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Hydropower: Federal and Nonfederal Investment

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Summary

Congress continues to look at various fuel contributions to the electricity market and federal involvement with these fuel sources. Hydropower, the use of flowing water to produce electricity, is one such contribution. Conventional hydropower accounted for approximately 6% of total U.S. net electricity generation in 2014.

Hydropower has advantages and disadvantages as an energy source. Its advantages include its ability to be a continuous, or baseload, power source that releases minimal air pollutants during power generation relative to fossil fuels. Some of its disadvantages, depending on the type of hydropower plant, include high initial capital costs, ecosystem disruption, and reduced generation during low water years and seasons.

Hydropower project ownership can be categorized as federal or nonfederal. The bulk of federal projects are owned and managed by the Bureau of Reclamation and the U.S. Army Corps of Engineers. These projects are typically authorized and funded by Congress. Nonfederal projects are licensed and overseen by the Federal Energy Regulatory Commission (FERC).

Considered by many to be an established and renewable energy source, hydropower is not always discussed alongside clean or other renewable energy sources in the ongoing energy debate due to its potential environmental impacts. However, hydropower proponents argue that hydropower is cleaner than some conventional energy sources, and point to recent findings that additional hydropower capacity could help the United States reach proposed energy, economic, and environmental goals. Others argue that the expansion of hydropower in the form of numerous small hydropower projects could have environmental impacts and regulatory issues similar to those of existing large projects.

The 114th Congress may face several issues as it considers how hydropower fits into a changing energy and economic landscape. For example, existing large hydropower infrastructure is aging; many of the nation's hydropower generators and dams are more than 30 years old. Proposed options to address these concerns include increasing federal funding, utilizing alternative financing and/or customer investments, and privatizing federally owned dams, among other options. Additionally, whether to significantly expand hydropower (either through new or more efficient federal hydropower generation or through federal incentives to encourage expansion or efficiency gains of nonfederal hydropower) may require congressional input due to the role of the federal government in hydropower development and permitting. Another issue receiving attention is the rate at which FERC issues licenses for nonfederal projects, which some find slower than ideal. Others defend the licensing process due to the environmental and other statutes with which agencies must comply.

Legislation related to hydropower development was enacted in the 113th Congress, including P.L. 113-23 and P.L. 113-24. P.L. 113-23, the Hydropower Regulatory Efficiency Act of 2013, grants small hydropower projects with a capacity of 10 megawatts or less an exemption from FERC licensing requirements, promotes conduit hydropower projects, and requires FERC to examine the feasibility of a two-year licensing process to promote hydropower development at nonpowered dams and closed-loop pumped storage projects, among other things. P.L. 113-24, the Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act, authorizes nonfederal hydropower development at all Reclamation projects, provides for the preference of existing project sponsors in developing this power, and makes Reclamation the lead agency in

implementing this authority. Other legislation related to hydropower enacted in the 113th Congress included the Water Resources Reform and Development Act of 2014 (P.L. 113-121), part of which expedites the approval and development of nonfederal Corps hydropower projects and orders a report on the status and funding of nonfederal hydropower projects as well as a study on the implications of issuing federally tax-exempt bonds from the Inland Waterways Trust Fund to hydropower facilities. Additionally, P.L. 113-76, the Consolidated Appropriations Act of 2014, provided new funding to the Department of Energy (DOE) for the expansion of hydropower development at existing dams, as authorized under the Energy Policy Act of 2005 (P.L. 109-58).

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Introduction

Conventional hydropower[1] accounted for more than 6% (258,749 gigawatt hours) of total net U.S. electricity generation in 2014.[2] The United States has considerable hydropower potential beyond what is already developed. Although there is some interest in increasing the current level of hydropower investment, such investment remains limited, in part because of federal and nonfederal financial constraints, high uncertainty in electricity generation policies and markets (which may dissuade capital investment), and the environmental operating requirements required for hydropower projects. Some hydropower proponents are pursuing policies to reduce what they view as impediments to hydropower development. Other stakeholders prefer that hydropower investments only proceed when they are protective of other interests, including other water users and the aquatic environment and its species.

At issue for the 114th Congress is whether, and if so how, to change federal support for hydropower and what priority to give hydropower vis-à-vis other energy investments, and social and environmental concerns. These issues are ongoing and are shaped by the introduction and consideration of hydropower-related bills from past Congresses. For example, more than 25 bills dealing with various aspects of hydropower were introduced in the 112th Congress, a quarter of which were state- or site-specific legislation.[3] And more than 30 hydropower-related bills were introduced in the 113th Congress. For example, Congress passed P.L. 113-20 (Bonneville Unit Clean Hydropower Facilitation Act), P.L. 113-23 (Hydropower Regulatory Efficiency Act of 2013) P.L. 113-24 (Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act), and P.L. 113-121 (Water Resources Reform and Development Act of 2014).[4] So far, four hydropower-related bills have been introduced in the 114th Congress: S. 1236 (Hydropower Improvement Act of 2015), S. 1264 (Renewable Electricity Standard Act), S. 1338 (Small Hydropower Dependable Regulatory Order Act of 2015), and S. 1270 (Reliable Investment in Vital Energy Resources [RIVER] Act).[5]

Over time, there has been a variety of hydropower legislative proposals and stakeholder opinions, which stem partly from differing views of the benefits and costs of hydropower development. Many have pointed out advantages and drawbacks of conventional hydropower. Cited advantages

[1] This report focuses primarily on conventional hydropower. Conventional hydropower refers to the use of dams or impoundments to store water in a reservoir, whereby water released from the reservoir flows through a turbine to generate electricity. It does not include small hydro, low head hydro, or new hydropower technologies. For more information on these technologies, see CRS Report R41089, *Small Hydro and Low-Head Hydro Power Technologies and Prospects*, by (name redacted).

[2] U.S. Energy Information Administration, *Electric Power Monthly*, March 2015, http://www.eia.gov/electricity/monthly/pdf/epm.pdf. A gigawatt is equal to one thousand megawatts. EIA defines net generation as the amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries. (Note: This is a monthly publication, and the data are subject to modification. This particular set comes from the March 2015 issue.)

[3] An example of state- and project- or site-specific legislation is S. 524, which would terminate certain hydropower reservations relating to Bureau of Land Management patents in Madera County, California.

[4] The "Enacted Legislation in the 113th Congress" section of this report contains a brief discussion of P.L. 113-23 and P.L. 113-24.

[5] These bills propose various methods to promote the development of new and incremental hydropower. For a more detailed description, see "Hydropower Legislation in the 114th Congress."

include its possible renewable energy status,[6] zero to minimal greenhouse gas emissions during operation, and high operational efficiency. Supporters also note its ability to generally serve as a reliable and flexible domestic energy source. Generally speaking, hydropower generation can be dispatched on relatively short notice, and can supplement shortfalls in generation. However, others note that conventional large hydropower has relatively high initial capital costs, can be detrimental to surrounding ecosystems (e.g., fish and wildlife), may not be reliable during low water years and seasons, and may disrupt recreational or scenic values.[7]

The legislative environment for hydropower can be complicated. Whether the hydropower project investor is a federal or nonfederal entity dictates which laws apply and thus may affect which committees are involved in oversight or changes to such laws. Several federal government agencies own and operate large hydropower projects, while other agencies administer the process by which nonfederal hydropower projects are built, maintained, and operated. Large federal hydropower projects are managed primarily by the U.S. Department of the Interior's Bureau of Reclamation (Reclamation) and the U.S. Army Corps of Engineers (Corps). The power from these projects is generally marketed by the Department of Energy's Power Marketing Administrations (PMAs).[8] FERC regulates investigation, construction, and operations of nonfederal hydropower projects as well as overseeing dam safety for nonfederal projects.

This report explains how the federal government is involved directly in hydropower generation at federal facilities and in the regulation of nonfederal hydropower generation; the focus is on current roles and processes and common concerns and questions about changing those roles.

Background

Most of U.S. hydropower capacity is from conventional hydropower.[9] Conventional hydropower plants take three general forms: storage (or impoundment), run-of-river (or diversion), and pumped storage.[10] A storage plant uses a dam to store enough water in a reservoir so that, when released, it flows through a penstock to a turbine, spinning it, which in turn activates a generator to produce electricity.[11] A run-of-river plant directs a portion of a river through a canal or penstock to generate electricity without the need for a reservoir. A pumped storage facility stores

[6] Some states do not consider hydropower to be a renewable energy source within their energy portfolio requirements. For example, California does not consider a new hydropower facility an eligible energy resource for its renewable portfolio standard if it will require a new or increased appropriation or diversion of water under Division 2, Part 2 of the California water code.

[7] Certain conditions that reduce water availability, such as a drought, may affect the ability of a hydropower plant to generate at capacity. There is an ongoing debate about whether and how to consider potential climate change and its impact on hydropower plant operations during the hydropower plant licensing process. For more information, see Joshua H. Viers, "Hydropower Relicensing and Climate Change," *Journal of the American Water Resources Association*, August 2011.

[8] The federal government operates four Power Marketing Administrations—Bonneville Power Administration (BPA) in the Pacific Northwest, Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA).

[9] M. J. Sale, U.S. Army Corps of Engineers, Institute for Water Resources, *Outlook for the U.S. Army Corps of Engineers Hydropower Program*, 2011-WRO-P-02, Washington, DC, March 2011, p.1. (Hereinafter referred to as "Corps Hydropower Outlook.")

[10] More information on the types of hydropower plants is available at http://www1.eere.energy.gov/water/hydro_plant_types.html.

[11] A penstock is a closed conduit or pipe for conducting water to the powerhouse.

energy and generates electricity by pumping water from a lower reservoir to an upper reservoir during off-peak hours, releasing the stored water from the upper reservoir to the lower reservoir during periods of higher electricity demand.

Conventional hydropower is a significant contributor to the national electric power portfolio.[12] Hydroelectric facilities produced 6%-9% of U.S. electric generation between 1998 and 2014.[13] When considered a renewable power source, hydropower was the largest contributor to renewable electric power generation in 2014, followed by wind and by wood and wood-derived fuels.[14] The western states produced the most hydropower in 2014, but the top individual hydropower-producing states were Washington, Oregon, and New York.[15]

As the West continues to experience drought, hydropower generation may decline.[16] For example, in 2014, hydropower in California (the fourth-largest producer of hydropower among the states) contributed half (10%) of its average generation (20%) to California's energy portfolio.[17] Generally, reductions in hydroelectric generation are addressed by increasing the use of natural gas, which some argue is more expensive and produces more greenhouse gas emissions than hydropower.[18] Facilities in western states, such as the Hoover Dam, are producing significantly less power than average due to drought conditions.[19]

There is an ongoing debate about whether hydropower should be characterized as "renewable." It has historically been characterized as renewable because it is a replenishable resource. More recently, others have asserted that it is not renewable because of its size (e.g., in the case of large-scale projects) and environmental impact, particularly on ecosystems, and in some cases induced evaporation (particularly at reservoirs at low elevations in dry climates) and greenhouse gas emissions during construction. However, for purposes of this report, hydropower is discussed as renewable because it does not originate from a fossil fuel (i.e., its source is not finite).

