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NOTE

FERC's Small Hydropower Exemption: A Missed Opportunity

Alex B. Clay[1]

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INTRODUCTION

In 2008, two separate hydropower projects were decommissioned on the Penobscot River in Maine.[2] When both of the dams were removed a few years later, it marked the first time in over 100 years that the area's historic Atlantic Salmon population was able to navigate a large portion of the river—approximately 1,000 miles—in order to spawn.[3] Biologists predicted the salmon population would increase exponentially and that eleven other species of fish would likely benefit in similar ways.[4]

The dams that had long impeded the largest salmon run in the United States, the Veazie Dam and the Great Works Dam,[5] had each produced fewer than ten megawatts (MW) of electricity—8.4 MW and 7.9 MW, respectively.[6] Had those hydropower projects been initiated today, they would likely qualify as "small hydropower projects," entitling them to an exemption from the burdensome, costly licensing process that dams producing more electricity must undergo.

Under section 4(e) of the Federal Power Act (FPA), the Federal Energy Regulatory Commission (FERC) may issue licenses to hydropower projects,[7] allowing them to operate for a fixed term—usually thirty to fifty years.[8] In issuing the licenses, FERC may include provisions to protect the environment and surrounding ecosystem as recommended by various state and federal agencies.[9] Although these provisions provide much needed safeguards for the various

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[2] FED. ENERGY REGULATORY COMM'N, FINAL ENVIRONMENTAL ASSESSMENT: APPLICATION FOR SURRENDER OF LICENSE: VEAZIE, GREAT WORKS, AND HOWLAND PROJECTS: FERC PROJECT NOS. 2403-056, 2312-019, AND 2721-020, at 1 (May 2010), https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12347892 [https://perma.cc/P84V-ZQKW].

[3] Jeff Opperman, *Penobscot River Dam Removal: Lessons for a World Demanding Energy*, COOL GREEN SCI. (Aug. 16, 2013), http://blog.nature.org/science/2013/08/16/penobscot-river-lessons-dam-removal-energy-hydropower/ [https://perma.cc/Z4RX-8M7H]. For additional discussion of the removal of the Veazie and Great Works Dams, as well as pictures documenting the river before and after the dams were removed, see *Veazie Dam Removal*, PENOBSCOT RIVER RESTORATION TR., http://www.penobscotriver.org/content/5012/veazie-dam-removal [https://perma.cc/Y29J-2ZEA] (last visited Jan. 13, 2018); *Great Works Dam Removal*, PENOBSCOT RIVER RESTORATION TR., http://www.penobscotriver.org/content/4149/great-works-dam-removal [https://perma.cc/D9S6-YUV3] (last visited Jan. 13, 2018).

[4] Opperman, *supra* note 3.

[5] *Id.*

[6] Order Accepting Surrender of Licenses with Dam Removal and Dismissing Applications for New Licenses, 131 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 62,238, at 3 (June 16, 2010), https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12368015 [https://perma.cc/J3RL-FGPT].

[7] 16 U.S.C. § 797(e) (2012); *see also* 18 C.F.R. § 4.40 (2017).

[8] *See* Catherine Cumming, Note, *The Hydropower Regulatory Efficiency Act: Not Giving a Dam for Negative Externalities or Stakeholder Oversight*, 16 MINN. J.L. SCI. & TECH. 917, 933–34 (2015).

[9] *Id.* at 934–35.

stakeholders affected by the hydropower project, the real protection lies in the temporary nature of the licenses.[10] Once the license has expired, the developer must reapply and undergo an additional application review.[11] This requirement is a crucial check of the dam's impact on surrounding communities and ecosystems.[12]

But, under the Public Utility Regulatory Policies Act of 1978, FERC may issue license exemptions for existing hydropower projects purporting to produce ten MW of electricity or less.[13] The exemption was meant to promote the development of small hydropower projects,[14] presumably to lessen dependence on more environmentally-destructive energy resources. Unlike licenses, these exemptions are perpetual, meaning the developer will likely never have to reapply for a license or exemption.[15] Although the exemptions apply only to projects that will be built into an existing dam, the perpetual nature of the projects essentially ensures the continued operation of the dam, no matter how large or harmful to the surrounding environment or communities it may become.

