October 5, 2009

Subject: Transmittal to ISEA Council of the Hydropower Resources Report

Dear Council Members:

The purpose of this letter is to transmit to you a report summarizing issues, opportunities, and suggested actions to address the State of Idaho energy objectives, outlined in the Legislature's 2007 Idaho Energy Plan. The report attached is focused on Hydropower.

The Board of Directors (Board) of the Idaho Strategic Energy Alliance (ISEA) recognizes and thanks the Hydropower Resources Task Force , one of more than a dozen expert groups working as part of the Alliance, for their development of this report. The ISEA Task Forces are comprised of volunteer experts, including energy engineers, developers, private and academic researchers, regulators, and policy experts who have come together in the interest of Idaho citizens to develop and analyze options, provide information, and build partnerships necessary to address Idaho's energy challenges and capitalize on Idaho's energy opportunities. The reports produced by these Task Forces present an understanding of the current status and potential path forward for each resource, and as such, provide a first step in executing the Legislature's 2007 Idaho Energy Plan.

The core of this report is the identification of barriers and challenges to, and the development of options for expanding development of hydropower resources in Idaho. The conclusions and recommended options are not intended to be exhaustive, but rather, form a starting point for informed discussions.

As you know, it is the Board's responsibility to evaluate the potential benefits and costs of the recommended options developed by ISEA Task Forces. Our initial review comments on the Hydropower Task Force report are summarized in this transmittal. The Board believes that an adequate policy assessment of individual reports cannot be made, however, until all of the Task Force reports and options have been evaluated together, including considerations of Economic Development & Finance, Energy Transmission, and Communications. In this respect, both this report and the Board's comments should be viewed as "living documents" that will be updated as significant new information and/or perspectives emerge.

Summary of Recommendations

The Task Force recommendations, including actions and implementing suggestions, are summarized below, and in greater detail in the body of the report. In some instances, the ISEA Board concurred completely with the Task Force recommendations. In other instances, there was conditional or no consensus. In all cases, we as a Board feel that it is valuable for you to have an understanding of the recommendation, its potential benefits and downsides.

Nine options are recommended in this report, including: 1) designation of hydropower as renewable; 2) evaluation of interconnection issues; 3) evaluation of avoided-cost rates; 4) streamline hydro licensing;

5) evaluate economic incentives for hydro; 6) promote renewable energy bonds / loan guarantees; 7) encourage promotion of hydro by the Idaho delegation; 8) comprehensively assess Idaho hydro potential, and 9) develop a fair system of carbon allocation. The Board was supportive of all of the recommendations, with the exception of number 3, for which there was no unanimous consensus. In addition, there was caution expressed about the adoption of number 2, interconnection rules, as applied to this application (hydropower) and other applications.

Proposed Action Items

In addition to commenting on recommended options, the Board believes it is helpful to suggest the organizations to which the Governor's Office or the Legislature might consider assigning the responsibility for evaluating, and possibly implementing recommended options. This evaluation would include, as appropriate, development of an implementation plan and timeline. In addition, we offer members of the Board and the Task Force as a resource to the reviewing organizations during the initial review and scoping of the recommendation, as well as during the evaluation and implementation. The Board's recommendations are presented below.

- **Department of Commerce**
  1. Evaluate Business Tax Credit

- **Office of Energy Resources**
  1. Potential for legislation to designate hydro as a renewable resource in Idaho
  2. Conduct workshops with agencies to streamline hydro development
  3. Promote use of renewable energy bonds, loan guarantees and grants
  4. Work with the Idaho Federal Delegation to promote the development of hydropower
  5. Work with the Idaho Federal Delegation to advocate for a fair allocation of carbon credits in pending Climate Legislation

- **Public Utilities Commission**
  1. Evaluation of interconnection rules
  2. Evaluation of avoided-cost rates

- **Department of Water Resources**
  1. Assess Idaho's hydropower potential

Again, the Board is pleased to commend the work of the Hydropower Resources Task Force and is pleased to submit their report to Council members for your review.

Steven E. Aumeier,

Chair, ISEA Board of Directors

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Jim Kempton, Idaho Public Utilities Commission
Michael Louis, Center for Advanced Energy Studies/Energy Policy Institute
Ric Gale, Idaho Power Company

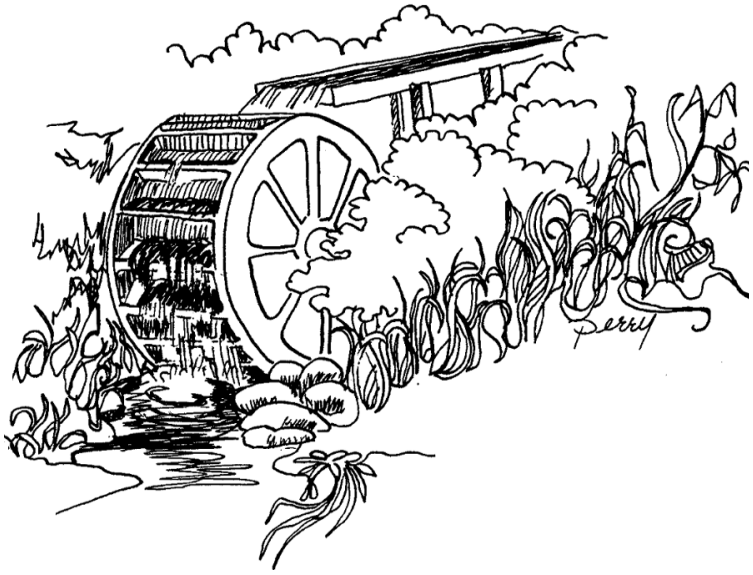
Hydropower Task Force: Pro/Con

Recommendation	Page		Explanation
Idaho acknowledges that hydro is a renewable energy source and a benefit to the state	ix, 25, 27	Pro:	*Will set the tone and send a message to everyone that Idaho values and benefits from hydropower*
IPUC conduct workshops on interconnection issues	ix, 27	Pro:	*A proceeding of the nature recommended would help developers and other interested parties better understand the regulatory framework and rules governing generator interconnection with utilities. Points of contention, worthy of merit in the eyes of the Commissioners, might be able to be resolved either in the favor the utility (utility's customers) or the developer. Avista would be pleased to participate in any such process.*
		Pro:	*Would allow all interested stakeholders to work together to develop points of agreement in improving interconnection issues*
		Con	*The Commission revised/increased the avoided cost rates in a public proceeding earlier in 2009 and it is too early to determine the impact of these recent changes.*
		Con	*Adoption of such a proceeding could be a distraction for parties who are already familiar with the rules governing interconnection, which currently, in the view of the IPUC, fairly balances the interests of electricity consumers, serving utilities, and resource developers.*
PUC conduct workshops on avoided cost rates		Pro:	*To the extent the characteristics of hydropower resources are not fairly evaluated in the practices or protocols followed by the IPUC in the development of avoided-cost rates, a review could prove useful.*
	ix, 1, 27	Pro:	*Would allow all interested stakeholders to work together to develop points of agreement in improving the current avoided cost methodology*
		Con	*Adoption of such a process would require all interested parties to spend the time and resources necessary to participate effectively.*
OER conduct workshops with developers and state agencies to streamline hydro development	ix, 25, 27	Pro:	*Would bring together all state agencies who have a permitting and/or regulatory role to streamline the coordination process and timeliness of the current application process.*
		Pro:	*This proposal would likely help raise the awareness of regulators of the need for additional hydropower resources in Idaho. The process could help streamline siting and permitting, and ultimately reduce developers' costs. Both of these consequences could increase the likelihood that new resources are developed in Idaho that might otherwise not have been successful.*

OER conduct workshops to look at economic incentives for hydro	ix, 27	Pro:	*To promote hydro development in Idaho and put hydro on an equal basis with other renewable resources.*
		Pro:	*This proposal has merit for the evaluation of any economic incentives being considered for application to all renewable and other forms of energy development in Idaho. The authors are also correct in asserting that all generating resources should receive the same consideration, with the exception, that the characteristics of each resource type should be factored into the analysis (intermittent v. baseload, carbon emissions, etc.). This type of analysis could improve the likelihood that the State of Idaho would allocate even limited incentives for at least some types of energy development.*
Promote use of Clean Renewable Energy Bonds, loan guarantees, grants	ix, 28	Pro:	*Would help developers access USDA rural development funding*
		Pro:	*Would be helpful in promoting the development of hydropower resources in Idaho, and do not pose any significant detractions.*
Encourage Idaho congressional delegates to promote hydro	ix, 28	Pro:	*Would allow hydro to be considered, at the federal level, on an equal basis with other renewable resources and the standards applied to them, potentially providing additional tax credits.*
		Pro:	*Would be helpful in promoting the development of hydropower resources in Idaho, and do not pose any significant detractions.*
Develop fair distribution of carbon credits	ix, 28	Pro:	*Would benefit Idaho utilities who have long invested in clean energy resources.*
		Pro:	*Would be helpful in promoting the development of hydropower resources in Idaho, and do not pose any significant detractions.*
Seek funding for INL and IDWR to comprehensively assess Idaho's water system	ix, 28	Pro:	*Would provide an updated, comprehensive study of Idaho's true hydro potential.*
		Pro:	*Would be helpful in promoting the development of hydropower resources in Idaho, and do not pose any significant detractions.*

Idaho Strategic Energy Alliance

HYDROPOWER TASK FORCE REPORT



May 2009

Idaho Strategic Energy Alliance

Hydropower Task Force Report

May 2009

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NOTE: Some sections and subsections of this report were written by single or dual authors because of their research, experience, or affiliation. For additional information on the topics listed below, the reader may wish to contact the author or authors. However, the contents of this task force report have been reviewed by all task force members, and they concur with its issuance.

2. HYDROPOWER IN IDAHO: CURRENT STATUS and Appendix A Idaho Grid-Connected Hydropower Plants - John Crockett – Idaho Office of Energy Resources

3.1 Resource Assessment – Douglas Hall – Idaho National Laboratory

3.1.4 Pumped Storage and Appendix D Pumped Storage Hydropower – Rick Sterling - Idaho Public Utilities Commission and Robert Ross – Bureau of Reclamation

5.1.1 Private Non-Utility (Independent Power Producers) – T.S. Sorensen – Hydropower Developer

5.1.2.1 Idaho Power – S. F. Larrando – Idaho Power

5.1.2.2 Avista – S. A. Fry – Avista Corp

5.1.2.3 Rocky Mt. Power – M. Stenberg – PacifiCorp Energy

5.1.2.4 Non-Federal Public (Co-ops, Municipalities) – Jackie Flowers – Idaho Falls Power

5.2 State Agencies and Appendix C IDWR Potential Surface Water Storage Reservoirs – B.W. Patton – Idaho Department of Water Resources

5.3.1 Bureau of Reclamation – R.W. Ross – Bureau of Reclamation

5.3.2 Bonneville Power Administration – J.J. Williams – Bonneville Power Administration

Appendix B Current Hydroelectric Plant Developments in Idaho – Ted Sorensen – Sorensen Engineering

ABSTRACT

This report was produced by the Hydropower Task Force as an activity in support of the Idaho Strategic Energy Alliance. The report presents an overview of the current state of Idaho's hydroelectric facilities and generation, describes the results of assessments of the state's untapped water energy resources, presents the benefits and issues associated with new hydroelectric development, provides the perspectives of hydropower stakeholder groups, and describes the current development environment including barriers to development. Conclusions are drawn from the information on these topics and recommendations are made to facilitate new in-state hydropower development. Appendices to the report provide a complete listing of Idaho's hydroelectric plants with plant characteristic information, current hydroelectric plant developments in Idaho, potential surface water storage reservoirs being considered by the Idaho Department of Water Resources, a discussion of in-state pumped storage hydropower, a comparative analysis of various types of hydroelectric plants considering various topical perspectives, and relevant excerpts from the 2007 Idaho Energy Plan and a study performed for the Western Governors Association.

EXECUTIVE SUMMARY

The mission of the Hydropower Task Force is to present the current status and the future potential of hydropower as an energy and economic resource for Idaho. A task force comprised of: investor owned utility experts; independent hydropower developers; hydropower project managers, Idaho Department of Water Resources specialists; and representatives from a municipal utility, Idaho Public Utilities Commission, Idaho Office of Energy Resources, Bureau of Reclamation, Idaho National Laboratory, and the Bonneville Power Administration were assembled to analyze and discuss:

- The current importance and status of hydropower
- The current and future potential for development and options
- Barriers and challenges to development
- Recommendations for policy proposals and state and federal action items

Background and Current Status

Hydropower is a renewable resource with no carbon emissions, fuel costs, or consumptive water uses. Electricity generated from hydropower by three investor owned utilities, public power entities such as cooperatives and municipalities, independent developers, and federal agencies such as the Bureau of Reclamation is vital to all sectors of Idaho's economy. Their generating portfolios contain 114 facilities with a combined capacity of over 3,000 megawatts (sources cited in main body of the report). In an average water year, approximately 60% of Idaho's electric consumption is generated by hydropower facilities. Production associated with large water storage facilities represents the lowest cost generating resource within the power production portfolio of the Bonneville Power Administration and the three investor-owned electric utilities with service territories within Idaho. Numerous small (less than 20 megawatt) projects have been added to the grid over the last twenty-seven years at rates associated with the various avoided cost rates scenarios approved by the Idaho Public Utilities Commission and those approved by the governing bodies associated with cooperatives and municipalities. Over the years, the ability of some hydropower facilities to produce power has been reduced due to changes in operating regimes required for both upstream and downstream flow and retention conditions.

Over the last five years development has been limited to small upgrades at investor-owned utilities (IOU) and federal facilities, relicensing of existing facilities, and a handful of small independent projects. There is a perception that the remaining sites are off limits, and all projects will result in serious environmental degradation. Currently, there are few federal incentives and no state incentives for hydropower development as exist for other renewable resource development projects. New water impoundment facilities have not been constructed since the demise of the Teton Dam. The Public Utility Regulatory Policy Act (PURPA) avoided cost pricing and subsequent qualifying project sizes have been changing variables in the recent past. There are no organized forums to discuss, educate, and solve the issues associated with hydropower expansion. Idaho Power and Avista no longer have active new hydro project teams, though Rocky Mountain Power has an active interest in all renewable resources and is willing to examine new hydro facility construction. Idaho's public power utilities, cooperatives and municipalities, have had limited discussions regarding hydropower issues through their association with the Idaho Consumer Owned Utilities Association (ICUA). Some ICUA members are working to examine and advance small hydropower projects. There are a few serious in-state, active independent developers and local engineering firms capable of assembling a team, securing the financing and enduring the timeframe required from permit and license application until construction.

The avoided cost model chosen by the Idaho Public Utilities Commission designates a natural gas fired, combined cycle, combustion turbine as the surrogate resource being avoided by the addition of

other qualifying resources. This has lifted the price to be paid by utilities for such additional generation to a price that is attractive enough to create a cautious renewal of interest in the hydropower industry.

Current and Future Development Potential and Options

Hydropower development, including the retention of the current hydropower facilities in Idaho, brings a number of benefits which are positive attributes encouraging development:

- No fuel cost risks or emissions risks
- Local employment
- Ancillary benefits of flood control, drinking water, recreation, and irrigation storage and delivery opportunities
- Stabilized long term power rates
- Water flows during peak power consumption periods
- Water flows from major impoundments can be managed to generate power matching customer requirements and provide help in shaping the power deliverability of intermittent resources
- Flexibility in downstream flow releases can be shaped to enhance fish and wildlife requirements
- Projects may qualify for a greenhouse gas credit as a carbon offset
- Historical flow knowledge provides for better resource availability planning
- Many projects may constitute no harm to riparian and aquatic resources

An Idaho National Laboratory study (referenced within the report) of possible Idaho hydropower resources goes into detail on site specific positive and negative attributes and the economic thresholds of each. It is very comprehensive and encouraging for potential development at various prices per kilowatt-hour (kWh). Based on this study and the personal knowledge of various task force members, a significant number of less than 10 megawatt development opportunities (perhaps as many as 150 megawatts total) exist with today's avoided cost pricing range of seven to nine cents per kWh for a twenty year power sales agreement. Not including pumped storage projects, over the next twenty years it is realistic to believe 800 megawatts of new hydropower generation could be developed. The types of projects listed below are those which the task force believes can contribute energy to augment Idaho's current hydropower supply:

Immediate to short and mid-term opportunities

- Upgrades to existing facilities
- Existing unpowered impoundments and water delivery systems such as irrigation canal drops
- Undeveloped licenses and /or exemptions
- Instream flow utilization
- Bypasses at existing dams
- Conduit projects from water supplies from municipal and industrial processes
- New technology turbine upgrades

Longer term opportunities

- Newly developed impoundment features
- New pumped storage for peak requirements and to firm wind generation
- Hydrokinetic power generation (instream concept at demonstration phase, not commercially available)

Potential Barriers and Challenges to Development

The feasibility of any project depends on the economics associated with the investment. The economic model must define the barriers in terms of constants and variables. The task is to turn the variables into constants with an associated risk factor so a reasoned decision to pursue the opportunity may be made. The development of hydropower projects must address numerous barriers, though the type and importance will vary by the resource being evaluated (see the list of project types in the previous paragraph). The task force documented from their knowledge, the barriers to new generation and the maintenance and relicensing of existing facilities. The barriers were described as follows:

Resource Barriers

- Misconception that the resource is tapped out
- Misconception that new hydropower = new dam
- Misconception that hydropower consumes water and is unreliable due to flow seasonality
- Competing water uses
- Legal issues over water ownership and user rights may stall interest
- Recreation
- Flow augmentation
- Endangered Species Act
- Environment/Water quality
- Perceptions about new hydro causing environmental degradation
- Access via federal/state/private lands
- Required studies and the broad scope of the same
- Agendas denying open discourse

Economic Barriers

- Price per kWh received
- Cost versus current avoided cost scenarios; increases in the costs of raw materials, labor and construction
- Upfront costs of engineering and permitting
- Required studies and broad scope of the same

- Time between filing a license application and receiving the same from the Federal Energy Regulatory Administration - three to seven years
- Access to capital
- Implications of creditworthiness and designation changes over time
- No incentive credits for production, investments, renewable energy designation, or accelerated depreciation state or federal
- Significant costs associated with appeals and interveners
- No formal recognition by state and federal agencies or executive branch designates that hydropower is a renewable resource
- Perception that the best remaining sites are off limits from an environmental and feasibility standpoint
- PURPA avoided cost pricing and qualifying project size have been a large variable in the past
- Interconnection costs, equipment ownership, maintenance, and reliability standards constitute significant expenses
- Proximity to distribution voltage facilities and capacity availability
- Resolution of utility customer requirements and cost issues

As with any renewable resource there will not be a unanimous chorus in favor of development of a resource at a site at some point in time. Hydropower is not any different. In the past and currently the investor owned utilities have certainly shown a willingness to address the barriers in a transparent manner inviting all with an interest to the table for discussions and resolution. Independent developers have shown, in the past, a remarkable resilience to pursue federal licenses and honestly address the needs identified by the agencies and other stakeholders.

