
SMALL-SCALE HYDRO DEVELOPMENT IN MONTANA

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INTRODUCTION

During the past three years, potential developers have filed more than 100 applications to construct small-scale hydropower projects on Montana streams and rivers. The flurry of activity here and in other western states has been described as a "gold rush in falling water," and presents a sharp contrast to the indifference toward small-scale hydro development that marked preceding years.

Much of the interest in hydropower stems from recently enacted federal laws and complementary state statutes which provide significant financial incentives to hydropower developers. In light of an apparent energy shortage, lawmakers promoted small-scale hydro as clean, renewable energy which could help reduce reliance on imported energy sources. Small-scale hydro was also believed to have few environmental drawbacks, in contrast to conventional fossil-fuel or nuclear power plants.

Small-scale hydro projects which generate electricity from existing dams or from watersheds without competing resource values are often environmentally benign; however, many of the Montana sites where hydropower development has been proposed do exhibit major conflicts with other uses. Projects on free-flowing waterways can jeopardize water quality, fish, wildlife, recreation and related economic values. Hydropower development may also conflict with agricultural and other consumptive water rights in certain locations. By downplaying such concerns, policymakers have failed to establish a legal framework to deal effectively with the impacts of small-scale hydro development.

The existing regulatory structure for hydropower development in Montana presents difficulties for both developers and government officials. The developer must negotiate a bureaucratic maze to obtain permits from the various state and federal agencies having jurisdiction over specific aspects of a proposed hydropower project. State records are scattered among the different agencies, with no central repository for information on the status and details of the projects proposed in Montana. Additionally

state agencies incur considerable expense in reviewing permit applications, but have no mechanism for obtaining reimbursement for these costs.

The procedure for licensing hydro projects is the cause of tension between state and federal officials. Although state agencies are responsible for analyzing specific aspects of proposed projects, the state does not have the authority to evaluate a project as a whole and issue a balanced ruling on its merits. Instead, state analysis is only advisory to the Federal Energy Regulatory Commission (FERC), which licenses hydropower projects. This agency has neither the staff nor the expertise to analyze the environmental impacts or technical feasibility of the literally thousands of projects proposed in the western states. As a result, FERC's rulings are unpredictable, and input from Montana resource officials may be of limited effectiveness.

This briefing paper provides a background on small-scale hydro issues in Montana. Permit procedures, environmental impacts, incentives and roadblocks to development, water rights, interagency cooperation, and state-federal relations are the major policy concerns which need to be addressed to ensure that Montanans can reap the potential benefits from small-scale hydropower without incurring the costs of unwise development.

WHAT IS SMALL-SCALE HYDRO

The term "small-scale hydro" has been used to describe projects ranging from simple waterwheel generators on tiny creeks to several-hundred-foot-high dams on large streams or rivers. This wide variation results from federal regulations which base licensing procedures and financial incentives on power generation capacity. Some federal regulations impose a 5 megawatt (MW) maximum for small-scale classification, and this is probably the most widely accepted number. Other statutes, however, use 15 MW and 30MW as the small-scale limit. The federal Public Utilities Regulatory Policies Act (PURPA), the most important law promoting alternative energy development, allows facilities of up to 80 MW to qualify for small power producer benefits.

This variety of definitions means that "small-scale" hydro projects are not necessarily small. A 5 MW project typically requires a dam higher than 50 feet; one proposed 24 MW project in Wyoming calls for a

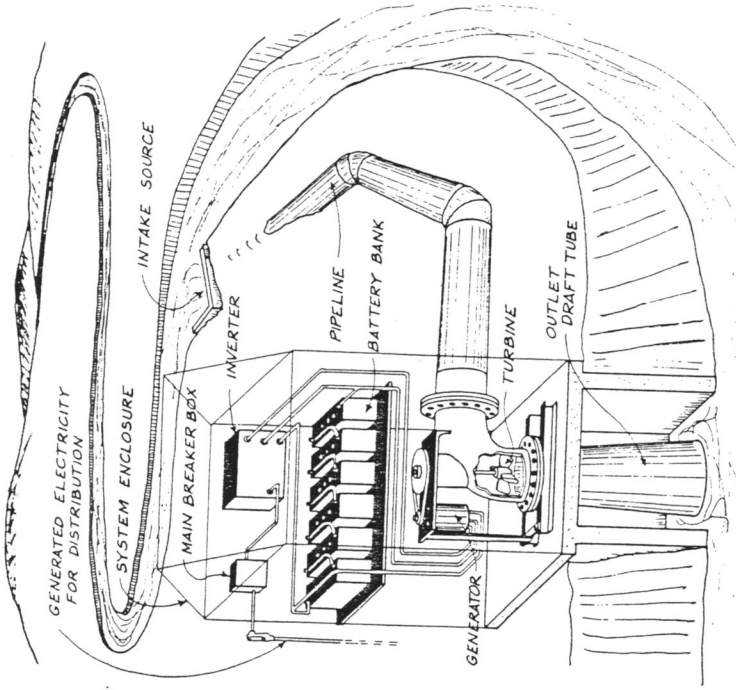
190-foot-high dam. An 80 MW project would approach the size of the proposed Kootenai Falls dam, which would have an average output of about 60 MW and a maximum power rating of 144 MW. At the other end of the spectrum are the so called "microhydro" projects which generate 100 kw (0.1 MW) or less. Thus, under the laws which now govern hydropower development, potential developers of both large and small projects can make use of the available financial incentives which promote small-scale hydro.

