

MINUTES OF THE MEETING OF THE NATURAL RESOURCES COMMITTEE
MARCH 26, 1981

The House Natural Resources Committee convened in Room 437 of the Capitol Building on Thursday, March 26, 1981, at 12:30 p.m. with CHAIRMAN DENNIS IVERSON presiding and thirteen members present (REPS. SALES, BERTELSEN, QUILICI, and NEUMAN were excused and REP. NORDTVEDT was absent).

CHAIRMAN IVERSON opened the hearing on SB 229.

SENATE BILL 229 SENATOR JEAN TURNAGE, chief sponsor, presented the bill which would provide for hydroelectric power generation at certain water projects operated by the Department of Natural Resources. It would provide for the lease of such projects for the purpose of power generation and authorize the construction and operation of such facilities by the department. This bill will focus attention on hydroelectric projects. It would be preferable to leasing the dam sites to either private individuals or R. E. A. operations.

Speaking as a proponent was LEO BERRY, Director of the Department of Natural Resources, who supported the concept of water development on private property. Lease agreements to private individuals and R. E. A.'s are preferred by the department.

REP. KATHLEEN MCBRIDE supported the bill. She stated that there is a lot of potential energy going over the dam and it should be tapped.

CHARLIE CRANE, Montana Water Developers Association, supported the bill but with some qualifications. He felt the language on page 6, line 8 should be reinserted because clear and convincing evidence must be submitted to someone and perhaps it should be the legislature.

DON JOHANNSEN, National Farm Organization, supported the bill.

There were no OPPONENTS.

SENATOR TURNAGE closed on the bill saying it is an enabling mechanism to get the process started. Using a revenue bond could be one form of financing.

During questions from the committee, REP. ROTH asked REP. MCBRIDE if this is a duplication of a bill of hers. The answer was that there are some similar qualities but that hers offers more guidance to the Department of Natural Resources.

REP. COZZENS asked MR. BERRY if this action would require additional staffing in the department. And, how many sites are involved. The answer was that the staff is available but feasibility studies require money. The state currently owns about 40 dams but fewer than 10 would qualify under this type of program.

The hearing on SB 229 closed and one on SB 138 opened.

SENATE BILL 138 SENATOR HAROLD DOVER, chief sponsor, presented the bill which would provide for industrial development project financing of small-scale hydroelectric facilities. This could provide the incentive to create power supplies in Montana. The Senate amendments make it more compatible with the environment and that is beneficial to everyone. It tries to avoid environmental impact in areas not already in use. It could also eliminate the high cost of constructing new dams. It is a reasonable type of power but financing is a problem.

LEO BERRY, Director of the Department of Natural Resources, supported the bill.

ANNE WILSNACK, A. E. R. O., supported the bill with the Senate amendments.

MARGARET MACDONALD, Northern Plains Resource Council, supported the bill. Her one concern was that 50 megawatts is still a large facility. She felt 30 or less is considered small.

SENATOR DOVER closed on the bill.

During questions from the committee, REP. COZZENS asked what difference it makes whether a dam is considered large or small. MS. MACDONALD replied that the difference can be great and that small scale should be defined.

The hearing on SB 138 closed and one on SB 139 opened.

SENATE BILL 139 SENATOR HAROLD DOVER, chief sponsor, presented the bill which would allow the sale of electricity from qualifying small power production facilities to utilities under rates and conditions mutually agreed upon by the Public Service Commission or electric cooperatives upon mutual agreement and in compliance with PURPA. Montana needs to comply with federal regulations. This would help in compliance as well as establish rates. SENATOR DOVER proposed one amendment to add on page 2, line 7, "other than electric power from a small power production facility".

LEO BERRY, Director of the Department of Natural Resources, supported the bill with the amendment, as did ANNE WILSNACK and MARGARET MACDONALD.

There were no OPPONENTS.

SENATOR DOVER closed on the bill.

During questions, REP. COZZENS asked if the fifty thousand dollar figure on the fiscal note is accurate. SENATOR DOVER said it would cost money to administer the program. He also said the proposed FTE would be for the PSC.

The hearing on SB 139 closed and one opened on SB 141.

SENATE BILL 141 SENATOR HAROLD DOVER, chief sponsor, presented the bill which would allow the Department of Natural Resources to award loans from the Alternative Energy Research Development and Demonstration Account for commercial production. Financing is a problem because some of the alternative energy methods are not proven and this prohibits people from acquiring financing from a bank or other lending institutions. He stated that this is a loan program.

REP. KATHLEEN MCBRIDE, who is on the Alternative Energy Council, supported the bill. When the program started, commercialization was forbidden. It has gone from small operations to commercial types. People cannot find other sources of financing so they look for grants. They would be willing to borrow but cannot.

LEO BERRY, Director of the Department of Natural Resources, said this would allow the department to provide loans. This is a new industry and it should be supported.

ANNE WILSNACK and MARGARET MACDONALD favored the bill.

REP. DAVE BROWN also favored the bill.

Speaking as an opponent of the bill was JOHN ALKE, Montana Bankers Association. He felt this was not a practical approach. The state would lend some of the funds and a bank would lend the rest. Somehow the money needs to be guaranteed. If the loan is not sound, the state should not be lending the money. He also felt the state should not be in the lending business.

SENATOR DOVER closed on the bill. He felt the banks had misinterpreted the bill. This is a new type industry and it needs help. The banks will simply handle the funds for the department. He asked that an amendment be added that the effective date is upon passage.

During questions from the committee, REP. COZZENS asked why the banks are being asked to carry the 90 percent part of the split. BILL GOSNELL, Department of Energy, said the banks would get the largest part of the loan, interest and service charge. The state does not want to get into the banking business.

REP. COZZENS further asked where in state law this loan program is allowed. MR. GOSNELL stated that rules would have to be established to do so.

Natural Resources
March 26, 1981
Page 4

REP. MUELLER asked MR. ALKE if the banks are willing to lend if the state provides most of the funds. The answer was that there is a problem in determining the eligibility of the borrower. He felt the grant money should be spent on fixed assets and not operating capital.

SENATOR DOVER mentioned that this is an alternative to a grant program. It is a chance to get some of the loan money back instead of simply handing it out in the form of a grant.

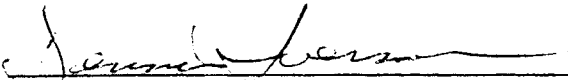
REP. COZZENS asked if the bill outlines the procedure or process to be used. MR. GOSNELL explained that it clearly states that the department will make loans through financial institutions in Montana.

MR. ALKE said the banking industry does want to cooperate but they are not satisfied with the commercial wording. He felt there must be a way to make the program more feasible to the banking area.

The hearing on SB 141 closed.

The meeting adjourned at 1:35 p.m.

Respectfully submitted,


DENNIS IVERSON, CHAIRMAN

Ellen Engstedt, Secretary

VISITORS' REGISTER

HOUSE NATURAL RESOURCES COMMITTEE

BILL SB 138

Date 3/26/81

SPONSOR DOVER

[illegible]

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR LONGER FORM.

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

VISITORS' REGISTER

HOUSE NATURAL RESOURCES COMMITTEE

BILL SB 139

Date 3/26/81

SPONSOR DOVER

[illegible]

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR LONGER FORM.

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

VISITORS' REGISTER

HOUSE NATURAL RESOURCES COMMITTEE

BILL SB 141

Date 3/26/81

SPONSOR DOVER

[illegible]

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR LONGER FORM.