Recommendations

The various current and proposed future hydropower projects meet all or a majority of the five objectives identified in the 2007 Idaho Energy Plan:

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 policy to adapt to changing circumstances.

The Task Force Recommendations are designed to further meet the objectives of the Energy Plan. They will enhance the viability of hydropower projects by avoiding expensive adversarial proceedings on key issues through respectful proceedings that hopefully will result in mutually agreed upon settlements which are fair to all concerned.

The Hydropower Task Force recommends that:

1. The legislative and executive branches of Idaho government express through appropriate action their agreement that hydropower is renewable energy and its development is in the best interests of the state and its citizenry.

2. The Idaho Public Utilities Commission conduct workshops with all relevant parties on the project interconnection issues including who pays what that will lead to the opening a docket for the Commissioners to formally accept the settlements and to adjudicate those remaining unsettled items.

3. The Idaho Public Utilities Commission conduct workshops on the avoided cost rates and protocols as they apply to resource pricing and fuel costs. This should include resource reliability standards. Agreements will be docketed for formal hearings and Commissioner approval.

4. The Idaho Office of Energy Resources conduct workshops involving hydropower developers and all state agencies that have a permitting or regulatory role in the licensing and/or relicensing of hydropower projects. The desired outcome is to reach agreement on a process that minimizes the time required for each agency to fulfill its responsibilities and still protect the interests of the public.

5. The Idaho Office of Energy Resources conduct workshops with the appropriate state departments, governor's staff, and legislative committees to examine the applicability of economic incentives for hydropower projects. If agreed upon, legislators should be asked to prepare a bill for passage and signature of the governor. To the extent any other forms of renewable energy qualify for incentives so too should hydropower.

6. The Idaho Strategic Energy Alliance, Idaho Office of Energy Resources, and Idaho Department of Water Resources help make potential developers aware of the availability of Clean Renewable Energy Bonds and/or the opportunity of loan guarantees and grant funding through the United States Department of Agriculture "rural development" arm through their information resources.

7. The Hydropower Task Force, the Energy Board, and the Governor's Council contact Idaho's congressional delegation and ask them to endorse and encourage the U.S. Congress to accept all types and configurations of hydropower as renewable resources that can be applied to any federal renewable energy standard.

8. The Hydropower Task Force, the Energy Board, and the Governor's Council contact Idaho's congressional delegation and ask them to endorse and encourage the U.S. Congress to make all types and configurations of hydropower eligible for any and all federal incentives and credits reserved for renewable energy development.

9. The Idaho Strategic Energy Alliance ask the governor, legislature and Idaho's congressional delegation to work together for a fair distribution of carbon credits to those utilities having made investments in renewable resources for many years.

10. The Idaho Strategic Energy Alliance seek, through the Idaho legislature and congressional delegation, funding for the Idaho National Laboratory and the Idaho Department of Water Resources to conduct comprehensive assessments of Idaho's constructed waterways (irrigation canals, effluent streams, etc) to identify potential sources of energy production and Idaho's natural streams to identify potential sites for energy production using hydrokinetic turbine technologies.

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ACRONYMS

BPA	Bonneville Power Administration
CWA	Clean Water Act
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
ICUA	Idaho Consumer Owned Utilities Association
IDWR	Idaho Department of Water Resources
IOU	Investor-owned utilities
IPC	Idaho Power Company
IPUC	Idaho Public Utilities Commission
IWRB	Idaho Water Resource Board
PESF	Project Environmental Suitability Factor
PMA	Power Marketing Agency
PNCA	Pacific Northwest Coordination Agreement
PNPCC	Pacific Northwest Power and Conservation Council
	The states of Idaho, Montana, Oregon, and Washington were authorized to form the Council [in the Act, Section 4.(a)(2)(A), it is called the Pacific Northwest Electric Power and Conservation Planning Council] with two representatives from each state, appointed by the governors. The Act directed the Council to draw up a plan for meeting the electrical needs of the region at the lowest possible cost.
PS	Pumped storage
PUC	Public utilities commission
PURPA	Public Utility Regulatory Policy Act
QF	Qualifying Facility
RPS	Renewable Portfolio Standard
WECC	Western Electric Coordinating Council

NOMENCLATURE

Annual mean power	The statistical mean of the rate at which energy is produced over the course of a year. When based on the predicted annual mean flow rate and associated hydraulic head at a water energy resource site or based on working fractions of these quantities associated with a feasible potential project, the predicted annual mean power is the mean of the annual mean powers occurring over a period of many years. Such power values are denoted by units of average kilowatts (kWa) or average megawatts (MWa). The actual annual mean power in a specific year will usually differ from the predicted value. A power rating of a hydroelectric plant based on electricity generation at this rate throughout the course of a year would produce the average annual electricity generation of the plant. This is sometimes referred to as average megawatt power rating denoted in some usages by "MWa."
Avoided cost rate	The maximum price per kilowatt-hour a utility is required to pay an independent power producer under a power purchase agreement as required by the Public Utility Regulatory Policy Act (PURPA). In Idaho, this price is set by the Idaho Public Utilities Commission.
Capacity	Typically refers to the design (nameplate) power rating of a hydroelectric plant and is denoted by units of megawatts (MW). Considering all U.S. hydroelectric plants, the average ratio of capacity to annual mean power is a factor of two.
Feasible potential project	A water energy resource site that has met a set of feasibility criteria, thus identifying it as feasible for development.
Hydropower potential	As used in Subsection 3.1.2 of this report - the power potential of a feasible potential project based on its working flow rate and working hydraulic head having units of MWa (average megawatts).
Power class (feasible potential projects)	As used in Subsection 3.1.2 of this report - the power and technology classes into which feasible potential projects have been divided based on their hydropower potential and working hydraulic head: • Small Hydro • Low Power-Convention Turbines • Low Power-Unconventional Systems • Microhydro where Small Hydro refers to hydropower potential ≥1 MWa and ≤ 30 MWa, and Low Power refers to hydropower potential <1 MWa. Conventional Turbines, Unconventional Systems, and Microhydro are technology classes that are subclasses of the Low Power class as defined by their operating envelopes. The Conventional Turbine subclass refers to Low Power sites where there is at least 8 ft of hydraulic head. The Unconventional Systems subclass refers to Low Power sites where there is less than 8 ft of hydraulic head. The Microhydro subclass refers to sites having power potentials of less than 100 kWa regardless of hydraulic head.
Water energy resource site	A stream reach for which the values of hydraulic head, annual mean flow rate, and power potential have been estimated. The site location is taken as the longitudinal midpoint of the reach.

Idaho Strategic Energy Alliance Hydropower Task Force Report

1. INTRODUCTION

Throughout the world the use of the force and fall of water to generate electricity is common place - Idaho is no exception. Hydropower is a carbon free, renewable, generating resource. It is for these reasons the Idaho Strategic Energy Alliance created by Governor Otter, managed by the Idaho Office of Energy Resources and directed by a Citizen Advisory Board has included a Hydropower Task Force among a fairly comprehensive list of current and potential energy resources available in Idaho to meet the state's needs.

Diverse groups with significant hydropower experience representing investor-owned utilities, public power utilities, regulatory bodies, independent developers, state and federal officials and the Idaho National Laboratory were chosen to comprise the task force. Its immediate mission is to create a report identifying the current use of hydropower in Idaho, hydropower's potential in the state, barriers and challenges to its development, and the identification of potential options to overcome these barriers to help hydropower to meet a portion of the energy requirements of Idaho and its citizens. The ongoing mission of the task force is to provide expertise on hydropower-related issues to Idaho decision-makers.

To produce the hydropower report, the task force adopted a process utilizing meetings combined with the results of independent study and analysis and personal experience. Open and frank discussions enabled the identification opportunities for development, perceived and real issues with hydropower expansion, barriers to development, and steps needed to eliminate or reduce the severity of these barriers. Included in this analysis were the activities necessary to preserve Idaho's current hydropower production facilities such as re-licensing.

It was recognized that most large scale hydropower has been associated with water storage, changes in flow regime, changes in recreation and visual aesthetics, and effects on fish and animal habitat. In many cases, the attributes of a free flowing stream or river have been exchanged for those of a reservoir. Many smaller projects have been affixed to previously existing impoundment structures and constructed water delivery systems. The task force's evaluative process sought to identify the type of projects remaining to be developed, who might be inclined to begin the Federal Energy Regulation Commission License Application and how might they be enabled if their project met acceptable environmental standards.

The economic drivers affecting the success or failure of projects were examined as were the impacts of including the costs of these projects in the approved rate structures of those entities providing electric service to Idaho's residents, businesses and industries. The principal determinant required to grow Idaho's hydropower industry is the price per kWh paid to the developer or the ability of a utility to place its capital costs in their rate base.

The avoided cost rates determined by the Idaho Public Utilities Commission or a derivative there from will be the applicable benchmark rate for new utility development for the investor owned utilities. The BPA Tier 2 rates will be the benchmark for the municipality and cooperative power producers. The second determinant will be the time, cost, and analysis necessary to get an operating license from the Federal Energy Regulatory Commission (FERC).

The report concludes with recommendations and appendices listing Idaho hydroelectric plants (Appendix A); descriptions of nine current hydroelectric plant developments in Idaho (Appendix B); descriptions of potential surface water storage reservoirs and associated hydroelectric development under consideration by the Idaho Department of Water Resources (IDWR) (Appendix C); a discussion of the

potential for pumped storage in Idaho with descriptions of three potential projects (Appendix D); matrices comparing the costs, economic benefits, environmental effects and sustainability of six different types of hydro projects (Appendix E); and hydropower related excerpts from the 2007 Idaho Energy Plan and the Report of the Clean and Diversified Energy Advisory Committee to the Western Governors Association (Appendix F).

2. HYDROPOWER IN IDAHO: CURRENT STATUS[1]

Inexpensive electricity is vital to all sectors of Idaho's economy. Hydroelectric power generation has given Idaho the lowest electricity rates in the nation. Hydropower is renewable, emits no pollutants or greenhouse gases and is an integral part of Idaho's rich history. The first electricity in Idaho was produced by hydropower in 1882 in Ketchum. By 1901 Swan Falls began providing electricity to Silver City and its surrounding mining operations. Today, there are about 114 grid-connected hydropower facilities on Idaho rivers and canals, including the Hell's Canyon Complex on the Idaho-Oregon border. It is likely there are that many additional small hydropower systems providing off-grid electricity to back country homes and operations in Idaho. Grid-connected hydropower plants in Idaho have an installed capacity of over 3,100 MW and produce over 13 million MWH during a normal water year. This is about 60-percent of Idaho's electricity consumption. Figure 1 is a map showing the locations of grid-connected hydropower facilities in Idaho. Power production for those facilities for 2005 is provided in Table 1.

Idaho hydropower plants are owned by Investor-Owned Utilities (IOU's), the federal government, municipal utilities, electric cooperatives, and private developers that have power sales agreements with public utilities. A breakdown of average power production by the ownership of Idaho hydropower facilities is provided in Figure 2. The number of plants by owner, capacity, and power production from 2002 to 2007 is provided in Table 1. Figure 3 shows a plot of the annual power generation from Idaho plants from 2002 to 2007. Nearly 70 percent of both the hydropower capacity and generation is provided by the three IOU's: Idaho Power Company, Avista Utilities, and Rocky Mountain Power. About 40 percent of Idaho's hydropower generation is from Idaho Power's three plants that make up the Hells Canyon Complex and straddle the Idaho-Oregon border: Brownlee, Oxbow, and Hell's Canyon. Idaho Power Company also owns and operates 13 additional plants for a total installed capacity of 1,695 MW.

Avista Utilities owns two hydropower plants in Idaho on the Spokane and Clark Fork Rivers. These have a total installed capacity of 278 MW. Rocky Mountain Power has seven plants in eastern Idaho. Three are located in the Ashton area and four are in the Bear Lake area.

Federal hydropower plants, operated by either the U.S. Bureau of Reclamation (Reclamation) or the U.S. Army Corps of Engineers (Corps) and located within the state, have a combined installed capacity of 706 MW. Reclamation operates the five federal plants in southern Idaho: Anderson Ranch, Black Canyon, Boise Diversion, Minidoka, and Palisades. The Corps operates the two federal facilities in northern Idaho: Dworshak Dam and Abeni Falls. Bonneville Power Administration (BPA) is the designated power marketing agency (PMA) for the Corps and Reclamation power generated in excess of federal reserve power supplied to authorized irrigation districts.

Three of Idaho's 12 municipal electric utilities own and operate hydropower plants in the State. The City of Idaho Falls has four plants; Soda Springs has two plants; and Bonners Ferry has one. The total combined capacity of these municipal utilities is 55 MW. The City of Preston, City of Hailey and Ada County also each own a plant. The power from these plants is sold to the local IOU.

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[1] Idaho hydroelectric plant information contained in this section and Appendix A was obtained from these sources:
http://www.ferc.gov/industries/hydropower/gen-info/licensing/licenses.xls

http://www.ferc.gov/industries/hydropower/gen-info/licensing/exemptions.xls
www.usbr.gov/power/data/fy02gen.html
FERC Financial Report - FERC Form 1: Annual Report of Major Electric Utilities, Licensees and Others, OMB No. 1902-0021
Numerous personal communications with hydroelectric plant owners

Idaho has 15 Rural Electric Cooperatives but only one operates hydroelectric facilities. Fall River Rural Electric Cooperative in Ashton operates 3 hydropower plants and is currently constructing a fourth at Chester Dam for a total capacity of 15.8 MW.

The Public Utilities Regulatory Policy Act of 1978 (PURPA) requires utilities to purchase energy from "qualifying facilities" (QFs). A qualifying facility is one which meets state and federal regulations required to qualify for the avoided cost methodology of energy pricing. Renewable generation facilities, including hydropower plants, can be QFs. The Federal Energy Regulatory Commission (FERC) administers PURPA and licenses the construction and operation of hydropower facilities. However, it leaves the determination of the rates QF's will be paid for their power, or "avoided costs" to the public utilities commission (PUC) of each state or the governing bodies for the cities and cooperatives. The policies established by the Idaho Public Utilities Commission (IPUC) in the 1980's were favorable toward QFs and led to the development of about 75 hydropower plants in the state. Within the 10-year period after the IPUC first implemented PURPA, Idaho increased its power production from hydropower by over 10 percent - a significant amount of power.

Most privately owned hydroelectric plants operate under a license or exemption issued by the Federal Energy Regulatory Commission. These operating permits are typically issued for a period of 30 years. A license renewal subjects a plant to a review of its operating restrictions and can result in additional operating restrictions being imposed and additional environmental mitigations being required. Scheduled license expirations of Idaho hydroelectric plants are shown in Figure 4. This figure shows that during the 2030's a particularly large number of Idaho plants will be subject to license renewal. While not a certainty, it is likely that the total electricity generation from these plants will be reduced spurring the need for more generation to be developed to replace this anticipated loss. An example is Idaho Power's relicensing efforts for the Hell's Canyon complex. Numerous federal agencies have suggested limiting Idaho Power's flexibility for managing downstream flows in a manner that would force Idaho Power to go to the market more often to buy more expensive power for load following.

Since about 1995 only a few new hydropower plants have been built. Today the combined capacity of privately owned hydropower facilities is nearly 780 MW. All but three independently owned hydropower plants market their generation to one of Idaho's IOU's. Power from Lucky Peak, Smith Creek and Dworshak (Idaho Water Resources Board) is sold to the City of Seattle, Eugene Water and Electric Board, and the BPA, respectively.

There are currently nine hydroelectric projects under development in Idaho, ranging in size from 300 kW to 15 MW. A complete list of these projects can be found in Appendix B. In addition, the Idaho Department of Water Resources is considering eight projects that may provide additional hydroelectric generation in Idaho. These projects are described in Appendix C.

It is important to note that hydropower generation in a given year varies due to variations in rainfall and mountain snow pack. The energy output from hydropower in Idaho is also seasonal, peaking during the spring runoff and declining in the late summer and fall. Annual variability is illustrated by the history of annual generation for the period 2002 to 2007 shown in Figure 3. In 2005, a low water year, hydropower provided about 51 percent of the electricity consumed in the state; while in 2006, a high water year, hydropower provided about 67 percent.