The exemption provision is based on the assumption that small hydropower projects—projects producing fewer than ten MW of power—have less of an impact on the environment than larger dams.[16] While this may be true in a general sense—that is, it is presumably true that a dam capable of producing five MW of power has less of an impact on a river than a dam capable of producing 500 MW of power—this belief has largely been debunked.[17] In fact, studies have consistently shown that small hydropower dams, in the aggregate, and in some cases, as individual dams, can far exceed the harm caused by larger dams requiring fixed-term licenses.[18]

Keeping this in mind, the exemption requirement—that the project produce ten MW or fewer of power—seems not only arbitrary and unnecessary, but inefficient

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[10] *See id.* at 933–35.

[11] *Id.* at 934–35.

[12] *See id.*

[13] Public Utility Regulatory Policies Act of 1978 § 405, 816 U.S.C. § 2705(a) (2012) (expediting licensing procedures for existing dams); *see also id.* 2705(d) (allowing FERC, "by rule or order[,]" to issue license exemptions to "small hydroelectric power projects having a proposed installed capacity of 10,000 kilowatts or less").

[14] *See* Hydropower Regulatory Efficiency Act of 2013, Pub. L. No. 113–23, §§ 2–3, 127 Stat. 493, 493.

[15] Cumming, *supra* note 8, at 949–50.

[16] *See id.* at 945–47.

[17] *See id.* at 947 & n.200.

[18] *See* Kelly M. Kibler & Desiree D. Tullos, *Cumulative Biophysical Impact of Small and Large Hydropower Development in Nu River, China*, 49 WATER RESOURCES RES. 3104, 3104, 3111–16 (2013); Darwin Werthessen, *Environmental Considerations of Small-Scale Hydroelectric Power Plants in Himachal Pradesh, India*, 10 BRIDGEWATER ST. U. UNDERGRADUATE REV., 178, 181 (2014); Dave Levitan, *As Small Hydropower Expands, so Does Caution on Its Impact*, YALE ENV'T 360 (Aug. 4, 2014), http://e360.yale.edu/feature/as_small_hydropower_expands_so_does_caution_on_its_impacts/2790/ [https://perma.cc/RH3B-TF6Z]; Press Release, Nat'l Sci. Found., Small Dams on Chinese River Harm Env't More than Expected (May 28, 2013), https://www.nsf.gov/news/news_summ.jsp?cntn_id=128073 [https://perma.cc/YCK3-5PBV] (discussing the significant negative impacts of small hydroelectric projects, despite their low output of power).

for the purpose of promoting low-impact energy. Such a requirement not only allows potentially harmful dams to be issued perpetual licenses under the false assumption that they are clean energy, but also fails to incentivize efficient hydropower projects that produce a large amount of energy and have a relatively small environmental impact.

Despite evidence that small hydropower may be just as devastating to the environment as large hydropower, in the face of a pressing need to decrease our reliance on nonrenewable sources of energy, promoting the development of a renewable source of energy such as hydropower is certainly an endeavor worth pursuing. Furthermore, legislative measures seeking to advance this goal have garnered "overwhelming bipartisan support."[19]

Therefore, this Note does not argue that the small hydropower exemption should be abandoned altogether. Instead, it argues that exemption eligibility should be based on criteria that measures the environmental impact of a hydropower project and dam and not on the current electricity output-based requirement of ten MW or less. Such a requirement would not only further advance the goals of the FPA in protecting the environment, but would also increase the overall production of electricity from hydropower by allowing projects producing higher amounts of energy to be eligible for the less costly exemption process.

Part I of this Note details the license and exemption application processes and the various safeguards placed on hydropower projects. Part II disputes the assumption that hydropower projects producing a small amount of electricity are less harmful to the environment than ones producing a large amount and are therefore less deserving of environmental regulation. Part III explains how the current exemption falls short of adequately promoting efficient energy production. Part IV advocates for the replacement of the electricity output-based metric by which hydroelectric projects are currently assessed in determining their eligibility for the exemption. Finally, Part V proposes and discusses possible metrics to measure environmental impact that could be adopted in place of the electricity output-based metric.

[19] Gina S. Warren, *Hydropower: Time for a Small Makeover*, 24 IND. INT'L & COMP. L. REV. 249, 260–61 (2014).