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

VISITORS' REGISTER

HOUSE NATURAL RESOURCES COMMITTEE

BILL SB 229

Date 3/26/81

SPONSOR TURNAGE

[illegible]

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR LONGER FORM.

PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

MAX BAUCUS
MONTANA

1107 DIRKSEN OFFICE BUILDING
WASHINGTON, D.C. 20510
(202) 224-2651

MONTANA TOLL FREE NUMBER
1-800-332-6106

United States Senate

WASHINGTON, D.C. 20510

December 11, 1980

COMMITTEE ON FINANCE
CHAIRMAN, SUBCOMMITTEE ON THE
OVERSIGHT OF THE INTERNAL
REVENUE SERVICE
COMMITTEE ON JUDICIARY
CHAIRMAN, SUBCOMMITTEE ON
LIMITATIONS ON CONTRACTED
AND DELEGATED AUTHORITY
SELECT COMMITTEE ON
SMALL BUSINESS

Honorable Jean Turnage
P.O. Box 450
Polson, MT 59860

Dear Jean:

Kayle told me of his conversation with you and particularly of your interest in small hydropower development.

I am enclosing some materials that we were able to obtain from the Library of Congress concerning federal help to states on these facilities. I hope you won't hesitate to get back to either him or me directly if there is something along this line we can do.

Best of luck over the coming legislative session.

With warmest personal regards, I am

Sincerely,



Enclosures

BILLINGS
(406) 637-6790

BUTTE
(406) 792-8700

GREAT FALLS
(406) 761-1574

HELENA
(406) 449-5480

MISSOULA
(406) 728-2043

RECYCLED PAPER

SOURCES FOR FINANCIAL ASSISTANCE

At the time of this writing, there are several potential sources for financial assistance usable in micro-hydro. This area is rapidly expanding and new programs are likely to be developed.

DOE Small Hydro Program

In 1978 Congress produced legislation that will encourage the development of small-scale hydro (up to 15 MW) on existing dams. The legislation as written will allow \$10 million for feasibility studies and \$100 million for construction. It apparently was not intended for individual systems, although they are not specifically excluded. The program may be useful for projects of a neighborhood or larger scale.

DOE Small Grants Program

The Small Grants Program, designed to encourage the demonstration of appropriate technologies in general, is administered through regional Department of Energy offices. The regional offices have been allowed some flexibility in their administration, and checking with the office in your area is recommended.

State Grants/Tax Credits

Many states now offer tax credits and/or grants designed to encourage the development of renewable resources. Many of these programs specifically reflect solar, but taken in its widest interpretation, wind and hydro in the broader sense are both solar energies. Check the legislation in your state to see what interpretation is used. Keep in mind that grant programs are often very competitive. In the case of the tax credit, you are generally allowed to deduct some percentage of the system's total cost from your gross income. Be sure to run a quick calculation using your own figures to determine the program's effect on the real cost of your system.

Conventional Bank Loans

One possible source of money is a loan from your local bank. The interest you pay is deductible, but again be sure to calculate real effects in your own situation. People that function in a relatively cash-free economy may derive little benefit from tax deductions. Also, you may encounter some resistance from the bank, as they may be uncomfortable about loaning money on something they don't understand. The development of solar heating systems encountered a similar problem some years ago. With hydro, this is likely to be less of a problem in the future. Also, of course be sure that you are able to afford the monthly payments.

NOTE:

The following changes have been made since the publication of this brochure:

The capacity limit has increased from a maximum of 15,000 kW to a maximum of 30,000 kW

Telephone number changes;

Region 6 214-767-7736

Region 9 415-764-7084

Region 10 206-442-2820



**Loan Program for
Small Hydroelectric Feasibility Studies**

U.S. DEPARTMENT OF ENERGY • IDAHO OPERATIONS OFFICE

What Is It?

Do you —

- Want to borrow up to \$50,000 to study the feasibility of developing a hydroelectric project?
- Know of a dam on which construction was complete by April 20, 1977, and which is not being used to generate electric power?
- Want to know if it might be technically and economically feasible to develop a small hydroelectric power project (more than 100 kilowatts but less than 15,000) at the dam (or to obtain licensing for a project for which there is already a favorable feasibility study)?
- Want to understand the steps necessary in developing a small hydroelectric power project?

Then you need to know more about the Department of Energy's Small Hydroelectric Loan Program.

whose purpose is to put more hydroelectric power on line, thus reducing our dependence on fossil fuels and other nonrenewable energy sources while increasing our reliance on a nonpolluting and inexhaustible energy source — water.

Initially the program will make loans to qualified applicants in two categories:

- Loans for up to 90 percent of the cost of a study to determine the feasibility of undertaking a small hydroelectric project at an existing dam.
- Loans for up to 90 percent of the cost of licensing or getting necessary approval for those applicants whose proposals are supported by favorable feasibility studies.

Regulations limit the loans to a \$50,000 maximum. All loans made must have a reasonable probability of being repaid.

A special feature of this program is that loans may be forgiven if a project is determined not to be feasible or if construction cannot be initiated.

The Small Hydroelectric Program was established by Title IV, Small Hydroelectric Power Projects, of the

Public Utilities Regulatory Policies Act of 1978, called Title IV in this brochure.

Who Qualifies?

You may, if you are a U.S. citizen. Individuals and organizations of all types may qualify. Only agencies of the federal government are specifically excluded. Your proposal will be evaluated for technical merit and you will be asked to provide financial, environmental, and administrative information so that the Department of Energy can assess the technical and economic feasibility of the project.

What's Required?

In order to evaluate proposals fairly, the Department of Energy has determined specific types of information that every applicant must supply.

Many of the requirements apply to feasibility study and licensing loan applicants alike. All applicants must provide financial scheduling, and administrative information as an aid in determining

the likelihood of work being completed as proposed. This information includes:

- A list of key personnel and major contractors and consultants who are proposed to be involved in the work.
- A description of the proposed schedule for completing the feasibility study or undertaking the licensing requirements, including a schedule for completion of individual major tasks.
- Financial data about the applicant, about the anticipated costs of the proposal, and about how the loan would be repaid.
- An explanation of the basis on which you have obtained, or plan to obtain, access to the project site, so that you can do the work and eventually operate the project.

In addition, you may be asked to supply additional information to ensure fair consideration of your loan request. More details about the type and format of required information may be found in the Applicant's Information Kit, which is available from your Department of Energy regional office. See the listing in "Is More Information Available?"

Specific requirements for the type of loan requested (feasibility study or licensing application) also are imposed. These requirements are summarized below.

FEASIBILITY STUDY LOAN APPLICANTS — You must give a narrative description of the site. To the extent that information is available, you should describe the physical characteristics and condition of the dam or dams and any associated structures. You should describe any reservoirs that will be part of your project.

You must make a preliminary estimate of power potential and average annual power generation. In order to show that your proposal appears to be economically viable, you must also identify the most likely customers for the power that would be produced and make a preliminary estimate about the selling price of power or the value of the power to the developer. The narrative must also include any other information that may aid in understanding the setting in which your project will be built, with particular attention to any potential environmental issues or problems. For example, are there any rare or endangered species present in

the area of your project? Is the dam located on a scenic river or in a wildlife preserve?

LICENSING LOAN APPLICANTS — You must submit a feasibility study whose content satisfies the loan program requirements. Specific feasibility study requirements are given in the Applicant's Information Kit. Briefly, your feasibility study must verify and expand on the financial projections that feasibility loan applicants must provide, must also describe the expected configuration and capacity of your proposed hydroelectric plant, and must assess technical and economic considerations as well as the environmental impact of your project.