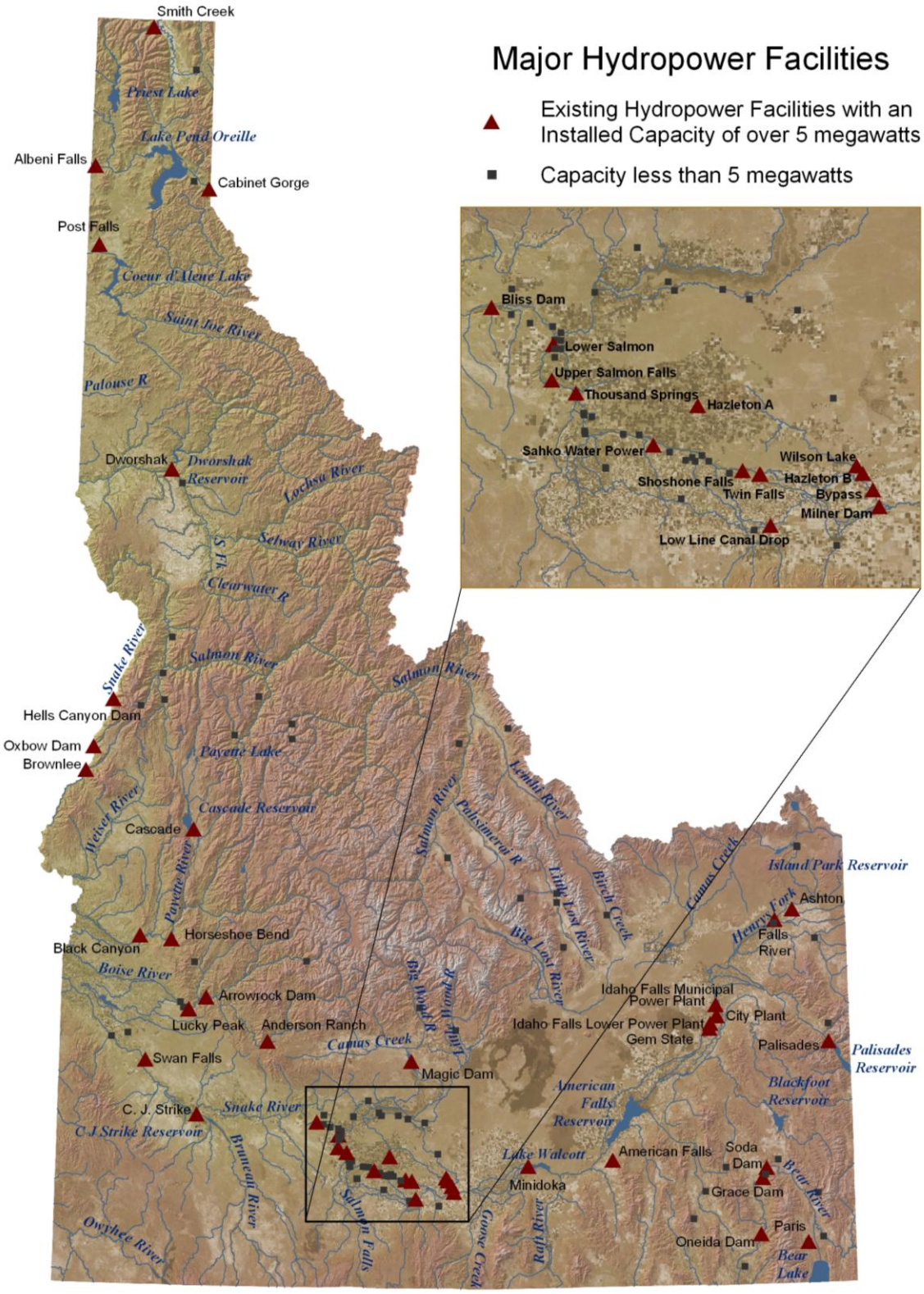

Figure 1. Map showing locations of Idaho hydroelectric plants.

Table. 1. Summary of Idaho hydroelectric plants - January, 2009.

	No. Plants	Capacity	2005* MWH/YR
	GRID-CONNECTED		
FEDERAL	7	706	2,605,486
EXEMPTIONS	55	88	224,758
LICENSES	44	1,126	3,717,360
LICENSES PENDING	4	1,182	4,459,584
NO FERC JURISDICTION	4	12	66,911
Subtotal	**114**	**3,113**	**11,074,100***
	OFF-GRID**		
EXEMPTIONS	6	0.09	Unknown
LICENSES	2	0.034	Unknown
Subtotal	**8**	**0.124**	
	NOT OPERATING		
LICENSE – Active	4	65	—
EXEMPTION – Inactive	8	4.305	—
LICENSE – Inactive	2	42.0	—
EXEMPTION - No Record of Operation	5	0.756	—
LICENSE - No Operation Record Found	3	0.20	—
Subtotal	**22**	**112**	
TOTAL PLANTS	**144**	**3,225**	

*Idaho 2005 electricity sales – 21,852,681 MWh (EIA) ≅ 22 billion kWh – hydropower supplied 50.7 % of sales

** Idaho has many off-grid hydropower facilities that are not permitted by the FERC

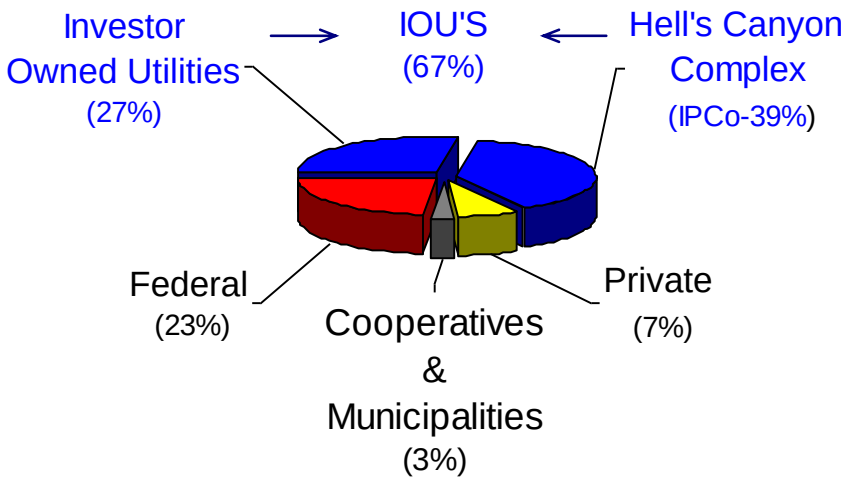

Figure 2. Idaho hydropower average electricity production by plant owner class.

Table 2. Idaho hydropower plant summary with generation by year.

	No. of PLANTS	CAPACITY MW	MWH/ YR 2002	MWH/YR 2003	MWH/YR 2004	MWH/YR 2005	MWH/YR 2006	MWH/YR 2007
IDAHO POWER CO. PLANTS	13	527.5	1,754,144	1,738,250	1,709,931	1,837,186	2,494,133	2,010,748
HELLS CANYON COMPLEX	3	1166.9	4,282,639	4,410,984	4,330,571	4,372,931	6,712,393	4,170,574
IPCo. PURPA PLANTS	56	120.3	*318,053*	*315,171*	*310,036*	333,109	*452,224*	*364,579*
	72	**1,815**	**6,354,836**	**6,464,405**	**6,350,538**	**6,543,226**	**9,658,750**	**6,545,901**
ROCKY MOUNTAIN POWER PLANTS	7	86.8	166,466	143,034	99,569	149,943	166,818	163,913
ROCKY MT. POWER PURPA PLANTS	12	15.2	*55,684*	*47,846*	*33,307*	50,157	*55,802*	*54,830*
	19	**102**	**222,150**	**190,880**	**132,876**	**200,100**	**222,620**	**218,743**
AVISTA POWER PLANTS	2	278	1,330,219	1,054,932	1,158,349	1,090,479	1,242,643	1,171,580
AVISTA PURPA PLANTS	3	2.8	*55,684*	*47,846*	*33,307*	7,342	*55,802*	*54,830*
	5	**281**	**1,385,903**	**1,102,778**	**1,191,656**	**1,097,821**	**1,298,445**	**1,226,410**
CORPS OF ENGINEERS	2	449	2,246,274	1,898,472	1,871,448	1,841,437	2,159,620	2,044,533
BUREAU OF RECLAMATION	5	257.0	646,801	628,374	689,958	764,049	998,019	826,301
	7	**706**	**2,893,075**	**2,526,846**	**2,561,406**	**2,605,486**	**3,157,639**	**2,870,834**
MUNICIPALITIES	7	55.3	231,329	238,029	249,329	253,711	303,143	272,157
COOPERATIVES	4	15.8	35,120	32,601	40,305	45,465	54,497	40,655
OTHER*	4	142.2	407,311	395,804	399,278	328,291	518,131	383,322
	15	**213**	**673,759**	**666,433**	**688,912**	**627,466**	**875,771**	**696,134**
TOTAL	**118**	**3,117**	**11,529,723**	**10,951,342**	**10,925,387**	**11,074,100**	**15,213,224**	**11,558,022**

PURPA plants are independent power producers having power purchase agreements with the indicated utility

Value in italics are estimated

*Other includes Dworshak (Water Board), Smith Creek, Lucky Peak & Atlanta

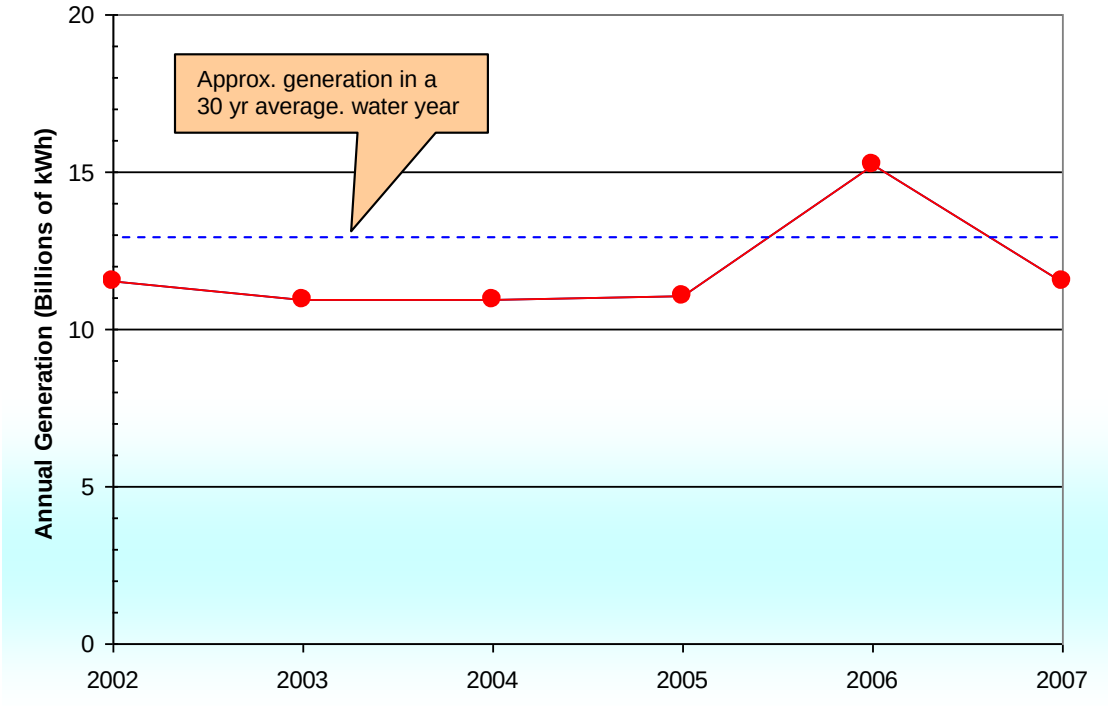

Figure 3. Annual Idaho hydroelectric generation for the years 2002 through 2007.

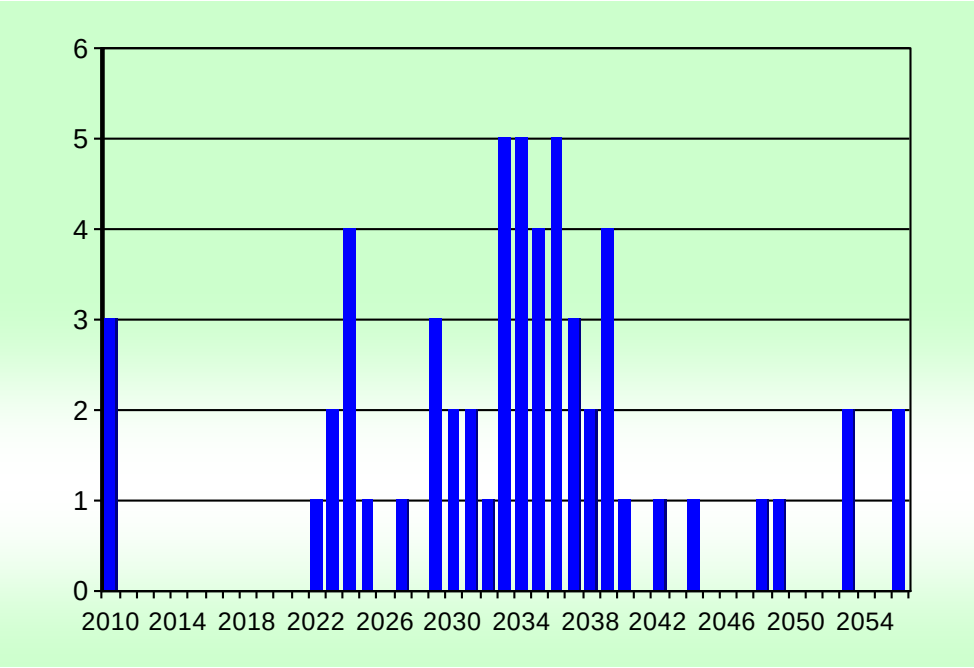

Figure 4. Number of Idaho hydroelectric plant license expirations by year (does not include exemptions).

3. IDAHO'S WATER ENERGY RESOURCES

3.1 Resource Assessments

Idaho has two principal categories of hydropower resources that are potential power sources: natural streams (conventional and hydrokinetic technologies) and constructed waterways (e.g. water supply systems, effluent streams, and canals). The power potential of natural streams using conventional technologies has been assessed in two studies conducted by the Idaho National Laboratory (INL). These studies and their results are briefly described in the two subsections below. No resource assessment has been conducted to determine the power potential of Idaho's natural streams using hydrokinetic technologies or use of its constructed waterways for energy production.

3.1.1 Capacity Increase Opportunities – 1998 Assessment

The INL performed a site-based resource assessment of capacity increase opportunities within the state of Idaho to determine the power potential at undeveloped sites, at existing dams not having associated power generating equipment (dams without power), and hydroelectric plants at which the capacity could be increased through power generating equipment additions or greater water use for power production (plant expansions) [Connor and Francfort, 1998]. Potential projects were identified using the 1996 version of the Federal Energy Regulatory Commission's Hydropower Resource Assessment (HPRA) database to identify hydroelectric projects for which a preliminary permit was filed, but were listed as undeveloped. The identified sites fell into the three aforementioned categories. This initial phase of the assessment resulted in the identification of 373 potential Idaho projects having a combined capacity increase potential of 7,713 MW. The distributions of numbers of projects and capacity increase potential by project category are shown in Figure 5.

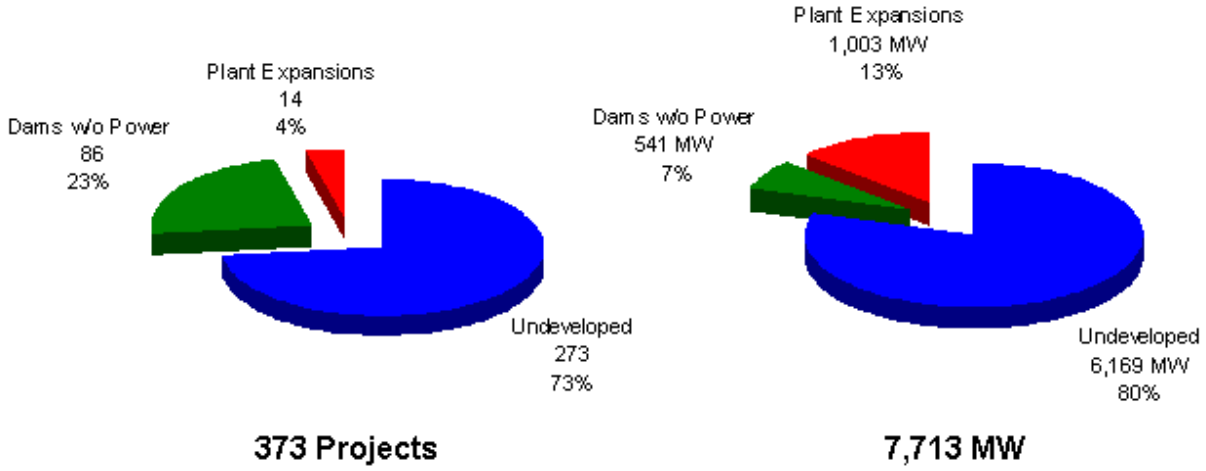

Figure 5. Distribution of sites and associated capacity potential by type – basic assessment.

A second phase of the assessment considered legal, institutional, and environmental factors affecting the likelihood of development. Each potential project was evaluated using 19 factors. The scoring based on these factors was used to define a likelihood of development index called the "project environmental suitability factor" (PESF). Considering only those potential projects that had a PESF of 0.75 or higher provides what was intended to be a realistic picture of future hydroelectric capacity increase. This more conservative view shows 82 out of a total of 373 potential projects have a good likelihood of future development. The corresponding total capacity of these projects is 488 MW or about 5 percent of the total capacity identified in the basic assessment. Ninety percent of this capacity potential is associated with the

addition of power generating equipment at 69 existing dams without power. The distributions of numbers of projects and capacity increase potential by project category based on the project development likelihood assessment are shown in Figure 6.

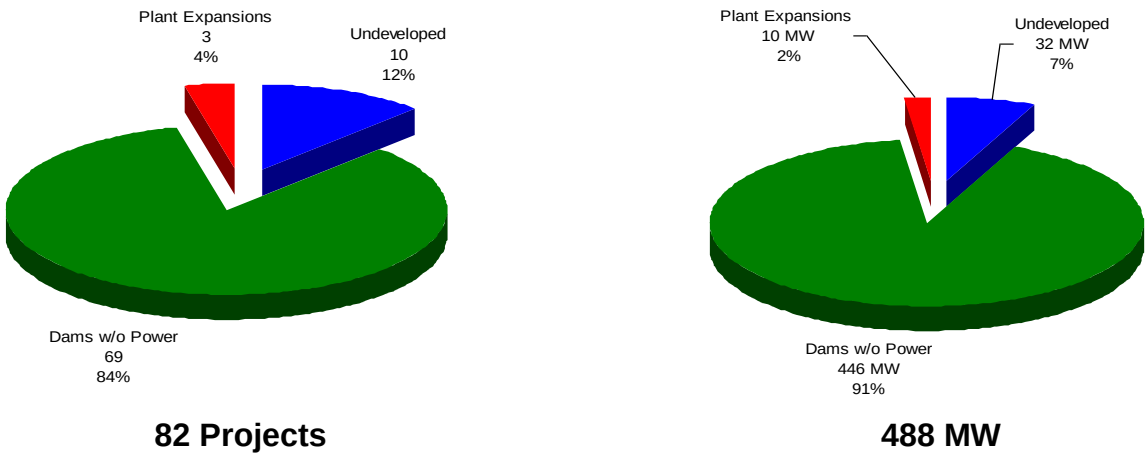

Figure 6. Distribution of sites and associated capacity potential by project type (projects having PESF values ≥ 0.75).

The results of the assessment indicate that the addition of generating equipment to existing dams is the most likely approach to increasing hydroelectric capacity. There may in fact be more opportunities than were identified in the assessment. The Army Corps of Engineers' National Inventory of Dams lists 396 dams in Idaho. Subtracting the 144 Idaho hydroelectric plants listed in Table 1, not all of which incorporate a dam, yields a conservative estimate of 252 unpowered dams that may have power generating potential.

