing energy demand will pressure prices upward. The magnitude of price changes is difficult to predict. The average price of electricity in Idaho shows a high correlation with overall price changes.[20]

Figure 2.2. Electricity Prices versus Consumer Price Index



The state produces about 25 percent of the energy it consumes, as shown in Figure 2.3.[21] Most of the energy produced in Idaho comes from hydroelectric dams. The state's reliance on energy from neighboring states indicates that infrastructure maintenance and development such as highway, rail, pipeline, and power lines are critical to support economic development.

Figure 2.3. Energy Production and Consumption

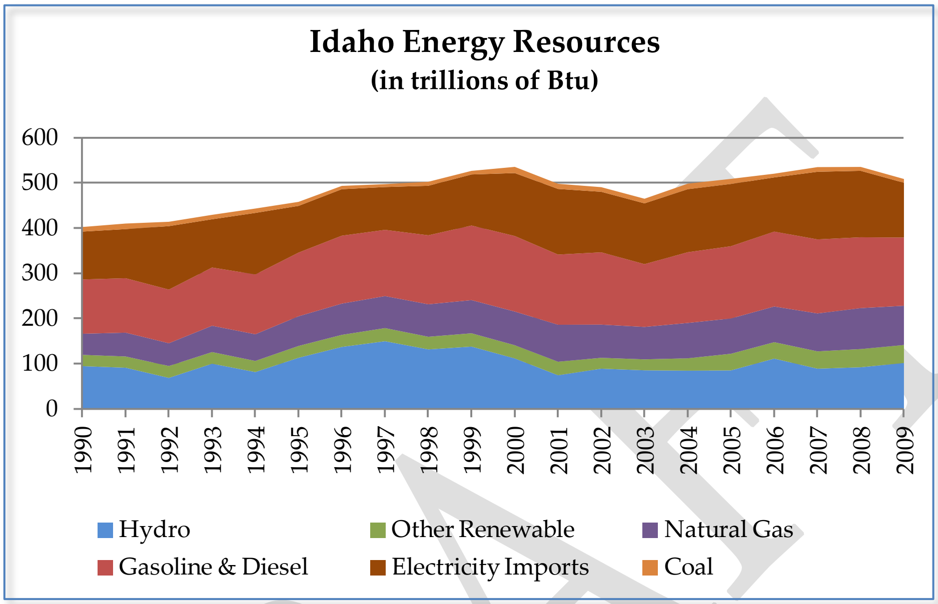


[20] U.S. Energy Information Administration, www.eia.gov/electricity/data.cfm#sales & U.S. Bureau of Labor Statistics

[21] U.S. Energy Information Administration, http://www.eia.gov/state/seds/sep_prod/pdf/PT2_ID.pdf

Idaho energy consumption is primarily a blend of electricity, natural gas, along with gasoline and diesel. Gasoline and diesel provide about 31 percent of energy used in Idaho. Natural gas provides about 16% of the state's energy, while electricity provides 53 percent of state's energy. [22] Roughly half of electricity consumed in Idaho comes from neighboring states.

Figure 2.4. Idaho Energy Resources



2.2. IDAHO UTILITIES AND ENERGY SYSTEMS

2.2.1. Electricity

Idaho consumers have access to low priced electric service as compared to other states, as shown in Figure 2.5.[23]

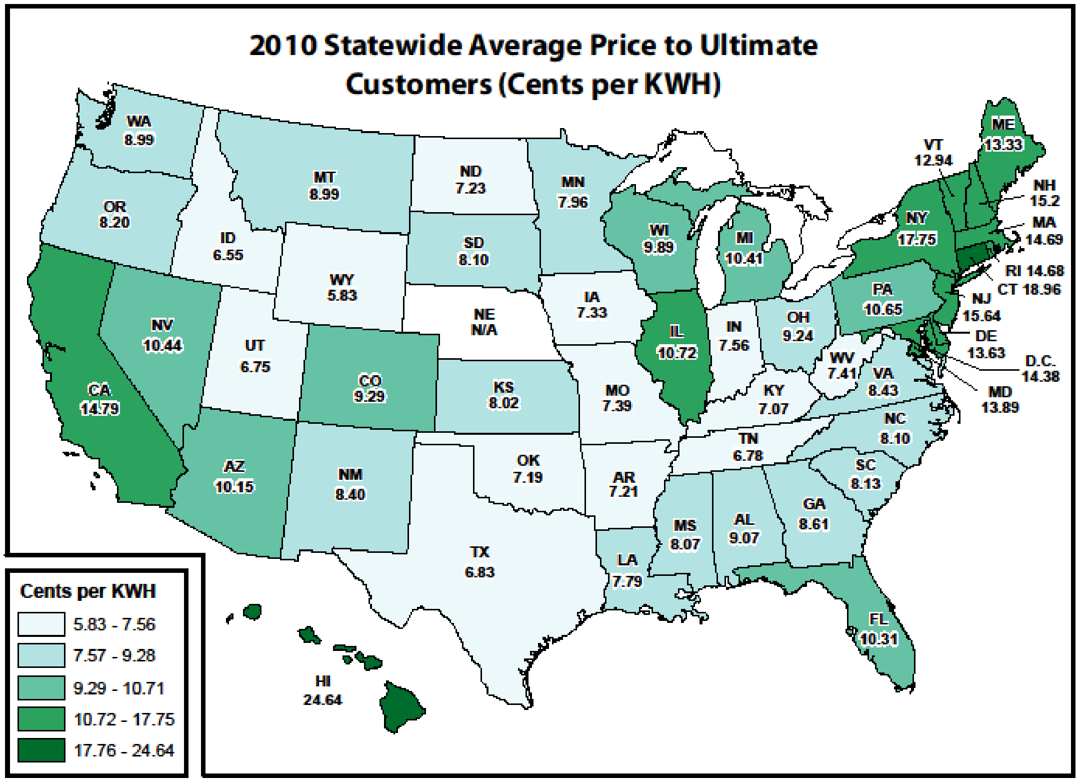
Consumers are served by three investor owned electric utilities ("IOUs"), eleven municipal utilities, and fourteen rural electric cooperatives. The three IOUs serve approximately 84 percent of the state's electricity needs. [24] The remainder is served by municipals and rural cooperative utilities. Figure 2.6 shows the service territories of the IOUs and Figure 2.7 shows the service territories of Idaho's municipal and cooperative utilities (see pages 32 and 33).

[22] U.S. Energy Information Administration, www.eia.gov/state/seds/hf.jsp?incfile=sep_use/total/use_tot_IDcb.html&mstate=Idaho

[23] Energy Information Administration, Average Retail Price of Electricity to Ultimate Consumers, Table 5.6.B, http://www.eia.gov/electricity/monthly/index.cfm)

[24] http://www.icua.coop/

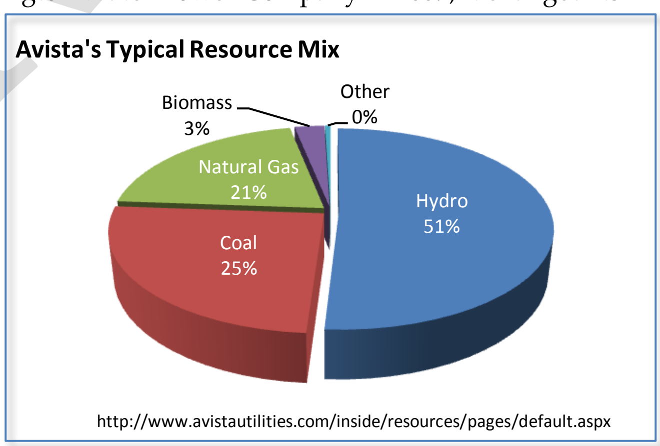
Figure 2.5. Statewide Average Electricity Price to Consumers



Source: Average Regulated Retail Price of Electricity: 2010 and comparative historical data, Financial Focus SNL Energy, May 23, 2011, http://www.citizing.org/data/projects/working-team-affordabilitycompetitive-pricing/RetailElectricityPrices.pdf

AVISTA CORPORATION

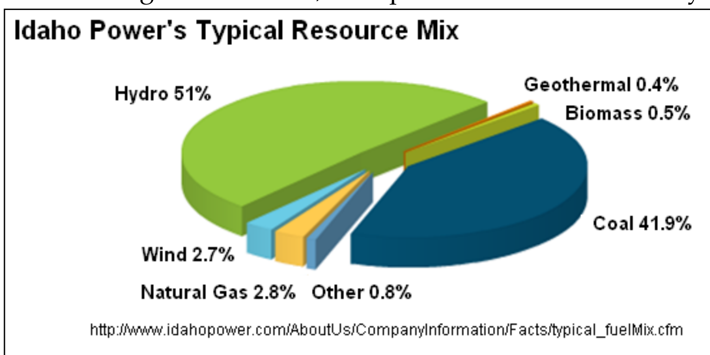
Avista is an investor owned electric and natural gas utility headquartered in Spokane, Washington. Founded as the Washington Water Power Company in 1889, it changed its name to Avista Corporation in 1999. Currently, Avista serves over 200,000 electric and natural gas customers in Idaho's north and central regions, and is the second largest electricity provider in Idaho. Electric customers receive a mix of hydroelectric, natural gas, coal, biomass, and wind generation delivered over 2,100 miles of transmission line and 17,000 miles of distribution line. About half of Avista's electricity comes from hydropower resources that provide a significant price benefit for its customers. Natural gas is delivered over 6,100 miles of natural gas distribution mains. Avista has a portfolio of hydroelectric resources located in western Montana, eastern



Washington, and north Idaho; ownership shares of Montana coal plants; and natural gas-fired baseload and capacity in Idaho, Oregon, and Washington.[25]

IDAHO POWER COMPANY

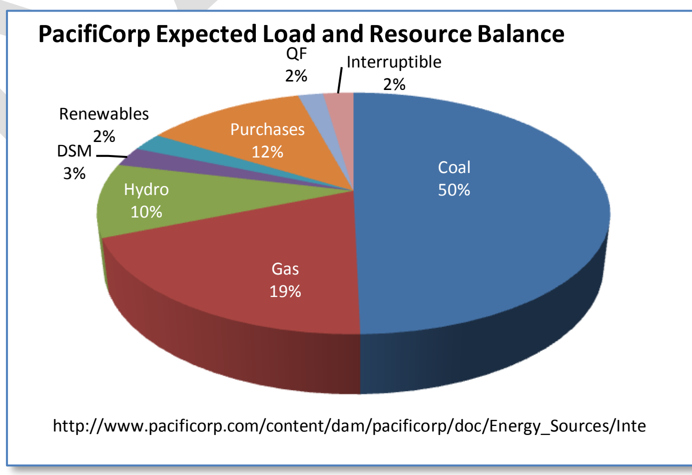
Founded in 1916, the Idaho Power Company serves 490,000 customers in southern Idaho and eastern Oregon across a 24,000 square mile service territory. Headquartered in Boise, Idaho,



Idaho Power is the largest provider of electricity in the state. With its 17 low-cost, emission-free hydroelectric projects at the core of its generation portfolio, it is one of the nation's few investor owned utilities with a significant hydroelectric generating base. The heart of this system is the 1,167 MW Hells Canyon Complex. Other resources include baseload coal facilities located in Wyoming, Oregon and Nevada. Idaho Power also has natural gas-fired combustion turbines and a natural gas-fired combined cycle project that is scheduled to be placed in service in 2012, all located in Idaho. In addition to its company-owned resources, Idaho Power's supply-side portfolio includes several long-term contracts with wind and geothermal facilities, and it has contracts with 116 PURPA projects, including over 650 MW of wind generation.[26]

PACIFICORP / ROCKY MOUNTAIN POWER

PacifiCorp serves retail customers in six western states: Washington, Oregon, Idaho, Wyoming, Utah and California. PacifiCorp serves over 1.7 million customers across its 136,000 square mile service territory. PacifiCorp was founded in 1910 as Pacific Power & Light, and changed its name to PacifiCorp in 1984. PacifiCorp began operating in Idaho in 1989 through its merger with the Utah Power & Light Company, which began serving customers in Idaho in 1912.[27] PacifiCorp was purchased by Mid-American Corporation in 2006, and subsequently changed the name of its eastside retail operating division to Rocky Mountain Power. Rocky Mountain Power serves 72,348 customers in Southern Idaho (approximately



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[25] Avista 2011 IRP.

[26] http://www.idahopower.com/AboutUs/CompanyInformation/Facts/default.cfm

[27] http://www.rockymountainpower.net/about/cf.html

four percent of PacifiCorp's total customer base). PacifiCorp owns 78 generating plants capable of 10,483 MW of net generation capacity, including coal, hydroelectric, natural gas, and wind resources. As a stand-alone utility, PacifiCorp is second only to Mid-American Energy Company in the ownership of wind generation. Wind, hydro, geothermal and other non carbon-emitting resources currently make up approximately 24 percent of PacifiCorp's owned and contracted generating capacity, accounting for nearly 10 percent of total energy output. At year-end 2010, PacifiCorp had more than 1,000 megawatts of owned wind generation capacity and long-term purchase agreements for more than 600 megawatts from wind projects owned by others.[28]

MUNICIPALS AND COOPERATIVES

There are 28 rural electric cooperatives and municipalities providing electric service in Idaho. These utilities serve more than 120,000 customers throughout Idaho, accounting for 16 percent of Idaho's load. The municipal and cooperative utilities are relatively small in size, ranging from 31 customers and 123 MWh of annual sales (Vigilante Electric Cooperative) to 26,033 customers and over 695,317 MWh of annual sales (City of Idaho Falls). [29] All rural electric cooperatives and municipalities in Idaho deliver electricity to customers "at cost". Most of these utilities collaborate under the Idaho Consumer Owned Utilities Association on issues of administrative, governmental, and regulatory significance.

These municipal and cooperative utilities are customers of the Bonneville Power Administration ("BPA"); BPA provides 95% of the wholesale electric power requirements of these utilities. The new BPA contracts with service scheduled for October 1, 2011, are based upon a tiered rate methodology. Under these contracts, BPA has fully allocated the federal system and provided each utility with its "share" of the federal system (tier one power) with cost for this power set "at cost" of the existing federal system. All BPA customers will be responsible to provide resource for electric demands in excess of that allocation (tier two power). Tier two power can be acquired by each utility from a variety of resources including but not limited to utility owned, individual purchase, joint action development or purchase, or through BPA at a tier two rate (based on the cost of the resource acquired to meet these demands). This change in construct will require Idaho's public power utilities to meet future load growth demand. Historically, these utilities have relied upon BPA to provide most or all of the energy needed to serve the utilities' loads.

As a requirement of their BPA contract, the power rate for utilities includes an allocation for energy efficiency and conservation that will be paid back to the utility upon completion of approved energy efficiency measures. The BPA targets for regional energy efficiency are based upon the integrated regional plan of the Northwest Power and Conservation Council (the Northwest Power Plan). Failure to implement measures will result in forfeiture of that conservation allocation from the individual utility to BPA. [30]

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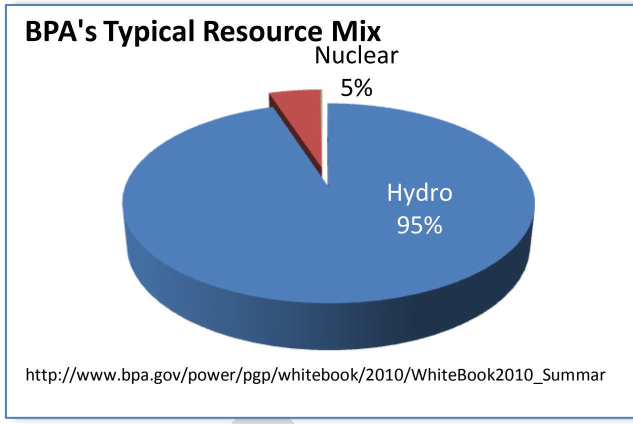
[28] http://www.midamericanenergy.com/newsroom/aspx/facts9.aspx

[29] Idaho Consumer-Owned Utilities Association: http://www.icua.coop/

[30] Ibid.

BONNEVILLE POWER ADMINISTRATION



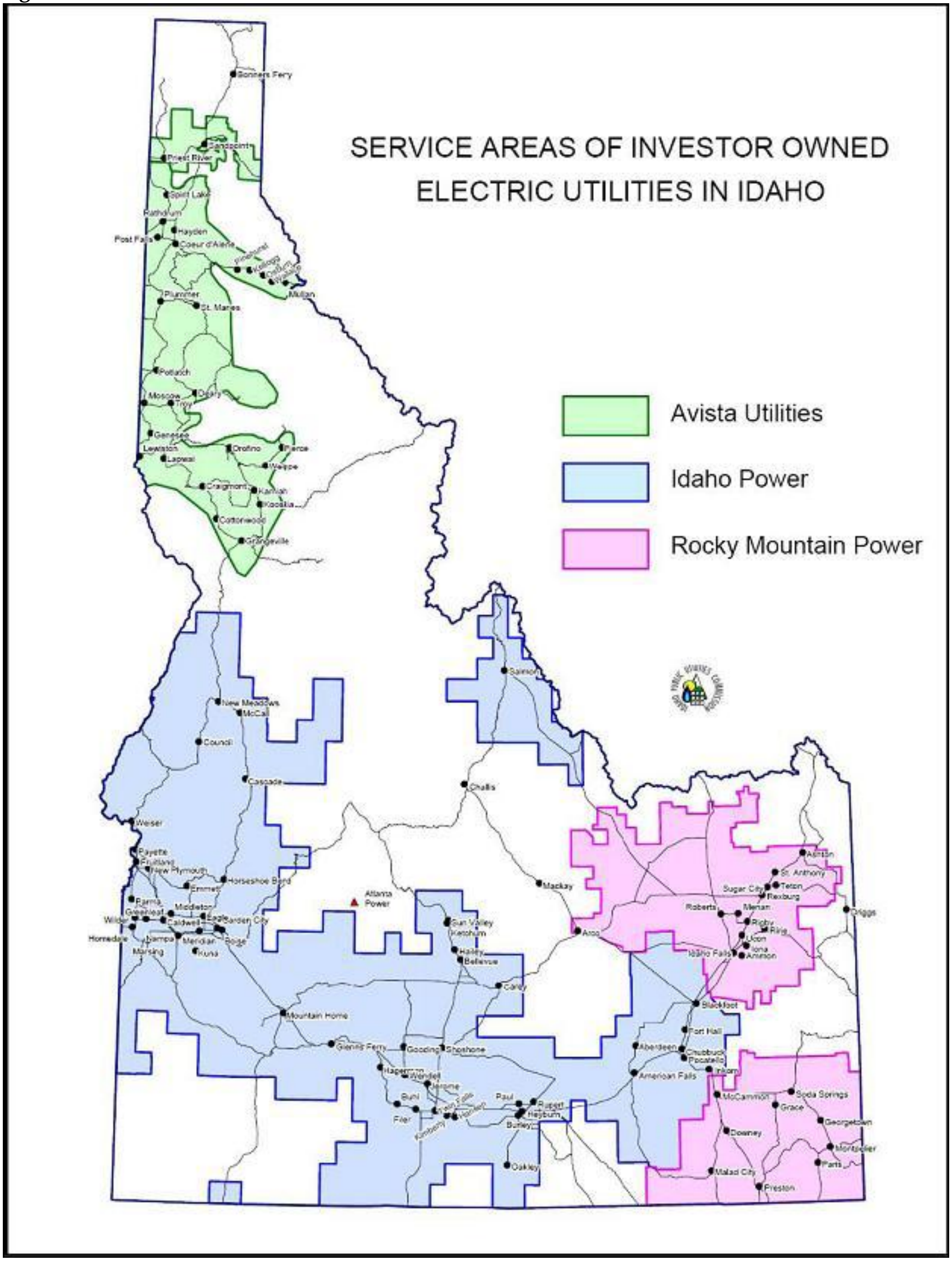
BPA is a federal power marketing agency in the United States Department of Energy. Although BPA is part of the U.S. Department of Energy, it is self-funding and covers its costs by selling its products and services. BPA markets the power from 31 federal hydroelectric dams on the Columbia River and its tributaries, as well as additional power from non-federal dams and from the 1,200 MW Columbia Generating Station nuclear power plant in Richland, Washington. These resources are referred to collectively as the Federal Columbia River Power System ("FCRPS"). The dams are operated by the U.S. Army Corps of Engineers and the Bureau of Reclamation. About 30 percent 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, which includes Idaho, Oregon, Washington, western Montana and small parts of eastern Montana, California, Nevada, Utah and Wyoming and covers over 300,000 square miles. [31] Idaho accounts for approximately five percent of BPA's load.[32] BPA also provides benefits to residential and small farm customers of IOUs within its service territories, and provides energy service to a handful of industrial customers known as "Direct Service Industries".[33]

[31] http://www.bpa.gov/corporate/about_BPA/Facts/FactDocs/BPA_Facts_2010.pdf

[32] 2010 Pacific Northwest Loads and Resources Study (2010 White Book): http://www.bpa.gov/power/pgp/whitebook/2010/

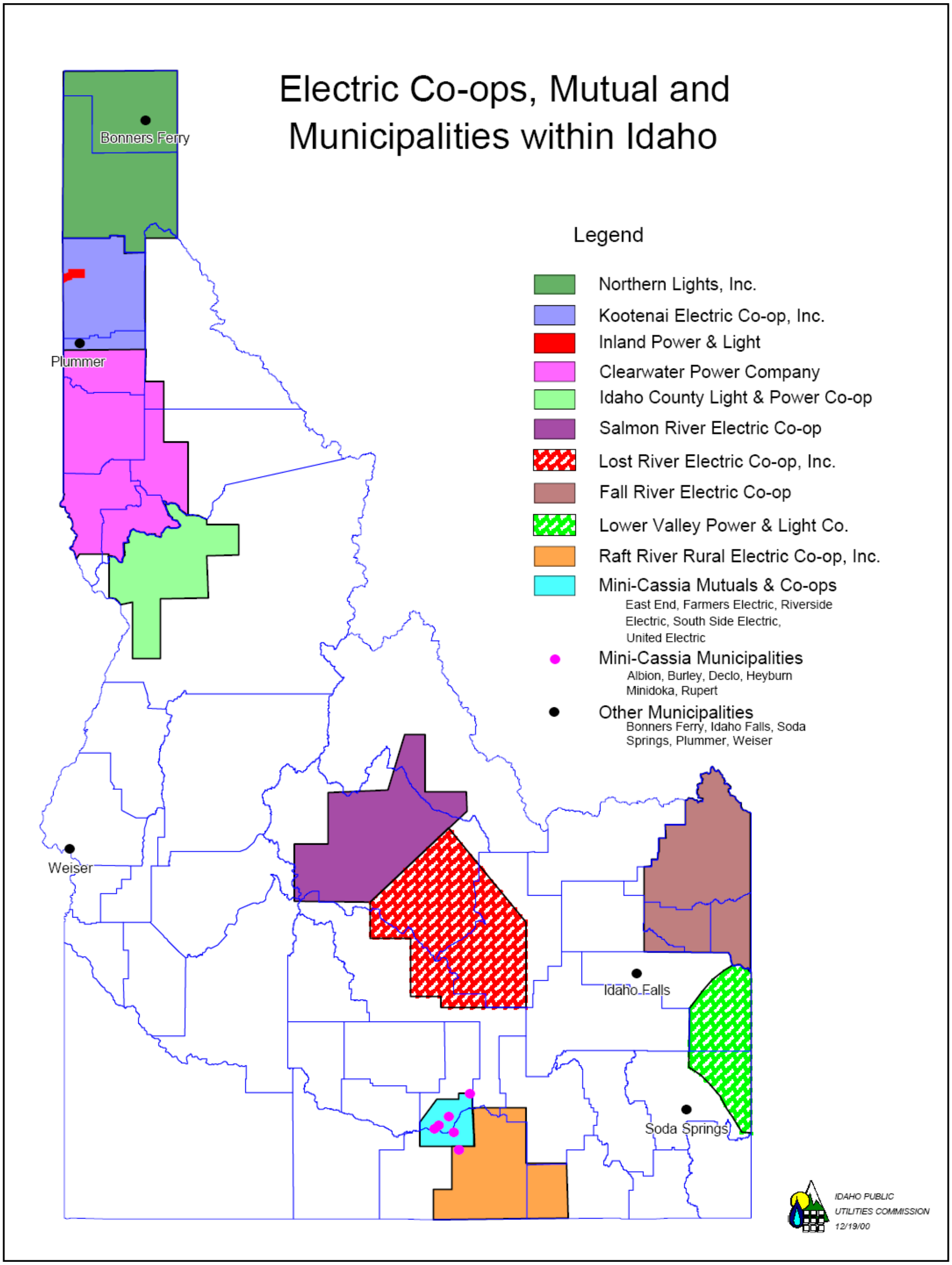
[33] http://www.bpa.gov/corporate/about_BPA/Facts/FactDocs/BPA_Facts_2010.pdf

Figure 2.6. Service Territories of Idaho's Investor Owned Utilities



Source: Idaho Public Utilities Commission

Figure 2.7. Service Territories of Idaho's Municipal and Cooperative Utilities

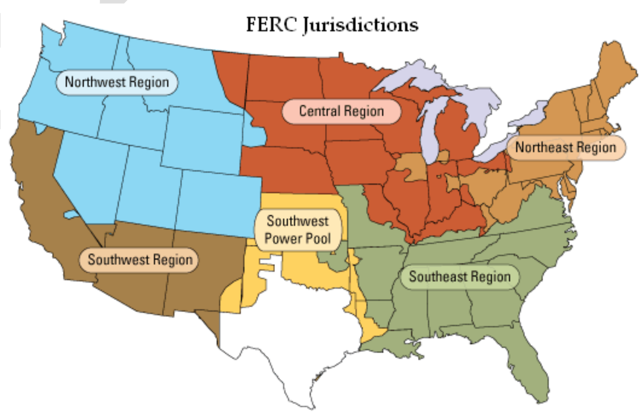


Source: Idaho Public Utilities Commission

Idaho utilities are interconnected with each other and with utilities in neighboring states in a single power grid known as the Western Interconnection. Existing coordinated planning requirements throughout the Western Interconnection on a local, sub-regional, and regional basis ensure a reliable and adequate integrated system.[34]

In general, Idaho's electric utilities are subject to federal oversight and as such are subject to compliance monitoring and enforcement by Western Electricity Coordinating Council (WECC). WECC is geographically the largest and most diverse of the eight Regional Entities that monitor and enforce reliability requirements under an agreement with the North American Electric Reliability Corporation (NERC). NERC is certified by the Federal Energy Regulatory Commission to establish and enforce reliability standards for the bulk-power system of North America.[35] WECC's service territory extends from Canada to Mexico. It includes the provinces of Alberta and British Columbia, the northern portion of Baja California, Mexico, and all or a portion of the 14 Western states between. In addition to its compliance role, WECC is responsible for coordinating and promoting bulk electric system reliability in the Western Interconnection and provides an environment for coordinating the operations and planning activities of its members.[36]

In addition to WECC, IOUs are regulated by the Federal Energy Regulatory Commission ("FERC".) The Federal Energy Regulatory Commission, or FERC, is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC also reviews proposals to build liquefied natural gas (LNG) terminals and interstate natural gas pipelines as well as licensing hydropower projects. FERC regulates interstate transmission and wholesale sales of electricity in interstate commerce, regulates the transmission and sale of natural gas and oil by pipeline for resale in interstate commerce, and regulate interstate energy markets. They may have siting jurisdiction on energy projects in some cases. One of their primary responsibilities is to protect the reliability of the high voltage interstate transmission system



[34]Electric Power Annual 2009 - Data Tables Format 1990 - 2009 : Net Generation by State by Type of Producer by Energy Source (EIA-906, EIA-920, and EIA-923)

[35] http://www.nerc.com/

[36] http://www.wecc.biz/About/Pages/default.aspx

through mandatory reliability standards. FERC's mission is to "assist consumers in obtaining reliable, efficient and sustainable energy services at a reasonable cost through appropriate regulatory and market means." FERC does not approve retail sales prices of energy or the physical construction of energy facilities; this is left to the state utilities commissions. In addition, FERC does not regulate nuclear facilities. This is left to the Nuclear Regulatory Commission.[37] FERC does not regulate Electric Reliability Council of Texas (ERCOT), as it schedules and centrally dispatches the grid within a single control area that does not have major transmission interconnections and is not synchronously connected to the Eastern or Western Interconnection (it is a separate interconnection).

To summarize these regulatory bodies, FERC has federal authority over power system reliability, NERC was assigned the role of writing the reliability standards to insure reliable operation of the bulk power system in North America (including parts of Canada and Mexico), and WECC is responsible for monitoring and insuring compliance with FERC and NERC reliability standards in the western United States (including parts of Canada and Mexico).

2.2.2. Natural Gas

Idaho is favorably located between two large natural gas supply basins: the Western Canadian Sedimentary Basin ("WCSB") in Alberta and British Columbia, and the Rocky Mountain basins, encompassing portions of Colorado, Montana, Wyoming and Utah. Over the near term, the production capacity of these two basins is expected to provide adequate supply to meet demand in Idaho and the Pacific Northwest. Over the longer term, however, increasing demand and expanded transportation capacity to more lucrative eastern markets are expected to tighten the supply-demand balance for the region.

Natural gas is transported from these supply basins to Idaho by two interstate pipelines. The Williams Companies' Northwest Pipeline transports supplies from both the WCSB and the Rocky Mountain region to Idaho, while TransCanada's Gas Transmission Northwest ("GTN") pipeline delivers gas from the WCSB south to the Northwest and California. The Northwest Pipeline is a bi-directional pipeline, with gas flowing into the pipeline from both ends in British Columbia and the Rockies, and flowing out of the pipeline at various points in between. Idaho therefore receives a mix of Canadian and Rockies gas from the Northwest Pipeline, with the actual composition varying depending on relative pricing in the two supply basins.[38]

Intermountain Gas (IGC) notes that regional cooperation is integral to their natural gas service and planning. Their gas supplies come from the north, sourced out of western Canada, and also from the southeast, mainly from the gas production areas in the Four Corner/Rockies region. The ability to obtain natural gas from two distinct and separate regions provides a supply security, and also provides some pricing flexibility, since the cost of the commodity, its transmission cost, and storage costs will vary depending on the season and customer usage. While their physical location provides IGC with operating and cost advantages, the issue of "regional energy landscape" speaks to how best to supply the Pacific

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[37] http://www.ferc.gov/about/ferc-does.asp

[38] http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/western.html

Northwest's energy needs. While much is done to coordinate the electrical system in Idaho, a much broader view coordinating all energy sources and systems needs to be developed.

Historically, natural gas prices in Idaho have been lower than those in most of the U.S. due to limited transportation capacity that prevents gas from the WCSB and Rocky Mountain regions from being diverted to major markets in the eastern U.S. Recently, however, transportation capacity additions allowed gas once captive to the Northwest to flow to higher price markets in California and the Midwest. This has reduced Idaho's location-based price advantage and subjected Idaho customers to similar gas price increases and volatility as are felt in the rest of North America. This trend is expected to continue, with three major eastbound pipeline expansions currently in development. These pipeline expansions, coupled with increasing demand in the Northwest and across North America, are expected to erode the price advantage Idaho has historically enjoyed.[39]

Idaho has two investor owned utilities, Avista Utilities and Intermountain Gas Company, which provide the majority of natural gas service in Idaho. Some additional gas service is provided by Questar Gas.

AVISTA UTILITIES

Avista manages its natural gas operations through two operating divisions. The North Division covers about 26,000 square miles, primarily in eastern Washington and northern Idaho. Over 840,000 people live in Avista's Washington/Idaho service area. The North Division has about 74 miles of natural gas distribution mains and 5,000 miles of distribution lines. Natural gas is received at more than 40 points along interstate pipelines and distributed to over 219,000 residential, commercial and industrial customers. The South Division serves four counties in southwest Oregon and one county in northeast Oregon. The combined population of these two areas is over 480,000 residents. The South Division consists of about 67 miles of natural gas distribution mains and 2,000 miles of distribution lines. Natural gas is received at more than 20 points along interstate pipelines and distributed to over 95,000 residential, commercial and industrial customers. Of the Avista customers who purchase directly for delivery to their home or business ("non-transportation"), approximately 60 percent are residential. [40]

Avista can access both Canadian and Rocky Mountain supplies via firm transportation capacity it holds on the Northwest and GTN pipelines. In addition, Avista hold rights to the Jackson Prairie and Plymouth storage facilities in Washington. Avista's latest natural gas IRP indicates that the number of customers in Washington and Idaho is projected to increase at an average annual rate of 2.2 percent with demand growing at a compounded average annual rate of 1.0 percent. In Oregon, the number of customers is projected to increase at an average annual rate of 2.5 percent, with demand growing 1.4 percent per year.[41]

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[39] For more details, please see: IPUC Annual Report 2010 Idaho Natural Gas Utilities, http://www.puc.state.id.us/ar2010/gas.pdf

[40] Avista Utilities Natural Gas 2009 IRP: http://www.avistautilities.com/inside/resources/irp/electric/Documents/2009%20Natural%20Gas%20IRP-FINAL.pdf

[41] Ibid., page 3.10

INTERMOUNTAIN GAS COMPANY (IGC)

Intermountain Gas is a natural gas distribution company which was incorporated in 1950 and began serving its first five customers on December 31, 1955. Intermountain Gas Company now serves all of southern Idaho; a total of 74 cities across 60,000 square miles. They serve approximately 280,000 residential, 30,000 commercial, and 114 industrial customers. Industrial and transportation customers, including potato processors, chemical and fertilizer manufacturers and electronics companies make up 43 percent of sales on IGC's system. The residential and commercial sectors comprise 38 and 19 percent, respectively. The major natural gas electrical generation facilities are located in Mountain Home and near Fruitland, Idaho, and are not IGC customers, but rather are "direct connect" customers of Williams Northwest Pipeline Company. IGC is a local distribution company, which connects to the Williams Northwest Pipeline across southern Idaho, and delivers gas to customers. [42] In addition to owning firm capacity on interstate pipelines, IGC owns and operates the Nampa liquefied natural gas storage facility, and also owns storage rights at the Jackson Prairie and Plymouth facilities. IGC projects that peak demand on it system will grow from 416 MDth/d in 2007 to 494 MDth/d in 2011, which is an annual growth rate of 4.3 percent.[43] IGC is a wholly-owned subsidiary of MDU Resources Group (MDU), located in Bismarck, North Dakota. MDU purchased IGC from its private owners in 2008.

QUESTAR GAS

Questar Gas provides natural gas service to residential, commercial and industrial customers in northern, central and southwestern Utah, southwestern Wyoming and southeastern Idaho. Questar Gas, based in Salt Lake City, provides natural gas service to approximately 1,750 customers in Franklin County in southeastern Idaho.[44] Idaho has elected to allow the Utah Public Service Commission to regulate Questar's activities in its small Idaho service area.

Figure 2.8 shows the major natural gas infrastructure in Idaho and Idaho utility service territories.

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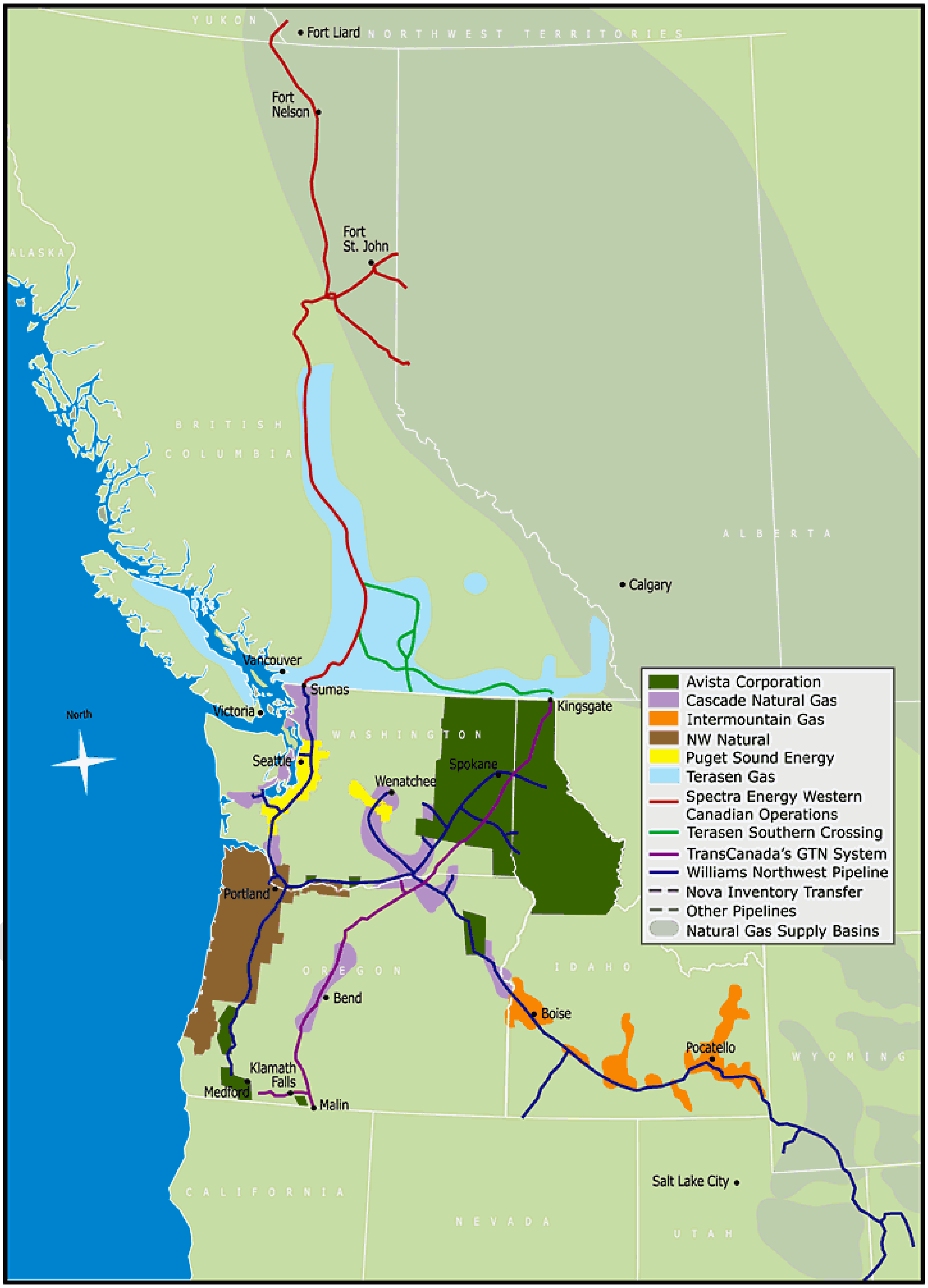
[42] http://www.intgas.com/aboutigc/aboutigc.html

[43] Intermountain Gas 2010 IRP:
http://www.puc.idaho.gov/internet/cases/gas/INT/INTG1004/201009012010%20IRP.PDF

[44] http://www.questargas.com/AreaMap/ServiceMap.php

Figure 2.8. Western U.S. Interstate Natural Gas Pipeline System and Natural Gas Service Territories

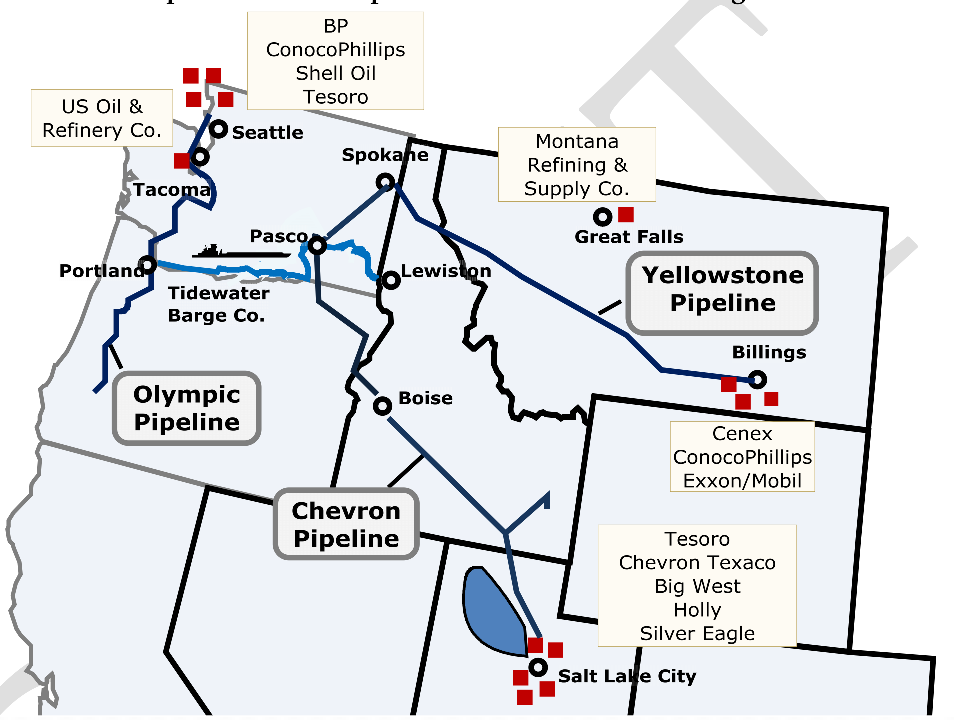


Source: Northwest Gas Association: http://www.nwga.org/index.php?option=com_content&view=article&id=153:service-area-map&catid=31:about-us&Itemid=44

2.2.3. Petroleum and Transportation Fuels

Idaho has a relatively small fuel market, lack of refineries and limited pipeline infrastructure. The Chevron pipeline connects Salt Lake City with Pocatello, Burley and Boise before continuing on to Pasco, Washington. A single pipeline then continues from Pasco to Spokane, Washington, delivering fuel to North Idaho. Additional supplies originate at three refineries in the Billings, Montana area and are transported to Spokane via the Yellowstone Pipeline. A small portion of Idaho's supply originates at refineries in Northwestern Washington. This fuel is transported to Portland via the Olympic Pipeline, where it is loaded onto barges and transported up the Columbia River-Snake River System to Lewiston.