I. THE LICENSING AND EXEMPTION SCHEME

A. Licenses

Through section 792 of the FPA, Congress created FERC and gave it the exclusive authority to issue licenses and regulate the development of all nonfederal hydropower facilities.[20] FERC may grant either original (initial) or new (relicense) hydropower licenses.[21] These licenses grant a private entity the ability to build and operate the hydropower project for a fixed period of time between thirty and fifty years, after which the entity must apply for a new license.[22]

Considerable safeguards against environmental externalities exist in the FERC licensing scheme. Notably, both original and new licenses may be subject to mandatory operating conditions set by FERC or suggested by certain federal and state agencies.[23]

Under section 4(e) of the FPA, hydropower projects on federally reserved lands, such as Indian reservations and national forests, are subject to mandatory conditions set forth by the secretary of the department that has jurisdiction over the federally reserved land.[24] These "conditions may address a range of goals"[25] aimed at maintaining the reservation.[26] For example, the Bureau of Indian Affairs, Bureau of Reclamation, and National Park Service, have all issued section 4(e) conditions in the past.[27] Further, the Clean Water Act extended condition-making authority to state water pollution-control agencies.[28] Under that Act, FERC must include conditions "that the state deems necessary to maintain state-designated uses or water quality standards."[29]

Similarly, section 18 of the FPA grants agencies the authority to impose mandatory license conditions aimed at helping fish travel around barriers created by the project.[30] These conditions often require the license holder to construct physical structures that provide migratory fish a passage around or through the dam.[31] Both

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[20] 16 U.S.C. § 792 (2012); *see also* KYNA POWERS, CONG. RESEARCH SERV., IB10122, HYDROPOWER LICENSE CONDITIONS AND THE RELICENSING PROCESS 2 (July 18, 2003); *see also*

[21] *See* FED. ENERGY REGULATORY COMM'N, *Guide to Developing Small/Low-Impact Hydropower Projects*, https://www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact/small-hydro.pdf [https://perma.cc/F9ZX-Q5RJ].

[22] *Id.*

[23] *See Small/Low-Impact Hydropower Projects: Project Comparison Chart*, FED. ENERGY REGULATORY COMM'N, https://www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact/get-started/exemp-licens/project-comparison.asp [https://perma.cc/8JLE-8A9Q] (last updated Nov. 22, 2017).

[24] POWERS, *supra* note 20, at 2.

[25] *Id.*

[26] *Id.*

[27] *Id.*

[28] *Id.*

[29] *Id.*

[30] 16 U.S.C. § 811; POWERS, *supra* note 20, at 3.

[31] POWERS, *supra* note 20, at 3.

the Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) have issued section 18 conditions in the past.[32]

Further, section 10(j) of the FPA requires FERC to consider additional recommended operating conditions from federal and state fish and wildlife agencies.[33] But, FERC may reject the recommended conditions if the "agency has not provided substantial evidence in support of its recommendation."[34]

Beyond the mandatory and optional conditions, the real protection against a hydropower project's negative effects on the surrounding community and environment stems from the temporary nature of FERC licenses. After a project's license has expired, the developer must reapply to obtain a new one from FERC.[35] In considering whether to grant a new license, "FERC must determine whether issuing a new license is in the public interest, providing equal consideration to power development and nonpower uses of the river (e.g., fish and wildlife habitat, recreation, aesthetics)."[36] Although relicensing occurs only every thirty to fifty years, depending on the duration of the license, the review process is thought to provide community stakeholders with an important opportunity to point out their concerns with an existing hydropower project.[37] This is especially true given that some negative impacts may not even be realized until the project is actually in operation, after the original license review process is complete.

Perhaps even more significant is FERC's authority to decommission a hydropower project up for relicensing. In 1994, FERC made clear that it had authority to order the removal of dams up for relicensing if it determined removal was in the public interest.[38] Although this power has been exercised only once before—in ordering the removal of the Edwards Dam on the Kennebec River[39]—it is a crucial safeguard against negative impacts that were not foreseen in the initial licensing process.

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[32] *Id.* (discussing the number of conditions the agencies have issued in past projects).

[33] ROBERT BLACK ET AL., ECONOMIC ANALYSIS FOR HYDROPOWER PROJECT RELICENSING: GUIDANCE AND ALTERNATIVE METHODS 2-3, 2-5 (Oct. 1998).

[34] *Id.* at 2-5.

[35] Margaret B. Bowman, *Legal Perspectives on Dam Removal*, 52 BIOSCI. 739, 740 (2002).

[36] *Id.*

[37] *See* Cumming, *supra* note 8, at 949 ("The Friends of the Kinni, a citizen group, describes relicensing as an opportunity that arises once every thirty years for stakeholders to speak their minds about dams and the health of the river, and challenge the 'status quo.'") (footnote omitted).