The severe reduction in number of undeveloped site projects from the basic assessment number of 273 potential projects with an associated total capacity potential of 6,169 MW to only 10 potential projects with an associated total capacity potential of 32 MW is in part due to the methodology used in the assessment. Potential projects at undeveloped sites were rated against the 19 legal, institutional, and environmental factors using rating values that ranged from 100 percent to as low as 20 percent of the values that were used for the other two types of projects. While there is logic in this approach since new development will certainly have more impact than adding capacity at an existing dam or hydroelectric plant, the approach may be overly conservative in assessing the likelihood of project development.

3.1.2 Natural Stream Resources – 2006 Assessment

More recently, INL performed a stream-based resource assessment of Idaho streams in collaboration with the U.S. Geological Survey. As with the earlier assessment, the research had two phases: 1) a basic assessment to determine the gross power potential of all stream reaches in the state and 2) a feasibility assessment to identify feasible potential project sites and estimate the developable power potential at these sites. An advantage of the stream-based approach is that it is more comprehensive when compared to the prior assessment that only included potential projects that someone identified and obtained a preliminary permit for development. The prior assessment did have the benefit of more extensive project evaluation information to evaluate the likelihood of development.

The methodology used in the basic assessment was to couple the elevation change over each stream reach (hydraulic head) with an estimate of its 30 year average flow rate to obtain an estimate of its gross

power potential. Elevation changes were obtained from digital elevation models and the flow rates were obtained from flow prediction equations derived using gauged stream flow data. This assessment methodology, which is fully described in Hall et al. 2004, yielded an estimate of the total gross average power potential of Idaho streams of 19,088 MWa of which about half (10,105 MWa) is undeveloped and not in zones where development is unlikely due to land use or environmental sensitivities.

The feasibility phase of the assessment first screened stream reaches using feasibility criteria that considered: prior development, location in zones where development was unlikely, site accessibility, and proximity to transmission and load. This screening resulted in the identification of 6,700 feasible potential project sites in Idaho about 70 percent of which were microhydro sites having average power potentials of less that 100 kWa.

Estimation of the developable power potential at each feasible project site required the assumption of how sites would be developed with associated limitations on water use and the amount of hydraulic head that could be used for power production. It assumed that no new dams would be constructed for hydroelectric plants and thus the development model was a damless small hydroelectric plant producing electricity at an average rate of 30 MWa or less. It was further assumed that only half the stream flow or an amount needed to produce 30 MWa, whichever was less, was useable for power production. In order to estimate the working hydraulic head, penstock lengths were limited to a realistic upper limit based on existing small hydro plants with the actual length being derived using an analysis technique that minimized the penstock length while maximizing the working hydraulic head. The methodologies used to perform the feasibility assessment and the results are described in Hall et al. 2006.

The feasibility assessment resulted in an estimation of a total average power potential at feasible potential project sites in Idaho of 2,122 MWa. Hydroelectric generation in the U.S. typically has a capacity factor of about 0.5 (ratio of actual generation to maximum generation based on plant capacity which is equal to the ratio of average power to plant capacity). Since the estimated power potentials from assessment were average values stemming from average stream flows, the installed capacity potential corresponding the average power potential would be about 4,000 MW. This potential exceeds to current total capacity of Idaho hydroelectric plants of about 3,000 MW.

The results of the feasibility assessment shown in Figure 7 indicate that there are a large number of undeveloped hydroelectric projects in Idaho. Perhaps of the greatest interest are the 409 Small Hydro (greater than 1MWa and less than or equal to 30MWa) and the 1,563 Low Power (greater than or equal to 100 kW and less than or equal to 1 MWa)-Conventional Turbines (hydraulic heads equal to or greater than 8 ft.) sites having a combined average power potential of 1,559 MWa. This corresponds to a total installed capacity of about 3,000 MW; approximately equal to the current total state hydroelectric capacity. The implication of developing just the small hydro projects would be a doubling of the state hydroelectric generation and nearly all of Idaho's current electricity sales being generated in state. Whatever percentage of these projects is actually developed represents a corresponding percentage increase in in-state electricity generation.

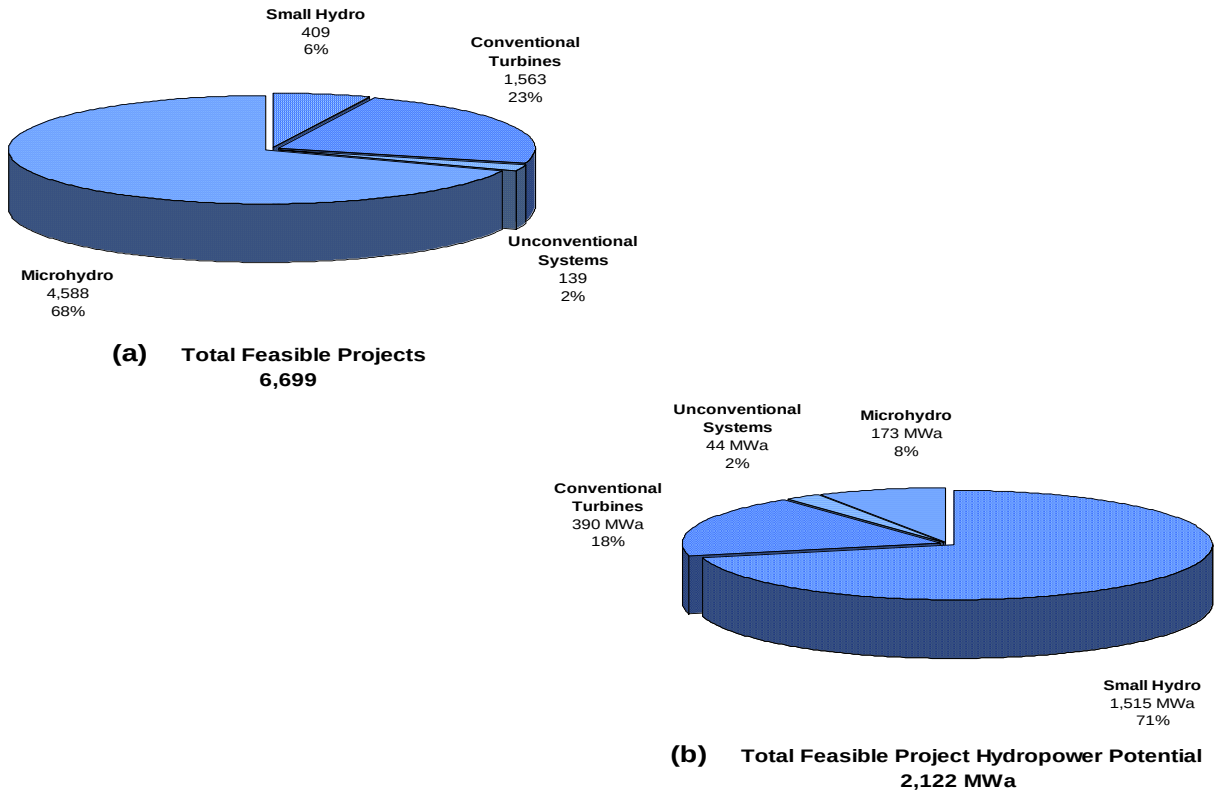

Figure 7. Power category distribution of feasible potential projects and their associated total hydropower potential with low power projects further divided by low power technology classes.

3.1.3 Comparison of Resource Assessment Results

The results of the resource assessments described in the two prior subsections differ significantly. These differences are understandable when the methodologies employed are considered. The site-based assessment identified 359 potential projects that were not plant expansions while the stream-based assessment identified over 6,000. This difference is because the site-based assessment only considered potential projects for which a FERC preliminary permit was obtained. In contrast, the stream-based assessment identified all of the potential project sites in the state that met a basic set of feasibility criteria.

The differences in capacity potential are not surprising when the assumptions used in the stream-based assessment are compared to those implicit in the site-based assessment. The total capacity potential corresponding to the 359 non-plant expansion potential projects identified in the site-based assessment was about 6,700 MW. By comparison the approximately 400 small hydro potential projects identified in the stream-based assessment corresponded to a total capacity potential of about 3,000 MW. This difference is attributable to the development constrains assumed in the latter assessment. The working flow rate of half the stream flow or less automatically cut the developable power potential of the site to at most half the gross power potential. The assumption of a damless small hydro plant development model with only part of the available hydraulic head useable for power production further reduced the estimated developable power potential. In contract, the preliminary permit projects used in the site-based assessment were most likely at least run-of-river projects. These projects could use more if not all of the stream flow and could use significantly more of the available hydraulic head for power production.

There is a large difference between the total capacity potential of the high ranking projects from the site-based assessment when compared to the results of the stream-based assessment (approximately 500 MW compared to approximately 4,000 MW). The site-based assessment results in only 79 potential projects that are not plant expansions ranked has having high likelihoods of development. These projects correspond to a total capacity potential of 478 MW. In this assessment, 237 undeveloped potential project sites having a total capacity potential of over 6,000 MW have PESFs of 0.25 or 0.10. The implication that only 10 out of 273 (4 percent) undeveloped sites corresponding to half a percent of the total potential capacity of these 273 projects are likely to be developed is not realistic. While the stream-based assessment did not involve the use of as extensive project evaluation criteria as was used in the site-based assessment, it seems realistic to predict that under favorable conditions at least 20 percent of the potential capacity identified in the stream-based assessment (800 MW) could be developed in at most the next 20 years. This estimate of future capacity development is even more defensible if the use of constructed waterways and in-stream hydrokinetic technologies for power production is included.

3.1.4 Pumped Storage

Another potential source of hydro generation is pumped storage. Like conventional hydropower projects, pumped storage projects use falling water to generate power. Water is stored in an upper reservoir for release to generate power during periods of peak demand. However, when demand and prices for electricity are low, they use reversible turbines to pump the water back to the upper reservoir. For example, in the summer water is released during the day for generating power to satisfy the high demand for electricity for air conditioning. At night, when demand decreases, the water is pumped back to the upper reservoir for use the next day. This type of project is particularly effective at sites having high heads (large differences in elevation between the upper and lower reservoir).

Pumped storage projects are uniquely suited for generating power when demand for electricity is high and for supplying reserve capacity to complement the output of large thermal plants and intermittent renewable plants such as wind. Although the losses of the pumping process makes the plant a net consumer of energy overall, the system produces revenue by selling electricity during periods of peak demand when electricity prices are highest, and consuming energy for pumping during off-peak periods when prices are lowest. Pumped storage projects also provide utilities with a variety of valuable ancillary services such as dispatchable capacity, increased reliability, spinning reserves, frequency regulation, load following, voltage and power factor support, black start capability, improved unit commitment of other system resources, and better utilization of transmission. The economics of many projects are greatly enhanced by the revenue received from the sale of these ancillary services. The major difficulty with pumped storage projects is their high capital cost of over a billion dollars for a 1,000 MW plant, often well in excess of the capability of any in-state utility to finance.

There are currently two very large pumped storage hydro project proposals being studied in Idaho. The proposed Little Potlatch Creek Pumped Storage Project would be located in Latah and Nez Perce counties, approximately 16 miles northeast of Clarkston, Washington and 32 miles southwest of Elk River, Idaho. Annual energy production at the site is expected to be 3,830,000 megawatt-hours (MWh) per year. The second proposed Idaho project is the Corral Creek South Pumped Storage Project would be located in Twin Falls County, approximately 40 miles south of Twin Falls, Idaho. The proposed project would be closed loop and would not be built on an existing body of water. The proposed project, generating 8 hours per day 7 days a week, would produce approximately 3,212,000 MWhs annually.

In addition, a project is proposed in Utah, approximately a mile across the Idaho-Utah border, that will deliver power through a transmission line located primarily in Idaho. The project would be located in North Eden Canyon on the eastern side of Bear Lake in Rich County, Utah. The project would have an annual generation of 2,030,000 MWh operating 10 hours per day, five days a week.

More detailed information about pumped storage and a more complete description of the projects mentioned can be found in Appendix D.

3.2 Summary of Opportunities

Development opportunities exist based on the price to be received per kWh. Potential resources could include: upgrades to existing facilities, undeveloped existing impoundments and water delivery systems, and in-stream flows. Some task force members believe that a firm price in the range of seven to nine cents per kWh will make a number of projects in the less than 10 MW range immediately feasible, perhaps as much collectively as 150 MW. They further estimate that over the next 20 years, it is realistic to believe that 800 MW could be developed, not including pumped storage.

Longer term opportunities exist at new impoundment features, pumped storage sites, and hydrokinetic applications. As the price of power increases, so too will the economics of previously bypassed projects. As discussed in the previous subsection, an INL assessment found that 82 out of 373 potential projects have a good likelihood of future development. These projects correspond to 488 MW of new capacity; ninety percent of which is associated with the addition of power generating equipment at 69 existing dams currently without power. A more recent INL assessment also discussed in the previous subsection further found feasible potential capacity using Idaho's natural streams of up to 4,000 MW; a significant faction of which could be developed in the very long term.

Immediate to short and midterm opportunities:

- Upgrades to existing facilities
- Add generation facilities to existing dams, bypasses at existing dams, and water delivery systems such as irrigation canals
- Develop undeveloped licenses and/or exemptions
- In-stream flow utilization
- Conduit projects using water supplies and effluents such as municipal and industrial processes
- Obtain more energy through equipment upgrades at existing hydroelectric plants

Longer term opportunities:

- Newly developed impoundment features of various sizes with various associated generating capacities
- New pumped storage for wind power firming and peak load generation
- Wind powered pumped storage
- Hydrokinetic power generation (presently at demonstration phase – not commercially available)

4. FUTURE HYDROPOWER DEVELOPMENT BENEFITS & ISSUES

4.1 Benefits

As a result of previous state, Federal, and local decisions, hydropower is a significant contributor in meeting the electricity needs of Idahoans. It has been and continues to be a carbon emission free generating renewable resource. Hydropower constitutes a non-consumptive water use. Additional advantages include:

- No fuel cost risks
- Flexibility of release to tailor generation for load following enhancing the viability of other renewable resources such as wind
- Employment
- Engineering, licensing, permitting, and construction expertise for smaller hydroelectric projects is available locally
- Ancillary benefits
- Flood control
- Recreation
- Drinking water
- Irrigation storage and delivery
- Contribution of low power rates
- O & M costs are predictable and stable
- Many projects may constitute no-harm to riparian and aquatic resources
- Long life projects
- Water flows during Idaho's peak consumptive time periods
- Water flows can be shaped to enhance a fishery
- Many projects may be developable at the current market power costs
- Projects may someday qualify for a greenhouse gas credit as a carbon offset
- Economic risk may be significantly mitigated with historical flow condition knowledge and firm pricing of costs
- In the new less carbon paradigm hydropower ranks at or near the top with established technology and with significant technological upgrades
- Virtually no emissions
- No waste
- Significant in-state hydropower operations knowledge.

The BPA power availability model for its customers will create the need for varying types and sizes of resources. There is a great deal of uncertainty on the development and fuel price of large resources, those over 100 MW. Thus, smaller hydro has the opportunity to fill a niche market.

4.2 Issues

As with the analysis of all natural resource utilization issues there are those who see the changes as unnecessary and or destructive, and those who see the change as a tradeoff where the pros outweigh the cons. The development of hydropower is no exception. Issues may lead to barriers to development such as those discussed in Section 6, but may also lead to generally beneficial opportunities.

There is an ongoing issue with hydropower in Idaho concerning its effect on anadromous fish. This issue is primarily with large dams on the Snake River, but applies to any project that impedes or would impede migration. While this is labeled as a hydropower issue, the issue should probably be characterized as a water impoundment issue, since the dams which some target for removal serve important functions beyond power production.

Though there are varying degrees, each hydropower project will have some effect on the water and adjacent lands. Each project will require access, a substation, a non-consumptive use for some portion of the water, a distribution voltage power line, and often a temporary adjustment to the flow regime. A new impoundment, if necessary, may possibly change the fishery and attendant wildlife occupation. The scenery may be altered providing different “out-of-doors” experiences.

Each of the State’s water basins are subject to wet and dry years. The availability of a specific water supply to service a specific project is based on an average as the principal tool for predictions. A developer can begin the FERC License Application process with one set of economic constants and variables only to see these changes during the two to five plus years it may take to secure the right to develop. The costs of the required analyses and ultimately mitigation may change dramatically along with budgeted construction costs and material availability. Developers who sign a power sales agreement with a utility at the start only to see costs and negative economic factors increase may be in financial peril. If they go through the process without a power sales agreement and the license is granted, they may find factors beyond their control have worked to lower the value of their power to a point where the economic value of the project is negative. This may result in having to relinquish the license and the lose of time and money invested.

Native Americans have particular concerns about the use of natural resources to protect and preserve their cultural heritage while exercising their treaty rights.

5. STAKEHOLDER PERSPECTIVES

This section provides perspectives on hydropower and the status of development plans from various Idaho hydropower stakeholders.

5.1 Power Producers

5.1.1 Private Non-Utility (Independent Power Producers)

When the climate for new hydro is right it takes about three to six years for the new plants to come on-line. New hydro has a bright future in Idaho at existing diversions, canals, existing dams and canals on streams where the private land is adjacent to the stream. Conditions favorable to additional hydropower development include:

1. Continued "avoided cost levels" from IPUC that reflect true avoided cost of a new plant. The recent increase in avoided cost rates by IPUC will spur development. IPUC review and possible elimination of 90/10 rule where the provider must predict stream flow or accept a lower rate would be an added boost. The 90/10 rule was developed for wind power.
2. Streamlined/revised interconnection study and pricing structure for interconnect to the utility. Connection of Qualifying Facility (QF) to utility is state jurisdictional not FERC jurisdictional. Interconnect should include provision for developer to hire outside professional electrical engineers to do studies and contract with someone other than utility to do the necessary work. Utility O&M charges should be limited to actual O&M.
3. State resource agencies (IDFG, DEQ, etc.) should not be for or against new hydro but merely stick to the resource issues. The DEQ 401 water quality certification should not be turned into mini FERC but should stick to water quality. The current oversight and filtering of state agency comments and study requests through the governor's office should continue.
4. Encourage hydro parity with wind in federal and state energy tax policy with respect to depreciation and production tax credits. Currently, for years 2009 through 2013 the developer can elect between federal tax credit of approximately $10 per MWh or 30% of capital cost. This will definitely spur development, but needs to be extended for 6-10 years to allow for time lag of permitting.
5. On the state level a sales tax exemption for hydro production equipment is in place (Title 63, chapter 36) for projects greater than 25 kW on "existing canals and reservoirs". Continuation of the credit is helpful.
6. Financing is available for new small hydro by private banks with about 25% equity required often with additional collateral required. For canal companies possible finance through the Clean Renewable Energy Bonds (CREB) is available. For rural plants some loan guarantee and grant funding may be available through the USDA "Rural Development" arm. This should be encouraged.