Figure 2.9. Transportation Fuel Pipelines and Refineries Serving Idaho



Source: U.S. Department of Energy's Dark Mountain Western States Energy Assurance Exercise, http://darkmountain.ea.govtools.us/documents/Overview_Oil_Industry.pdf

2.3. IDAHO RESOURCES

Idaho currently has no commercial coal, oil or natural gas resource extraction operations (although natural gas exploration and test wells have been drilled and production is anticipated to being in late 2011.) Idaho does have a variety of renewable resources available for potential development, including wind and small hydro power, geothermal, biomass and solar energy. Idaho does not have commercial nuclear generating assets or uranium resources (although neighboring states and Canadian provinces do).

2.3.1. Fossil Fuels

Idaho currently has no in-state production of coal, natural gas, or petroleum, although active exploration of natural gas is currently underway near Payette. Idaho's current natural gas supplies are imported from supply in the Western Canadian Sedimentary Basin and the U.S. Rocky Mountains. Idaho also has no oil refineries, so all of Idaho's gasoline, diesel and other petroleum needs are served with imported refined products, mostly via pipeline from refineries in Salt Lake City and Billings, Montana. Idaho utilities do own coal-fired power plants that supply approximately 40 percent[45] of Idaho's electricity; however, all of these plants are located in neighboring states. As a result, approximately 70 percent[46] of Idaho's total end-use energy is derived from imported fossil fuels.

Fossil fuels have historically been the least-costly and most-reliable source of energy. Now, however, Idaho's reliance on imported fossil fuels places the state's economy at risk due to fuel price volatility. Political instability in the Middle East and other areas of the world is now directly felt in the pocketbooks of Idaho consumers through high and volatile oil prices, and rising demand from rapidly-developing economies such as China and India are placing increasing demand pressure on world crude oil and regional coal and to a lesser extent natural gas.

Coal is found in abundance in the United States, with the nation's largest coal exporter (Wyoming) and largest coal resources (Montana) in close proximity to Idaho. The increasing attention being paid to global climate change has led to mounting calls for federal regulation of carbon dioxide and other greenhouse gas emissions, and the U.S Environmental Protection Agency (US EPA) has been increasingly active in regulating power plant emissions. This substantially impacts generation costs and available options today and in the future, creating significant doubt regarding the viability of new coal based generation and the future of existing coal-fired generation. New technologies may alleviate these risks. Coal gasification – the chemical conversion of coal into hydrogen and carbon monoxide gas – is a promising technology that would facilitate carbon dioxide sequestration while simultaneously reducing emissions of other criteria pollutants relative to conventional coal-fired steam facilities. However, the technology has not yet been proven economic for use among North American electric utilities, and there is considerable uncertainty about the ultimate cost of power plants relying on coal gasification.

The rocky mountain west, particularly Utah, Colorado, and Wyoming contains enormous reserves of kerogen contained in sedimentary deposits, commonly referred to as "oil shale" US Geological Survey estimates that there may be approximately 3 trillion barrels of oil equivalent in such deposits in Utah, Wyoming and Colorado, and possibly 1.5 trillion barrels of oil equivalent recoverable. Although this resource is not presently being commercially developed, any future development would likely have significant implications for regional oil supply, price, and economic development regionally.

The fossil energy resources in the western US – conventional and unconventional gas and oil and coal, are considerable. Although only a very small fraction of these resources are within Idaho, our proximity to these supply areas and transmission systems means that development of these resources will impact Idaho's energy supplies and broader economic prospects.

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[45] Investor owned Utilities Information: Each utilities FERC Form 1 (http://www.ferc.gov/docs-filing/forms.asp) and http://www.eia.gov/cneaf/electricity/page/eia861.html (for percent of Idaho load served); for BPA http://www.bpa.gov/power/pgp/whitebook/2010/WhiteBook2010_SummaryDocument_Final.pdf

[46] Energy Information Administration SEDS, State Energy Data System Idaho (139.9 TBTUs production, 509 TBTUs consumption)

2.3.2. Hydroelectricity

Idaho has over 140 existing hydro plants with combined capacity of approximately 2,500 MW. The largest hydroelectric projects are the 1,167 MW Hells Canyon Complex owned by Idaho Power and the 400 MW Dworshak dam operated by the U.S. Army Corps of Engineers. Idaho dams produce approximately 1,300 aMW of electricity in an average year, approximately half of Idaho's 2010 electricity consumption. While Idaho's most promising hydroelectric sites have already been developed, an INL site-based assessment study resulted in the identification of 373 additional Idaho hydro projects having a combined capacity increase potential of 1,655 MW.[47] Sixty-eight percent of these projects are small in size, less than 5 MW, and include upgrades at existing hydropower sites as well as newly identified potential sites listed in the INL assessment. Note that a wide combination of attributes can result in a lower suitability factor. Multiple environmental and regulatory considerations would reduce the likelihood that a site may be developed to its physical potential.

Hydroelectric energy is renewable and emits no pollutants or greenhouse gases. However, the amount of energy available in a given year can vary widely due to variations in rainfall and mountain snowpack. Moreover, the energy output profile is highly seasonal, peaking during the spring runoff and declining in the late summer and fall. Recent analyses have also suggested that climate changes can significantly alter hydro-generation through decreased snowpack and the timing of snowmelt. New hydro resources without significant reservoir storage would compound the seasonal nature of the Northwest's existing hydro resource base, reducing their attractiveness relative to other resources.[48]

2.3.3. Wind

Because of recent experience and technology improvements, wind energy is maturing quickly and is now responsible for nearly two and one-half percent[49] of U.S. electricity produced. Over 42,000 MW of nameplate wind was in operation at the end of June 2011 with another 7,400 MW under construction.[50] Idaho has experienced a wind construction boom, growing from 75 MW at the end of 2008 to nameplate capacities of nearly 350 MW by mid-2011, with the total expected to reach nearly 500 MW by the end of 2011.[51] An additional 150 MW (nameplate capacity) of wind projects are under construction in Idaho as of August 2011.[52]

Approximately four percent of Idaho's total nameplate capacity 2010 generation capacity came from wind generation, and its share should more than double to around 10 percent in

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[47] "U.S. Hydropower Resource Assessment for Idaho," Alison M. Conner, et al., Published August 1998, Idaho National Engineering and Environmental Laboratory, http://hydropower.inl.gov/resourceassessment/pdfs/states/id.pdf

[48] For more information please see the Idaho Strategic Energy Alliance Hydropower Task Force Report, http://www.energy.idaho.gov/energyalliance/taskforce.htm and Idaho National Laboratory (INL) "U.S. Hydropower Resource Assessment for Idaho", August 1998, http://hydropower.inl.gov/resourceassessment/pdfs/states/id.pdf

[49] Energy Information Administration, 2010 calendar year statistics from EIA-923 January - December

[50] American Wind Energy Association (AWEA) http://www.awea.org/learnabout/publications/reports/upload/2Q-2011-Public-Market-Report.pdf

[51] Renewable Northwest Project, http://rnp.org/project_map

[52] Ibid.

2011.[53] Recent wind mapping studies estimate that Idaho has approximately 25,000 MW of wind generation potential, the 13th largest potential in the U.S.[54] The most readily available wind resources in Idaho are located in the Snake River Plain and the surrounding hills and ridges, and the eastern end of the Plain in particular has seen high interest for wind development.[55]

Wind energy produces no emissions of criteria pollutants or carbon dioxide, and it reduces the need to burn fossil fuels. However, it is an intermittent resource producing energy only when the wind blows. Because of this intermittent nature, wind generators cannot be dispatched or counted on to produce at their nameplate capacity during times of high energy demand, or at any other particular time for that matter. The consequence is that dispatchable resources must be ready to meet actual customer loads before the wind picks up and after it dies down. As a result, only about 5% of a wind generator's nameplate generation capacity is counted as firm capacity in a utilities resource planning.[56]

2.3.4. Geothermal

Geothermal energy utilizes the earth's abundant heat and is typically harvested by drilling wells into reservoirs and pumping hot water to the surface. The heat is extracted and used to generate electric power or for space heating, then the water is injected back into the reservoir to be reheated. Idaho ranks high in its potential for geothermal resources. An estimated 855 megawatts of near-market, reasonably-priced geothermal power potential exists in Idaho.[57] Only California and Nevada rank higher than Idaho.

Currently Idaho has one operating geothermal power plant at Raft River in Cassia County. This plant is designed to provide 13 MW (net) of capacity. The Raft River project expects to add two or more 13 MW power plant modules in the coming years and may one day produce up to 100 MW. In May 2010, the IPUC approved a power purchase agreement for approximately 22 MW of generation from the Neal Hot Springs Geothermal Project located in eastern Oregon. The Neal Hot Springs project is under development and is expected to begin commercial operations in 2012.[58]

Idaho has a number of sites that can be developed for geothermal power generation. A new 25 MW generation power plant is under construction within Idaho Power's service territory for U.S. Geothermal's Neal Hot Springs project that incorporates new power plant technology providing for modularity, leading to lower cost and a higher efficiency power conversion cycle. The most advanced sites are the Crane Creek area near Weiser in Washington County, the Roystone Hot Springs area near Sweet, and Magic Reservoir area near Hailey. Thermal springs and geothermal resources located in Blaine, Owyhee, Lemhi,

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[53] See footnote 44 for source of 2010 statistic; 2011 statistic is estimated based on the growth in nameplate capacity referenced in footnote 46.
[54] *Wind Task Force Initial Mandate Response* to the Idaho Strategic Energy Alliance, February 2009, page 7.
[55] http://awea.org/learnabout/publications/upload/1Q-11-Idaho.pdf
[56] The Northwest Power Planning Council Sixth Northwest Conservation and Electric Power Plan Appendix D: Wholesale Electricity Price Forecast, page D-8, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan_Appendix_D.pdf
[57] Western Governors' Association, Clean and Diversified Energy Initiative, *Geothermal Task Force Report*, January 2006.
[58] http://www.idahopower.com/pdfs/AboutUs/PlanningForFuture/irp/2011/2011IRPFINAL.pdf (Page 33)

Valley, Bannock and Camas counties may provide future power generation development opportunities for Idaho given sufficient exploration.

The benefits of geothermal energy include reliable baseload 24 x 7 power generation, sustainable low operating costs, superior online availability, and minimal environmental impacts. An obstacle to development of this power source is the upfront risks of drilling expensive wells to prove a reservoir. Continued long-term federal tax incentives have been necessary to overcome these risks. Lower-temperature geothermal resources are also used in many parts of Idaho for various end uses such as space heating, aquaculture, greenhouses, and recreation. These applications are already substantial and have undergone expansion as demonstrated by recently bringing geothermal space heating to the Boise State University campus in the new College of Business and Economics building.[59]

2.3.5. Bioenergy

Idaho has abundant biomass resources that can be converted to energy. Sources of potentially sustainable biomass discussed below are forest residues, solid waste, oilseeds and agricultural residues. A brief conclusion highlights the emerging opportunity of liquid transportation fuels from biomass, and the two major challenges for expanding the use of bioenergy and biofuels: high cost with no consideration of the full range of benefits, and public acceptance.[60]

Forest Residues.[61] Behind hydropower, wood bioenergy is Idaho's second largest homegrown energy product, producing 8 percent of the energy consumed in the state.[62] Some 40,000 households in Idaho (7% of the total) use wood as their primary heating source.[63] Direct combustion of woody biomass in a steam boiler produces thermal energy to heat buildings and to drive industrial processes, and can also generate electricity. The University of Idaho has been heating the main campus in Moscow with sawmill residues for more than two decades, saving Idaho taxpayers upwards of $2 million per year, depending on the price of natural gas that would otherwise heat campus buildings. With the help of federal cost-share grants, several Idaho public schools have switched from fossil energy to heating with modern wood boilers that meet air quality standards. Because sawmill residues are already fully utilized, additional energy depends on other woody biomass resources, or retrofitting existing uses for potential cogeneration of electricity. There is an abundance of forest residues left in the woods after timber harvesting. This logging slash consists primarily of tree tops and branches left in the woods to decompose or is piled and burned to reduce fire hazards.

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[59] For more information please see the Idaho Strategic Energy Alliance Geothermal Task Force Report, http://www.energy.idaho.gov/energyalliance/taskforce.htm

[60] Prepared by the Forestry/Biomass and Biofuels Task Forces, Idaho Strategic Energy Alliance, http://www.energy.idaho.gov/energyalliance/taskforce.htm

[61] Unless otherwise noted, data are from *Wood Bionergy: Homegrown Baseload Energy for Idaho*, Forestry/Biomass Task Force Report, Idaho Strategic Energy Alliance. http://www.energy.idaho.gov/energyalliance/d/forest_packet.pdf

[62] Energy Information Administration. State Energy Data System (SEDS). Table CT2. Primary Energy Consumption Estimates, Selected Years, 1960-2009, Idaho. U.S. Dept. of Energy, Washington, D.C. http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/total/use_tot_IDcb.html&mstate=Idaho

[63] U.S. Census Bureau. Idaho Selected Housing Characteristics. http://factfinder.census.gov/servlet/ADPTable?_bm=y&-geo_id=04000US16&-qr_name=ACS_2009_5YR_G00_DP5YR4&-ds_name=ACS_2009_5YR_G00_&-_lang=en&-_sse=on

Although it is costly to transport this low-value material off-site to an energy production facility, there is enough of it to sustainably provide 500,000 dry tons per year. This is sufficient to either heat 25 district energy systems comparable in size to the University of Idaho, or to produce 50 MW of electricity, enough for 50,000 homes. Three-fourths of Idaho's forest resources are on federal lands, but they provide less than ten percent of the timber harvested each year. Many federal forests are overstocked and thinning to reduce wildfire hazards is desirable. However, removing small-diameter hazard trees is costly, and while the amount of thinning has increased markedly over the past decade, much more of it is needed to address forest health and wildfire risks on federal lands. If thinning was done at the scale needed to modify wildfire behavior, another 500,000 dry tons per year of woody biomass would be available as an energy resource. There are currently eight community-based groups in Idaho working with local national forest managers to develop projects for improving forest conditions.[64] These collaborative groups are the best way forward for developing the social acceptance needed to support active management of national forests and removal of additional timber.

Solid Waste. The decomposition of biomass produces biogas, a mixture of methane and trace constituents. Idaho has three biogas production sources that are viable resources: waste streams from food processing plants, dairy waste, and landfills. Food processing plants offer a very small potential. The largest potential is to capture biogas from the state herds totaling 600,000 dairy animals, most of them in the Magic Valley where the generation of 10 MW from the dairy waste biogas resource is possible. The Ada County landfill generates 3.2 MW from waste-to-gas operations, and Kootenai County's landfill generates a smaller amount from leachate (i.e., liquid draining from a landfill). Because wood and plastic deteriorate slowly, these materials have low biogas potential and need to be sorted out from biogas operations.[65] In a few larger municipalities some wood is being sorted out of landfills and sold to biomass processing facilities.

Oilseeds and Agricultural Residues. Idaho citizens used over 600 million gallons of gasoline and 520 million gallons of diesel fuel in 2008. Except for a small amount of biodiesel, none of this liquid fuel is produced in-state. Idaho's biomass resources could help meet the impending need for renewable liquid transportation fuels driven by federal policy.[66] Federal programs support corn-based ethanol and mandate the future production of advanced biofuels (i.e., other than corn ethanol).[67] Agricultural science is reducing the residue left in the fields after harvest by developing shorter wheat stalks.

Transportation Fuels. Technologies are emerging that use heat, chemicals and microorganisms to process cellulose-based materials into fuels and chemicals, thus paving the way to using forest and agricultural residue streams, as well as significant portions of

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[64] See "Idaho Forest Restoration Partnership: A Network of Collaboration" website. http://www.idahoforestpartners.org/main.html

[65] See *Biogas Generation and Use in Idaho*, Biogas Task Force Report, Idaho Strategic Energy Alliance. http://www.energy.idaho.gov/energyalliance/d/biogas_resources_report.pdf

[66] See *Idaho Biofuels Task Force Report*, Idaho Strategic Energy Alliance. http://www.energy.idaho.gov/energyalliance/d/biofuels_report.pdf

[67] See Renewable Fuels Standard (RFS), page 2 in, *Energy Independence and Security Act of 2007: A Summary of Major Provisions*. CRS Report for Congress, Order Code RL34294, Congressional Research Service, Washington, D.C. http://energy.senate.gov/public/_files/RL342941.pdf

municipal and industrial solid waste. The potential for developing aviation jet fuel from biomass resources in the Pacific Northwest is a promising endeavor in which half of the new jobs would be in feedstock production.[68] The University of Idaho is involved in a four-state research consortium called the Northwest Advanced Renewables Alliance (NARA) that will help turn the promise of liquid jet fuel from wood into reality.

Challenges. Two factors inhibit the use of biomass to produce energy: 1) Costs are not competitive with energy produced from other resources including fossil (petroleum, natural gas, and coal) and hydroelectric. This reflects high capital investment costs more than operating costs. However, the benefits of energy security and local employment opportunities are generally not factored into cost comparisons. Neither are benefits from avoided costs associated with wildfire suppression, reduced waste streams, landfills and noxious odors, as well as reduced greenhouse gas emissions from substituting bioenergy for fossil energy. 2) Public perception is that wood bioenergy may be unsustainable or environmentally harmful, and that biofuels may damage cars and trucks. Additionally, advocacy groups are watching carefully the additional cost of "green energy" that utilities add to their portfolios of energy resources.

2.3.6. Nuclear

Nuclear power production continues to contribute substantially to United States electricity supply, with approximately 20% of the nation's electricity provided by 104 nuclear reactors operating in 31 states.[69] Over the past 2 decades, the operational performance of these reactors has improved markedly[70], as evidenced by an increase in operational capacity factors from approximately 53% in 1980 to well over 90% today.[71] This improvement, and the related safety record of the existing units, suggests maturity in the conduct of U.S. nuclear electric generation in general. Spurred by financial incentives authorized by the 2005 Energy Policy Act, new stream-lined licensing designed to maintain safety while reducing the risk of construction delays, and generally positive public sentiment about nuclear power, there has been increasing business interest in expanding nuclear power deployment in the United States. Since 2007, there have been 16 license applications filed to build new nuclear reactors in the United States.[72]

Although several developers have expressed interest in siting commercial nuclear generating stations in Idaho and surrounding states that impact Idaho's energy supply, there are no firm plans involving merchant generators or Idaho utilities to do so at the present time. Technology maturity, risk mitigation through demonstration and federal financial assistance, public sentiment post-Fukushima accident, greenhouse gas emissions policy, water availability, availability and proximity to transmission, and notably the cost of alternative generation such natural gas-fired generation, will all factor heavily on any decision by utilities to pursue commercial nuclear generation in Idaho. . Debate related to the desirability

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[68] See *Powering the Next Generation of Flight*. Sustainable Aviation Fuels Northwest, 2011 Report, produced by Climate Solutions, Kirkland, WA. An estimate of total potential jobs in a robust sustainable industry producing biofuel for jet aircraft is not provided. Report is available online at http://www.safnw.com/

[69] http://www.world-nuclear.org/info/inf41.html

[70] Nuclear Energy Institute, http://www.nei.org/keyissues/safetyandsecurity/

[71] http://www.nei.org/resourcesandstats/nuclear_statistics/usnuclearpowerplants/

[72] http://www.world-nuclear.org/info/inf41.html

and feasibility of nuclear energy deployment often centers around concerns related to cost compared to alternatives, public acceptance, and safety. Regarding safety; in the United States, the Nuclear Regulatory Commission (NRC) is responsible for regulating nuclear power plants and ensuring that the plants comply with safety requirements established by law. The NRC will track compliance of those plants in the categories of reactor safety, radiation safety, and security, and that performance and assessment data can be found on the NRC web site.[73] Cost for new nuclear construction in the United States is difficult to accurately gauge, as there has not been new construction in this country for decades, leaving some uncertainty equipment and construction costs. This uncertainty can be seen in widely varying cost estimates; ranging from the very high[74] to relatively competitive.[75] One can also find a number of public opinion polls showing quite different states of acceptance of nuclear power generation, ranging from very positive[76] to very negative.[77] Therefore, when considering the desirability of nuclear-electric generation, as well as with any generation approach, decision makers and citizens are encouraged to seek current information based on facts from credible sources that they trust.

Aside from resources that support the deployment of commercial nuclear electric production, Idaho has important attributes and resources that enable growth in nuclear energy-related business. The lead nuclear energy national laboratory for the United States, the Idaho National Laboratory (INL), is already one of Idaho's largest employers.[78] INL activities and facilities related to energy systems testing, nuclear fuel management, and a highly skilled nuclear savvy workforce are significant resources in attracting nuclear energy service business to Idaho.

Idaho's proximity to major uranium resources and low electricity prices could also attract nuclear fuel service, component testing, and other energy-intensive operations. Areva has been authorized by the NRC to enrich uranium to manufacture nuclear fuel for commercial power reactors[79] and recently secured a federal license to build and operate a gas centrifuge uranium enrichment plant, the Eagle Rock Enrichment Facility, near Idaho Falls. They plan to begin construction in 2012. This project is estimated to create 4,800 jobs and invest billions of dollars into the regional economy.[80] The announcement that a uranium enrichment facility

[73] United States Nuclear Regulatory Commission, http://www.nrc.gov/reactors.html
[74] Nuclear Power in a Post-Fukushima World", Schneider et al, WorldWatch Institute (2011), http://www.worldwatch.org/system/files/WorldNuclearIndustryStatusReport2011_%20FINAL.pdf
[75] "Projected Costs of Generating Electricity", International Energy Agency (2010), http://www.iea.org/press/pressdetail.asp?PRESS_REL_ID=298
[76] ABC News / Washington Post Poll, April 14-17, 2011, http://www.washingtonpost.com/wp-srv/politics/polls/postpoll_04172011.html
[77] www.langerresearch.com: http://abcnews.go.com/Politics/nuclear-power-opposition-grows-japan-earthquake-abc-news/story?id=13412262
[78] "Boise State Research Details Positive Economic Impacts from INL Operations", December 9, 2010, Boise State University Update, http://news.boisestate.edu/update/2010/12/09/boise-state-research-details-positive-economic-impacts-from-idaho-national-laboratory-operations/
[79] Associated Press, "Areva wins federal license for Idaho uranium plant. Idaho Falls, Idaho," October 12, 2011, http://moneywatch.bnet.com/investing/news/french-firm-wins-license-for-idaho-uranium-plant/6314091/
[80] "AREVA Awarded DOE Loan Guarantee for Idaho Enrichment Facility." (2010, May 21). Retrieved October 12, 2011, from AREVA: http://www.areva.com/EN/news-8390/areva-awarded-doe-loan-guarantee-for-idaho-enrichment-facility.html

will be sited near Idaho Falls is an example of the opportunity in serving global nuclear energy markets from Idaho.

2.3.7. Solar

Solar energy is currently used in the state for specific applications, such as water pumping, thermal heating, and electricity production in remote locations that would be difficult to serve with energy from the electricity grid. Increasingly solar is used in Idaho for grid inter-tied applications, offsetting facility energy use. Southwest Idaho's solar potential is very similar to the desert southwest, which has the highest solar potential in the United States.[81] This allows Idaho many opportunities for solar power applications; however, despite its excellent solar resource Idaho is behind much of the rest of the country in solar installations.

Cost is the major barrier to installation of photovoltaic (PV) systems, although the price of PV systems continues to decline rapidly, making wide-scale use of solar power for electricity generation less prohibitive. Cost is also the primary barrier for solar hot water systems. It is estimated that a total of 1 to 1.2 MW of solar PV is currently installed in Idaho.[82] The Office of Energy Resources administered a "Solar Panels for Schools" program that funded installation of PV systems at six Idaho schools to help offset energy consumed by the schools and encourage education on solar power. A few large-scale PV utility plants are also in the works for Idaho. These facilities will generate electricity to be delivered directly to the utility grid.

2.3.8. Hybridization

Recent advances in gas turbine technology and advanced computing and control technologies have opened the door for hybridization of energy systems and resources. System hybridization involves coupling various energy resource inputs to generate one or more energy products. Early generation hybrid systems now deployed couple solar and natural gas, and planned systems that couple solar, natural gas, and wind inputs for electricity generation show significant benefits in overall system efficiency and transmission stability under high intermittent generation scenarios. Future hybrid systems being researched combine fossil, renewable, and nuclear resources to produce both electricity and synthetic transportation fuels. System hybridization (combining the various resources listed above) may provide additional options to best utilize Idaho resources in a manner consistent with stated policy objectives.

2.3.9. Conservation, Energy Efficiency, and Demand Response

Conservation, energy efficiency, and demand response are not natural resources in the same sense as fossil fuels or hydroelectric power, but they do constitute another economically attractive resource that electric and natural gas utilities can call upon to meet their customers' energy needs. "Conservation" refers to consumers acting to reduce their use of energy-consuming devices. An example would be a consumer remembering to turn off the lights when leaving a room. "Energy efficiency" refers to processes that provide the same energy service but consume less electricity. An example would be switching from incandescent to compact fluorescent light bulbs. "Demand response" refers to customers

[81] Solar Generation Feasibility Study for Southwest Idaho, Black & Beach, August 2008; Idaho Power Company's Draft 2009 Integrated Resource Plan

[82] Idaho Strategic Energy Alliance Solar Task Force Report, 2010

temporarily altering their energy-consuming behavior in response to signals from the utility or grid operator. An example would be lighting fixtures that can be dimmed remotely by utility personnel during times of high electricity demand. Collectively, these resources are referred to as "demand-side management" ("DSM"), although the terms "conservation" or "efficiency" are sometimes used to refer to all DSM measures.

In the future, according to the Northwest Power and Conservation Council ("Power Council") estimates, electricity load is expected to grow by about 7,000 average megawatts between 2009 and 2030 in the Northwest, growing at about 335 average megawatts, or 1.4 percent, per year. Residential and commercial sector electricity use account for much of the growth due to an anticipated increase in air conditioning and consumer electronics. The Power Council's most recent estimate, published in the Sixth Northwest Electric Power and Conservation Plan, suggests that achievable potential conservation is 4,000 to 6,000 average megawatts. Of that, approximately 2,500 average megawatts will require new initiatives, programs, market transformation efforts or progress toward adoption of codes and standards. Idaho accounts for approximately 15 percent of regional electricity load, so a simple allocation suggests that there are approximately 375 to 600 aMW of conservation in Idaho that could be acquired over the next 20 years. The Power Council reiterates that improved efficiency of electricity use is by far the lowest-cost and lowest-risk resource available to the region.[83]

Many states such as Washington, Oregon, California, and New York have made strong commitments to energy conservation and efficiency. Despite retail electricity rates lower than any other state[84], Idaho has also recently made tremendous gains in securing cost-effective conservation and as a state is currently ranked 26th in efficiency efforts by the American Council for an Energy Efficient Economy[85].

Cost-effective conservation provides economic benefits to Idaho utilities when they can earn a rate of return on this investment. Conservation reduces the energy bills paid by consumers, freeing up dollars to be spent on other goods and services and representing, in economic terms, an increase in disposable income. Moreover, implementation of conservation measures requires a local labor force. Thus, increased investment in conservation not only reduces total energy expenditures but shifts a portion of the remaining expenditures from imported fuel to locally-provided goods and services.

Demand response programs have grown beyond the long standing irrigation load control programs to include large commercial and industrial customers in Idaho. At least two significant factors should be considered as these programs develop. One is to solidify methods by which demand response grow and determine their size as a great deal of forecasting is required and it is possible to overestimate actual needs. Second, with the expansion of demand response programs into commercial applications, it is necessary to

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[83] Northwest Power Planning Council 6th Power Plan, February 2010, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan.pdf

[84] Northwest Power and Conservation Council. (2010). *Sixth Northwest Conservation and Electric Power Plan* (No. Council Document 2010-09). Retrieved from http://www.nwcouncil.org/energy/powerplan/6/default.htm

[85] ACEEE Energy Efficiency Rankings by State, http://www.aceee.org/node/820

carefully track implications of these programs on occupant comfort and productivity to avoid negative impressions of the program.[86]

The following tables show Idaho's current energy efficiency initiatives and energy-related regulations.

Table 2.1. Idaho's Current Energy Efficiency Incentives

Idaho's Energy Efficiency Financial Incentives
Non-Profit Grant Program
Bonneville Environmental Foundation - Solar 4R Schools
Personal Deductions
Insulation Income Tax Deduction
Residential Alternative Energy Tax Deduction
Property Tax Incentive
Property Tax Exemption for Wind and Geothermal Energy Producers
State Bond Program
Renewable Energy Project Bond Program
State Loan Program
Low-Interest Energy Loan Programs
Utility Loan Programs
Idaho Falls Power - Commercial Energy Conservation Loan Program
Idaho Falls Power - Energy Efficient Heat Pump Loan Program
Idaho Falls Power - Residential Energy Efficiency Loan Program
Idaho Falls Power - Residential Weatherization Loan Program
Utility Rebate Programs
Avista Utilities (Electric) - Commercial Energy Efficiency Incentives Program
Avista Utilities (Electric) - Commercial Lighting Energy Efficiency Program
Avista Utilities (Electric) - Residential Energy Efficiency Rebate Programs
Avista Utilities (Gas and Electric) - Commercial Food Equipment Rebates
Avista Utilities (Gas) - Commercial Energy Efficiency Incentives Program
Avista Utilities (Gas) - Residential Energy Efficiency Rebate Programs
Idaho Falls Power - Commercial Energy Conservation Rebate Program
Idaho Falls Power - Residential Energy Efficiency Rebate Program
Idaho Power - Easy Upgrades for Simple Retrofits Rebate Program
Idaho Power - Irrigation Efficiency Rewards Rebate Program
Idaho Power - Large Commercial Custom Efficiency Program
Idaho Power - New Building Efficiency Program
Idaho Power - Rebate Advantage for New Manufactured Homes

[86] For more information please see the Idaho Strategic Energy Alliance Energy Efficiency and Conservation Task Force Report, http://www.energy.idaho.gov/energyalliance/taskforce.htm

Idaho Power - Residential Energy Efficiency Rebate Programs
Intermountain Gas Company (IGC) - Gas Heating Rebate Program
Kootenai Electric Cooperative - Residential Efficiency Rebate Program
Northern Lights Inc. - Energy Conservation Rebate Program
Rocky Mountain Power - Energy FinAnswer
Rocky Mountain Power - FinAnswer Express
Rocky Mountain Power - Residential Energy Efficiency Rebate Program

Table 2.2. Idaho's Current Energy Efficiency Related Regulations

Idaho's Energy Efficiency Rules, Regulations & Policies
Building Energy Code
Idaho Building Energy Code
Energy Standards for Public Buildings
Energy Efficiency Standards for Public Buildings
Net Metering
Avista Utilities - Net Metering
Idaho Power - Net Metering
Rocky Mountain Power - Net Metering
Solar/Wind Access Policy
Solar Easements

Source for Table 2.1 and 2.2: http://www.dsireusa.org/incentives/index.cfm?state=ID

2.3.10. Energy Resource "Lessons Learned"

Between 2008 and 2011, the Idaho Strategic Energy Alliance, through the means of broad based task forces composed of Idaho and regional energy experts reviewed the electricity energy options available to meet both the near and long-term requirements of Idaho consumers. In summary, the reports resulting from these reviews identified the following:

1. All commercially-proven supply-side generating resources are much more expensive than the utilities' existing portfolios, and consequently, will put upward pressure on the price consumers pay for electricity. And, renewable resources such as wind, geothermal, biomass and solar, are more expensive than conventional fossil-fuel burning generators when the complete costs, such as capacity value and integration, are included in the comparison. Significant technological breakthroughs would have to be achieved to result in a lowering of the cost of electricity produced by new generating resources.
2. The same holds true for electrical transmission. The time and expense required to site, permit and acquire corridors for new transmission lines, in addition to the cost of construction and the associated environmental mitigation, will contribute to the increase in the price Idaho consumers pay for electricity going forward.
3. The cost of new electric generating capacity needed to meet the growing demand for electricity, and the compliance requirements related to environmental regulations, reliability standards and homeland security, are all increasing the cost of production and delivery of electricity to all Idahoans.

4. Streamlining the siting and permitting of generation and transmission projects may help mitigate some of the costs of future resource development, but the regulatory improvements required to do this would have to be substantial.
5. Energy efficiency activities, as currently being pursued by the utilities and the state, not only reduce participating utility customers' total energy costs but have the added benefit of reducing the long-term cost of energy supplies to Idahoans. Investments in energy efficiency also result in local economic development benefits such as support of engineering firms, wholesalers, retailers and contractors to meet the market demand for more efficiency equipment, material, appliances and supplies.

In general, with the exception of conservation, energy efficiency, demand response, fossil fuels and limited hydroelectric development, Idaho's resources are generally not cost competitive with resources available from other states in meeting Idaho consumers' electric energy requirements. This being said, the existence of renewable portfolio standards in states within the Western Interconnection make these resources attractive options for export. To that end, the following efforts have been undertaken by Idaho's state agencies, Idaho's investor owned utilities, and the Idaho legislature:

1. Increased emphasis on conservation (energy efficiency and demand reduction) in electricity usage and a commitment by the Governor to emphasizing energy efficiency in all state buildings and facilities.
2. Adoption of the 2009 International Building Code for Idaho.
3. Idaho K-12 Energy Efficiency Project funded through ARRA (performed 894 school energy audits and implemented energy efficiency measures with the potential of saving over 200 million kWh annually.)[87]
4. Boise State University was awarded over $2.8 million dollars from the Department of Energy to develop a project planning tool based on geographic information systems that optimizes siting for utility-scale solar developments.
5. The CAES Energy Efficiency Research Institute (CEERI), headquartered at Boise State, was awarded $1.5 million by the U.S. Department of Energy to train engineering students in energy efficiency and to provide energy audits to mid-sized industrial facilities in the Northwest.[88]
6. The U.S. Department of Energy awarded Boise State a grant of $4.9 million over the next five years to establish a National Geothermal Data System due to the efforts of members of the ISEA Geothermal Task Force. This system gathers existing nationwide geothermal data into one location, housed at Boise State, and may encourage additional geothermal development.
7. Idaho electric investor owned utilities voluntarily report annually to customers on their fuel mix in compliance with the recommendation in the 2007 Idaho Energy Plan.
8. Investor owned utilities are actively engaged in state and regional efforts to increase the capability of the western transmission grid through the Public Utilities Commission, the Northern Tier Transmission Group, ColumbiaGrid, the Western Governors Association, and others.

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[87] Office of Energy Resources JFAC Presentation, February 2, 2011 - http://legislature.idaho.gov/budget/JFAC/presentations/OER.2011-02-02.pdf#xml=http://legislature.search.idaho.gov/isysquery/ce0d72c5-d302-4a11-80e3-3aae1665798f/13/hilite/
[88] http://news.boisestate.edu/update/2011/09/15/boise-state-ceeri-receive-1-5-million-for-manufacturing-efficiency-training/

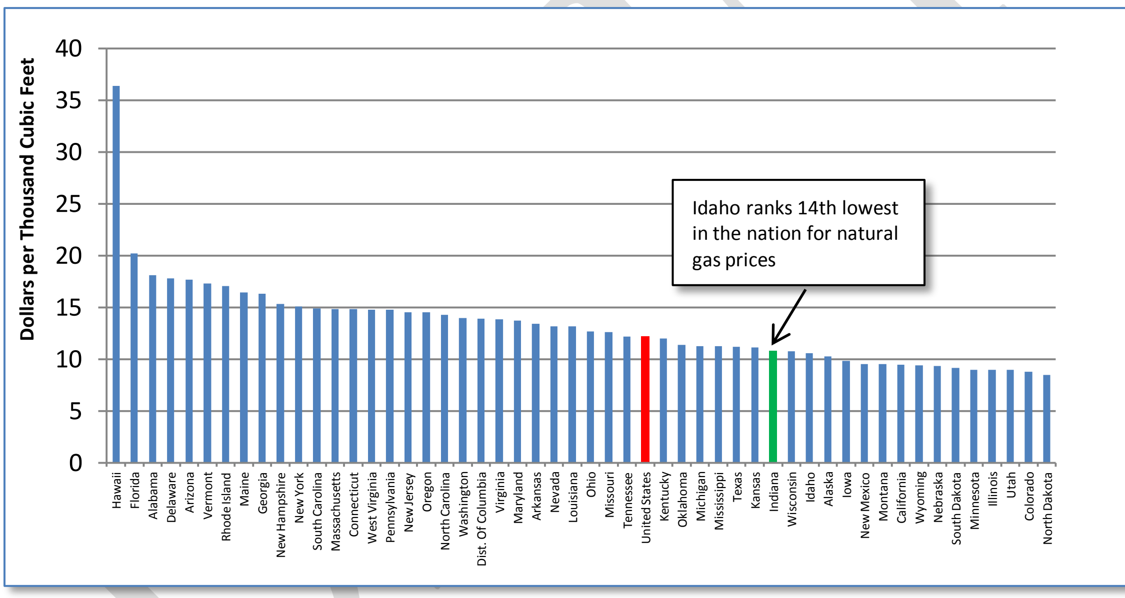
9. State vehicle fleets increased use of more fuel efficient, flex fuel, and alternative fuel..
10. Forming the Office of Energy Resources to better recognize the importance of energy issues to the state and moving these efforts from the Energy Division of the Department of Water Resources.