[12] During the 1940s, hydropower accounted for 40% of U.S. electricity generation. Over time, as other electricity sources expanded, hydropower's share decreased. Other reasons for the decline in electricity generation from hydropower include aging infrastructure, market conditions, environmental and ecosystem concerns, and the fact that large conventional hydropower resources are mostly developed.

[13] U.S. Energy Information Administration, *Electric Power Monthly*, March 2015, http://www.eia.gov/electricity/monthly/pdf/epm.pdf; EIA defines net generation as the amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries.

[14] Ibid.

[15] Ibid.

[16] CRS Report R43407, *Drought in the United States: Causes and Current Understanding*, by (name redacted) and (name redacted).

[17] Michelle Bowman, *California drought leads to less hydropower, increased natural gas generation*, Energy Information Administration, Washington, DC, October 6, 2014, http://www.eia.gov/todayinenergy/detail.cfm?id=18271.

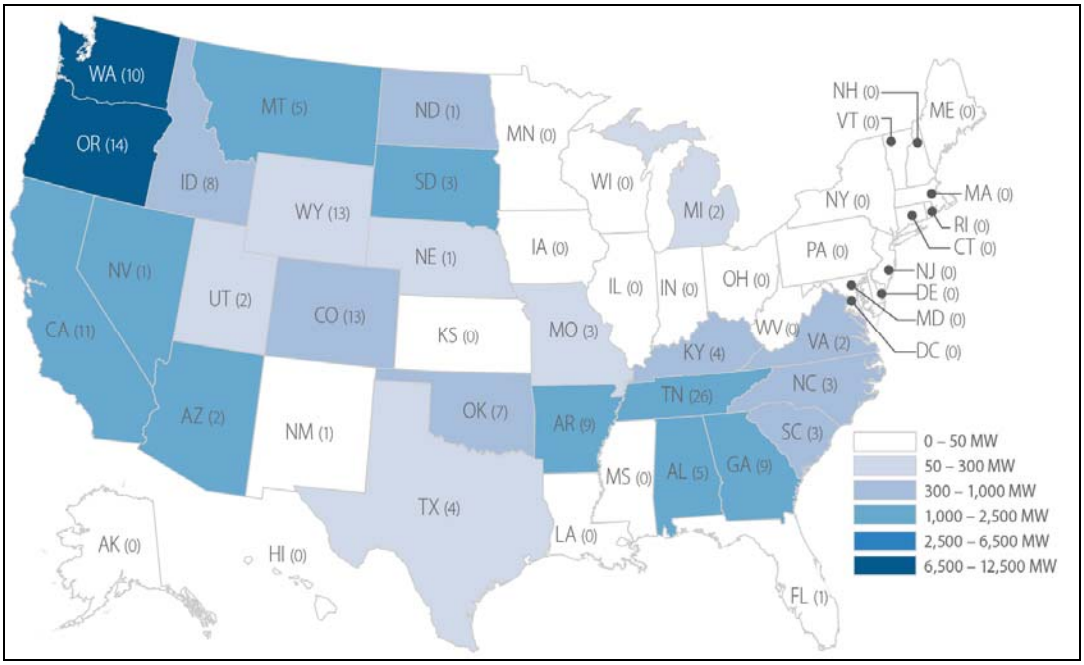
[18] A study by the Pacific Institute estimates that this shift has cost California ratepayers $1.4 billion from 2011 to 2014 as well as resulted in an 8% increase in carbon dioxide emissions. Peter H Gleick, *Impacts of California's Ongoing Drought: Hydroelectricity Generation*, Pacific Institute, Oakland, CA, March 17, 2015, http://pacinst.org/wp-content/uploads/sites/21/2015/03/California-Drought-and-Energy-Final1.pdf.

[19] Mary Ann Capehart, *Drought Diminishes Hydropower Capacity in Western U.S.*, Water Resources Research Center, Tucson, AZ, January 2015, https://wrrc.arizona.edu/drought-diminishes-hydropower. See also, Written Testimony of Thomas Buschatzke, in U.S. Congress, Senate Committee on Energy and Natural Resources, *Full Committee Hearing: Drought Conditions Throughout the Western United States and Actions States and Others are Taking to Address Them,* 114th Cong., 1st sess., June 2, 2015.

The precise number of hydropower projects in the United States is unknown.[20] Different databases yield different results based on selected criteria.[21] As of 2015, 90 nonfederal hydropower projects are licensed to operate at Corps dams and 28 are licensed to operate at Bureau of Reclamation sites.[22]

The public sector (federal, states, cooperatives, and municipalities) owns the majority of hydropower capacity because it owns mostly large (>30 megawatt [MW]) hydropower plants (see **Figure 1**). The private sector (e.g., private utility, private nonutility, and industrial entities) owns the majority of hydropower projects, and many are small hydro (1 MW-30 MW) and low-power (< 1 MW) plants (see **Figure 2**). Small hydro and low-power plants make up of 83% of total plants but constitute approximately 10% of total hydropower production capacity in the United States. In contrast, large hydropower plants are responsible for approximately 90% of total hydropower capacity though they make up 16% of total plants.

Figure 1. Federal Hydropower Plants and Capacity



Source: Adapted by CRS from Oak Ridge National Laboratory, *National Hydropower Asset Assessment Program (NHAAP): Existing hydropower assets dataset*, Oak Ridge, TN, 2015.

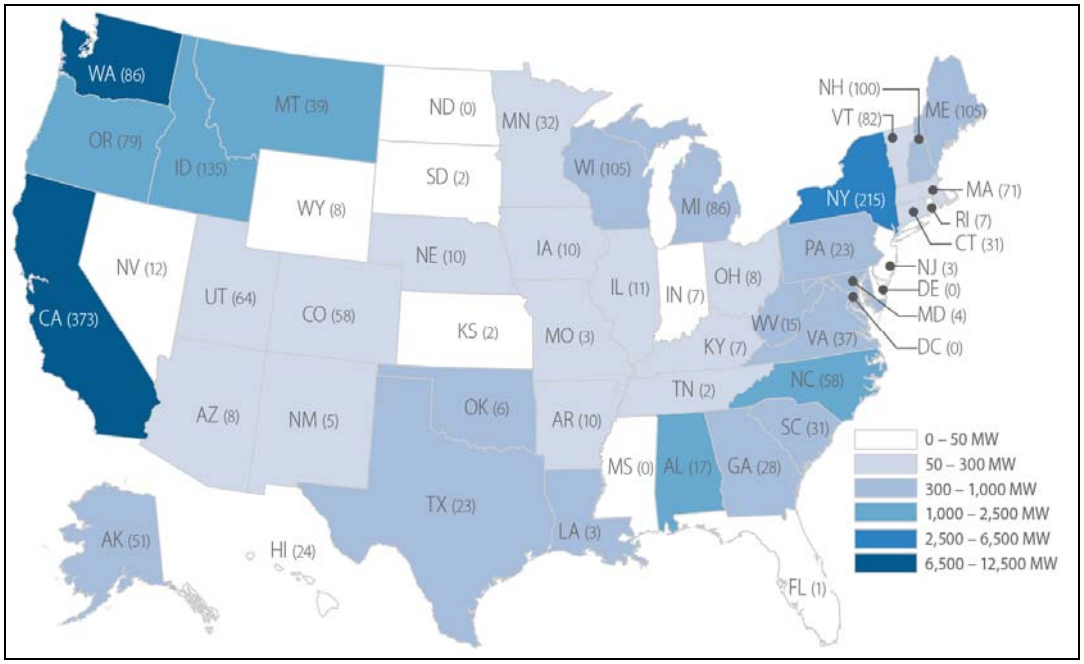
Notes: The federal government owns approximately 7% of total hydroelectric plants and 48% of total hydroelectric generation capacity.

[20] This is especially true for nonfederal hydropower projects, as one project could have multiple generating stations.

[21] For instance, the total of FERC hydropower licenses and exemptions amounts to roughly 1,600 projects. EIA lists more than 1,400 conventional hydroelectric plants; Oak Ridge National Laboratory (ORNL) lists more than 2,200 plants.

[22] U.S. Army Corps of Engineers, *U.S. Army Corps of Engineers Civil Works Program: Five-Year Development Plan*, May 2011, http://www.usace.army.mil/Portals/2/docs/civilworks/5yr_devplan/fy11_5yrplan.pdfBureau of Reclamation, *Hydroelectric Powerplants Operated by Others*, 2013, http://www.usbr.gov/power/data/faclothr.html.

Figure 2. Nonfederal Hydropower Plants and Capacity



Source: Adapted by CRS from Oak Ridge National Laboratory, *National Hydropower Asset Assessment Program (NHAAP): Existing hydropower assets dataset*, Oak Ridge, TN, 2015.

Notes: Nonfederal ownership is approximately 93% of total plants and 52% of total production capacity.

Without considering economics, current hydropower capacity represents a fraction of U.S. hydropower resources that technically could be developed at non-powered dams in addition to accessing new stream-reaches.[23] The National Inventory of Dams identifies that of the more than 80,000 dams in the United States, 2.5% are used for hydropower.[24] According to a 2012 Department of Energy (DOE) study, there are more than 54,000 non-powered dams with a total potential capacity of 12 GW, which would increase hydropower capacity by 15% (See **Figure 3**).[25] The majority of this capacity (8 GW) is concentrated at 100 non-powered dams, 81 of which are operated by the Corps.

