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The U.S. Federal Energy Regulatory Commission
Lessons Learned in the Last 78 years

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Introduction

The U.S. Federal Energy Regulatory Commission (FERC) is one of the oldest regulatory commissions in the world that regulates aspects of electric, gas and hydropower development owned and operated by the private sector and municipal entities.[2] The FERC regulates 1,600 hydropower projects at over 2,000 dams. These hydropower projects constitute over 50 percent of the 100 gigawatts of hydropower capacity in the U.S. or over 5 percent of all electric power generated in the U.S. This paper will focus on hydropower regulation over the course of some 78 years and emphasize the key experiences, lessons learned and policies that have developed to the present day.

FERC only regulates *non-federal* hydropower projects; it does *not* finance, own, construct or operate them. In contrast, all *federal* hydropower projects in the U.S. are owned and operated by the federal government. Hydropower projects built by the federal government are authorized by the U.S. Congress and constructed and operated primarily by the U.S. Department of the Interior (Bureau of Reclamation), the U.S. Army Corps of Engineers, and the Tennessee Valley Authority. Hence for most non-federal hydroelectric power projects, the FERC must issue a license authorizing construction, or in the case of an existing project, continued project operation.

Although a well-established agency, the FERC has had to adapt to the times and needs of American society over the years. The Commission has had to deal with a variety of changes since its creation. Many of these changes were swift due to legislation, but other changes took years and were of a more subtle nature. These included the desire to develop U.S. water resources via the private sector, changes in legal authority, and the growth of environmentalism.

Currently, the Commission is dealing with increased competition in the energy industry and rapid technological and scientific innovations that are affecting the industries it regulates. These changes have resulted in a regulatory structure and approach that are quite different from the early days of hydropower regulation. If anything is certain, it is the fact that the Commission will have to continue to evolve to meet the challenges in future years. This is particularly true for hydropower projects that are licensed in the U.S. for long periods of time, between 30 and 50 years.

To some observers and practitioners that have dealt with the FERC over the last 20 years, FERC is living proof that energy regulation, and specifically hydropower

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[1] The opinions contained here do not reflect the opinions or polices of the Federal Energy Regulatory Commission and are soley those of the author.

[2] Municipal entities include state agencies, cities, water-power authorities, pubic utility districts, etc.

regulation can be done in such a manner to achieve a financially healthy industry and adequate protection of the environment. This has not been an easy task and didn't occur in one giant step. In fact, the changes at FERC have been *incremental* over a long period of time. Even more important in assessing the success of the program is the value that the market places on FERC hydropower projects that have undergone relicensing.[3] These relicensed projects should hypothetically be economically viable and adequately protect and enhance the environment. Recent offers to sell FERC projects that have undergone relicensing have been relatively successful despite a great deal of apprehension by the hydropower industry. Nevertheless, in today's competitive market place in the U.S., hydropower projects must be able to compete with other energy generating resources.

This paper attempts to summarize the experiences and lessons learned by the FERC in the U.S. and its predecessor agency the Federal Power Commission over a 78-year period. These experiences and their relation to FERC's history and the stage of U.S. economic development are very important. Kerwin's 1926 work on Federal Water-Power Legislation (the Federal Water Power Act of 1920) is a useful starting point to those who believe the U.S. experience has little to contribute to the current global debate on dams and hydropower.

"After the great fifteen-year struggle for water-power legislation, it is doubtful if the public to-day recalls the legislative complexities that marked the passage of the Act of 1920. It is doubtful if the average citizen understands the important relation of government to this new source of energy, if he understands what is involved in that relation which touches so nearly his own happiness. Throughout the United States the vast resource of water power, belonging primarily to the people, has been harnessed for man's service by great private corporations which are bound by the state legislation and federal Water Power Act to serve the public. These laws are the result of years of struggle in the state legislatures and in Congress. In the Congress especially the conflict was prolonged and bitter. The struggle should not be forgotten, for it holds lessons for the people of this and other generations."

Irrespective of one's appreciation of history, the preceding paragraph should underscore the challenges faced years ago and the enormity of the task ahead of those who have bravely decided to tackle these difficult issues. Hopefully, all participants in the debate over dams can benefit from some of the lessons learned at the FERC.

Background

Regulation of any industry is organic and changes with the developmental stages of a particular country and societal attitudes as well. This is quite evident when examining the FERC and its predecessor the Federal Power Commission (FPC). When the FPC was established after World War I in 1920, there was an increase in the demand for electrical energy in the U.S. and water development projects funded by the private sector were looked upon as being able to satisfy this need.

[3] Projects that are relicensed contain licensing conditions that are designed to protect and enhance the environment.

Prior to creation of the FPC, a great debate ensued between the development community and the conservationists. The developers advocated that licensing hydropower projects should be a matter for each individual state to decide. While the conservationists looked upon rivers and water resources as a national resource that should be managed in an orderly manner. The conservationists argued successfully for a federal agency that would decide whether or not a project would be licensed and under what conditions. As a result, the Federal Water Power Act was made into law in 1920 and the FPC began operations in 1921.

The chief purpose of creating the FPC was to secure a common policy and a single executive agency in water power administration. The new FPC's mandate was to license only those projects that in its judgment were "best adapted to a comprehensive plan for improving or developing a waterway or waterways for the purpose of navigation, interstate commerce and recreational purposes. The FPC was also authorized to add conditions to any license issued to ensure that the project met the above standard. The new Commission was authorized to issue licenses for no less than 30 years and no more than 50 years. These long license terms provided assurance to developers and investors that there would be adequate time to amortize the large debt associated with such investments.

Congress also required that all licensed hydropower projects undergo relicensing to ensure that they were consistent with development of the waterway and in the public interest. Also prevalent at that time was the notion that the Federal government might want to take over the project. Hence, the basis for relicensing is statutory in nature in the U.S. The intent of relicensing was to give the Federal Government an opportunity to take over the project. More important, relicensing would allow the FPC or FERC to determine if the project was still in the public interest and should be allowed to continue to operate. A key aspect of the relicensing review was that the project would be judged against new laws and regulations that were not in existence when the projects were constructed some 30 to 50 years ago.

The FPC began its work in 1921 as an interagency committee staffed by the Departments of War, Agriculture, and Interior. In 1930, the FPC was reorganized as an independent Commission composed of five members appointed by the President with the advice and consent of the Senate. In 1935, Congress amended and recodified the Federal Water Power Act of 1920 as Part I of the Federal Power Act. This legislation extended the FPC's authority to regulate the interstate aspects of the electric power industry.

Finally, in the Department of Energy Organization Act of October 1, 1977, Congress created the Federal Energy Regulatory Commission and abolished the FPC. The Commission inherited most of the work done by the FPC, including the licensing of non-federal hydroelectric power projects and natural gas regulation such as construction of interstate pipelines and Liquified Natural Gas terminals. Today the FERC has a total of 1,250 staff located mainly in Washington DC. Of this total, 249 employees are responsible for all aspects of hydropower regulation.