2.4. HISTORICAL PERFORMANCE IN KEY AREAS

2.4.1. Energy Rates Compared to Other States

The most important part of the story about Idaho's current energy picture is the very low average electricity and natural gas rates that Idahoans currently enjoy. Idaho's low electricity rates are largely the result of its hydro-thermal resource base. Baseload coal plants built in neighboring states in the 1970s and 1980s provide a constant source of reliable, relatively low-cost power to Idaho utilities. Large hydroelectric facilities on the Snake River and other tributaries of the Columbia River provide energy as well as flexible and very low-cost capacity for meeting peak demands. As a result, Idaho's average electricity rates were the 2nd lowest among the fifty states in 2009 (see Figure 2.12).[89]

Figure 2.10. Idaho's Residential Natural Gas Prices Compared to Other States in 2009



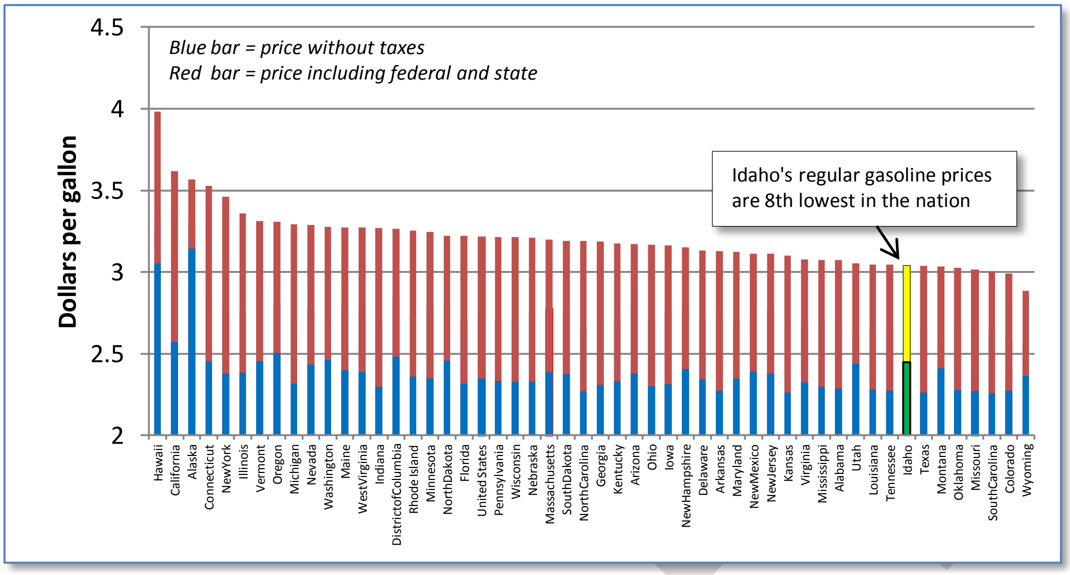
Source: http://www.eia.gov/dnav/ng/NG_PRI_SUM_A_EPG0_PRS_DMCF_A.htm

Idaho's proximity to major natural gas supply basins in the Rocky Mountains and western Canada has also allowed Idaho to benefit from relatively low natural gas rates, despite the lack of natural gas resources in Idaho. Idaho's average natural gas rates were among the lowest in U.S. states in 2009 as shown in Figure 2.10.[90] However, Idaho's prices for petroleum products are typically somewhat higher than the national average, as Idaho relies principally on refineries in Montana, Utah and Washington for its supplies of gasoline, diesel, and other petroleum

[89] http://www.eia.doe.gov/cneaf/electricity/epa/average_price_state.xls: Total Electricity Price
[90] Source: http://www.eia.gov/dnav/ng/NG_PRI_SUM_A_EPG0_PRS_DMCF_A.htm

products. However, Idaho's average gasoline prices were still among the lowest of the U.S. states in 2010, as shown in Figure 2.11.[91]

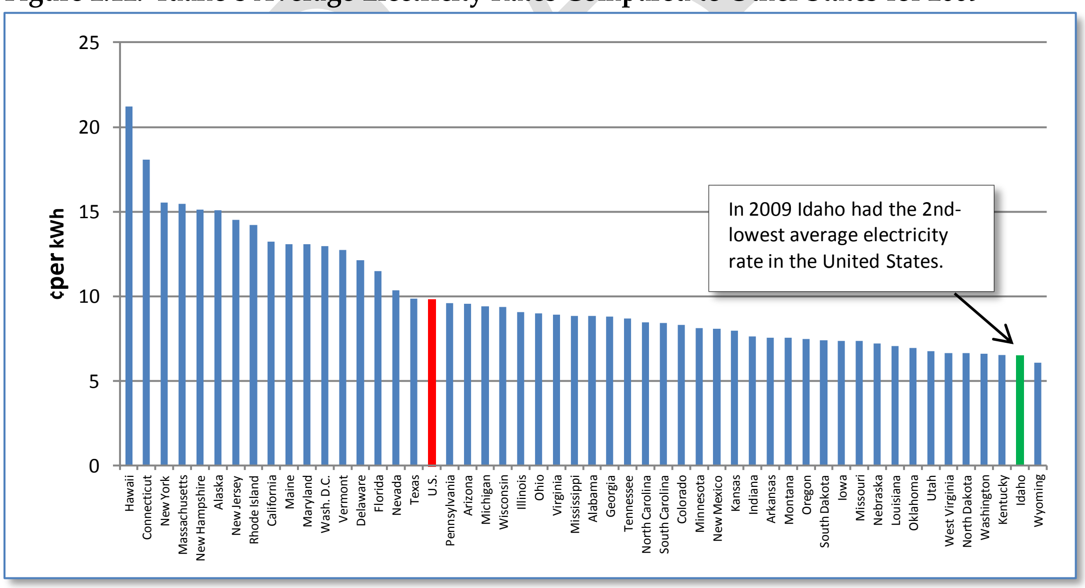
Figure 2.11. Idaho's 2010 Retail Gasoline Prices Compared to Other States



Note: The federal tax on gasoline in 2011 was 18.4 cents per gallon. The average state gasoline tax was 45.7 cents per gallon. Idaho's gasoline tax rate in 2011 was 43.4 cents per gallon.

Source: http://www.eia.gov/dnav/pet/pet_pri_allmg_a_EPM0_PTC_Dpgal_m.htm and http://www.api.org/statistics/fueltaxes/

Figure 2.12. Idaho's Average Electricity Rates Compared to Other States for 2009



http://www.eia.doe.gov/cneaf/electricity/epa/average_price_state.xls: Total Electricity Price

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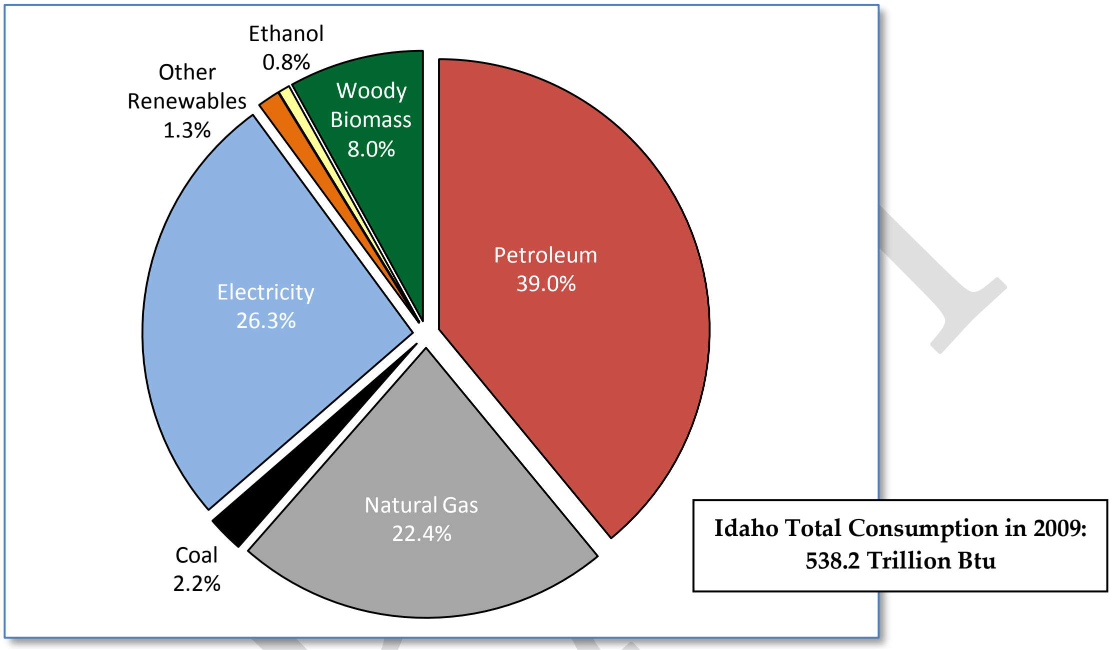
[91] Energy Information Administration, Retail Gasoline Prices - http://www.eia.gov/dnav/pet/pet_pri_allmg_a_EPM0_PTC_Dpgal_m.htm and American Petroleum Institute Fuel Tax Tables - http://www.api.org/statistics/fueltaxes/upload/July2011_gasoline_diesel_summary.pdf

2.4.2. Sources of Idaho's Energy

As shown in Figure 2.13, petroleum fuels, mostly used for transportation, account for approximately 39 percent of Idaho's end-use energy consumption. Electricity (26 percent) and natural gas (22 percent) are also important energy commodities, while the remaining approximately 13 percent is attributable to coal, biomass, ethanol, and other renewable energy sources. Energy demand growth both in Idaho and across the country is placing upward pressure on energy rates as low-cost sources of energy are exhausted and energy suppliers must turn to higher-cost resources.

Figure 2.13. Sources of Energy Consumed in Idaho in 2009

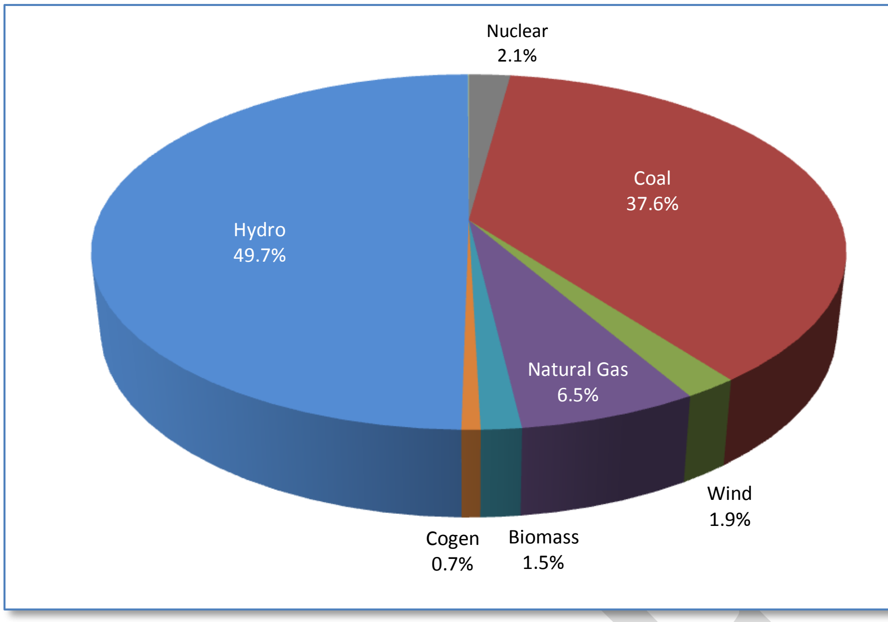


Note: "Other Renewables" includes geothermal (0.5%) and wind (0.8%)

Source: http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/total/use_tot_IDcb.html&mstate=Idaho

Figure 2.14 depicts the sources of Idaho's electricity in 2010, i.e., Idaho's "fuel mix". The chart shows that hydroelectricity and coal are the dominant sources of Idaho's electricity, comprising approximately 50 and 38 percent, respectively. Natural gas comprises 6.5 percent, with non-hydro renewables, principally wind power and biomass, accounting for approximately 3.4 percent. Idaho's municipal and cooperative utilities also receive a small share of the output of the Columbia Generating Station nuclear plant in Washington. (Note that the fuel mix in this figure is based on the percentage of Idaho load served by each utility.)

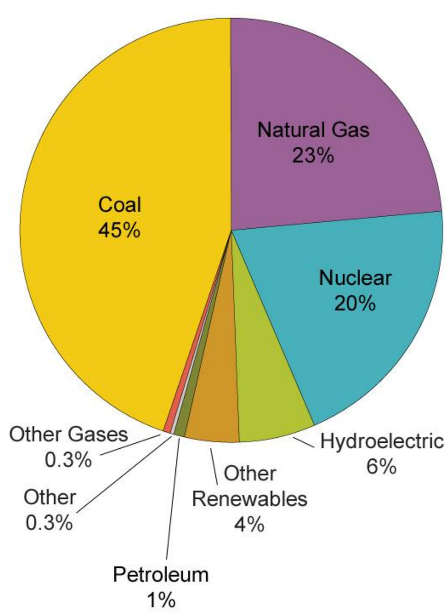
Figure 2.14. Idaho's 2009 Electricity Fuel Mix



Note: Data based upon three IOUs and BPA 2010 resources apportioned by percent of Idaho load served and that none of these resources are specifically allocated to Idaho. *Sources: Investor owned Utilities Information is from each investor-owned utility's FERC Form 1: http://www.ferc.gov/docs-filing/forms.asp and for percent of Idaho load served: http://www.eia.gov/cneaf/electricity/page/eia861.html BPA: Source: http://www.bpa.gov/power/pgp/whitebook/ 2010/WhiteBook2010_SummaryDocument_Final.pdf*

In Idaho, hydro is still the primary source of fuel for our electricity generation, followed by coal. This depends, of course, on the quality of the water year. As mentioned earlier, all of our coal generation comes from our neighboring states.

U.S. Net Electricity Generation by Fuel, 2010



Source: U.S. Energy Information Administration, *Electric Power Monthly*, Table 1.1 (March 2011), preliminary data.

Coal is the most common fuel for generating electricity in the United States.

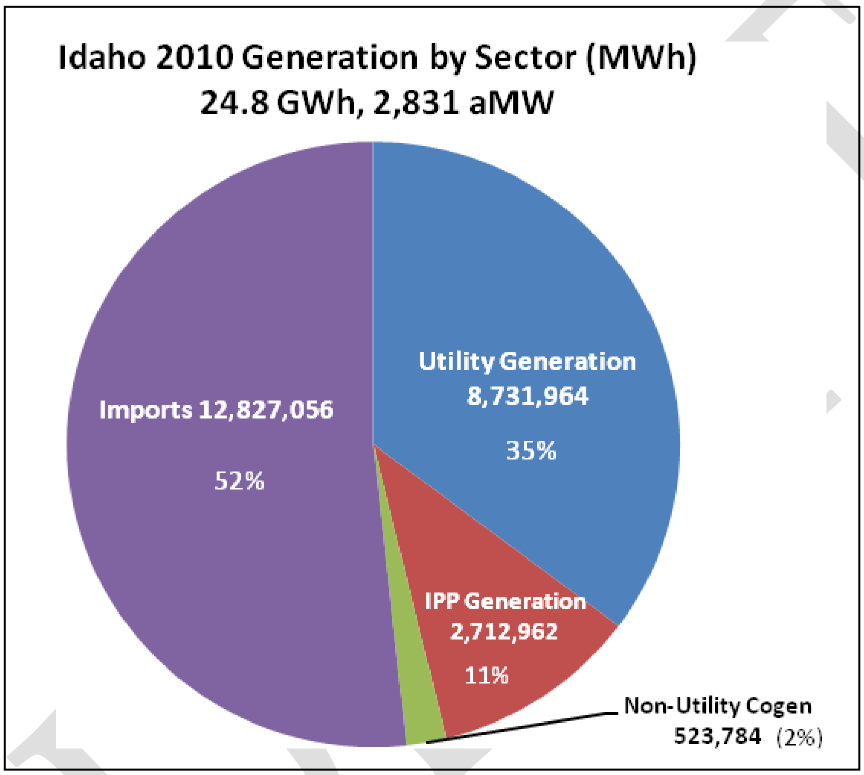
In 2010, 45% of the Country's nearly 4 trillion kilowatt hours of electricity used coal as its source of energy and 24% of the nation's electricity was fueled by natural gas. Nuclear power was used to generate about 20% of all of the country's electricity in 2010 and hydropower was the source for 6% of U.S. electricity generation. Renewable resources, including biomass, wind, and geothermal, account for about 1% each, with solar providing less than 1% of the electricity in the country in 2010.[92]

The Energy Information Administration predicts that generation from coal will increase by 25 percent from 2009 to 2035, largely as a result of increased use of existing capacity; however, its share of the total generation mix will fall from 45 percent to 43

[92] Source: http://www.eia.gov/energyexplained/index.cfm?page=electricity_in_the_united_states

percent as a result of more rapid increases in generation from natural gas and renewables over the same period. The role of natural gas will grow due to low natural gas prices and relatively low capital construction costs that make it more attractive than coal. The share of generation from natural gas will likely increase from 23 percent in 2009 to 25 percent in 2035. They also estimate that electricity generation from renewable sources will grow by 72 percent, raising its share of total generation from 11 percent (including hydro) in 2009 to 14 percent in 2035. Most of the growth in renewable electricity generation in the power sector will consist of generation from wind and biomass facilities, with much of that growth driven by state renewable portfolio standards and federal tax credits.[93]

Figure 2.15. Idaho's 2010 Electricity Energy Sources



Source: http://www.eia.gov/cneaf/electricity/epa/epa_sprdshts.html
Electric Power Annual 2009 - Data Tables Format 1990 - 2009
Net Generation by State by Type of Producer by Energy Source (EIA-906, EIA-920, and EIA-923)

Figure 2.15 indicates that Idaho is heavily dependent upon imported electricity to meet our loads. Our utilities generate in-state approximately 35% of the energy we utilize, with another 13% being provided by non-utility cogeneration or independent power producers. The remaining 52% is made up through energy imports which are comprised of generation from out-of-state resources owned by Idaho utilities as well as market purchases.

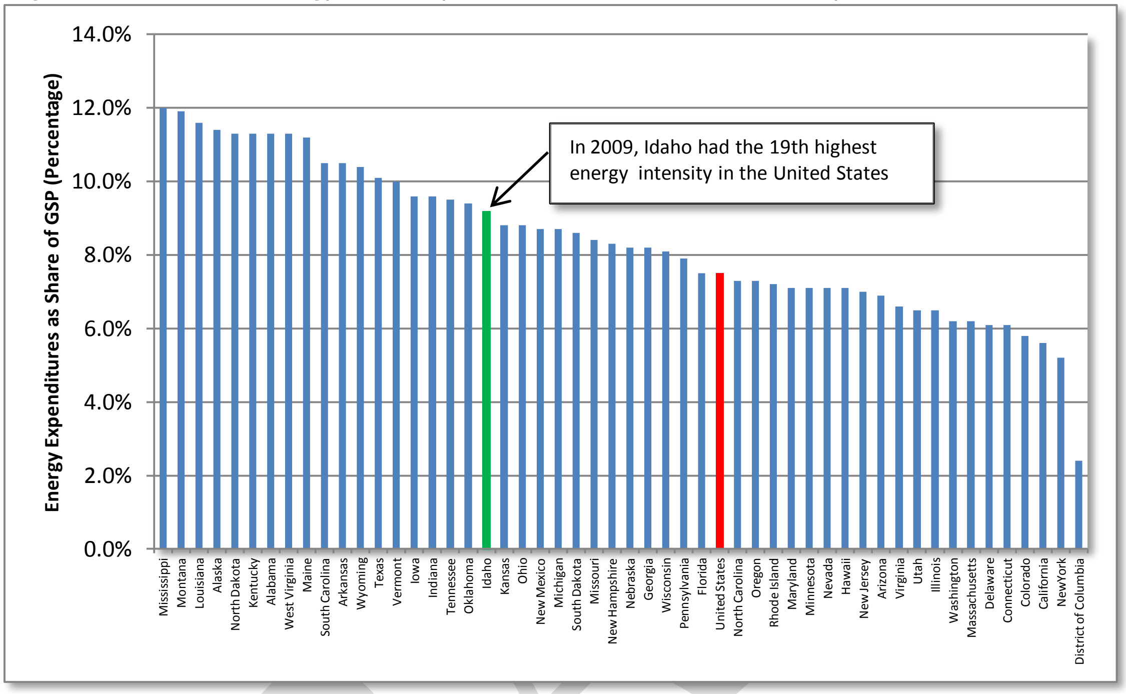
2.4.3. Energy Intensity

Idaho's historically low rates for electricity and natural gas have allowed it to attract and retain energy-intensive industries, including mining, pulp and paper, agriculture, and food processing.

[93] http://www.eia.gov/forecasts/aeo/chapter_executive_summary.cfm

As a result, Idaho's economy is more energy-intensive than many other states. Idaho's energy use per dollar of Gross State Product (GSP) was 19th among U.S. states in 2009. Idaho's energy use per capita was 31st highest in 2009, higher than neighboring states such as Washington, Oregon and Utah.[94] [95]

Figure 2.16. Idaho's Energy Intensity as a Share of the State Economy



Source: http://www.eia.gov/state/seds/sep_sum/html/pdf/rank_pr.pdf

2.4.4. Household Energy Bills

Idaho's residential, commercial, industrial, and transportation sectors spent $4.9 billion on energy in 2009[96]; the average Idaho household spent approximately $4,500 on direct energy products in 2009.[97] This figure (Figure 2.17) includes monthly electricity and natural gas bills as well as an estimate of Idaho households' gasoline expenditures, as can be seen in Table 2.3. Energy expenditures consume almost 10 percent of median household income in Idaho. This figure places Idaho near the average for the U.S. as a whole, despite Idaho's very low electricity and natural gas rates. This is because 1) Idahoans drive more miles and purchase more gasoline than residents of more densely-populated states, and 2) Idaho's median household income of $46,778

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[94] Source: http://www.eia.gov/state/seds/sep_sum/html/pdf/rank_pr.pdf

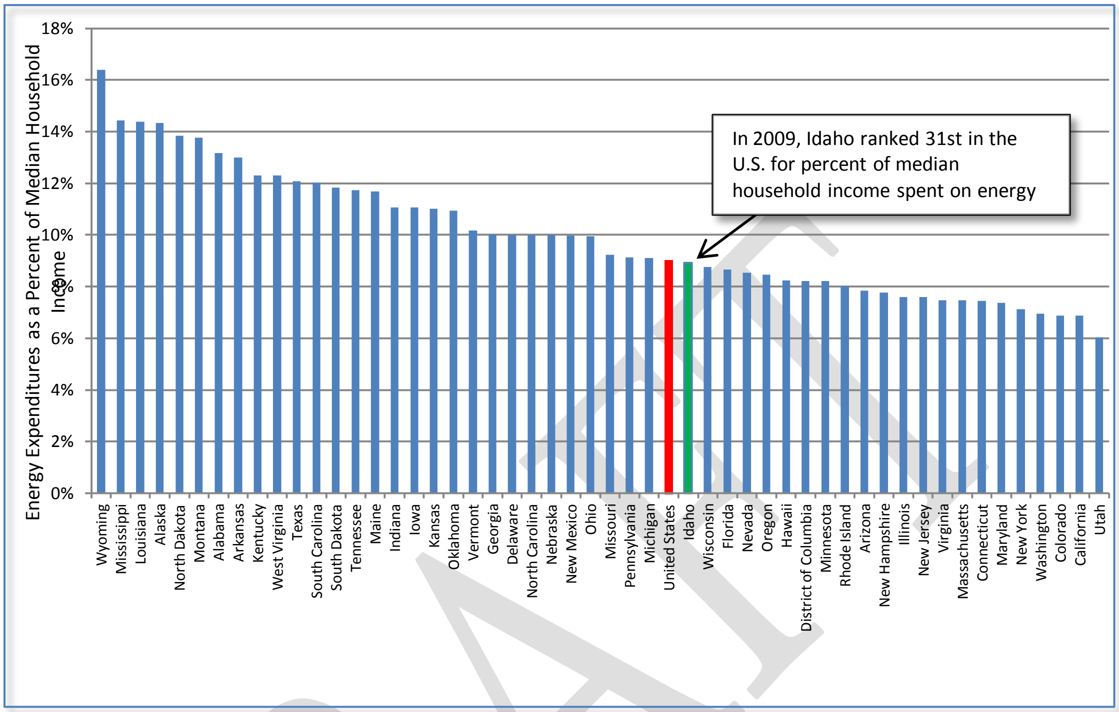
[95] Ibid.

[96] Based upon per capita energy expenditure of $3,172.08 (http://energy.gov/maps/2009-energy-expenditure-person) times the 2010 population of 1,567,582 (http://quickfacts.census.gov/qfd/states/16000.html)

[97] Expenditures http://205.254.135.24/state/seds/hf.jsp?incfile=sep_prices/res/pr_res_ID.html&mstate=Idaho; Total Households http://factfinder.census.gov/servlet/ADPTable?_bm=y&-context=adp&-qr_name=ACS_2009_1YR_G00_DP2&-ds_name=ACS_2009_1YR_G00_&-tree_id=309&-_caller=geoselect&-geo_id=04000US16&-format=&-_lang=en; fuel expenditures http://205.254.135.24/state/seds/hf.jsp?incfile=sep_prices/tra/pr_tra_ID.html&mstate=Idaho

in 2009 was lower than the U.S. average of $49,777.[98] Thus, energy is a significant burden for many Idaho households, despite the low energy rates that Idahoans continue to enjoy.

Figure 2.17. Idaho's Average Household Energy Burden Compared to Other States in 2009 (including Transportation Fuel)



Source for Total Median Household Income by State in 2009 Dollars:
http://www.census.gov/hhes/www/income/data/statemedian/index.html
Source for Energy Prices and Expenditures Per Person and Gasoline Expenditures:
http://www.eia.gov/state/seds/sep_prices/notes/pr_print2009.pdf (Tables E15 and E16)

Table 2.3. Average Household Energy Bill in Idaho, 2009 Energy Source	**Dollars per Year**	**Share**
Gasoline	$2,555	57%
Electricity	$1,195	27%
Natural Gas	$482	11%
Other Petroleum (Propane, Fuel Oil, Kerosene)	$196	4%
Wood	$66	1%
Coal	$0	0%
TOTAL	$4,494	100%

Sources: EIA Tables, ET3, ET6, ET4 and ET5 as well as the American Community Survey 2009 Profile Data

[98] http://www.census.gov/hhes/www/income/data/statemedian/index.html (Table H8) 2009

2.4.5. Historical Investments in Idaho Renewable Resources

Idaho's domestic resource base consists largely of renewable energy sources such as hydro, wind and geothermal energy. Idaho is home to 140 hydroelectric dams, with combined capacity of approximately 2,500 MW, and which combined produce 1,300 aMW of low-cost energy each year.[99] The direct use of geothermal energy also has a rich history in Idaho, with Boise's Warm Springs Geothermal Heating District being one of the oldest continuously operating geothermal heating projects in the nation. Aside from a few co-generation projects, hydro power has historically been the primary renewable resource developed in Idaho. Recent years have seen the development of significant levels of wind energy, a few biomass and landfill gas projects and some geothermal sites. Small scale solar energy is a viable resource and contracts Idaho utilities have executed for solar projects.

One of the vehicles for developing smaller-scale resources in Idaho has been the Public Utility Regulatory Policies Act (PURPA) of 1978. PURPA requires utilities to purchase energy from "qualifying facilities" ("QFs") at the utility's avoided energy costs. The federal law places these facilities fall into two categories: qualifying small power production facilities and qualifying cogeneration facilities. A small power production facility is a generating facility of 80 MW or less whose primary energy source is renewable (hydro, wind or solar), biomass, waste, or geothermal resources. A cogeneration facility is a generating facility that sequentially produces electricity and another form of useful thermal energy (such as heat or steam) in a way that is more efficient than the separate production of both forms of energy. For example, in addition to the production of electricity, large cogeneration facilities might provide steam for industrial uses. [100]

Determining avoided costs as well as other implementation details are conducted at the state level. The policies established by the Idaho PUC have been relatively favorable toward QFs, and as a result, Idaho experienced development of 200 MW of QF resources by the early 1990s, principally industrial co-generation and small hydro projects. While momentum slowed with the move toward competitive markets in the 1990s, a resurgence of interest in using PURPA to develop projects began with the new century. Many of the projects in the late 1990s and early 2000s were wind facilities sized to come in just under the 10 average MW maximum size eligible for their published available cost rates established by the Idaho PUC. However, in recent years, wind developers were disaggregating much larger projects into 10 MW sized units in order to qualify for the published PURPA rates. In order to address such disaggregation, in late 2010, the Commission reduced the eligibility size from 10 MW to 100 kW for intermittent resources (wind and solar). Larger projects are still eligible for PURPA contracts, with the rate determined on a case by case negotiation with the utility, with the prices based upon the utility's Integrated Resource Plan.[101]

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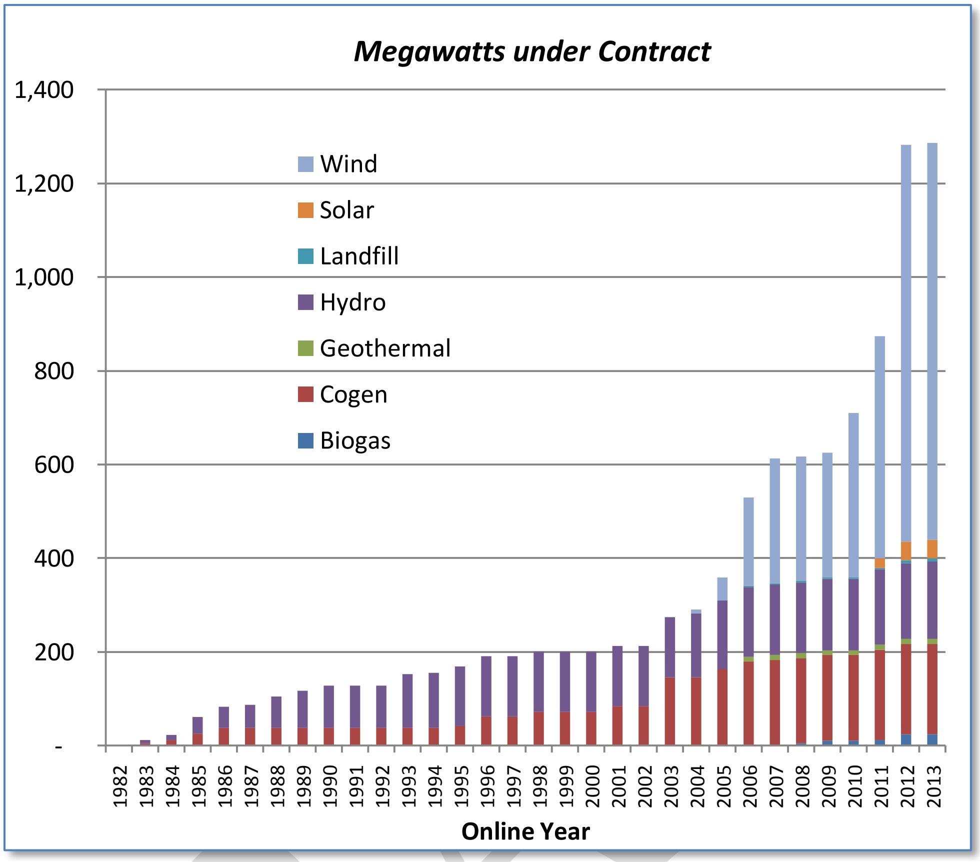
[99] ISEA Hydropower Task Force Report, May 2009: http://www.energy.idaho.gov/energyalliance/d/Hydro%20Packet.pdf

[100] http://www.ferc.gov/industries/electric/gen-info/qual-fac/what-is.asp and http://www.fs.fed.us/im/directives/fsh/2709.15/05.txt

[101] Idaho Public Utilities Commission Case No. GNR-E-10-04, order number 32176.; http://www.puc.idaho.gov/internet/cases/summary/GNRE1004.html

Figure 2.18. PURPA Generation in Idaho, 1981-2013



Source: Idaho Public Utilities Commission

2.4.6. Historical Investments in Energy Efficiency and Conservation

The Northwest Power and Conservation Council ("Power Council") produces estimates of the amount of conservation that can be acquired cost-effectively in the four-state Pacific Northwest region. Historically, since the Northwest Power Act of 1980, the Pacific Northwest has actively pursued programs to improve electrical energy efficiency. The Power Council calculated that the region saved over 3,900 average megawatts of electricity by 2008 as a result of the accumulated effects of Bonneville and utility conservation programs, improved energy codes and appliance-efficiency standards, and market-transformation initiatives. These efficiency improvements have met 48 percent of the region's load growth since 1980, and the savings now amount to more than the total electricity use of Idaho and Western Montana combined.[102] Conservation is the fourth-largest resource meeting the Northwest's electric energy needs, exceeded only by hydropower, coal, and natural gas.[103]

Idaho's Conservation Program Funding Charge of 1.5% of customer electricity bills is collected and administered by Idaho's electric utilities following a 2002 ruling by the Idaho Public Utilities Commission. Idaho budgeted over $50 million in 2010 to promote energy efficiency and load management (including residential and low-income programs) in the state through initiatives

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[102] Published February 2010, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan.pdf

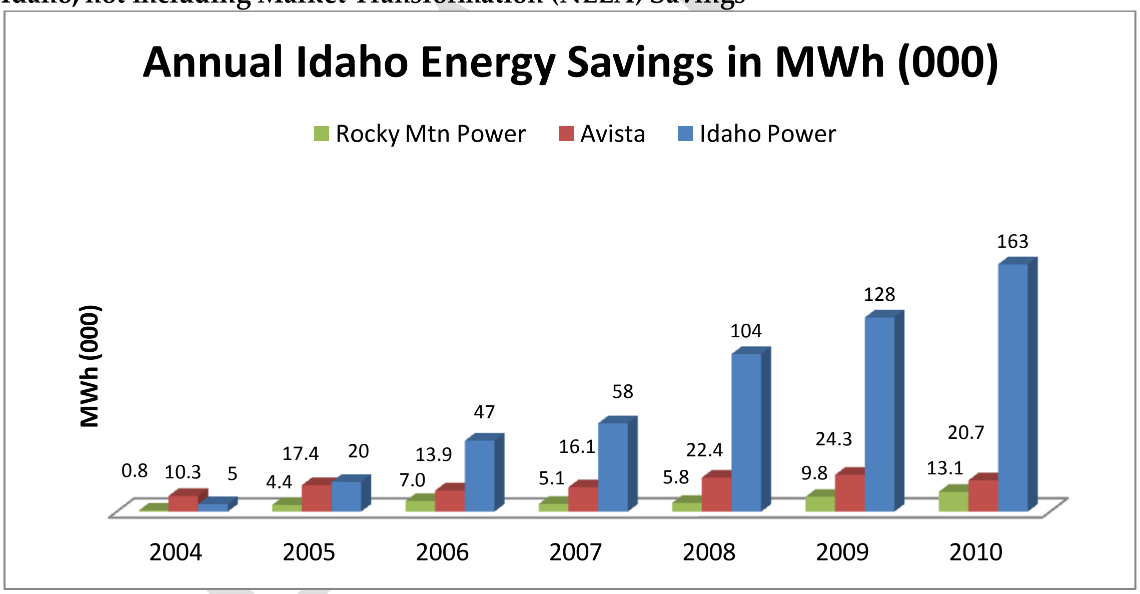
[103] Northwest Power Planning Council 6th Power Plan, February 2010, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan.pdf

administered by Idaho utilities and the Northwest Energy Efficiency Alliance.[104] The state has increasingly worked toward energy efficiency and demand reduction in state buildings and facilities; they adopted the 2009 International Building Code for Idaho and increased use of more fuel efficient, flex fuel, and alternative fuel vehicles in State vehicle fleets. In addition, using ARRA funding, the state performed 894 public school energy audits and implemented energy efficiency measures with the potential of saving over 200 million kWh annually, money which directly reduces the school district budget outlays.[105]

Idaho universities are also committed to energy efficiency. The CAES Energy Efficiency Research Institute (CEERI), a research and education partnership between Boise State University, Idaho National Laboratory, Idaho State University and University of Idaho, is leading a statewide effort to make buildings, homes, transportation and industrial systems more energy efficient, including developing better lighting plans for buildings and evaluating HVAC systems.[106]

Idaho's public utilities have all aggressively stepped up energy efficiency programs in the past several years. Since 2004, overall energy savings in Idaho have increased by 3100% at Idaho Power, 1600% at PacifiCorp (doing business as Rocky Mountain Power in Idaho) and 100% at Avista. Descriptions of utility efforts in energy efficiency and conservation include the following:

Figure 2.19. Electric Utility Conservation Achievements since 2004 by Public Utilities in Idaho, not including Market Transformation (NEEA) Savings



Note: Figure 2.19 was created using historical data Rocky Mountain Power, Idaho Power, and Avista 2011 annual reports, includes electrical energy savings for Idaho only, and does not include market transformation savings provided by NEEA.

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104 http://www1.eere.energy.gov/femp/financing/eip_id.html

105 http://legislature.idaho.gov/budget/JFAC/presentations/OER.2011-02-02.pdf#xml=http://legislature.search.idaho.gov/isysquery/ce0d72c5-d302-4a11-80e3-3aae1665798f/13/hilite/

106 https://inlportal.inl.gov/portal/server.pt/community/caes_home/281/energy_efficiency

IDAHO FALLS POWER

Public Power in Idaho has been engaged in energy efficiency for decades through programs and incentives developed by Bonneville Power Administration. For example, Idaho Falls Power has been providing energy efficiency programs to its customers for 29 years. Efforts initiated largely with focus on residential weatherization but over the years have expanded to a full suite of residential, commercial and industrial programs. In addition to incentives offered through BPA, Idaho Falls Power has maintained a revolving loan program for 15 years, offering zero interest loans to finance energy efficiency improvements. Recent program promotion has resulted in a 400% increase in annual energy efficiency savings (from average 1.2 million kWh/year to 5 million kWh/year) with the focal program being commercial and industrial lighting. Energy efficiency savings over that time has been more than 53 million kWh, with more than 20 million kWh of that occurring in the last four years. Idaho Falls Power is currently soliciting customer involvement in smart grid technology to set priorities for future energy efficiency program offerings for customers.[107]

IDAHO POWER COMPANY

In 2010, Idaho Power spent approximately $45.6 million on energy efficiency and targeted demand reduction response programs which resulted in reduced energy usage by approximately 170,000 MWh, and the demand response programs resulted in a summer peak demand reduction of about 300 MW. Idaho Power currently has 15 energy efficiency and demand response programs in place, offered to all customer segments and emphasizing the wise use of energy, especially during periods of high demand. This energy and demand reduction can minimize or delay the need for new infrastructure. Idaho Power's programs include:

- Financial incentives for irrigation customers for either improving the energy efficiency of an irrigation system or installing new energy efficient systems;
- Energy efficiency for new and existing homes, including efficient appliances and HVAC equipment, energy efficient building techniques, insulation improvement, air duct sealing, and energy efficient lighting;
- Incentives to industrial and commercial customers for using energy efficient equipment, and using energy efficiency techniques and operational and management processes; and
- Demand response programs to reduce peak summer demand through the voluntary interruption of central air conditioners for residential customers, interruption of irrigation pumps, and reduction of commercial and industrial demand through a third-party demand response aggregator.

Approximately $3 million of Idaho Power's 2010 energy efficiency spending was related to research and analysis, education, technology evaluation, and market transformation. Most of this activity was done in conjunction with the Northwest Energy Efficiency Alliance (NEEA).[108]

PACIFICORP / ROCKY MOUNTAIN POWER

PacifiCorp has provided a comprehensive set of demand-side management (DSM) programs to its customers since the 1970s. The programs are designed to reduce energy consumption and more effectively manage when energy is used, including management of seasonal peak loads. PacifiCorp is a forerunner in a new and innovative type of efficiency program in which customers repay the costs of their efficiency installations through monthly energy service charges

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[107] http://www.idahofallsidaho.gov/faq/encourage-conservation.html

[108] Idaho Power 2010 Annual Report: http://www.idacorpinc.com/pdfs/annualreps/ar2010.pdf

on their electric bills. While the jury is still out on the effectiveness of this approach compared to more traditional rebate and other incentive programs, Pacific/Utah Power's pioneering efforts with financing energy services for its customers is a model that is being closely watched around the country.[109] In March 2011 PacifiCorp was ranked 9th in the nation for its demand side management investments by Zpyrme Smart Grid Insights, a national research and consulting firm.[110]

PacifiCorp/Rocky Mountain Power offers several energy efficiency programs for commercial, industrial and irrigation customers in Idaho:[111]

- Idaho Energy FinAnswer offers cash incentives for energy efficiency retrofits, major renovation and new construction projects equal to $0.12 per kWh of the projected annual savings plus $50 per average monthly on-peak kW reduced. Incentives are capped at 50% of the project cost. The program also incorporates a variety of energy efficiency services, including facility energy analysis, detailed design assistance, competitive financing, commissioning, and post-installation savings verification, tailored to the specific needs of the project.
- Idaho FinAnswer Express for small commercial customers and for industrial and large commercial customers provides pre-calculated cash rebates for energy-efficient lighting, HVAC, motors and green motor rewinds, building envelope measures and other upgrades. Incentive amounts depend on the equipment installed. In order to be eligible for incentives, participants sign either a letter of intent (for lighting) or complete an incentive application (for other measures) prior to purchasing or installing the equipment.
- The Irrigation Pumps & Water Distribution program offers agricultural customers incentives for upgrading the efficiency of their irrigation systems.