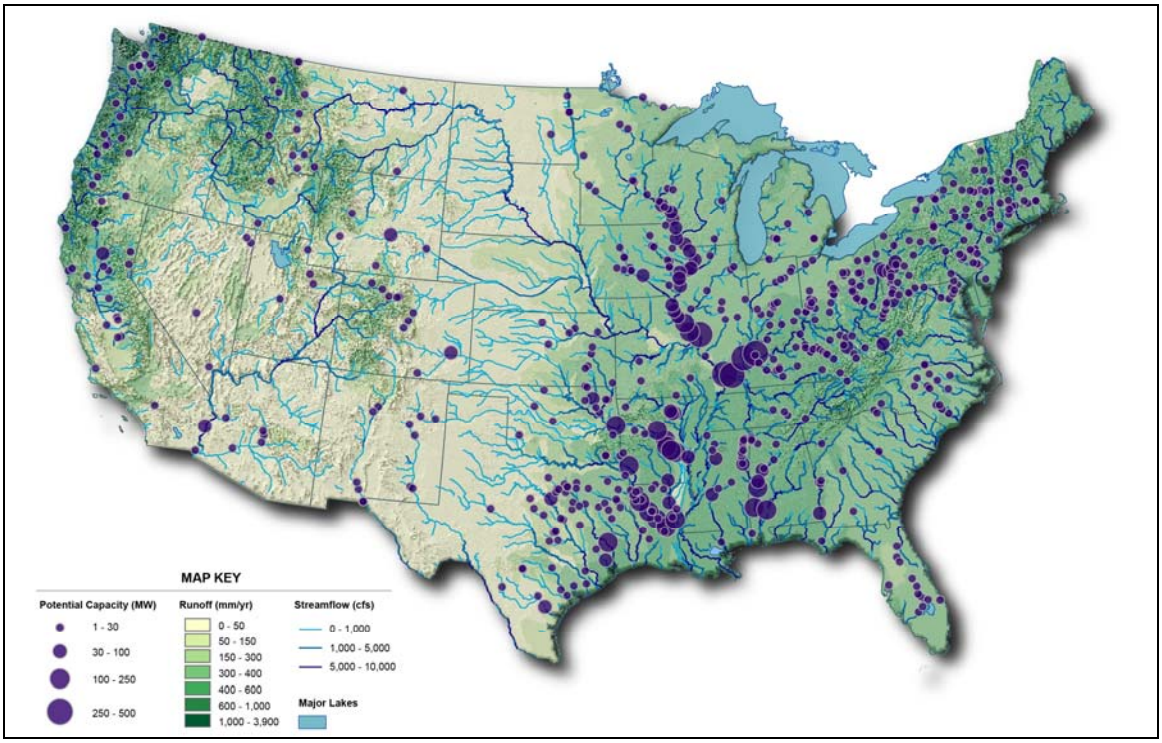
Some have argued that many of the monetary costs and environmental impacts of construction already have occurred at non-powered dams, so using non-powered dams for hydropower is an option for increasing the U.S. renewable energy portfolio. However, the actual cost and economic feasibility of powering these dams is unknown, and additional costs for site-specific studies may be required before hydropower capacity could be added.

[23] The total potential for new stream-reach development is 65.5 GW, of which the highest potential for development is located in the Midwest. The locations of non-powered dams do not necessarily match the locations of new stream-reaches. Oak Ridge National Laboratory, *New Stream-Reach Development Resource Assessment*, http://nhaap.ornl.gov/nsd.

[24] U.S. Army Corps of Engineers, "National Inventory of Dams," http://www.agc.army.mil/Media/FactSheets/FactSheetArticleView/tabid/11913/Article/480923/national-inventory-of-dams.aspx; http://nid.usace.army.mil.

[25] U.S. Department of Energy, *An Assessment of Energy Potential at Non-Powered Dams in the United States*, April 2012, http://www1.eere.energy.gov/water/pdfs/npd_report.pdf.

Figure 3. Hydropower Potential Capacity of Non-powered Dams



Source: Oak Ridge National Laboratory, 2013.

Note: Data for potential development are based on streamflows, not economic or environmental analysis.

Federal Hydropower

The federal government owns and operates approximately half of all U.S. hydroelectric generating capacity. This capacity is principally at large multi-purpose dams owned and operated by the Corps or Reclamation. Combined, the Corps and Reclamation operate almost all federal hydroelectric dam capacity (90% of federal capacity).[26] Other federal entities operating hydroelectric generation facilities include the Tennessee Valley Authority, the Bureau of Indian Affairs, and the International Boundary and Water Commission. Other entities also own facilities that generate hydroelectric power, but they are relatively small. While the electricity generated by these facilities is owned by these federal agencies, the Power Marketing Administrations (PMAs), which are part of the U.S. Department of Energy, are generally responsible for selling and distributing this power.

Federal hydropower capacity varies substantially by state and region. For instance, 90% of all federal capacity is found in 13 states, and the majority of this capacity is in the West.[27] Washington and California contain the greatest federal hydroelectric capacity, while Oregon,

[26] Oak Ridge National Laboratory, *National Hydropower Asset Assessment Program (NHAAP): Existing hydropower assets dataset*, Oak Ridge, TN, 2015.

[27] Douglas G. Hall and Kelly S. Reeves, *A Study of United States Hydroelectric Plant Ownership*, Idaho National Laboratory, INL/EXT-06-11519, Idaho Falls, ID, June 2006, (hereinafter referred to as "Hall and Reeves"). http://www.inl.gov/technicalpublications/Documents/3374828.pdf.

Arizona, Montana, and Idaho also have significant federal hydropower capacity. In the East, New York, Georgia, South Carolina, and North Carolina have the most federal capacity.

U.S. Army Corps of Engineers Projects

The Corps' multi-purpose dams are the largest producer of hydropower in the United States. Much of this power generation capacity is concentrated in the Pacific Northwest. The Corps constructed hydropower facilities at many of its water resources projects, beginning in 1925. Its most recent hydroelectric construction project was the R.D. Willis project in Texas, completed in 1989. Today, the Corps owns and operates 353 units at 75 projects, with a total estimated capacity of 22.9 GW, or approximately one-fourth of all national hydropower capacity.[28] These projects generate approximately 77,000 gigawatt hours (GWH) of hydropower annually, with an average gross revenue of $5 billion.[29] Revenues from the sale of this hydropower are deposited into the U.S. Treasury.

Hydropower generating units have a nominal 50-year life expectancy, and many Corps hydropower projects are nearing or exceeding this age. In 2014, the average age of Corps hydropower facilities was 49 years, and approximately 40% of the Corps hydro fleet was 50 years old or older.[30] Hydroelectric generation is highly variable and depends on a number of factors. In the past, some have raised concerns that generation at Corps facilities may be declining due to aging infrastructure. However, the exact effects of aging infrastructure on Corps facilities has not been documented on a nationwide basis and thus remains uncertain.[31] Relative to national generation totals, the Corps contribution to total hydropower generation has remained steady since 2008 at approximately 24%.[32]

In addition to overall declining generation, the delivery of Corps hydroelectric power is also an issue connected to aging infrastructure. That is, unit availability is down because of maintenance and repairs.[33] According to the Corps, many of its hydropower assets have fallen below the generally accepted hydropower industry goal of 95% unit availability. Unit availability at Corps

[28] U.S. Army Corps of Engineers, *USACE Hydropower - Renewable, Reliable Energy for America*, February 2, 2015, http://www.usace.army.mil/Portals/2/docs/civilworks/budget/strongpt/fy16sp_hydropower.pdf; Corps Hydropower Outlook, p. 9. Approximately 60% of hydropower capacity is located in the Pacific Northwest.

[29] U.S. Army Corps of Engineers, *Civil Works Strategic Work Plan 2014-2018*, January 2015, p. 25, http://www.usace.army.mil/Portals/2/docs/civilworks/news/2014-18_cw_stratplan.pdf; U.S. Congress, House Committee on Natural Resources, Subcommittee on Water and Power, *Statement of Michael Ensch, Chief of Operations, U.S. Army Corps of Engineers, Investment in Small Hydropower: Prospects of Expanding Low-Impact and Affordable Hydropower Generation in the West*, 111th Cong., 2nd sess., July 29, 2010, p. 2. Hereinafter referred to as "Ensch."

[30] CRS analysis based on Corps data. Kamau Sadiki, *US Army Corps of Engineers Hydropower Infrastructure: Challenges and Opportunities*, U.S. Army Corps of Engineers, October 30, 2013, http://www.cg-la.com/documents/NALF5/presentations/10.30.13/2ColonialRoom/1ElectricityGenerationTransmission/6USACE.pdf.

[31] Corps Hydropower Outlook, p. 9. Availability of water, including the lack of water in certain hydrological conditions and instream flow requirements, are some of the other factors that may account for decreased generation.

[32] CRS analysis of Corps and EIA data. Again, this calculation does not account for water availability in different regions of the country, which has the ability to affect the Corps contribution to overall generation.

[33] "*Unit availability* generally is defined as the amount of time (or in this case, percentage of time) a unit is available to produce electricity, regardless of whether or not it is operated.

dams has fallen to the point where no Corps division is meeting the 95% target, while at the same time, the total hours of "forced outages" have grown.[34]

Concerns related to aging infrastructure have resulted in internal reviews of the Corps hydropower program and recommendations for ways to improve Corps hydropower operations. Under its Hydropower Modernization Initiative (HMI), the Corps has reviewed facilities requiring rehabilitation that would produce the greatest returns on investment, reliability, and safety. In the first phase of the HMI, the Corps concluded that modernization of six "critical needs" projects could produce 341 GWH in additional electricity per year, or an average increase in production of approximately 8% per plant.[35] The cost for these upgrades would have been approximately $600 million. The second phase of the HMI looked at facilities outside the Federal Columbia River Power System (i.e., projects not eligible for funding by the Bonneville Power Administration, or BPA) and concluded that if the Corps took no action to modernize the 54 units not financed by BPA, it would forego potential revenues of approximately $7 billion over a 20 year horizon.[36] Costs for the upgrades necessary to avoid the aforementioned losses were estimated at $3.7 billion. The Corps currently is working on prioritizing efficiency improvements and capacity upgrades at these plants as well as developing an annual budget-based HMI implementation strategy.[37]

Nonfederal Development at Corps Facilities

Besides federal investment and development, nonfederal development of hydropower at Corps sites is also permissible under certain circumstances. According to the Corps, as of 2015 there are 63 nonfederal power units at Corps dams with a total capacity of 2.36 GW.[38] Such development requires a Federal Energy Regulatory Commission (FERC) license and a Corps Section 408 permit, which authorizes the nonfederal use of a federal facility.[39] The Corps and FERC signed a Memorandum of Understanding (MOU) in March 2011 to coordinate the regulatory review; among other things, the MOU indicates that the Corps will conduct its regulatory review concurrently to the FERC process to the extent possible.[40]

Bureau of Reclamation Projects

After the Corps, Reclamation is the second-largest producer of hydroelectric power in the United States. Reclamation operates in the 17 western states, and 11 of these states have Reclamation

[34] Corps Hydropower Outlook, p. 10.

[35] Ensch, p. 3.

[36] Montgomery, Watson, Harza, *Phase II Needs and Opportunities Evaluation and Ranking, Reconnaissance Hydroelectric Assessment Plants Life Extensions and Upgrades, Cumberland River Basin*. Report prepared for the U.S. Army Corps of Engineers Nashville District, Contract No. W912P5-06-D-0008-0004.

[37] U.S. Army Corps of Engineers, U.S. Department of Energy, and U.S. Department of the Interior, *Memorandum of Understanding for Hydropower*, March 2015, p. 10, http://www.doi.gov/news/pressreleases/loader.cfm?csModule=security/getfile&pageid=1018386.