5.1.2 Private Utilities

5.1.2.1 Idaho Power

Idaho Power is currently pursuing two types of generation upgrades at its existing hydroelectric facilities. The first effort is a program approach looking at all operating hydroelectric power plants and evaluating whether replacement of the turbine runners is economically justified. The utility has replaced a turbine runner at its Upper Salmon "B" plant, and one at its CJ Strike plant in the past year. Replacement the other runner at the Upper Salmon "B" plant is planned for later this year. These replacements were

primarily for generation efficiency improvements and not capacity improvements. This is an ongoing program and the company is evaluating the economic justification of other runner replacement projects.

Idaho Power is also pursuing the expansion of the Shoshone Falls power plant. The company has submitted an application to the FERC to amend the project's existing license. The current Shoshone Falls Project is operated as a run-of river project with a generating capacity of 12.5 MW. The proposed amendment would add 50 MW to the project's installed capacity. This project proposes to remove two small inefficient units at the power plant, and replace them with a new unit rated at 50 MW.

5.1.2.2 Avista

Avista is currently evaluating installing a fifth unit at Cabinet Gorge. Additionally, there have been some discussions about the prospects of redeveloping the Post Falls project in some fashion. Both of these projects would be incremental types of installations in that they contemplate developing additional capacity at an existing site.

These projects have been reviewed at various times in the past. There are several reasons that they are again being looked at.

First, the costs to attain new energy sources, renewable and non-renewable, continue to escalate. In past reviews, there was not cost justification to develop these projects. As the price for energy has increased, these projects continue to look more cost competitive with other potential energy sources.

In its integrated resource planning process, Avista identified a need for additional capacity. This capacity need is driven by anticipated peak loads on the system and also in part by the need to cover more intermittent energy sources, such as wind power. The ability to add capacity to the hydro system is a more desirable option than others, if it is cost competitive to other capacity resources.

Additionally, Avista, like many other utilities, is faced with meeting either federal or state renewable portfolio standards. Developing these sites help Avista in meeting these and potential future targets.

Certainly, the current tax credits that are available for incremental hydro projects like these have increased the interest in these projects. One of the characteristics of conventional hydro projects is the trade off of higher initial costs for lower production costs due to the naturally occurring hydraulic cycle.

Finally, in the case for Cabinet Gorge specifically, Avista is faced with trying to reduce the Total Dissolved Gas (TDG) at the site to achieve a standard. The development of this unit along with other features could help Avista achieve this objective.

5.1.2.3 Rocky Mountain Power

Rocky Mountain Power (PacifiCorp Energy) operates seven hydroelectric plants in southeastern Idaho. Five of these have Federal Energy Regulatory Commission licenses and two are operated under Federal Energy Regulatory Commission exemptions. These projects are on the Bear River, Paris Creek (a tributary to the Bear River) and the Henry's Fork of the Snake River.

Rocky Mountain Power intends to apply for low impact certification for its three licensed Bear River projects and the Ashton Project on the Henry's Fork in 2009. The continued operation of these projects as low-cost renewable generation sources for its customers, while complying with all operating requirements, is the priority at these projects. PacifiCorp is interested in adding renewable energy resources to its generation portfolio and would not be opposed to participating in new hydro development if circumstances presented a cost-effective proposal in the interests of customers with a high potential for a successful federal licensing outcome.

5.1.2.4 Non-Federal Public (Cooperatives and Municipalities)

Idaho has a strong contingent of public power entities including twelve electric cooperatives and eleven cities with municipal electric systems. Collectively public power in Idaho serves 115,000 customers, operates 11 hydropower plants with a total nameplate capacity of 71.1 megawatts. The earliest public power generating facility in Idaho dates back to 1900.

Public power systems deliver electricity to consumers "at cost" with no system operated on a "for profit" basis. These public power utilities have historically met electrical demand with electricity generated from their individual hydropower projects and the Bonneville Power Administration federal hydropower system, of which several dams are located in Idaho. Idaho public power has a legacy of power service without CO_2 emissions with internal resources and external federal resources. Public power in Idaho opposes removal of dams that provide clean, affordable, reliable power to citizens in Idaho. This view applies to dams within Idaho as well as those outside the bounds of the state from which Idahoans benefit from the power output.

The historic reliance on hydropower sets Idaho apart in terms of long standing clean, affordable, and reliable energy resources. These resources have served as a key component of state's economic foundation. Public power entities in Idaho continue to view the hydropower resources as a vital component to the economics of the state. Today public power utilities continue to investigate opportunities for hydropower generation in terms of new resource development or increased capacity from existing dams. Public power entities in Idaho have historically funded projects through the issuance of tax exempt bonds. Present day tax exempt bonding opportunities continue to be strong and additional funding sources through Clean Renewable Energy Bonds exist for qualifying low impact hydropower projects. Additionally, the Idaho Energy Resources Authority provides finance options to public power projects in Idaho.

As national attention turns to clean, renewable resources, public power in Idaho views the state's hydropower resources as clean, renewable resources for which Idahoans can be proud.

5.2 State Agencies

The State of Idaho, through the Idaho Water Resource Board (IWRB) and Department of Water Resources (IDWR), is undertaking a Water Storage Initiative. This effort has the active support of the Governor's Office and the Legislature. The IWRB has formed a subcommittee to oversee and guide this effort.

Idaho's existing water storage system met the needs of the 20th Century, including irrigation, flood control, and hydropower. The 21st Century, however, has added several new demands on the state's water storage system including endangered species needs, water supplies for increasing urbanization, and potential hydrologic changes brought about by climate change. For these reasons, Idaho has recognized the need to develop more water storage.

Both underground storage (aquifer recharge) and surface water reservoirs are under consideration. The Idaho Water Resource Board is currently constructing a pilot aquifer storage project on the Eastern Snake Plain near Wendell. If successful, additional aquifer storage projects may be constructed. These types of projects obviously would have no hydropower generation potential, but at some locations may actually decrease existing hydropower generation by diverting surplus flows for aquifer storage rather than leaving them for power generation.

Several new large-scale reservoir projects are under consideration. A brief description and the current status of each is provided in Appendix C.

5.3 Federal Agencies

5.3.1 Bureau of Reclamation

The Bureau of Reclamation (Reclamation) is currently seeking funding from the Bonneville Power Administration (BPA) for addition of a third unit at Black Canyon Dam. Sized at approximately 12.5 MW, it would bring the total plant capacity to 22.5 MW. The incremental production increase is expected to be about 46 GWh annually. Reclamation is also seeking funding for a replacement / upgrade of the turbine runners at Palisades Dam. The new runners are expected to have about a 3% increased efficiency and result in about a 5 megawatt increase in power output from the plant. As both projects are awaiting funding before design can commence, no projected on-line date is available.

5.3.2 Bonneville Power Administration

The Pacific Northwest energy generation characteristics are shown in Figures 8a and 8b. The distribution of the sustained peak capacity (January) totaling 41,528 MW by energy source is shown in Figure 8a. Similarly, Figure 8b shows the energy source distribution of firm power totaling 26,254 MWa.

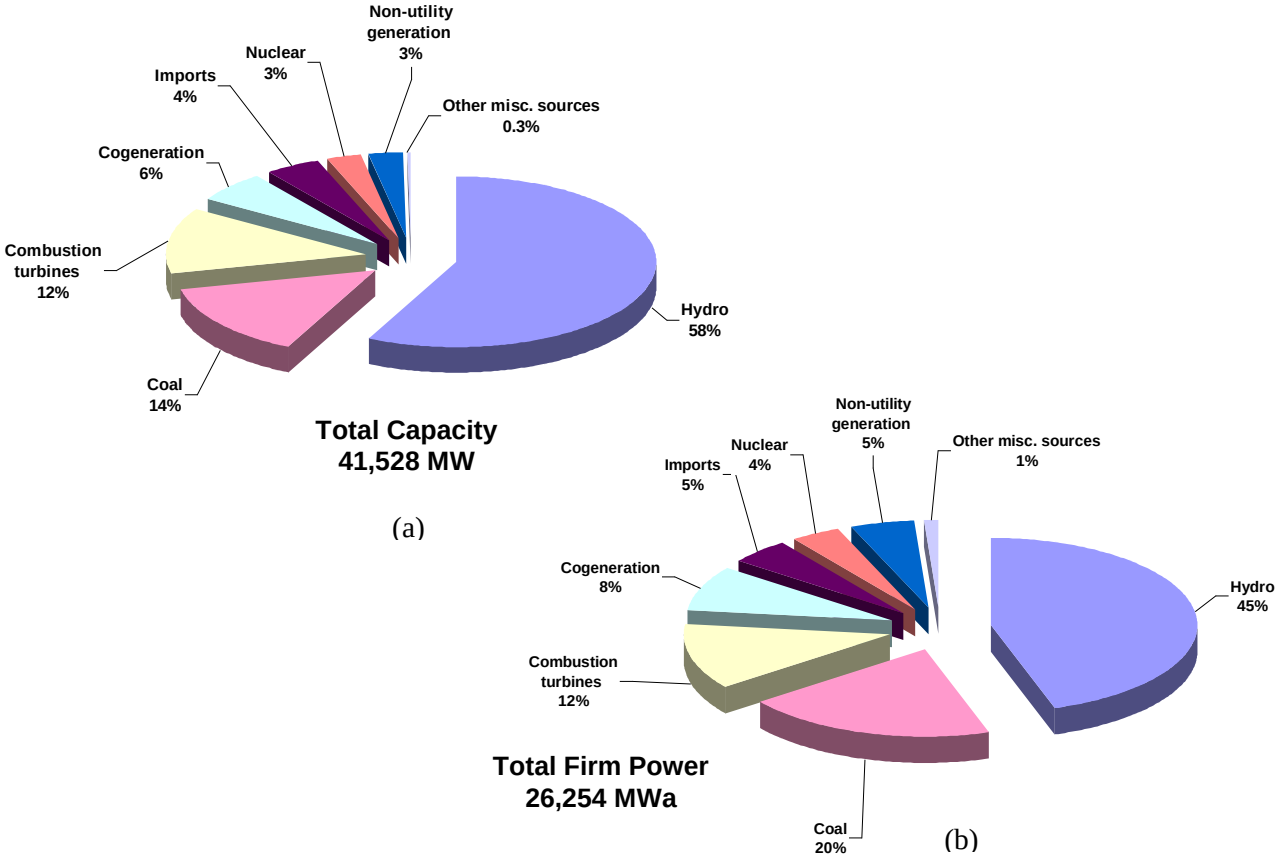

Figure 8. Pacific Northwest energy generation characteristics: a) sustained peak capacity, b) firm power.

In its Fifth Power Plan, the Pacific Northwest Power & Conservation Council (PNPCC) recognized the importance of developing a resource adequacy framework and standard in order to avoid a repeat of the 2000-01 energy crises. To achieve this, the Council and the Bonneville Power Administration initiated the Pacific Northwest Resource Adequacy Forum to develop a resource adequacy standard for the region. The Council will annually use the standard to assess the adequacy of the Northwest power system. The Council is currently working on its Sixth Power Plan that will incorporate wind development and integration, other renewable resources (geothermal, biomass), and traditional resources such as major hydro plants and thermal resources (gas, coal, nuclear). The plan must give highest priority to cost-effective conservation to meet future demand for electricity. Renewable sources of energy must be given next-highest priority in the region's power planning, to the extent that they are cost-effective, ranking ahead of conventional thermal generating resources. Among thermal options, fuel-efficient methods of producing energy, such as cogeneration, must be given priority.

Development and operation of new resources to meet the Renewable Portfolio Standards (RPS) is having a huge impact on the Federal base hydro system. Wind is the predominate renewable resource of choice in meeting RPS for utilities in Oregon, Washington, California and the Intermountain West. The hydro system is the primary resource to integrate effectively wind resources in the PNW, by providing rapid response reserves to balance power delivery within control areas.

Reliability, predictability, availability, and longevity will be based on transmission infrastructure improvements, possible cap-and-trade standard (economic impact to energy market prices and construction of new generation plants), and finding non-federal hydro resources to balance/back-up wind power.

Beginning in 1997, the Pacific Northwest Coordination Agreement (PNCA) agreement incorporated NOAA Fisheries and U.S Fish and Wildlife Service's Biological Opinions. These Biological Opinion requirements changed the shape of energy production by increasing flows in the spring and summer to aid in the downstream migration of juvenile salmon. A result of these requirements is that reservoirs are no longer fully drafted to meet firm loads in the fall and winter but are operated to retain as much water as possible yet still meet flood control requirements by mid-April. The additional water in storage going into the spring snowmelt runoff season results in additional flow in the river during the spring and summer. As a result, the ability to shift and shape hydro energy production to meet firm loads is greatly reduced. The PNCA agreement will remain in place through September 15, 2024.

BPA and other load serving utilities are meeting peak energy load by purchasing market price power. When and if the region/Idaho loads grow, new generation resources will have to be develop to meet load demand while meeting various environmental conditions/measures (ESA, CWA, Carbon emission standard- clean air). BPA and other entities are looking into the potential of storage facilities for generation and/or water management benefits.

6. HISTORICAL DEVELOPMENT ENVIRONMENT AND CURRENT BARRIERS TO DEVELOPMENT AND DELIVERY

6.1 Development Environment History

The passage by Congress of the Public Utilities Regulatory Policy Act (PURPA) of 1978 required each state to create a methodology through which the price of the next investment of electricity could be determined and under what conditions that price would be offered to all non-utility generators. In Idaho, the IPUC decided upon a Montana coal plant as the initial surrogate resource. When the avoided cost rates were published many independent developers constructed numerous and various hydro and biomass facilities.

As regional and local surplus power conditions evolved and with the deregulation of natural gas, the Idaho avoided costs rates were reduced, as was the maximum project capacity qualifying for these prices. This increased the uncertainty and brought the PURPA project industry to a near standstill in the mid 1990's. Primarily only those entities with access to lower cost capital maintained an interest.

A return to a gas fired surrogate resource and an increase in the size of qualifying projects in the early 2000's resulted in a cautious renewal of interest in this industry.

6.2 Barriers to Development and Delivery

The Task Force analyzed barriers to the development of new generation facilities and the maintenance and re-licensing of existing hydropower plants. Obviously certain barriers could be placed in several categories of hydropower projects. Barriers today must be considered both as pertaining to all types of hydropower activity and also on a site specific basis.

6.2.1 Resource Barriers (New/Existing Projects)

- Misconception that the resource is tapped out (see Subsection 3.1)
- Misconception that new hydropower = new dam (damless plants exist -see Subsection 3.1.1 discussion of powering unpowered dams)
- Misconception that hydropower consumes water and is unreliable due to flow seasonality
- Competing water uses
- Legal issues over water ownership and user rights may stall interest
- Recreation
- Flow augmentation
- Endangered Species Act
- Environmental/Water Quality
- Perceptions about new hydro: environmental degradation
- Access via BLM, Forest Service, Private/State
- Hearings and professionals involved
- Agendas denying open discourse

6.2.2 Economic Barriers

Economics is the main determining factor for any project. A utility cannot expect to roll a cost into its rate base unless the value is reasonable relative to a PUC approved standard or acceptable city council action. An independent developer must be able to demonstrate profitability to get funding. Hydropower is not a pro bono venture. The economic barriers to new hydropower development include:

- Price per kWh received
- Cost versus current avoided cost scenarios; increases in costs: raw materials and construction
- Upfront costs: permitting and engineering
- Permitting and licensing: 3 to 7 years with FERC
- Required studies and broad scope of the same
- Capital Access: based on more than project economics
- Creditworthiness
- No production credits, investment tax credits, energy tax credits, accelerated depreciation or only limited term credits
- Costs of appeals and interventions
- Continued coordination of state agencies necessary
- Need federal and state recognition of hydropower as a renewable energy source
- Perception that the best sites have been developed or are not viable because of economic or environmental considerations
- PURPA avoided cost pricing and qualifying project size has been a large variable in the past
- Tribal interests must be understood and respected.

6.2.3 Barriers to Idaho Customers Receiving the Generation

- New mandatory reliability standards for projects greater than 20 megawatts
- Transmission and distribution lines
  - Proximity to project
  - Capacity available for new generation
- Interconnection fees and equipment ownership
- Utilities need a fair return opportunity on projects where they take some of the costs from the developers

There are legitimate processes and regulatory agencies in place to address many of the barriers. The quality of the project economically will overcome numerous business barriers. The time from concept to operation for smaller projects is a serious deterrent.

7. CONCLUSIONS

Throughout the history of the State of Idaho, the gradient of running water has been captured in many places to provide electricity, recreation, flood control, irrigation and as an aide to mining. The lowest cost electricity is generated from large projects primarily on the major drainages in Northern and Southern Idaho. It is important to acknowledge that large and smaller hydro generation plants have to be relicensed with the FERC periodically. While all environmental attributes surrounding a facility must be carefully and publicly considered, it is important to retain the base of Idaho's electrical supplies.

There are numerous smaller hydropower development opportunities with a smaller environmental footprint throughout the state such as in-stream, canal drops, partial stream diversions, pumped storage, and new impoundments whose principal purpose is water retention for flow augmentation. Several hundred megawatts of new hydro power can add significantly to the resource base needed to meet growing peak and base loads.

The lack of greenhouse gas emissions coupled with predictable summer flows adds to the value of hydropower. Off the shelf technology and local engineering expertise enhance the local nature of these projects. The key to development of a hydropower opportunity is the economic test of profitability. A prospect that is promising has numerous barriers to hurdle. Chief among these is the lengthy process and cost of FERC licensing. Today's available power purchase rates associated with newly revised avoided cost rates will spawn an interest in the further development of this resource by independents and at least one local investor owned utility.

Environmental issues must be addressed both locally and through the FERC process. A transparent process will keep surprises at a minimum and allow for meaningful input from communities, state and federal agencies and concerned citizen groups. There are governmental regulatory processes in place to safe guard the environment and adjudicate the capability of a project to be in the overall public interest.