Classification of hydroelectric projects by "head" (the vertical distance water falls between a dam or diversion and a powerhouse) and flow (the volume of water passing through the turbines) provides a means to more clearly define the scale of development. High-head, high-flow projects are major dams, such as those developed throughout the Columbia River system; low-head (less than about 60 feet), low-flow projects are typically microhydro projects designed to meet the energy load of an individual home, ranch or shop. Most of the projects currently proposed in Montana and other western states, however, have been either high-head, low-flow or low-head, high-flow, as detailed below.

The high-head, low-flow projects include most of the small stream developments proposed in the mountainous regions of the west. These projects typically employ a diversion dam to channel streamflow into a penstock, the long pipe which conveys water to the turbine. The penstock often extends several thousand feet downslope in order to obtain the greatest head and thus the maximum power output. Water under tremendous pressure exits from the penstock at the powerhouse and drives a turbine connected to a generator. The generator produces electricity, which enters transmission lines.

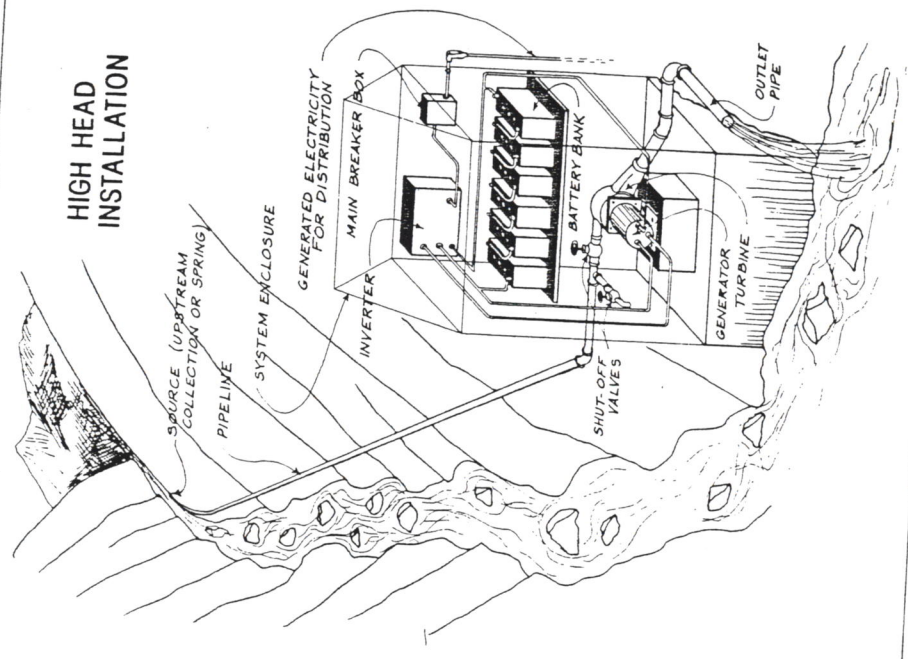
Low-head, high-flow projects are characteristic of valley locations, where rivers provide large quantities of water but gentle topography precludes designs incorporating a sizable vertical drop. Most low-head, high-flow projects under study for development utilize existing dams having large reservoirs and the capability to regulate flow releases. Adding hydroelectric generators for these dams -- termed "retrofitting" -- can in many cases produce significant amounts of power without environmental

LOW HEAD INSTALLATION



Adapted from: Independent Power Developers' brochure "Hydroelectric Power".

HIGH HEAD INSTALLATION



Adapted from: Independent Power Developers' brochure "Hydroelectric Power".