[38] U.S. Army Corps of Engineers, *USACE Hydropower - Renewable, Reliable Energy for America*, February 2, 2015, http://www.usace.army.mil/Portals/2/docs/civilworks/budget/strongpt/fy16sp_hydropower.pdf.

[39] 33 U.S.C. §408.

[40] Corps and FERC, *Memorandum of Understanding between United States Army Corps of Engineers and the Federal Energy Regulatory Commission on Non-Federal Hydropower Projects*, http://www.ferc.gov/legal/mou/mou-usace.pdf.

hydropower facilities.[41] As part of its mission to facilitate settlement of the West through water resources development, Reclamation built numerous projects that included facilities to impound water to provide water supply for irrigation and municipal use and to capture floodwaters. Reclamation also constructed hydropower units at some of these facilities, in part to finance project construction for these other purposes.[42] Reclamation constructed some of these units in the early part of the 20th century, and significantly increased its hydropower production during World War II to meet wartime production demands. Reclamation operates 176 generating units at 53 power plants, with total capacity of 14.7 GW, or about 14% of the hydroelectric generating capacity of the United States.[43] Reclamation generates on average 40,000 GWH annually.

There are two tiers of customers for federal hydropower projects. For Reclamation projects, power is first used for project purposes (e.g., pumping of water for irrigation); the remaining power is marketed by one of the Power Marketing Administrations with jurisdiction over the area—Bonneville Power Administration (BPA), Western Area Power Administration (WAPA), or Southwestern Power Administration (SWPA). In turn, the PMAs provide this power for distribution and sale (see below section, "Federal Power Marketing Administrations"). Receipts from hydropower revenues at Reclamation Facilities are deposited into the Reclamation Fund and are first applied to project repayment costs.[44]

Like the Corps, Reclamation has identified challenges associated with the operation of its facilities. Reclamation's facilities also are aging; as of 2015, the average age of its hydropower plants is 58 years old.[45] Reclamation estimated the cost of rehabilitation and replacement for all assets (not exclusively hydropower) for FY2012-FY2016 to be $2.6 billion.[46] However, net generation at Reclamation facilities has remained somewhat constant over the last 10 years, and Reclamation has stated that its project performance is generally favorable compared with most industry benchmarks.[47]

Reclamation has also studied the potential gains associated with upgrades to its hydropower facilities. However, the potential for additional development at Reclamation facilities appears to be considerably less than that for Corps facilities. In a 2010 study, Reclamation concluded that

[41] Reclamation operates hydropower projects in the following states (in order of generation capacity): Washington, Oregon, California, Montana, Idaho, Arizona, Nevada, Colorado, Wyoming, Utah, and New Mexico.

[42] Although the Reclamation Act of 1902 was the original statute authorizing construction of Reclamation projects, the Reclamation Service (later renamed the Bureau of Reclamation) was first authorized to develop hydropower resources in the Town Site and Power Development Act of 1906 (34 Stat 116). The Fact Finders' Act of 1924 (43 Stat 701) later authorized the use of hydropower revenues as a credit to construction charges of a project.

[43] Bureau of Reclamation, *Reclamation's Role in Hydropower: Reclamation's Power Program*, November 27, 2013, http://www.usbr.gov/power/data/role_rpt.html#power.

[44] For more on the Reclamation Fund, see CRS Report R41844, *The Reclamation Fund: A Primer*, by (name redacted).

[45] Based on a 2015 CRS analysis of initial service dates of current Reclamation hydroelectric power plants. For the list of initial hydroelectric power plant service dates, see Bureau of Reclamation, *Bureau of Reclamation Hydroelectric Powerplants*, January 17, 2014, http://www.usbr.gov/power/facil/Reclamation_Hydroelectric_Powerplants_Summary_Table.pdf.

[46] U.S. Bureau of Reclamation, *Bureau of Reclamation Asset Management Plan: Fiscal Year 2011*, September 2012, p. 20, http://www.usbr.gov/assetmanagement/Asset%20Inventory/AssetManagementPlanFY2011FinalWithSignaturePageOnly.pdf.

[47] This statement takes into account "available water" for generation, which Reclamation tracks. For instance, see U.S. Bureau of Reclamation, *Reclamation-Wide Power Profile*, p. 6, http://www.usbr.gov/power/data/recl-wid.pdf.

significant upgrades were only feasible at 10 of its then-58 facilities and would increase Reclamation's total capacity by 0.067 GW, or less than 1%.[48]

Nonfederal Development at Reclamation Facilities

Adding nonfederal hydropower facilities at existing Reclamation projects is permitted by Reclamation. The process is accomplished through either (1) obtaining a FERC license (for projects not currently authorized for hydropower); or (2) a process managed by Reclamation known as the Lease of Power Privilege Process (for projects currently authorized for hydropower but not developed). As of 2010, Reclamation reported this type of development at 47 sites that provided capacity of more than 46 GW.[49] According to Reclamation, whichever of these processes is used, power development must not conflict with the purposes for which Congress authorized the original Reclamation project, and it must not affect the structural and operational integrity of the project. Furthermore, the development must not have significant adverse environmental, cultural, or historical impacts.[50] The 113th Congress enacted legislation to further facilitate this development.[51] Legislation to continue hydropower research and development have been proposed in the 114th Congress: H.R. 459, H.R. 1806, and H.Res. 215 (see below section, "Hydropower Legislation in the 114th Congress," for additional information).

Federal Dam Removal and Hydropower

Interest in dam removal for ecosystem and species restoration and recreational purposes is a controversial issue, especially when the dam is producing hydroelectric power. Congress becomes involved as proposals for federal dam removal (or support for dam removal) are considered for authorization and appropriations, as well as in the ongoing implementation of some dam removal projects. H.R. 6247, introduced in the 112th Congress, would have barred federal agencies from funding the removal of hydroelectric dams unless explicitly authorized to do so by Congress.

There are a few federal facilities with hydropower units where dam removal has been debated and actively pursued. Most notably, two formerly nonfederal dams on the Elwha River in Washington (outside of Olympic National Park) were purchased and removed by the federal government to restore fish passage and the river ecosystem.[52] The Department of the Interior is involved in an ongoing effort to remove four nonfederal hydroelectric dams on the Klamath River in Oregon (near a major Reclamation project) through an agreement among project water users, a private dam owner, and others. While the Elwha project was authorized by Congress, the Klamath Dam removal project (including the relevant studies) has yet to receive congressional authorization.[53]

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[48] Bureau of Reclamation, *Assessment of Potential Capacity Increases at Existing Hydropower Plants*, October 2010, http://www.usbr.gov/power/AssessmentReport/USBRHMICapacityAdditionFinalReportOctober2010.pdf.

[49] U.S. Congress, House Committee on Natural Resources, Subcommittee on Water and Power, *Statement Michael Conner, Commission, Bureau of Reclamation, Hearing on Investment in Small Hydropower: Prospects of Expanding Low-Impact and Affordable Hydropower Generation in the West*, 111th Cong., 2nd sess., July 29, 2010.

[50] For more information on the program, see http://www.usbr.gov/uc/power/progact/nonfedpwr.html.

[51] P.L. 113-23, the Hydropower Regulatory Efficiency Act of 2013, for example.

[52] Removal of these two dams was authorized by Congress in 1992 in P.L. 102-495. Among other things, the act authorized the Secretary of the Interior to acquire the Elwha and Glines Canyon hydroelectric power projects (which were nonfederal dams at the time).

[53] For more information, see CRS Report R42158, *Klamath Basin Settlement Agreements*, coordinated by Charles V. (continued...)

In addition to the aforementioned efforts involving the federal government, some nonfederal groups are also involved in ongoing efforts (i.e., litigation) to force the removal of federal and nonfederal hydroelectric dams. The most prominent of these are efforts to remove four hydroelectric dams on the lower Snake River in Washington State that are operated by the Corps. The dams supply power to the Bonneville Power Administration and customers in the Pacific Northwest.[54] The status of these dams is controversial among some, who have called for their removal.[55] To date, the Obama Administration has not included removal of these dams as reasonable or prudent alternatives in several successive biological opinions on the effect of the Federal Columbia River Power System (FCRPS) on federally listed threatened and endangered species. However, litigation by nonfederal parties on this issue is ongoing, and some are concerned it could result in removal of the dams. If dam removal were mandated by the courts, the Corps would likely require specific authority from Congress to breach or remove any of these four dams.

Some interests oppose removal of hydroelectric dams, arguing that hydropower is a clean, renewable energy source. Others argue that dam removal should be considered among the suite of options in deciding whether to relicense and/or maintain aging hydropower dams, some of which may no longer be cost-effective to maintain and operate. Still others argue that dam removal is the best way to restore fish passage and avoid extinction of certain species.

Federal Power Marketing Administrations

The federal government operates four Power Marketing Administrations—Bonneville Power Administration (BPA) in the Pacific Northwest, Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA).[56] Each is operated as a distinct and self-contained entity within DOE. Among other responsibilities, the PMAs are responsible for marketing surplus power from Corps and Reclamation facilities to their customers.[57] The revenue collected from the sale of this power is deposited into the U.S. Treasury.[58] It is generally used to pay with interest the federal investment in the hydropower facilities. Gross annual revenue returned to the Treasury from power sales of electricity at federal facilities is estimated at approximately $5 billion, and usually amounts to considerably more than the budgets for hydropower and related operations and maintenance (O&M) for the Corps and Reclamation.

The Flood Control Act of 1944 requires that the PMAs sell and distribute power "at the lowest possible rate consistent with sound business practices."[59] This means that the PMAs typically sell power at a lower price than investor-owned utilities (whose purpose is to provide a financial

(...continued)

Stern.

[54] The dams are Lower Granite, Little Goose, Lower Monumental, and Ice Harbor.

[55] See, generally, National Wildlife Federation v. National Marine Fisheries Service, No. 01-640-RE.

[56] For more information, see CRS Report R41960, *Federal Agency Authority to Contract for Electric Power and Renewable Energy Supply*, by (name redacted).

[57] Some of the PMAs also own and operate transmission lines associated with these facilities.

[58] Revenues from most hydropower receipts are deposited into the General Fund of the Treasury, although as previously discussed, some hydropower receipts at Reclamation projects are credited to the Reclamation Fund.