Does The Site Have Potential?

A guide for small hydroelectric development has been prepared that provides a means of doing a quick preliminary evaluation to determine if the site has sufficient potential to warrant further consideration.

Is More Information Available?

More detailed information on the Loan Program for Small Hydroelectric Projects is available in the Applicant's Information Kit. This kit is available from the ten regional offices of the U.S. Department of Energy, shown on the adjacent map. Each office has a representative for small hydroelectric projects. Representatives' names, addresses, and telephone numbers are listed in the illustration. Or you may contact A.E. Hymer, Hydroelectric Loan Program, Department of Energy, 550 Second Street, Idaho Falls, ID 83401, telephone (208) 526-9180.

Licensing information is available from the regional engineers of the Federal Energy Regulatory Commission. Their names and addresses are:

Aarne Kauranen, Regional Engineer
Federal Energy Regulatory Commission
730 Peachtree Building, Room 500
Atlanta, GA 30308
(404) 881-4134

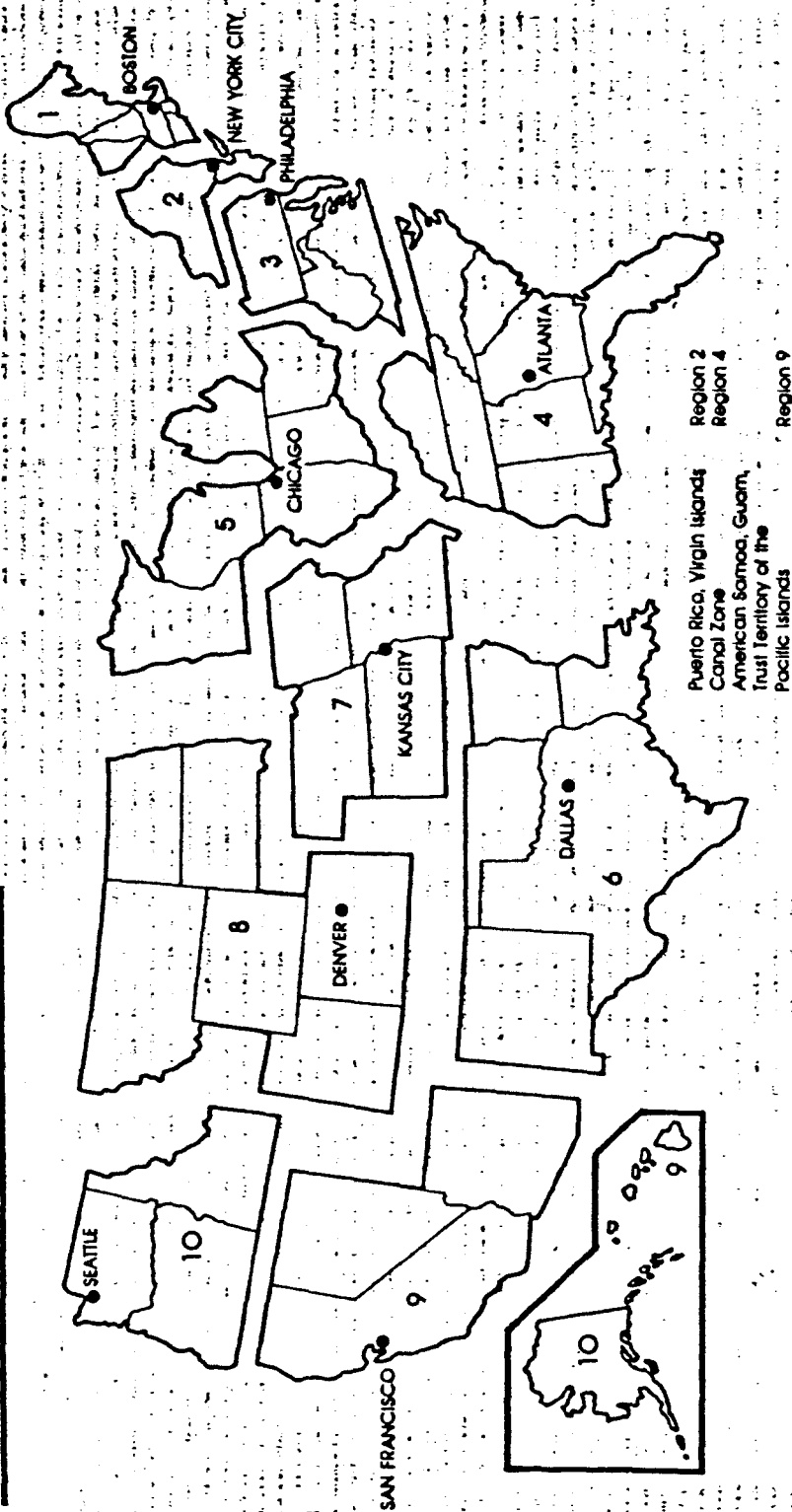
Bernard D. Murphy, Regional Engineer
Federal Energy Regulatory Commission
31st Floor, Federal Building
290 South Dearborn Street
Chicago, IL 60604
(312) 353-6171

Lenard B. Young, Regional Engineer
Federal Energy Regulatory Commission
819 Taylor Street
Fort Worth, TX 76101
(817) 334-2631

James D. Hebson, Regional Engineer
Federal Energy Regulatory Commission
26 Federal Plaza, 22nd Floor
New York, NY 10007
(212) 264-3687

Eugene Neblett, Regional Engineer
Federal Energy Regulatory Commission
555 Battery Street
San Francisco, CA 94111
(415) 556-3581

REGIONS AND REGIONAL OFFICES FOR THE LOAN PROGRAM FOR SMALL HYDROELECTRIC PROJECTS



Region 1

Rich Meister/John DeTore
U.S. Department of Energy
Analex Building, Room 700
150 Causeway Street
Boston, MA 02114
617-223-5287

Region 2

Wayne Belgrave/Edward Fedak
U.S. Department of Energy
26 Federal Plaza, Room 3206
New York, NY 10007
212-264-4835

Region 3

Ed Gray/Joe DiBlase
U.S. Department of Energy
1421 Cherry Street, 10th Floor
Philadelphia, PA 19102
215-597-3606

Region 4

Charles Mierek/Bill Rankin
U.S. Department of Energy
1655 Peachtree Street, NE,
8th Floor
Atlanta, GA 30309
404-881-2389

Region 5

Hugh Gardner/David Stein
U.S. Department of Energy
175 W. Jackson Boulevard
Room A-333
Chicago, IL 60604
312-353-8565

Region 6

Darrel Greenwell
U.S. Department of Energy
P.O. Box 35228
2626 West Mockingbird Lane
Dallas, Texas 75235
214-729-7736

Region 7

Winfield Hull/Dwain Skelton
U.S. Department of Energy
324 East 11th Street
Kansas City, MO 64108
816-374-3116

Region 8

Clarence Council
U.S. Department of Energy
P.O. Box 26247 Belmar Branch
1075 South Yukon Street
Lakewood, CO 80228
303-234-2472

Region 9

John Crawford/Bill Gough
U.S. Department of Energy
333 Market Street, 7th Floor
San Francisco, CA 94105
415-556-7084

Region 10

Nan Evans/Bob Hackman
U.S. Department of Energy
1992 Federal Building
915 Second Avenue
Seattle, WA 98174
206-399-2820

SMALL HYDRO BULLETIN



Prepared for the Division of Hydroelectric Resources Development
U.S. Department of Energy
Idaho National Engineering Laboratory

JUNE 1980

WASHINGTON INFORMATION

FEDERAL LEGISLATION AFFECTING SMALL HYDRO PROJECTS

Tax Legislation

The Crude Oil Windfall Profits Tax Act of 1980 (Public Law 96-223, April 2, 1980) contains two provisions directly affecting small hydro projects.