With respect to hydropower project regulation, the FPC and later the FERC's experience were characterized by:

1) An initial 10 year period that was characterized by licensing large numbers of hydropower projects,

2) The passage of major environmental laws and growth of the Environmental Movement in the late 1960s,

3) The Energy Crisis in the U.S. caused by the OPEC Oil Embargo,

4) Passage of energy legislation that encouraged renewable energy such as hydro in the late 1970s,

5) Major amendments of the Federal Power Act advocating greater environmental considerations in hydropower licensing decisions in the mid 1980s,

6) Creation of a compliance organization at FERC to deal with environmental issues and the administration of licenses that were issued,

7) The Class of 1993 relicenses, and

8) The passage of the Energy Policy Act of 1992 and growth of non-traditional hydropower regulation.

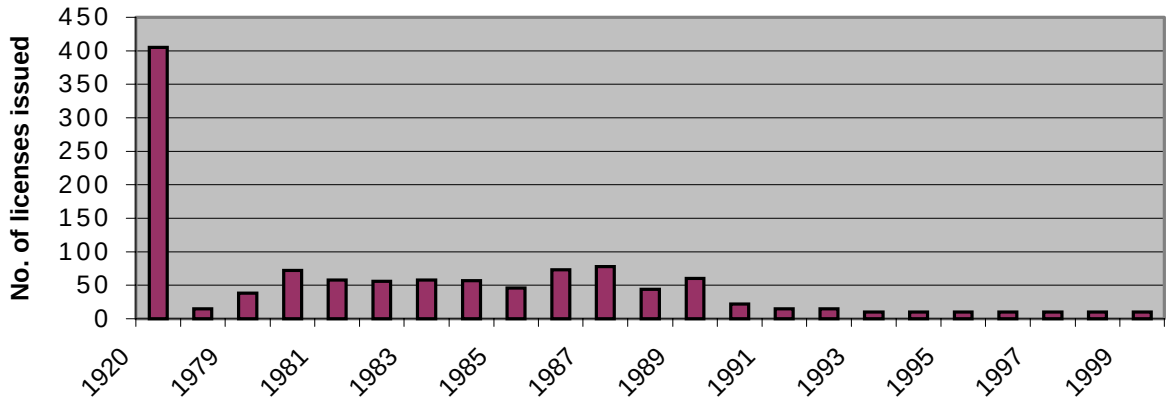
Experiences

The Early Years to the mid 1960's

During the first 56 years of its existence, the FPC authorized a little over 400-hydropower projects (Figure 1). The bulk of these applications came in the first 2 years. The Commission received 321 applications involving the construction of about 15,000 megawatts (MW) of new generating capacity during this time. This was more than three times the capacity of then-existing water power projects and 30 percent more power than had been granted in the previous 20 years. At this time, the FPC was nothing more than an interdepartmental coordinating committee with staff detailed from the Departments of War, Agriculture, and Interior.

Since there had been15 years of bitter debate prior to the creation of the FPC, its is little wonder that the new FPC was concerned with licensing hydropower projects as quickly as possible. It's also no mystery that staff of the FPC consisting of 8 engineers, 2 attorneys, 2 accountants, and 18 clerks found themselves totally overwhelmed by this undertaking. Because the FPC was totally understaffed and could not hire its own staff at the time, it issued an order in 1928 that shut off all applications, except emergency ones or where agreement had been reached as to an valuation. This was done more or less to get the attention of Congress and in a few years it eventually did in 1930 when it was made an independent commission.

Figure 1. Number of licenses issued at the FPC and FERC



Some of the largest projects regulated by the today's FERC were authorized in the early 1950's when little or no environmental review was required. Projects like the 912 -MW St. Lawrence-FDR Project were a part of the St. Lawrence Seaway Project in New York, and the 2,755-MW Niagara Project in New York fall into this category. This was a time after World War II when there was a great deal of interest in provide inexpensive electricity to fuel economic development in various regions and also providing improved navigation. The FPC authorized similar projects in the Pacific Northwest on the Columbia River such as the 1,755-MW Priest Rapids Project.

During the early years and during the authorization of the above projects, the FPC enjoyed popular support from most the conservation community and the development community. Few projects were delayed because of environmental concerns at that time with the exception of one project Nemakegon, in which the FPC denied the license. The challenges that FPC faced with such large projects were in the arena of engineering and dam safety. Environmental aspects of these projects were not really a troublesome issue. With such international boundary projects like St. Lawrence-FDR and Niagara, for example, international treaties and agreements between the U.S. and Canada specified the operations of the projects thus guaranteeing sufficient flows for navigation of the St. Lawrence Seaway and for scenic purposes over Niagara Falls, respectively. Anadromous (seagoing) fish passage issues were not a major issue when the Priest Rapids Project was licensed on the Columbia

River, but would be as that river and the Snake River were heavily dammed by both FPC projects and federal projects built by the Corps of Engineers and Bureau of Reclamation.

Given the professional makeup of the Commission in the early years with engineers, its no surprise that the Commission's main concern was dam construction and dam safety. The Commission's preoccupation with engineering and particularly dam safety are understandable. The new commission was entrusted with the public interest and a large part of that was to ensure that the projects it authorized were constructed and operated safely. During the early years though, many other federal agencies were involved in evaluating the early FPC hydropower projects. Agencies like the Army Corps of Engineers, U.S. Geological Survey, the Forest Service, and the Bureau of Reclamation conducted field surveys of the early FPC projects and the new FPC drew on this expertise. The FPC's insistence on a strong dam safety program in its early days is no less important today. The dam safety program is highly respected by many and FERC has taken a leadership role with other federal and state agencies.

One aspect of hydropower regulation that is often overlooked is the question of who pays for regulation? This has never been a problem for either the FPC or the FERC. Both have *always* charged for services in three distinct ways. FPC and later FERC assessed each hydropower licensee for annual charges to cover the cost of administering the regulations. These fees are based on a formula that considers energy generation at the project. Second, hydropower licensees are assessed charges for the use and enjoyment of lands and other property owned by the federal government. Thus, if a project is built in a national forest, the Commission collects annual fees. Finally, the Commission has had the right to expropriate excess profits should the states fail to do so. All fees that are collected by the FERC are deposited in the U.S. Treasury. In recent years the Commission has taken in more money than it costs to operate the agency; the excess funds are deposited in the U.S. Treasury.

Today the Commission has approximately 1,600 licensed hydropower projects under its jurisdiction and a total operating budget of $180 million [hydropower makes up almost $58 million](FERC 1999b).

While the period from its creation to the mid 1960's was tranquil in FPC's hydropower licensing history, the FPC was to experience a different type of development atmosphere beginning in the late 1960s and 1970s and find itself in a number of bitter conflicts with other federal and state agencies and with a new group called environmentalists. As discussed in the next section, the environmental movement differed from the conservation movement from which FPC drew a great deal of its support.