[38] Bowman, *supra* note 35, at 740.

[39] *Id.*

B. Exemptions

While the vast majority of hydropower projects must undergo the extensive licensing process outlined above, an increasing number of them are exempt from this process.[40] Through the FPA, Congress gave FERC the authority to give certain projects exemptions in lieu of licenses.[41]

Specifically, FERC may issue an exemption to hydroelectric projects generating ten MW or less of power that are to be installed on existing non-federal dams or at natural water features.[42] Projects receiving the "small hydro exemption" enjoy an expedited review process with a shortened comment period[43] and are not subject to the section 4(e) or section 18 mandatory conditions outlined above.[44] But, exemption holders must comply with heightened environmental safeguards on the front end, as the FWS, the National Marine Fisheries Service, and the state fish and wildlife agency of the state in which the project is located each retain the ability to impose mandatory conditions on the exemption holder pursuant to section 30(c) of the FPA.[45]

Despite the heightened initial environmental standards, project developers who qualify for an exemption are issued the right to develop and operate the dam in perpetuity.[46] This is perhaps the most significant oversight abatement of the exemptions, considering qualifying projects will never be forced to endure the important relicensing and reassessment process.

FERC maintains the ability to revoke a project's exemption if a "term or condition of the exemption is violated,"[47] if there are "material discrepancies, inaccuracies, or falsehoods" on the exemption application,[48] or if doing so is required "to best develop, conserve, and utilize in the public interest the water resources of the region."[49] But, the revocation process tends to focus primarily on compliance with the terms and conditions set by the federal and state agencies at the time the exemption was originally issued.[50] Thus, as scholars have noted, without the need for

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[40] *See Exemptions from Licensing*, FED. ENERGY REGULATORY COMM'N, https://www.ferc.gov/industries/hydropower/gen-info/licensing/exemptions.xls [https://perma.cc/QN3D-3T9V] (last updated Dec. 7, 2017).

[41] *See* 16 U.S.C. § 2705.

[42] *Small/Low-Impact Hydropower Projects*, FED. ENERGY REGULATORY COMM'N, https://www.ferc.gov/industries/hydropower/gen-info/licensing/small-low-impact/get-started/exemp-licens.asp [https://perma.cc/8NB2-JKQW] (last updated Jan. 9, 2018).

[43] *See* FED. ENERGY REGULATORY COMM'N, *supra* note 21.

[44] DIV. OF HYDROPOWER ADMIN. & COMPLIANCE, FED. ENERGY REGULATORY COMM'N, COMPLIANCE HANDBOOK 6 (2015), https://www.ferc.gov/industries/hydropower/gen-info/handbooks/compliance_handbook.pdf [https://perma.cc/GZ77-FZG9].

[45] 16 U.S.C. § 823a(c) (2012 & Supp. IV 2013); *see also* DIV. OF HYDROPOWER ADMIN. & COMPLIANCE, *supra* note 44, at 6–7.

[46] *See Small/Low-Impact Hydropower Projects: Project Comparison Chart*, supra note 23.

[47] 18 C.F.R. § 4.106(a) (2017).

[48] *Id.* § 4.106(g).

[49] *Id.* § 4.106(f).

[50] DIV. OF HYDROPOWER ADMIN. & COMPLIANCE, *supra* note 44, at 46–47.

reapplication, exempt small hydro projects escape an important reevaluation of the impacts to the surrounding environment and communities.[51]

II. THE NEED FOR EXTENSIVE REGULATION OF SMALL HYDROPOWER STILL EXISTS

Implicit in Congress's efforts to promote the development of small hydroelectric projects is the assumption that small hydro is less harmful to the environment than large hydro and therefore warrants fewer environmental safeguards.[52] In fact, support for this belief appears to be so strong that in 2013 Congress passed the Hydropower Regulatory Efficiency Act (HREA),[53] which expanded the small hydro exemption to include projects purporting to produce up to ten MW of power (where the previous threshold was five MW).[54] Consistent with this assumption, the Act's legislative history characterizes these hydroelectric projects as "low-impact."[55]

Although the negative impacts of large hydropower are well noted—which is perhaps the reason for a national and international push towards small hydropower development[56]— the body of research concerning small hydropower is far less developed. But, an examination of the existing commentary and a look at various small hydropower projects suggests that legislators wishing to promote the development of small-scale hydro while keeping environmental responsibility in mind should *at least* be skeptical of its "low impact" characterization.[57]

A. Small Hydropower Projects Are Not Always Small

When thinking about small hydroelectric projects (producing less than ten MW of electricity), small dams over tiny streams and tributaries likely come to mind. However, for many small hydro projects in the United States, the correlation between energy output and the size of the environmental obstruction is not so clear. The Penobscot River Restoration project is a frequently cited example of the large impact that a small project can have.