KOOTENAI ELECTRIC COOPERATIVE

Kootenai Electric Cooperative (KEC) is also very active in the area of energy efficiency. Through the combined programs of BPA and KEC, more than $700,000 was paid to more than 2,000 members in energy efficiency rebates in 2010. This accounts for 2.4 million kWh in member energy savings. They offer rebates on heat pumps, water heaters and appliances.
BPA and KEC are also focusing efforts to improve commercial lighting, efficient motors and pumps and efficiency improvements in the industrial sector.[112]

AVISTA CORPORATION[113]

In 1995 Avista (then Washington Water Power) proposed a two-year experimental system benefit charge to provide stable, predictable funding for demand side management programs. Approved by both the Idaho and Washington Commissions, it became the first use of distribution charges to sustain cost-effective energy efficiency investments in the nation. [114] [115]

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[109] http://www.iiec.org/index.php?option=com_content&view=article&id=339&Itemid=176
[110] http://smartgridresearch.org/wp-content/uploads/sgi_reports/Top_10_US_Utilities_by_DSM_Investment_Zpryme_Smart_Grid_Insights_March_2011.pdf
[111] http://www1.eere.energy.gov/femp/financing/eip_id.html
[112] http://www.kec.com/documents/web2010_kec_annualreportv2.pdf
[113] http://www1.eere.energy.gov/femp/financing/eip_id.html
[114] http://eec.ucdavis.edu/ACEEE/1994-96/1996/VOL07/007.PDF

Avista Utilities offers energy efficiency incentives for a broad array of electric and gas efficiency measures and equipment, as well as fuel-switching projects. Rebates are limited to eligible projects that achieve a simple payback of less than 8 years for lighting and less than 13 for other measures (e.g., HVAC, windows, insulation, renewable energy projects). Several programs have been added or updated for 2011. Opportunities available include:

- Site-specific incentives, which provide custom incentives (up to 50% of incremental cost) based on first-year energy savings for electric efficiency, fuel conversion and natural gas efficiency projects, including measures and equipment not included under other programs.
- Commercial lighting, refrigeration, and HVAC incentives
- Food service equipment rebates
- A commercial windows and insulation program
- Standby generator block heater and premium efficiency motors programs
- Commercial clothes washer rebates
- Incentives for optimizing the performance of building systems

BONNEVILLE POWER ADMINISTRATION

Bonneville Power Administration (BPA) partners with its customers to promote energy efficiency. They offer assistance in developing new energy efficiency programs and services, improving design of existing programs, developing more informed marketing strategies, and improving targeting of customer communications. Their philosophy is that providing these services will result in greater participation by retail utility customers, resulting in greater energy savings for the region. Bonneville offers several energy conservation programs relevant to federal customers:[116]

- BPA provides project analysis, development services and financial incentives through its Energy Smart Federal Partnership. Federal facilities located in areas that are served by public utilities receiving power from BPA can receive preliminary energy assessments, project development studies or specifications, and engineering support.
- BPA's Implementation Manual, updated semi-annually, provides utilities, program partners and regional stakeholders information on how to implement energy-saving projects.
- BPA's Technical Services Proposal (TSP) program guides customers in submitting proposals for energy efficiency technical services.
- BPA's Commercial and Industrial Lighting program provides access to a lighting calculator, lighting trade allies, and incentives for energy-efficient lighting retrofits.
- BPA's Energy Smart Design program offers incentives for new small offices via participating BPA utilities.

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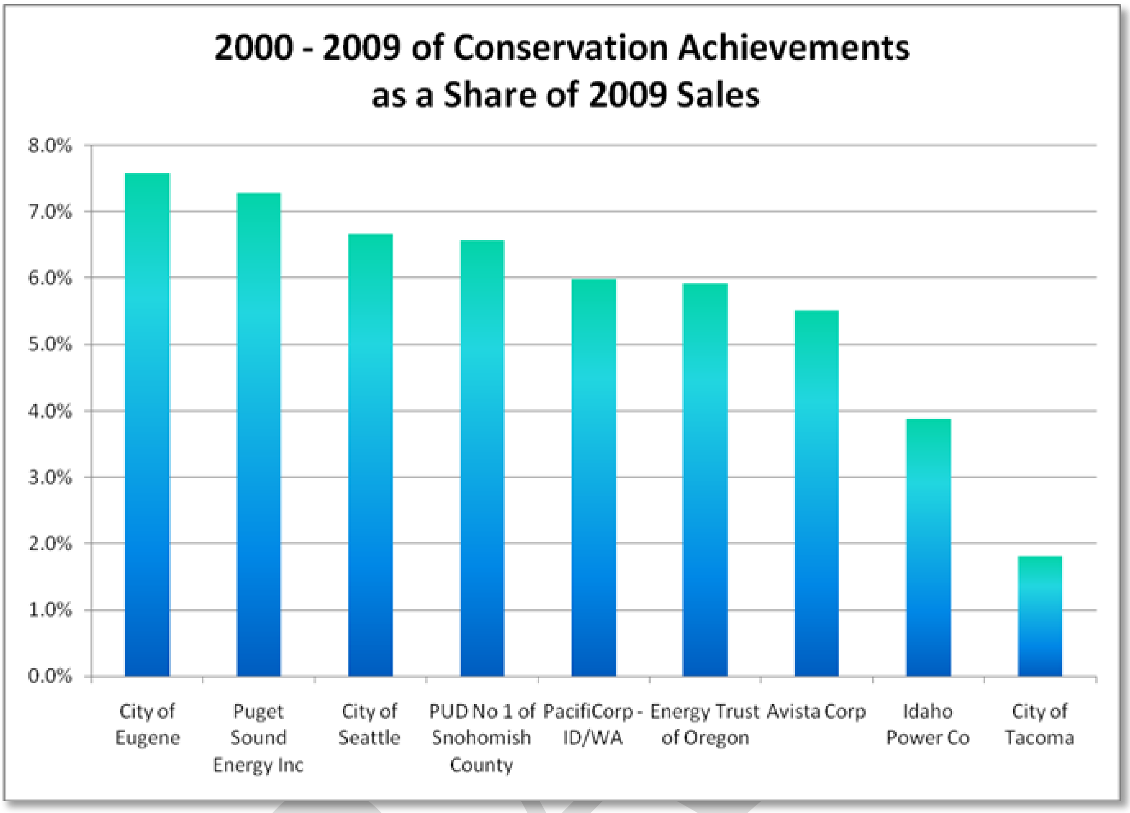
[115] Idaho Public Utilities Commission Order No. 25809, CASE NO. WWP-E-94-10 WWP-G-94-5, November 1994 (http://www.puc.state.id.us/search/orders/dtsearch.html)

[116] http://www1.eere.energy.gov/femp/financing/eip_id.html

Figure 2.20. Electric Utility Conservation Achievements from 2000 – 2009 as a Share of 2009 Retail Electricity Sales



Note: Idaho Power has historically focused its demand-side efforts on programs that reduce peak demand, which are not reflected on this chart, rather than programs that reduce overall energy consumption.

Source of Graph: Northwest Power and Conservation Council. Derived from the Regional Technical Forum Annual Conservation Achievements Surveys 2000 – 2009. (http://www.nwcouncil.org/energy/rtf/consreport/Default.asp)

2.4.7. Historical Investments in Fossil Fuel Based Electrical Generation

Baseload coal plants built in neighboring states in the 1970s and 1980s have provided a constant source of reliable, low-cost power to Idaho utilities. Coal-based electrical generation offers the advantage of a known technology that can produce electricity at a low and stable cost. Coal plants are best suited to baseload operation, where their electricity output is stable from hour to hour and day to day. However, new investments in this type of resource are becoming problematic, as coal combustion emissions are increasingly associated with the impacts of global climate change and other environmental concerns.

2.5. ENERGY RESPONSIBILITIES IN IDAHO STATE GOVERNMENT

Energy responsibilities are spread among many state and local agencies, depending upon the resource (i.e. Department of Water Resources, Department of Environmental Quality), where it is located (Department of Lands, County Commissions), and whether it is developed by a utility regulated by the Public Utilities Commission. Investor owned utilities are subject to economic regulation by the Public Utilities Commission. Energy policy within the State is established by the Legislature, except in those areas preempted by federal statutes. Policies are administered by the respective state agencies, with coordination provided by the Office of Energy Resources (OER).

Energy responsibilities are carried out principally by the Idaho Public Utilities Commission and the OER. OER's responsibilities quite often are accomplished in coordination with other state agencies including the Idaho Department of Lands, Idaho Department of Environmental Quality, Governor's Office of Species Conservation, Idaho Department of Fish and Game, Idaho Department of Water Resources, and Idaho State Historic Preservation Office.

In addition, Idaho is a member of the Northwest Power and Conservation Council, an organization created pursuant to a multi-state compact. The Council develops power plans and fish and wildlife mitigation plans that guide the Bonneville Power Administration's expenditures in these areas. Finally, the Idaho Legislature in 2005 created the Idaho Energy Resources Authority to promote the development of generation and transmission resources in Idaho.

2.5.1. Idaho Public Utilities Commission

The Idaho Public Utilities Commission ("PUC") regulates Idaho's investor owned electric, natural gas, telecommunications and water utilities in order to ensure adequate service at just, reasonable and sufficient rates. The three-member commission was established by the 12th Session of the Idaho Legislature and was organized May 8, 1913 as the Public Utilities Commission of the State of Idaho. In 1951 it was reorganized as the Idaho Public Utilities Commission. Statutory authorities for the Commission are established in Idaho Code titles 61 and 62. The PUC also has authority to promulgate administrative rules, and the PUC's official rules are published in IDAPA 31.[117]

The PUC consists of three Commissioners who are appointed by the governor, subject to Senate confirmation, to staggered, six-year terms. No more than two commissioners may be of the same political party.

The PUC holds formal hearings on utility issues on a case-by-case basis. These hearings resemble judicial proceedings and are recorded as well as transcribed by a court reporter. Formal parties to the case under consideration present testimony and evidence, subject to cross-examination by attorneys representing the parties and the commissioners. To help insure its decisions are fair and workable, the commission employs a staff of about 50 people, including engineers, accountants, economists, and investigators. The staff analyzes each matter before the Commission and issues a recommendation. In formal proceedings before the commission, the staff acts as a separate party to the case, presenting its own testimony, evidence and expert witnesses. The Commission considers staff recommendations along with those of other participants in each case - including utilities, public, agricultural, industrial, business and consumer groups. The Commission renders a decision based on all the evidence that is presented in the case record. Commission Orders can be appealed directly to the Idaho Supreme Court.

2.5.2. Idaho Office of Energy Resources

The Idaho Office of Energy Resources (OER) was established by Executive Order 2007-15 on October 19, 2007.[118] This order placed the OER within the Office of the Governor, transferring the staff of the former Energy Division of the Idaho Department of Water Resources to OER. OER was designated as the state level entity to coordinate energy policy, direct Idaho's

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[117] Idaho Statute Title 61: http://www.legislature.idaho.gov/idstat/Title61/T61.htm and Idaho Statute Titl3 62: http://www.legislature.idaho.gov/idstat/Title62/T62.htm
[118] http://gov.idaho.gov/mediacenter/execorders/eo07/eo_2007_15.html

response to federal energy issues, and participate in state and regional energy planning efforts on behalf of Idaho. Their duties include advising the Governor, the Legislature and other public officials regarding matters related to Idaho's energy requirements, supply, generation, transmission, conservation, and energy efficiency efforts. The OER is also responsible for accepting and utilizing funds from various state, federal, and other sources to accomplish purposes outlined within the Executive Order referenced above. The OER performs its duties in accordance with statutory requirements and in conformity with the 2007 Idaho Energy Plan.[119]

OER has a dedicated funding source through geothermal royalties from the auction of geothermal leases on federal land. However, since the initial payment into the geothermal royalties fund, payments from the federal government have been very limited. Based on actual geothermal development on federal land, a steady revenue stream from this fund appears unlikely. Due to the limited dedicated funding, OER primarily relies on federal funds to support its program work; no employees are supported by general fund appropriations. As a result of its reliance on federal grant money, the OER staff is restricted to activities that are provided for in the federal grants.

In service to educating Idahoans on energy issues and advising stakeholders on energy issues, the OER, on behalf of the Governor, created the Idaho Strategic Energy Alliance ("Alliance"). The Alliance was created to help develop effective and long-lasting responses to the energy challenges facing Idaho, and is lead by a council comprised of leaders in a number of State agencies. The structure of the Alliance allows a wide variety of stakeholders to play a role in developing options for Idaho's energy future. 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 our citizens, that ensures quality stewardship of our environment, and that functions as an effective, secure, and stable energy system for our state. It is Idaho's primary mechanism to engage in seeking options for and enabling advanced energy production, energy efficiency, and energy business in the State of Idaho.[120]

2.5.3. Northwest Power and Conservation Council

The Northwest Power and Conservation Council develops and maintains a regional power plan and a fish and wildlife program to balance the Northwest's environment and energy needs. The Council also produces estimates of the amount of conservation that can be acquired cost-effectively in the four-state Pacific Northwest region.[121]

2.5.4. Idaho Energy Resources Authority

The Legislature established the Idaho Energy Resources Authority ("IERA") in 2005 for the purpose of promoting transmission, generation and renewable energy development in the state and the region. The IERA is an energy-related lending/financing authority with the ability to issue revenue bonds. This legislation was proposed in response to the recognized inability of Idaho's municipal and cooperative electric utilities to adequately and reasonably finance transmission and generation projects required for the benefit and needs of their residents and members. The IERA can participate in planning, financing, constructing, developing, acquiring,

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[119] http://dfm.idaho.gov/Publications/BB/StrategicPlans/SP2011/EnergyResources_SP.pdf

[120] http://www.energy.idaho.gov/energyalliance/

[121] http://www.nwcouncil.org/energy/powerplan/6/default.htm

maintaining and operating electric generation and transmission facilities and their supporting infrastructure. The IERA provides a vehicle for Idaho utilities to jointly own and finance transmission and generation projects for the benefit of their ratepayers. While the IERA has bonding authority and other powers to promote specific projects, it has no appropriation, no full-time staff, and no ability to finance projects that are not backed by utility ratepayers.[122]

In 2010 the Authority undertook a structured transaction in conjunction with the Utah Associated Municipal Power System (UAMPS) to develop the Horse Butte Wind Project (Horse Butte) on behalf of UAMPS members, including the City of Idaho Falls and Lower Valley Energy electrical cooperative. Participation by and ownership of Horse Butte by a subsidiary of the IERA materially lowered the development costs of Horse Butte for the UAMPS participant members that will eventually own Horse Butte, upon completion of construction of the project. The Horse Butte Project cost savings is a result of the Authority being able to take advantage of certain federal tax incentives that were otherwise unavailable to UAMPS. The Horse Butte Wind Project will enter commercial operation in the first part of 2012, at which time the IERA's subsidiary will divest itself of Project ownership. [123] [124]

2.5.5. Idaho Oil and Gas Conservation Commission

The Idaho Oil and Gas Conservation Commission was created by Idaho Code § 47-317[125] and is based in the Idaho Department of Lands Director's Office in Boise. It is made up of state board of land commissioners and includes the Governor, Secretary of State, Attorney General, State Controller and Superintendent of Public Instruction. The efficient recovery of oil and gas, protection of correlative rights, and protection of fresh water supplies are the duties of this Commission, as well as other activities associated with oil and gas development including spacing orders, directional drilling, secondary recovery, and unit operations. Drill permits are issued by the Director after a review by the Idaho Department of Water Resources. Commission activities may require a public hearing as part of the review process.[126]

3. Idaho's Future Energy Supply

3.1. OVERVIEW

This chapter describes Idaho's future energy supply under the current plans of Idaho energy suppliers' current plans for investing in new resources and infrastructure. For electricity and natural gas, the information presented in this chapter is based largely on the integrated resource plans that Idaho's investor owned utilities file every two years with the PUC and on input received from Idaho's consumer-owned utilities. The IRPs evaluate a variety of different resources, including demand-side measures such as conservation and energy efficiency, and typically select a "preferred resource strategy" based on evaluation criteria including cost, risk, reliability and environmental concerns. For petroleum, the projections are based on the best publicly-available information, as petroleum suppliers do not file IRPs with state regulators.

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[122] http://www.iera.info/pdf/statement_of_purpose_august2006final.pdf
[123] http://www.windpowerengineering.com/construction/projects/32-for-horse-butte/
[124] Idaho Energy Resources Authority, 2010 Horse Butte Press Release: http://www.iera.info/wp-content/uploads/2011/08/Horse-Butte-Press-Release.pdf
[125] http://www.legislature.idaho.gov/idstat/Title47/T47CH3SECT47-317.htm
[126] http://www.idl.idaho.gov/bureau/minerals/min_leasing/iogcc.html

Idaho's electric utilities have historically relied on coal and hydroelectricity as their predominant energy sources. New investments in these two resources are becoming problematic, however, as large hydro resources are mostly developed and coal is increasingly associated with the impacts of air emissions and global climate change. Moreover, these existing resources are now themselves sources of risk due to hydro relicensing and possible carbon regulation. Idaho utility resource plans are currently focused on renewable resources, natural gas resources, and additional transmission capacity necessary to move energy within the region. In addition, Idaho utilities continue to place an emphasis on cost-effective conservation, energy efficiency and demand response as the growth of Idaho loads has accelerated and the cost of developing new resources has risen.

Idaho has been in a favorable position for accessing natural gas supplies since 1956. Northwest Pipeline is an interstate natural gas pipeline running from the Four Corners area to the British Columbia/Washington border. It has numerous laterals in Washington to assist in serving North Idaho. It was designed to be fed from both ends and in the middle at Stanfield, Oregon with an interconnection with Gas Transmission North coming from British Columbia and Alberta. New connections to Northwest Pipeline will allow for more gas to move into and out of the region providing more gas on gas price competition. Though Northwest Pipeline is usually fully subscribed, the capacity segmentation has allowed more gas to get where it is being consumed when needed. In time, Idaho may need more access to additional pipeline capacity.

The rapid and very successful development of large tight sands gas reservoirs in the Rockies and shale reservoirs in the U. S. and Canada have been beneficial to the Northwest in terms of long term available supplies and competitive pricing. The development of shale gas in the Northeast reduces the quantity of Western Canadian natural gas flowing to Eastern Canada and the New England states, thus improving the market for California and the Pacific Northwest. Additional natural gas underground storage in the Northwest and Canada has provided the opportunity to help soften the higher prices of winter spot gas. The Idaho Public Utilities Commission has worked with investor owned gas utilities to allow for the use of a wide variety of market pricing tools and supply arrangements creating flexibility which benefits all ratepayers. Industrial consumers have the flexibility to tailor their purchases to meet their consumptive needs. As the basis differential from one consumptive center to another in the U.S. seems to level itself, we are still in a natural gas supply positive balance in the Northwest that will bode well for prices being competitive with other regions.

Recent drilling in the Payette Basin of Southwestern Idaho appears to be successful in finding and developing supplies of pipeline quality natural gas with some gas liquids. This production is supposed to go on line in the fall of 2011 and more will be known at that time. This will be the first commercial production of natural gas and related liquids in Idaho. The new Ruby pipeline, which went into service on July 28, 2011, is positioned to redirect displaced volumes and incremental supply to Northern California and the Pacific Northwest.[127]

As a whole, the Committee finds that current plans by Idaho suppliers result in an outcome that lines up reasonably well with the Idaho Energy Plan policy objectives. The Committee is also mindful that major restructuring initiatives can have unintended consequences. As a result, the Committee does not recommend major structural changes to Idaho's energy industry at this time.

[127] http://www.rubypipeline.com/

However, there are a few key areas where action is recommended. First, the Committee finds that cost-effective energy conservation and energy efficiency measures provide the greatest economic and environmental benefits for Idaho (and enhanced economic competitiveness for our businesses) and should be Idaho's highest-priority energy endeavor resource; however, there are many barriers that currently prevent this "resource" from being utilized to its full potential. Second, the Committee finds that continued support investments in economically attractive local renewable energy resources such as wind energy, geothermal energy, low-head hydro and biomass (biofuels and biopower) fuels could also provide economic benefits, particularly in rural areas of the state, while representing an environmentally-friendly source of energy. Third, the Committee finds that conventional resources such as oil, coal, natural gas or nuclear power will continue to be needed to meet Idaho's energy demand; and the Committee encourages suppliers to invest in the most environmentally-sound methods of extraction, production and delivery of conventional energy. Fourth, the Committee recognizes that technology innovation, global market evolution, and regulatory changes have a high probability of changing our energy choices and options, should be closely monitored and policy updated accordingly. Finally, the Committee finds that local officials asked to make decisions about whether and under what conditions to allow the construction of major energy production and major electric generating or transmission facilities would benefit from access to the expertise and information of state agencies; and the public in general will benefit from a continued focused, fact-based dialogue concerning energy options, risks and opportunities

3.2. SUMMARY OF ELECTRIC UTILITY INTEGRATED RESOURCE PLANS

All of Idaho's investor owned utilities develop Integrated Resource Plans (IRPs) on a regular basis. The IRP is a comprehensive decision support tool and road map for utility planning. These plans address supply-side resources, demand-side measures, load forecasts, potential resource portfolios, risk analysis and near-term and long-term action plans. The plans are developed with state utility commission staff, state agencies, customer and industry advocacy groups, project developers, and other stakeholders.

Avista states that its strategy in planning new resource additions is to "own or control a diverse mix of low-cost/low-risk resource, both on the supply- and demand-side, that meet our customer loads while reducing both rate variability and our environmental footprint." This is consistent with general practices among other electric utilities, and the results can be seen in Figure 3.1, which shows the investor owned utility planned additions through 2020, weighted by the percentage of each company's load located in Idaho. The actual resources may be located outside of Idaho. Major planned investments are listed by online service date in Table 3.1.

Idaho's three investor-owned utilities; Avista, Idaho Power, and Rocky Mountain Power all filed updated integrated resource plans (IRP) with the Idaho PUC in 2011. The following sections provide a brief overview of each utilities current plan as well as plans for Idaho's public power utilities.

AVISTA CORPORATION

Avista filed its latest IRP in August 2011. The plan highlights a newly signed contract for the 100 MW Palouse Wind project located near Spokane, Washington and an additional 120 MW of nameplate wind (or other qualifying renewable resources) by 2020. Beyond the recent Palouse Wind acquisition, Avista does not anticipate a need for new resources until late in this decade.

Energy efficiency reduces Avista's load growth by 48 percent over the IRP timeframe. The energy efficiency measures are expected to reduce utility loads by 310 aMW of cumulative energy over the next 20 years. In addition to customer-supplied efficiency, Avista's grid modernization and distribution feeder upgrade programs are projected to reduce load by a further five aMW by 2013, growing thereafter.

Gas-fired generation continues its role as a major contributor to Avista's resource mix. A total of 756 MW of natural gas-fired generation facilities are required between 2018 and 2031. Finally, transmission upgrades will be needed to carry the output from new generation to Avista's loads.

PACIFICORP / ROCKY MOUNTAIN POWER

PacifiCorp's 2011 Integrated Resource Plan indicates the need for a significant amount of new resources to offset load growth over the next several years. Their preferred plan focuses on acquiring combined cycle combustion gas turbines, renewable resources, and significant increases in energy efficiency measures. The IRP estimates average annual energy efficiency measure additions equivalent to about 130 MW, along with 250 MW of load control added through 2015. The National Renewable Energy Laboratory (NREL) ranked PacifiCorp 3rd in the nation for its green energy power (renewable energy sales) programs, 10th in green power sales as a total percent of retail sales, and 2nd in green energy customer participation.[128] They plan to continue actively pursuing green energy options, with plans to add 100 to 300 MW per year in wind resources beginning in 2018, as well as additional solar and biomass resources.[129] For PacifiCorp, energy efficiency represents the largest resource added on an average capacity basis through 2030.

Transmission is a major focus for PacifiCorp's future as they attempt to bring additional renewable and cost-effective energy sources to their customers. They are also required to meet increasingly stringent mandatory federal reliability standards, which require infrastructure sufficient to withstand unplanned outages. Significant new transmission capacity is needed to adequately serve customers load and growth needs in the long-term. In November 2010 they placed the first major segment of the Energy Gateway (double-circuit 345 kV Populus to Terminal line) in service, ahead of schedule and within budget. The Gateway project (jointly owned by Idaho Power and PacifiCorp) includes approximately 1,100 miles of new high-voltage transmission lines between the Windstar Substation near Glenrock, Wyoming and the Hemingway Substation near Melba, Idaho, approximately 300 miles of 230 kilovolt (kV) lines in Wyoming and approximately 800 miles of 500 kV lines in Wyoming and Idaho. The project is scheduled for line segments to be completed in phases by 2018.[130]

IDAHO POWER COMPANY

Idaho Power's 2011 IRP proposes significant amounts of energy efficiency and demand response programs. By 2020, Idaho Power expects energy efficiency programs will reduce average annual load by almost 160 aMW. Demand response programs are also forecast to reduce summer peak load in 2020 by 385 MW.

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[128] http://www.nrel.gov/news/press/2010/838.html

[129] http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/2011IRP/2011IRP-MainDocFinal_Vol1-FINAL.pdf

[130] http://www.gatewaywestproject.com/project_info.aspx

The Langley Gulch combined-cycle combustion turbine is currently under construction and is expected to be on-line in the summer of 2012. In addition, the Neal Hot Springs geothermal project is expected to begin delivering energy to Idaho Power in 2012 and a significant amount of PURPA wind projects will be completed by the end of 2012. Idaho Power currently has 395 MW of wind generation on its system and an additional 363 MW is expected to be completed by the end of 2012 which will bring the total to nearly 760 MW.

Beyond 2012, Idaho Power's next planned large transmission resource is the Boardman to Hemingway transmission line. This project will allow Idaho Power to access the Pacific Northwest energy market to serve growing summer peak load and also facilitate the delivery of energy in the region year-round. The project is currently in the permitting phase and is expected to be completed by the summer of 2016.

IDAHO'S MUNICIPAL AND COOPERATIVE UTILITIES

There are 28 rural electric cooperatives and municipalities providing electric service in Idaho. These utilities are customers of the Bonneville Power Administration (BPA), receiving most of their required power resource from BPA. BPA posted a 2010 Resource Program to help determine the amount, type and timing of new resource acquisitions. The program is guided by and consistent with the Northwest Power and Conservation Council's Sixth Power Plan, released in February 2010. The Resource Program shows that most of BPA's (including Idaho municipal and cooperative customers) incremental energy needs for the next several years can be met by meeting the conservation targets in the Council's Sixth Power Plan and relying on short- and mid-term market purchases. BPA will update the Resource Program periodically as load forecasts, the Power Plan, and customer requirements and resource opportunities evolve.

BPA establishes targets for energy efficiency for the region based on the integrated regional plan of the Council's Sixth Power Plan. As a requirement of the BPA contract, the power rate for utilities includes an allocation for conservation that will be paid back to the utility upon completion of approved energy efficiency measures to help meet the target. Failure to implement the measures will result in forfeiture of that conservation allocation from the individual utility to BPA.

Although historically the Idaho municipal and cooperative utilities have been able to rely on BPA for all power needs, the new BPA contracts, effective October 1, 2011, will "cap" the amount of federal power available to all utilities. Each utility will be faced with acquiring resource to meet any future load growth. These resources may be developed or acquired independently or jointly with other utilities, including BPA (tier two power purchase). Each utility will follow its own City Council or board approved process for evaluating resources and determining the best power resource acquisition. These processes are public processes and involve consideration of factors related to load forecasting, power availability/variability, costs, and transmission availability.

3.2.1. Conventional Resources

Growing concerns over emissions and climate change regulations have made it impractical to pursue the construction of new conventional coal-based generation in Idaho. Natural gas-fired simple-cycle (SCCT) and combined-cycle combustion turbines (CCCT) have lower emissions and are the primary conventional resources being considered by utilities. Because SCCT and CCCT resources have a relatively low capital cost and natural gas prices are forecast to remain low, natural gas resources are one of the least expensive new resources that can be built.

Natural gas plants also provide significant operational benefits because they can quickly ramp their output up and down to follow changing electricity demands, including the changes in the generation from wind projects. New advanced turbine technology, coming to market soon, will increase opportunities to hybridize renewable and gas-based generation and offer more opportunities for Idaho-based generation. This operational flexibility is becoming more valuable as the amount of wind generation in the Pacific Northwest continues to increase.

The potential for carbon regulation is a risk factor that Avista, Idaho Power, and PacifiCorp include in their IRP analyses as it impacts both existing resources and the selection of new resources. With both coal and natural gas, air emissions are risk factors that Avista, PacifiCorp, and Idaho Power include in their IRP analyses. In particular, coal is a highly carbon-intensive fuel source, so future carbon dioxide emission limits and emission costs are specifically addressed. Other emission such as particulates, sulfur dioxide and oxides of nitrogen are also considered.

Figure 3.1 indicates that natural gas is the preferred resource for our electric utilities in their planning. This information, gained from the IRPs of Idaho's three investor owned utilities, also shows a commitment to renewable resources as well as system upgrades (including transmission, distribution, and increasing the efficiency of existing power plants.)

The focus on natural gas seems like a logical conclusion at this point in time. Natural gas plants are built in smaller, more modular units that can quickly ramp their output up and down to follow changing electricity demands. Natural gas is relatively abundant, clean burning and easy to distribute. Nearly 87% of U.S. natural gas used is domestically produced.[131] Natural gas (largely methane) burns more cleanly than the other fossil fuels (45% less carbon dioxide emitted than coal and 30% less than oil) due the chemical nature of the fuel having a highly efficient combustion process and being a less carbon-intensive fuel.[132] It typically has greater price volatility than coal. Nevertheless, natural gas units are often required because of the operational flexibility that they provide. In addition, the capital costs of a natural gas plant are significantly lower on a per-kW basis than a coal plant. Although natural gas is more environmentally friendly than other fossil fuels, it is a non-renewable energy source, and its extraction process can create environmental issues. Additionally, expanded pipeline access in the region and increasing attractiveness of natural gas for direct use and power generation means that natural gas prices are vulnerable to price volatility as observed in the past.

3.2.2. Renewable Resources

The utility IRPs show planned additions of hydroelectric, wind, solar, geothermal, and landfill/biomass gas resources. The cost and operational flexibility of hydroelectric plants depends upon the location, availability of a storage basin, timing of river flows, and fish flow requirements. The most cost-effective and operationally flexible sites have already been developed, so the potential for cost-effective hydroelectric power is limited. This is reflected in the relatively small hydropower additions in the utility IRPs.

Wind power is a mature technology that can produce energy at a relatively low cost compared to other renewable resources. However, since wind power is an intermittent power source, system

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[131] http://www.fueleconomy.gov/feg/bifueltech.shtml
[132] http://fossil-fuel.co.uk/natural-gas/the-advantages-of-natural-gas

planners must assure that there is sufficient dispatchable generating capability (capacity) in the rest of the electric system to meet instantaneous customer demands regardless of when or how much wind is blowing. In addition, the variability of wind resources can cause overall system dispatch costs to increase. These "system integration" issues generally limit projections of wind power expansion.

The large quantity of wind resources being built in the Pacific Northwest is driven by renewable portfolio standards (RPS) adopted by surrounding states. While Idaho does not have an RPS, attractive PURPA rates have led to the construction of a considerable amount of wind generation in the state. In addition to hydropower and wind energy, geothermal, biomass, landfill gas, and digester plants are planned on behalf of Idaho customers through 2020. Because these types of resources tend to be small in size and difficult to develop on a utility scale, many of these projects will happen under PURPA.

3.2.3. Electricity Fuel Mix

Figure 2.14 indicates that Idaho currently receives nearly half of its electricity from hydroelectric power facilities. Coal provides about 38 percent, and non-hydro renewables approximately 3 percent. Given the planned plant additions shown in Table 3.1 and the resource mix shown in Figure 3.1, the share of power from non-hydro renewables is forecast to increase substantially.

3.2.4. New Resource Additions

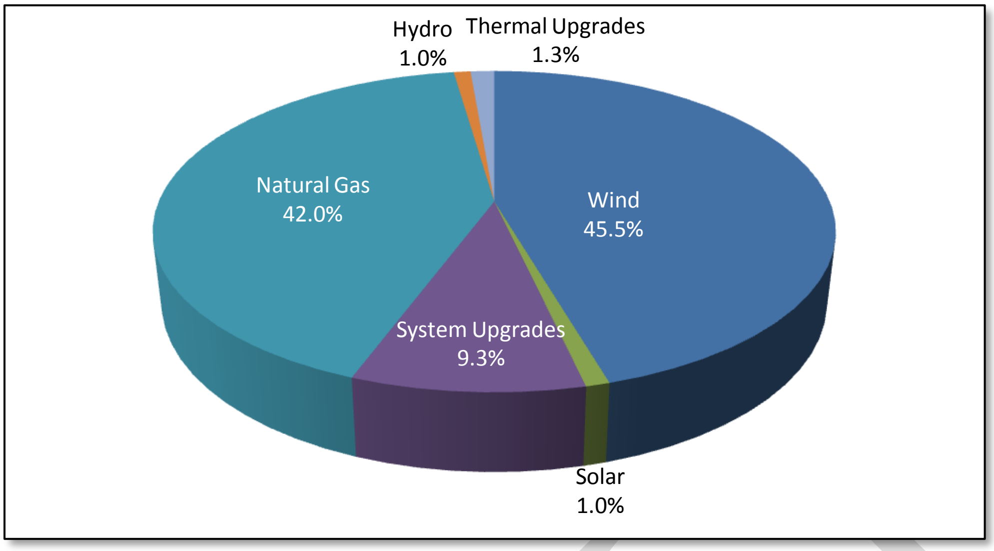
Figure 3.1 shows the total planned additions by all companies through 2020, weighted by the percentage of each company's load located in Idaho. The actual resources may be located outside of Idaho. Major planned generating facilities investments through 2020 are listed by online service date in Table 3.1.

Table 3.1. Planned Investments in Electric Generating Facilities by Idaho Investor-Owned Utilities, 2012-2020

Year	Investment Type	Nameplate Capacity (MW)	Utility
2010-2015	Distribution Efficiencies	28	Avista
2011-2015	Oregon Solar Programs	19	PacifiCorp
2011-2021	Coal Plant Turbine Upgrades	65	PacifiCorp
2012	Northwest Wind	120	Avista
2012	Combined-Cycle Combustion Turbine (Langley Gulch)	300	Idaho Power
2012-2018	Micro Solar- Water Heating	30	PacifiCorp
2014-2016	Combined-Cycle Combustion Turbine	1,222	PacifiCorp
2015	Shoshone Falls Upgrade	49	Idaho Power
2016	Boardman to Hemingway Transmission	450	Idaho Power
2018-2019	Existing Thermal Resource Upgrades	4	Avista
2018-2019	Northwest Wind	120	Avista
2018-2029	Wind, Wyoming	2,100	PacifiCorp
2019	Simple Cycle Combustion Turbine	83	Avista
2019	Combined-Cycle Combustion Turbine	475	PacifiCorp
2020	Simple Cycle Combustion Turbine	83	Avista

Note: Table 3.1 reports the preferred resource strategy from each utility based upon their 2011 IRPs.

Figure 3.1. Electric Investor Owned Utility Planned Additions Through 2020 (aMW)

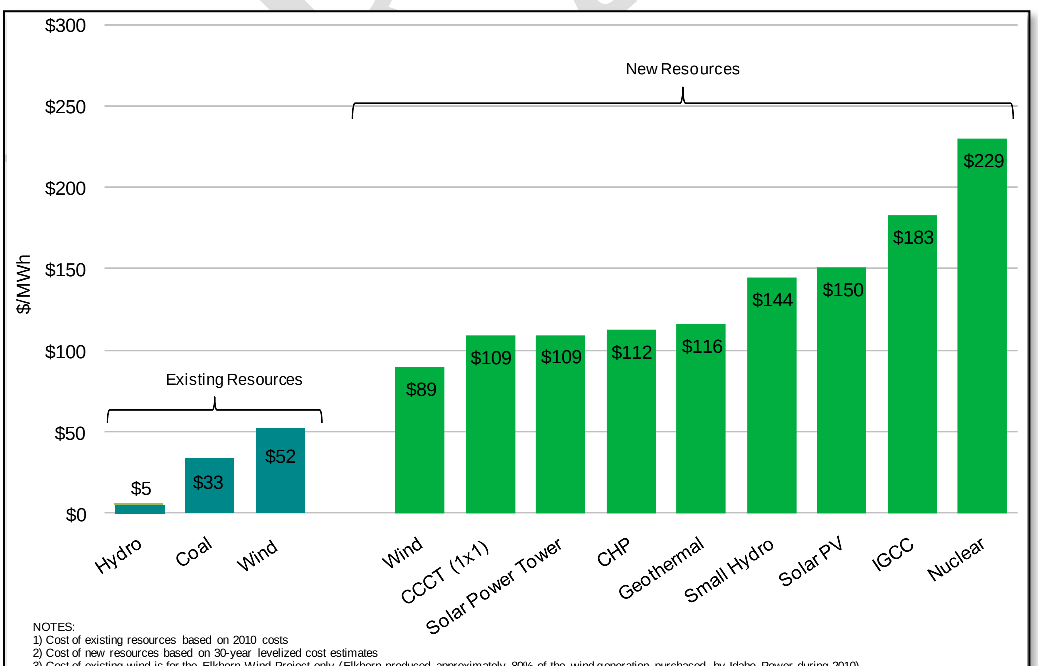


Source: Avista, Idaho Power, and Rocky Mountain Power IRPs for 2011

3.2.5. New Resource Costs

Recent cost increases have significantly impacted the cost of new supply-side resources, especially when compared to the cost of the existing resources. Figure 3.2 is taken from Idaho Power's 2011 IRP and shows the 2010 costs in dollars per megawatt hour (MWh) for Idaho Power's existing hydroelectric resources, coal generation facilities, and power purchased from the Elkhorn Valley Wind Project. In addition, Figure 3.2 also shows the estimated cost of energy from new resources considered in the IRP.

Figure 3.2. Energy Cost of Existing and New Supply-Side Resources

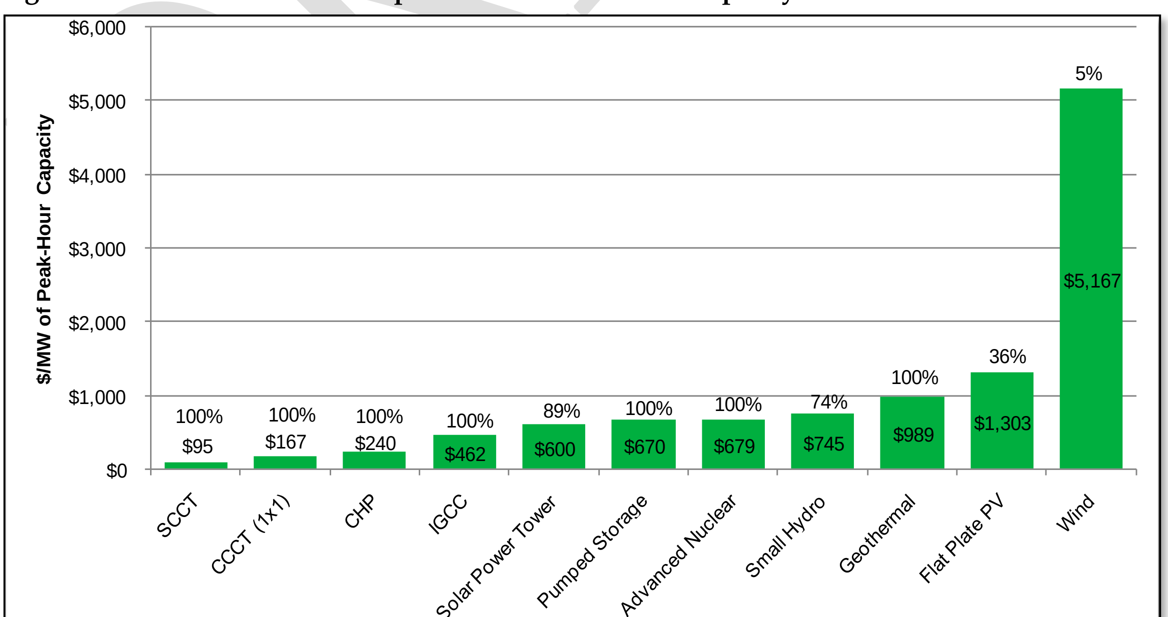


Source: Idaho Power 2011 IRP, http://www.idahopower.com/pdfs/AboutUs/PlanningForFuture/irp/2011/2011IRPFINAL.pdf

While it is important to consider the costs presented in Figure 3.2, it is critical to point out that these figures do not provide a comparable basis for evaluating all of the costs and values of the resources considered without including other factors such the 'peak hour capacity' costs shown in Figure 3.3. This is because the unit costs ($/MW/h) of the new resources shown are the total costs for a project divided by the amount of *energy* generated. For a new resource such as wind, the $89 is close to representing a total value for that resource, since the capacity contribution of a wind plant is typically only about 5% of its nameplate. When compared with the "energy only" value of the CCCT of $109, the value of the wind project appears to be greater. However, the "energy only" value of the CCCT is just a part of the total value of that resource, which includes significant capacity on a planning basis as well as quick-start integrating and load-following capabilities. A true total value comparison of the resources would involve either stripping out the costs associated with the capacity and integration values of the dispatchable resources to show an "energy only" cost comparison, or adding the required capacity and integration costs to the non-dispatchable resources to allow for a total value look.

Further, the value that each type of resource provides in conjunction with the other resources in a utility's generation portfolio must also be considered. Supply-side resources have different operating characteristics, making some better suited for meeting capacity needs while others are better for providing energy. The low capital cost and dispatch capability of a simple-cycle combustion turbine (SCCT) resource makes it a good choice for meeting capacity needs, as long as it is needed for only short durations to meet peak-hour load. A geothermal resource typically provides maximum generation during peak load periods, but because it is non-dispatchable and generally provides constant generation year round (baseload), it is considered a better energy resource. Wind, as discussed above, has favorable characteristics because it can displace fossil-fuel sources of energy when the wind is blowing; however, it provides almost no peak-hour capacity due to the variable and intermittent nature of the generation.