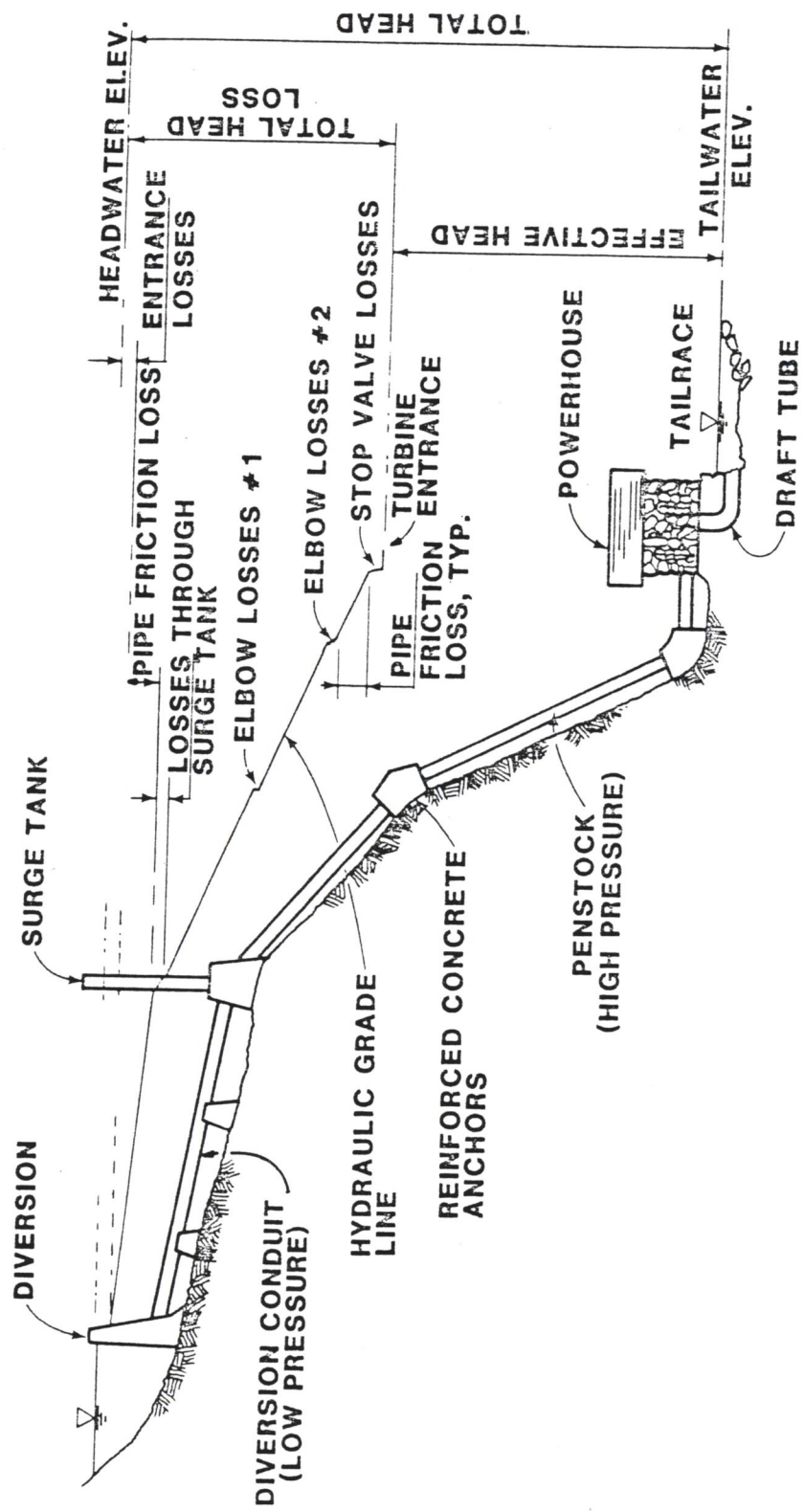


FIGURE VI-1
TYPICAL HIGH
HEAD INSTALLATION



disruption. Low-head projects can also be designed for use on irrigation canals or other man-made water developments.

The emphasis on small stream developments and retrofits results from a number of factors. First, most of the economically attractive sites for major dams have been developed already. Additionally, small projects and retrofits can be developed without the tremendous capital investment required for major dams. This financial consideration is particularly important because most of the potential hydrodevelopers are either small businesses or independent entrepreneurs. Finally, public concern for environmental values can represent a serious obstacle for the development of large dam and reservoir projects.