On November 7, 2008, the Penobscot River Restoration Trust (PRRT)—a conservation organization—filed an application with FERC to surrender hydropower licenses to two historic projects on the Penobscot River: the Great

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[51] Cumming, *supra* note 8, at 948–51.

[52] *See also id.* at 946 (recognizing the implicit assumption).

[53] Hydropower Regulatory Efficiency Act of 2013, Pub. L. No. 113–23, 127 Stat. 493 (codified as amended in scattered sections of 16 U.S.C.).

[54] *Id.* § 3 (codified as amended at 16 U.S.C. § 2705).

[55] S. REP. NO. 113–38, at 2 (2013).

[56] Kibler & Tullos, *supra* note 18, at 3104 (noting the large body of literature concerning the negative impact of large hydroelectric projects and its influence on small hydropower regulation).

[57] *See id.* at 3111–12, 3116.

Works Project and the Veazie Project.[58] The application was an important step in a $60 million conservation effort to restore the river to its natural state for the benefit of several anadromous fish populations.[59] By 2013, the effort had paid off, and both dams that once supported the hydropower facilities were removed.[60]

The Great Works Project was situated on a dam that was twenty-feet-high and 1,086 feet long.[61] The project had been issued an original license by FERC in 1963.[62] When the license expired in 2002, the license-holder applied for a new one, but the application was soon suspended pursuant to an agreement with the PRRT.[63] Likewise, the Veazie Project was situated on a concrete dam that was twenty-five-feet-high and 902-feet-long.[64] The project was issued a license in 1998,[65] before the expansion of the small hydropower exemption in 2013.[66] The new license was set to expire on March 31, 2038.[67]

The removal of the dams marked the first time in over 100 years that the first ten miles of spawning ground would be accessible to "shad, sturgeon, alewives, eels[,] . . . smelt[,]"[68] and what was once the nation's largest run of Atlantic salmon.[69] Perhaps more noteworthy, the return of the fish populations marked an important moment for the native Penobscot Indian Nation. In the early 1830s, this tribe's cultural heritage was dealt a massive blow when the erection of the Veazie Dam effectively destroyed the salmon population on which the tribe had heavily relied.[70]

Despite such a massive obstruction to the Penobscot River Basin and the surrounding community, the two dams produced a shockingly insignificant amount of energy. The hydro project on the Veazie Dam was authorized to produce a maximum of 8.4 MW of electricity, while the project on the Great Works Dam

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[58] FED. ENERGY REGULATORY COMM'N, FINAL ENVIRONMENTAL ASSESSMENT, *supra* note 2, at 1–2.

[59] *See* Order Accepting Surrender of Licenses with Dam Removal and Dismissing Applications for New Licenses, *supra* note 6, at 2; Murray Carpenter, Editorial, *Letting the Fish Flow Anew*, N.Y. TIMES, Oct. 25, 2016, at D6 (noting the various types fish populations that benefitted from the dam removals).

[60] Murray Carpenter, *Taking Down Dams and Letting the Fish Flow*, N.Y. TIMES (Oct. 24, 2016), https://www.nytimes.com/2016/10/25/science/penobscot-river-maine-dam-removal-fish.html [https://perma.cc/6QFA-ZXBB].

[61] Order Accepting Surrender of Licenses with Dam Removal and Dismissing Applications for New Licenses, *supra* note 6, at 3.

[62] *Id.*

[63] *Id.*

[64] *Id.*

[65] *Id.*

[66] *See* Hydropower Regulatory Efficiency Act of 2013, Pub. L. No. 113–23, § 3, 127 Stat. 493, 493 (codified as amended at 16 U.S.C. § 2705).

[67] Order Accepting Surrender of Licenses with Dam Removal and Dismissing Applications for New Licenses, *supra* note 6, at 3.