Figure 3.3. 30-Year Levelized Capital Cost of Peak-Hour Capacity



Source: Idaho Power 2011 IRP, http://www.idahopower.com/pdfs/AboutUs/PlanningForFuture/irp/2011/2011IRPFINAL.pdf

Figure 3.3 is also taken from Idaho Power's 2011 IRP and shows the 30-year levelized capital cost in dollars per MW of peak-hour capacity for many of the supply-side resources evaluated in the 2011 IRP. This metric provides useful information on the value of each resource type in terms of providing peak-hour capacity. Idaho Power's peak loads typically occur between 3:00 p.m. and 7:00 p.m. on hot summer days; the expected capacity factor for each resource type during this time period is also shown in Figure 3.3.

Resources capable of providing 100 percent of nameplate capacity during peak load periods have an obvious cost advantage when compared to resources with lower peak-hour capacity factors, such as wind. Because wind, as stated above, can be counted on to only provide 5 percent of nameplate capacity[133] during the peak-hour, 20 MW of nameplate wind would need to be built to get one MW of peak-hour capacity.

3.2.6. Transmission Planning

Pursuant to recent rules adopted by the Federal Energy Regulatory Commission (FERC)[134], Idaho's investor owned utilities are required to participate in local and sub-regional transmission planning and to coordinate with neighboring sub-regional planning groups. Two Pacific Northwest planning groups – Northern Tier Transmission Group (NTTG) and Columbia Grid[135] – now produce transmission expansion and economic study plans on a periodic basis. Additionally, Idaho's electric utilities, the Idaho PUC, and the Idaho OER are participating in numerous committees under the umbrella of the Western Electricity Coordinating Council (WECC) to develop a Western Interconnection-wide ten-year Regional Transmission Expansion Plan (RTEP).[136] These local, sub-regional, and regional planning processes are providing the opportunity to explore transmission project costs, benefits, and risks and their allocation to customer group beneficiaries, as well as to explore opportunities for project coordination at the sub-regional and regional levels in order to avoid costly duplication of facilities.

This building-block, bottom-up approach to transmission planning is being conducted in open, transparent, and inclusive processes that allow all interested stakeholders, including Idaho's Consumer-Owned Utilities, to participate by providing their customer load and new resource data for inclusion in the plan. By participation in these planning processes, stakeholders can gain information to determine whether, how, and at what cost they will be able to bring new resources to load.

FERC sets policies for investor owned utilities concerning new resource interconnection and transmission service requests[137]. FERC sets cost-based rates for transmission services, as does BPA through its own rate cases, the results of which are then subject to FERC approval. An investor owned utility may seek incentive rates of return from FERC for specific transmission projects.

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[133] The Northwest Power Planning Council Sixth Northwest Conservation and Electric Power Plan Appendix D: Wholesale Electricity Price Forecast, page D-8, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan_Appendix_D.pdf

[134] FERC Order Nos. 890 and 1000

[135] Idaho Power and PacifiCorp are members of NTTG, and Avista and BPA are members of ColumbiaGrid.

[136] RTEP activities are being funded by a grant from the U.S. Department of Energy as a part of the American Recovery and Reinvestment Act of 2009.

[137] BPA also follows these interconnection and transmission service request policies through FERC's reciprocity requirement for non-investor owned utilities.

Idaho's consumer-owned utilities have historically taken transmission service from BPA, despite their physical location on the grids of investor owned utilities. BPA has, in turn, relied upon a system of agreements with the investor owned utilities known as General Transfer Agreements ("GTAs"), which allow BPA to serve its customers without having to construct duplicate transmission facilities. BPA delivers power to approximately 60 percent of its preference customers through transfer arrangements. In 2011, BPA received notice from PacifiCorp of its intent to terminate the GTA. This notice means BPA will be required to deliver power to systems in Southeast Idaho after June 22, 2016, through another arrangement possibly including constructing new transmission lines.[138] It is unclear for many of these utilities whether, how, and at what cost they will receive power resources and be able to bring new resources to load.

3.2.7. Conservation and Energy Efficiency Programs

As of 2009, energy efficiency accounted for only 1 percent of all electricity production (or off-set of required production) in the United States. But in the Northwest, it accounted for 12 percent, thanks to collaboration among a number of entities - the Bonneville Power Administration, Northwest Power and Conservation Council, regional utilities, state agencies and environmental interests.[139]

Bonneville Power Administration provides energy efficiency programs and services to all of its customer classes, including the Idaho consumer-owned utilities it serves. Idaho Falls Power and Kootenai Electric Cooperative are among Idaho's most active participants in energy efficiency measures in the consumer-owned utility sector. BPA participates in a variety of cutting-edge energy efficiency efforts, sponsoring research in identifying, assessing, and developing emerging energy efficiency technologies including the Pacific Northwest Smart Grid Demonstration Project. They are also active in the area of demand response to help reduce peak demands and transmission constraints. Voluntary demand response offers consumers incentives to voluntarily reduce their electric loads at system peaks. In fiscal year 2009, BPA secured approximately 70 average megawatts of energy efficiency for the Northwest - enough energy to power 60,000 homes.[140]

Idaho electric utilities continue to place an emphasis on cost-effective conservation, energy efficiency and demand response, and the Idaho Public Utilities Commission has the Commission has "steadfastly" directed Idaho utilities to pursue all cost-effective DSM programs.[141] Energy Efficiency and conservation not only addresses current energy use, it is a reliable and cost effective resource to meet future energy demands. This new "supply" of energy comes in two forms, increasing energy savings from existing programs and new savings from new programs. Today, Idaho's utilities analyze new energy efficiency and conservation as a viable supply resource when factoring their total load and resource balance. Every two years, Idaho's public utilities each file an updated Integrated Resource Plan (IRP) which provides a 20-year forecast of future electrical load needs and proposed resources to meet those needs.

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[138] http://www.ferc.gov/whats-new/comm-meet/2011/012011/E-5.pdf

[139] http://www.bpa.gov/energy/n/

[140] http://www.bpa.gov/energy/n/innovation/index.cfm

[141] For additional information please see IPC-E-10-27 regarding the changing landscape of financing electric DSR at: http://www.puc.idaho.gov/internet/cases/elec/IPC/IPCE1027/ordnotc/20110517ORDER_NO_32245.PDF

PacifiCorp is aggressively pursuing energy efficiency in several sectors. Their 2011 IRP estimates that energy efficiency will represent the largest "resource" added to their system on an average capacity basis through 2030. They estimate average annual energy efficiency measure additions equivalent to about 130 MW, along with 250 MW of load control added through 2015, totaling nearly 2,800 MW of capacity over the next twenty years. They are also closely examining energy efficiency potential within their own system including in distribution feeders.[142] Rocky Mountain Power, the Idaho division of PacifiCorp, includes 19 aMW of energy savings in Idaho through 2021. Rocky Mountain has historically focused its demand-side efforts on programs that reduce peak demand, rather than programs that reduce overall energy consumption. Most of its electrical sales in Idaho come from the irrigation customer class. Rocky Mountain Power provides a wide range of costs including a bundle of programs at 1.6 cents and another bundle at 5.7 cents.[143] This compares to energy only from new generation from natural gas plants from 6.7 and 13.4 cents, wind from 6 to 7.6 cents, coal from 7.4 to 11.5, and nuclear at 8.8 cents.[144]

Approximately thirty percent of Avista's customer base is in Idaho. Their 2011 IRP includes energy efficiency measures to reduce overall load growth by 48 percent, save 310 aMW of cumulative energy and a peak reduction of 419 MW over the next 20 years. They estimate that efficiencies gained in their distribution system will add another 13 aMW.[145] Idaho energy savings are forecast to amount to 93 aMW over this time period. Avista provides energy efficiency programs covering a range of conservation and education programs to residential, low-income, commercial, and industrial customer segments. Avista estimates that their entire portfolio of energy efficiency and conservation (EE&C) programs costs between 2 and 4 cents per kilowatt hour saved, depending on assumptions.[146] This compares to energy only from new generation from natural gas plants at 9.9 cents, wind at 10 cents, coal at 13.9 cents, and nuclear at 14.2 cents.[147]

Idaho Power published its 2011 Integrated Resource Plan in June 2011. The 2011 IRP portfolio development strategy divides the study period into two, 10-year periods, 2011-2020 and 2021-2030. Resource portfolios in each 10-year period are designed to satisfy the energy and peak-hour deficits forecast for these two periods. The IRP identified 233 aMW of additional demand-side resources to be acquired over the 20-year planning period, 95% of which are expected to occur in its Idaho service territory, and avoiding over $1.1 billion in power supply costs in 2011 dollars. Total peak summer capacity of the demand response program portfolio is targeted at 330 MW in 2011 and increases to 351 MW by 2016. New energy efficiency opportunities come from a combination of new measures and program expansions. The cost to acquire energy efficiency will vary between an average of 3.6 cents per kilowatt hour (kWh) for existing programs to 5.1 cents

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[142] PacifiCorp 2011 IRP:
http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/2011IRP/2011IRP-MainDocFinal_Vol1-FINAL.pdf
[143] PacifiCorp 2011 Integrated Resource Plan at 148.
[144] Rocky Mountain Power 2011 Integrated Resource Plan at 119, table 6.5. This uses the costs of generation for the east side of the system and includes a $19 per pound adder to account for carbon risk. This adder is consistent with the analysis of Idaho Power and Avista.
[145] Avista 2011 IRP:
http://www.avistautilities.com/inside/resources/irp/electric/Documents/2011%20Electric%20IRP.pdf
[146] Avista 2011 Integrated Resource Plan at page 3-15, Figure 3.6.
[147] Avista 2011 Integrated Resource Plan at pages 6-2 and 6-10.

per kWh for new program activities and measures.[148] These future energy efficiency resources include programs and measures designed to capture energy savings from all customer groups including industrial, irrigation, commercial and residential rate classes. Idaho Power figures existing programs cost 3.6 cents per kilowatt hour, while new programs cost 5.1 cents per kilowatt hour.[149] This compares to energy only from new generation from natural gas plants at 10.9 cents, wind at 8.9 cents, coal at 18.3 cents, and nuclear at 22.9 cents.[150]

Each of the utility plans includes demand side resources that are less expensive than every type of new generation.

3.3. NATURAL GAS SUPPLY

Idaho has been in a favorable position for accessing natural gas supplies since 1956. Northwest Pipeline is an interstate natural gas pipeline running from the Four Corners area to the British Columbia/Washington border. It has numerous laterals in Washington to assist in serving North Idaho. It was designed to be fed from both ends and in the middle at Stansfield, Oregon with an interconnection with Gas Transmission Northwest coming from British Columbia and Alberta. New connections to Northwest Pipeline will allow for more gas to move into and out of the region, providing more gas on gas price competition. Though Northwest Pipeline is usually fully subscribed, the capacity segmentation has allowed more gas to get where it is being consumed when it needs. In time, Idaho may need more access to additional pipeline capacity.

The rapid and very successful development of large tight sands gas reservoirs in the Rockies and shale reservoirs in the U. S. and Canada have been beneficial to the Northwest in terms of long term available supplies and competitive pricing. The development of shale gas in the Northeast reduces the need for as much Western Canadian natural gas to flow to Eastern Canada and the New England states thus improving the market for the California and the Northwest. Additional natural gas underground storage in the Northwest and Canada has provided the opportunity to help soften the higher prices of winter spot gas. The Idaho Public Utilities Commission has worked with the investor owned gas utilities to allow for the use of a wide variety of market pricing tools and supply arrangements creating flexibility which benefits all ratepayers. Industrial consumers have the flexibility to tailor their purchases to meet their consumptive needs. As the basis differential from one consumptive center to another in the U.S. seems to level itself, we are still in a natural gas supply positive balance in the Northwest that will bode well for prices competitive with other regions.

Recent drilling in the Payette Basin of Southwestern Idaho appears to be successful in finding and developing supplies of pipeline quality natural gas with some gas liquids. This production is scheduled to go on line this fall and more will be known at that time. This will be the first commercial production of natural gas liquids in Idaho. The natural gas supply/demand balance for Idaho and the Northwest is expected to tighten in the future. Demand for natural gas is growing in the region, particularly in the residential and commercial sectors which increases the potential for future price volatility. In addition, increasing quantities of natural gas are burned to make electricity.

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148 Idaho Power 2011 IRP:
http://www.idahopower.com/pdfs/AboutUs/PlanningForFuture/irp/2011/2011IRPFINAL.pdf

149 Idaho Power 2011 Integrated Resource Plan at page 3.

150 Idaho Power 2011 Integrated Resource Plan at page 4.

Demand outside of the Northwest for natural gas from the Western Canadian Sedimentary Basin and Rocky Mountain basins is also growing. Several major pipeline expansions are proposed, dramatically increasing the capacity to transport Rocky Mountain and WCSB gas to more lucrative eastern markets. At the same time, the development of oil sands deposits in Canada is poised to significantly increase local demand for WCSB gas in Alberta.

Liquefied natural gas (LNG) shipped from foreign supply basins is expected to become an important source of new supply. The siting of LNG terminals will be challenging, however, due to concerns about safety and coastal development. So-called "Arctic gas" from northwestern Canada and Alaska is also a potentially large source of future supply; however, developing the pipeline infrastructure necessary to import that gas to demand centers in Canada and the lower 48 states faces significant cost and engineering challenges.

3.4. PETROLEUM AND TRANSPORTATION FUELS SUPPLY

New drilling and extraction techniques, primarily hydraulic fracturing for natural gas extraction, have significantly altered the natural gas market landscape, opening up fields of previously out-of-reach oil in the western United States and helping reverse a two-decade decline in domestic production of crude. Natural gas reserves in the United States are estimated to have increased by approximately 1/3 in the past decade alone.[151] This impacts the price and availability for Idahoans for both natural gas for direct use and the technologies that may be chosen to supply electrical generation. Oil executives and analysts say that by 2015 the new fields across the U.S. could yield as much as 2 million barrels of oil a day -- more than the entire Gulf of Mexico produces now and enough to boost U.S. production 20 percent to 40 percent and, within 10 years, potentially reduce oil imports by more than half.[152] The potential for domestic oil shale development could usher in a tremendous regional source of petroleum right on the borders of Idaho.

Hydraulic fracturing, known as "fracking", allows engineers to drill down and horizontally into rock, then pump in water, sand and chemicals at very high pressure in order to allow gas and liquid extraction from tight sandstones and siltstones. It can be used for vertical and horizontal wells. These same techniques have been successfully applied to shales, thus turning source rocks into reservoir rocks. The industry has greatly improved the technique of drilling vertical wells and then drilling a horizontal leg of great distance within the reservoir. The process of fracking has been occurring for over 100 years. Over a million wells have been fracked in the United States and most wells drilled today are given this treatment, although to various degrees of intensity. The primary and overriding environmental concern is the correct process of running and cementing pipe in place to seal freshwater zones from contamination and invasion from deeper waters and frack fluids.

Over the time frame from the 1920's to present day, a number of companies and individuals have explored for oil and gas in Southwestern and Southeastern Idaho. Shows of hydrocarbons have been found but no commercial discoveries have been made. Of course, the economics have always depended upon an infrastructure being in place whereby natural gas can be sold and utilized. The price for the commodities had to justify the risk and costs of the search.

In recent years interest in the Payette Basin of Washington, Payette, and Malheur (Oregon) Counties has increased resulting in Bridge Resources and their partner, Paramax Resources of

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[151] http://www.naturalgas.org/overview/resources.asp

[152] "New Drilling Method Opens Vast U.S. Oil Fields", Associated Press, Published February 10, 2011

Calgary, Alberta, with offices in Denver, conducting new seismic operations and drilling near New Plymouth, Idaho. To date, they have drilled 11 wells and believe they have completed seven wells as producers. The wells have tested commercial quantities of pipeline quality natural gas and a few wells have also tested high gravity condensate. Three of the 11 wells can produce at economic levels naturally. Four require stimulation through fracking. The other four were dry. The estimated reserves of the production wells are in the 250 billion cubic feet range[153] with seismic analysis demonstrating numerous potential drilling targets. The project is awaiting pipeline construction with a tap into the interstate Northwest Pipeline which runs through the area. Several additional oil and gas companies are also leasing the oil and gas mineral interests from landowners and mineral interest owners in the area and reprocessing the seismic lines that have been produced in past years. The state will earn a 12.5 percent royalty on any production from wells located on endowment lands. It also charges a 2 percent production tax, regardless of where the well is located, and some of that revenue would go to public schools and local governments.[154] The Idaho Petroleum Council estimates that Idaho has an expected production value of $205 million. If that is the case, the state could realize a royalty of nearly than $11 million in severance taxes and royalties, nearly $6 million of which will go directly to Idaho public schools.[155]

The Idaho Oil and Gas Conservation Commission approved temporary rules for hydraulic fracturing that allow Bridge Resources to become the first natural gas driller in the state. The commission decided not to put a permanent ban on horizontal fracking, where fluids are pumped into shale formations at high pressure to allow natural gas to permeate through for recovery. The company stated that it only will use a "mini-fracking" procedure to stimulate flows of some of its wells. Bridge would inject only vertically, at high pressure, a mixture of gel and sand into the sandstone formation where the company has found gas to clean out the reservoir near the well bore. This process props open fractures and entices gas to flow more freely. Bridge officials said they could go into production before the end of 2011.[156]

Petroleum usage is related to fuel costs, vehicle usage, number of vehicles, and changing vehicle technology. In 2009, the estimated vehicle miles traveled (VMT) in Idaho was 15.251 billion. This is an estimated 10,008 vehicle miles traveled per capita in Idaho compared to a national average of 9,779 miles per capita in 2009.[157] Increasing fuel efficiency due to CAFE legislation, lower vehicle weights from improved design and new materials, and improved combustion technologies and optimized fuel systems may decrease total petroleum demand as vehicle fuel efficiency is estimated to increase by 25-40% for passenger vehicles and 20% for commercial vehicles by 2015.[158] Urban transportation planning and personal behaviors, such as increased use of carpooling and public transportation can also reduce transportation fuels demand. The use of alternative liquid fuels and electricity as a transportation fuel could also affect future petroleum demand.

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[153] http://www.standard.net/topics/business/2011/02/16/natural-gas-driller-has-hopes-idaho
[154] Ibid.
[155] http://idahopetroleumcouncil.com/wp-content/uploads/2011/08/Economic-Benefits.pdf
[156] http://www.idahostatesman.com/2011/04/20/1616690/controversial-drilling-practice.html
[157] U.S. Department of Transportation, Bureau of Transportation Statistics, State Transportation Statistics, 2009
[158] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Vehicle Technologies Program, DOE/GO-102010-3058, May 2010

There is considerable interest in using electricity as a transportation fuel with the first modern mass market plug-in electric passenger vehicles (hybrid-electric Chevrolet Volt and the full-electric Nissan Leaf) recently becoming available. While plug-in electric vehicles are likely to be a small fraction of the market (estimated at about 1.4% of the global light duty vehicle market in 2017[159]) they have important potential implications on electrical generation, the transmission grid, and electricity costs. As such, plug-in electric vehicle penetration in Idaho and its effects should be monitored. Vehicle charging during daytime peak loads would result in the need for additional generation capacity, more transmission assets, and could affect grid reliability although smart grid technology could help mitigate impacts. However, while plug-in electrics represents a new load source, if charged at night during low loads, they could potential lead to lower electricity costs as a result of higher electricity sales but without the need for additional capital costs (and assuming that there are no additional reliability or grid maintenance costs).

In a sense, transportation fuel usage is the energy "elephant in the room" in Idaho. Transportation fuels provide about 31 percent of the energy used in Idaho and represent (gasoline) an average of 57% of household energy expenditures. Further, the large majority of our liquid transportation fuels are imported. While Idaho has approximately 60 million gallons per year of ethanol production capacity and about 1.5 million gallons of biodiesel production capacity, over 1 billion gallons of transportation fuels were consumed in Idaho in 2009.[160,161,162] Also, production of these renewable biofuels is often at less than capacity, depending upon the price and availability of feedstock.

3.5. ENERGY EFFICIENCY AND CONSERVATION

The Northwest Power and Conservation Council develops estimates of the amount of conservation that can be acquired cost-effectively in the four-state Pacific Northwest region. The Power Council's Sixth Northwest Power Plan concluded the entire region could meet 85% of future load growth through cost-effective efficiency over the next 20 years. This is double the amount in the Fifth Power Plan and is attributed to better technology, falling costs, and new program designs. The Council noted that "failure to achieve the conservation included in the plan will increase the cost of, and risks to, the power system . . ." and hinder other states efforts to meet their carbon reduction goals. The Power Council's most recent estimate suggests that approximately 5,900 aMW of conservation are achievable in the four state region between 2010-2030.[163] Current electric utility integrated resource plans published by Idaho's investor owned utilities comprise approximately 350 aMW over a similar period of time.

Idaho has a significant amount of cost effective energy efficiency and conservation (EE&C) available. When considering the size of the available EE&C supply, analysts investigate it at three levels: 1) The technical potential envisions every electrical use with the most efficient option currently available regardless of cost. 2) The economic potential is a subset of this supply where the benefits exceed the costs; meaning electrical demand is met through efficiency for less cost

[159] Pike Research, Electric Vehicle Market Forecasts, 3Q 2011

[160] http://ww.eia.gov/state/seds, Table C2 Energy Consumption Estimates for Major Energy Sources by Physical Units, 2009

[161] http://www.ethanolproducer.com/plants/listplants

[162] http://biodiesel.org/buyingbiodiesel/plants

[163] Northwest Power and Conservation Council. (2010). *Sixth Northwest Conservation and Electric Power Plan* (No. Council Document 2010-09). Retrieved from http://www.nwcouncil.org/energy/powerplan/6/default.htm

than a generation resource. 3) The achievable potential is a smaller subset that factors in expected customer participation in programs and constraints on investments in EE&C.[164] This technique is different than the method used by the Power Council.

While EE&C is consistently shown to be cost effective and available in sufficient supply, some uncertainty remains. All utilities, not just in Idaho, continue to improve their ability to evaluate measure and verify actual energy savings. Also, overall energy conservation depends on each individual consumer taking steps to use energy wisely. Some people are simply more likely to conserve energy than other people. These are manageable uncertainties however.

Idaho can likely realize substantial benefits by acquiring all economic EE&C. These types of projects also tend to stimulate sales of materials in Idaho stores; and projects to improve buildings and manufacturing processes create local jobs. Developing new, innovative techniques and materials are valuable assets Idaho could export to other states. And in the face of the rising cost of energy, EE&C programs give individuals the tools to control their energy bills by reducing their energy consumption.

State policy makers can play a significant role in closing the gap between the economic potential and the achievable potential. Because the economic potential is defined as providing greater benefits to citizens than costs, policy makers can be confident in taking on this role. Policies that can help close the gap include providing tax incentives for acquiring cost effective EE&C, reducing regulatory burdens such as conflicting building or zoning codes, and educating citizens about the benefits of using energy wisely. Such actions should be considered based on value propositions for specific projects.

Policy makers can also lead by example by acquiring all the economic EE&C at public facilities. The Office of Energy Resources K-12 Schools Efficiency Program is an excellent example. Using federal stimulus funding OER contracted with private companies to install new lights and upgrade heating, cooling, and ventilation systems in schools across the state. As a result, schools see lower power bills, freeing up dollars for students, and better learning environments. This program is a great example of using EE&C as a resource to meet schools energy demands that results in both saving money and improving classrooms.[165]

3.6. ENERGY TECHNOLOGY TRENDS

Due primarily to the importance of energy security – economic, environmental, and national security, one can expect continued to increasing investments globally for energy research and development. Energy technologies, novel systems and approaches stemming from these investments will impact every facet of energy generation, transmission and use and will most likely offer opportunities and risks not foreseen today.

Areas to closely monitor include advances that enable transmission capability and improve system operations, which will impact access to renewable energy and its integration in into the power system. Emerging smart grid technologies could make it possible for consumers to help balance their supply and demand. By providing information and tools to consumers to adjust

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[164] National Action Plan for Energy Efficiency (2007). National Action Plan for Energy Efficiency Vision for 2025: Developing a Framework for Change. www.epa.gov/eeactionplan.

[165] See Idaho Office of Energy Resources K-12 School Efficiency Project at http://www.energy.idaho.gov/stimulus/state_programgrants.htm

electricity use in response to available supplies and costs, the capacity and flexibility of the power system could be enhanced, and may have a significant impact on Idaho energy networks. Smart grid development also may facilitate the deployment of plug-in hybrid electric vehicles that could improve the use of available generating capacity and help reduce carbon emissions in the transportation sector; and the development of new energy storage technologies will impact both the feasibility of fuel-switching in the transportation sector (gas to electric) as well as grid stability through grid-scale energy storage. In the future, power generated by geothermal resources, gasified coal with carbon sequestration, advanced nuclear, or currently unknown technologies could become available to Idaho. New technologies and approaches such as system hybridization offer the potential to fundamentally change the power system while improving its efficiency and reliability.[166]

With numerous successful high-tech related businesses, entrepreneurial startups, a national laboratory focused on energy research, development and demonstration, and universities with substantial energy research and development portfolios; Idaho holds strategic advantages in playing a major role in bringing new energy technologies to market.

3.6.1. Nuclear Technology Look-Ahead

Technology maturity, availability, and attributes would influence the viability of commercial deployment of nuclear electric production in Idaho. New reactor designs available today or in the near future include five advanced water-cooled reactors that now received, or are very near to receiving (2013 time frame), design certification from the United States Nuclear Regulatory Commission (US NRC). All of these designs are very large production units (in excess of 1,000 MWe), and three of these designs (or variants that are substantially the same technology) are either operating (GE-Hitachi Advanced Boiling Water Reactor) or under construction (Westinghouse AP-1000 and Areva Evolutionary Power Reactor) outside of the United States.[167] This experience with construction and operation of new designs could provide substantial data to assist in making business and policy decisions regarding deployment in Idaho.

Reactor technologies possibly available in a 10 year time frame include several water-cooled small modular reactor designs (SMR). SMRs are presently of interest with national energy policy and business communities because of their small size (generally less than 300 MWe per module), enhanced safety features, and more favorable financial outlay characteristics (theoretically offering lower construction costs and shorter construction schedules). High temperature gas cooled reactors (HTGRs), most notably embodied in the US Department of Energy's Next Generation Nuclear Plant (NGNP) Program, either in a small modular configuration or in larger units, may be further developed. These classes of systems are topics of research by DOE national laboratories and under consideration for deployment assistance by DOE. Progress in these areas should be monitored and the Idaho National Laboratory's role in demonstration of these technologies should be considered.

Additional areas of technology advance that may impact the viability and desirability of commercial nuclear power in Idaho include systems hybridization (coupling nuclear reactors with renewable or fossil energy inputs to create synthetic fuels while improving transmission

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[166] Northwest Power Planning Council Sixth Northwest Conservation and Electric Power Plan, February 2010, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan.pdf
[167] http://www.world-nuclear.org/info/inf08.html

system stability) and development of dry-cooling technologies (reducing the water consumption / withdrawal associated with nuclear generation). Advanced simulations and computing approaches, coupled with advances in system diagnostics and control techniques, hold promise for enhancing operability, maintainability, and safety of existing and future nuclear systems. These advances may also be transferable to non-nuclear energy systems, offering greater economic competitiveness and breadth of deployability of renewable and fossil systems. Nuclear energy-related technology markets may offer attractive business and employment opportunities for Idaho separate from building a nuclear power plant in the State. With the global growth in nuclear power expected to continue, areas such as nuclear fuel services, nuclear and non-nuclear component testing and evaluation, and related research and professional services are important areas of consideration for Idaho with potential economic impact and energy supply requirements. The development and demonstration of advanced used fuel processing technologies, used fuel storage and related management systems, and advanced fuels for existing nuclear reactors is continuing (and in some cases accelerating). Advances in these areas may provide opportunities for Idaho in research, development, demonstration and deployment of fuel management systems. The announcement of plans to construct a large enrichment plant in Idaho exemplifies opportunity in global nuclear fuel services while national used fuel service markets could provide additional fuel cycle business opportunities.

3.6.2. Clean Coal Technology

"Clean coal technology" describes a new generation of energy processes that sharply reduce air emissions and other pollutants from coal-burning power plants. Clean coal technologies are several generations of technological advances that have led to more efficient combustion of coal with reduced emissions of sulfur dioxide and nitrogen oxide. The U.S Department of Energy (DOE) administers the clean coal technology program to encourage and support public/private partnerships to research, develop and demonstrate clean coal technologies that ultimately can be brought to large-scale commercial deployment. This program has resulted in more than 20 new, lower cost, more efficient and environmentally compatible technologies; power plants being built today emit 90 percent less pollutants (SO_2, NO_x, particulates and mercury) than the plants they replace from the 1970s, while coal use has tripled, according to government statistics. Some of the new “clean coal” technologies developed include: fluidized-bed combustion (where limestone and dolomite added during combustion mitigate sulfur emissions), flue gas desulfurization (also called “scrubbers”), low nitrogen oxide burners, catalytic reduction, and electrostatic precipitators. Work is also being done in the areas of coal liquefaction (the conversion of coal into synthetic oil) and gasification (converts the coal to burnable gas with the maximum amount of potential energy from the coal being in the gas). Carbon monoxide from coal gasification can also be used as a feedstock to produce a number of energy products, such as synthetic transportation fuel and fertilizer, this latter application being the focused of a proposed plant in Idaho. A critical research area is in CO_2 capture and storage technologies.[168] A number of means exist to capture carbon dioxide from gas streams, but they have not yet been optimized for the scale required in coal-burning power plants. The most promising "clean coal" technology involves using the coal to make hydrogen from water, then burying the resultant carbon dioxide by-product and burning the hydrogen. The greatest challenge is bringing the cost of this down sufficiently.[169] The DOE is

[168] http://www.nma.org/pdf/fact_sheets/cct.pdf
[169] http://world-nuclear.org/info/inf83.html

sponsoring several research projects to examine the potential for clean coal and natural gas systems.[170]

3.6.3. Energy Storage Technologies and Approaches

Energy storage technologies are often referred to as a way to shift time and smooth the delivery of renewable energy or more efficiently utilize baseload energy resources during off-peak demand periods. There are multiple ways of storing energy: chemically, potentially or kinetically. For example, batteries stores energy chemically, capacitors and pumped hydro store energy potentially and a flywheel stores energy kinetically. But the cost of energy storage infrastructure is not insignificant and utility-scale storage systems are only now being developed. Grid-scale battery and related storage technologies are the subject of considerable research and demonstration interest.[171]

There are several thermal (heat) storage technologies that could provide energy storage at a utility level. At present there exist concentrated utility-scale solar power plants that have the ability to store thermally. Many use a special molten salt or other heat-retaining substance to store the sun's energy as heat which can be released as needed through the generation of steam that is run through turbines. This type of thermal energy storage plant costs roughly $50 per kilowatt-hour to install, roughly 13 cents a kilowatt-hour, about twice the cost of a coal-fired power plant. Research in ongoing to improve this technology and bring the costs down.[172]

The U.S. Department of Energy is providing $7 million over the next five years for independent cost analyses that will support research and development efforts for fuel cells (including those for transportation) and hydrogen storage systems.[173] There are several different types of fuel cells, but basically they are electrochemical devices that combine hydrogen and oxygen to produce electricity, with water and heat as its by-product. Since the conversion of the fuel to energy takes place via an electrochemical process, not combustion, the process is clean, quiet and highly efficient – two to three times more efficient than fuel burning.[174] Hydrogen is an energy carrier, not an energy source, meaning that it stores and delivers energy in a usable form. Research is underway to determine how it can most effectively and efficiency be utilized in both transportation and energy, but additional study is required to better understand the mechanism of hydrogen storage in materials under practical operating conditions and to overcome other critical challenges.[175]

Another area of potential interest involves compressed air storage, in which excess energy (usually generated at night when demand is low) is used to run a compressor which pumps air at high pressure into an underground cavern. The next day, when demand is highest, the air is allowed to rush back out to raise the efficiency of a gas turbine, which generates electricity. According to the U.S. Department of Energy's Sandia National Labs, compressed air energy storage is a low-cost, environmentally benign way to store large volumes of power. Unfortunately it requires very specialized environmental elements.[176] Compressed air has about

[170] http://fossil.energy.gov/programs/powersystems/index.html
[171] DOE 2011 Strategic Plan: http://energy.gov/downloads/2011-strategic-plan
[172] http://www.scientificamerican.com/article.cfm?id=how-to-use-solar-energy-at-night
[173] http://energystoragetrends.blogspot.com/2011/08/doe-awards-nearly-7-million-to-advance.html
[174] http://www.fuelcells.org/
[175] http://www.hydrogen.energy.gov/pdfs/doe_h2_storage.pdf
[176] http://www.ecomii.com/investing/compressed-air

ten times the storage capacity of the same amount of water.[177] This same basic system can be applied in a pumped storage system, where excess electricity to pump water from a lower to a higher reservoir and then, when more power is needed, let the water run back down through a turbine. There are over 100 pumped storage facilities in the world.[178]

Another fairly well-known potential storage sources is the flywheel. Flywheel energy storage system is a unique energy storage system where energy is maintained as rotational energy as the wheel or the rotors are accelerated with extreme speed to mechanically store energy for future use. This stored energy can then be easily extracted and used with the help of a generator which converts mechanical energy into electrical energy. It is similar to battery storage system, with the difference being that batteries store energy in the chemical form which is later converted to electric energy. [179]

3.6.4. Distributed Energy Systems

Also called on-site generation, dispersed or decentralized generation, distributed energy systems are small-scale (usually up to 50 MW according to the Electrical Power Research Institute)[180] electrical generating facilities that are located close to energy consumers. In recent years there has been a resurgence of interest in distributed generation due to developments in distributed generation technologies, constraints on existing transmission lines and on the construction of new transmission lines, and concerns about climate change.

Distributed energy systems can include micro-turbines, photovoltaic installations, combined heat and power, biomass, wind, and gas turbines, and can be favored due to their relatively low-cost operation, small size, flexibility as well as many of distributed energy technologies being renewable in nature. These systems can be placed close to customer load, reducing or eliminating the need for transmission. In some cases a distributed generation unit can even be used as an alternative to connecting a customer to the grid. In addition, well chosen distributed generation locations can even reduce grid losses and can provide ancillary services which improve grid stability (such as reactive power, frequency and/or voltage control).[181] Retail electric utilities as well as their customers can use distributed generators to avoid or defer investments at the local level. For example, to meet seasonally high demand, a utility could install a small-capacity generator at a site on the distribution portion of its network instead of investing in increased capacity of "upstream" power lines and transformers. Small generators can be used to relieve periodic local congestion. Security benefits may come from increasing the geographic dispersion of the nation's electricity infrastructure. However, the prospects for widespread adoption of distributed generation technologies are not at all certain.[182]

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[177] http://zebu.uoregon.edu/1996/ph162/l10a.html
[178] http://www.ecomii.com/investing/pumped-hydroelectric
[179] http://edmortimer.wordpress.com/2011/07/05/everything-i-need-to-know-about-flywheel-energy-storage-system/
[180] "Distributed Generation: A Definition" by Thomas Ackerman, Electric Power Systems Research, December 5, 2000: http://paginas.fe.up.pt/~cdm/DE2/DG_definition.pdf
[181] "Distributed Generation: Definition, Benefits, and Issues", G. Pepermans et al, K.U. Leuven Energy Institute, Katholieke Universiteit Leuven.
[182] Congressional Budget Office, "Prospects for Distributed Electricity Generation", September 2003, http://www.cbo.gov/doc.cfm?index=4552&type=0&sequence=4

Even with the development of these additional resources, transmission lines will still be essential to energy delivery, though the need for additional capacity may be reduced as more energy is generated locally. Capital costs for building these units can be much higher than the cost for large central plants, and concerns such as permitting, siting and environmental impacts remain. These plants also tend to be less efficient than large-scale generating sources of the same type. In addition, if the distributed generation source is non-dispatchable (such as wind or photovoltaic systems), they reduce rather than enhance system security and add the need for additional system resources to provide backup generation due to their variable power supply.[183]

The introduction of distributed resources with their often intermittent nature brings with it the prospect of imbalances in transmission and distribution grids, requiring complex and expensive integration and power-balancing mechanisms. Distributed power is accompanied by unpredictable short-term variations in the supply-demand balance of the distribution grid, which can result in grid instability. Smart grid technology and energy storage systems would be valuable in reducing these risks, but these systems are not yet available. So, in addition to adapting to the shorter run times resulting from increased amounts of renewable and distributed power generation in the energy supply, in most cases conventional generators will still be required to provide backup resources for these systems and, in addition, will be required to change the way they operate in order to meet additional flexibility requirements.[184]

3.6.5. Unconventional Fossil Energy Extraction

New technologies are being developed to improve recovery from conventional oil reservoirs and from unconventional oil and gas reservoirs and to safely utilize coal that is currently deemed un-minable. Significant amounts of oil are left in conventional reservoirs in mature oil fields, only some of which can be accessed through existing enhanced oil recovery techniques. Enormous amounts of hydrocarbons are locked in unconventional reservoirs (oil shale, heavy oil, tar sands) and could be a game-changing resource in terms of U.S. energy security if research can develop ways to generate oil from the shale's kerogen in ways that are energy-efficient and environmentally sustainable. Fractured shale reservoirs are currently being developed using a combination of horizontal drilling and hydraulic fracturing but these methods must be demonstrated to be safe and environmentally acceptable. Economic extraction of these resources will require research to provide a better understanding of the nature of these reservoirs, as well as new technologies for cost-effectively producing the oil and new strategies to safely utilize coal resources that cannot be mined with conventional methods.[185]

Though total consumption of renewable fuels is expected to grow 2.8 percent per year, overall growth in energy demand will mean that the contribution of fossil energy to the nation's energy mix will remain very significant. Energy consumption will continue to grow and in particular, liquid fossil fuels will remain a significant part of our national energy supply for the next quarter century and more. Demand for liquid fossil fuels will require the U.S. to continue to import

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[183] "Distributed Generation: Definition, Benefits, and Issues", G. Pepermans et al, K.U. Leuven Energy Institute, Katholieke Universiteit Leuven.
[184] The Boston Consulting Group, "Toward a Distributed Power World", Frank Klose et al, http://www.bcg.com/documents/file51254.pdf
[185] U.S. Department of Energy, National Energy Technology Laboratory, "Unconventional Fossil Energy Resource Program", http://www.netl.doe.gov/publications/factsheets/program/Prog100.pdf

roughly half of its crude oil supply for the foreseeable future.[186] But in the future, unconventional fossil energy extraction could play an important part in enhancing national economic growth and strengthening national security by reducing dependence on foreign energy supplies.

3.6.6. Transportation[187]

Conventional transportation technologies usually involve the use of fossil fuels for vehicle propulsion. Conventional internal combustion engine (ICE) technology offers a path for continuous improvements in vehicle efficiency with technological advances directed toward reducing vehicle fuel consumption. Vehicle weight and size reduction could significantly reduce fuel consumption and greenhouse gas (GHG) emissions. Direct weight reductions through the substitution of lighter materials as well as basic vehicle design changes will improve vehicle mileage. An especially promising opportunity is the development and deployment of more efficient propulsion systems—engines and transmissions. At constant vehicle performance and size, a 30–50% reduction in the fuel consumption of new light-duty vehicles is feasible over the next 20–30 years. Radically different technologies—such as plug-in hybrids and hydrogen and fuel cells—could take more than 30 years to be developed to the point where they are market feasible and deployed in substantial numbers.

Over a time horizon of 20–30 years, the gasoline hybrid-electric vehicle (HEV) offers a promising path to cost-effective reduction in fuel use. It must be acknowledged, however, that plug-in hybrids need electricity for recharging their batteries, and in most cases the electricity will have to be generated centrally and distributed through the power grid. The efficiency of electricity generation and transmission must be counted in determining the overall energy efficiency. For very large market penetration of plug-in hybrids, electrical generation capacity will have to be increased and the grid will have to be upgraded.

The plug-in hybrid electric vehicle (PHEV) offers important advantages over the two all electric alternatives, fuel cell and battery-electric vehicles. It is no more range-limited than existing vehicles, and requires only modest changes to fueling infrastructure for battery recharging. The main technical challenges for plug-in hybrids are improving the energy storage capacity of lithium-ion batteries, demonstrating their reliability for automotive use, and reducing their cost. However, due to the likely GHG emissions from the electricity production required, the GHG emissions reduction that plug-ins would achieve in the nearer term are comparable to those available from change-sustaining gasoline hybrids at a lower cost.

Even with optimistic battery assumptions, the battery electric vehicle (BEV) is not competitive with other options on a mass-market level, particularly in comparison to the different plug-in hybrid configurations. Configuring a vehicle to offer a relatively modest 200-mile range currently requires a prohibitively large and expensive battery pack. And while the BEV completely displaces petroleum, the weight of the battery pack significantly increases the tank-to-wheel energy use compared to a plug-in hybrid operating in charge depleting mode. With the current electric grid source mix, GHG emissions from electric power generation and grid recharging of

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[186] Ibid.