The uncertainty associated with the time it takes a resource to be developed from the initial concept to the first kilowatt-hour produced needs to be reduced to the shortest time required to fulfill all obligations. Agencies need to make cooperation, joint analysis, and deadlines the rule rather than the exception. Utilities and developers must work together to mitigate the confusion and costs associated with the interconnection of the project to the grid. Utilities have to be able to receive compensation for their efforts, equipment, and risk. The ultimate risk taker must have access to the same credits and benefits as other renewable resource developers. The state legislature could acknowledge through policy, as has the Governor, that hydropower is a renewable resource. The wise development of hdyropower can complement Idaho's drive to utilize all its natural and agricultural assets for clean power generation.

8. RECOMMENDATIONS

The Hydropower Task force has taken a pragmatic view toward recommendations. The Task Force believes all the phases and types of hydropower discussed are important to Idaho regardless who the developers might be. The Task Force is more interested in offering recommendations that will lead to new development of the resource and retention of the current facilities rather than suggestions and directions that will lead to adversarial proceedings requiring time and money for hearings and litigation outside the purview of all relevant parties seeking settlement around the same table. These recommendations equate to significant action items that will produce the positive results we support.

8.1 Idaho Policies & Legislation

It is recommended that the tone or environment for hydropower development must be set by the governor and the legislature, preferably through a joint House/Senate Resolution supporting the growth and retention of hydropower. This will send a message to all of the pertinent state regulatory agencies of the direction the executive and legislative branches wish to pursue. As with any energy resource, a blanket endorsement may lead to the development of projects of lower value and at worst, environmentally damaging.

It is recommended that the IPUC conduct workshops with all relevant parties on the following topics:

- Interconnection fees; equipment, and timing - who owns and who controls; how the costs are apportioned; how the utilities are compensated and/or held harmless; and what role the ratepayers assume beyond the price per kWh the developer receives. After the workshops, the IPUC will open a docket for commissioner approval covering the points of agreement and asking for adjudication on those points where agreement was not reached.

- Avoided cost rates and the current protocol as it applies to the accuracy of the pricing of the surrogate resource and its associated fuel costs, understanding and consideration of the uniqueness and timing of the availability of the hydro resource, and any type of mechanical guarantee a purchaser believes is necessary. Agreements regarding new and/or amended practices and protocols will be forwarded to the IPUC commissioners for their acceptance through a docket and hearing if necessary.

It is recommended that the Idaho Office of Energy Resources conduct workshops involving all the state agencies that have a permitting and regulatory role in the licensing and relicensing of hydropower projects. The desired outcome is to bring all the relevant parties to the same table to further streamline the coordination process and the timeliness of the evaluation and recommendation process the current application requires. In no way is this recommendation offered to reduce the absolute necessity for public participation and resource protections. It is recognized that priority cannot be given to hydropower projects since state agencies have limited staff that must devote time to every energy project requiring the exercise of their jurisdiction. Appropriate priorities should be designated in advance.

It is recommended that the appropriate Idaho state departments and the governor's staff and the Idaho Legislature House-Senate Joint Interim Energy Committee participate in hearings held by the Idaho Office of Energy Resources to examine the applicability of economic incentives. These include production and other tax credits and relief from sales and property taxes to better enable the development of the hydropower industry in Idaho. To the extent any generating resource is receiving consideration through an income tax credit, production credit, sales tax credit, etc., hydropower should qualify for the same consideration. Decisions derived from such hearings should be sent to the appropriate branches of government for approval.

It is recommended that the Idaho Strategic Energy Alliance, Idaho Office of Energy Resources, and Idaho Department of Water Resources help make potential developers aware of the availability of Clean Renewable Energy Bonds and/or the opportunity of loan guarantees and grant funding through the U.S. Department of Agriculture "rural development" arm.

8.2 Federal Policies & Legislation

Renewable energy standard – It is recommended that Idaho's congressional delegation and others be encouraged to accept hydropower as a viable renewable energy source that can be applied to any federal renewable energy standard through a letter from this task force, the Energy Board, the governor's Council and by joint Idaho House/Senate resolution. The designation of "renewable energy source" can not be allowed to be interpreted that all hydropower is automatically low impact.

Production and development tax credits – It is recommended that hydropower be included in federal legislation providing production and development tax credits for renewable energy development and that the terms of these credits be at least five years to ensure that hydropower development can benefit from these incentives. Furthermore, it is recommended that any production and development tax credits applicable to hydropower extend to new small hydropower development in addition to adding capacity at existing hydroelectric plants and adding energy production facilities to existing unpowered dams.

Carbon credits – It is recommended that Idaho's governor, legislature, and congressional delegation continue to work to encourage a fair distribution of any carbon credits to all distribution utilities to avoid unduly penalizing utilities who have long invested in clean renewable energy resources. Fair should be defined as a numerical recognition of the investments of utilities and their ratepayers in clean renewable resources.

8.3 Research and Development

It is recommended that the Idaho Strategic Energy Alliance seek, through the Idaho legislature and congressional delegation, funding for the Idaho National Laboratory and the Idaho Department of Water Resources to conduct comprehensive assessments of Idaho's constructed waterways (irrigation canals, effluent streams, etc) to identify potential sources of energy production and Idaho's natural streams to identify potential sites for energy production using hydrokinetic turbine technologies.

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[2] Accessible at: http://hydropower.inl.gov/resourceassessment/index.shtml .

Appendix A

Idaho Grid-Connected Hydropower Plants

Appendix A
Idaho Grid-Connected Hydropower Plants

Count	PROJECT NAME	FERC NO.	CAPACITY (MW)	OWNER	STREAM	2005 KWH/YR	POWER MARKETER
	FEDERAL						
1	ALBENI FALLS	None	49	CORPS OF ENGINEERS	PEND OREILLE RIVER	236,691,000	BPA
2	DWORSHAK	None	400	CORPS OF ENGINEERS	N.F. CLEARWATER	1,604,746,000	BPA
3	ANDERSON RANCH	None	40	BUREAU OF RECLAMATION	S.F. BOISE RIVER	91,164,000	BPA
4	BLACK CANYON	None	10	BUREAU OF RECLAMATION	PAYETTE RIVER	61,600,000	BPA
5	BOISE DIVERSION	None	3	BUREAU OF RECLAMATION	BOISE RIVER	14,700,000	BPA
6	MINIDOKA (LAKE WALCOTT)	None	28	BUREAU OF RECLAMATION	SNAKE RIVER	79,173,000	BPA
7	PALISADES	None	176	BUREAU OF RECLAMATION	S.F. SNAKE RIVER	517,411,940	BPA
			706			**2,605,485,940**	
	EXEMPTIONS - Operating						
1	AMY RANCH	8700	0.65	NEW ENERGY INC	BLACK & DEEP CREEK	Unknown	RMP-PP
2	BILLINGSLEY CREEK	6208	0.28	MIKE & K. BRANCHFLOWER	BILLINGSLEY CREEK	845,032	IPCO-PP
3	BIRCH CREEK TROUT CO.	6458	0.086	EVERAND JENSEN	BIRCH CREEK	276,821	IPCO-PP
4	BLACK CANYON NO. 3	6137	0.99	CHI-BLACK CANYON INC.	N. GOODING CANAL	337,000	IPCO-PP
5	BLIND CANYON	8375	1.3	BLIND CANYON AQUARANCH	S. COULEE	3,493,000	IPCO-PP
6	BOX CANYON HYDRO	6543	0.564	CLEAR SPRINGS TROUT CO.	BOX CANYON CREEK	1,736,000	IPCO-PP
7	BRIGGS CREEK	4360	0.75	RICHARD KASTER	BRIGGS CREEK	3,628,000	IPCO-PP
8	BYPASS	9070	9.9	BYPASS LTD (NY)	MAIN/BYPASS CANAL	23,232,000	IPCO-PP
9	CURRY CATTLE	6676	0.254	DOUG HULL	LATERAL 28 CANAL	564,251	IPCO-PP
10	DRY CREEK	9134	3.56	DRY CREEK, LLC	DRY CREEK	9,499,000	UP&L-PP
11	ELK CREEK	3503	2.003	El Dorado Hydro (NY)	ELK CREEK	4,048,000	IPCO-PP
12	FAULKNER HYDRO	7592	0.87	FAULKNER L&L	NORTHSIDE Y CANAL	2,797,000	IPCO-PP
13	FISHERIES DEVELOPMENT	7885	0.249	NYAL HOFFMAN	BILLLINGSLY CREEK	1,046,939	IPCO-PP
14	GEO-BON II	7548	1.15	GEORGE ARKOOSH	LITTLE WOOD RIVER	2,659,157	IPCO-PP
15	GEORGETOWN IRRIGATION	6445	0.48	GEORGETOWN IRRIGATION DIST.	GEORGETOWN CREEK	1,756,000	RMP-PP
16	HAILEY HYDRO	7016	0.046	CITY OF HAILEY	INDIAN CREEK SPRING	24	IPCO-PP
17	HAZELTON A	10164	8.94	NORTHSIDE CANAL CO.	NORTHSIDE CANAL	19,839,489	IPCO-PP
18	HAZELTON B	10326	7.5	NORTHSIDE CANAL CO.	NORTHSIDE CANAL	19,653,906	IPCO-PP
19	JAMES WHITE HYDRO	3922	0.25	JAMES WHITE	DEER CREEK	1,362,000	Avista -PP
20	JIM KNIGHT HDYRO	7686	0.289	MUTUAL ENERGY COMPANY	S. GOODING CANAL	1,111,281	IPCO-PP
21	JOHN DAY CREEK	5865	1.01	DAVID CEREGHINO	JOHN DAY CREEK	2,199,000	Avista -PP
22	KASEL & WITHERSPOON CO.	6410	1	KW CO IDAHO GEN.PARTNERS	CANAL	3,608,400	IPCO-PP
23	KOYLE RANCH	4052	1.405	JOHN KOYLE	BIG WOOD RIVER	2,971,231	IPCO-PP
24	LAST CHANCE CANAL	4580	1.734	PACIFICORP Last Chance Canal Co	IRRIGATION CANAL	2,062,000	RMP

Count	PROJECT NAME	FERC NO.	CAPACITY (MW)	OWNER	STREAM	2005 KWH/YR	POWER MARKETER
	EXEMPTIONS – Operating (cont'd)						
25	LATERAL NO. 10	6250	2.869	LATERAL 10 VENTURES	CANAL	8,016,924	IPCO-PP
26	LEMOYNE	4563	0.075	JOHN LEMOYNE	RILEY CREEK	646,643	IPCO-PP
27	LITTLE MAC (CEDAR DRAW)	6443	1.619	T.L. & R.R. MCCAULEY	CEDAR DRAW	5,201,721	IPCO-PP
28	LITTLE WOOD RANCH	7530	0.662	WILLIAM ARKOOSH	LITTLE WOOD RIVER	2,984,634	IPCO-PP
29	LITTLE WOOD RESERVOIR	7427	3	LITTLE WOOD RVR IRR. DIST.	LITTLE WOOD RIVER	6,275,907	IPCO-PP
30	LOW LINE MIDWAY	12437	2.3	TWIN FALLS CANAL CO.	LOW LINE CANAL	0	IPCO-PP
31	LOWER LOW LINE	8961	2.8	CHI-IDAHO INC	LOWLINE CANAL	8,348,525	IPCO-PP
32	LOWLINE CANAL DROP	3216	8.0	TWIN FALLS CANAL CO.	LOWLINE CANAL	22,856,324	IPCO-PP
33	LQ & LS HYDRO	5767	1.75	PIGEON COVE POWER CO	LQ & LS DRAINS	7,381,683	IPCO-PP
34	MORA CANAL DROP	3403	1.9	BOISE PRJCT BOARD OF CNTRL	BOISE RIVER	Not Operating*	IPCO-PP
35	MUD CREEK	4769	0.624	HK HYDRO	MUD CREEK	1,281,952	IPCO-PP
36	N-32 (MARCO RANCHES)	6778	1.28	MARCO RANCHES	N-32 CANAL	2,018,442	IPCO-PP
37	NICHOLSON	7865	0.45	ORVILLE NICHOLSON	UNCLE IKE CREEK	1,422,000	RMP-PP
38	O.J. POWER CO	7719	0.26	O.J. POWER CO	MILL CREEK	890,000	RMP-PP
39	PANCHERI (Telford Pipeline)	5637	0.16	PANCHERI INC	TELFORD PIPELINE	1,279,000	RMP-PP
40	PARIS	703	0.7	PACIFICORP (OR)	PARIS CREEK	2,756,000	RMP
41	PRESTON	5892	0.41	CITY OF PRESTON	CITY'S WATER LINE	2,673,000	RMP-PP
42	PRISTINE SPRINGS HYDRO #3	12144	0.5	IDAHO WATER RESOURCE BOARD	WARM CREEK	1,412,376	IPCO-PP
43	RAVENCROFT RANCH	4055	1.063	VERN RAVENSCROFT	MALAD RIVER	1,518,481	IPCO-PP
44	REYNOLDS IRRIGATION	6229	0.35	REYNOLDS IRRIGATION DIST.	CANAL	1,203,164	IPCO-PP
45	RIM VIEW	9543	0.525	RIM VIEW TROUT CO	NIAGRA SPRINGS	1,228,061	IPCO-PP
46	ROCK CREEK	6450	2.542	COGENERATION INC (UT)	ROCK CREEK	8,771,631	IPCO-PP
47	SAGEBRUSH HYDRO	8046	0.35	MUTUAL ENERGY (O'KEEFE)	S. GOODING CANAL	944,141	IPCO-PP
48	SCHAFFNER	8438	0.45	LEHI HYDRO POWER INC	W.F. SANDY CREEK	1,254,677	IPCO-PP
49	SNAKE RIVER POTTERY	5651	0.086	ALDRICH BOWLER	THOUSAND SPRINGS	385,049	IPCO-PP
50	SNEDIGAR RANCH	5731	0.54	LS-LQ HYDRO. PARTNERS (UT)	COULEE CREEK	1,151,114	IPCO-PP
51	SODA CREEK HYDRO	7959	0.35	CITY OF SODA SPRINGS	SODA CREEK	1,254,000	MUNC
52	SODA CREEK PROJECT NO. 4	11503	0.5	CITY OF SODA SPRINGS	SODA CREEK	**	MUNC
53	WHITE RANCH	4115	0.284	MUD CREEK HYDRO (UT)	MUD CREEK	328,073	IPCO-PP
54	WHITE WATER RANCH	6271	0.17	STAN STANDAL	STODDARD CREEK	561,386	IPCO-PP
55	WILSON LAKE	10454	6.3	NORTH SIDE CANAL CO.	WILSON LAKE	22,224,034	IPCO-PP
			88			**224,994,473**	
	LICENSES - Operating						
1	AMERICAN FALLS	2736	92.4	IDAHO POWER COMPANY	SNAKE RIVER	224,948,000	IPCO
2	ASHTON	2381	6.85	PACIFICORP	HENRYS FORK RIVER	31,673,000	RMP
3	ATLANTA POWER STATION	11541	0.187	ATLANTA POWER CO. INC.	MF BOISE RIVER	Unknown	AP
4	BARBER DAM	4881	3.7	ADA COUNTY	BOISE RIVER	9,841,000	IPCO-PP

Count	PROJECT NAME	FERC NO.	CAPACITY (MW)	OWNER	STREAM	2005 KWH/YR	POWER MARKETER
	LICENSES – Operating (cont'd)						
	BEAR RIVER	**20**	**77**	**PACIFICORP**	**BEAR RIVER**	**113,452,000**	**RMP**
5	ONEIDA HYDROELECTRIC PROJECT	Formerly ~~472~~	30	PACIFICORP	BEAR RIVER	38,801,000	RMP
6	GRACE	Formerly ~~2401~~	33	PACIFICORP	BEAR RIVER	61,852,000	RMP
7	SODA	Formerly ~~20~~	14	PACIFICORP	BEAR RIVER	12,799,000	RMP
8	BIRCH CREEK	7194	2.7	TED SORENSON	BIRCH CREEK	14,059,000	RMP-PP
9	BLISS DAM	1975	73.763	IDAHO POWER COMPANY	SNAKE RIVER	287,702,000	IPCO
10	BUFFALO	1413	0.25	FALL RIVER REA	BUFFALO RIVER	1,119,422	RMP-PP
11	C.J. STRIKE	2055	82.8	IDAHO POWER COMPANY	SNAKE RIVER	383,049,000	IPCO
12	CABINET GORGE	2058	263.2	AVISTA	CLARK FORK	1,003,826,000	Avista
13	CASCADE	2848	12.42	IDAHO POWER COMPANY	N.F. PAYETTE	37,584,000	IPCO
14	CEDAR DRAW	8278	2.878	CRYSTAL SPRINGS TROUT CO.	CEDAR DRAW CREEK	7,468,573	IPCO-PP
15	DIETRICH DROP	8909	4.77	BP HYDRO ASSOCIATES	MILNER-GOODING CANL	12,310,000	IPCO-PP
16	DWORSHAK	10819	3	IDAHO WATER RESOURCE BOARD	NF CLEARWATER RIVER	21,000,000	BPA-PP
17	FALLS RIVER	9885	9.1	MARYSVILLE HYDRO PRTNRS.	MARYSVILLE CANAL	43,957,833	IPCO-PP
18	FELT DAM	5089	7.45	FALL RIVER REA	TETON RIVER	27,296,690	RMP-PP
19	FORD POWER PROJECT	7986	1.497	FORD HYDRO LTD PRTNRSHIP	JIM FORD CREEK	3,781,000	Avista -PP
20	GEM STATE	2952	23.5	CITY OF IDAHO FALLS	SNAKE RIVER	See Idaho Falls	MUNC
21	HORSESHOE BEND	5376	7.85	L.B. INDUSTRIES	PAYETTE RIVER	33,298,675	IPCO-PP
	IDAHO FALLS	**2842**	**27.9**	**CITY OF IDAHO FALLS**	**SNAKE RIVER**	**222,365,404**	**MUNC**
22	UPPER PLANT	2842	8.3	CITY OF IDAHO FALLS	SNAKE RIVER	See Idaho Falls	MUNC
23	CITY PLANT	2842	8.3	CITY OF IDAHO FALLS	SNAKE RIVER	See Idaho Falls	MUNC
24	LOWER PLANT	2842	11.3	CITY OF IDAHO FALLS	SNAKE RIVER	See Idaho Falls	MUNC
25	ISLAND PARK	2973	4.8	FALL RIVER REA	HENRY'S FORK	17,048,620	Coop
26	L&M ANGUS RANCH (Ingram)	8498	0.86	LOIS VON MORGANROTH	WARM SPRINGS CREEK	1,887,000	RMP-PP
27	LOWER SALMON	2061	60	IDAHO POWER COMPANY	SNAKE RIVER	196,441,000	IPCO
26	LUCKY PEAK	2832	101.25	BIG BEND IRRIGATION DIST. (OR)	BOISE RIVER	226,238,000	SCL
27	MAGIC DAM	3407	9	J. R. SIMPLOT CO.	BIG WOOD RIVER	12,180,015	IPCO-PP
28	MARSH VALLEY HYDRO	10468	1.65	MARCH VALLEY HYDRO CO	PORTNEUF-M.V. CANAL	4,741,000	RMP-PP
29	MILE 28	10552	1.5	JOHN STRAUBHAR	MILNER/GOODING CANAL	3,920,704	IPCO-PP
30	MILNER DAM	2899	59.448	IDAHO POWER COMPANY	SNAKE RIVER	35,641,000	IPCO
31	MINK CREEK	8646	3.075	ROBERT FACKRELL	MINK CREEK	10,631,000	RMP-PP
32	MOYIE RIVER	1991	3.938	CITY OF BONNERS FERRY	MOYIE RIVER	30,091,296	BPA
33	PORTNEUF	7447	0.9	COMMERCIAL ENERGY MNGMNT	PORTNEUF RIVER	1,320,000	RMP-PP
34	ROCK CREEK #2	6015	1.9	BONNEVILLE PACIFIC CORP.	ROCK CREEK	6,314,625	IPCO-PP
35	SAHKO WATER POWER	11060	0.50	J M MILLER ENTERPRISES INC	SNAKE RIVER	0	IPCO-PP
36	SHINGLE CREEK	4025	0.224	WILLIS & BETTY DEVENY	SHINGLE CREEK	794,320	IPCO-PP