[68] Murray Carpenter, Editorial, *Dam Removal to Help Restore Spawning Grounds*, N.Y. TIMES, June 12, 2012, at A15.

[69] Carpenter, *supra* note 59.

[70] Tom Bell, *Salmon's Return Means Much to Tribe*, PORTLAND PRESS HERALD (Sept. 18, 2011), http://www.pressherald.com/2011/09/18/salmons-return-means-much-to-tribe_2011-09-18/ [https://perma.cc/LG5Y-PC9Z].

produced a mere 7.9 MW.[71] As a generous estimate, the two dams combined could have supplied electricity to no more than 17,000 homes.[72]

Although the projects operated under FERC licenses, if the project developers applied for licenses today, they would likely have been eligible for a perpetual license exemption, despite their massive size. An exemption for a project placed on such an environmentally obtrusive structure would not be uncommon. In 2016, for instance, FERC issued an exemption for a project installed on a twenty-five-foot-high, 397-foot-long earthen dam that produced just .22 MW of electricity.[73]

B. Small Hydropower is Likely More Harmful than Large Hydropower When Considered in the Aggregate

Presumably, a large hydroelectric project, like the well-known Hoover Dam, is more detrimental to the environment and its surrounding communities than a small hydroelectric project.[74] But, when considered in the aggregate, this observation becomes less meaningful. For example, while the Hoover Dam has an installed capacity of 2,080 MW of power,[75] the combined installed capacity of the dams mentioned in the last section produce less than 17 MW.[76] In fact, it is likely that small hydropower, per megawatt of power produced, is more harmful to the environment than its larger, politically-unpopular counterpart.

A 2013 study of hydroelectric projects in the Nu River Basin in China—another country facing a political push for small hydropower development[77]—discussed the need for research concerning the cumulative effects of small hydroelectric projects.[78] The study determined that the "biophysical impacts of small hydropower[79] may

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[71] Order Accepting Surrender of Licenses with Dam Removal and Dismissing Applications for New Licenses, *supra* note 6, at 3.

[72] *See FAQ*, NAT'L HYDROPOWER ASS'N, http://www.hydro.org/policy/faq/ [https://perma.cc/R287-SBRY] (last visited Jan. 13, 2018) (stating that one MW of energy is enough to provide electricity to approximately 750 and 1,000 average American homes).

[73] New England Hydropower Co., LLC, 155 Fed. Energy Reg. Comm'n Rep. (CCH) ¶ 62,132, at 1–2, 13 (May 19, 2016), https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14251954 [https://perma.cc/H64M-CZDS].

[74] *See, e.g.*, Gaia Vince, *Why Damming World's Rivers Is a Tricky Balancing Act*, BBC FUTURE (June 28, 2012), http://www.bbc.com/future/story/20120627-dammed-if-you-do [https://perma.cc/4XBD-JN9V] (discussing negative environmental impacts of many large-scale dams).

[75] Bureau of Reclamation, *Hoover Dam: Frequently Asked Questions and Answers*, RECLAMATION: MANAGING WATER WEST, https://www.usbr.gov/lc/hooverdam/faqs/powerfaq.html [https://perma.cc/9LDL-FLRJ] (last updated Feb. 7, 2017).

[76] *See supra* text accompanying note 71 (discussing the electricity produced by the Veazie and Great Works Dams).

[77] *See* Kibler & Tullos, *supra* note 18, at 3104.

[78] *Id.* at 3104–05.

[79] The size of projects in this study were characterized according to Chinese law. *Id.* at 3105. Thus, dams producing less than 50 MW were considered small. *Id.*

exceed those of large hydropower" when "normalized per megawatt of power produced."[80] Specifically, small hydroelectric projects were found to "return greater impacts, per megawatt of power generated, with respect to the length of river channel affected, diversity of habitats affected, influence to lands designated as conservation and biodiversity priorities, and potential for modification of hydrologic regimes and water quality."[81] Overall, small hydro had a greater impact on the environment in nine of the fourteen metrics analyzed.[82] Faced with these findings, the authors suggested that more stringent governance and assessment of small hydroelectric projects may be necessary to adequately safeguard against the environmental impacts.[83]