[187] "On the Road in 2035: Reducing Transportation's Petroleum Consumption and GHG Emissions", Massachusetts Institute of Technology, Laboratory for Energy and the Environment, July 2008, http://web.mit.edu/sloan-auto-lab/research/beforeh2/otr2035/On%20the%20Road%20in%202035%20Exec%20Summary_MIT_July%202008.pdf

batteries result in little or no reduction of well-to-wheels GHG emissions relative to improvements in more conventional technologies. Development of significantly improved batteries with reasonable cost could result in increased BEV market penetration.

Fuel cell vehicle (FCV) assessment is characterized by a high degree of technical and cost uncertainty with respect to both power plant and energy supply and storage. It is not yet clear that fuel cell vehicles will offer the real-world reliability and longevity that is commonly expected of general purpose vehicles. Hydrogen fuel cell vehicles also continue to suffer from high cost and other limitations. Their limited market penetration means that their impact on fuel use and emissions is unlikely to be significant over the next few decades. In addition, hydrogen fuel cell vehicles will probably require centralized production of hydrogen and development of a major distribution and delivery infrastructure.

3.6.7. Bioenergy

Bioenergy is renewable energy derived from biological sources to be used for heat, electricity, or vehicle fuel. Currently it comes primarily from wood, wastes, ethanol from corn fermentation, and biodiesel from oil seeds and animal fats, although it can also come from agricultural wastes and dedicated energy crops, including switchgrass, miscanthus, and poplar used to make advanced biofuels. Biomass energy can theoretically be made from any material that is, or was, living.

The low energy content of biomass compared to fossil fuels requires a higher input of feedstock, posing significant logistic and economic challenges. In addition, conversion technologies (e.g. waste incineration, anaerobic digestion, gasification, pyrolysis, pellet heating, co-firing) need to be further improved in order to make large gains in this potential energy source. Because biomass is a relatively diluted energy compared to concentrated fossil energy, it presents unique tradeoffs concerning land and water use, delivery, and intensity.

Much of the emphasis on ethanol has centered upon its use as a means of reducing carbon dioxide emissions. However, according to a recent study, most prior studies have found that substituting biofuels for gasoline will reduce greenhouse gases because biofuels sequester carbon through the growth of the feedstock. There may be issues with carbon emissions as farmers worldwide respond to higher prices and convert forest and grassland to new cropland to replace the grain (or cropland) diverted to biofuels.

Biofuel derived from plant materials is among the most rapidly growing renewable energy technologies. The total annual demand for biomass has increased steadily over recent years and currently accounts for over 10% of global primary energy consumption.[188] In the United States, ethanol might displace about 10% of gasoline by 2025.[189] A recent study concludes that, on average, using biomass to produce electricity is 80 percent more efficient than transforming the biomass into biofuel. In addition, the electricity option would be twice as effective at reducing

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[188] U.S. Department of Agriculture, Economic Research Service: http://www.ers.usda.gov/features/bioenergy/

[189] "On the Road in 2035: Reducing Transportation's Petroleum Consumption and GHG Emissions", Massachusetts Institute of Technology, Laboratory for Energy and the Environment, July 2008, http://web.mit.edu/sloan-auto-lab/research/beforeh2/otr2035/On%20the%20Road%20in%202035%20Exec%20Summary_MIT_July%202008.pdf

greenhouse-gas emissions.[190] However, liquid biofuels do provide some advantages in transportation applications that may make the lower conversion efficiency acceptable.

Ethanol displaces gasoline by two-thirds, volume for volume, in terms of energy content. Because ethanol has a higher octane rating than gasoline, engines designed for ethanol-based fuels can have higher efficiencies and partially compensate for its lower energy content. The GHG emission reductions provided by different feedstocks are substantially different, but the contribution of biofuels is likely to be constrained by land availability, as well as by biomass yields, their environmental impacts, agricultural policy, energy and environmental policy, and costs.[191] All of these results raises concerns about large biofuel mandates and highlights the value of examining the "big picture" when evaluating these resources.[192]

3.6.8. Energy Efficiency

Cost effective energy efficiency technologies currently exist and their increased implementation is often the most economical and effective way to reduce our nation's energy consumption. New and improved energy efficiency and demand reduction technologies are continually being developed.

In the United States today, buildings account for 40% of primary energy consumption and industrial processes count for another 32%, with the transportation sector accounting for 28%.[193] Studies by government and industry researchers have found that using currently available high-performance energy efficiency technologies can reduce a building's energy consumption and CO_2 emissions by 30% to 50%. "Smart Systems", measurement systems that show users actual data on energy savings, highlight inefficiencies and problem areas over the building lifecycle, and that report on consumption (segregated by end-uses) are being developed to help track energy usage and opportunities for savings. Buildings are also being designed with an integrated approach in which all components and subsystems are considered together in an effort to optimize overall building performance, as are increased usage of solar heating and lighting, energy storage technologies, and natural ventilation.

Some of the more exciting developments in this area include glass panels which can instantly tint themselves or switch from transparent to opaque, new building envelop membranes that provide dynamic increases or decreases in air and moisture permeability, systems that route visible sunlight throughout buildings, technologies for capturing and recycling waste heat, and systems that monitor occupant usage and automatically adjust as needed.

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[190] Massachusetts Institute of Technology, Technology Review, May 8, 2009: http://www.technologyreview.com/energy/22628/

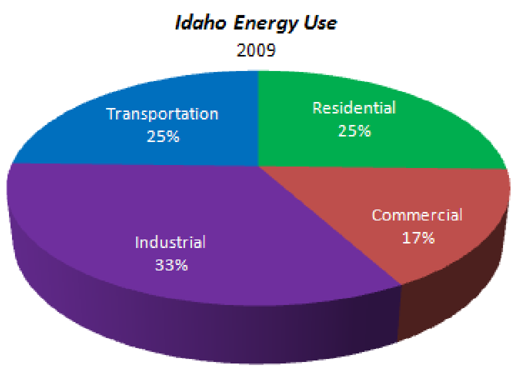
[191] "On the Road in 2035: Reducing Transportation's Petroleum Consumption and GHG Emissions", Massachusetts Institute of Technology, Laboratory for Energy and the Environment, July 2008, http://web.mit.edu/sloan-auto-lab/research/beforeh2/otr2035/On%20the%20Road%20in%202035%20Exec%20Summary_MIT_July%202008.pdf

[192] Science: The World's Leading Journal of Original Scientific Research, Global News, and Commentary, February 2008, http://www.sciencemag.org/content/319/5867/1238.abstract

[193] National Science and Technology Council, "Net-Zero Energy, High-Performance Green Buildings", October 2008, http://www.bfrl.nist.gov/buildingtechnology/documents/FederalRDAgendaforNetZeroEnergyHighPerformanceGreenBuildings.pdf

Some of the barriers to implementing new energy efficiency technologies include the cost of the technologies, the visibility of the true cost of power, the dynamic nature of building ownership, education about available energy efficiency technologies, and the absence of tools and guides to help the practitioner make good choices.[194] Other issues concern a lack of industry integration (the building industry consists of multiple subsectors from architects to construction workers), diverse building codes, and lack of training on operations and maintenance. Widespread adoption of energy efficiency measures will require new communication channels, updated and consistent codes and standards, technology tools for tracking and management, regulatory and financial incentives, and consistent methodologies across government and private industry sectors.[195]

In Idaho, industrial energy customers are the largest energy consumer group, using approximately 33 percent of the state's energy.[196] In most industrial businesses, energy is a small proportion of the costs of owning and operating a factory, typically accounting for less than 10% of operating costs in most industries, so do not get much notice.[197] Energy efficiency investments are often overlooked because the anticipated cost savings from investing in improved energy efficiency in absolute terms are generally expected to be low. Payback periods can be perceived as being too lengthy to fit economic requirements and there may also be insufficient access to capital for these types of investments. Improvements in reducing operating costs may be perceived as less important by senior management than investments that increase revenue.



However, interestingly, some of the greatest barriers lie in the areas of information and expertise. Time may not be devoted to searching for information about energy use in a company because senior management regards energy efficiency as a routine maintenance issue that is assigned a lower priority rather than either essential maintenance projects or strategic investments. Most industrial businesses do not have individuals assigned to the energy portion of their budgets and consider their energy bill just another cost of doing business, giving it very little attention.

In Idaho, there are significant efforts being made to overcome these barriers. The J.R. Simplot Company is recognized as a national leader and innovator in energy conservation and sustainability. Since 2008 they have invested more than $10 million in energy efficiency projects, which saved (in Idaho alone) more than 7 million kWh of electricity. They are actively working

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[194] "Reducing U.S. Greenhouse Gas Emissions: How Much at What cost?", McKinsey and Company, http://www.mckinsey.com/Client_Service/Sustainability/Latest_thinking/Reducing_US_greenhouse_gas_emissions.aspx

[195] National Science and Technology Council, "Net-Zero Energy, High-Performance Green Buildings", http://www.bfrl.nist.gov/buildingtechnology/documents/FederalRDAgendaforNetZeroEnergyHighPerformanceGreenBuildings.pdf

[196] EIA: http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/tx/use_tx_ID.html&mstate=Idaho

[197] "The Multiple Pathways to Industrial Energy Efficiency", Lukas C. Brun and Gary Gereffi, February 15, 2011, Duke University, http://www.cggc.duke.edu/pdfs/DukeCGGC_EE-Report_2011-2-15_APPENDIX.pdf

toward a goal of reducing their energy intensity by 25 percent over the next ten years.[198] The Simplot Company is also leading efforts for industrial energy efficiency throughout Idaho as they host annual conferences and training seminars as well as leading the Idaho Strategic Energy Alliance Industrial Energy Forum, which brings Idaho utilities, industrial and commercial interests, and other stakeholders together to explore industrial energy efficiency opportunities.

The Washington State University Extension Energy Program partners with the Office of Energy Resources and Idaho businesses to educate, inform, and support energy efficiency projects as well. They have done a significant amount of work in the industrial energy efficiency sector, working with stakeholders in Idaho, Montana, Oregon and Washington to establish long-term industrial energy efficiency programs, delivering federal Save Energy Now programs, coordinating and delivering industrial training and education in partnership with the Department of Energy, industry associations, NEEA and the Bonneville Power Administration.[199]

3.6.10. Other Potential Energy Technologies

Other technologies being examined include increased turbine efficiencies, hybrid systems and related technologies (such as rapid-start turbines), advanced nuclear reactor designs (including small modular reactors), advanced energy-related computer systems, sensors, controls and instrumentation, materials research, advanced biofuels, new and less expensive solar and photovoltaics.[200] The largest and least costly savings will likely come from energy efficiency improvements in buildings, appliances, transport, and industry as well as in power generation.

Some of the potential technologies being examined at the present time are summarized in the table below.

Supply Side	Demand Side
■ CCS fossil-fuel power generation	■ Energy efficiency in buildings, lighting, appliances
■ Nuclear power plants	■ Hybrid heat pumps
■ Onshore and offshore wind	■ Solar space and water heating
■ Biomass integrated-gasification combined-cycle and co-combustion	■ Energy efficiency in transport
	■ Electric and plug-in vehicles
■ Photovoltaic systems	■ H_2 fuel cell vehicles
■ Concentrating solar power	■ CCS in industry, H_2, and fuel transformation
■ Coal: integrated-gasification combined-cycle	■ Industrial motor systems
■ Coal: ultra-supercritical	■ Smart grid and other demand response tools
■ Second-generation biofuels	
■ Coal: integrated-gasification combined-cycle	
■ Unconventional fossil energy extraction	

[198] J.R. Simplot Sustainability Summary 2010, http://www.simplot.com/customcf/company/sustainability/index.html
[199] http://www.energy.wsu.edu/IndustrialEfficiency.aspx
[200] http://www.iea.org/techno/etp/ETP_2008_Exec_Sum_English.pdf

There are a variety of studies describing trends in energy technology.[201]

3.7. AREAS WHERE ACTION IS RECOMMENDED

The Committee finds that, on the whole, the current plans of Idaho's energy companies to meet the energy needs of Idaho's citizens and businesses line up reasonably well with the policy objectives of this Idaho Energy Plan, and consequently does not recommend major changes to the structure and functioning of Idaho's energy industry. However, the Committee recommends action in a few key areas in order to further advance progress toward meeting its five policy objectives. These areas are described below.

3.7.1. Energy Conservation and Direct Use of Natural Gas

There are applications in which it is more energy efficient to use natural gas directly than to generate electricity from natural gas and then use the electricity in the end-use application. In many cases the direct use of natural gas can be more economically efficient, and the increased use of natural gas by residential and commercial customers can reduce overall energy consumption. According to the American Gas Foundation, the total delivered efficiency is about 90% for natural gas use from the point of extraction to the end-user. The total deliver efficiency for natural gas converted to electricity through combined cycle combustion turbines ranges from 27% to 50% (depending on the efficiency of the turbine). At present, approximately 27% of natural gas consumption is used for power generation. Used directly at customer premises, natural gas is two to three times more efficient than electricity produced from natural gas.[202] [203]

A survey by the Northwest Energy Efficiency Alliance found that nearly all new single-family homes constructed where natural gas was available had gas-fired, forced-air heating systems.[204] The Northwest Power Planning Council's analysis of Northwest utilities indicated that those with fuel-choice markets are working well. Their study indicates that consumers are selecting natural gas for space and water heating where it makes economic sense and that increased direct use of natural gas in residential and commercial applications can increase the productivity of available energy supplies, reduce overall energy cost, and reduce related CO_2 emissions. The use of natural gas contributes almost 30% less carbon dioxide emissions than oil and almost 45% less than coal.[205]

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[201] International Energy Agency: iea.org or www.energy.gov/science-innovation or Massachusetts Institute of Technology Energy Initiative: web.mit.edu/mitei/research/index.html or Blue Ribbon Commission on America's Nuclear Future: www.brc.gov or Clean Edge Market Technology: www.cleanedge.com/reports/ or U.S. Dept. of Energy Report on the First Quadrennial Technology Review, Sept. 2011, http://energy.gov/sites/prod/files/ReportOnTheFirstQTR.pdf

[202] American Gas Foundation: http://www.gasfoundation.org/ResearchStudies/natural-gas-smart-energy-future.htm

[203] American Gas Foundation Study: "Direct Use of Natural Gas--Implications for Power Generation, Energy Efficiency, and Carbon Emissions", http://www.gasfoundation.org/ResearchStudies/directuse.htm

[204] Northwest Energy Efficiency Alliance. "Single-Family Residential New Construction Characteristics and Practices." Portland, OR, March 27, 2007.

[205] Northwest Power Planning Council Sixth Northwest Conservation and Electric Power Plan, February 2010, http://www.nwcouncil.org/energy/powerplan/6/final/SixthPowerPlan.pdf

3.7.2. Continued Development of In-State Renewable Resources

Idaho currently imports more than 70 percent[206] of its energy needs from out of state. While developing in-state resources would create jobs and result in economic benefits to Idaho, the state lacks conventional resources such as coal and oil. However, Idaho does sit in a region possessing world-class energy resources (fossil, renewable, and uranium), suggesting the importance of interstate energy collaboration. The resources that can be developed in Idaho in the near future are natural gas and renewable resources such as wind, geothermal, small hydro and biomass (for either electric generation or the production of biofuels such as ethanol or biodiesel). Renewable resources provide fuel diversity, reducing Idaho's exposure to the price volatility of other resources. In-state renewables also typically have attractive environmental attributes because of substantially reduced air and water emissions, including carbon dioxide. Finally, in-state renewable resources contribute to economic growth by creating jobs and tax revenues in Idaho, frequently in rural areas that are most in need of new economic stimulus.[207]

However, the Committee recognizes the costs, risks, and concerns associated with the development of renewable energy resources as well. Siting concerns, land-use impacts, cost (including secondary costs associated with intermittency), and transmission stability have been raised as concerns. These issues will need to be considered and addressed.

Cost is the principal barrier to increased investment in local renewable resources. Renewable resources can be more expensive than conventional resources, and the Committee wishes to avoid burdening Idahoans' energy bills with needless investment in high-cost resources. While the Committee endorses renewable resources in general because of the many benefits they provide, it declines to adopt specific targets or standards out of concern that setting arbitrary targets could conflict with the goals of maintaining Idaho's low-cost energy supply and ensuring access to affordable energy for all Idahoans. The Committee is also concerned that adopting firm targets may not provide sufficient flexibility for Idaho energy providers given the rapid development of new energy technologies. At the same time, the Committee recognizes that new technology has reduced the cost of renewable resources in recent years. This has made some renewable resources more cost-competitive today, particularly when considering their human health and environmental benefits and the fact that renewables are not subject to fuel price volatility. This Energy Plan contains a number of recommendations and policy guidance that may further reduce the cost of renewable resources in Idaho and help make them more competitive with conventional resources.

The Committee recognizes that because of cost and stability concerns, utilities integrating wind and other variable generation resources into their systems must continue to build traditional resources, such as gas-fired combustion turbines, to meet their on-peak capacity requirements because many renewable resources have very limited capacity value. Renewable generation does reduce overall utility fuel costs, but the total cost to customers of building renewable generation, which must include the costs of traditional capacity resources to meet actual loads when renewable energy is not available, is greater than if Idaho simply chose to build non-renewable generators.

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[206] Energy Information Administration SEDS, State Energy Data System Idaho (139.9 TBTUs production, 509 TBTUs consumption)

[207] See "Energy Careers in Idaho", Idaho Department of Labor, Spring 2009: http://labor.idaho.gov/publications/energy_report.pdf and http://www2.labor.idaho.gov/futureready/docs/Infographic_Green_Economy_8x11.pdf

Targeted policies have been shown to stimulate development of renewable energy in the state. For example, developers in 2009 and 2010 responded to high PURPA rates implemented by the Idaho Public Utilities Commission (IPUC) and signed or offered to sign utility contracts that in total added up to more than a 10-fold increase in in-state wind generation. Since that time the cost of natural gas has declined, and the IPUC has adjusted rates accordingly, with the natural consequence of halting the construction boom. The state sales tax exemption is another example of an incentive that can help bring additional development to the state. These incentives should be carefully considered and debated as energy technologies and markets evolve.

Idaho citizens will need to decide on the appropriate contribution of renewable energy in our energy portfolio. It is recognized that every Idahoan wants affordable and stable energy prices while having the energy they consume have minimal environmental impact This Committee, however, recognizes that every energy generation option has associated costs, risks, impacts, and benefits – there is simply no free lunch when it comes to energy, and renewable energy is no exception to this rule.

3.7.3. Environmental Impacts and Carbon Regulation[208]

Idaho's investor owned utilities are keeping a close watch on federal environmental regulations, especially related to potential carbon legislation, and they are factoring in the potential impact in their Integrated Resource Plans. Avista's 2011 Integrated Resource Plan includes developing a weighted cost using four different cases for greenhouse gas emissions including regional cap and trade, national cap and trade, national carbon tax and no greenhouse gas policies.[209] Idaho Power's 2011 IRP attempts to quantify the cost and longer term impacts of carbon regulations by including a carbon adder that is applied to all resources that emit CO_2.[210] PacifiCorp's 2011 IRP also includes several scenarios related to CO_2, stating, "The Company does, however, anticipate that additional state and federal environmental laws and regulations will necessitate further investment in pollution control and environmental compliance projects, as well as further evaluation of unit specific operational/dispatch impacts, especially with respect to pending

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[208] Carbon section sources: 2007 Idaho Energy Plan http://www.energy.idaho.gov/informationresources/d/energy_plan_2007.pdf; Carbon Issues Task Force Report at http://www.energy.idaho.gov/energyalliance/taskforce.htm; United States Global Change Research Program National Climate Assessment at http://www.globalchange.gov/; Climate Change at the National Academies at http://dels-old.nas.edu/climatechange/; U.S. Climate Change Technology Program at http://www.climatetechnology.gov/; United States Environmental Protection Agency, Climate Change, at http://www.epa.gov/climatechange/index.html; United States Department of Agriculture, Office of the Chief Economist, Climate Change, at http://www.usda.gov/oce/climate_change/; United States Department of Defense, Quadrennial Defense Review Report, February 2010, at http://www.defense.gov/QDR/QDR%20as%20of%2026JAN10%200700.pdf; International Energy Agency at http://www.iea.org/; Intergovernmental Panel on Climate Change at http://www.ipcc.ch/; Western Governors' Association at ,http://www.westgov.org

[209] Avista 2011 Integrated Resource Plan, page 4-4: http://www.avistautilities.com/inside/resources/irp/electric/Documents/2011%20Electric%20IRP.pdf

[210] Idaho Power Company 2011 Integrated Resource Plan, page 6: http://www.idahopower.com/pdfs/AboutUs/PlanningForFuture/irp/2011/2011IRPFINAL.pdf

greenhouse gas regulations and hazardous air pollutants maximum achievable control technology requirements."[211]

Carbon dioxide (CO_2) has increased from approximately 280 parts per million (ppm) to over 390 ppm over the past 150 years. This rise in CO_2 is increasing the acidity of the oceans, and is likely a contributor to both global and regional changes in temperature and precipitation. These changes in CO_2 levels pose a real and present threat to human security and prosperity, and in response, the federal government has begun to take action. It is likely that global and national efforts to control CO_2 will impact Idaho's economy; both through energy pricing and our overall economic competitiveness. Idaho is among the nation's largest per capita energy importing states, and many of our energy imports come from coal-fired power plants that are most susceptible to carbon-based price increases. If pending regulations increase power production costs, utility regulators in states hosting the power production facilities will likely act to protect the consumers in their region. This could further increase the price of power sold on the open market. When current long-term power contracts expire, these higher prices could expose Idaho electricity consumers to higher rates than neighboring states pay. Additionally, our rural, dispersed economy depends heavily upon personal vehicles and is sensitive to increases in fuel prices.

Large energy facilities can have significant and complex environmental impacts. Generating plants fired by fossil fuels consume large volumes of water and emit carbon dioxide and mercury as well as regulated pollutants such as carbon monoxide, sulfur dioxide, particulates, and oxides of nitrogen. Nuclear power plants create radioactive waste that must be safely stored for thousands of years. Even renewable resources can have significant environmental impacts: large hydroelectric facilities can alter stream flows and degrade riparian habitat; wind energy farms can have visual and noise impacts and can cause avian mortality; and geothermal energy projects can emit sulfur dioxide gas and are sometimes located in culturally or environmentally-sensitive areas. As such, the Committee establishes as one of the Energy Plan Objectives the protection of Idaho's public health, safety and natural environment.

The Committee is particularly concerned about the possible impact of federal regulation of carbon dioxide and other greenhouse gas emissions. The Committee did not debate the science of global climate change. The Committee found it sufficient to note that there is enough momentum behind efforts to regulate greenhouse gases at the federal level that it is prudent for Idaho and its energy suppliers to continue to incorporate that likelihood into their energy planning. The Committee encourages these utilities and all Idaho energy producers, deliverers, and consumers to continue to improve their preparedness by pursuing less carbon-intensive resources as part of a diversified resource portfolio.

While federal regulations on carbon dioxide and greenhouse gases have potential for significant impact on energy costs in Idaho, such regulations also may provide potential opportunities. Idaho has an abundance of renewable resources and energy efficiency opportunities, which would reduce Idaho's exposure to CO_2 regulatory risk while fostering economic growth. Global growth in nuclear energy, in part driven by CO2 concerns, would also provide opportunities for Idaho's workforce. Further, clean energy technology development including equipment design,

[211] PacifiCorp 2011 Integrated Resource Plan, page 181: http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Integrated_Resource_Plan/2011IRP/2011IRP-MainDocFinal_Vol1-FINAL.pdf

software and control instrumentation, and manufacturing to serve the needs of state, regional, and global markets would further add to economic development.

3.7.4. Energy Facility Siting

Energy facility siting is the responsibility of local officials, primarily counties. Energy facility projects – which can refer to either energy generating projects (such as power plants and wind farms) or electricity transmission and distribution lines –typically require approval through the local land use planning process, which generally requires obtaining a conditional use permit. A few counties and cities have specific requirements for energy facilities, but most have more general requirements that apply to the siting of all types of industrial development.

In developing the 2007 Energy Plan, the Legislature considered but ultimately did not recommend moving energy facility siting decisions from the local to the state level. However, the Legislature recognized Idaho counties were receiving a growing number of requests to site energy facilities, and that county governments may not have the resources available to conduct a thorough examination of all pertinent aspects of an energy facility siting application. The 2007 Energy Plan therefore recommended that state agency resources be made available to local governments in the form of an Energy Facility Site Advisory Team, composed of key employees from a number of state agencies, to provide information and advice upon request of local officials. In 2007, this recommendation was memorialized in the "Energy Facility Site Advisory Act" (the "Act"). *Idaho Code §67-2351 through §2355*.[212]

Under the Act, technical assistance is available to a city or county from any department of state government to evaluate the environmental attributes and impacts of a proposed energy facility that will be used for the generation of more than 50 MW of electricity. The Act does not cover proposals to install transmission or distribution lines. For covered projects, the Act encourages city and county officials to contact any state agency for assistance. If the assistance of more than one department is requested, then coordination among the offices is required. The Office of Energy Resources (OER) has informally acted in this coordinating role. Upon the request of a local government, OER will secure the assistance of the appropriate state agencies, based upon the specific nature of the project and any specific requests of the local government. In accordance with the Act, departments shall provide written reports to the requesting city or county within sixty (60) days of receipt of a request. The assistance of state agencies is not intended to replace the judgment of the local officials, but to provide information and expertise to local officials evaluating the potential impacts of proposed energy projects on their communities. The Committee notes that while the Office of Energy Resources is prepared to act in a coordinating role, to date no counties have formally requested the support of OER. Nonetheless, adequate funding of OER will ensure that OER can provide assistance and coordination for local government, among other activities, when the need inevitably arises.

Projects proposed for development on federal land must secure land rights, typically referred to as "rights-of-way" and undergo review in accordance with the National Environmental Policy Act ("NEPA")[213] and other federal statutes, in addition to local government and state agency reviews. The Bureau of Land Management (BLM) typically serves as the lead federal agency and

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[212] http://www.legislature.idaho.gov/legislation/2007/H0154.html

[213] http://www.epa.gov/region1/nepa/

coordinates the review by federal agencies. In addition, OER serves as the coordinating agency for the comments of state agencies on energy projects seeking access to federal lands.

Over the past five years, proposals to construct energy facilities have generated a great deal of public interest and debate. The Committee believes this level of public interest in energy facility siting can only be expected to grow as existing and new energy facility proposals are advanced to meet future energy demands in Idaho. Therefore, the Committee reiterates the recommendation from the 2007 Plan that local jurisdictions make a reasonable effort to hear testimony about the impact of proposed energy facilities from citizens and businesses in neighboring jurisdictions. This is included in the Act.

3.7.5. Regional Energy Engagement and Partnership

Given that the majority of energy consumed in Idaho is derived from outside of Idaho, principally energy producing states near Idaho; that energy transmission is a common and critical interest of Idaho and neighboring states; that Idaho and neighboring states share significant energy and economic development-coupled opportunities and concerns; and that Idaho and neighboring states have common risks and concerns regarding federal energy policy directions, the Committee believes that the development of an inter-state dialogue and/or planning council on energy issues and opportunities may be beneficial and could positively impact federal policy and regional economic development. It is the desire of the Committee to encourage the appropriate state agencies to explore this potential with representatives throughout the region.

4. Energy and Economic Development in Idaho

4.1. UPDATES FROM THE 2007 PLAN

In an ideal world, the strategies and policies of the 2007 Idaho Energy Plan would remain unchanged at the five year update point. Much has changed since the 2007 Plan was adopted in both the energy industry and in the overall economy. There were many and varied participants in the first Plan. Fortunately, the initial writers mostly got it correct by forging a cohesive consensus about what strategies and policies were right for Idaho. These efforts have proven to be robust even in a changing world. We are grateful to the first Plan drafters because their work allowed for evolutionary change instead of a reversal of policy.

Promoting a comprehensive energy strategy encouraging cost-effective energy efficiency and at the same time promoting cost-effective and reliable production and delivery of energy is relevant yesterday, today and tomorrow. A convincing consensus of thoughtful Idahoans agrees that adequate energy supplies are essential to the long-term health of the State economy; energy is fundamental to all that we do

Fortunately for the State, the energy sector, including electricity, natural gas and transportation fuels can act now and in the future as a positive influence on the demanding economic issues of our times.

4.2. IDAHO’S ECONOMIC PRIORITIES

Project 60[214] is a comprehensive initiative to grow Idaho's Gross Domestic Product. Designed in three tiers to strengthen both rural and urban communities, the plan will create quality jobs for Idahoans by fostering systemic growth, recruiting new companies to Idaho, and selling Idaho's trade and investment opportunities to the world.

A $1.25 million federal grant financed the Idaho Department of Labor’s 2010 study on green professions in Idaho. The survey found occupations in the areas of in pollution and waste control, renewable and efficient energy, sustainable agriculture and natural resource management exist in 95 percent of all industry sectors in Idaho, and the state’s growing expertise in these areas makes them a natural direction for Idaho workers who are looking to improve their skills. To foster these skill sets, the Department created a website with information on Idaho occupations and training programs in green energy areas.[215] [216]

The first step to improving Idaho's economy is to make the Gem State's business climate even more attractive by taking care of our existing workers, cultivating a highly skilled workforce, establishing a method to get research from the Idaho National Laboratory and our universities to the consumer market, and improving our statewide infrastructure.

Keeping our existing businesses in Idaho is also a top priority for systemic growth. Business retention and expansion can to assist our Idaho companies in maintaining a healthy bottom line. Access to affordable energy is a key ingredient in allowing Idaho businesses to grow while enhancing the energy efficiency of Idaho’s businesses, particularly the most energy intensive of those, helps these businesses be more competitive.

Maintaining a skilled, highly trained workforce is also essential for growth. The current economic climate has created real financial hardship for thousands of Idaho citizens. It has also created a significant pool of highly skilled workers who can immediately provide bottom-line value to any new or expanding business. Our first line of defense is to support those workers that have been impacted by layoffs through cross department cooperation with the Department of Labor, which provides access to unemployment insurance, job searches, opportunities for training, and retraining or vocational education. Highly skilled workers, such as engineers, are in demand from many of our Idaho companies. Existing business is increasingly high tech and Idaho has a shortage of qualified, skilled labor to fill immediate needs. The recruitment effort will be a public/private partnership. In 2011 The Idaho Legislature established The Workforce Development Training Fund, which helps eligible Idaho companies with up to $2,000 per employee for job skill training, both for new employees of companies expanding in Idaho and for skill upgrade training of current workers who are at risk of being permanently laid off.[217] This fund, ID Code § 72-1347b[218], set aside treasury money creating a special trust fund to aid Idaho workers and encourage ongoing employment in the state.

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[214] http://project60.idaho.gov/

[215] Idaho Department of Labor Press Release, October 12, 2011, http://labor.idaho.gov/news/NewsReleases/tabid/1953/ctl/PressRelease/mid/2527/itemid/2360/Default.aspx

[216] Idaho Green Jobs Website: http://www2.labor.idaho.gov/futureready/ and http://www2.labor.idaho.gov/futureready/docs/Infographic_Green_Economy_8x11.pdf

[217] http://labor.idaho.gov/dnn/idl/Businesses/CustomizedTraining/tabid/647/Default.aspx

[218] http://law.justia.com/codes/idaho/2011/title72/chapter13/72-1347b/

In 2007, the Kauffman Foundation ranked Idaho #6 in "Innovation Capacity," but only 38th in venture capital investment. Hence, while Idahoans are inventing and advancing innovative ideas, they are not easily taking those innovations to market. Technology transfer is the processes by which this intellectual property developed in a research institution is moved out of that facility, turned into a product, marketed, and monetized in the global marketplace. The transfer of these innovative ideas is a complex endeavor that depends on the cooperation of many individuals and institutions. The Center for Advanced Energy Studies could be instrumental in aiding Idahoans in technology commercialization. The University of Idaho's Office of Technology Transfer manages the University's intellectual property developed by faculty, staff and students as well as assisting Idaho businesses. They establish commercial partnerships with industry to promote the development of products and new ideas.[219]

The second step, domestic recruitment, has always been a priority for Idaho. New programs have been added under the Project 60 campaign to enhance those efforts. Idaho has implemented a Top-2-Top Business Attraction Strategy[220], recruiting a network of Idaho executives to engage their peers nationwide and encouraging them to move or expand their companies into Idaho. Idaho will continue to target businesses that will by synergistic with our existing industry clusters, including alternative energy, recreational technology, manufacturing, aeronautics, and technology.

Third and last, Foreign Direct Investment (FDI) plays an extraordinary and growing role in global business. It can provide a firm with new markets and marketing channels, less expensive production facilities, access to new technology, products, skills and financing. For Idaho, FDI can provide a source of new technologies, capital, processes, products, organizational technologies and management skills, and as such can provide a strong impetus to economic development.

The U.S. Citizenship and Immigration Service administers an immigrant investor visa program called EB-5. The program grants foreigners permanent U.S. residency in exchange for helping create U.S. jobs. The program requires a $1 million investment in urban areas or a $500,000 investment in rural or targeted employment areas and the creation of 10 permanent jobs. The investment must also remain "at-risk" without repayment for a period of two full years. The Idaho Department of Commerce is working to combine the EB-5 Regional Center with the state's technology-transfer protocol, providing Idaho with additional skills workers and potential new businesses.[221]

Opportunities afforded by changing global energy markets, deployment of new energy production technologies, and energy supply and cost all impact the ability of Idaho businesses to expand. An important element in Idaho's energy strategy is developing an energy-centric approach to economic development in order to capitalize on market opportunities while enhancing energy security for Idahoans.

4.3. ENERGY AND ECONOMIC DEVELOPMENT

One area where evolutionary change continues is energy and economic development. Idaho has always had plentiful, low cost electricity and natural gas as an attractor to business. Motor fuel prices have remained competitive because of a location advantage and excellent highway, rail

[219] http://www.uidaho.edu/ott
[220] http://www.project60.idaho.gov/recruit.html
[221] http://www.project60.idaho.gov/encourage.html

and pipeline transportation networks. The Idaho economy is largely based on low cost energy, for example extensive agricultural pumping, energy intensive industry, and relatively high-use in residences. Accordingly, there is an energy policy conundrum in the state – continued development of energy intensive industries steadily dilutes the existing energy cost competiveness to both new and existing commercial operations, thus creating negative impacts to current economic mainstays such as Micron and Simplot.

Energy related development, design and manufacturing have created many jobs over the years, and the prospects for continuation remain bright. This creates value that can be captured by a state seeking to expand its energy and efficiency technology capability. The key is to think beyond Idaho and seek markets for products beyond just building new generation. Energy related research, development and demonstration has also been a major economic driver in the State, with the INL being the State's second largest employer and a major contributor to the tax base and driver for private sector employment.[222] With the addition of the CAES Energy Efficiency Research Institute, other INL and university-based capabilities and outstanding engineering and light manufacturing demographics, the region can become a national and international leader in efficiency products and services. There is a mix of products and services on both the supply and demand-side of the energy equation where Idaho can be a competitive player. New power production is one element, but requires corresponding transmission capacity to get energy in and out the region. Other supply side products which are more easily exported include renewable generation and integration components, devices, and software.

In the face of intense competition for these new jobs and new industries, many states have upped the ante significantly with public money subsidies, grants and other questionable means. Although Idaho has a number of special tax benefits for the energy industry, today these are structured fairly and reasonably to insure the net benefits to the citizens remains positive. Some states recently have significantly reduced tax benefits and grants because they were causing dramatic increases in the tax burden of others. Idaho has been prudent through excellent leadership at the legislative level and the governor's office.

Serving global and local energy markets through manufacturing and services has a large potential to create jobs and add other economic value to the State. Of course there will be intense competition for these investments in facilities. But Idaho has many advantages due to great cooperation between business, government, universities and especially the Idaho National Laboratory (INL) and its research and development emphasis. Only a few states can match the caliber of the research being conducted within the state, especially with the emphasis on technology transfer.

Economic development can take many forms and paths, but when you drill down to the underlying drivers of economic activity it becomes very straightforward. If you are importing more money (income or investments) into the economy than you are exporting then you experience economic growth. This can come from something as simple as selling a potato to another state or reducing the purchase of a gallon of motor fuel from another state by increasing the fuel efficiency of a vehicle or by carpooling. In the case of the potato, the work, the investment

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[222] "Boise State Research Details Positive Economic Impacts from INL Operations", December 9, 2010, Boise State University Update, http://news.boisestate.edu/update/2010/12/09/boise-state-research-details-positive-economic-impacts-from-idaho-national-laboratory-operations/

and the return occur in Idaho, while the payment comes from outside the state. Foreign trade does not only come from other countries, but it also comes to Idaho from other states. Obviously there are no automobile manufacturers in Idaho today. When more fuel efficient vehicles that meet the needs of Idahoan's are available in the market, the indirect impact of our residents purchasing them is to reduce exports of money to the states with refineries or oil production. Every purchase has a cost and a benefit. Trading potatoes for gasoline makes great economic sense. Trading potatoes produced with energy efficient planting, irrigation, harvest, storage and delivery equipment keeps more money in Idaho because less gets spent elsewhere. Living standards have an opportunity to grow benefiting citizens as well as state and local government. A holistic approach taking everything, including education, into account can make the existing economy perform at a much higher level. Economic development and state energy policy should be built around two fundamentals. One is optimizing the low-cost legacy energy base, and the other is leveraging inherent Idaho advantages to research, develop, and commercialize valuable energy and efficiency products and services in a global market.

During the last five years, the Board of the Idaho Strategic Alliance has rigorously applied the five Energy Plan Objectives outlined in the 2007 Idaho Energy Plan. The reviews by the Board of task force reports considered each element of these objectives, including but not limited to "promote sustainable economic growth, job creation and rural economic development." Each report was evaluated for its economic development potential for both construction related job impacts as well as continuing impacts. There was also thoughtful discourse related to educating and training Idahoans for the growing existing technologies and emerging technologies with new skill sets.

The Board recognized early on the limited financial opportunities available due to the economic slowdown and volatility of the past several years. Recommendations generally suggest existing program shifts, greater cooperation between agencies already involved in energy development, and the expectation that once the economy was less stressed, incentives for targeted energy investment and programs would be more achievable. As it turns out, the economy has remained stressed and budgets continue to tighten. Competition from other states has been mixed as some have reduced incentives while others continue to offer options not fundable in Idaho at this time.

Idaho remains an excellent place to do business because of favorable location advantages, relatively low energy costs, and an excellent transportation network. Although Idaho imports much of its motor fuels and natural gas, there are promising changes to both fuel economy and fuel making or mining, although these efforts remain in their infancy. The State has existing tax programs available from various departments that make development challenging while at the same time hold the State's residents harmless. The legislature recognizes developers are always going to ask for special treatment. The legislature remains disciplined as they review various proposals and remain frugal with funding due to budgetary constraints.

As the economy improves over the next five years, there will be no shortage of requests for a share of increasing revenues flowing from existing State taxes. This Energy Plan will guide the legislature to make prudent decisions as we move forward. It is important to note that state energy policy should thoughtfully and purposefully align the additional allocation of low-cost energy with public benefit value (i.e. the number and quality of new jobs created and the expanded tax base). Without commensurate public benefit, the state is net "worse off" by adding the new load and existing industry and population get to pay the difference.

5. Energy Outreach and Education

5.1. OVERVIEW

The phrase "energy education" can have two very different meanings. On one hand, it can refer to providing energy consumers, policymakers and others unbiased, factual and complete information with which to make informed energy choices. On the other hand, it can refer to educating the scientists, engineers, technicians, and the other highly skilled workers who will develop, construct, operate and maintain our energy supply systems, now and in the future.

The Committee believes both of these aspects are important to securing Idaho's energy future.

5.2. INFORMING THE PUBLIC AND POLICYMAKERS

Access to affordable, reliable and secure forms of energy is an essential component of a well-functioning economy and has offered the state of Idaho an important competitive advantage over neighboring states. As Idaho plans for its energy future, Idaho's citizens, business leaders, and elected officials must have access to complete and unbiased information about our energy choices. Several noteworthy efforts are underway across the state to better inform Idahoans about energy.

The Idaho Strategic Energy Alliance (ISEA) is a state government initiative intended to provide state leaders and the public with balanced information about energy in Idaho. Governor Otter established the ISEA to help develop effective and long-lasting responses to energy challenges. The primary purpose of the ISEA Board of Directors is to provide options and support to the Governor's Council regarding energy activities for the State of Idaho.