[59] 16 U.S.C. §825s.

return to investors). For instance, in 2014, BPA's average industrial firm power rate was 3.9 cents per kilowatt-hour (kWh), compared with the nationwide average industrial retail price of 7.0 cents/kWh that same year.[60] This rate-setting policy was established to encourage regional economic development and appropriate use of federal assets. Some have pointed out that current PMA policies result in long-term, low-cost contracts that do not take into consideration major O&M upgrades and replacement, and are therefore artificially lower than the true cost needed to maintain these facilities.[61]

Costs to Ratepayers of Compliance with Environmental Laws

The use of hydropower revenues for fish mitigation has been another controversial issue associated with the PMAs. Previous Congresses have debated the cost of environmental laws to PMA ratepayers. In previous testimony, BPA estimated that costs for fish and wildlife mitigation, including the Endangered Species Act, accounted for $802 million, or approximately 30% of BPA's charges in 2010.[62] In addition to the magnitude of these costs, critics of these requirements also note that most PMA power customers are unaware that a part of their bill goes to fish and wildlife mitigation. The last proposal to address this issue was introduced in the 112th Congress; Section 5 of H.R. 6247, which was not enacted, would have required that the four PMAs include in their monthly billing statements to power customers estimates of the direct and indirect costs related to compliance with any federal environmental laws impacting the conservation of fish and wildlife.

Opportunities and Challenges

Hydropower generation at federal facilities has occurred since the early 20th century and is well established. These projects have provided low-cost power to many, but also have associated environmental costs. As previously mentioned, several recent studies have noted the potential for increases in federal hydropower, both through efficiency gains and through development of nonfederal power at federal sites. Two bills in the 112th Congress, H.R. 2842 and H.R. 6247, would have facilitated nonfederal development by directing revenues from lease of power privileges toward the rehabilitation and expansion of storage at Reclamation facilities and increasing opportunities for project authorization. Neither bill was enacted.

Challenges to future production and development persist. At Corps facilities in particular, hydroelectric production is facing a number of challenges, including aging infrastructure. The federal government is faced with limited options for dealing with these issues. Financing major upgrades and expansions of federal hydropower facilities beyond immediate maintenance needs is difficult to accomplish without congressional appropriations and, in some cases, authorizations. Construction of new projects also faces challenges. As with expansions and upgrades, new federal developments are dependent upon congressional actions. Other challenges for hydropower at or on federal facilities include

[60] Bonneville Power Administration, *BPA Facts*, March 2015, https://www.bpa.gov/news/pubs/GeneralPublications/gi-BPA-Facts.pdf.U.S. Energy Information Administration, *Electric Power Monthly*, Washington, DC, May 26, 2015, http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_03.

[61] Corps Hydropower Outlook, p. 39.

[62] Hearing on H.R. 1719, Statement of R. Scott Corwin. Testimony in 2006 by the BPA on H.R. 4857 estimated a similar percentage for these costs.

- Environmental operating restrictions to protect species that would otherwise be harmed by these projects;
- Uncertain and variable hydrologic conditions (e.g., precipitation and snowpack runoff patterns related to climate variability and change);[63]
- Limited operational flexibility (e.g., limits derived from congressional authorization and carefully negotiated operating manuals balancing multiple uses); and
- Demand for water by other competing uses (e.g., municipal water supply, navigation, and recreation).

Nonfederal Hydropower

Nonfederal hydropower projects can be privately owned or publicly owned, and may or may not be located at a federal site. They differ from federal projects primarily in that they are subject to regulation stemming from their licensing by FERC. According to U.S. Energy Information Administration (EIA) data, roughly 1,261 nonfederal hydropower plants generated 142,340 GWh of net electricity in 2013.[64] The amount generated constitutes roughly 53% of total electricity generated from hydropower and roughly 3.5% of total U.S. electricity in 2013.[65]

In addition to the general advantages and disadvantages of hydropower discussed earlier in this report, nonfederal projects have unique benefits. For example, some argue that nonfederal projects are more likely to receive regular maintenance and major upgrades than federal projects, since the plant owner has a financial incentive to generate as much electricity as possible. On the other hand, drawbacks of nonfederal projects generally mirror those of federal projects (e.g., initial high capital costs, environmental concerns, regulatory requirements). An additional drawback of nonfederal projects is the length of time required to obtain state and federal approval. Still, some surmise that any increase in hydropower generation is most likely to come from nonfederal projects because, as described earlier, federal projects face hurdles that could prevent them from adding substantial generation capacity quickly, with the major barrier being federal financing for major upgrades and expansions.

Federal Energy Regulatory Commission

FERC licenses the construction and operation of nonfederal hydropower projects.[66] It has the exclusive authority to license new nonfederal hydropower projects, relicense existing projects and

[63] A 2013 assessment conducted by DOE, *Effects of Climate Change on Federal Hydropower*, projects changes in runoff, precipitation, and air temperature will have minimal effects on hydropower generation in PMA regions. This amounts to reductions ranging from less than 2% to increases from 3.6% to 22%, in the near term (2010-2024), and reductions of 3.3% to 7.7% and an increase of 20% in the midterm (2024-2039) in various regions. U.S. Department of Energy, *Effects of Climate Change on Federal Hydropower*, Washington, DC, August 2013, http://www1.eere.energy.gov/water/pdfs/hydro_climate_change_report.pdf.

[64] Energy Information Administration, *2013 EIA-923 Data*, http://www.eia.gov/electricity/data/eia923/.

[65] CRS calculations do not include electricity generated from pumped storage projects.

[66] Three divisions under the FERC Office of Energy Projects (OEP) administer the hydropower responsibilities of the Commission—the Division of Hydropower Licensing (DHL), the Division of Hydropower Administration and Compliance (DHAC), and the Division of Dam Safety and Compliance (DDSC). DHL is responsible for case (continued...)

provide oversight for all ongoing projects, and it has a role in the decommissioning of projects.[67] FERC was granted this authority under the Federal Power Act of 1935 (FPA; 16 U.S.C. §§791-828c). FERC may issue a license for a hydroelectric project that

- is located on navigable waters of the United States;
- occupies public lands or reservations of the United States;
- utilizes surplus water or water power from a U.S. government dam; or
- is located on a body of water over which Congress has Commerce Clause jurisdiction, for which project construction occurred on or after August 26, 1935, and which affects interstate or foreign commerce.[68]

FERC reports that nonfederal projects represent 54 GW of hydropower capacity, or more than half of all U.S. hydropower capacity.[69] FERC has issued a license for 1,023 projects and has exempted 631 additional projects from the licensing process.[70] Licenses typically are issued for 50 years, but if the relicensing process is under way, an annual license is issued. A CRS analysis of 2015 FERC license expiration data suggests that 61 licensed projects (3.7%) are set to expire between January 2016 and December 2020 and that 296 licensed projects (17.9%) are set to expire between January 2016 and December 2026. Exemptions are issued in perpetuity.

FERC's role with respect to hydropower is to license and oversee projects. Historically, FERC placed more emphasis on encouraging hydropower development. However, most large-scale hydropower sites have been developed and FERC's current role focuses more on relicensing hydropower projects and examining the role of small hydropower projects and hydrokinetics.[71] FERC has worked with stakeholders, as directed by Congress, to streamline its application process. FERC now has three licensing processes that applicants may use to apply for a new license or relicense—the Traditional Licensing Process (TLP), the Alternative Licensing Process

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management and order preparation for applications for licenses, relicensing, exemptions, major amendment of licenses, 5MW exemptions, and license surrender of constructed projects. DHL is also responsible for the preparation of NEPA documents (e.g., environmental assessments and environmental impact statements) and pre-filing collaborative work. DHAC is primarily responsible for reviewing and ensuring compliance by owners of hydropower projects with the conditions specified in their licenses and exemptions. DDSC is responsible for construction, operation, exemption, prelicense, and environmental and public use inspections; engineering evaluations and studies; independent consultant report reviews; emergency action plan development and testing; engineering guidelines development; and interagency/industry committee participation.

[67] In addition to issuing licenses, in 1995 FERC released a policy statement (66 Federal Register 339) asserting that it has the legal authority to deny a new license at the time of relicensing. For more on license denial, dam removal, and dam decommissioning, see CRS Report RL33480, *Dam Removal: Issues, Considerations, and Controversies*, by (nam e redacted); and Federal Energy Regulatory Commission, "Project Decommissioning at Relicensing; Policy Statement," 60 *Federal Register* 339-356, Jan. 4, 1995.

[68] 16 U.S.C §817.

[69] CRS analysis of licenses and exemptions and authorized capacity. Both lists of licenses and exemptions are regularly updated and available at FERC's Hydropower website, http://www.ferc.gov/industries/hydropower.asp.

[70] Ibid. Reasons for the difference in the number of nonfederal facilities (roughly 1,654 according to FERC and roughly 1,261 according to EIA) are unclear. FERC offers two types of exemptions: small hydropower and conduits. For more information on exemptions, see Federal Energy Regulatory Commission, "Exemptions from Licensing," http://www.ferc.gov/industries/hydropower/gen-info/licensing/exemptions.asp.

[71] Hydrokinetic energy is generated from a flow of water, such as a tidal stream or river, passing through a conversion device, in the form of a wave converter or rotating device.

(ALP), and the Integrated Licensing Process (ILP).[72] In July 2005, the ILP became the default licensing process (see **Appendix**).[73]

Opportunities and Challenges

In many respects, nonfederal projects face the same challenges and opportunities as federal projects for both increased capacity at existing facilities and new capacity. Both federal and nonfederal projects must consider power generation, environmental concerns, and surrounding community issues (e.g., safety, recreation). Furthermore, they must consider power grid connection and transmission capacity. However, there are some issues unique to nonfederal projects, such as satisfying FERC licensing requirements.

Many contend that generation capacity at nonfederal projects should be expanded and that financial incentives are necessary to do so. For nonfederal investment, this could require Congress to consider whether to modify tax incentives or provide other subsidies and to further examine the role of FERC. Mitigating environmental costs and impacts associated with expansion also could be considered.

Challenges unique to nonfederal hydropower projects generally emerge from the regulatory framework. Some regulatory challenges involve the issuance and renewal of licenses in a timely manner, and the adequacy of the federal workforce to oversee the license and exemption process. Other challenges include community opposition, market demand fluctuations, and data collection and analysis to better assess production capability. For some time there has been criticism of FERC's handling of its licensing responsibilities, much of which centers on the assertion that the full potential of nonfederal hydropower is not being delivered because of licensing delays. Some argue that additional generation capacity from hydropower would be possible if FERC's licensing process were less of a barrier, specifically with respect to the amount of information needed to apply for a license and the time it takes to acquire a license. Others may contend that the amount of information needed in the licensing process is appropriate, given the safety and environmental concerns surrounding hydropower development.

Several factors affect the length of time it takes to issue a hydropower license, which in some cases may take six years or more. Obtaining a FERC license can involve roughly a dozen federal and state agencies.[74] Federal and state agencies that are consulted during the process may not always adhere to the prescribed time frames. For instance, a 2001 FERC report to Congress on hydroelectric license policies notes that one common reason license applications are delayed is untimely receipt of state water quality certification under the Clean Water Act.[75] Testimony by a

[72] For background on licensing processes, see CRS Report RL31903, *Relicensing of Nonfederal Hydroelectric Projects: Background and Procedural Reform Issues*, by (name redacted).