Count	PROJECT NAME	FERC NO.	CAPACITY (MW)	OWNER	STREAM	2005 KWH/YR	POWER MARKETER
	LICENSES – Operating (cont'd)						
37	SHOSHONE	9967	0.945	SHOROCK HYDRO, INC.	LITTLE WOOD RIVER	3,676,242	IPCO-PP
38	SHOSHONE FALLS	2778	11.875	IDAHO POWER COMPANY	SNAKE RIVER	82,726,000	IPCO
39	SMITH CREEK	8436	37.792	CITY OF EUGENE	SMITH CREEK	81,053,000	EWEB
40	SUNSHINE POWER	9907	0.11	LEE MCMILLIAN	LAKE CREEK	117,815	IPCO-PP
41	SWAN FALLS	503	25	IDAHO POWER COMPANY	SNAKE RIVER	119,857,000	IPCO
42	TWIN FALLS	18	42.217	IDAHO POWER COMPANY	SNAKE RIVER	54,446,000	IPCO
43	UPPER & LOWER MALAD	2726	21.77	IDAHO POWER COMPANY	MALAD RIVER	158,637,000	IPCO
44	UPPER SALMON FALLS	2777	34.5	IDAHO POWER COMPANY	SNAKE RIVER	190,867,000	IPCO
			1,126			**3,717,360,234**	
	LICENSE PENDING - Operating						
1	BROWNLEE	1971	585.4	IDAHO POWER COMPANY	SNAKE RIVER	1,958,064,000	IPCO
2	HELLS CANYON	1971	391.5	IDAHO POWER COMPANY	SNAKE RIVER	1,589,522,000	IPCO
3	OXBOW	1971	190	IDAHO POWER COMPANY	SNAKE RIVER	825,345,000	IPCO
4	POST FALLS	2545	14.75	AVISTA	SPOKANE RIVER	86,653,000	Avista
			1,182			**4,459,584,000**	
	NO FERC JURISTICTION - Operating On-Grid						
1	CLEAR LAKES		2.5	IDAHO POWER COMPANY	CLEAR LAKES	13,238,000	IPCO
2	THOUSAND SPRINGS		8.8	IDAHO POWER COMPANY	THOUSAND SPRINGS	52,050,000	IPCO
3	CANYON SPRINGS	None	0.13	MCCOLLUM	ARTESIAN WELL	731,835	IPCO-PP
4	PRISTINE HYDRO #1	None	0.125	IDAHO WATER RESOURCE BOARD	ARTESIAN WELL	891,438	IPCO-PP
			11.555			**66,911,273**	

Note: The abbreviations for the Power Marketer are as follows:

AP	Atlanta Power Company
Avista	Avista Utilities
Avista-PP	Avista Utilities PURPA Project
BPA	Bonneville Power Administration
BPA-PP	Bonneville Power Administration PURPA Project
IPCO	Idaho Power Company
IPCO-PP	Idaho Power Company PURPA Project
MUNC.	Municipal Electric Utilities
Coop	Rural Electric Cooperative
RMP	Rocky Mountain Power
RMP-PP	PURPA Project
EWEB	Eugene Water and Electric Board (Oregon)
SCL	Seattle City and Light

Appendix B

Current Hydroelectric Plant Developments in Idaho

Appendix B

Current Hydroelectric Plant Developments in Idaho

1. **Bear River Narrows** (FERC No. 12486) - Integrated Licensing Process, currently in 2nd year of studies. The project Owner is Twin Lakes Canal company, Preston Idaho. The project is a 100 foot dam on the Bear River to provide for irrigation water storage and 10 MW of hydropower.

2. **Arkoosh** (FERC No. 12063) - License issued 17-March-2006. The 1.5 MW project is under construction.

3. **Arrowrock Dam Hydroelectric** (FERC No. 4656) - The 15 MW plant (twin Frances turbine units) at the base of Arrowrock Dam on Boise River is currently under construction and will come online in early 2010. The owners are the five irrigation districts comprising the Boise Board of Control.

4. **Midway Hydroelectric** (FERC No. 12437) - The 2.6 MW hydro plant located on the Low Line Canal near Hansen, Idaho is owned by the Twin Falls Canal Company. The twin Kaplan turbine units plant came online in July 2007.

5. **Mora Drop Hydroelectric Plant** (FERC No. 3403) - Developed and is on the Boise Board of Control system near Kuna, Idaho. The FERC exemption for this project was issued in 1981. The 1.5 MW Kaplan turbine unit was brought on line July 2006.

6. **Arena Drop Hydroelectric** (FERC No.4858) – This is one of 8 additional Boise Board of Control unconstructed projects that were issued FERC exemptions in 1981. The 0.5 MW Frances turbine unit is currently being designed. This project is expected to be online in 2010. Several other drops are being studied in systematic fashion and are expected to come on line over the next five years.

7. **Bell Mountain Hydro** (FERC No. 5637) - Rebuild of the shut down Pancheri hydro plant 35 miles North of Howe, Idaho on a tributary of Little Lost River. The 300 kW Pelton turbine plant is owned by Ted Sorenson. The construction is in the final stages with beginning of service expected to be June 2009.

8. **Cross Cut Hydroelectric Plant** (No active FERC No.) - Owner is Madison Fremont Irrigation and the developer is Symbiotics of Rigby, Idaho. It is about 3 to 4 MW and is located on the Henry's Fork of the Snake River just north of Ashton, Idaho.

9. **Chester Diversion Hydroelectric Project** (FERC No. 11879) - License issued July 23, 2008 to Fall River Rural Electric Cooperative. The 3.3 MW run-of-river project will be located on the Henry's Fork of the Snake River in Fremont County, Idaho. Construction of the project began in April 2009 with commercial operation scheduled to start December 31, 2010.

Appendix C

Idaho Department of Water Resources

Potential Surface Water Storage Reservoirs

Appendix C

Idaho Department of Water Resources

Potential Surface Water Storage Reservoirs

Minidoka Enlargement – This project would be the enlargement of the Bureau of Reclamation's existing Minidoka Dam and Reservoir by 50,000 acre-feet. The Legislature appropriated $1.4 million to the Water Resource Board to undertake the feasibility-level study for this project in cooperation with Reclamation. We are currently finalizing the contract between the Water Resource Board and Reclamation and the active study will begin soon. **This enlargement may result in additional energy generation at Reclamation's existing powerhouse**.

Teton Replacement – This project would be the replacement of the Bureau of Reclamation's failed Teton Dam and Reservoir, either at the same site or at some alternate site that would provide similar water storage benefits. This could provide approximately 200,000 acre-feet of active reservoir storage. The Legislature appropriated $400,000 to the Water Resource Board to undertake a reconnaissance-level study for this project in cooperation with Reclamation. We are currently beginning the process of scoping the study to develop the work tasks. This project could have significant hydropower potential depending on this actual site and configuration. **The original failed project included a 20 MW power plant.**

Twin Springs/Boise River Basin – This project would be the construction of Twin Springs or the construction of storage at some alternate site that would provide similar water storage benefits. The Corps of Engineers has received feasibility study authority from Congress for this study. In order to match the Corps' funds, the Department of Water Resources was granted a $500,000 credit for prior work accomplished, plans to accomplish an additional $500,000 of in-kind work during this study, and received $500,000 from the Legislature as part of the "Aquifer Planning Program." We are currently scoping this study with the Corps and finalizing the study agreement. This project could have significant hydropower potential depending on this actual site and configuration. **If constructed at Twin Springs, the powerplant could be up to 100 MW.**

Galloway – This project would be the construction of a new reservoir at the Galloway Site on the Weiser River of up to 900,000 acre-feet in size. It is located such that Idaho could meet its flow augmentation requirements from Galloway in most years, relieving pressure on the Upper Snake, Boise, and Payette systems. This is under consideration as a State-only project with no federal agency involvement. **Depending on project configuration, the power plant could be up to 40 MW in size**.

Lost Valley – This project would be the enlargement of the existing Lost Valley Reservoir by 20,000 acre-feet. Lost Valley is located in the Weiser River Basin headwaters. This is under consideration as a State-only project with no federal agency involvement. **The power capacity at this project in unknown, but there may be some.**

Other Potential Projects – these are not currently under active consideration in this initiative, but they have potential for consideration.

> Caribou – This 40,000 acre-foot site is located on the Bear River. The Idaho Water Resource Board has considered this several times in the past. **The power plant would be 5MW in size.**
>
> Swan Falls-Guffey – This was considered first by Reclamation in the 1960's and then as a joint project between the state and Idaho Power in the 1970's. There has been some interest in

reconsidering this project. This would provide about 300,000 acre-feet of storage. **The power generation capacity is unknown at this time, but would be relatively large.**

Bear River Narrows - This is a 10,000 acre-foot project proposed by the Twin Lakes Canal Company on the Bear River. **It would include a 10 MW power plant**. The Water Resource Board has been approached by the Twin Lakes Canal Company about Board's interest in financing this project.

Appendix D

Pumped Storage Hydropower

Appendix D

Pumped Storage Hydropower

Like conventional hydropower projects, pumped storage projects use falling water to generate power. Water is stored in an upper reservoir for release to generate power during periods of peak demand. However, when demand and prices for electricity are low, they use reversible turbines to pump the water back to the upper reservoir. For example, in the summer water is released during the day for generating power to satisfy the high demand for electricity for air conditioning. At night, when demand decreases, the water is pumped back to the upper reservoir for use the next day. This type of project is particularly effective at sites having high heads (large differences in elevation between the upper and lower reservoir).

Pumped storage projects are uniquely suited for generating power when demand for electricity is high and for supplying reserve capacity to complement the output of large thermal plants and intermittent renewable plants such as wind. Although the losses of the pumping process makes the plant a net consumer of energy overall, the system produces revenue by selling electricity during periods of peak demand when electricity prices are highest, and consuming energy for pumping during off-peak periods when prices are lowest. Pumped storage projects also provide utilities with a variety of valuable ancillary services such as dispatchable capacity, increased reliability, spinning reserves, frequency regulation, load following, voltage and power factor support, black start capability, improved unit commitment of other system resources, and better utilization of transmission. The economics of many projects are greatly enhanced by the revenue received from the sale of these ancillary services.

Currently there are 19,490 MW of pumped storage (PS) projects nationwide licensed by the Federal Energy Regulatory Commission (FERC) plus approximately 2,000 MW of federally own PS projects. There are no operating PS projects are in the Northwest region. The only projects nationwide that are currently in the licensing phase are the Lake Elsinore and Iowa Hills projects in California. Preliminary permits, which reserve a site for study, have been issued by FERC on 16,381 MW of PS and applications for preliminary permits have been filed, but not issued, on another 15,267 MW of PS. By far the factor driving renewed interest in PS is as a way to backup wind and solar power.

Preliminary permits have been issued by FERC on two pumped storage (PS) projects in Idaho. These are the Little Potlatch (FERC No. 13303 - 1,340 MW) project in Nez Perce & Latah counties and the North Eden (FERC No. 13249 - 100 MW) project in Rich County. A preliminary permit has filed but has not been issued on a third pumped storage project, the Corral Creek South project (FERC No. 13314 - 1,100 MW). In addition, a project is proposed in Utah, approximately a mile across the Idaho-Utah border that will deliver power through a transmission line located primarily in Idaho.

It should be noted that the issuance of a preliminary permit in no way indicates feasibility, in fact, the vast majority of projects to which a preliminary permit are issued are not financially viable and are never licensed. All three of the proposed projects with issued permits are described below.

Little Potlatch Creek

The Little Potlatch Creek Pumped Storage Project is proposed to be located in Latah and Nez Perce counties, approximately 16 miles northeast of Clarkston, Washington and 32 miles southwest of Elk River, Idaho.

Brookfield Renewable Power, through its wholly owned subsidiary BPUS Generation Development LLC, obtained a preliminary permit from the Federal Energy Regulatory Commission (FERC) on February 6, 2009. A preliminary permit does not give the project developer approval to construct the project; rather, it allows the developer to maintain priority for a license while detailed studies are

conducted to determine the feasibility of the project and to confirm the project's economic viability. The term of the preliminary permit is 36 months. Brookfield Renewable Power is a leading developer of both conventional and pumped storage hydropower projects, with 164 hydro facilities in the US, Canada and Brazil.

As proposed, the project would consist of a new underground powerhouse, upper and lower intake structures, power tunnel, and tailrace. A 1,400-foot-deep, 34-foot-diameter vertical shaft would be constructed to connect the upper reservoir to a horizontal power tunnel. The power tunnel will be 3,000 feet long and have a diameter of 34 feet, connecting to four 13-foot-diameter, steel-lined penstocks of various lengths. A 200-foot by 500-foot reinforced concrete, underground powerhouse will be constructed 500 feet below the ground surface. The powerhouse would accommodate pump/turbine units with an operating head varying from 1,280 feet to 1,500 feet. Four pump/turbine-generator units would be installed with a combined capacity of 1,340 MWs per 8-hour cycle. Each turbine would discharge into a 17-foot-diameter draft tube tunnel, connected to two 1,500-foot-long by 28-foot-diameter tailrace tunnels. Annual energy production at the site is expected to be 3,830,000 Megawatt hours (MWh) per year**.**

Two new lakes would be used for both the upper and lower reservoirs. Each lake would have a surface area of approximately 125 acres and a storage volume of approximately 8,775 acre-feet. Earth fill embankments—150 feet high for the upper reservoir and 230 feet high for the lower reservoir—would create the reservoirs. The proposed project will operate as a closed system, using initial water obtained from the Clearwater River, south of the project. Presently, it is unknown whether the project will require additional make-up water during operations, or if the facility will be self-sustaining from natural drainage.

The State of Idaho, on behalf of the Department of Environmental Quality, the Department of Fish and Game, the Department of Parks and Recreation, and the Idaho Water Board have petitioned to intervene in the FERC permitting process.

North Eden

The project would be located in North Eden Canyon on the eastern side of Bear Lake in Rich County, Utah. The project site is near the eastern bank of Bear Lake, approximately 1.25 miles south of the Idaho-Utah border and 23 miles south of Montpelier, Idaho. The point of electrical interconnection will be in Idaho, approximately 4 miles north of the Idaho-Utah border.

A three-year preliminary permit to study the project's feasibility was issued on December 24, 2008. The proposed project would consist of two, approximately 12,000 acre-foot new storage reservoirs with 100-foot-high and 148-foot-high earth embankment dams. A 25 ft diameter, 2,200 ft long steel penstock would connect to seven generating pump/turbine units having a total installed capacity of 700 MWs. The project's hydraulic head would range from 745 to 927 feet. A proposed 5-mile-long, 500-kV transmission line would interconnect with a proposed upgrade to an existing PacifiCorp 240-kV line. The project would have an annual generation of 2,030,000 MWhs operating 10 hours per day, five days a week. Power would be sold to local utilities and providers in the Western Electrical Coordinating Council system.

Corral Creek South

The Corral Creek South Pumped Storage Project is proposed to be located in Twin Falls County, approximately 40 miles south of Twin Falls, Idaho. The proposed project would be closed loop and would not be built on an existing body of water.

The proposed project would consist of two new storage reservoirs, each with surface area of about 115 acres and approximately 10,000 acre-foot of storage capacity. Two earthen dams approximately 200-feet high would be constructed to form the reservoirs. A 30 ft diameter, 4,710 ft long steel penstock

would connect to a powerhouse containing 10 generating pump/turbine units with a total installed capacity of 1,100 MW. The hydraulic head of the project would vary from a minimum of 1,000 feet to a maximum of 1,280 feet. The proposed project, generating 8 hours per day 7 days a week, would produce approximately 3,212,000 MWhs annually. Power would be marketed to local utilities and providers in the WECC system. The proposed 10.6 mile 500 kV line will interconnect with a proposed upgrade to a proposed Idaho Power line that is within the Gateway West power corridor.

On February 4, 2009, a preliminary permit application was accepted for filing by the FERC from Symbiotics LLC, on behalf of Corral Creek South Hydro, LLC. If granted, the three-year permit would allow the developer to conduct preliminary environmental reviews, prepare an environmental impact statement, conduct feasibility studies and prepare a preliminary design. Symbiotics of Rigby, Idaho has been involved in various phases of numerous conventional and pumped storage projects over the past twenty years including projects in Idaho, Utah, Montana, Wyoming, Oregon and Hawaii.

The State of Idaho, on behalf of the Department of Environmental Quality, the Department of Fish and Game, the Department of Parks and Recreation, and the Idaho Water Board have petitioned to intervene in the FERC permitting process.