The Growth of the Environmental Movement

Over the years, the FERC had built a reputation with most as a good regulator, a watchdog for the public, and was a source of certainty and stability for the industries

that it regulated. The FERC also had a reputation for being very independent and single-minded when it came to hydropower development. After all, the FPC was created to secure a common policy and a single executive agency in water power administration. This was largely because the agency had enjoyed a great deal of support from the conservation movement. However, the conservation movement, which supported the FPC, was changing and taking its place was an environmental movement that had broad popular support and a very different agenda. In addition, environmental laws were being passed and the U.S. was also faced with an Oil Embargo. The latter ushered in energy legislation that encouraged renewable energy project development. Thus the stage was set for a great deal of controversy between the FERC and the environmentalists over hydropower development.

Before discussing the specific FERC experiences, the differences between the conservationists and environmentalists are summarized. The principal reason to gain an appreciation of this is because this phenomena may be also active in many countries. This is also illustrates how support for a specific program in a country can change over time and It may be very important for developers and participants in the international dam debate to understand these differences.

The conservation movement of the first half of the twentieth century and the environmental movement that arose after 1950 had symbolic and ideological relationships but quite *different* social roots and objectives. The first emphasized natural resources as commodities to produce material goods; the second focused on resources - air, water, and land - that would enhance the quality of life.

The conservation movement grew out of a concern for the depletion of water, forests, minerals, and soils. Many deplored the rapid exploitation of these resources, fearing that they would soon be exhausted. They called for more efficient management to sustain the yield of renewable resources on a permanent basis and enable nonrenewable resources to last longer.

Key objectives of the conservation movement were the construction of dams to conserve water for irrigation, navigation, and hydroelectric power production and, in the process, store flood waters and prevent flood damage; the management of forests on a sustained-yield basis; the reduction of soil erosion to foster permanent farm productivity; and the restoration of fish and game populations for fishing and hunting.

Alongside but subordinate to these ventures was the movement to establish national and state parks in order to enhance the quality of the human environment by protecting natural areas. The first national park was Yellowstone (1872); after a number of other parks were created, the National Park Service was formed in 1916 to administer them.

The initial impetus for the environmental movement was the growing interest in outdoor recreation in a more natural environment. This led to the creation of the National Wilderness Preservation System (1964), the National Trails System (1968),

and the National Wild and Scenic Rivers System (1968) and to a public purchase program in the Land and Water Conservation Act (1964). By 1989 the wilderness system, the most dramatic result of these measures, had reached 90 million acres.

The above programs set a direction in resource management different from the conservation focus on efficient development of material resources, which the old FPC and FERC had relied on. In wilderness areas no timber was to be cut and no roads built; wild and scenic rivers were to remain free flowing with no dams built in them. The programs meant that resources were now prized for their aesthetic rather than their material value.

The environmental movement gave rise to a new appreciative use of wildlife as an object of observation rather than of hunting. This led to a federal endangered species program, non-game wildlife programs fostered by the states, a heightened interest in habitat for wild plants and animals, and a focus on biological diversity of wild resources.

In the environmental era a new interest arose in curbing pollution - first air and water pollution in the 1950s and 1960s and then the pollution from toxic chemical wastes in the 1970s and thereafter. A host of new laws, federal, state, and local, were intended to protect drinking water, contain the spread of pesticides and other toxic chemicals, and clean up the air, rivers, lakes, and oceans. These programs emphasized a healthy as well as an aesthetically pleasing environment

Public support for environmental objectives grew steadily over the years, as charted by public opinion surveys and membership in citizen organizations such as the Sierra Club, the Wilderness Society, the National Wildlife Federation, and the National Audubon Society. After 1970 many new organizations were formed, often to address specific problems such as scenic rivers, hiking trails, billboard removal, pesticide control, energy efficiency, mineral extraction on public lands, and solid waste management. These organizations expanded their activities from national legislative lobbying to include initiating legal actions and participating in administrative proceedings; in the late 1970s they began to work in electoral campaigns for members of Congress; and in the 1980s they became involved in state environmental affairs. This growth was a result of slow and persistent change rooted in the new attitudes, interests, and values of the American people.

The FPC and the FERC in its early years failed to recognize these differences between the conservation and environmental movements. This caused a great deal of friction between the environmentalist and FPC/FERC for years to come. Both the conservation and environmental movements focused on the management of public resources; hence they were deeply involved in the formation of public policy and debates over how land, air, and water should be used - for private or public objectives. But there were also differences. The conservation movement, which arose out of the interests of technical experts and managers in reducing waste in production, had a *limited* popular base. The environmental movement, in contrast, arose out of *broad*

public interests in improving the quality of life and thus had widespread support. It was an integral part of the increasing citizen participation in American public affairs during the last half of the twentieth century.

While the growth of the environmental movement was important, the passage of two laws with very different goals appeared to put FERC and specifically the hydropower program on the list of every governmental and non-governmental environmental organization. The first law was the National Environmental Policy Act of 1969 (NEPA) that created the U.S. Environmental Protection Agency and required the preparation of environmental impact statements before a federal agency undertook and action. The second law was the Public Utility Regulatory Policies Act of 1978 and associated legislation that came about as a result of the OPEC Oil Embargo. These latter laws encouraged development of renewable energy projects, especially small hydropower projects.

In the late 1960's the FPC licensed several large hydropower projects at a time when implementation of NEPA was being challenged in the courts. FPC was among those agencies in the courts that were challenging NEPA. The FPC was ultimately forced to prepare EISs. These actions and the FPC's high visibility of being anti-environmental did not do the FPC/ FERC or the hydro industry much good. FERC was the *last* federal agency to implement regulations implementing NEPA for the hydropower program. This took 20 years in the making and did not do much to improve agency's reputations even when it began to prepare environmental impact statements (Kerwin 1999).

The FPC began to prepare environmental impact statements (EISs) on several large hydropower projects, specifically the 1,166-MW Hells Canyon Project Complex on the Snake River in Idaho, the 1, 657-MW Ludington Pumped Storage Project on Lake Michigan and the 1,050-MW Helms Pumped Storage Project in the Sierra Nevada Mountains in California. All of these projects were examined in EISs and all were licensed and constructed. The state of the art of preparing an EIS differed markedly from what it is today. However, the result was that environmental requirements began to appear in these licenses.

In contrast, other projects in the 1980s met a great deal of resistance from environmental agencies and environmental NGOs. These projects included the proposed 1,000-MW Prattsville Pumped Storage Project in New York and the 1,620-MW Susitna Project in Alaska. The Susitna Project was quite ambitious. The proposal was to serve the two largest cities in Alaska, Anchorage and Fairbanks and included the construction of two dams, 370 miles of transmission line, and 62 miles of new roads. The project also proposed to build a new town to house the estimated 3,300 workers who would construct the project. Both the Prattsville and Susitna Projects were not licensed. The developers withdrew their applications because of a variety of reasons.

In 1978, the Congress passed the Public Utility Regulatory Policies Act (PURPA) in response to the OPEC Oil Embargo. PURPA promoted the development of renewable energy projects like hydropower. It also created what no other law did, namely a market for the power produced by qualified projects and also set a relatively high price for the power produced by such projects. Together with associated changes in the U.S. tax code it created great incentives to construct such projects.