The ISEA has a presence on the Idaho Office of Energy Resources website where it provides information about energy transmission, renewable energy, energy efficiency, and access to information resources. The Alliance also publishes reports on the website that take an unbiased, scientific look at certain subject areas. The reports are created by about a dozen volunteer task forces in areas such as wind, biofuels, geothermal and hydropower, and energy conservation and efficiency.[223]

The ISEA also developed an Idaho Energy Primer in early 2011. The primer includes facts and information about energy in the state of Idaho. It is intended to be a resource to help Idaho citizens make informed decisions about Idaho's energy future. The booklet provides information about energy resources, production, distribution and use in the state.[224]

Idaho's energy providers are also engaged in efforts to provide useful information to Idaho's energy consumers. An excellent example is the work of Idaho Falls Power – a municipal utility with electricity operations in the city of Idaho Falls – to establish an Energy Center for customers and the public that informs them of how energy electricity is generated, where it comes from and how to use it more efficiently. The Energy Center was created by using over $300,000 of Energy Efficiency Conservation Block Grant funds from the U.S. Department of Energy. The Energy Center consists of several displays and interactive exhibits explaining fossil fuel power stations,

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[223] http://www.energy.idaho.gov/energyalliance/

[224] http://www.energy.idaho.gov/energyalliance/d/isea_primer_new.pdf

hydroelectricity, and renewable electricity sources. There is also a display that highlights Smart Grid technology and what part Idaho Falls Power will play in this new technology.[225]

Idaho Power's "Our Energy Future" campaign represents another excellent effort to provide energy information to Idaho's energy consumers. Launched in 2010, the campaign includes a website page, video and PowerPoint slides, a pamphlet, and employee and customer newsletter articles to better communicate with the public about the future of energy and how to use it efficiently.

Idaho Power also has offered the Students for Energy Efficiency program to Idaho schools to educate students and their families about energy used in schools, their homes and other buildings. The program, implemented with the Idaho Office of Energy Resources and local school district administrators, was a hands-on learning lab that allowed students to gain knowledge of energy and apply it to recommend energy efficiency improvements. Since 2009, over 125 schools and more than 7,500 students have participated in the program.[226]

Avista Utilities has begun a new program entitled "Powering Our Energy Future,"[227] that focuses on engaging and informing the public. In the fall of 2010, Avista sponsored a forum for several hundred business, academic and community leaders in Spokane, Washington. The event is being followed up by smaller, tailored outreach events that are responsive to specific topics raised by participants during the large event, and are focused on stakeholders who have shared their interest with Avista. In addition to the outreach events in development, Avista is creating an interactive energy planning model that is similar to the one used in development of resource scenarios in the IRP process. Participants will be able to interactively change the energy source inputs and see the effects on the amount of energy generation needed, the capacity required and the resulting costs.

Avista has also developed a program focused on educating children about energy. The program features a mascot called "Wattson the Energy Watchdog," who is involved in events, fairs and special outreach events. Avista engages schools in organizing presentations to students at which the mascot teaches them about energy conservation and safety.[228]

The effort to educate Idaho's energy consumers extends to our universities. For example, within Boise State University, elective courses are offered in energy efficiency and renewable energy that are designed for the non-scientist. By providing students outside the science and engineering fields with a solid grounding in energy fundamentals, Boise State is helping to educate an energy-savvy generation of energy consumers, policy makers, teachers and business leaders. The Department of Biological and Agricultural Engineering at the University of Idaho houses the Biodiesel Fuel Education Program. The goal of the program is to provide unbiased, science-based information about biodiesel, and to assist in the development of educational tools for a national biodiesel outreach program. The program develops and distributes educational materials that support advances in biodiesel infrastructure, technology transfer, fuel quality, fuel safety, and increasing feedstock production.

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[225] http://www.idahofallschamber.com/wwwroot/userfiles/files/pr_if_power_celebrates_public_power_week.pdf
[226] http://www.idahopower.com/AboutUs/CompanyInformation/ourFuture/default.cfm
[227] http://www.avistautilities.com/community/poweringourfuture/pages/default.aspx
[228] http://www.avistakids.com/

Idaho State University offers bachelor's and master's degree programs in Nuclear Science and Engineering that prepare students for advanced placement in the nuclear industry in commercial, research or development areas. The University's goal is to prepare graduates to excel in a wide range of careers in nuclear engineering associated with nuclear reactors, the nuclear fuel cycle, and other applications of nuclear technology.

All three of the Idaho public universities, the Idaho National Laboratory and industry are partners in Center for Advanced Energy Studies (CAES).[229] CAES is a public/private partnership which involves students in performing innovative, cost-effective, credible energy research leading to sustainable technology-based economic development in areas such as: energy efficiency, energy policy, nuclear science and engineering, bioenergy and others.

The Idaho National Laboratory, the State's second largest employer and United States lead national laboratory for nuclear energy and a leading contributor to a variety of other clean energy technologies, is a tremendous resource for energy education and outreach. The INL has contributed to broad education and outreach campaigns regarding energy, and should be looked to as a resource to help enhance knowledge of energy technologies and trends that can impact Idaho's future.

CAES holds multiple workshops throughout the year which facilitate discussion among researchers and the public regarding energy topics. Through this medium, CAES is able to inform the public and bring together experts in energy fields.

The CAES Energy Policy Institute (EPI)[230] provides robust and timely research that meets the challenges of an increasingly carbon-constrained economy, which include the need for energy and environmental security, as well as sustainable economic development. EPI research focuses on both innovation and the more routine but critical mission of improving government performance in the implementation of energy policy. EPI seeks to inform and educate policymakers and other stakeholders to aid them in making decisions about energy. EPI does this through research publications with more than 15 to date, the development of decision support tools, policy roundtables, workshops, and the Western Energy Policy Research Conference. EPI has nationally and regionally recognized expertise in energy infrastructure siting and decision support tools, electricity transmission, nuclear energy, carbon capture and sequestration, renewables, and analysis of public attitudes and participation.

Important research questions that EPI seeks to comprehensively address are, "How do we make the most appropriate choices in regard to energy usage and meeting demand, and how do we better understand the important issues in regard to siting energy infrastructure in the most appropriate places?" These overarching questions have national, state, and local significance and are of particular importance to the arid West.

The Energy Policy Institute is currently creating a publication that will analyze the "State of the State" regarding energy in Idaho. The document will include in depth research, facts and figures informed by the EPI's research using US Energy Information Administration quantitative data, which will be replicable for potential future reports. It will serve as a tool for the public and state

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229 https://inlportal.inl.gov/portal/server.pt/community/caes_home/281
230 http://epi.boisestate.edu/

leaders to increase understanding of how energy is generated, distributed and consumed in Idaho.

5.3. EDUCATING AN ENERGY WORKFORCE

Making the right energy technology choices is important, but even the best plan will fail without the skilled workforce necessary to implement the plan. Idaho's educational and research institutions and Idaho companies have embarked on a series of initiatives that are helping to train our next generation of energy workers.

Several Idaho high schools participate in the Wind for Schools program funded by the U.S. Department of Energy. With the help of this program and with assistance from the Idaho National Laboratory, in 2008 Skyline High School in Idaho Falls formed the Energy and Power Systems for Tomorrow course. Through the course students learn about the physical concepts of work, force, energy, and power, and study many forms of traditional and alternative sources of electrical energy.

Idaho's three public research universities are all heavily engaged in educating tomorrow's energy workforce. The College of Technology at Idaho State University has established the Energy Systems Technology and Education Center (ESTEC) in Pocatello. ESTEC integrates the education and training required for graduates to maintain existing plants as well as to install and test components in new plants in the areas of electrical engineering technology, instrumentation and control technology, mechanical engineering technology, wind engineering technology, instrumentation and automation technology, nuclear operations technology and renewable energy technology.

Understanding the performance of materials in existing energy systems and developing advanced materials for new energy applications are key factors in meeting future energy needs. The Materials Science and Engineering program at Boise State University is investigating a broad range of materials issues in areas such as nuclear fuels and materials, biomaterials, glasses, semiconductors, electronic memories, computational modeling, and magnetic materials.

The National Institute for Advanced Transportation Technology at the University of Idaho is a center of excellence for transportation research, education and technology transfer. It is committed to preserving and protecting the natural and pristine environments of the Pacific Northwest and its small cities and towns. The Institute contributes to the sustainability of this environment through the development of clean vehicles, alternative fuels, efficient traffic control systems, safe transportation systems, sound infrastructure, and the policies that support these systems.

CAES has launched an initiative to build the Center for Energy Efficiency Research Institute (CEERI) promoting efficient and effective use of energy resources through research, education and outreach. CEERI is developing energy efficiency concepts through research in applied technology and consumer behavior; providing specialized education for energy efficiency technicians, engineers and architects; evaluating existing energy-saving technologies; and creating infrastructure for the accelerated transfer of ideas from the institute to the marketplace. Drawing on the strengths of many partners including Boise State University, Idaho State University, the University of Idaho, Idaho Power, the Boise Metro Chamber of Commerce, J.R. Simplot Company, Micron Technology, the National Resources Defense Council, the Idaho Office of Energy Resources, and the Idaho National Laboratory, the institute is based at Boise State University.[231]

CEERI plans to develop a state-wide energy efficiency curriculum goals include developing energy efficiency concepts through research in applied technology and consumer behavior; providing specialized education for energy efficiency technicians, engineers and architects; evaluating existing energy-saving technologies; and creating infrastructure for the accelerated transfer of ideas from the institute to the marketplace. This Institute can be a valuable asset in a state like Idaho with relatively high energy intensity.

The CAES Institute of Nuclear Science and Engineering (INSE) was established in 2003. Under the INSE's administrative umbrella, the three public universities jointly focus on nuclear science and engineering education at the combined Idaho Falls Campus. CAES researchers are helping to solve some of the most critical technical issues related to nuclear energy, including "closing" the fuel cycle, developing new materials that can be used in the next generation of reactors and extending the life of the nation's current fleet of light water reactors.

Educating tomorrow's energy workforce is also a major focus of Idaho's community colleges. At the College of Southern Idaho (CSI), instructors have been training the next-generation energy workforce with education and training in renewable energy since 1981. CSI's Renewable Energy Training Center provides a comprehensive curriculum designed to give students the skill sets necessary to work in any of the renewable energy fields. In 2009, CSI created a Wind Energy Technician program that teaches about 70 students a year about troubleshooting, maintaining, and operating industrial size wind turbines. The program prepares Wind Energy Technicians to work with either small companies providing a specialist niche product or very large companies such as power giants on an energy team.

CSI received a $4.4 million federal grant in early 2011 from the U.S. Economic Development Administration to help build a nearly $7 million technology center in Twin Falls. The Applied Technology and Innovation Center will provide a consolidated home for CSI's renewable energy programs. The 29,600-square-foot, energy efficient center will provide training to students in a wide array of renewable energy generation techniques and green construction.

Eastern Idaho Technical College (EITC) is also training the labor force that will build, operate and maintain the energy systems of the future. EITC launched their Energy Systems Technology program in 2010. The College provides the first year of this two year program at the Idaho Falls EITC campus, and the students are qualified to enter the second year of the ESTEC program at ISU. The program equips students to become energy systems maintenance technicians with mechanical, electrical, and instrumentation and control skills.

[231] http://news.boisestate.edu/update/2010/11/04/new-energy-efficiency-research-institute-to-be-housed-at-boise-state/

6. Recommended Policies and Actions

6.1. OVERVIEW

This chapter presents the 2012 Idaho Energy Plan recommendations. The Committee's Objectives for this Energy Plan are to:

1. **Ensure a secure, reliable and stable energy system for the citizens and businesses of Idaho;**
2. **Maintain Idaho's low-cost energy supply and ensure access to affordable energy for all Idahoans;**
3. **Protect Idaho's public health, safety and natural environment and conserve Idaho's natural resources;**
4. **Promote sustainable economic growth, job creation and rural economic development; and**
5. **Provide the means for Idaho's energy Policies and Actions to adapt to changing circumstances.**

Specific recommendations are classified either as "Policies", establishing the direction that Idaho should pursue in a given topic area in order for Idaho's energy systems to meet the Objectives, or "Actions", specific items that help advance each Policy. This Energy Plan contains eighteen Policies and forty-four Actions that were approved by the Committee on a consensus basis.

6.2. ELECTRICITY

RESOURCES

<u>**Policies**</u>

1. ***Enable robust development of a broad range of power generation and energy efficiency resources within environmentally sound parameters that are cost-effective.***

   The Committee finds that it is in Idaho's interest that Idaho energy consumers be served from reliable, diverse, cost-effective and environmentally sound resource portfolios. The Committee recognizes that fuel diversity contributes to reliable and stable electricity service by avoiding over-reliance on any one source of energy, and urges utilities to incorporate fuel diversity as a means of reducing risk. Moreover, in order to maintain Idaho's low electricity rates, the Committee finds that Idaho's utilities need to have access to a broad variety of resources, both conventional and renewable, and nothing in this Energy Plan should be read as precluding a utility from investing in a particular resource. There are many important attributes to a given resource portfolio, including adequacy to meet customer demands under a variety of circumstances, overall cost, exposure to commodity price and regulatory risk, and environmental impact. The Committee endorses integrated resource planning as a useful vehicle for utilities and their stakeholders to assess the tradeoffs among these different attributes. The Committee notes that each of Idaho's investor owned utilities has developed detailed IRP studies over the past several years under the direction of the PUC. The Committee notes that Idaho's municipal and cooperative utilities are not required to utilize IRPs but would encourage these utilities to follow a similar process involving public input as they meet their new responsibilities to plan for their future energy needs under new BPA contracts.

Actions

E-1. *Idaho utilities should continue to acquire resources that are reliable, that promote diversity, are cost-effective and environmentally sound to meet their customers' short and long-term electricity needs.*

E-2. *Idaho investor-owned electric utilities should continue to conduct formal Integrated Resource Planning, or the individual, board-accepted equivalent for public utilities, to assess the relevant attributes of a diverse set of supply-side and demand-side resource options and to continue to provide an opportunity for public input into utility resource decisions.*

E-3. *Idaho's electric utilities should continue evaluating transmission as a resource option in their Integrated Resource Plans filed every two years with the Idaho PUC and should continue participating in the development of local, sub-regional, and regional transmission plans in order to construct transmission facilities that are needed to provide reliable, low-cost energy service to their customers, access to regional markets, and access to a diverse set of current and new resources in the most cost-effective and efficient manner practicable.*

Idaho's electric investor owned utilities have the Idaho statutory obligation to plan sufficient transmission facilities to serve current and future needs of their customers. With the establishment of mandatory reliability standards, the need to address transmission operations and sufficiency through compliance with these standards has become more important[232]. In the context of Integrated Resource Plans filed with the Idaho PUC every two years, Idaho's electric utilities consider new or upgraded transmission facilities as a future resource option, along with new or upgraded generation facilities and consumer-response programs, such as demand response, energy conservation, and energy efficiency, to address both reliability needs and access to needed new resources.

Transmission construction in the United States is not keeping up with increased electricity demand. The Committee is concerned that this trend could negatively affect Idaho, and finds that it is important for Idaho utilities to have the appropriate incentives to construct transmission facilities that are needed to provide reliable, low-cost energy service to Idaho ratepayers. Idaho's municipal and cooperative utilities, in particular, could suffer if new transmission facilities cannot be constructed in a timely and cost-effective manner to allow those utilities to acquire new resources to meet their future energy needs. The Committee urges BPA, the investor owned utilities, and the IPUC to

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[232] The Energy Policy Act of 2005 established a national Electricity Reliability Organization, which is the North American Electric Reliability Corporation (NERC), to ensure the reliability of the bulk transmission system. NERC has the authority to adopt standards approved by its membership and Board and to submit them to the Federal Energy Regulatory Commission for approval. The Western Electricity Coordinating Council (WECC) may also initiate and approve regional standards, which must then go through the NERC and FERC approval processes. Because reliability standards are now mandatory, violations are subject to penalties and fines.

work together to ensure that these utilities continue to receive reliable and cost-effective transmission service.

Policies

2. ***Establish cost-effective conservation, energy efficiency and demand response as a high priority electricity resource for Idaho.***

   The Committee finds that energy conservation and energy efficiency measures provide the greatest economic and environmental benefits for Idaho (and enhanced economic competitiveness for our businesses) and should be a high priority energy endeavor resource.

3. ***The IPUC and Idaho's municipal and cooperative utilities should ensure that their orders and actions are consistent with the policies and objectives listed in the Idaho Energy Plan.***

Actions

E-4. *Idaho should encourage cost-effective investment in renewable generation and combined heat and power facilities.*

Like energy conservation and efficiency, renewable energy provides Idaho with greater environmental and economic development benefits than conventional resources, but investment in renewables tends to be hindered due to higher initial costs. Idaho's Residential Alternative Energy Tax Deduction[233] already provides a limited income tax incentive for households to invest in renewable resources. The Committee recommends that this incentive be broadened to include additional technologies and extended to Idaho businesses as well as households. A statute similar to Idaho Code 63-3022QQ, which expired 6/30/11, could be added to Idaho code to provide a sales tax exemption for the purchase of specific types of renewable energy equipment used to produce electricity or to provide fuel for heating or propulsion of vehicles.

E-5. *Energy project financing by the Idaho Energy Resources Authority should be encouraged to promote energy and economic development.*

The IERA was granted the authority during the 2005 legislative session to provide financing for renewable energy projects.[234] The IERA is prohibited in the IERA Act from financing Qualifying Facilities (QFs) as such term is defined in the Public Utilities Regulatory Policy Act of 1978 (PURPA). Most renewable energy projects in Idaho are QFs. Secondarily, the few renewable generation projects that approached the Authority for financing that were not QFs did not have the credit worthiness needed for the IERA to act as the conduit financing entity for such renewable projects. Adequate power resources are critical to supporting economic development in Idaho. Financing through resources such as IERA provide a valuable tool to facilitate such economic growth.

E-6. *Idaho utilities should provide customers with the information and choices that enable them to more effectively manage their electricity consumption.*

[233] http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ID01F&re=1&ee=1
[234] http://www.legislature.idaho.gov/legislation/2005/S1192.html

As Idaho moves to a "smarter grid", customers will have the potential to manage their electrical usage to minimize their usage during times of peak demand and to respond to opportunities that allow them to maximize their use of renewable resources. However, simply installing a "smart meter" is only the first step. Pricing structures, along with other options, should be considered that will allow customers to take advantage of this potential. Customers will also need to be informed on the options and benefits available to them, and educated on how to take advantage of them. Manufacturers and dealers of appliances and other devices that can communicate with the smart grid will also need to be involved in the planning and implementation of many of these options.
Many utilities, including Idaho's three investor owned utilities, currently offer programs that allow customers to voluntarily support clean, renewable energy sources through their electricity bills. These options could be expanded to effectively utilize the capabilities of a smarter grid or similar technology. The Committee encourages all Idaho utilities move to a smarter grid and to offer such programs and options to their customers, to focus these programs on local, Idaho resources, and to provide sufficient funding, support and marketing to maximize potential participation in these programs.

E-7. In accordance with federal law, the Idaho PUC should continue to administer its responsibilities under the Public Utility Regulatory Policy Act (PURPA).

Customer-owned generation and combined heat and power facilities provide additional economic benefits beyond conventional, central station generation by helping keep local businesses competitive. The IPUC has historically been among the leaders in encouraging customer-owned and local renewable generation through its implementation authority under PURPA. The Committee endorses this direction and urges the IPUC to continue to administer its authorities in a way that encourages the development of local generation opportunities. Ultimately, IPUC decisions associated with PURPA should not result in resources being brought online before customers need them.

E-8. The Idaho PUC, utilities, municipalities, and cooperatives should ensure non-discriminatory policies for interconnection and net metering of customer-owned generation.

The Committee finds that it is in Idaho's interest to encourage small-scale renewable generation such as wind, solar or micro-hydro in addition to larger facilities that qualify for PURPA payments. Idaho's investor owned utilities have established interconnection and "net metering" policies for these resources and Idaho's municipal and cooperative utilities have developed model policies through the Idaho Consumer-Owned Utilities Association. The Committee urges the PUC and Idaho utilities to review these policies to ensure that they encourage investment in small-scale renewable resources, and to fully implement these policies as quickly as possible.

E-9. Idaho utilities should continue to report their sources of electricity (their "fuel mix") annually.

Utilities in Washington, Oregon and many other states regularly report the sources of the electricity sold to retail ratepayers. This initiative, known as "fuel mix disclosure", is intended to educate customers about the fuels that are used in producing the electricity they use in their homes and businesses.

CONVENTIONAL GENERATION RESOURCES

Actions

E-10. *The Idaho PUC and the Office of Energy Resources and the Department of Environmental Quality should monitor the status advanced energy generation technologies in order to stay aware of opportunities and risks.*

E-11. *Idaho leaders, electric utilities and other energy-related companies, economic development professionals, universities, other stakeholders and the Idaho National Laboratory should work cooperatively to assess opportunities and risks associated with development of commercial nuclear power and nuclear energy-related services in Idaho and provide related recommendations.*

As the nation's lead national laboratory for nuclear energy, the INL can provide Idaho stakeholders valuable insight, data, infrastructure and expertise to help reduce the business, technical, and environmental risks associated with advanced technology deployment, including advanced nuclear electric generation plants and related nuclear energy technologies. Additionally, INL programs and infrastructure can be a significant catalyst for public/private energy demonstration programs that could provide both energy products and economic advantage to the State. Idaho leaders should facilitate broad dialogue and public engagement to identify opportunities and risks in these areas, and should establish policy appropriate to enabling development in these areas deemed desirable through this dialogue. As the nation's lead national laboratory for nuclear energy, the INL can provide Idaho stakeholders valuable insight, data, infrastructure and expertise to help reduce the business, technical, and environmental risks associated with advanced technology deployment, including advanced nuclear electric generation plants and related nuclear energy technologies. Additionally, INL programs and infrastructure can be a significant catalyst for public/private energy demonstration programs that could provide both energy products and economic advantage to the State. Idaho leaders should facilitate broad dialogue and public engagement to identify opportunities in these areas, and should establish policy appropriate to enabling development in these areas deemed desirable through this dialogue.

E-12. *Idaho should encourage the efficient use of water resources in all energy generation facilities with a focus on efficient cooling.*

Like most western states, Idaho's climate is semi-arid to arid, and water resources are likely to be an increasingly binding constraint on future economic development. The Committee wishes to conserve Idaho's water resources for the use of agriculture and industry and encourages developers of energy generation resources in Idaho to utilize technologies that minimize the consumptive use of water.

TRANSMISSION

Actions

E-13. Idaho should continue to participate in regional efforts aimed at increasing the capability of the western transmission grid and bringing to Idaho the benefits of cost-effective remote resources.

A number of long-distance transmission projects have been proposed for the western interconnection that would bring low-cost energy from remote areas such as eastern Wyoming, eastern Montana or northern Alberta to load centers in California and the Southwest. Idaho is unlikely to be a primary destination for such a project due to its relatively small electric load, but many of the projects would transit through Idaho and participation by Idaho utilities could result in some benefit from these projects to Idaho ratepayers. The PUC and Idaho's investor owned utilities are already participating in many western forums that relate to regional transmission expansion, and the Committee encourages them to continue in this activity.

E-14. Energy projects financed by the Idaho Energy Resources Authority should be encouraged to promote low-cost financing for transmission or distribution projects that benefit Idaho citizens and promote economic development.

Since being established, the IERA made proposals to finance several transmission projects to provide benefits to Idaho utilities and their ratepayers, including the potential for financing Bonneville Power Administration transmission projects to provide critical connectivity to Southeast Idaho. IERA's ability to offer low-cost financing for transmission projects will secure future capacity for continued economic growth and prosperity. Additionally, the IERA provides a low cost alternative to distribution system expansion and replacement for utilities making system improvements by allowing utilities to aggregate needs to enhance finance attractiveness.

6.3. NATURAL GAS

Policies

4. ***Encourage the most effective use of natural gas and ensure that Idaho consumers have access to a reliable supply from diverse and varied resources.***

5. ***Support responsible exploration and production of natural gas supplies and the expansion of the transmission, storage and distribution infrastructure.***

Natural gas is an increasingly important fuel for Idaho; accounting for approximately 22 percent of Idaho's end-use energy consumption in 2009 (see Figure 2.13). However, natural gas pricing is determined in a wholesale market over which Idaho has little authority or control; like gas utilities across the country, Idaho utilities purchase their natural gas supplies from the wholesale market and pass through their costs to customers. This Energy Plan recommends that Idaho continue to support and encourage efforts to increase natural gas production and delivery capacity to Idaho utilities. Additionally, the Committee finds it is generally in Idaho's interest to encourage the use of natural gas for space and water heating, and can support current and future efforts on the part of Idaho's gas utilities to promote energy conservation programs.

Actions

NG-1. *Idaho should encourage investments in non-traditional natural gas supply resources, including landfill methane, anaerobic digesters, and biomass methane.*

Heating homes and businesses with natural gas is more efficient than heating them with electricity when energy losses due to fuel conversion and delivery are considered. Therefore, the Committee finds it is in Idaho's interest to encourage the use of natural gas rather than electricity in these instances. The PUC regulates both electric and natural gas utilities, and its line extension policies can affect the rate at which natural gas service is extended to new Idaho communities. The Committee recommends that the PUC consider the net cost of energy service to Idahoans, including energy conversion losses and the relative cost of natural gas and electric energy, when establishing policies governing line extensions and other aspects of natural gas and electricity service. A statue similar to Idaho Code 63-3022QQ , which expired 6/30/11, could also be added to Idaho Code to provide a sales tax exemption for the purchase of specific types of renewable energy equipment used to produce electricity or to provide fuel for heating or propulsion of vehicles.

6.4. PETROLEUM AND TRANSPORTATION FUELS

Policies

6. ***Promote the production and use of cost-effective and environmentally-sound alternative fuels.***
7. ***Promote conservation and efficiency as a means of reducing the burden of transportation fuel expenditures, improving the reliability and cost of Idaho's transportation fuel supply, and reducing transportation-related emissions.***
8. ***Support responsible exploration and production of petroleum supplies and the expansion of transmission, storage and distribution infrastructure benefiting Idaho.***

Like natural gas, Idaho has little direct control over petroleum supply or pricing. Prices for the gasoline, diesel, and other petroleum products consumed by Idaho citizens and businesses are closely tied to crude oil, which is traded in a global market. Thus, Idaho consumers are directly exposed to price effects resulting from political uncertainty in regions that are thousands of miles away. Unlike natural gas, Idaho exercises no price regulation over the infrastructure for distributing petroleum products. While petroleum products make up nearly 40 percent of Idaho's end-use energy consumption (see Figure 2.13), Idaho has less leverage over the petroleum industry than it does over electricity and natural gas. Thus, the Committee's recommendations in the area of petroleum and transportation fuels are principally aimed at reducing Idaho's petroleum dependence through more efficient use of oil products and increased utilization of locally-produced biofuels such as ethanol and biodiesel. The Committee does not recommend renewable fuel standards or other mandates at this time.

ALTERNATIVE FUELS

Actions

T-1. *Idaho should ensure that its state vehicle procurement rules promote purchases of high-efficiency, flex-fuel, and alternative-fuel vehicles where cost-effective.*

Idaho state government owns and operates a very large fleet of passenger vehicles. With centralized purchasing, maintenance and fueling, fleets present a particularly attractive venue for the adoption of alternative fuel vehicles. This represents an opportunity for Idaho to help demonstrate and support the market for technologies that reduce Idaho's petroleum dependence, and the Committee encourages Idaho state agencies to explore ways to increase their purchases of high-efficiency and alternative-fuel vehicles. We take note that Allied Waste, Idaho's largest trash & recycling hauler, is building compressed natural gas public (CNG) pumps in Boise (two sites) and Nampa (one site), following their decision to convert their local fleet of over 120 refuse trucks to CNG.[235]

T-2. *Idaho should encourage the purchase of efficient, flex-fuel and alternative fuel vehicles.*

As with other alternative technologies, high initial cost is a barrier to increased deployment of high-efficiency and alternative fuel vehicles. Incentives such as income tax credits and sales-and-use tax exemptions can help to reduce the initial cost, making these technologies more affordable for Idaho citizens and businesses. Note that the state may lose tax revenue for roads and bridges as alternative transportation sources such as electricity and compressed natural gas are further developed, as these sources may not be taxed like gasoline. In addition, as vehicles continue to get better mileage, less tax revenue will come to the state. It should be noted that the addition of ethanol reduces fuel mileage. The amount of reduction depends upon the ethanol blend with E10 (10% ethanol in gasoline) providing about a 2-3% reduction in miles per gallon while the reduction using E85 is usually around 25%.[236] [237]

T-3. *Idaho should encourage investments in retail and wholesale alternative fuel supply infrastructure.* Alternative fuels, such as ethanol and biodiesel, can require substantial investment in new infrastructure as straight ethanol and biodiesel as well as high-level blends cannot be transported or dispensed with the existing equipment used for petroleum fuels. The large capital investment required for this new infrastructure is a significant barrier to the distribution and sale of alternative fuels. The Committee finds that it is in Idaho's interest to promote the development of alternative fuel distribution infrastructure, and recommends tax incentives as a way to help reduce the high initial cost.

T-4. *Idaho should promote research and development and business-university partnerships to speed the commercialization of alternative fuel technologies.*

The biofuels industry stands to benefit from additional research into methods for increasing the net energy yield of the biofuels cycle (energy produced through combustion of the biofuels relative to the energy used to produce the fuel). The INL and University of Idaho are active in a variety of research efforts related to alternative fuels and may be good partners in this area. The Committee believes that commercialization of cellulosic ethanol, in particular, would benefit Idaho because it could utilize wood waste

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[235] http://www.tvcleancities.org/ and http://www.cngprices.com/stations/CNG/Idaho/
[236] U.S. Department of Energy, Energy Efficiency & Renewable Energy, "Ethanol", www.fueleconomy.gov/feg/ethanol.shtml
[237] Changes in Gasoline IV, Renewable Fuels Association, June 2009, http://ethanolrfa.3cdn.net/dd9e74ce1c454a97cc_rbm6bdgh3.pdf

and crop residues such as wheat straw, which are abundant in Idaho. An interesting note related to this is that though there is a fairly large ethanol plant in Burley, the corn feedstock is not coming from Idaho farmers but from the Midwest by train.

6.5. CONSERVATION AND ENERGY EFFICIENCY

Actions

CE-1. All Idaho utilities should fully incorporate cost-effective conservation, energy efficiency and demand response as the priority resources in their Integrated Resource Planning.

The Committee intends that Idaho utilities should make cost-effective conservation, energy efficiency and demand response the highest priority resources in their IRPs. The Committee recommends the "Total Resource Cost" perspective as the appropriate test of the cost-effectiveness of conservation measures, and provides the following definition of cost-effectiveness as guidance: "Cost-effectiveness of a conservation measure means that the lifecycle energy, capacity, transmission, distribution, water and other quantifiable savings accruing to Idaho citizens and businesses exceed the direct costs of the measure to the utility and participant."

CE-2. The Idaho PUC should encourage investor owned utilities (IOUs) to pursue cost effective conservation in their service territories.

Each of Idaho's investor owned utilities establishes numerical targets for the acquisition of conservation resources in the preparation of their biennial Integrated Resource Plan (IRP). These plans are developed in a public process administered by each utility, then reviewed by the Commission, which also establishes a period for public comments. The final plans are accepted for filing by the Commission. Each utility has contracted for the preparation of a "conservation potential study" by an independent third party expert that identifies the amount of conservation that is technically possible, the amount that is economically potential (i.e. cost effective), and the amount that can realistically be expected to be acquired by the utility, given that not every owner of a conservation project will agree to participate in a utility's programs. The public may comment on these studies during the utility's IRP process or during the Commission's review of an IRP.

CE-3. The Idaho PUC should establish and continue to periodically update an avoided-cost benchmark for each utility to be used in evaluating the cost-effectiveness of conservation and renewable resource investments and in calculating payments to Qualifying Facilities (QFs) under the Public Utility Regulatory Policy Act (PURPA).

The avoided costs to be used by each utility in evaluating the cost-effectiveness of conservation resources is developed by each utility through its preparation of its Integrated Resource Plan. Each IRP is updated every other year. The results will vary by resource, depending upon the specific characteristics of the conservation resource, such as the expected time of day or seasonality of the savings. The PUC currently publishes avoided costs that are used for payments to QFs smaller than 10 average megawatts (and smaller than 100 kW for wind and solar facilities). These published avoided cost rates are updated whenever significant changes occur in fuel prices or resource costs. Avoided cost rates for large Qualifying Facilities are computed on a case-by-case basis whenever a new project is proposed.

CE-4. The Idaho PUC should seek to eliminate disincentives that stand as barriers to implementing cost-effective conservation measures. The PUC should consider appropriate methods to avoid the disincentives associated with investor owned utility conservation efforts. Options may include, but are not limited to:

i. Recovery of revenues lost due to reduced sales resulting from conservation investments;

ii. Capitalization of conservation expenditures;

iii. A share of the net societal benefits attributable to the utility's energy efficiency programs.

CE-5. The Idaho PUC should support market transformation programs that provide cost-effective energy savings to Idaho citizens.

"Market transformation" refers to energy efficiency programs that promote the manufacture and purchase of energy-efficient products and services. The goal of market transformation is to induce lasting structural and behavioral changes in the marketplace, resulting in increased production and adoption of energy-efficient technologies and energy savings that continue to accrue even after the program ends. Idaho's investor- owned utilities participate along with many other regional utilities in the Northwest Energy Efficiency Alliance (NEEA) which administers market transformation programs on a regional scale. BPA also provides funding to NEEA on behalf of Idaho municipal and cooperative utilities. The Committee encourages the PUC and utilities to continue supporting market transformation as long as doing so continues to provide net benefits to Idaho citizens.

CE-6. The Idaho PUC and Idaho utilities should continue to adopt rate designs that encourage more efficient and effective use of energy.

Examples of innovative designs currently in use include tiered rates, which charge a higher rate for larger quantities of electricity used in a given month, or time-of-use rates that change by season and perhaps even by time of day.

CE-7. Idaho's municipal and cooperative utilities should annually report their estimates of conservation in their service territories and their estimated savings in electrical energy (MWh) and peak capacity (kW) during the lifetime of the measures implemented.

The Committee recognizes that municipal and cooperative utilities are governed by locally-elected city councils and boards of directors, and the Committee does not recommend increased state oversight of these utilities. The Committee expects municipal and cooperative utilities to be guided by the policies and recommendations of this Energy Plan. The Committee finds that state government needs to have good information about the efforts of municipal and cooperative utilities to capture energy savings in their service territories. Historically public power in Idaho has been on the forefront of energy conservation and efficiency programs, with many of them offering energy efficiency programs for more than 25 years. These public power utilities are customers of the Bonneville Power Administration (BPA) and participate in the development and deployment of BPA conservation efforts based on the goals of the Northwest Power Plan provided by the Northwest Power and Conservation Council. The Committee recognizes that these utilities report results annually to Bonneville Power Administration and the Northwest Power and Conservation Council. The Committee encourages these utilities to make available the reported information, when requested by the State.

CE-8. Idaho should encourage investments in energy efficient technologies to the extent practical.

The high initial cost of many energy-saving technologies is among the most important barriers to increased deployment of energy efficiency. While the life-cycle cost of these technologies (including the cost of energy during the lifetime of the product) is lower than the cost of less-efficient technologies, consumers typically demand very rapid payback periods for efficiency investments. The state may help to lower the initial cost of these technologies by providing tax incentives. Idaho's current Residential Alternative Energy Tax Deduction allows an income tax deduction up to $20,000 over four years for solar, wind, geothermal and pellet stoves.[238] The Committee recommends considering the expansion of this program to include energy efficient technologies.

Idaho's current state sales tax is 6 percent. Under this recommendation, Idaho would not collect sales tax for a list of approved energy-efficient technologies. This would provide a visible signal to customers encouraging energy efficiency at the time of purchase, and would at the same time educate the sales force about which technologies meet the state's energy efficiency guidelines. Energy Star product definitions could be used as the basis for determining which products qualify for the sales tax exemption.

CE-9. Idaho State Government will:

i. *Demonstrate leadership by promoting energy efficiency, energy efficient products, use of renewable energy and fostering emerging technologies by increasing energy efficiency in State government;*
ii. *Ensure that public facility procurement rules allow full implementation of cost-effective energy efficiency and small-scale generation at public facilities;*
iii. *Collaborate with utilities, regulators, legislators and other impacted stakeholders to advance energy efficiency in Idaho's economy;*
iv. *Work to identify and address all barriers and disincentives to increased acquisition of energy conservation and efficiency;*
v. *Educate government agencies, the private sector and the public about the benefits and means to implement energy efficiency;*

In the K-12 area, develop a comprehensive K-12 energy efficiency education program to include curriculum, interactive kiosks, and other program activities. For grades 3-8, promote and encourage school participation in America's Home Energy Education Challenge[239] to engage students and their families in a save energy, save money initiative. Sponsored by the Department of Energy and administered by the National Science Teachers Association, it aims to enhance and extend existing energy-focused programs, provide specific home energy-saving tips, and make materials that support the learning of science

[238] Idaho Statutes § 63-3022C: http://www.legislature.idaho.gov/idstat/Title63/T63CH30SECT63-3022C.htm
[239] http://www.homeenergychallenge.org/

and energy available to schools. Participating schools compete for more than $200,000 in prizes distributed at the regional and national levels of the competition.

At the state and local government level, require owners of state and local government buildings over 10,000 square feet, including school districts, to benchmark their building's energy consumption. The resulting Statement of Energy Performance must be disclosed to the Idaho Energy Office on an annual basis. At the request of a building owner, utility companies will be required to provide electronic energy consumption data to be uploaded into Portfolio Manager software.[240]

The State Board of Education, in conjunction with CAES CEERI should conduct or fund a feasibility assessment for developing an Energy Design, Engineering, and Operations degree program in Idaho. This could be a multi-university degree or certificate offering Renewable Generation Resources.

6.6. ENERGY FACILITY SITING

Policies

9. ***The Committee reiterates the recommendation from the 2007 Plan that Idaho state agencies play a role in providing technical assistance to support local energy facility siting decisions and that local jurisdictions make a reasonable effort to hear testimony about the impact of proposed energy facilities from citizens and businesses in neighboring jurisdictions.***

Many states have energy facility siting bodies that assess the costs and benefits of new large energy facilities, and decide whether and under what conditions the facility should be allowed to operate. However, many stakeholders continue to believe that the existing system under which local officials make energy facility siting decisions meets Idaho's needs, and the Committee does not endorse moving energy facility siting decisions to the state level. At the same time, the Committee recommends that state resources be made available at the request of local officials to provide technical assistance. The state also supports neighboring counties having input into facility siting.

Actions

S-1. The Office of Energy Resources should ensure local officials are aware of the Energy Facility Site Advisory Act ("the Act") and the opportunity to establish Energy Facility Site Advisory Teams to provide technical assistance when requested by local jurisdictions.

The Committee finds that it is in Idaho's interest to make state resources available to assist local officials in making energy facility siting decisions. The Act allows for teams to be appointed upon request from a local jurisdiction that has been asked to site an electric generating facility with a rated capacity greater than 50 MW. While the Committee recommends retaining the ultimate decision-making authority at the local level, the Committee believes that the use of Energy Facility Site Advisory Teams can help local officials make informed decisions. Therefore, the Committee recommends that the Office of Energy Resources take action to ensure local officials are aware of the Act

[240] http://www.buildingrating.org/

and opportunity to establish Energy Facility Site Advisory Teams. Adequate funding of OER will ensure that OER can provide assistance and coordination for local government, among other activities, when the need arises.

S-2. *Sponsors of new transmission line projects in Idaho should consider adopting best practices from the siting of other transmission lines in the Western Interconnection.*

The siting of new transmission capacity has been the subject of a great deal of public interest and, in some cases, vocal opposition. The Committee understands and appreciates many of the concerns voiced by Idaho's citizens but also believes that new transmission capacity will be needed to help serve Idaho's growing electricity demands. The Committee therefore supports efforts to improve the way in which new transmission lines are sited. The Committee encourages project sponsors and other interested parties to participate in and consider the recommendations arising from such efforts. The Committee also believes, because of the high level of public interest in transmission line proposals since the 2007 Plan was enacted, that the Act should be expanded to allow local officials to request technical assistance under the Act to support their evaluations of the local impacts of transmission projects.

6.7. ECONOMIC DEVELOPMENT

Policies

10. ***Pursue regional energy dialogue with neighboring states, with the goal of pursuing common energy market economic development interests and managing energy-related policy risks.***

11. ***Continue to promote energy-related jobs and career opportunities for Idaho citizens.***

Actions

ED-1. Encourage a broader engagement with the Center for Advanced Energy Studies (CAES) to advance energy-related technology commercialization, efficiency, and research and deployment.