[73] Applicants may petition to use a different licensing process based on anticipated costs, level of complexity and controversy related to licensing, and other factors.

[74] An initial consultation contact list is available for each state, with information on federal, state, and regional agencies and more, at http://www.ferc.gov/industries/hydropower/enviro/consultlist.aspx. For an account of the changes to hydropower license processes over time, see CRS Report RL31903, *Relicensing of Nonfederal Hydroelectric Projects: Background and Procedural Reform Issues*, by (name redacted). The most recent modification to the licensing process was enacted in the 113th Congress, through P.L. 113-23, which is further discussed in the section "Enacted Legislation in the 113th Congress."

[75] FERC, Report on Hydroelectric Licensing Policies, Procedures, and Regulations Comprehensive Review and (continued...)

FERC representative delivered at a 2011 congressional hearing further expresses FERC's perspective:

> Project developers and other stakeholders, not the Commission, in most instances play the leading role in determining project success and whether the regulatory process will be short or long, simple or complex.
>
> To the extent that a proposed project, even one of small size, raises concerns about water use and other environmental issues, it may be difficult for the Commission to quickly process an application. It is important to remember that the small capacity of a proposed project does not necessarily mean that the project has only minor environmental impacts.[76]

Another issue of particular concern to some stakeholders is the requirement that agencies review and provide "mandatory conditions" to protect fish and other resources as part of the licensing process.[77] Others argue that the licensing process needs to be comprehensive, allowing impacted parties adequate time to review the application and offer comment because, once approved, licenses are valid for 30 years to 50 years. A legislative proposal to address some of these issues has been introduced in the 114th Congress. S. 1236 would designate FERC as the lead agency in coordinating federal authorization of projects and establishing a schedule with which federal and state agencies must comply. Additionally, the bill would have FERC investigate best practices for license studies, with the goal of producing a comprehensive methodology to inform future environmental impact reports.

Although the challenges for nonfederal projects are significant, there may be opportunities to overcome or minimize the significance of the barriers mentioned above. For example, legislation incorporating a federal renewable electricity or clean energy standard that includes hydropower or sets a price on carbon could reduce some market anxiety and lead to large-scale investments in new nonfederal projects. Moreover, energy efficiency measures and technological advancements could spur additional generation at existing projects.

Other Nonfederal Hydropower Issues

Other issues associated with nonfederal hydropower include its treatment in state renewable portfolio standards, annual charges by FERC for federal lands transferred with a power site classification, and residential and commercial development on the shoreline of FERC-regulated hydropower projects. These issues, which are discussed below, may have an indirect impact on the progress of hydropower to meet current and future energy demand.

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Recommendations Pursuant to Section 603 of the Energy Act of 2000, May 2001, http://www.ferc.gov/legal/maj-ord-reg/land-docs/ortc_final.pdf.

[76] Testimony of Jeff C. Wright, in U.S. Congress, Senate Committee on Energy and Natural Resources, *Full Committee Hearing: to hear testimony on S. 629, S. 630, and Title I, Subtitle D of the American Clean Energy Leadership Act of 2009,* 111th Cong., 1st sess., March 31, 2011.

[77] U.S. Congress, House Committee on Natural Resources, *Mandatory Conditioning Requirements on Hydropower: How Federal Resource Agencies are Driving Up Electricity Costs and Decreasing the Original Green Energy*, 112th Cong., 2nd sess., June 27, 2012. For more information on the licensing process, see **Appendix**. For more information on mandatory conditions, see Federal Energy Regulatory Commission, U.S. Department of Interior, and U.S. Department of Commerce, et al., *Interagency Task Force Report on Agency Recommendations, Conditions, and Prescriptions Under Part I of the Federal Power Act*, December 2000, http://www.ferc.gov/industries/hydropower/indus-act/itf/fpa_final.pdf.

Role of Hydropower in Renewable Electricity Standards

Some in Congress are interested in strategies that could support more domestic renewable energy production. One proposed strategy in the 114th Congress is a federal renewable electricity standard (RES) or clean energy standard (CES) (S. 1264), which would require certain retail electricity suppliers to provide a minimum percentage of the electricity they sell from renewable energy sources or other resources (see "Hydropower Legislation in the 114th Congress"). While a federal RES does not exist, many states have created a renewable portfolio standard (RPS)—essentially the same as an RES but carried out at the state level. As of June 2015, 37 states and the District of Columbia allow hydropower in their RPS.[78]

The inclusion of hydropower in state standards is not uniform, with each state setting its own criteria. The state standards generally have similar intents, but differ in how they achieve their goals. For example, many have different yearly targets and eligibility requirements for renewable sources. Some state standards include hydropower, but almost always with conditions (e.g., allowing only new hydro projects that have a capacity of 10 MW or less and do not require a new dam, allowing only existing hydro projects of 30 MW or less, excluding pumped storage, only including incremental production at existing facilities). Furthermore, the location and delivery requirements for the electricity generated differ for state standards, with a handful of states having caveats for "geographic eligibility" concerns for hydro projects.[79]

Federal Power Act Section 24 Power Site Reservations

Power site classification is the classification of federal lands that have potential value for water power development. Traditionally, the U.S. Geological Survey (USGS) has had the authority to classify the lands as having potential value for water power development (i.e., power site classification), FERC has jurisdiction over the power value on the lands, and BLM has certain management jurisdiction over the surface and subsurface resources, but not the power value. Once land is assigned a power site classification, this classification remains with the land. The classification is not extinguished if the land has been transferred out of federal ownership, although there is a process to extinguish the classification.

The "power site reservation" under Section 24 of the FPA has been the subject of a number of administrative disputes over the years.[80] One administrative dispute associated with power site classification is that hydropower projects on land transferred from federal ownership to state ownership are still subject to annual fees if the land has a power site classification.[81] According to FERC, annual charges are still required for federal lands that were transferred with a power site classification because the classification remains with the land and the United States still has the

[78] Hydropower Reform Coalition, *Renewable Portfolio Standard (RPS),* http://www.hydroreform.org/policy/rps. For specific standards and enacted legislation by state, see http://maps.google.com/maps/ms?ie=UTF8&hl=en&source=embed&msa=0&msid=211150021284136543290.00046428557edb853379c&t=m&ll=37.0625,-95.677068&spn=31.701751,62.490234.

[79] Ibid.

[80] Section 24 (16 U.S.C. §818) establishes that when FERC licenses a hydropower facility on federal land, it reserves lands associated with that facility for the federal government and that if and when such lands are later transferred by the federal government, the government reserves the ability to continue to regulate the hydroelectric facility.

[81] In November 2011, FERC issued a proposal to revise the methodology for assessing annual charges for the use of federal lands by hydropower projects. Federal Energy Regulatory Commission, "Annual Charges for Use of Government Lands," 76 *Federal Register* 72134-72142, November 22, 2011.

right to obtain power from this land.[82] FERC does not keep a record of the number of acres transferred with a power site classification.[83]

Hydroelectric Power and Shoreline Management Plans

Controversies over property rights in areas near hydropower facilities have drawn attention to the FERC "Shoreline Management Plan" (SMP) process. An SMP governs the use and occupancy of the project reservoir shoreline for activities not related to hydropower production. With an SMP, FERC is trying to ensure that waterfront development along the shoreline of hydropower projects does not have an adverse impact on project operations, public safety, commercial navigation, and other interests. In the past, FERC orders proposing to limit acceptable use and occupancy near hydroelectric facilities, including potential interference with existing recreational and other structures, have drawn the ire of nearby communities (see **Appendix**). For example, in 2013, local property owners contended that their rights and land use were limited by an SMP that included their property within the boundaries of a relicensed project.[84] In the past, property owners along some reservoirs have complained when reservoirs are drawn down to produce power. Such conflicts between shoreline uses can be especially acute during droughts. A proposal to amend Sections 4(e) and 10(a)(1) of the FPA to require FERC to consider the property rights of non-licensees during the licensing process has been introduced in the 114th Congress.[85]

The source of FERC's authority to require SMPs and to enforce their terms on hydropower license applicants is primarily found in Sections 10(a)(1) and 4(e) of the FPA.[86] However, the requirement that FERC-permitted hydropower facilities file and abide by SMPs is not in the FPA.[87] In fact, the phrase "shoreline management plan" does not appear anywhere in the *U.S. Code*. The only reference to SMPs is in the titles of the *Code of Federal Regulations* as a requirement that existing licensees include their SMPs in their pre-application filing for renewal of the license.[88] Section 10(a)(1) directs FERC to issue hydropower licenses that include a "comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of waterpower development, for the adequate protection mitigation, and enhancement of fish and wildlife … and for other beneficial public uses." Shoreline management plans are one way that FERC ensures that hydroelectric facilities that it permits satisfy these requirements.

Within this broad statutory framework, FERC decides on a case-by-case basis whether an SMP is warranted for a proposed hydropower licensee. On occasion an applicant has submitted a

[82] Personal communication with FERC Office of the General Counsel, January 31, 2012. Annual charges for hydropower projects allow FERC to recover costs incurred in the performance of its regulatory responsibilities. Information on annual charges, including FERC's proposal to revise the methodology for calculating rental rates for the use of federal lands by hydropower projects is available at http://www.ferc.gov/industries/hydropower/annual-charges.asp.

[83] Written testimony of John Katz. U.S. Congress, Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power, *Miscellaneous Water Bills*, 112th Cong., 2nd sess., September 19, 2012.

[84] Crescent Bar Condominium Master Ass'n and Crescent Bar Recreational Vehicle Homeowners Ass'n v. FERC, No. 13-73971(9th Cir. filed 11/15/2013), http://www.ferc.gov/legal/court-cases/briefs/2014/9th13-73971CrescentBar.pdf.

[85] H.R. 2929.

[86] 16 U.S.C. §803(a)(1).

[87] 16 U.S.C. §792 et seq.

[88] 18 C.F.R. §5.6.

proposed SMP without prompting by FERC. In some cases, FERC determined an SMP was not needed. Regardless of whether a hydropower licensee is required to submit an SMP, all licensees must obtain the property rights needed to satisfy any obligations that may be included in an SMP.

Legislative Questions

Federal Hydropower

What Are Some of the Options to Address Aging Hydropower Infrastructure at Existing Federal Hydropower Projects?