With the passage of PURPA, hydropower site that in years past were uneconomical to develop became viable over night. The FERC was overwhelmed with a back load of applications. Most of the projects were proposed on small streams in mountainous areas. These projects had small diversions, but no reservoir to speak of, and were usually under 5-MW. The problem with such projects was that they took advantage of the significant differences in head (elevation) from the diversion to the powerhouse which was located many miles downstream. The most significant problem was the potential dewatering of small streams and the fact that many of these projects were being proposed in federal lands in national forests or lands managed by the Bureau of Land Management. The developers insisted that the project impacts were negligible, but the question of multiple project proposals also raised the issue of cumulative impacts from all of these developments.

Federal agencies and environmental NGO's raised the issue of cumulative effects and demanded that FERC assess these prior to making licensing decisions. In contrast, the developers, most of whom were entrepreneurs, farmers or ranchers who saw the opportunity to make some money and use a renewable resource were advocating quick environmental reviews of "their" project proposals.

Congress also got into the act by requiring a study of 12 hydropower proposals in the Upper San Joaquin River Basin in California. These were located in a national forest. The study was completed amidst a great deal of controversy and much was learned about assessing cumulative effects. The FERC did not take action on the projects though since it was embroiled in the larger issue of cumulative effects.

The FERC responded in 1985 with its Cluster Impact Assessment (CIAP). This procedure was used to assess cumulative effects and assign rankings of impacts to projects that were clustered in river basins. Supported by Argonne National Laboratory and the Oak Ridge National Laboratory, the FERC staff decided to prepare three river basin EISs on projects in the Salmon River Basin in Idaho, the Owens River Basin in California and the Snohomish River Basin in Washington using the CIAP.

The Salmon River Basin EIS assessed the site specific and cumulative effects of 15 proposals; the amount of power proposed totaled almost 35 MW of hydro capacity in a river basin with very little development. These projects were all located on national forest lands and required certain permits from the U.S. Forest Service to proceed. The major concerns for these small projects were the adverse effects on anadromous fish that made the 800-mile journey from the Pacific Ocean up the Columbia and Snake Rivers to spawn in the small streams in the Salmon River Basin. The seven projects

analyzed in the Snohomish River Basin EIS were concerned with similar anadromous fish issues.

In contrast, the Owens River Basin EIS was concerned with seven project proposals on the east side of the Sierra Mountains. The principal impact of these projects would be there visual impact on the area and dewatering of streams. The Owens River Basin was not like the Salmon or Snohomish River basins. It had suffered the effects of significant water diversions by the City of Los Angeles over the years and the streams where the new FERC projects were proposed were all that was left.

The Commission acted on the proposals in the Snohomish and the Owens River Basin. It denied certain licenses in each basin, and licensed others. The outgrowth of the entire CIAP process was that it was expensive, took a great deal of time and FERC and the participants could not agree on what was significant with respect to cumulative effects. To this day, the debate on significance rages on, despite some very good efforts to outline what a cumulative effects analysis should look like.

In 1988, the FERC had received 24 project proposals to site hydropower projects on the Ohio River at existing navigation locks and dams mostly owned and operated by the U.S. Army Corps of Engineers. These proposals were advanced by a number of cities and private applicants and totaled almost 652-MW of hydro capacity. The issues here were the cumulative effects of the projects on dissolved oxygen and water quality and entrainment and mortality of fish that went through the turbines at each project.

The FERC did not employ the CIAP procedure on the Ohio River projects, but did make use of a water quality mathematical model to describe project impacts on water quality and mortality of various fish species. A great deal of controversy surrounded the issue of fishery turbine mortality caused by fish passing through the turbines at each proposed and existing hydro project site. Federal and state fish and wildlife agencies wanted to be compensated for the loss of the fishery resources. The disagreement centered on what to value a fish, i.e. what it would cost to raise it in a hatchery or the market value associated with catching it. The agencies preferred the market value and FERC did not agree. FERC acted on the proposals and like the preceding river basin EISs decided to deny some licenses and included a large number of environmental requirements in the licenses. FERC was also taken to court on the Ohio River Basin projects, but the court upheld the FERC's decisions. Today, many of the projects that were approved have not been built due to a variety of reasons, mostly economical.

One thing to come out of this era in FERC history was that the agency was growing increasing "green" relatively speaking. The recent passage of the Electric Consumers Protection Act of 1985, which amended the Federal Power Act, specifically required the FERC to give "equal consideration" to fish and wildlife and other environmental values. The law also required the FERC to give great discretion to the recommendations of the fish and wildlife agency recommendations and resolve disputes with them on these matters where they occurred.

The FERC staff was also becoming very adept at preparing EISs and EAs that would withstand judicial scrutiny and the federal agencies and environmental NGOs soon realized this. FERC was especially interest in identifying needed mitigation that could be included in a license and were not reluctant to include these measures in any licenses issued. For large projects, this amounted to an erosion of some of the economic benefits, but by and large the projects were still viable. On smaller projects the additional environmental conditions made such projects marginal assets at best.

The Class of 93 and Growth of Non-traditional Hydropower Regulation

The class of 93 has a great deal of significance at the FERC for a number of reasons. First and foremost it meant that on December 31, 1991, the Commission would be receiving 157 applications for relicense from projects whose licenses were to expire in 1993. Once again FERC was to be buried with applications. The key difference was that the environmental community and the federal and state environmental agencies were ready and well organized. They had long recognized that relicensing was coming and that it presented an enormous opportunity either to remove projects or change the way they operated to provide environmental benefits. The hydro industry justifiably displayed a great deal of anxiety as reports came back from the field of conflicts with agencies and participants in preparing relicense applications and necessary numbers.

By the end of 1992 two significant things occurred. First, there was general recognition at the FERC that the overall relicensing was moving very slowly. FERC's early assumptions that its extensive pre-filing consultation regulations would result in adequate applications to allow immediate processing were way off the mark. Most applications required additional study, which delayed processing by at least another year. FERC's other assumption that agencies and NGOs would want to quickly relicense projects to realize the environmental benefits of different operations was also not correct. Instead the agencies and NGOs insisted on a great many studies and the expenses associated with the number and complexities of these studies grew exponentially. Applicants and participants were at a standstill and there was very little assistance coming from the FERC to resolve these issues. The fact of the matter was that relicensing was not proceeding as planned.

The second thing to come about was the passage of the Energy Policy Act of 1992. This act enabled applicants to prepare an EA or pay a third party contractor under FERC supervision to prepare an EIS on the project. The Act alone would not do much for accelerating relicensing, if solely prepared by the developers. Some developers and FERC staff had some ideas on using the new provision of the Act to IS could expedite relicensing and reduce the conflicts inherent in the process. Their ideas called for broader participation and involvement of FERC staff in the process well before the application was filed with the FERC.