The first provision is in Title II, Part II, which is entitled "Business Energy Investment Credits." This provision allows an 11% business energy credit for investments in qualifying hydroelectric property. This credit is in addition to the long standing 10% investment tax credit. The new 11% credit is available both at sites where there is existing generating capacity and where there is none. It is available at existing dams which were completed before October 18, 1979, and at new or existing natural or manmade water flows (such as rivers, conduits, or irrigation ditches) which are not at the site of a dam. This credit is available to all tax payers.

The credit applies to generating equipment such as turbines and generators, powerhouses, penstocks, and fish passageways. It also applies to reconstruction or rehabilitation (but not enlargement) of a dam. The energy credit is phased out as the total capacity of electric generating equipment installed at the site increases from 25 to 125 MW.

The second provision in the Crude Oil Windfall Profits Tax Act that affects small hydro is in Title II, Part IV, which is entitled "Energy-Related Uses of Tax Exempt Bonds." This provision authorizes tax-exempt status for industrial development bonds issued to provide hydropower facilities at existing dams. It applies to dams owned by "a State, political subdivision thereof, or agency or instrumentality of any of the foregoing." The provision applies to projects up to 125 MW installed capacity. However, with respect to projects between 25 and 125 MW, only a portion of the project costs may be provided by tax-exempt bonds. Developers interested in the above provisions should consult competent tax and/or bond counsel to determine details and eligibility.

General Legislation

P.L. 96-294, Jun. 30, 1979

House/Senate conferees have agreed on the provisions of S. 932, the Energy Security Act. Title IV, Renewable Energy Initiatives, contains several sections dealing with small hydro development.

The bill amends the small hydro feasibility study loan program authorized by the Public Utility Regulatory Policies Act by raising the eligibility ceiling from 15 MW capacity to 30 MW and by including projects that do not utilize impounding structures. It also authorizes the Federal Energy Regulatory Commission to exempt projects below 5 MW from certain licensing requirements on a case-by-case basis.

The bill requires the Secretary of Energy to promulgate regulations to implement the construction loan program authorized by PURPA and to study Federal small-hydro commercialization programs. Finally, it authorizes appropriations for both PURPA loan programs through 1982.

RURAL ENERGY INITIATIVE

The Department of Energy (DOE) continues to coordinate the President's Rural Energy Initiative (REI) for small-scale hydroelectric power. The REI is a multiagency program to provide Federal financial assistance for the development of hydro sites. Under this program, the Rural Electrification Administration (REA), the Farmer's Home Administration (FmHA), the Economic Development Administration (EDA), and the Department of Housing and Urban Development (HUD) will provide grants, loans, and loan guarantees to eligible small-scale hydroelectric developers. The goal is to arrange the construction funding assistance for 100 hydroelectric projects by the end of 1981.

The efforts to implement the REI to date have provided an opportunity to assess the financial assistance programs of the above agencies and to identify changes in these programs which will make these mechanisms more effective for hydroelectric development. One significant change has been made in the REA programs in that the REA has agreed to make five % direct or insured loans for hydroelectric feasibility studies, licensing, and construction. The REA will provide a mix of direct loans and loan

RURAL ENERGY INITIATIVE (Cont'd)

guarantees to lower the overall cost of capital for the project to a manageable level. A second change, being considered by FmHA, involves expanding the FmHA Community Facilities five % loan program to include small-scale hydro. This program would be available for nonprofit entities and municipalities developing sites in rural communities of less than 10,000 people.

Each of the 10 DOE regional offices is working with the regional staffs of the participating agencies and is the point of contact for persons interested in the REI.

Small-Scale Hydro Regional Contacts

DOE Region I Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
John Detore
U. S. Department of Energy
Analex Building, Room 700
150 Causeway St.
Boston, MA 02114
(617) 223-5287
FTS 223-5287

DOE Region II New York, New Jersey, Puerto Rico, Virgin Islands
Ed Pedak or Wayne Belgrave
U. S. Department of Energy
26 Federal Plaza, Room 3206
New York, NY 10007
(212) 264-4835
FTS 264-4835

DOE Region III Delaware, Maryland, Pennsylvania, Virginia, West Virginia, District of Columbia
Ed Gray
U. S. Department of Energy
1421 Cherry St., 10th Floor
Philadelphia, PA 19102
(215) 597-3607
FTS 597-3607

DOE Region IV Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee
Bill Rankin or Charlie Mierek
U. S. Department of Energy
1655 Peachtree St., NE, 8th Floor
Atlanta, GA 30309
(404) 881-2390
FTS 257-2390

DOE Region V Illinois, Indiana, Minnesota, Michigan, Wisconsin, Ohio
David Stein or Hugh Gardner
U. S. Department of Energy
175 W. Jackson Blvd. Room A-333
Chicago, IL 60604
(312) 353-8565
FTS 353-8565

DOE Region VI Arkansas, Louisiana, New Mexico, Oklahoma, Texas
Darrel Greenwell
U. S. Department of Energy
2626 West Mockingbird Lane
P. O. Box 35228
Dallas, TX 75235
(214) 767-7736
FTS 729-7736

DOE Region VII Iowa, Kansas, Missouri, Nebraska
Dwain Skelton or Winfield Hull
U. S. Department of Energy
324 East 11th St.
Kansas City, MO 64106
(816) 374-3116
FTS 758-3116

DOE Region VIII Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming
Clarence Council
U. S. Department of Energy
P. O. Box 26247 - Belmar Branch
1075 South Yukon St.
Lakewood, CO 80226
(303) 234-2472
FTS 234-2472

DOE Region IX Arizona, California, Hawaii, Guam, American Samoa, Nevada
Bill Gough or John Crawford
U. S. Department of Energy
111 Pine St., 3rd Floor
San Francisco, CA 94111
(415) 764-7084
FTS 454-7084

DOE Region X Alaska, Idaho, Oregon, Washington
Bob Hackman or Nan Evans
U. S. Department of Energy
1992 Federal Building
915 Second Ave.
Seattle, WA 98174
(206) 442-2820
FTS 399-2820

PURPA FACTSProblem

Traditionally, if a dam owner wanted to develop a small-scale hydroelectric facility and market any excess energy produced, that owner was forced to deal with the local public utility. Insofar as the utility enjoyed a state sanctioned monopoly on the sale of electricity, its possessing power lines essentially insured its monopoly buyer power as well. The result was that the utility often paid the dam owner a price for his power below the value of that power to the purchasing utility and, in some cases, totally refused to deal with the owner.

Solution

As part of the five-bill National Energy Act, President Carter, on November 9, 1978, signed into law the Public Utility Regulatory Policies Act of 1978 (PURPA). Title II of PURPA sought to address the above problem and, in so doing, dramatically changed several of the ways in which electric utilities have been regulated. The most important provisions of Title II of PURPA are:

1. Electric utilities are now required to purchase the excess power offered for sale by "qualifying facilities" (QF).
2. A QF is defined as a facility that:
 - a. is owned by an individual or a corporation (including municipalities), but no more than 50% of the equity interest in a facility may be owned by an electric utility.
 - b. produces electric energy primarily by use of a renewable resource (water power is considered to be a renewable resource at both new and existing dams).