THE LEGAL FRAMEWORK

The enactment of the Public Utilities Regulatory Policies Act (PURPA) in 1978 signaled a major congressional initiative to promote alternative energy development including hydropower. Sections of this federal law provide financial and tax incentives to small-scale, renewable energy producers and, more importantly, require utility companies to purchase the electricity generated by these producers.

The Federal Energy Regulatory Commission (FERC) administers PURPA. In its rules to implement the act, FERC has established two conditions which greatly benefit small-scale renewable energy producers. First, FERC requires that utility companies purchase power from these producers at "full avoided cost" -- in other words, at a rate equal to the amount the utility company would have to spend to generate additional electricity from conventional sources. Second, FERC requires the utility companies to allow small-scale power producers to interconnect with the electric utility grid. The combined effect of these rules (which were upheld by the U.S. Supreme Court in May, 1983) is to guarantee both a price and a market for energy produced by small-scale producers using renewable energy resources.

The passage of Senate Bill 139 by the 1981 Montana Legislature established a statewide "mini-PURPA" which, like its federal counterpart, guarantees that utility companies will purchase electricity from a qualifying facility. (A qualifying facility under the act is one which (a) produces energy from biomass, water, waste, wind, cogeneration or other

renewable resources, (b) has a capacity not greater than 80 megawatts, and (c) is owned by a person not primarily engaged in electric power sales other than small power production.) The Public Service Commission sets the rates and conditions for the sale of this electricity to the utility companies from the small-scale power producers.

In its recent rulings, the PSC has followed the federal model and used the full-avoided-cost approach in setting the rates at which utility companies must purchase electricity from qualifying facilities. The PSC ordered calculations of avoided costs for Montana Power Company and Pacific Power and Light be based on the cost per kilowatt for electricity from the Colstrip 3 and 4 coal-fired power plants, and avoided costs for Montana-Dakota Utilities be based on the cost of electricity produced by the Antelope Valley System 2 coal-fired power plant. The PSC rejected utility company contentions that the current energy surplus should be considered to reduce the rates the utilities have to pay for electricity generated by small power producers.

The Public Service Commission also agreed to the concept of utility companies setting long-term contract rates for electricity purchases. The establishment of long-term rates is crucial for small power producers to determine the economic feasibility of proposed projects and to obtain financing for construction.

During 1983, the PSC held hearings on the progress of small power production contracts and the methods of computing avoided cost rates. In an order dated November 10, 1983, the Commission found that "major problems" in the implementation of PURPA and Montana's mini-PURPA "have acted as an almost complete barrier to Montana's utilities' purchasing qualifying facility power." The PSC identified the Montana Power Company's failure to offer long-term contracts as the most significant factor stifling small power production in Montana.

To address the need for long-term contracts, the Public Service Commission decided to specify the purchase rates and conditions that must be contained in long-term contracts. The Commission emphasized, however, that its rate schedule is intended to stimulate, not replace, good faith negotiations for purchases of small power production by utilities. The PSC

rates do provide a bottom line if negotiations fail to produce agreement on interconnection details, payment scheduling or other specifics.

In early February, 1984, the Public Service Commission is expected to announce its rate schedule for long-term purchases of energy by utilities from small power producers. Preliminary calculations indicate that the payment schedule will range from about 7 cents per kilowatt-hour for a 35-year contract to about 4 cents per kilowatt-hour for a four-year contract.

Both Montana and federal law offer potential hydropower developers additional financial incentives for development. The federal energy tax credits and accelerated depreciation allowance are cited by developers as major incentives encouraging small-scale hydro projects. Under Montana law, hydro developers have access to tax-exempt, industrial development financing for projects under 50 MW. Additionally, the Alternative Renewable Energy Sources Program administered by the Department of Natural Resources and Conservation can provide grants and loans to hydro projects which exhibit technological advances or meet other established criteria.

The Environmental Quality Council was instrumental in the adoption of state legislation promoting small-scale hydropower development. Through a joint project with the National Conference of State Legislatures, EQC drafted and had introduced the bills which established Montana's mini-PURPA and which provided industrial development financing for small-scale hydro. Additionally, the EQC sponsored a bill to promote hydropower development at state-owned dams. A bill similar to the EQC proposal became law during the 1981 session. This law requires the DNRC to survey its dams for hydropower feasibility and then make the potential hydro sites available for lease. As drafted, the EQC legislation would have made private developers eligible to develop these sites; however, the bill which passed permits the DNRC to accept lease offers only from utilities and electric cooperatives, not from private developers. The law also allows the DNRC to construct and operate its own hydropower projects at these dams if no acceptable lease offers are received.