Although the study defined small hydropower as facilities with an installed energy capacity of fifty MW or less (pursuant to Chinese law)[84] instead of the ten MW threshold set by the FPA, the findings are still relevant. Even considering the possibility that a study of hydroelectric projects with an installed capacity of ten MW may show less detrimental impacts, the principal finding of the 2013 study casts considerable doubt on the assumption that small hydropower is *per se* less harmful and ultimately warrants less comprehensive regulation. In fact, other researchers have noted that, compared to measuring the impact of large dams, "fundamentally different approach[es]" are necessary to understand the impacts of small, low-head dams because of their unique "size and abundance."[85]

C. The Effects of Small Hydropower Are Unpredictable at Best

The danger of allowing exemptions to remain in perpetuity becomes particularly salient when considering the unpredictable nature of environmental systems. As others have noted, environmental costs can be extremely difficult to predict because "the environment is made up of balances and exchanges between millions of different substances, in media ranging from the chemical to the social."[86] Further, the costs of failing to account for an environmental externality are high, as "large scale changes have usually been long lasting and unfortunate."[87]

Take, for example, the extreme flooding in Uttarakhand, India. In 2013, heavy monsoon rains overflowed the region's rivers and "killed almost 6,000 people, tore

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[80] *Id.* at 3104; *see also id.* at 3111–12.

[81] *Id.* at 3116.

[82] *Id.* at 3111. For a list of the metrics analyzed, see *id.* at 3111, 3115.

[83] *Id.* at 3104, 3116.

[84] *Id.* at 3105, 3115.

[85] *See* Jane S. Fencl et al., *How Big of an Effect Do Small Dams Have? Using Geomorphological Footprints to Quantify Spatial Impact of Low-Head Dams and Identify Patterns of Across-Dam Variation*, PLOS ONE, Nov. 5, 2015, at 17–19, http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0141210&type=printable [https://perma.cc/6LVV-YGNN]. "Low-head dams" are defined as those that are less than 7.6 meters high. *Id.* at 2.

[86] *See* Michael Anton Proett, *Cumulative Impacts of Hydroelectric Development: Beyond the Cluster Impact Assessment Procedure*, 11 HARV. ENVTL. L. REV. 77, 78–79 (1987).

[87] *Id.* at 79.

up 1,300 roads, took out nearly 150 bridges, and destroyed twenty-five small hydropower projects."[88] It was later determined that the "new hydroelectric power infrastructure" was responsible for much of the flooding.[89] An expert panel appointed by the Indian Supreme Court to investigate the flood[90] determined that the placement of a large number of dams—many of which were considered "small hydro"—so close to each other altered the river's course and "exacerbate[ed] the flooding."[91]

While the impacts of small hydropower may be uncertain, the unpredictable nature of this energy source, combined with the potential for devastating results, make it a particularly bad candidate for allowing permanent exemption status.

III. THE SMALL HYDROPOWER EXEMPTION'S HEIGHTENED ENVIRONMENTAL STANDARDS DO NOT ADEQUATELY PROTECT AGAINST ENVIRONMENTAL HARM

Although the current regulatory scheme requires small hydropower developers to comply with stricter environmental standards at the start of their project, the heightened requirements are wholly inadequate to guard against negative externalities of exempt projects. This is due in part to the lack of an effective reevaluation mechanism and because the heightened initial environmental standards are not as effective at protecting the environment as they may seem.

A. The Exemption Regulatory Scheme Lacks a Crucial Reassessment Mechanism for Small Hydro Projects

The lack of knowledge concerning the environmental impacts of small hydropower illuminates the need for an effective reassessment process. The current regulatory scheme, however, severely lacks such a mechanism because exemptions are issued in perpetuity.[92] Although FERC retains the ability to revoke a project's exemption at any point in production,[93] for a number of reasons, this safeguard does not make up for the lack of a reapplication process.

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[88] Levitan, *supra* note 18; *see also India Floods: More than 5,700 People 'Presumed Dead,'* BBC NEWS (July 15, 2013), http://www.bbc.com/news/world-asia-india-23282347/ [https://perma.cc/5J4Y-YWLQ].

[89] Levitan, *supra* note 18.

[90] Keith Schneider, *Uttarakhand Flood Disaster Made Worse by Existing Hydropower Projects, Expert Commission Says*, CIRCLE BLUE (May 8, 2014), http://www.circleofblue.org/2014/world/uttarakhand-flood-disaster-made-worse-existing-hydropower-projects-expert-commission-says/ [https://perma.cc/6EZU-4C4P].

[91] Levitan, *supra* note 18. A signficant number of dams in the new hydroelectric infrastructure were "smaller than 25 [MW] in capacity." *Id.*

[92] *See supra* notes 40–46 and accompanying text.