PURPA FACTS (Cont'd)

- c. has a power production capacity of no more than 80 MW.
- 3. Electric utilities, required to purchase a QF's excess energy, if offered for sale, are defined to include any person, state agency (including political subdivisions thereof) or federal agency that sells electricity.
- 4. The rate which purchasing electric utilities are required to pay a QF has three elements. Rates for purchases shall:
 - a. be just and reasonable to the electric consumer of the electric utility and in the public interest;
 - b. not discriminate against the QF; and
 - c. not exceed the utility's "avoided costs." "Avoided costs" are defined as the incremental costs to an electric utility of electric energy or capacity or both which, but for the purchase from the QF, such utility would generate itself or purchase from another source.
- 5. PURPA authorizes the Federal Energy Regulatory Commission (FERC) to exempt QFs (up to 30 MW) from certain provisions of the Federal Power Act and the Public Utility Holding Company Act, as well as the financial and organizational regulations of electric utilities.
- 6. PURPA requires FERC to issue regulations defining who are qualifying facilities and setting standards for the rates. State regulatory commissions or, in the case where they are unregulated, public utilities must adhere to the FERC regulations. FERC recently issued regulations which specify what facilities qualify, how the rates should be set, and the provisions of federal and state law from which facilities are exempt.

States have one year from March 20, 1980, the date on which final regulations implementing Section 210 of PURPA took effect, to implement the provisions. The states, given responsibility for the day-to-day administration of the federal PURPA standards, have been given wide latitude to implement the statute as they see fit. Some states may choose to hold a generic proceeding applicable to all QFs and electric utilities in that jurisdiction. Others may choose to issue orders on a utility-by-utility, or QF-by-QF basis. Furthermore, some states are proceeding under authority of state statutes, modeled after PURPA, which govern the same issues. PURPA allows a state to legislate greater incentives for small power production facilities using renewable energy resources.

DOE PROGRAMSDOE DEMONSTRATION PROJECTS

The Goodyear Lake Demonstration Project (total capacity, 1325 kW) at Milford, NY, it appears, will be the first DOE demonstration project to accomplish power-on-line. It is expected that this milestone will be reached around June 30, 1980. A second demonstration project, the Turlock Irrigation District Project (total capacity 3260 kW) at Turlock, CA, is close behind with the power-on-line milestone expected to be reached in late July or early August, 1980.

The City of Spokane was awarded a demonstration project grant from DOE to expand the hydroelectric generation facilities at Upriver Dam, and has recently submitted an application for a FERC license. This work will be accomplished in two steps: (1) uprating and modernization of the existing turbine-generator units; (2) installing additional units. Equipment specifications for both have been published. The bid opening for uprating and modernization of the three existing 1800 hp, 1300 kW turbine-generators was June 19, 1980. The bid opening for delivery of two 6700 hp, 6500 kW turbine-generators is July 3, 1980.

ULTRA LOW-HEAD HYDRO PRDA

On April 7, 1980, DOE issued Program Research and Development Announcement (PRDA) DE-RA07-80-ID-12087 titled, "Economic Innovations for Ultra Low-Head Hydroelectric Applications." This PRDA solicits proposals to conduct engineering studies, research, and/or development of concepts which would significantly improve the economic viability of the nation's ultra low-head (3 meters or less) hydroelectric resource at sites which have a power potential of 25 MW or less. Proposals will be considered for any or all aspects of ultra low-head hydroelectric applications from design through model testing and economic feasibility assessment of generic concepts. Proposals pertaining to concepts for retrofitting existing dams, locks, or canals with power generating equipment are particularly applicable. However, proposals to study economic feasibility of specific sites or proposals for full-scale demonstrations will not be accepted as responsive to this PRDA. The closing date for submitting proposals in response to the PRDA was June 9, 1980. There were 39 proposals submitted and currently under evaluation.

LOANS FOR SMALL HYDROELECTRIC FEASIBILITY STUDIES AND RELATED LICENSING

Loans are now being granted under DOE's program that provides financing for feasibility studies and for the cost of obtaining licenses for small hydroelectric projects. To date, 28 loans have been granted and 19 contracts are awaiting applicants' signatures. The initial backlog of applications received before regulations and procedures were finalized have now been evaluated and applicants should have received the contracts or contacted for additional information by a member of the evaluation team. New applications are now being processed so that contracts are mailed within approximately four weeks after receipt at the Idaho National Engineering Laboratory.

The program provides direct loans for up to 90% of appropriate costs and has the provision that the loans may be forgiven if the feasibility study is negative or the site cannot be licensed. The program is a continuing activity, and appropriated funds will remain available until expended. Municipalities,

LOANS FOR SMALL HYDROELECTRIC FEASIBILITY STUDIES AND RELATED LICENSING (Cont'd)

electric cooperatives, public and private utilities, irrigation districts, individuals, and others who can identify a site with hydroelectric potential are encouraged to apply for a loan to assist in financing a feasibility study. Those who have been pursuing the development of a site and have had a favorable feasibility study performed are encouraged to apply for a loan to assist in the financing of license and permit activities.

Applications should be made to the appropriate DOE Regional Office. The individuals and phone numbers are listed on page 2. Information can also be obtained by contacting the Hydroelectric Loan Office, Idaho National Engineering Laboratory, P. O. Box 1625, Idaho Falls, ID 83415 (208)526-9180.

FEDERAL ENERGY REGULATORY COMMISSION

PRINCIPAL ACTIVITIES - FEBRUARY 1980

Licenses Issued

On February 8, a new major license was issued to Pacific Gas and Electric Company for the 3000 kW Kilarc-Cow Creek Project, FERC No. 606, located on Old Cow Creek, South Cow Creek, and tributaries in Shasta County, California. The project had been under a minor-part license.

On February 20, an amendment of the license for the Pelton-Round Butte Project, FERC No. 2030, located on the Deschutes River in Jefferson County, Oregon, was issued jointly to Portland General Electric Company (current licensee for the project) and the Confederated Tribes of the Warm Springs Indian Reservation of Oregon. The Tribes were authorized to construct a powerhouse and install 15,000 kW of new generating capacity at the existing Pelton Reregulating Dam.

On February 27, the Commission issued an order approving an uncontested offer of settlement in Docket No. E-9579. This order resolved the question of mitigating fishery resources at Idaho Power Company's Hells Canyon Project, FERC No. 1971.

The following preliminary permits were issued:

Date	FERC No.	Issued to	kW	Project
2-11	2938	Ptarmigan Resources & Energy Inc.	2,700	Lemon Reservoir LaPlata County, CO
2-11	2936	Mitchell and Melba White	900	Sears Project Rock Island County, IL
2-14	2914	Alabama Electric Coop.	15,000	Clairborne Project Monroe County, AL
2-14	2955	City of Watervliet	842	Normans Kill Project Albany County, NY
2-21	2864	Wheatland Rural Electric	3,900	Tunnel Creek Project Albany, Platte County, WY
2-21	2945	Allegheny Electric Coop.	20,000	Emsworth Project Allegheny County, PA
2-21	2947	Central Vermont Public Service Corp. and Townscape, Inc.	1,500	Frog Hollow Project Addison County, VT
2-25	2949	City of Alexandria	15,000	Red River Lock and Dam No. 1 Project, Avoyelles Parish, LA
2-25	2950	City of Alexandria	25,000	Red River Lock and Dam No. 2 Project, Red River Rapides Parish, LA
2-29	2844	Public Utility District		Tumwater Project Chelan County, WA

On February 13, the Commission issued a series of orders, granting and denying preliminary permits for nine potential hydro sites for which four applicants had filed applications that, in whole or in part, competed for the nine sites.