6.8. ENERGY OUTREACH AND EDUCATION

Policies

12. ***Idaho should raise the awareness of energy challenges and opportunities in Idaho through education and outreach.***

Energy is a critically important industry. Reliable, affordable energy supplies are not only critical to the functioning of a modern economy but are necessary to protect the public health and safety. The nature of energy systems necessitates a strong degree of public oversight, and regulation of electric and natural gas utilities places the state in a very active oversight role. In order to make informed decisions, the public and decision-makers must be well informed regarding these issues. Thus, the Committee believes that it is crucial for policy-makers to maintain consistent oversight of the energy industry and to stay informed about the latest technological and institutional developments. To that end, the Committee recommends a number of steps to raise the profile of energy issues within state government and to promote and oversee implementation of the recommendations of this Energy Plan.

<u>Actions</u>

EE-1. *Encourage schools to provide courses or workshops on energy technologies, issues, and approaches.*

EE-2. *The Office of Energy Resources, including the Idaho Strategic Energy Alliance, should engage in public outreach and education and work with Idaho energy stakeholders to promote a reliable, diverse, cost-effective and environmentally-sound energy system for the benefit of Idaho citizens and businesses.*

One of the roles that the Committee envisions for the OER is to work with the public, policy-makers, utilities and other Idaho energy stakeholders to promote the development and maintenance of a portfolio of energy resources that support the Objectives of this Energy Plan. Provided the monetary means to do so, the OER would serve as a clearinghouse for information about new technologies and ways to use energy more efficiently, and would provide this information in a variety of energy policy forums. The Idaho Strategic Energy Alliance was created, in great part, to provide a group of experts in various aspects of energy and thus is in an ideal position to provide guidance, information, and assistance in moving the state toward a reliable, diverse, cost-effective, and environmentally sound energy system.

EE-3. *The Office of Energy Resources will report to the Legislature as requested on the progress of Idaho state agencies, energy providers and energy consumers in implementing the recommendations in this Energy Plan.*

The Committee recommends that the standing committees with jurisdiction over energy issues maintain active oversight over the implementation of this Energy Plan, and that the Idaho Strategic Energy Alliance be available to provide ongoing expertise and information. The Committee recommends that the OER submit a report to the Legislature and testify to the standing committees every two years regarding the progress that has been made in implementing the recommendations of this Energy Plan. It is the Committee's expectation that this will provide a forum for standing committee members to consistently engage with state energy policy issues.

EE-4. *The Interim Committee recommends that the Legislature revisit this Energy Plan and develop a process and approach to continually update data and access opportunities and risks on a yearly basis and perform a complete revision of the Plan on at least a five year basis.*

The Committee finds that it is important that the recommendations in this Energy Plan be subject to an organized review on a regular, scheduled basis to ensure that they continue to reflect the best interests of Idaho citizens and businesses. While the Committee cannot bind future Legislatures to a schedule for Energy Plan updates, the Committee recommends that data, lessons learned, technologies, approaches, etc. be revisited regularly (at least on a yearly basis) by the Idaho Strategic Energy Alliance as needed, and that they entire Plan be revised at least every five years.

Appendix A. List of Idaho Electric and Natural Gas Utilities

Table A.1. Idaho Electric Utilities in 2009

INVESTOR-OWNED UTILITIES	Customers in Idaho	Idaho Load in Mwa
Avista Corp	121,727	3,444,692
Idaho Power Co	469,726	13,275,219
PacifiCorp	70,282	2,955,687
FEDERAL UTILITIES		
Bonneville Power Admin	1	35,427
MUNICIPAL UTILITIES		
City of Albion	180	3,278
City of Bonners Ferry	2,595	65,203
City of Burley	4,430	113,418
City of Declo	130	2,499
City of Heyburn	1,223	35,617
City of Idaho Falls	25,749	698,154
City of Minidoka	46	800
City of Plummer	821	31,919
City of Rupert	2,858	77,898
City of Soda Springs	1,767	25,308
City of Weiser	2,679	47,735
RURAL ELECTRIC COOPERATIVES		
Clearwater Power Company	9,241	165,385
East End Mutual Elec Co Ltd	681	20,000
Fall River Rural Elec Coop Inc	13,064	218,135
Farmers Electric Company, Ltd	120	4,198
Idaho Cnty L&P Coop Assn, Inc	3,632	53,635
Inland Power & Light Company	1,641	29,135
Kootenai Electric Coop Inc	22,537	420,310
Lost River Electric Coop Inc	2,586	67,449
Lower Valley Energy Inc	1,644	54,893
Missoula Electric Coop, Inc	57	1,342
Northern Lights, Inc	14,308	218,249
Raft River Rural Elec Coop Inc	2,427	170,252
Riverside Electric Cooperative	500	19,190
Salmon River Electric Coop Inc	2,720	235,486
South Side Electric, Inc	1,178	50,712
United Electric Co-op, Inc	5,975	212,431
Vigilante Electric Coop, Inc	31	123

Source: http://www.eia.gov/cneaf/electricity/page/eia861.html (File 2)

Table A.2. Idaho Natural Gas Utilities in 2009

UTILITY NAME	Customers in Idaho	Idaho Demand in Million Therms
Intermountain Gas	299,889	559
Avista Corp	72,265	125
Questar Gas	1,923	2

Source: http://www.puc.state.id.us/ar2009/gas.pdf

Appendix B. Definitions

Accelerated depreciation: Any method of depreciation used for accounting or income tax purposes that allow greater deductions in the earlier years of the life of an asset, as opposed to straight-line depreciation that spreads the cost evenly over the life of an asset. Accelerated depreciation encourages capital projects, the benefits of which are passed on to utility customers in the form of updated and expanded generation, transmission and distribution infrastructure.

Advanced energy production technologies: Included in this category are a) power generation via gasified coal with carbon sequestration, advanced nuclear technologies, and new and less expensive solar and photovoltaics; b) transportation technologies, including fuel cells and advanced biofuels, which includes any alcohol-based fuel other than corn ethanol; and c) other technologies, including advanced battery storage, materials research, hydrogen production, increased turbine efficiencies, and advanced energy-related computer systems, sensors, controls and instrumentation.

Advanced Metering Infrastructure (AMI): AMI is the term coined to represent the networking technology of fixed network meter systems that go beyond automated meter reading (AMR) into remote utility management. The meters in an AMI system are often referred to as smart meters, since they often can use collected data based on programmed logic. Originally AMR devices just collected meter readings electronically and matched them with accounts. As technology has advanced, additional data could then be captured, stored and transmitted to the main computer and often the metering devices could be controlled remotely. Many AMR devices can also capture interval data and log meter events. The logged data can be used to collect or control time of use or rate of use data that can be used for energy or water usage profiling, time of use billing, demand forecasting, demand response, energy conservation enforcement, remote shutoff, etc.

Aggregator: Related to Direct Access; a company that consolidates a number of individual users and/or suppliers into a group in order to sell power in bulk.

Auction: In the context of a cap and trade system, a process of bidding for greenhouse gas emission allowances.

Automated meter reading (AMR): Technology of automatically collecting data from energy or water metering devices and transferring that data to a central database for billing and/or analysis. This form of utility data collection eliminates the need for each meter to be visually read by a technician, thereby reducing personnel costs.

Avoided cost: The cost to produce or otherwise procure electric power that an electric utility does not incur because it purchases this increment of power from a qualifying facility (QF). It may include a capacity payment and/or an energy payment component.

Backup power: Power provided by terms of the contract to a customer when the normal source is unavailable.

Baseload: The minimum amount of electric power or natural gas delivered or required over a given period of time at a steady rate. The minimum continuous load or demand in a power system over a given period of time.

Baseload plant: A plant that is normally operated to take all or part of the minimum continuous load of a system and that consequently produces electricity at an essentially constant rate. These plants are operated to maximize system mechanical and thermal efficiency and minimize system operating costs. Traditionally, coal, nuclear plants and some high efficiency natural gas plants have been considered baseload plants. Baseload plants are also required to firm intermittent energy resources such as wind or solar.

Base rate: A charge normally set through rate proceedings by appropriate regulatory agencies and fixed until reviewed at future proceedings. It is calculated through multiplication of the rate from the appropriate electric rate schedule by the level of consumption.

Biomass: Plant materials and animal waste used as a feedstock for energy production.

Bonneville Power Administration: A power marketing and electric transmission agency of the U.S. government with headquarters in Portland, Oregon.

Brokers: Agents who match wholesale power buyers to sellers for a fee. They are subject to Federal Energy Regulatory Commission jurisdiction.

Brownout: A reduction in the voltage at which customers are supplied due to a power shortage, system or mechanical failure, or overuse by customers. Loads may not actually be disconnected, but brownouts can still be very harmful to electronic equipment, especially if prolonged. Brownouts may be noticeable to the consumer (such as flickering or dimming of lights) but are not always apparent.

BTUs: British Thermal Unit is a traditional unit of energy equal to about 1,055 joules. Production of 1 kWh of electricity generated in a thermal power plant requires about 10,000 BTUs. 1 gallon gasoline ≈ 125,000 BTUs.

Cap and Trade: A market-based policy tool for reducing emissions. The program first sets a cap, or maximum limit, on emissions. Sources covered by the program then receive permits to emit in the form of emissions allowances. Sources are allowed to buy and sell emission allowances in order to continue operating in the most profitable manner available to them. Over time, the cap becomes stricter, leading to the reduction in emissions.

Capacity (electric): The maximum power that can be produced by a generating resource at specified times under specified conditions.

Capacity factor: A capacity factor is the ratio of the average power output from an electric power plant compared with its maximum output. Capacity factors vary greatly depending on the type of fuel that is used and the design of the plant. Baseload power plants are operated continuously at high output and have high capacity factors (reaching 100 percent). Geothermal, nuclear, coal plants, large hydroelectric and bioenergy plants that burn solid material are usually operated as baseload plants. Many renewable energy sources such as solar, wind and small hydroelectric power have lower capacity factors because their fuel (wind, sunlight or water) is not continuously available.

Capacity (gas): The maximum amount of natural gas that can be produced, transported, stored, distributed or utilized in a given period of time under design conditions.

Capacity, peaking: The capacity of facilities or equipment normally used to supply incremental gas or electricity under extreme demand conditions. Peaking capacity is generally available for a limited number of days at a maximum rate.

Carbon capture and sequestration: An approach to mitigate climate change by capturing carbon dioxide from large point sources such as power plants and storing it instead of releasing it into the atmosphere. Technology for sequestration is commercially available and is used at many locations at a modest scale primarily for oil and gas recovery. However, technology needed for capturing carbon dioxide from large point sources has yet to be developed. Although carbon dioxide has been injected into geological formations for various purposes (such as enhanced oil recovery), long-term storage on a large scale has yet to be demonstrated. To date, no large-scale power plant operates with a full carbon capture and storage system.

Carbon dioxide (CO2): A gaseous substance at standard conditions composed of one carbon atom and two oxygen atoms produced when any carbon-based fuels are combusted. It is considered by many scientists a major contributor to global climate change. Plants use carbon dioxide for photosynthesis and for plant growth and development. The atmosphere contains about 0.039 percent CO2.

Carbon offset (greenhouse gas emission offset): A financial instrument aimed at a reduction in greenhouse gas emissions. Offsets are typically achieved through financial support of projects that reduce the emission of greenhouse gases in the short- or long-term. The most common project type is renewable energy, such as wind farms, biomass energy or hydroelectric dams. Others include energy efficiency projects, forestry projects, the destruction of industrial pollutants or agricultural by-products and the destruction of landfill methane.

Carbon tax: A direct tax on carbon dioxide and other greenhouse gas emissions intended to reduce emissions of carbon dioxide, which is generated as a by-product of the combustion of fossil fuels, among other processes. Unlike other approaches, such as a cap and trade system, a carbon tax lends predictability to energy prices for consumers.

Class of service: A group of customers with similar characteristics (e.g., residential, commercial, industrial, etc.) that are identified for the purpose of setting a rate for service.

The Climate Registry: A nonprofit partnership working to develop an accurate and transparent greenhouse gas emissions measurement protocol that is capable of supporting voluntary and mandatory greenhouse gas emission reporting policies. It will provide a verified set of greenhouse gas emissions data from reporting entities supported by a robust accounting and verification infrastructure.

Coal gasification: A process by which synthetic gases are made from coal by reacting coal, steam and oxygen under pressure and elevated temperature. These gases can be used in processes to produce electricity or to make a variety of carbon-based products, including methane (natural gas), gasoline, diesel fuel and fertilizer.

Cogeneration: Also known as "combined heat and power" (CHP) or cogen. The simultaneous production of heat (usually in the form of hot water and/or steam) and power utilizing one primary fuel. Cogeneration is often used to produce power as a secondary use of the waste steam/heat from a primary industrial process.

Commercial: A sector of customers or service defined as non-manufacturing business establishments, including hotels, motels, restaurants, wholesale businesses, retail stores and health, social and educational institutions. A utility may classify the commercial sector as all consumers whose demand or annual use exceeds some specified limit. The limit may be set by the utility based on the rate schedule of the utility.

Commission: State public utility commission(s); the Federal Energy Regulatory Commission.

Concentrating solar power (CSP): A process that uses lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. The concentrated light is then used as a heat source for a conventional power plant or is concentrated onto photovoltaic surfaces.

Conservation: Demand-side management (DSM) strategy for reducing generation capacity requirements by implementing programs to encourage customers to reduce their energy consumption. Program examples include incentives/savings for the installation of energy efficient appliances, lighting and electrical machinery, and weatherization materials.

Control area: A geographical area in which a utility is responsible for balancing generation and load. A control area approximates the service area of a utility.

Conventional energy resource: As used in this report, includes fossil fuels (oil, coal and natural gas) and nuclear power.

Cooperative electric utility (Co-op): Private, not-for-profit electric utility legally established to be owned by and operated for the benefit of those using its service. It will generate, transmit and/or distribute supplies of electric energy to cooperative members. Such ventures are generally exempt from federal income tax laws. Many were initially financed by the Rural Electrification Administration, U.S. Department of Agriculture.

Cost-based rate: A rate based upon a projected cost of service and throughput level, contrasted with a market-based rate determined directly by supply and demand.

Cost of capital: The weighted average of the cost of various sources of capital, generally consisting of outstanding securities such as mortgage debt, preferred stock and common stock.

Cost of service: The total cost to provide service, including return on invested capital, operation and maintenance costs, capital costs, administrative costs, taxes and depreciation expense. Traditional utility cost of service may be expressed as: *operating costs + taxes + (rate of return x [cost of plant - depreciation])* More frequently called revenue requirement.

Cross-subsidization: The practice of charging rates higher than the actual cost of service to one class of customers in order to charge lower rates to another class of customers.

Cubic foot: The most common unit of measurement of gas volume; the amount of gas required to fill a volume of one cubic foot under stated conditions of temperature, pressure and water vapor.

Curtailment: A temporary, mandatory power reduction under emergency conditions taken after all possible conservation and load management measures and prompted by problems of meeting peak energy demand.

Customer costs: Costs directly related to serving a customer, regardless of sales volume, such as meter reading, billing and fixed charges for the minimum investment required to serve a customer.

Demand: The amount of power consumers require at a particular time. Demand is synonymous with load. It is also the amount of power that flows over a transmission line at a particular time. System demand is measured in megawatts.

Demand-side management (DSM): The term for all activities or programs undertaken by an electric system to influence the amount and timing of electricity use. Included in DSM are the planning, implementation and monitoring of utility activities that are designed to influence customer use of electricity in ways that will produce desired changes in a utility's load shape such as, among other things, direct load control, interruptible load and conservation.

Depreciation: The loss of value of assets, such as buildings and transmission lines, to age and wear. Among the factors considered in determining depreciation are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the technology, changes in demand, requirements of public authorities and salvage value. Depreciation is charged to utility customers as an annual expense.

Deregulation: The reduction or elimination of government power in a particular industry usually enacted to create more competition within the industry. Since the mid 1990s, many states across the nation have embarked on some form of deregulation of the electric industry, allowing the sale of electricity at market prices with the theory that competition will keep prices low, compared to a regulated market in which customer rates are directly tied to costs. *(See also restructuring.)*

Direct Access: The ability of a retail customer to purchase commodity electricity directly from the wholesale market rather than through a local distribution utility. *(See also Industrial bypass.)*

Dispatch: The monitoring and regulation of an electrical or natural gas system to provide coordinated operation; the sequence in which generating resources are called upon to generate power to serve fluctuating load; the physical inclusion of a generator's output onto the transmission grid by an authorized scheduling utility.

Distribution (electrical): The system of lines, transformers and switches that connect the high-voltage bulk transmission network and low-voltage customer load. The transport of electricity to ultimate use points such as homes and businesses. The portion of an electric system that is dedicated to delivering electric energy to an end user at relatively low voltages.

Distribution (gas): Mains, service connections and equipment that carry or control the supply of natural gas from the point of local supply to and including the sales meters.

Distributed generation: Electric power produced other than at a central station generating unit, such as that using fuel cell technology or on-site small-scale generating equipment.

Electric utility: A corporation, person, agency, authority or other legal entity that owns and/or operates facilities for the generation, transmission, distribution or sale of electric energy primarily for use by the public. Facilities that qualify as co-generators or small power producers under the Public Utility Regulatory Policies Act (PURPA) are not considered electric utilities.

Electricity generation: The process of producing electric energy by transforming other forms of energy such as steam, heat or falling water. Also, the amount of electric energy produced, expressed in kilowatt-hours or megawatt-hours.

Electricity transmission congestion: Transmission congestion results when transmission lines reach their maximum capacity so no additional power transactions can take place, regardless of power needs. Attempting to operate a transmission system beyond its rated capacity is likely to result in line faults and electrical fires, so this can never occur. The only ways the congestion can be alleviated are to tune the system to increase its capacity, add new transmission infrastructure, or decrease end-user demand for electricity.

Emissions allowance allocation: In the context of a cap and trade system, the amount of greenhouse gas emissions that a regulated entity is allowed to lawfully emit per year. Each allowance constitutes a right to emit usually one ton of a regulated emission.

Exempt Wholesale Generator (EWG): A class of generators defined by the Energy Policy Act of 1992 that includes the owners and/or operators of facilities used to generate electricity exclusively for wholesale or that are leased to utilities.

Federal Energy Regulatory Commission (FERC): A quasi-independent regulatory agency within the U.S. Department of Energy having jurisdiction over interstate electricity sales, wholesale electric rates, hydroelectric licensing, natural gas transmission and related services, pricing, oil pipeline rates and gas pipeline certification.

Filed rate doctrine: The doctrine established under the Natural Gas Act that requires rates to be on file with the Commission and that prevents increased rates from being imposed retroactively; also known as "retroactive ratemaking." This also applies to electric utilities.

Firm power: Electric power that is guaranteed by the supplier to be available during specified times except when uncontrollable forces produce outages.

First Jurisdictional Delivery: A hybrid approach to regulating greenhouse gas emissions generated in the electricity sector established by the Western Climate Initiative. First jurisdictional deliveries are:

- All fossil-fuel generators located within the Western Climate Initiative jurisdiction
- The first party to import electricity generated outside the Western Climate Initiative region

An importing deliverer could be an independent power producer, a retail provider, a power marketer or a power broker.

Force majeure: A common law concept borrowed from the French civil law meaning superior or irresistible force that excuses a failure to perform. It has been defined by the U.S. Supreme Court as a cause that is "beyond the control and without the fault or negligence" of the party excused. Force majeure events also must not have been reasonably foreseeable (e.g., a blizzard in Houston in January may be a force majeure event, but a January blizzard in Montana may not qualify).

Forecasting: The process of estimating or calculating electricity load or resource production requirements at some point in the future.

Franchise: A special privilege conferred by a government on an individual or corporation to occupy and use the public rights of way and streets for benefit to the public at large. Public utilities typically have exclusive franchises for utility service granted by state or local governments.

Fuel-switching: Substituting one fuel for another based on price and availability. Large industries often have the capability of using either oil or natural gas to fuel their operation and of making the switch on short notice.

Generator nameplate capacity (installed): The maximum rated output of a generator or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.

Geothermal power: Power generated from heat energy derived from hot rock, hot water or steam below the earth's surface.

Gigawatt: A gigawatt (GW) is equal to one billion (109) watts.

Gigawatt-hour: A gigawatt-hour (GWh) is a unit of electrical energy that equals one thousand megawatts of power used for one hour. One gigawatt-hour is equal to 1,000 megawatt-hours.

Green power: Term usually used to mean power produced from a renewable resource such as wind, solar, geothermal, biomass or small hydropower.

Greenhouse gas emission offset (Carbon offset): A means to a reduction, avoidance or sequestration of greenhouse gas emissions. Offsets are so named because they counteract or offset greenhouse gases that would otherwise have been emitted into the atmosphere. *(See also Carbon offset.)*

Greenhouse gas effect: A process by which the earth's temperature rises because certain gases in the atmosphere, known as greenhouse gases, trap energy from the sun.

Greenhouse gases: Gases found within the earth's atmosphere including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulfur hexafluoride (SF_6) that trap energy from the sun and warm the earth. Some greenhouse gases are emitted from the earth's natural processes; others from human activities, primarily the combustion of fossil fuels.

Grid: The layout of the electrical transmission system or a synchronized transmission network.

Head: The vertical height of the water in a reservoir above the turbine. In general, the higher the head, the greater the capability to generate electricity due to increased water pressure.

Heat rate: The measure of efficiency in converting input fuel to electricity. The lower the heat rate, the more efficient the plant. The heat rate equals the BTU content of the fuel input divided by the kilowatt–hours of power output. Lower heat rates are associated with more efficient power generating plants.

High-voltage lines: Wires composed of conductive materials that are used for the bulk transfer of electrical energy from generating power plants to substations located near to population (load) centers. Transmission lines, when interconnected with each other, become high voltage transmission networks. In the U.S., these are typically referred to as "power grids" or sometimes simply as "the grid". Electricity is transmitted at high voltages (110 kV or above) to reduce the energy lost in long distance transmission. Power is usually transmitted through overhead power lines. Underground power transmission has a significantly higher cost.

Hydroelectric plant: A plant in which the power turbine generators are driven by falling water.

Incremental energy cost: Cost incurred by producing or purchasing next available unit of energy (gas, electricity, oil, coal, etc.).

Independent power producers: A non-utility power generating entity, defined by the 1978 Public Utility Regulatory Policies Act, that typically sells the power it generates to electric utilities at wholesale prices. *(See also Exempt Wholesale Generator.)*

Industrial bypass: A situation in which large industrial customers buy power directly from a non-utility generator, bypassing the local utility system. Deregulation of generation and transmission in some states has opened up the opportunity for large electricity users to purchase services from a supplier other than the local retail utility. *(See also Direct Access.)*

Industrial customer: The industrial customer is generally defined as manufacturing, construction, mining, agriculture, fishing and forestry establishments. The utility may classify industrial service using the Standard Industrial Classification codes or based on demand or annual usage exceeding some specified limit. The limit may be set by the utility based on the rate schedule of the utility.

Integrated energy plan: Includes consideration of all energy systems in Idaho and neighboring states from which Idaho imports energy.

Integrated Gasification Combined Cycle (IGCC): Technology that combines both steam and gas turbines to produce electricity. In this process, coal is converted to syngas, a mixture of hydrogen and carbon monoxide. The syngas is then converted to electricity in a combined cycle power block consisting of a gas turbine process and a steam turbine process that includes a heat recovery steam generator. IGCC plants can achieve up to 45 percent efficiency, greater than 99 percent sulfur dioxide removal, and nitrogen oxide below 50 parts per million.

Integrated Resource Plan (IRP): A plan that utilities produce periodically for regulators and customers to share their vision of how to meet the growing need for energy. These plans contain a preferred portfolio of resource types and an action plan for acquiring specific resources to meet the needs of customers including conservation measures. Specific resources will be acquired as individual projects or purchases and, when appropriate, through a formal request for proposals (RFP) process.

Interconnection: A link between power systems enabling them to draw on one another's reserves in times of need to take advantage of energy cost differentials resulting from such facts as load diversity, seasonal conditions, time-zone differences and shared investments in larger generating units.

Interstate pipeline: A natural gas pipeline company that is engaged in the transportation of natural gas across state boundaries and is therefore subject to FERC jurisdiction and/or FERC regulation under the Natural Gas Act.

Investor owned utility (IOU): A utility that is a privately owned, often publicly traded corporation whose operations are regulated by federal and state entities.

Joint use facilities: Facilities that are used in common by two or more entities. For example, a utility pole or structure may contain wires and equipment for electrical power service and wires and equipment for telephone/cable TV service.

Kilowatt (kW): A unit of electrical power or capacity equal to one thousand watts.

Kilowatt-hour (kWh): A unit of electrical energy that is equivalent to one kilowatt of power used for one hour. One kilowatt-hour is equal to 1,000 watt-hours. An average household will use between 800 and 1,300 kWh per month, depending upon geographical area.

Leakage: Within the context of a cap and trade system with a limited geographic scope, a term to describe the potential for greenhouse gas emitters to move outside the geographic area of the cap to avoid compliance with the regulation.

Load: The amount of electric power delivered or required at any specific point or points on a system. The requirement originates at the energy-consuming equipment of the consumers. The load of an electric utility system is affected by many factors and changes on a daily, seasonal and annual basis, typically following a general pattern. Electric system load is usually measured in megawatts (MW). It is synonymous with demand.

Load-based cap: A cap on the amount of emissions from electricity based on total kilowatt-hour sales, regardless of the carbon content of the resources or where it was generated.

Load management: The management of load patterns in order to better utilize the facilities of the system. Generally, load management attempts to shift load from peak use periods to other periods of the day or year.

Load shedding: Usually an agreement arranged ahead of time to reduce electric system demand by dropping certain loads to keep others. For example, in exchange for cheaper power, an industrial customer may sign a contract agreeing to have its power interrupted, if needed, during peak demand periods.

Local distribution company (LDC): A company that obtains the major portion of its revenues from the operations of a retail distribution system for the delivery of electricity or gas for ultimate consumption.

Market-based price: The price of power on the open market.

Marketers: Organizations or individuals who take title to power in anticipation of selling it at a higher price to a buyer. Marketers are subject to FERC regulation.

Megawatt (MW): A unit of electrical power equal to 1 million watts or 1,000 kilowatts. Plant power output is typically measured in megawatts. (*See also capacity (electric).*)

Megawatt-hour (MWh): One million watt-hours of electric energy. A unit of electrical energy that equals one megawatt of power used for one hour.

Metering: Use of devices that measure and register the amount and/or direction of energy quantities relative to time.

Multi-state Process (MSP): A regulatory forum for exploring issues pertaining to the PacifiCorp Inter-Jurisdictional Cost Allocation Protocol (Revised Protocol). The objectives of the Revised Protocol include:

- Allocating PacifiCorp's costs among its jurisdictional states in an
- equitable manner
- Ensuring PacifiCorp plans and operates its generation and transmission
- system on a six state integrated basis in a matter that achieves
- a least-cost/risk-balanced resource portfolio for its customers
- Allowing each state to independently establish its ratemaking policies
- Providing PacifiCorp the opportunity to recover 100 percent of its prudently
- incurred costs

Municipal utility: A utility owned and operated by a municipality or group of municipalities.

National Association of Regulatory Utility Commissioners (NARUC): A professional trade association, headquartered in Washington, D.C., composed of members of state and federal regulatory bodies that have regulatory authority over utilities.

NERC (North American Electric Reliability Corporation): An organization subject to oversight by the Federal Energy Regulatory Commission and governmental authorities in Canada whose mission is to ensure the reliability of the bulk power system in North America. To achieve that, NERC develops and enforces reliability standards; assesses power adequacy annually via 10 year and seasonal forecasts; monitors the bulk power system; evaluates users, owners and operators for preparedness; and educates, trains and certifies electric industry personnel.

Net metering: A method of crediting customers for electricity that they generate on site in excess of their own electricity consumption.

Network: An interconnected system of electrical transmission lines, transformers, switches and other equipment connected together in such a way as to provide reliable transmission of electrical power from multiple generators to multiple load centers.

Normalization: The accounting method used to ensure that the sum total of taxes payable for an asset under an accelerated method of depreciation is congruent to what would be the sum total of taxes payable for that same asset under a straight-line method of depreciation. Normalization was instituted by Congress in 1969 to prevent the tax benefits of deferred payables from being directly passed on to customers instead of the proper governing authorities.

Nuclear power plant: A facility in which nuclear fission produces heat that is used to generate electricity.

Obligation to serve: In exchange for the regulated monopoly status of a utility for a designated service territory with the opportunity to earn an adequate rate of return, comes the obligation to provide electrical service to all customers who seek that service at fair and reasonable prices. This has been part of what the utility commits to under the "regulatory compact" and also includes the requirement to provide a substantial operating reserve capacity in the electrical system. *(See also Regulatory compact.)*

Off peak: The period during a day, week, month or year when the load being delivered by a natural gas or electric system is not at or near the maximum volume delivered by that system for a similar period of time (night vs. day, Sunday vs. Tuesday).

On peak: The period during a day, week, month or year when the load is at or near the maximum volume.

Open access: The term applied to the evolving access to the transmission system for all generators and wholesale customers. This is also the use of a utility's transmission and distribution facilities on a common-carrier basis at cost-based rates.

Outage: Periods, both planned and unexpected, during which power system facilities (generating unit, transmission line or other facilities) cease to provide generation, transmission or the distribution of power.

PCBs: Synthetic chemicals (polychlorinated biphenyls), manufactured from 1929 to 1977, found in electric equipment, such as voltage regulators and switches, and used to cool electrical capacitors and transformers. The manufacture of PCBs was banned by the U.S. Congress in 1979 and by the Stockholm Convention on Persistent Organic Pollutants in 2001.

Peak demand: The maximum load during a specified period of time.

Peak load plant or peaker unit: A plant usually housing low-efficiency, quick response steam units, gas turbines, diesels or pumped-storage hydroelectric equipment normally used during the maximum load periods. Peakers are characterized by quick start times and generally high operating costs, but low capital costs.

Photovoltaic (solar) conversion: The process of converting the sun's light energy directly into electric energy through the use of photovoltaic cells.

Pipeline system: A collection of pipeline facilities used to transport natural gas from source of supply to burner tip, including gathering, transmission or distribution lines, treating or processing plants, compressor stations and related facilities.

Point of delivery: The physical point of connection between the transmission provider and a utility. Power is metered here to determine the cost of the transmission service.

Point of regulation: Refers to which entities are responsible for complying with regulations. Within the context of a cap and trade greenhouse gas emissions system, the point of regulation may occur upstream at the source of fuels or other greenhouse gas-containing substances; downstream with the distributors of fuel or electricity; or through a hybrid approach.

Point to point: Transmission service from one discrete point to another discrete point.

Power plant: A plant that converts mechanical energy into electric energy. The power is produced from raw material such as gas, coal, nuclear or other fuel technologies.

Preference customers: Publicly owned utilities and not-for-profit cooperatives, which, by law, have preference over investor owned systems and industrial customers for the purchase of power from federal power marketers, such as the Bonneville Power Administration.

Production Tax Credit (PTC): Production tax credits support the introduction of renewables by allowing companies which invest in renewables to write off this investment against other investments they make. A PTC can be used as the central mechanism for the support of renewables as part of a national or regional mechanism, or it can be used in support of other mechanisms, such as a quota mechanism. Production tax credits have been supplied at the federal level.

Purchase Power Agreement (PPA): Typical name for bilateral wholesale or retail power contract.

Qualifying facility (QF): A designation created by PURPA for non-utility power producers that meet certain operating, efficiency and fuel-use standards set by FERC. To be recognized as a qualifying facility under PURPA, the facility must be a small power production facility whose primary energy source is renewable or a cogeneration facility that must produce electric energy and another form of useful thermal energy, such as steam or heat, in a way that is more efficient than the separate production of both forms of energy. It must also meet certain ownership, operating and efficiency criteria established by FERC.

Rate base: The value of property upon which a utility is given the opportunity to earn a specified rate of return as established by regulatory authority. The rate base generally represents the value of property used by the utility in providing service and may be calculated by any one or a combination of the following accounting methods: fair value, prudent investment, reproduction cost or original cost. The rate base may include a working capital allowance covering such elements as cash, working capital, materials and supplies, prepayments, minimum bank balances and tax offsets. The rate base may be adjusted by deductions for accumulated provision for depreciation, contributions in aid of construction, accumulated deferred income taxes and accumulated deferred investment tax credits.

Rate design: The development of electricity prices for various customer classes to meet revenue requirements dictated by operating needs and costs within current regulatory and legislative policy goals.

Rate of return: The allowed rate of return is the percentage determined by the jurisdictional state or federal commission based on standards including the cost of capital in other sectors with comparable risk. The achieved rate of return is the actual result the utility obtained over any given period. Investor owned utilities are not guaranteed, but given the opportunity, to earn a profit.

Rate schedule: The rates, charges and provisions under which service is supplied to a designated class of customers.

REA: Rural Electrification Administration; currently called *Rural Utility Service*.

Regional transmission organization/group (RTO/RTG): A proposal advanced by FERC to establish regional groups to expedite the coordination of wholesale wheeling. The group is voluntary in each region and may include transmission system owners, wholesale purchasers and independent power generators.

Regulatory compact: A traditional covenant between customers in a state and investor owned utilities (IOUs). In exchange for the obligation to provide service to all customers in a defined service territory, an IOU is given a territorial monopoly on service and allowed to earn a limited return set by state regulators. The commission enforces the terms of the regulatory compact. *(See also Obligation to serve.)*

Reliability: The ability to meet demand without interruption. The degree of reliability may be measured by the frequency, duration and magnitude of adverse effects on consumer service.

Renewable energy credit/green tag: Tradable certificate confirming 1 megawatt-hour of electricity generated by an eligible renewable resource that is tracked and verified by an authorizing entity; includes all of the environmental attributes associated with that 1 megawatt-hour unit of electricity production.

Renewable Portfolio Standard (RPS): A policy that establishes a percentage of electric retail sales that must be derived from eligible renewable resources. Another common name for the same concept is renewable electricity standard (RES).

Renewable resource: An energy source that is continuously or cyclically renewed by nature, including solar, wind, hydroelectric, geothermal, biomass or similar sources of energy.

Request for Proposal (RFP): Request For Proposal is a written solicitation that conveys to vendors a requirement for materials or services that the purchaser intends to buy. An RFP is a primary means of inviting a bid or proposal from prospective suppliers. The RFP process allows for the equitable and simultaneous comparison and analysis of competing businesses' product and service offerings.

Reserve capacity: Capacity in excess of that required to carry peak load, available to meet unanticipated demands for power or to generate power in the event of loss of generation.

Residential consumer: A consumer residing at a dwelling served by the company, and using services for domestic purposes. This does not include consumers residing in temporary accommodations, such as hotels, camps, lodges and clubs.

Restructuring: The reconfiguration of the vertically integrated electric utility. Restructuring usually refers to separation of the various utility functions (such as power generation and transmission) into separate functions, typically to offer more competitive choices to customers. *(See also Deregulation.)*

Retail: Sales covering electrical energy supplied for end-use residential, commercial and industrial end-use purposes. Agriculture and street lighting are also included in this category. Power sold at retail is not resold by the purchaser to another customer.

Retail competition: A system under which more than one electricity provider competes to sell to retail customers and retail customers are allowed to buy from different providers. *(See also Direct Access.)*

Retail wheeling: The sale of electricity by a utility or other supplier to a customer in another utility's retail service territory. Refers to the use of the local utility's transmission and distribution lines to deliver the power from a wholesale supplier to a retail customer by a third party.

Return on equity: Compensation for the investment of capital. Regulated public utilities are allowed to charge rates that provide them an opportunity - but not a guarantee - to earn a reasonable return on their equity invested.

Revenue requirement: The amount of funds (revenue) a utility must take in to cover the sum of its estimated operation and maintenance expenses, debt service, taxes and allowed rate of return. Revenue requirement is often defined as: *Revenue requirement = Operating expenses + depreciation expense + income taxes + (rate of return x rate base)*

Rolling blackout: Shutting off power to groups or blocks of customers in a controlled and preplanned manner to reduce system demand. Interruptions happen in intervals and between blocks of customers so all customers share in the efforts to reduce demand.

Rural electric cooperative: *See Cooperative electric utility.*

RUS: Rural Utility Service; formerly called *Rural Electrification Administration*.

Sales for resale: Energy supplied at wholesale to other utilities, cooperatives, municipalities and federal and state agencies for resale to ultimate consumers. May be subject to FERC regulation.

Scheduled outage: The shutdown of a generating unit, transmission line or other facility, for inspection or maintenance in accordance with an advance schedule.

Scheduling: Operating a power system to balance generation and loads; managing the accounting, billing and information reporting for such operations.

Service area: The territory in which a utility system is required or has the right to supply service to ultimate customers.

Shaping, or load shaping: The scheduling and operation of generating resources to meet changing load levels. Load shaping on a hydroelectric system usually involves the adjustment of water releases from reservoirs so that generation and load are continuously in balance.

Smart grid: Smart grid is a concept. At the moment that concept is undeveloped. The basic concept of smart grid is to add monitoring, analysis, control and communication capabilities to the national electrical delivery system to maximize the throughput of the system. In theory, the smart grid concept might allow utilities to move electricity around the system as efficiently and economically as possible. It might also allow the homeowner and business to use electricity as economically as possible. Consumers will have the choice and flexibility to manage electrical use while minimizing bills. Smart grid hopes to build on many of the technologies already used by electric utilities. It also adds communication and control capabilities with the idea of optimizing the operation of the entire electrical grid. To reduce this concept to a single sentence, one might describe smart grid as overlaying a communication network on top of the power grid.

Solar generation: The use of radiation from the sun to substitute for electric power or natural gas heating.

Spot market: Commodity transactions in which the transaction commencement is near term (e.g., within 10 days) and the contract duration is relatively short (e.g., 30 days).

Spot purchases: A short-term single shipment sale of a commodity, including electricity or gas, purchased for delivery generally on an interruptible or best efforts basis.

Standards of conduct: Requirements under FERC's marketing affiliate rule that prohibit discrimination in favor of the utility's own marketing affiliates and that require utilities to submit reports detailing compliance with the rules.

Substation: Equipment that switches, changes or regulates electric voltage. An electric power station that serves as a control and transfer point on an electrical transmission system. Substations route and control electrical power flow, transformer voltage levels and serve as delivery points to industrial customers.

Tariff: A document filed by a regulated entity with either a federal or state commission, listing the rates the regulated entity will charge to provide service to its customers as well as the terms and conditions that it will follow in providing service.

Test period: In a rate case, a test period is used to determine the cost of service upon which the rates will be based. A test period consists of a base period of 12 consecutive months of actual operational experience, adjusted for changes in revenues and costs that are known and are measurable with reasonable accuracy at the time of the rate filing.

Thermal generation: The production of electricity from plants that convert heat energy into electrical energy. The heat in thermal plants can be produced from a number of sources such as coal, oil or natural gas.

Transmission: The network of high-voltage lines, transformers and switches used to move electrical power from generators to the distribution system (loads). This network is also utilized to interconnect different utility systems and independent power producers together into a synchronized network.

Transmission grid: An interconnected system of electric transmission lines and associated equipment for the transfer of electric energy in bulk between points of supply and points of demand.

Turbine: The part of a generating unit usually consisting of a series of curved vanes or blades on a central spindle that is spun by the force of water, steam or heat to drive an electric generator. Turbines convert the kinetic energy of such fluids to mechanical energy through the principles of impulse and reaction or a measure of the two.

Used and useful: The traditional test for whether a utility asset may be included in rate base.

Volt: A unit of measurement of electromotive force or electrical potential. It is equivalent to the force required to produce a current of one ampere through a resistance of one ohm. Typical transmission level voltages are 115 kV, 230 kV and 500 kV.

Watt: A measure of real power production or usage equal to one joule per second.

Watt-hour (Wh): An electrical energy unit of measure equal to one watt of power supplied to, or taken from, an electric circuit steadily for one hour.

Western Climate Initiative: A collaboration which was launched in February 2007 by the governors of Arizona, California, New Mexico, Oregon and Washington to develop regional strategies to address climate change. Since February 2007, the group has expanded to include Utah, Montana, British Columbia, Manitoba and Quebec. The group has established a goal to reduce overall emissions within its member states by 15 percent below 2005 levels by 2020.

Western Electricity Coordinating Council (WECC): A group of utilities banded together to promote reliability by coordinating the power supply and transmission in the West.

Wheeling: The use of the transmission facilities of one system to transmit power for another system. Wheeling can apply to either wholesale or retail service. *(See also Retail wheeling.)*

Wholesale power market: The purchase and sale of electricity from generators to resellers (who sell to retail customers or to wholesale customers) along with the ancillary services needed to maintain reliability and power quality at the transmission level.

Wholesale sales: Energy supplied to other electric utilities, cooperative, municipals, federal and state electric agencies and power marketers for resale to other wholesale customers or ultimate consumers.

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