As previously discussed, declining generation trends at federal facilities have been tied to aging infrastructure and the need for funds to replace and/or upgrade this infrastructure. Several policy options have previously been proposed to deal with aging federal hydropower infrastructure. Some of these options are specific to the Corps or Reclamation, while others could generally apply to both agencies. All of these options have budgetary costs in one form or another. Some of the options commonly mentioned include

- **Increase federal funding for hydropower upgrades and/or modernization initiatives within annual appropriations processes**. This option would maintain the status quo practice of funding hydropower upgrades within existing discretionary budget allocations, albeit at increased levels or over a different timetable. Some point out that increased funding in annual appropriations is unrealistic in the current budgetary climate.
- **Use alternative funding mechanisms to finance hydropower upgrades**. Some have proposed alternative funding mechanisms that fall outside of the regular appropriations process, such as an infrastructure bank or some form of private sector contracting vehicle (such as Energy Savings Performance Contracts, or ESPCs).[89] Advocates argue that these funding mechanisms could increase hydropower production without requiring annual appropriations. However, using these alternative programs to fund federal projects typically entails "up-front" budgetary costs, especially if they entail federal backing (e.g., loan guarantees) or otherwise commit future federal outlays.
- **Increase rates to re-coup "full" costs of operations and maintenance (including major upgrades) and/or institute new user charges to pay for upgrades.** Some argue that rates charged by the PMAs should be increased to recover the costs for major infrastructure upgrades. Congress could alter existing law to allow for these increased rates. However, any practice that results in increased rates for PMA customers may be viewed negatively by customers and some Members of Congress.
- **Privatize federally owned dams through divestiture of assets.** One option sometimes raised is the potential to privatize federally owned hydropower assets,

[89] More information on ESPCs is available at http://www1.eere.energy.gov/femp/financing/espcs.html. Currently, federal hydroelectric projects are ineligible for ESPCs.

thereby relieving the federal government of its operation and maintenance responsibilities and putting these dams in the hands of other interests, who might better afford to invest in facility upgrades that would increase generation. However, private entities might also increase electricity rates to achieve greater revenues and repay investments in these projects.

- **Allow customers to commit future power revenues to pay for upgrades to federal facilities.** Some would prefer that those entities that benefit from federal hydropower upgrades be allowed to directly finance these upgrades by redirecting funds that would otherwise flow to the Treasury for these projects. Some PMAs, including BPA, already have some form of this authority, and some advocate for extending it to the other PMAs.[90] In the 112th Congress, Section 6 of H.R. 6247 could have allowed PMA customers to harness funding streams to pay for future facility upgrades under some circumstances.

What Are Some of the Current Data Gaps Related to Federal Hydropower?

Although a number of the studies previously mentioned in this report collected data on federal hydropower resources, several data gaps have been identified. For instance, one study identified a data gap on the value of ancillary benefits from federal hydropower operations.[91] Ancillary benefits, such as the ability to suddenly increase hydropower production when power is needed (and/or other sources are not available), have the potential to boost the stability and resilience of the nation's power system.[92] However, the role and value that federal hydropower sources currently provide or could provide through ancillary benefits has not been well documented. Additionally, although Reclamation has investigated the economic feasibility of uprating and capacity additions at its facilities, the Corps has not published a similar study. Other gaps related to availability of downscaled climate data of sufficient quality to inform operations of hydropower facilities are a source of ongoing controversy for federal projects.[93]

How Does Uncertainty Affect Operations of Federal Projects?

Uncertainty, in the form of natural climate variability and related changes (e.g., precipitation, runoff), has affected water resources in the past and may affect how much and when water is available for hydroelectric generation in the future. Both the Corps and Reclamation have found that operations of federal hydropower infrastructure will need to be altered due to climate change.[94] Federal facilities are often operated based on procedures set out in operating manuals, which are commonly put together based on past trends and the assumption of "stationarity" (i.e., the idea that future hydrologic trends will be similar to past time periods). Revising these

[90] Specifically, Congress provided BPA with "self-financing" authority in 1974 (P.L. 93-454) by establishing a separate fund in the Treasury, the Bonneville Fund, in which BPA deposits and manages its revenues. The fund allows for BPA to enter into multi-year commitments. BPA also has the authority to borrow from the Treasury; it must repay these loans with interest at market rates.

[91] Corps Hydropower Outlook, p. 51.

[92] Another ancillary benefit is hydropower's ability to restart electric power systems in the event of a blackout; this is known as "black start."

[93] Joshua H. Viers, "Hydropower Relicensing and Climate Change," *Journal of the American Water Resources Association*, vol. 47, no. 4 (August 2011), pp. 655-661.

[94] For example, see the Corps climate response page at http://corpsclimate.us/responses.cfm. Reclamation research on climate change is compiled at http://www.usbr.gov/climate/SECURE/.

estimates can be difficult, and much uncertainty still exists in the process. Alterations to federal operations are further complicated by existing requirements to meet multiple competing goals in the face of uncertain water conditions. Some stakeholders have questioned whether federal agencies will require greater flexibility in operating existing reservoirs if climate conditions result in changes to weather patterns, less predictability, and more extreme events. In 2009, the Secretary of the Interior, Ken Salazar, issued an order stating that the department (which has purview over the Bureau of Reclamation) would consider and analyze climate change impacts when undertaking long range planning exercises, but to date the effect of the order on hydropower operations at specific facilities remains unclear.[95] Similarly, in a 2013 report to Congress, DOE gave an assessment on the projected effects of climate change on hydropower generation in each of the PMA regions over near-term (2010-2024) and midterm (2025-2039) periods.[96]

Nonfederal Hydropower

Should Congress Support Additional Nonfederal Hydropower Projects?

There is a debate about whether more nonfederal hydropower could help to meet current and future electricity demand.[97] Additional hydropower could be used as a tool to minimize the electric utility industry's overall emissions.[98] Hydropower can also be a flexible source of generation. It can be a baseload energy source, meaning that it is readily available, or it can be used for peaking, meaning that it is turned off and on to meet peak demand. On the other hand, there can be environmental concerns, regulatory concerns, and security concerns. Congress could decide whether to support additional hydropower development, how much additional development is necessary, and whether the current regulatory environment for nonfederal hydropower is appropriate. Congress could also determine how involved it wants to be with nonfederal hydropower projects. Hydropower is one of the few remaining energy sources where the federal government owns a significant portion of the projects that generate the bulk of the electricity. Congress could decide that hydropower development of a certain size and scale is an energy resource that no longer requires such large ownership and intervention by the U.S. government, possibly transferring some of those activities and infrastructure to nonfederal entities.

[95] Department of the Interior, *Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural Resources*, Order No. 3289, Washington, DC, September 14, 2009, http://www.doi.gov/whatwedo/climate/cop15/upload/SecOrder3289.pdf.

[96] The report did not address shorter time intervals, local, or project-specific conditions. DOE is currently developing more detailed modeling approaches as well as studying non-climatic factors that may have significant impacts on federal facilities. U.S. Department of Energy, *Effects of Climate Change on Federal Hydropower*, Washington, DC, August 2013, http://www1.eere.energy.gov/water/pdfs/hydro_climate_change_report.pdf.

[97] For a variety of reasons, electricity generation from coal is predicted to be on the decline in the United States. U.S. Energy Information Administration, *Annual Energy Outlook 2015*, Washington, DC, April 2015, http://www.eia.gov/forecasts/aeo/pdf/0383(2015).pdf.

[98] While hydropower is often viewed as being a clean and renewable source of energy, the environmental costs due to stream flow disruption, particularly effects on fish and wildlife, can be quite high. For example, the Bonneville Power Administration and Reclamation spend hundreds of millions on salmon restoration and mitigation activities associated with federal dams and hydropower facilities. Requiring fish mitigation strategies upfront might avoid costly habitat mitigation later.

In What Ways Can Additional Power Be Generated from Existing Nonfederal Projects?

Congress could offer support for additional hydropower generation using numerous mechanisms. For example, the 113th Congress passed the Hydropower Regulatory Efficiency Act of 2013 (P.L. 113-23), which grants small hydropower projects with a capacity of 10 megawatts or less an exemption from licensing requirements, promotes conduit hydropower projects, and requires FERC to examine the feasibility of a two-year licensing process to promote hydropower development at nonpowered dams and closed-loop pumped storage projects, among other things. Small hydropower—less than 10 MW—represents approximately 5% of total U.S. hydropower capacity.[99]

Congress could choose to assess current federally funded efforts for nonfederal hydropower projects and take action by providing supplementary funds or modifying efforts to ensure that congressional goals are met on schedule.[100] Congress may evaluate tax credits available for hydropower. Some could argue that hydropower does not need assistance in the form of tax credits because it is an established source and tax credits should be issued to ease the entry of new renewable energy sources to the market, or all types of generation should have to compete without federal support. Others could argue that tax credits are needed for hydropower to defray the large capital costs associated with new projects.

Additionally, Congress could establish a clean energy standard that includes hydropower as an eligible clean energy source (e.g., S. 1264, H.R. 1971, introduced in the 114th Congress). As mentioned earlier, some contend that FERC licensing is an impediment to increasing hydropower capacity. Congress could amend specific laws to expedite the licensing process for select projects (e.g., S. 1236).

What Could Congress Do to Expedite Nonfederal Project Licensing?

Congress may decide to further examine FERC's role in nonfederal hydropower regulation. One oversight issue includes time delays throughout the licensing process, such as those related to gathering input from multiple affected parties and agencies. If the length of time required for licensing continues to be a concern, Congress could impress upon federal, state, and local agencies involved in the licensing process the need to complete their contributions in a prompt manner. However, some stakeholders might object if they believe their concerns (e.g., fish, wildlife, recreation, water use, or other impacts) are not given sufficient time to be thoroughly vetted.

[99] Based on a CRS analysis of NHAAP Existing hydropower assets dataset.

[100] For example, DOE supports conventional hydropower through its water power research and development program. The program's conventional hydropower activities are focused on new technologies, optimization, and siting techniques that might improve combined energy and environmental performance.

Hydropower Legislation in the 114th Congress

Several bills related to the expansion of hydropower development and modifying the regulatory process have been introduced in the 114th Congress. These bills are discussed below:

S. 1236, the Hydropower Improvement Act of 2015, proposes to amend the FPA[101] with regard to FERC's authority on hydropower projects, as well as other issues. The bill would designate FERC as the lead agency for coordinating all federal authorization of hydropower projects, as which it would establish and comply with a schedule for granting licenses and permits, collect all required information from federal and state agencies, and make determinations on projects. FERC would examine and compile existing data and methodologies to form a comprehensive environmental impact statement framework for license studies. Under S. 1236, both FERC and resource agencies would submit to Congress annual reports on the changes in the quantity and capacity of energy as well as an assessment of the economic, climatic, air quality, and environmental costs and benefits of all licensed, exempt, and proposed hydropower projects. The bill would extend the preliminary permit term for up to eight years and would allow the possibility of additional permits under special circumstances. S. 1236 would modify the administrative hearing process to allow license applicants to contest disputes related to the licensing process in trial-type hearings conducted by FERC's Office of Administrative Law Judges. The bill states that hydropower would be a renewable resource for the purposes of all federal programs. S. 1236 also would modify the operation and maintenance of fishways near projects on the condition that FERC determines that there is a direct link in which fishways are necessary for the mitigation of project effects on fish populations.