Denied	2786	Central Vermont Public Service Corp.	21,750	Ball Mountain Site West River Windham County, VT
Granted	2819	Vermont Electric Coop.		Union Village, Surry Mountain, and Otter Brook
Denied		Vermont Electric Coop.		Townsend Site
Granted	2838	Towns of Brookline		Windham, VT
			20,000 4,000	Ball Mountain Townsend

WATERPOWER '79

INTERNATIONAL CONFERENCE ON SMALL SCALE HYDROPOWER

U.S. GOVERNMENT FUNDING OF SMALL HYDROPOWER PROJECTS

INTRODUCTION

With the establishment of hydroelectric power as a source of energy in the United States, the President has asked DOE to coordinate a multiagency effort to increase supplies of energy in the Nation's rural areas. This effort, called the Rural Energy Initiative (REI), seeks to maximize the effectiveness of on-going Federal programs that are, or can be, oriented toward small hydro development, as well as certain other energy sources.

Promising existing hydro sites will be identified and assessed, and when appropriate, will be referred for full-scale feasibility studies. The REI target is to bring about 100 retrofitted sites on line by 1981 with approximately 300 MWe of additional capacity.

CURRENT ACTIVITIES

The Department of Energy has asked that each of the Federal agencies involved provide input concerning their hydro involvement in relation to the rural energy initiatives. DOE's coordination efforts have resulted in the following information.

The Bureau of Reclamation accomplishes planning, estimating, also design, contract administration, construction, supervision, and related activities in the development of water and land resources projects in the 17 Western states. Projects developed under the Reclamation Act of 1902 directly benefit local sponsoring entities as well as indirectly benefiting other entities. Such local entities are held legally responsible under contracts for repayment of all reimbursable portions of the project costs. Planning, design and construction activities and funds related to all activities require justification annually through the budget process. In addition to annual fund approval, individual project feasibility studies and construction initiatives require specific authorization by the Congress.

Under Public Law 84-984, the Small Reclamation Projects Act, loans and/or grants can be approved by the Secretary of the Interior for single-purpose irrigation or drainage projects and other multiple purpose functions of water supply projects. Hydropower development may be funded under this act if it can be accomplished as an addition to other water supply functions of the project. Single-purpose hydropower development under this act is not possible.

The Federal Reclamation program does not include provisions for direct assistance loans and grants.

Community Services Administration (CSA's) role in small scale hydro development will be limited to providing assistance to low income communities in their planning, and in securing funding and financing for feasibility studies for dam retrofit, and also the development of activities for the use of the power generated. CSA has contracted with the International Science and Technology Institute (ISTI) for the preparation of audio-visual training materials to assist local communities in preliminary assessment and planning for small scale hydro development, and for the providing of on-site technical assistance to selected low income communities involved in such development. ISTI has, under previous contracts with CSA, carried out a study of small scale hydro potential, entitled "Potential Use of Small Dams to Produce Power for Low Income Communities", and prepared a pamphlet, "Developing Small Hydroelectric Potential", based on the study, which has been published by CSA.

The Economic Development Administration (EDA) is actively participating in the Administration's interagency initiative to promote the development of small scale hydroelectric power. They will use the following program tools in this effort:

- Public Works (Title I) Grants - Under this authority grants are available to eligible applicants (States, local political subdivisions, Indian Tribes and private or public non-profit organizations) for the development of public works projects which will stimulate economic development in designated redevelopment areas.
- Business Development (Title II) Loans - This program provides loans and loan guarantees to private industry for the purpose of creating or retaining permanent jobs in designated redevelopment areas.
- Technical Assistance - This program provides grants for activities such as feasibility studies and demonstration efforts which are designed to foster economic development.
- Institutional Support - EDA provides institutional support to States, multi-county Economic Development Districts, cities and other local bodies through its economic development planning and research grant programs. Informational and technical support may be available from these grantees. For example, a number of the Districts assisted the Corps of Engineers and DOE in identifying potential dam sites.

The Department of Housing & Urban Development (HUD) has an Urban Development Action Grant program that is a highly flexible economic development tool which seeks to create partnerships among government, the community and private industry to overcome problems of development. Action Grants are designed to assist severely distressed cities and urban counties in revitalizing their stagnating economies and re-claiming deteriorated neighborhoods. The program searches for unique opportunities where qualifying communities can use Federal funds to stimulate new, or increased private investment.

Action Grant funds are available to carry out projects in support of a wide variety of economic revitalization or neighborhood reclamation activities that involve partnerships with the private sector.

These activities may include a broad range of development actions like land clearance; site improvements; providing infrastructure; rehabilitation, and building public, commercial, industrial and residential structures.

Other possibilities may involve Action Grant financing in the form of equity funding, loans, loan guarantees, lease guarantees or other appropriate mechanisms for joint public-private development.

Priority will be given to those proposals where the community will be in a position to recapture or recycle its Action Grant funds if the project is especially successful.

The program is designed to encourage innovation in joint public-private community development and can address a wide range of problems and opportunities such as converting underutilized land or structures to more productive use; such as the retrofitting of a hydroelectric dam by a private developer and the inability to finance the project without Federal assistance.

HUD will be looking for projects that generate substantially more private commitments than the Action Grant money requested. However, HUD will take into account the various types of projects considering the degree of private leverage. A community must request a determination of eligibility from the HUD Area Office before submitting an application. HUD will then supply the needed data. An applicant may also ask for a preliminary determination of the proposed project's eligibility at the same time.

The Farmers Home Administration (FMHA) has agreed to utilize its network of local offices to identify existing dams which may be candidates for the small scale hydro program. Under this program, dam sites which are identified as having potential for electric generating purposes will be examined by a team of specialists and if found suitable will receive aid from the Department of Energy for engineering feasibility studies. Funds for rehabilitation of dams and generating equipment may be obtained from a number of sources including the FMHA farmer programs and Business and Industry loan guarantee program.

While small-scale projects are eligible under all these programs, it is anticipated that the majority of EDA dollars will come from the Title I program. EDA will be interested in those projects which result primarily in on-site use of the power produced and have income and job producing benefits. EDA, in most instances, will not consider projects as eligible which simply result in power being purchased by a large utility company and placed in a grid system for subsequent distribution. Power produced solely for residential consumption will not be eligible for EDA assistance. Projects that produce power for commercial/industrial activity will be appropriate for EDA funding. A business loan could be made to a private business to retrofit a dam for electric power, i.e., a paper or textile mill.

For more information on the potential eligibility of a project and EDA program procedures, applicants should contact the appropriate Economic Development Representative.

Rural Electrification Administration (REA) makes loans and loan guarantees to nonprofit and cooperative associations, public bodies, and other electric utilities to finance the construction and operation of distribution lines of systems, generating plants, (including hydroelectric) and transmission lines to provide initial and continued adequate electric service to persons in rural areas. Rural areas are defined in the Rural Electrification Act of 1936, as amended, as any area of the United States not included within the boundaries of any city, village, or borough having a population in excess of 1500 inhabitants.

Most REA loans bear interest at the standard rate of 5 percent, with a 2 percent rate being available under special circumstances. For large-scale facilities, such as generating stations and transmission facilities, REA normally provides a loan guarantee. Guaranteed loans may be obtained from any qualified lender, and bear interest at a rate agreed upon by the borrower and the lender. REA has an agreement with the Federal Financing Bank whereby loans guaranteed by REA have an interest rate based upon the cost of money to the Federal Financing Bank and the rate for each advance of funds is determined at the time the advance is made. REA guarantees may be made concurrently with a direct loan from REA.