Although it may be inaccurate to contend that a PS project will never be built in Idaho, it does not appear in the foreseeable future that the power and market conditions will exist that will be conducive to PS development. High capital costs, over a billion dollars for a 1,000 MW plant, are well in excess of the capability of any in-state utility to finance. Although re-licensing has reduced the flexibility of the Hells Canyon Complex, significant load following capability still exists in the Idaho Power Company (IPC) system between overall hydro resources, combustion turbines, and power exchanges. IPC is also realizing significant benefit from active demand side manage measures that curtail large irrigators and major industrial customer during peak conditions. The IPC Integrated Resource Plan which includes additional wind power development and other renewables through 2029 does not anticipate a need for PS any time in this period.

Most likely, even on the most remote chance that a merchant PS plant were developed in the state, it would most likely be well after 2020 before the plant were to come on line. Some interest is still being shown by out-of-state developers in construction of a nuclear plant within the state, which might change that picture. For the present, the possibility of a pumped storage plant should be considered not likely.

Appendix E

Comparative Analysis of Various Types of Hydroelectric Plants

Appendix E

Comparative Analysis of Various Types of Hydroelectric Plants

Table B-1. Hydropower summary matrix.

	COST & ECONOMICS	PRESERVE NATURAL ENVIRONMENT	RELIABILITY & SECURITY	SUSTAINABLE GROWTH	AVERAGE
Option 1 - Canal Drop	**7.6**	**9.0**	**8.0**	**7.8**	**8.1**
Option 2 - Existing Plant Upgrade	**7.6**	**7.9**	**8.0**	**7.8**	**7.8**
Option 3 - New Impoundment - Large	**5.4**	**5.3**	**8.0**	**6.8**	**6.4**
Option 4 - New Impountment - Small	**7.4**	**7.7**	**7.8**	**7.0**	**7.5**
Option 5 - New Plant - Existing Impoundment	**7.4**	**8.4**	**7.8**	**7.8**	**7.8**
Option 6 - Pump Storage	**7.3**	**9.0**	**7.0**	**7.0**	**6.0**
Average Rating	**7.1**	**7.9**	**7.8**	**7.3**	**7.3**

Table B-2. Canal drop matrix.

COST & ECONOMICS	**Variable Production Cost**	**Tax Base Enhancement**	**Development Risk**	**Deployment Time**
	Fuel is virtually free. Variable/incremental O&M about 0.5-cent/kwh or less	Good tax base enhancement to rural counties w/o services	Permitting risk for development, weather risk during operation.	Authorization & FERC licensing can be 1-2 yrs for simple efficiently upgrades, 2-5 for operational redevelopments
Rating 7.6	**9**	**7**	**8**	**7**
COST & ECONOMICS (Cont'd.)	**Transmission Requirement**	**Business Friendly Process**	**Capital Intensity**	**Fixed O&M Costs**
	Distribution lines typically all that is needed	Local engineering sufficient. Major equipment & installation experience in-state. Small staff.	Roughly $2-4 million per MW. Off the self technology.	Maintenance cost is low - up to 20% of revenue
	8	**7**	**7**	**8**
PRESERVE NATURAL ENVIRONMENT	**Water**	**Footprint**	**Air Quality**	**Health & Safety**
	Non-consumptive Use. May involve impoundment/rerouting	Very small. Limited to access and a few acres for structure, interconnect and powerline	Virtually no release of GHG emissions or odors	Safe production w/o health risks
Rating 9.0	**9**	**8**	**10**	**9**
PRESERVE NATURAL ENVIRONMENT (Cont'd.)	**Fisheries**	**Water Quality**	**Cultural Resources**	
	Canals are not maintained as an active fishery. The flow is seasonal.	Flow is seasonal and water is used for agriculture	Canals and canal banks typically have scheduled disturbance for maintenance	
	9	**9**	**9**	
RELIABILITY & SECURITY	**Electric Grid**	**Resource Fuel Security**	**Dispatchability**	**Adaptability**
	Water year dependent. Predictable. Off-the-shelf technology available	Not dependent or exposed to security issue except for structures.	This will be a year-round predominantly spring/summer baseload. Can be dispatched easily	Requires no inventive integration.
Rating 8.0	**8**	**8**	**7**	**9**
SUSTAINABLE GROWTH	**Job Impacts**	**Public Acceptance**	**National Energy Security**	**Generation Life**
	Positive but minor impact after construction	Project by project determination	Distributed generation.	Can be 40 plus years. Opportunity for technology upgrades
Rating 7.8	**5**	**9**	**7**	**10**
AVERAGE RATING 8.1				

Table B-3 New impoundment – large.

COST & ECONOMICS	**Variable Production Cost**	**Tax Base Enhancement**	**Development Risk**	**Deployment Time**
	Fuel is virtually free. Variable/incremental O&M about 0.5-cent/kwh or less	Good tax base enhancement to rural counties w/o services	Permitting risk for development, weather risk during operation.	Authorization & FERC licensing can be 1-2 yrs for simple efficiently upgrades, 2-5 for operational redevelopments
Rating 7.6	**10**	**7**	**9**	**6**
COST & ECONOMICS (Cont'd.)	**Transmission Requirement**	**Business Friendly Process**	**Capital Intensity**	**Fixed O&M Costs**
	Transmission enhancements may be needed	Local engineering sufficient. Major equipment & installation experience in-state. Small staff.	Roughly $1-3 million per MW. Site dependent. Off-the-self technology reduces cost.	Fixed O&M Costs are low
	7	**8**	**6**	**8**
PRESERVE NATURAL ENVIRONMENT	**Water**	**Footprint**	**Air Quality**	**Health & Safety**
	Non-consumptive Use. May involve impoundment/rerouting	Existing structure. Limited to access and a few acres for structure, interconnect and powerline	Virtually no release of GHG emissions. Potential GHG reduction/replacement credits	Safe production w/o health risks
Rating 7.9	**8**	**9**	**10**	**9**
PRESERVE NATURAL ENVIRONMENT (Cont'd.)	**Fisheries**	**Water Quality**	**Cultural Resources**	
	Entrainment often an issue, along with enhancement, especially with ESA	Potential TDG, DO, temperature, and sediment issues	Potential tribal & historic property (SHPO) issues	
	5	**7**	**7**	
RELIABILITY & SECURITY	**Electric Grid**	**Resource Fuel Security**	**Dispatchability**	**Adaptability**
	Water year dependent. Predictable. Off-the-shelf technology available	Not dependent or exposed to security issue except for structures.	This will be a year-round predominantly spring/summer baseload. Can be dispatched easily	Requires no inventive integration.
Rating 8.0	**8**	**8**	**7**	**9**
SUSTAINABLE GROWTH	**Job Impacts**	**Public Acceptance**	**National Energy Security**	**Generation Life**
	Positive but minor impact after construction	Project by project determination	Distributed generation.	Can be 30-50 plus years. Opportunity for technology upgrades
Rating 7.8	**5**	**8**	**8**	**10**
AVERAGE RATING 7.8				

COST & ECONOMICS	**Variable Production Cost**	**Tax Base Enhancement**	**Development Risk**	**Deployment Time**
	Fuel is free. 1.5-cent/kwh or less production cost	Good tax base enhancement to rural counties w/o services	Permitting risk for development, weather risk during operation.	Authorization & FERC licensing can be timely, roughly 2-10 years
Rating 5.4	**9**	**8**	**4**	**2**
COST & ECONOMICS (Cont'd.)	**Transmission Requirement**	**Business Friendly Process**	**Capital Intensity**	**Fixed O&M Costs**
	Distribution lines typically all that is needed	Local engineering sufficient. Major equipment state & construction in state. Small staff.	Roughly $2-4 million per MW. Off the self technology.	Maintenance cost is low - up to 20% of revenue
	3	**4**	**6**	**7**
PRESERVE NATURAL ENVIRONMENT	**Water**	**Footprint**	**Air Quality**	**Health & Safety**
	Non-consumptive Use. May involve impoundment/rerouting	Very small. Limited to access and a few acres for structure, interconnect and powerline	Virtually no release of GHG emissions or odors	Safe production w/o health risks
Rating 5.3	**3**	**3**	**10**	**9**
PRESERVE NATURAL ENVIRONMENT (Cont'd.)	**Fisheries**	**Water Quality**	**Cultural Resources**	
	Impoundment can have adverse and/or beneficial impacts	Impoundment will impact	Inundation	
	4	**4**	**4**	
RELIABILITY & SECURITY	**Electric Grid**	**Resource Fuel Security**	**Dispatchability**	**Adaptability**
	Water year dependent. Predictable. Off-the-shelf technology available	Not dependent or exposed to security issue except for structures.	This will be a year-round predominantly spring/summer baseload. Can be dispatched easily	Requires no inventive integration.
Rating 8.0	**8**	**8**	**7**	**9**
SUSTAINABLE GROWTH	**Job Impacts**	**Public Acceptance**	**National Energy Security**	**Generation Life**
	Positive but minor impact after construction	Project by project determination	Distributed generation.	Can be 40 plus years. Opportunity for technology upgrades
Rating 6.8	**7**	**3**	**7**	**10**

AVERAGE RATING 6.4

Table B-4 New impoundment – small.

COST & ECONOMICS	**Variable Production Cost**	**Tax Base Enhancement**	**Development Risk**	**Deployment Time**
	Fuel is free. 1.5-cent/kwh or less production cost	Good tax base enhancement to rural counties w/o services	Permitting risk for development, weather risk during operation.	Authorization & FERC licensing can be timely, roughly 2-10 years
Rating 7.4	**9**	**7**	**7**	**6**
COST & ECONOMICS (Cont'd.)	**Transmission Requirement**	**Business Friendly Process**	**Capital Intensity**	**Fixed O&M Costs**
	Distribution lines typically all that is needed	Local engineering sufficient. Major equipment state & construction in state. Small staff.	Roughly $2-4 million per MW. Off the self technology.	Maintenance cost is low - up to 20% of revenue
	8	**7**	**7**	**8**
PRESERVE NATURAL ENVIRONMENT	**Water**	**Footprint**	**Air Quality**	**Health & Safety**
	Non-consumptive Use. May involve impoundment/rerouting	Very small. Limited to access and a few acres for structure, interconnect and powerline	Virtually no release of GHG emissions or odors	Safe production w/o health risks
Rating 7.7	**7**	**7**	**10**	**9**
PRESERVE NATURAL ENVIRONMENT (Cont'd.)	**Fisheries**	**Water Quality**	**Cultural Resources**	
	Depending on the type - the water will flow only partially interrupted	No major impoundment to significantly impact temperature, DO or sediments	Most impacts can be avoided or mitigated	
	7	**7**	**7**	
RELIABILITY & SECURITY	**Electric Grid**	**Resource Fuel Security**	**Dispatchability**	**Adaptability**
	Water year dependent. Predictable. Off-the-shelf technology.	Not dependent or exposed to security issue except for structures.	This will be a year-round predominantly spring/summer baseload. Can be dispatch easily	Requires no inventive integration.
Rating 7.8	**7**	**8**	**7**	**9**
SUSTAINABLE GROWTH	**Job Impacts**	**Public Acceptance**	**National Energy Security**	**Generation Life**
	Positive but minor impact after construction	Project by project determination	Distributed generation.	Can be 40 plus years. Opportunity for technology upgrades
Rating 7.0	**5**	**6**	**7**	**10**

AVERAGE RATING 7.5

Table B-5 New plant – existing impoundment.

COST & ECONOMICS	**Variable Production Cost**	**Tax Base Enhancement**	**Development Risk**	**Deployment Time**
	Fuel is free. 1.5-cent/kwh or less production cost	Good tax base enhancement to rural counties w/o services	Permitting risk for development, weather risk during operation.	Authorization & FERC licensing can be timely, roughly 2-10 years
Rating 7.4	**9**	**7**	**7**	**6**
COST & ECONOMICS (Cont'd.)	**Transmission Requirement**	**Business Friendly Process**	**Capital Intensity**	**Fixed O&M Costs**
	Distribution lines typically all that is needed	Local engineering sufficient. Major equipment state & construction in state. Small staff.	Roughly $2-4 million per MW. Off the self technology.	Maintenance cost is low - up to 20% of revenue
	8	**7**	**7**	**8**
PRESERVE NATURAL ENVIRONMENT	**Water**	**Footprint**	**Air Quality**	**Health & Safety**
	Non-consumptive Use. May involve impoundment/rerouting	Very small. Limited to access and a few acres for structure, interconnect and powerline	Virtually no release of GHG emissions or odors	Safe production w/o health risks
Rating 8.4	**9**	**8**	**10**	**9**
PRESERVE NATURAL ENVIRONMENT (Cont'd.)	**Fisheries**	**Water Quality**	**Cultural Resources**	
	Most adverse impacts have already occurred. Adding Hydropower facilities can provide opportunities to improve resources.			
	7	**7**	**9**	
RELIABILITY & SECURITY	**Electric Grid**	**Resource Fuel Security**	**Dispatchability**	**Adaptability**
	Water year dependent. Predictable. Off-the-shelf technology.	Not dependent or exposed to security issue except for structures.	This will be a year-round predominantly spring/summer baseload. Can be dispatch easily	Requires no inventive integration.
Rating 7.8	**7**	**8**	**7**	**9**
SUSTAINABLE GROWTH	**Job Impacts**	**Public Acceptance**	**National Energy Security**	**Generation Life**
	Positive but minor impact after construction	Project by project determination	Distributed generation.	Can be 40 plus years. Opportunity for technology upgrades
Rating 7.8	**5**	**9**	**7**	**10**
AVERAGE RATING 7.8				

Table B-6 Pumped storage.

COST & ECONOMICS	**Variable Production Cost**	**Tax Base Enhancement**	**Development Risk**	**Deployment Time**
	Fuel is free. 1.5-cent/kwh or less production cost	Good tax base enhancement to rural counties w/o services	Permitting risk for development, weather risk during operation.	Authorization & FERC licensing can be timely, roughly 2-10 years
Rating 7.3	**9**	**7**	**7**	**6**
COST & ECONOMICS (Cont'd.)	**Transmission Requirement**	**Business Friendly Process**	**Capital Intensity**	**Fixed O&M Costs**
	Distribution lines typically all that is needed	Local engineering sufficient. Major equipment state & construction in state. Small staff.	Roughly $2-4 million per MW. Off the self technology.	Maintenance cost is low - up to 20% of revenue
	6	**7**	**7**	**8**
PRESERVE NATURAL ENVIRONMENT	**Water**	**Footprint**	**Air Quality**	**Health & Safety**
	Non-consumptive Use. May involve impoundment/rerouting	Very small. Limited to access and a few acres for structure, interconnect and powerline	Virtually no release of GHG emissions or odors	Safe production w/o health risks
Rating 8.4	**9**	**8**	**10**	**9**
PRESERVE NATURAL ENVIRONMENT (Cont'd.)	**Fisheries**	**Water Quality**	**Cultural Resources**	
	Cycling of water may result in some impingement	Potential to have minor DO impact	Typically can be avoided or mitigated	
	7	**7**	**9**	
RELIABILITY & SECURITY	**Electric Grid**	**Resource Fuel Security**	**Dispatchability**	**Adaptability**
	Water year dependent. Predictable. Off-the-shelf self technology.	Not dependent or exposed to security issue except for structures.	This will be a year-round predominantly spring/summer baseload. Can be dispatch easily	Requires no inventive integration.
Rating 7.8	**7**	**8**	**7**	**9**
SUSTAINABLE GROWTH	**Job Impacts**	**Public Acceptance**	**National Energy Security**	**Generation Life**
	Positive but minor impact after construction	Project by project determination	Distributed generation.	Can be 40 plus years. Opportunity for technology upgrades
Rating 7.8	**5**	**9**	**7**	**10**
AVERAGE RATING 7.8				

Appendix F

Excerpts from Relevant Energy Resource Plans

Appendix F
Excerpts from Relevant Energy Resource Plans

2007 Idaho Energy Plan – January 26, 2007

1.4.1. Energy Plan Objectives

The Committee established the Objectives for the Energy Plan at the outset of its investigation. 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

5. Provide the means for Idaho's energy policy to adapt to changing circumstances.

2.3.2. Hydroelectricity

Idaho has 136 existing hydro plants with combined capacity of approximately 2,500 MW. The largest hydroelectric projects are the 400 MW Dworshak dam operated by the U.S. Army Corps of Engineers and the 1,167 MW Hells Canyon Complex owned by Idaho Power. Idaho dams produce approximately 1,300 aMW of electricity in an average year, nearly 50 percent of Idaho's 2005 electricity consumption. While Idaho's most promising hydroelectric sites have already been developed, INL estimates that there are 2,100 aMW of potentially developable new hydroelectric resources at 6,700 sites around the state.

Hydroelectric energy is renewable and emits no pollutants or greenhouse gases. However, the energy that is 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. New hydro resources without significant reservoir storage would compound the seasonality of the Northwest's existing hydro resource base, reducing their attractiveness relative to other resources.

Clean Energy, a Strong Economy and a Healthy Environment

Western Governor's Association – June 2005

Water Energy

Hydropower provides nearly 18% of the WGA's electrical generating capacity by utilizing the natural energy created through the West's vast network of streams, rivers and coastlines. A report published by the Idaho National Laboratory identified 30,000 MW of additional hydropower potential in the United States; two-thirds of this potential is in the West. Ninety-eight percent of the dams in the United States do not have a power component attached to them, meaning a significant hydro contribution to the West's future energy portfolio can be made without the construction of any new dams. Water-powered technology has also continued to advance to include many non-conventional applications. Wave, tidal and in-stream capabilities present a tremendous opportunity to explore other technologies for capturing energy from an abundant renewable source. Given the varying degree of development among these different water energy technologies, Western states should approach their continued development through broad policy options that create incentives, encourage research and development and streamline permitting procedures:

- Support economic incentives for traditional, new and emerging hydropower technologies:

1. Extension of the federal Section 45 Production Tax Credit to 2015.

2. Expand production tax credits to include small hydropower, hydropower at non-hydro dams and hydrokinetic/ocean technologies.

3. Include hydropower in state clean and renewable energy initiatives.

- Support Hydropower R&D funding – provide federal and state financial support for the development of emerging hydrokinetic/ocean technologies and new turbine advancements for traditional hydropower technology.

- Encourage regulatory flexibility to promote the development of small hydropower potential and related emerging technologies.