S. 1264, the Renewable Electricity Standard Act, proposes to amend the Public Utility Regulatory Policies Act of 1978 to establish a federal renewable energy standard and a federal renewable energy credit program. The bill would require retail electric suppliers who sell 1,000 GWh or more of electric energy to meet an annual standard in which a percentage of the base quantity of electricity must be generated from renewable energy resources. (The annual percentage requirement ranges from 7.5% in calendar year 2015 to 20.0% in 2025 and 30.0% in years 2030 through 2039.) Retail electric suppliers may submit an application to be issued credits and may submit credits to the Secretary of Energy, who would manage the program. Under S. 1264, incremental hydropower, in the form of efficiency improvements or capacity additions to hydropower facilities, constructed from the date that the bill is enacted, would qualify for renewable energy credits.

S. 1338, the Small Hydropower Dependable Regulatory Order Act of 2015, proposes to amend the FPA by adding that covered projects with a capacity of 5 MW or less would receive licensing decisions from FERC within 180 days of the submission of an application. Licenses for covered projects would be modified to 10-year terms.

S. 1270, the Reliable Investment in Vital Energy Resources (RIVER) Act, proposes to amend Section 242 of the Energy Policy Act of 2005[102] to reauthorize incentives for the production and

[101] 16 U.S.C. §797.

[102] Section 242 directs the Secretary of Energy to provide payments to owners or operators of nonfederal hydropower facilities built before 2005. The guideline for these incentive payments is 1.8 cents/kWh when adjusted for inflation.

efficiency improvement of hydropower. The 113th Congress authorized appropriations payments for FY2014. S. 1270 would extend this incentive program from FY2016 to FY2025.

In addition to these bills, the 114th Congress may consider conducting oversight on policies or programs authorized by laws passed in previous Congresses. The 113th Congress enacted legislation that made changes to hydropower development and related processes: P.L. 113-23 (Hydropower Regulatory Efficiency Act of 2013) and P.L. 113-24 (Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act).[103] Each of these laws is discussed below.

Enacted Legislation in the 113th Congress

P.L. 113-23, The Hydropower Regulatory Efficiency Act of 2013, contains a number of provisions that are intended to promote the development of additional select hydropower projects.[104] Section 3 amended the Public Utility Regulatory Policies Act of 1978 (PURPA) to redefine small hydropower as 10 MW or less. Previously, PURPA defined small hydropower as 5 MW or less.[105] P.L. 113-23 permits FERC to grant an exemption for small hydropower projects. Section 4 amended Section 30 of the FPA by not requiring qualifying conduit hydropower projects to be licensed and by expediting the approval process. The law gives FERC 15 days to make an initial determination on the project's notice of intent, and it gives the public 45 days to contest the notice. Previously, there was no explicit time limit by which FERC had to make a determination. The law allows FERC to grant an exemption for conduit projects with certain stipulations and for those projects with an installed capacity of 40 MW or less. Previously, the FPA allowed FERC to issue an exemption only for generating capacities of 15 MW or less for nonmunicipal and 40 MW or less for municipal projects. Section 5 of P.L. 113-23 amended Section 5 of the FPA to allow preliminary permits to be extended once for two years. Previously, the FPA allowed for the issuance of preliminary permits for three years with no extension. Section 6 requires FERC to study the feasibility of issuing a license within a two-year period for projects at nonpowered dams and closed-loop pumped storage facilities. Section 7 requires the Secretary of Energy to study various aspects of pumped storage facilities and to submit to Congress a report with study results and any recommendations.

P.L. 113-24, the Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act, made changes to the process by which Reclamation permits nonfederal hydropower development at its projects (see "Nonfederal Development at Reclamation Facilities," above). Lease of Power Privilege previously was possible only at Reclamation facilities specifically authorized for hydropower development. P.L. 113-24 authorized this development for all Reclamation projects (e.g., irrigation projects). It also clarified that Reclamation's Power Resources Office shall be the lead office to set policy and procedures for this type of hydropower development (i.e., not FERC), that local project operators shall be the first entities offered the

[103] Another bill, the Bonneville Unit Clean Hydropower Facilitation Act (P.L. 113-20), was also enacted but is not discussed here because its provisions are geographically specific. P.L. 113-20 authorizes the Secretary of the Interior to facilitate the development of hydroelectric power on the Diamond Fork System of the Central Utah Project.

[104] FERC testimony given at a Senate committee hearing delves into some of their concerns about the act. Testimony of Jeff C. Wright, in U.S. Congress, Senate Committee on Energy and Natural Resources, *Full Committee Hearing: To Consider Energy Efficiency and Hydropower Bills*, 113th Cong., 1st sess., April 23, 2013.

[105] 16 U.S.C. §2705.

chance to develop conduit hydropower, and that these projects shall receive categorical exclusions under the National Environmental Policy Act of 1969 (42 U.S.C. §4321 et seq).

P.L. 113-121, the Water Resources Reform and Development Act of 2014, states that the approval and construction of nonfederal hydropower at Corps facilities should be expedited. It required the Secretary of the Army to submit a biennial report describing the initiatives to encourage nonfederal hydropower development at Corps facilities as well as the status, costs, and environmental impact of nonfederal hydropower projects associated with the Corps.

P.L. 113-76, the Consolidated Appropriations Act, appropriated funds to DOE to carry out a hydropower development program under Section 242 of the Energy Policy Act of 2005. This program directs the Secretary of Energy to provide incentive payments to owners or operators of nonfederal hydropower facilities for electricity generated from hydropower over a 10-year period. To be eligible, the hydropower facility must have been built before 2005 and the facility owner must sign and file a formal application. The guideline given for potential incentive payment is 1.8 cents/kWh, adjusted for inflation.

Conclusion

It is unclear whether financing to construct, operate, and maintain hydropower projects will be a congressional priority. Federal operators of hydroelectric facilities have noted the need for infrastructure improvements. The private sector has a sizeable presence in the small hydropower market. Depending on the economics of the power market, the private sector could expand power capacity and production. However, it is unlikely that there will be public or private sector investment in large hydropower projects in the near term owing to economic and geographic constraints,[106] environmental concerns, changes in climate, and public perception. It is possible that other forms of water power (e.g., hydrokinetics, ocean thermal) may one day contribute to the U.S. energy portfolio, but small hydropower is a more likely near-term option. If Congress determines that increasing hydropower capacity is a priority, then Congress could pursue several policy options to add additional hydropower generation in the public or private sectors or both.

As Congress considers whether to alter support for future hydropower development, it is also dealing with current hydropower infrastructure issues. These include aging infrastructure, delayed maintenance, the permitting process, and water availability.

Many of the hydropower issues Congress is likely to address in the near term are the same issues it has addressed for some time: operation of federal projects, the permitting process for nonfederal projects, and environmental impacts. The federal government has been responsible for ownership and operation of the bulk of the larger projects. Regular maintenance and upkeep of federal projects has not kept a pace that some would prefer. Also, developers of nonfederal projects would like an easier way to obtain permits and financing for their projects. The nonfederal project permit process has been revised over time in an effort to streamline the process, but still is unacceptable to some.

Hydropower has a long tenure in the electricity market, and its advantages and disadvantages are well documented. However, there are questions for Congress about whether hydropower capacity

[106] Most of the large, economically feasible generation sites were developed in the 20th century.

could or should be increased, and whether that increase should occur at existing projects or by building new projects (including small and low-head hydropower), or both. Other issues affecting conventional hydropower involve the development of nonconventional hydropower technologies, competition from other energy sources (e.g., wind) that are perceived to be more environmentally friendly, and competition from fossil fuel energy sources that may be significantly cheaper (e.g., natural gas).

Appendix. FERC Integrated Licensing Process

FERC's Integrated Licensing Process

The Integrated Licensing Process (ILP) was implemented in 2005 to offer a more efficient licensing process.[107] The ILP incorporates elements of the Traditional Licensing Process (TLP) created in 1985 (e.g., deadlines for multiple steps), and the Alternative Licensing Process (ALP) created in 1997 (e.g., focus on early stakeholder involvement). Additionally, the ILP includes a new process for resolving study disputes and requires FERC to participate earlier in the licensing process. FERC indicates that these changes are intended to make the process shorter and more efficient without altering agencies' authorities under the FPA or the Clean Water Act (33 U.S.C. §1341) to develop license conditions that protect fish, federal reservations (e.g., national forests, Indian reservations), or rivers' state-designated uses. The ILP differs from the TLP and the ALP in that it is more collaborative than the TLP and more structured than the ALP. Also, the ILP moves FERC's National Environmental Policy Act (NEPA) scoping process from the post-application phase to the pre-application phase in an effort to resolve study disputes early in the licensing process.

Some entities that might be consulted during the licensing process include

- National Marine Fisheries Service (NOAA Fisheries);
- U.S. Fish and Wildlife Service (FWS);
- National Park Service (NPS);
- U.S. Environmental Protection Agency (EPA);
- the federal agency administering any United States lands or facilities to be used or occupied by the project (e.g., U.S. Forest Service, Bureau of Land Management, etc.);
- any state agency with responsibility for fish, wildlife, and botanical resources, water quality, coastal zone management plan consistency certification, shoreline management, and water resources;
- the State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officer (THPO—if applicable);
- local, state, and regional recreation agencies and planning commissions;
- local and state zoning agencies;
- any Indian tribe that may be affected by the project; and
- any potentially affected landowners;

[107] FERC receives an annual appropriation from Congress to defray its operating costs and recovers 100% of this appropriation through the collection of annual charges and filing fees. There are no filing fees for hydropower projects. However, there are annual charges for hydropower projects if the project capacity is greater than 1.5 megawatts (MW). The annual charges for hydropower projects in 2010 totaled nearly $81 million. (The total included 2010 actual administrative charges, 2010 actual fix annual charges, and 2010 other federal agency annual charges.) See Federal Energy Regulatory Commission, "Annual Charges," http://www.ferc.gov/industries/hydropower/annual-charges.asp.

Applicable laws that might have to be complied with throughout the licensing process include

- Section 401 of the Clean Water Act (CWA);
- Endangered Species Act (ESA);
- Magnuson-Stevens Fishery Conservation and Management Act;
- Coastal Zone Management Act (CZMA);
- National Historic Preservation Act (NHPA);
- Pacific Northwest Power Planning and Conservation Act;
- Wild and Scenic Rivers and Wilderness Act; and
- National Environmental Policy Act.

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