In 1990 and 1991, Consumers Power Company had been dealing with the Michigan Department of Natural Resources and other agencies during the pre-filing application process for its 11 projects that were a part of the Class of 93. Historically, these organizations were adversaries over a large number of issues in the State of Michigan and the relicensing was to be no different. Years of controversy, higher consulting and legal costs lay ahead, if things did not change.

In a stunning turn about, Consumers Power approached the agency participants and asked them if they were willing to enter into a negotiation on what they wanted to see in the projects that were going to be relicensed. This was a dramatic change in direction on how things were normally done. The agencies agreed and a series of extensive meetings were held to craft mitigation for the projects that were to be licensed. FERC staff (the author) was asked to participate in the meetings and did. The FERC staff served as a resource since they were knowledgeable of successful approaches and mitigation measures across the entire country and could provide valuable insight to the Consumers Power participants.

As required, Consumers Power filed its 11-relicense applications, while continuing to negotiate with the agency participants. The long list of agency study requests soon disappeared, environmental mitigation and budgets were prepared, and a negotiated settlement was filed with the FERC with all participants supporting it. The FERC staff prepared the EAs on three separate river basins for all the 11 projects in cooperation with the U.S. Forest Service. Both the Forest Service and FERC were required to base decisions on a NEPA document and decided to prepare the document jointly to avoid duplication and waste.

The FERC relicensed all 11 projects in July 1994 and included most of the provisions of the settlement in the new licenses. No one appealed FERC's licensing conditions. This happened at a time when the majority of the relicensing workload was significantly backlogged due to conflicts between the applicants and other participants. Consumer Power agreed to an extensive mitigation and monitoring plan estimated to cost $28 million over the term of the new license. FERC issued 40-year licenses instead of the customary 30-year license associated with no new construction. By issuing the 40-year license, FERC sent a message to the hydropower industry that it would view environmental benefits and mitigation plans as it does installing additional hydropower capacity that provides power benefits. Thus applicants could at least hope for a longer new license term to amortize those additional costs of the mitigation.

Georgia Power Company was the first developer who successfully used the provisions of the Energy Policy Act to reduce conflict in licensing its hydropower project. The company proposed to do what is termed an "applicant prepared" EA and submit that to the FERC as a means to expedite the process for its Sinclair Project. Georgia Power also reasoned that it would have more control of the process. The company wanted FERC staff to help with process. FERC staff agreed on condition that the agency participants be used to jointly prepare a draft of the EA. During the normal pre-filing process, the FERC staff worked with Georgia Power and the agencies to prepare

the draft document. The application was filed with FERC and the same staff reviewed the application, accepted comments on the application and EA, and issued the new license in a unprecedented 7 months after the application was filed. Georgia Power was also granted a 40-year license.

Recently the FERC issued licenses for International Paper Company's Riley-Jay and Livermore Projects underscore the importance of the process. International Paper Co. and the participants jointly prepared the EA for the project. The agency and NGO participation went well beyond just reviewing drafts of the EA; they actually prepared sections of the document. One year after filing the application, FERC issued licenses for a 50-year term (the maximum term). The collaborative team who worked on the project supported the 50-year license term.

Hence, after the Consumers Power settlement and relicensing, and the issuance of Georgia Power's successful relicensing of the Sinclair license, interest in this non-traditional licensing process grew. At the time there were no regulations on this process. Staff simply worked cooperatively with interested developers and other participants who wanted to undertake the process and who were frustrated by the conflicts inherent with the traditional licensing process.

Today, there are regulations at the FERC dealing with Alternative Licensing Procedures (FERC 1997a). Currently, there are about 45 projects in various stages of an alternative licensing process, including large-capacity installations such as the 912-MW St. Lawrence Project in New York; the 460-MW Cowlitz River Project in Washington; the 291-MW Fifteen Mile Falls Project in New Hampshire; the 278-MW Lake Gaston Project in Virginia and North Carolina; and the 211-MW Cabinet Gorge Project in Idaho.

Based on discussions FERC staff has had with the industry, they expect that One-third to one-half of the next wave of relicense applicants will pursue the alternative process route. Experience to date demonstrates that the alternative procedures can reduce both the length and contentiousness of relicensing proceedings. The average post-filing processing time for relicense applications developed using the alternative procedures is less than 12 months. Moreover, where the alternative procedures have been used, there has been little, if any, additional information requested of the applicants post-filing, and there have been no rehearing requests. It thus appears that the alternative procedures lead not only to faster decisions, but to decisions that better meet the needs of all participants. Moreover, staff has found that the positive relationships built during one collaborative process often carry over to other proceedings, thus generally improving the climate for the hydropower program.

Traditional Licensing

Although the FERC prefers to work closely with developers and participants in cooperative manner, it recognizes that even with the best intentions, some projects will require use of the traditional process. Generally, the project proposals that have dam

removal as a reasonable alternative fall under this category. However, there are exceptions even with this, as Wisconsin Electric Power Company's Upper Menominee River Basin Projects process shows. In this proceeding, Wisconsin Electric is proposing to remove one of the eight projects as part of their Wilderness Shores Settlement Agreement on the eight projects that was signed with over 20 participants.

As stated above, the majority of projects are still handled via the traditional process. The three projects that a especially relevant with respect to dam removal are the Edwards Dams Project and two projects in the state of Washington, the Elwha River and Glines Canyon Projects.

On November 25, 1997, for the first time, the Federal Energy Regulatory Commission ordered the removal of a 160 year-old hydroelectric dam that the owner had asked to continue to operate under a new license. The decision will restore salmon, shad, the endangered shortnose sturgeon and other species of fish to at least 15 miles
of Maine's Kennebec River. The Commission stressed that this decision pertained to some very special facts and that hydropower will continue to play a role in U.S.

Although this is the first time the Commission has required removal when a licensee wanted to continue to operate a project, since 1920, FERC--or its predecessor, the Federal Power Commission--has approved the removal of seven dams in which the Licensee wished to abandon the project.

FERC never did issue a final decision on the Elwha River and the Glines Canyon Projects since its analysis was conducted in 1991. Both dams were built in the early 1900's with a combined capacity of 19-MW. The Elwha River system, about 80% within the National Park, was once a rich spawning ground for salmon and other anadromous fish. FERC never completed relicensing as Congress approved the purchase of the dams with the intent of removing them. The U.S. Department of the Interior is now studying how decommission the dams and to fully restore the ecosystem and the native fisheries. Estimates to remove the dams have been as high $113 million. No work has taken place so far.

Sometimes the traditional process does not yield satisfactory results. The FERC may require conditions that make the project marginal or not satisfactory for the developer. A good example of this is the Condit Project, which is licensed to PaciCorp. The company began the process to relicense the 14-MW Condit hydroelectric project on the White Salmon River in southwestern Washington in 1989. The most significant issue in the relicensing process has been mitigation of impacts on anadromous (sea-going) fish.

In October 1996, FERC issued a final Environmental Impact Statement for the project that would have imposed $30 million or more of license conditions. The

company has determined that these conditions would make the project uneconomic to operate over the life of a new license, primarily because of required fish passage facilities. The company was faced with either rejecting the license or challenging it.