With regard to the financing of facilities for communities, REA activities are confined to financial assistance to those systems which qualify under the Rural Electrification Act. REA can provide assistance to eligible borrowers for joint projects with other systems not eligible for REA financing, or for the purchase of a portion of a large project constructed and operated by non-eligible borrowers. In each case, however, the net result of the financing must be the providing of, or the improvement of, service to rural areas in quantities commensurate with the amount of financing provided.

The FMHA guarantees loans to family farmers and ranchers for farm ownership, improvement and operation.

Guaranteed loans are made and serviced by legally organized private lending institutions, such as commercial banks, Federal Land Banks, Production Credit Associations, insurance companies, and savings and loan associations. FMHA provides the lender with a guarantee to reimburse up to 90 percent of any loss the lender takes on a loan.

The use of an FMHA guarantee may enable a private lender to serve, or continue to serve, a farmer who cannot be served on a wholly conventional basis. The maximum amount of loan FMHA can guarantee is higher than the limit on an FMHA insured loan made directly to the borrower by the agency.

All applications for FMHA guaranteed loans are treated with equal consideration, without regard to sex, age, race, color, religion, national origin or marital status.

LC Science Tracer Bullet

Reference Section, Science and Technology Division
Library of Congress, 10 First Street, S.E., Washington, D.C. 20540

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SMALL SCALE WATER POWER
Compiled by Jane Collins +/

TB 75-14

November 1975

SCOPE: The construction of small dams and utilization of water wheels, hydraulic rams, or water turbines to harness the flow of streams or small rivers for the production of useful mechanical or electrical power.

An introduction to the topic appears in:

Small scale water power. In Steadman, Philip. Energy, environment and building. Cambridge [Eng.]; New York, Cambridge University Press, 1975. p. 213-220.

TJ163.2.S74* and Vertical file*

SUBJECT HEADINGS under which books dealing with small scale water power can be located in the LC card and book catalogs and the on-line computer terminal in the Science Reading Room include the following:

WATER-POWER (Highly relevant)
WATER-POWER ELECTRIC PLANTS (Relevant)
WATER MILLS (Relevant)
DAMS (Relevant)
HYDRAULIC ENGINEERING (More general)

BASIC TEXTS

Energy primer: solar, water, wind and biofuels. Menlo Park, Calif., Portola Institute, 1974. 200 p. TJ153.E4748*
Includes bibliographical references.

Hand, A. J. Home energy how-to. [Popular Science] New York, Harper and Row, 1977. 258 p. TJ163.5.D86H36

Handbook of homemade power. By the staff of the Mother earth news. New York, Bantam Books, 1974. 374 p. TJ153.H33*
Bibliography: p. 354-367.

*Available in the Science Reading Room Collection

**Available in the Science Reading Room Microform Collection

+/ Updated Oct 1980 by John Justus, Congressional Research Service,
Science Policy Research Division.

Stoner, Carol. Producing your own power; how to make nature's energy sources work for you. Emmaus, Pa., Rodale Press, Book Division, 1974. 322 p. TJ153.S795*
Bibliography: p. 297-308.

ADDITIONAL TEXTS

Anderson, Edwin P. Audels domestic water supply and sewage disposal guide: a practical treatise. New York, T. Audel, 1963. 444 p. TD920.A6 1963

Clegg, Peter. New low-cost sources of energy for the home; with complete illustrated catalog. Charlotte, Vt., Garden Way Pub., 1975. 252 p. TH4812.C55*
Includes bibliographies.

Creager, William Pitcher, Joel D. Justin, and Julian Hinds. Engineering for dams. New York, J. Wiley & Sons; London, Chapman & Hall Ltd., 1945. 3 v. TC540.C7

Harris, Carl C., and Samuel O. Rice. Power development of small streams; a book for all persons seeking greater comfort and higher efficiency in country homes, towns and villages. Orange, Mass., Rodney Hunt Machine Co., 1920. 177 p. TC147.H3*

Paton, Thomas Angus Lyall, and J. Guthrie Brown. Power from water. With a foreword by Lord Reith of Stonehaven. London, L. Hill, 1961. 210 p. TK1081.P35 1961

Reynolds, John. Windmills and watermills. London, H. Evelyn, 1970. 196 p. TJ823.R48 1970b*
Bibliography: p. 192-193.

Vallentine, H. R. Water in the service of man. Baltimore, Penguin Books, 1967. 223 p. TC406.V3
Bibliography: p. 220-221.

Wilson, Paul N. Water turbines. London, H. M. Stationery Off., Palo Alto City, Calif.: obtainable in the U.S.A. from Pendragon House, 1974. 31 p. TJ870.W54

Other books including material on small scale water power are shelved under the following LC call numbers: TC145-TC147, TC540, TJ153, TK1081.

HANDBOOKS, ENCYCLOPEDIAS and DICTIONARIES which contain information on small scale water power include:

Benjamin, Park, ed. Appletons' cyclopedia of applied mechanics; a dictionary of mechanical engineering and the mechanical arts. Rev. and improved ed. New York, N. Appleton, 1973.
2 v. T9.A66
See: v. 2, p. 916-927.

Creager, William Pitcher, Joel D. Justin, and others. Hydroelectric handbook. 2d ed. New York, Wiley, 1950. 1151 p.
TK1081.C7 1950

Davis, Calvin Victor, and Kenneth E. Sorensen, eds. Handbook of applied hydraulics. 3d ed. New York, McGraw-Hill, 1969.
1 v. TC145.D3 1969*
Includes bibliographies.

BIBLIOGRAPHY

Bibliography on alternative sources of energy. Alternative sources of energy, no. 15, Oct. 1974: 1-64. Vertical file*
See particularly "Water power": p. 24-26.

GOVERNMENT PUBLICATIONS

Brown, Lloyd, N. Small earth dams. Berkeley, Calif., University of California, Division of Agricultural Sciences, 1965. 23 p. (California Agricultural Experiment Station Extension Service. Circular 467, Revised) Vertical file*

Daniels, A. M. Electric light and power from small streams. In U.S. Dept. of Agriculture. Yearbook of agriculture, 1918. Washington, U.S. Govt. Print. Off., 1919. p. 221-238.
S21.A35 1918 and Vertical file*

United States. Bureau of Reclamation. Design of small dams. 2d ed. Washington, U.S. Govt. Print. Off., 1973. 816 p.
Includes bibliographical references. TC540.U615 1973*

Warren, George M. Farm water power. Washington, U.S. Govt. Print. Off., 1931. 22 p. (U.S. Dept. of Agriculture. Farmers' bulletin no. 1658) S21.A6 no. 1658

U.S. Department of the Army. Corps of Engineers. Institute for Water Resources and Hydrologic Engineering Center. National Hydroelectric Power Resources Study: Preliminary Inventory of Hydropower Resources. Washington, July 1979. 6 v. (various pagings)

An ABSTRACTING AND INDEXING SERVICE which indexes relevant journal articles and other literature on small scale water power is

Synerjy: A Directory of Energy Alternatives (1974-)*
See: Water Power

JOURNALS that often contain articles relevant to small scale water power are

Alternative Sources of Energy*
Mother Earth News AP2.M7919*
Popular Mechanics T1.P77
Popular Science AP2.P8*
Water Power TK1081.W3

SELECTED REPRESENTATIVE JOURNAL ARTICLES on small scale water power include:

- Bassett, C. D. Your own water-power plant. Popular science, v. 150, no. 4, Apr. 1947: 186-189. AP2.P8 and Vertical file*
- Putting water to work. Popular science, v. 150, no. 5, May 1947: 180-184. AP2.P8 and Vertical file*
- Dams turn water into kilowatts. Popular science, v. 150, no. 6, June 1947: 200-203. AP2.P8 and Vertical file*
- Water wheel delivers over 3 hp. Popular science, v. 151, no. 1, July 1947: 194-197. AP2.P8 and Vertical file*
- Building an overshot wheel. Popular science, v. 151, no. 2, Aug. 1947: 192-196. AP2.P8 and Vertical file*
- Bell, K. Water over the dam. Conservationist, v. 28, no. 6, June/July 1974: 11-14. Vertical file*
- Crowley, C. A. Power from small streams. Popular mechanics, v. 74, no. 3, Sept. 1940: 466-473; v. 74, no. 4, Oct. 1940: 626-630. T1.P77 and Vertical file*
- Haimenl, L. A. The cross-flow turbine. Water power, v. 12, no. 1, Jan. 1960: 5-13. TK1081.W3 and Vertical file*
- Hebert, William J. The hydraulic ram pump: perpetual motion for the homestead. Mother earth news, no. 22, July 1973: 40-43. AP2.M7919 and Vertical file*

SELECTED MATERIALS available in the Science Reading Room vertical file include:

- Barberie, Edward. Hydraulic ram water pump design. Green Spring, W. Va., The Whole Mother Earth Waterworks, n.d. 5 p.
- Boissevain, M. A 1 kW river generator. Mt. Rainier, Md., Volunteers in Technical Assistance, Inc., 1971. 9 p.
- A waterwheel driven pump. Mt. Rainier, Md., Volunteers in Technical Assistance, Inc. 1969. 13 p.
- Hamm, Hans W. Low-cost development of small water-power sites. Mt. Rainier, Md., Volunteers in Technical Assistance, Inc., 1967. 43 p.
- The hydraulic ram. In Ramsower, Harry Clifford. Equipment for the farm and the farmstead. Boston, New York, Ginn and Company, 1917. p. 195-205.
- The James Leffel & Company. Hints on the development of small water powers. Pamphlet "A". Springfield, Ohio, n.d. 9 p.
- Hydro-electric power from a Hoppes Hydro-Electric Unit. Springfield, Ohio, n.d. 11 p. (Its Bulletin H-49)
- Kaufman, A. W. Hydraulic ram forces water to pump itself. Popular science, v. 153, no. 10, Oct. 1948: 231-233.
- Kindel, Ersal W. Hydraulic ram for village use. Mt. Rainier, Md., Volunteers in Technical Assistance, Inc., 1970. 9 p.
- Mockmore, C. A., and Fred Merryfield. The Banki water turbine. Corvallis, Ore., Oregon State Engineering Experiment Station, Feb. 1949. 30 p. (Engineering Experiment Station bulletin 25)
- Reciprocating wire power transmission for small water wheels. In Village technology handbook. Mt. Rainier, Md., Volunteers in Technical Assistance, Inc., 1970. p. 117-122.
- Rife manual of information on hydraulic rams. Millburn, N.J., Rife Hydraulic Engine Mfg. Co., 1975. 16 p.
- Water power. Alternative sources of energy, no. 14, May 1974: 17-21.
- Water power! Mother earth news, no. 24, Nov. 1973: 62-64.

ADDITIONAL SOURCES of information

Alternative Sources of Energy
c/o Donald Marier
Route 2, Box 90A
Milaca, Minnesota 56353

The James Leffel & Company
426 East Street
Springfield, Ohio 45501

Rife Hydraulic Engine Mfg. Co.
Rife Ram & Pump Works
Box 367
Millburn, New Jersey 07041

Volunteers in Technical Assistance (VITA)
3706 Rhode Island Avenue
Mount Rainier, Maryland 20822
Telephone: (301) 277-7000

The Whole Mother Earth Water Works
P.O. Box 104
Green Spring, West Virginia 26722

Richard J. McDonald
Resource Manager for Small Scale Hydropower Program
Office of Resource Applications
U.S. Department of Energy
Washington, D C. 20545

Georgiana Sheldon, Commissioner
Federal Energy Regulatory Commission
U.S. Department of Energy
Washington, D C. 20426

Ronald D. Smith
National Conference of State Legislatures
1405 Curtis Street, Suite 2300
Denver, C O. 80202

Allis-Chalmers Corporation (turbine manufacturers)
1126 So. 70th Street
Milwaukee, W I. 53214

Community Services Administration
Attn: Energy Programs
1200 19th Street, N.W.
Washington, D C. 20506

Farwell Smith
Office of Resource Applications (Rm. 7104)
U.S. Department of Energy
12th & Pennsylvania Avenue, N.W.
Washington, D C. 20461

Engineering Foundation
345 E. 47th Street
New York, N Y. 10017

Proaction Institute
206 Urban Planning Bldg.
Michigan State University
East Lansing, M I. 488

National Alliance for
Hydroelectric Energy
1629 K Street, N.W.
Suite 700
Washington, D C. 20006

International Science and
Technology Institute,
2033 M St., N.W. Suite
Washington, D C. 2003

New England River Basins
Commission
141 Milk Street, 3d floor
Boston, M A. 02109

- ▶ (Limited copies of Preliminary Inventory of Hydropower Resources, Volumes I-VI, a US Army Corps of Engineers Study divided by regions in the US, are available without charge from Hydrologic Engineering Ctr., 609 Second St., Davis, CA 95616.)
- ▶ (Developing Small Hydroelectric Dam Potential, SN 059-000-00057-8, available at \$1 from Superintendent of Documents, Government Printing Office, Wash., DC 20402.)
- ▶ (Potential Use of Small Dams to Produce Power for Low-Income Communities, available at \$15 from International Science and Technology Inst., 1129 20th St., Wash., DC 20036.
- ▶ (Water Power, Its Promises and Problems, available at \$2.50 from Ctr. for Industrial and Institutional Development, McConnell Hall, Univ. of New Hampshire, Durham, NH 03824, after Nov. 1.)

The following documents are now available in limited supply without charge, from DOE, Attn: R. Burr, Off. of Resource Applications, Rm. 3344, Federal Bldg., Wash., DC 20461:

- Problems in Redevelopment of Old Hydroelectric Dams, Report II on New England.
- Problems of Hydropower Development at Existing Dams, Middle Atlantic States.
- An Analysis of Institutional, Economic and Environmental Restraints in Pennsylvania, New Jersey and Maryland.
- Preliminary Analysis of Legal Obstacles and Incentives to the Development of Low-Head Hydroelectric Power in the Northeastern United States.
- Environmental Assessment, Small Hydropower Development Program.
- ▶ (For more information regarding DOE's Ultra-Low Head Program, offering \$500,000 for design of economic turbines working on low heads less than ten feet, contact C. Benson, DOE Idaho Office, 550 Second St., Idaho Falls, ID 83401. Telephone: 208/526-1911.)
- ▶ (For details of the computer analysis program for hydrologic engineering feasibility, contact J.H. Dixon, Tippetts, Abbett, McCarthy and Stratton, 655 Third Ave., New York, NY 10017.)
- ▶ (For more information on the newly-formed American Small Hydropower Assn., contact S. Barnes, Acting Secy., Systems Engineer, City of Columbus, Div. of Water, Marconi Bldg., Columbus, OH 43201.)