In January 1997, PaciCorp asked the FERC to halt the licensing proceedings for the Condit Project and initiated settlement discussions with intervenors in the licensing process to determine whether settlement might be possible. PacifiCorp also began working with the Yakima Nation, American Rivers and the Columbia Intertribal Fish Commission to see if dam removal was feasible, i.e. could it be accomplished and, if so, could it be done at a substantially lower cost than a new license? Over the course of the next two years, settlement discussions focused on methods and costs of removing the dam and addressing short-term impacts associated with removal.

In April 1998, consulting engineers for PacifiCorp identified removal alternatives and costs and further discussions resulted in an Agreed-to Method for the Condit Project. In September 1999, a settlement agreement was reached to remove the dam in seven years (2006) at a cost not to exceed $17.15 million, which will be submitted to FERC for approval. PacifiCorp will continue to operate the project under current license conditions for seven years until October 2006.

The FERC First Project- FERC reengineers itself for the future

Changes in the industries FERC regulates--in particular, the development of competitive markets in natural gas and electricity, and increasingly complex environmental requirements for hydropower projects and gas pipelines--have been enlarging and altering the nature of FERC's workload. The FERC's budget also recognized that "increasing staffing levels in the future [cannot] be counted on."

To meet the above challenges, the FERC First Project was started to reengineer the FERC. This was the first comprehensive look at agency operations since the creation of the FPC. Early in 1998, FERC senior leaders developed a statement of the agency's Vision, Mission, and Values. This agency-wide effort included a:

- A complete reexamination of all [of FERC's] processes, and
- The radical redesign of business processes for dramatic improvement

"New forms of regulation…including monitoring markets, mitigating market power, and interacting with new will become increasingly important" as "increasing competition in natural gas and electric power commodity markets promises to create billions of dollars in benefit to the American public.

By March 2000, the Hydropower Licensing Office and the Gas Certificate Office will be combined into a single Office of Energy Projects. This new office will continue to emphasize alternative licensing procedures for hydropower project and introduce the concepts to gas facility developers.

Lessons Learned

Identifying all of the lessons learned from 78 years of experiences is beyond the scope of this paper. In lieu of this, I have distilled a set of seven major categories and various sub-categories, which are a beginning for the reader (Table 1-1). These are discussed in summary form in the table and text that follows.

The major categories listed in table 1-1 are very important not only from the standpoint of a regulator but can also be used by developers and stakeholders to judge how their regulatory structure either enables or disables their efforts to site sustainable hydropower projects. Like all lessons learned, these categories and lessons have to be looked at through the various lenses of each country. Hence they should be used as guidelines and the reader should weigh heavily the economic and societal attitudes that prevail today and might evolve tomorrow.

Table 1-1. Detailed list of lessons learned at the FERC arranged in major categories, sub-categories and with annotated comments.

A. Conflict Resolution

1. There is a need for a conflict resolution process in every country that must be provided by the government.

2. An independent agency charged with ensuring economic viability, safety and environmental protection is a necessity.

   a) As competition increases and privatization becomes a part of the scene, customers and citizens will demand that health, safety, and environmental concerns be dealt with satisfactory.

   b) Don't drag your heals when it comes to EAs and EIS this is counterproductive

   c) An environmental assessment and the process can serve to ensure transparency and be the forum for dealing with issues and resolving disputes

   d) EA can refine a proposal

   e) Developers and stakeholders must revisit their missions and redefine themselves

B. General and Traditional Regulatory Roles

1. A "One Size Fits All" regulatory process is not good for any country. Developers and stakeholders need regulatory "choice" if they are to succeed.

2. A modern hydropower regulator *can* and *must* play both traditional and non-traditional regulatory roles.

   a) A successful hydropower program can't be built without working agreements between the regulatory body and the other agencies, NGOs, and other governmental entities.

   b) Aboriginal people should not be expected to participate in a siting or relicensing process on the developer's or regulator's terms. Regulators and developers must work with these people to explain process and enable participation.

c) Regulators need to bridge the gap between the developer and stakeholders.

d) Stakeholders need to have a better understanding of the implications of competition and how it will affect the behavior of developers and vice versa.

e) Most hydropower projects began as "pure power" plays, but over time other beneficial uses have become a part of the project. Need to recognize this and who is subsidizing those benefits.

f) Relicensing is an important "snap shot," but the goal is to develop relationships between the developer, stakeholders, and regulator over the term of the license to deal with the management of the water resources and environmental issues.

g) With respect to mitigation, everything doesn't have to be done all at once, however, specific plans, milestones, budget, and compliance need to be in place before site or relicensing approval or shortly afterward.

h) All developers and stakeholders don't necessarily understand regulations or the siting process. More often than not perceptions are based on previous experience that may be out dated. Regulators need to educate developers and stakeholders (use outreach programs)

i) Regulators need to reward or provide incentives to developers and stakeholders for good performance. Provide greater time to amortize costs, publicity, faster service, etc.

j) The skill sets necessary to conduct a successful siting or licensing process are no longer rooted in engineering, economic, and the environmental sciences. Mediation, oral communication, negotiation skills are even more important.

k) Regulators need to develop a successful track record by linking developers and stakeholders via settlements and successful projects.

l) Make participation user friendly and try to level the playing field.

3. Give "equal consideration" to power and non-power resources in all decision making. Don't confuse this with "equal treatment."

4. Comparing a hydropower proposal to realistic alternatives such as coal and natural gas fired generating sources does not always mean that the alternatives and proposed project are mutually exclusive for the decision maker.

   a) Recognize that impacts differ (e.g. air vs. water impacts) and that fuel consumption, extraction, transportation, and preparation need to be factored in to obtain the complete picture**.**

5. Give "equal consideration" to power and non-power resources in all decision making. Don't confuse this with "equal treatment."

   a) Recognize that you cannot treat all power and non-power resources equally when making the siting or relicensing decision.

6. Comparing a hydropower proposal to realistic alternatives such as coal and natural gas fired generating sources does not always mean that the alternatives and proposed project are mutually exclusive for the decision maker.

7. Make provisions to revisit hydropower projects after a specific time frame such as every 30 to 50 years. Societies change and the benefits provided by such projects need to be reconciled with the current and future needs.

C. Non-Traditional Regulatory Roles

1. Regulations should not get in the way of common sense. Good regulation is not a series of steps to be followed blindly.

2. A good regulator will interpret the regulations and work with the developer and stakeholders to achieve both their goals and to do what's in the public interest.

    a) People need guidelines, not a series of regulations, or a cookbook.

3. Stakeholders and developers can resolve disputes if given the opportunity and with proper facilitation.

    a) Hydropower siting and relicensing teams as opposed to “committees” stand a better chance of successfully siting or relicensing a project.
    b) Try jointly preparing EAs and EISs as a group instead of letting the developer or regulator prepare it and then reacting to it.

4. The decision to financially underwrite the costs of a participant or stakeholder is best left to the discretion of the developer.

    a) Performance of participants must be measured in terms of tasks completed rather than agreement with the developers.

D. Compliance

1. Compliance is the key to a hydropower program's credibility and success. A regulator must mean what it says and enforce the rules.

    a) Dam safety comes before everything else (Cost is not an issue--comply or cease operating or lower reservoir or risk of dam failure.

    b) Good EAs and EISs don't ensure good power and environmental performance, but compliance does.

2. When new projects are being constructed, appoint an independent board of engineering consultants and work with them to ensure that the project is constructed properly and safely.

3. Routine dam safety inspections throughout the life of the project are the norm rather than the exception.

4. Vigorously enforce the terms of the license or permit by all legal and regulatory means, including altering project operations and/or fines.

5. An EA or EIS is just a paper exercise, if it doesn't contain or reference a thorough discussion of necessary environmental and safety measures, a budget to support them, and a commitment or regulatory requirement to implement the measures.

    a) The focus of EAs and EISs should be on the measures needed to avoid or reduce adverse effects and the plan and budget to implement these.

    b) Good EAs and EISs don't ensure good power and environmental performance, but compliance does.

E. Financial Matters

1. The financial health of current projects and utilities enables them to fund environmental mitigation and enhancement measures. If not financially health, the project can't afford the necessary mitigation nor produce the developmental benefits.

2. The cost of environmental mitigation is a part of the cost of doing business today. Least-cost environmental mitigation that produces the intended benefits is the goal.

   a) Marginal projects can seldom support the necessary mitigation-- don't authorize or build them.

   b) The financial health of current projects and utilities enables them to fund environmental mitigation and enhancement measures.

   c) The challenge today is develop a project scenario where the project can compete with other energy generating sources and still underwrite the necessary environmental safeguards.

   d) Aim for least cost environmental mitigation measures. The environmental benefits should at least equal the cost and more if possible.

F. Organizational Behavior and External Factors

1. Defining and periodically redefining the mission and business of organizations involved in siting hydropower projects is critical to grounding developers and stakeholders with what they are trying to accomplish.

2. Competition has changed everyone's "idea of reality and the rules of the game," and some of our behavior as well.

   a) Developers and participants must be somehow linked to the success and risks associated with a project, especially if environmental benefits are related to operation of the project.

   b) The development community is changing. Electric and gas utilities are merging and many new organizations are entering the energy markets. These new entrants may have different approaches. Don't stereotype developers and vice versa.

3. Most organizations, be they developmental or environmental/social, have finely focused missions and mandates that make it difficult for them to make tradeoffs in siting and relicensing hydro projects. The challenge is find ways to reconcile project objectives with their respective missions.

   a) Progress in negotiation with resource agencies occurs when they don't have to abandon their missions or they can support a mitigation package because it's consistent with their mission.

   b) Settlements that are specific to a particular project help developers, stakeholders, and regulators become more creative and open to compromise.

   c) Some NGO's have a broader view of issues and are better able to reconcile their mission with respect to levels of environmental protection and power production

   d) Local people see things in a unique and special way

G. Siting and Relicensing Projects

1. Good science and engineering and a commitment to base decisions on them are singularly important to gaining credibility in a siting or relicensing process.

    a) Good science may not yield precise answers and should not be an excuse for in action.

    b) Adaptive management can be used as a tool to mitigate uncertainty and imprecise scientific study results and knowledge

    c) You will never be able to totally understand and anticipate project impacts. Acknowledge this and make plans and provision to address these in the future.

    d) Use adaptive management as a tool to minimize risk and move forward

2. Analyzing groups of hydro projects, including existing projects, increases the probability of finding least-cost environmental solutions and achieving the goals of sustainable development.

    a) Existing projects can be used to leverage environmental benefits in river basins. Non-hydro assets and other assets also.

3. Regional or local solutions are preferable to solutions mandated by the lead agency or regulator.

    a) Don't confuse specific interests of a regional with high level issues and policies like dam removal, sustainable development (flesh this out).

    b) All developers and stakeholders are not alike. Some are very narrowly focused on specific resource issues; all have different cultures, etc.

    c) Grouping developers or NGOs into commonly used terms like the hydro industry or environmental group category, respectively, is no longer valid now that competition is a factor.

    d) Developers are more focused on what makes sense for them and their stockholders rather than what the industry as a whole would like to see. The same may be true for NGOs and governmental agencies.

    e) Stakeholders will not abandon scientific studies to base their decisions on and rely on best judgment alone

H. Information and Data

1. We are all generally overwhelmed with data and yet have little information to base our decisions on.

    a) Good science and information may not yield precise answers and should not be an excuse for in action.

2. Each hydropower siting or relicensing case adds to the body of knowledge of how issues and problems were dealt with. This body of knowledge needs to be brought to the attention of developers and stakeholders to avoid costly mistakes and lost opportunities for resolving issues.

    a) Following regulations or procedures to the “letter” is a prescription for delay, confrontation, increased costs and a poor siting process.

3. Become a "Learning Organization" by monitoring the effects of your actions, test assumptions, build on knowledge, and take calculated risks.

a) Convene conferences to exchange success stories and not just horror stories. Share resources and information in areas of interest. Good science and engineering should find common ground.

4. Cost effective information technology can enable and facilitate collaboration and cooperation.

   Use the worldwide web to share and manage information when siting projects and to ensure greater participation.

Policies

Over the years the FERC has developed a number of policies in the form of new or modified regulations. It has also issued administrative policy statements. Recently, as a result of the FERC First Reengineering efforts, the FERC has formed an Alternative Dispute Resolution Service and will be combining the hydropower and gas certificate programs into a single Office of Energy Projects to meet the challenges posed in citing these projects. FERC's policy is to also encourage settlements between participants in its processes. Administrative Judges are on call daily and staff are available to assist developers and stakeholders to resolve disputes outside of the traditional hydropower licensing process.

The FERC has also issued Order 596 on Alternative Licensing Procedures and also recently issued similar regulations on Collaborative Procedures for Gas Facilities. The FERC has also published a strategic plan and developed vision, mission and values of the agency as a whole and with respect to the hydropower program. The hydropower programs goals are to develop and maintain sustainable hydropower projects that are able to compete in the competitive U.S. market place.

The FERC conducts an extensive hydropower outreach program that actively publicizes what FERC is doing and how people can participate in its programs. There is a general policy that encourages broad public participation in everything that goes on in the Hydropower Program. FERC is also has a policy of trying to reward applicants who do alternative licensing procedures by approving most terms of settlements and issuing licenses with longer terms. There is also an unwritten policy to expedite processing of applications that use alternative licensing procedures.

A great deal of effort given to doing adequate environmental scoping and producing high quality EAs and EISs. The NEPA process is generally the forum ensuring transparency and for resolving disputes on all aspects of hydropower licensing. With the passage of the Government Performance and Results Act, there is greater emphasis on measuring performance and monitoring. FERC's policy is also to use adaptive management as a tool for minimizing risks and dealing with uncertainty during the terms of all new licenses issued where appropriate.

FERC conducts a dam safety inspection of the 1,600 dams regulated each year. Its policy is to ensure dam safety, especially now that the hydropower infrastructure in the U.S. is beginning to age. Since FERC is including a great number of license conditions in new licenses, it is also requiring the developers develop compliance plans. On newly constructed projects it is FERC's policy to require that financial plans be filed prior to any construction activities. This is especially relevant for project where the market is the final arbiter of whether a project is built after all permits are obtained.

Because of the extensive term of a hydropower license, all new licenses issued by the FERC contain "re-opener" conditions. These conditions allow the FERC and other governmental agencies and in some cases NGOs to revisit a specific issue in a license. FERC also has a policy of inviting state environmental agencies on dam safety inspections and environmental/administrative inspections.

Dam safety supercedes everything else in the hydropower program, including environmental considerations, especially if there is a high hazard---threat to human life. It is FERC's policy to protect the public and take action immediately to do so.

References

Cudahy, Richard D. 1994. Is the revolution necessary? Energy Law Journal, Vol. 15, No. 2, p. 351-363.

American Society of Civil Engineers. 1997. Guidelines for retirement of dams and hydroelectric facilities, Task Committee on Guidelines for Retirement of Dams and Hydroelectric Facilities. Hydropower Committee of the Energy Division of the American Society of Civil Engineers, New York,

Burkhart N, Lamb BL and Taylor JG. 1997. Power distribution in complex environmental negotiations: does balance matter? *Journal of Public Administration Research and Theory*, v. 2: 247-275.

Cada GF, Sale MJ, Transfort JE, Rinehart BN, and Sommers GL, 1997. Hydroelectric power generation mitigating the fish passage impacts. *Abstracts from the 17th Annual Conference of the International Association for Impact Assessment*, May 28-31, 1997, New Orleans, Louisiana, U.S.

Churchill A. 1992. "Foreign opportunities?" *Cogeneration Magazine*, vol. 9, no. 4.

DuBois R, Mederios K, Zuleta J, and Villafane JP, 1997. The "greening" of public irrigation and drainage institutions. *Abstracts from the 17th Annual Conference of the International Association for Impact Assessment*, May 28-31, 1997, New Orleans, Louisiana, U.S.

Federal Energy Regulatory Commission. 1997a. Regulations for the licensing of Hydroelectric Project. *Federal Energy Regulatory Commission*, Order 596, Final Rule, October 29, 1997, 44 pp.

Federal Energy Regulatory Commission. 1997b. Kennebec River Basin, Maine- Final Environmental Impact Statement. *Federal Energy Regulatory Commission Office of Hydropower Licensing, FERC/FEIS-0097. 500 + pp. and appendices.*

Federal Energy Regulatory Commission. 1999a. Federal Energy Regulatory Commission 1998 Annual Report. FERC, 29 pp.

Federal Energy Regulatory Commission. 1999b. Federal Energy Regulatory Commission's FY2000 Budget. FERC, 500 pp.

Federal Energy Regulatory Commission and New York Department of Environmental Conservation. 1997. Scoping Document for the relicensing of the St. Lawrence-FDR Hydropower Project, *Federal Energy Regulatory Commission*, pp. 88.

Fox, S. 1981, John Muir and His Legacy: The American Conservation Movement

Giffen RA, 1997. Project conflict: A win-win model for licensing hydropower projects. *Abstracts from the 17th Annual Conference of the International Association for Impact Assessment*, May 28-31, 1997, New Orleans, Louisiana, U.S.

Harpman D, 1997. Assessing economic environmental impacts of Glen Canyon Dam Beach/Habitat-Building test flow. *Abstracts from the 17th Annual Conference of the International Association for Impact Assessment*, May 28-31, 1997, New Orleans, Laesione, U.S.

Hays S. P. 1987. Beauty, Health and Permanence: Environmental Politics in the United States, 1955-1985.

Hays S. P. 1959, Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920.

Hoecker JJ. 1992. The NEPA mandate and federal regulation of the natural gas industry. *Energy Law Journal*, vol. 13, p. 265-311.

Keil, Julie. 1995. Toward a sensible hydro licensing process. Public Utilities Fortnightly, January 1, 1995.

Kerwin, C.M. 1999. Rulemaking- How government agencies write law and make policy. CQ Press, 2nd edition, p. 106-107.

Kerwin, J.G. 1926. Federal water-power legislation. Columbia University Press, New York, pp. 396

New England Power Company. 1997. Fifteen Mile Falls Project L.P. No. 2077 Settlement Agreement. *New England Power Company,* August 6, 1997, 29 pp.

Palmer 1997. Changing Attitudes on the development & operations of hydropower facilities on the Upper Colorado River. *Abstracts from the 17th Annual Conference of the International Association for Impact Assessment*, May 28-31, 1997, New Orleans, Louisiana, U.S.

Pierce, Richard J. 1994. The state of the transition to competitive markets in natural gas and electricity. Energy Law Journal, Vol. 15, No. 2, p. 323-350.

Russo, T.N. and Timblin, L.O. 1994. Public involvement and sustainable hydropower. Proceedings of the 18th Congress of the International Committee on Large Dams, Durban, South Africa, pp. 3, November 1994.

Russo, T.N. 1994. Making hydropower sustainable. International Journal of Hydropower & Dams, November 1994, p. 126-131.

Russo, T.N. 1995. Making hydro sustainable. Public Utilities Fortnightly, January 1, 1995.

Russo T.N. 1997. Leveraging sustainable development at water projects. *Abstracts from the 17th Annual Conference of the International Association for Impact Assessment*, May 28-31, 1997, New Orleans, Louisiana, U.S.

Russo, T.N. and Narins, M.J. 1993. Effects of US national energy legislation on future US and international hydro. International Water Power & Dam Construction, August 1993.

Russo T.N, and Narins MJ, 1994. Opportunities for achieving environmental protection in the international electric power sector. *Environmental Impact Assessment Bulletin*, Vol. 14, No. 4, p. 233-243.

Russo T.N. and von Stackelberg K. 1994. Sustainable development after Rio, *Independent Energy Magazine,* January 1994.

Santa, D.F. and Sikora, C.S. 1994. Open access and transition costs: Will the electric power industry transition track the natural gas industry restructuring? Energy Law Journal, Vol. 15, No. 2, p. 273-321.

Silliman K, and Russo TN, 1997. EIS and relicensing of the New York Power Authority's St. Lawrence-FDR hydroelectric project. *Abstracts from the 17th Annual Conference of the International Association for Impact Assessment*, May 28-31, 1997, New Orleans, Louisiana, U.S.

USDOE Western Area Power Administration, 1996. Navajo transmission project draft environmental impact statement. USDOE Western Area Power Administration, DOE/EIS-0231, 579 pp.

US Bonneville Power Administration and Whatcom County, Washington. 1995. Summary of supplemental draft environmental impact statement: BPA/ Puget Power Northwest Washington transmission project. *US Bonneville Power Administration and Whatcom County, Washington*, 18 pp.