[93] *See supra* notes 47–49 and accompanying text.

First, FERC's ability to revoke a license is focused on compliance with the terms and conditions set at the beginning of a project's existence, however ineffective those conditions may become over time. The Division of Hydropower Administration and Compliance (DHAC) is the division of FERC charged with ensuring "that actions necessary to protect life, health, . . . property, and the environment [are] properly taken"[94] with respect to licenses and exempted hydroelectric projects.[95] This includes monitoring and conducting environmental investigations at existing hydroelectric projects after they have received a license or exemption.[96] But, the DHAC handbook indicates that the regularity of environmental investigations of exempt projects turns on a project's "environmental and public use requirements," which are determined by the terms and conditions state and federal agencies set for the project.[97] Thus, DHAC may review projects with stricter requirements more frequently, but inspections generally occur "periodically," with some only conducted annually "when a particular environmental or public use controversy arises."[98]

Therefore, although FERC has the authority to ensure exempt projects are operating in an environmentally responsible way, it appears the Commission may be exercising this power in a way that focuses on compliance with conditions set at the beginning of the project's life. Because exemptions are issued in perpetuity, even perfect compliance with these fixed operating conditions would fall short of the protection a periodic reassessment would provide.

Further, any existing reassessment protection may be exposed to the negative effects of "regulatory capture."[99] Under agency capture theory, industry interest-groups may "capture" the interests of the agencies that regulate them by "somehow convinc[ing] regulators to think like [them]."[100] When an agency's interests are aligned with those of the industry actors it regulates, opposing interests (stakeholders' interest in ensuring the dam operates in an environmentally responsible manner, for example) may be overlooked.[101]

In this case, even assuming FERC actually exercises its authority to ensure an exempted project is operating in an environmentally responsible manner beyond simply monitoring the facilities for compliance violations, that important responsibility is left entirely to this single commission. As previously noted, the lack of a reapplication process gives FERC the sole authority to determine whether a failing hydroelectric project will remain in existence. The danger of this becomes

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[94] DIV. OF HYDROPOWER ADMIN. & COMPLIANCE, *supra* note 44, at 1.

[95] *Id.* at 1–2.

[96] *Id.*

[97] *Id.* at 47.

[98] *Id.*

[99] *See* David Freeman Engstrom, *Corralling Capture*, 36 HARV. J.L. & PUB. POL'Y. 31, 31–32 (2013).

[100] *Id.* at 32.

[101] *See id.* at 36.

particularly clear when considering the possibility that FERC and the various entities created under it may have already been captured with respect to other industries.[102]

At the very least, if it becomes apparent that the economic benefits of an exempt project have been outweighed by an unforeseen environmental externality, the project owner's interest in continuing production will be checked only by a regulatory body whose interests are considerably at risk for alignment. If FERC were to become "captured" by the hydropower industry, the protection provided by its authority to ensure exempt projects are operated for the benefit of the public or without considerable environmental harm would likely be inadequate. Therefore, it seems especially dangerous to leave the power of regulating private hydropower operations, the negative effects of which are relatively unknown, indefinitely in the hands of a single regulatory body.

B. The "Existing Dam" Requirement Provides Little Protection

The requirement that hydropower projects be placed on an "existing dam" in order to qualify for the exemption—as opposed to projects proposing to erect new dams which are only eligible for licenses—may appear to offset many of the regulatory issues highlighted so far. But, that requirement has been interpreted to provide less protection than appears on its face and should not be seen as an adequate safeguard against negative externalities.

The phrase "existing dam" in the exemption statute has been interpreted broadly. For example, in the 1985 case, *Steamboaters v. FERC*, "Steamboaters, a private conservation group composed mostly of recreational fishermen" challenged FERC's determination that a hydroelectric project on the North Umpqua River qualified for an exemption because the modifications merely involved the repair of an "existing . . . dam."[103] The project proposed using an existing wooden dam consisting of "tied-back timber" to construct a new concrete dam anchored in bedrock immediately in front of it.[104] The project developer even characterized the concrete structure as a

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[102] *See* David B. Spence, *Agency Policy Making and Political Control: Modeling Away the Delegation Problem*, 7 J. PUB. ADMIN. RES. & THEORY 199, 204–05 (1997) ("[T]he Environmental Protection Agency's (EPA) Office of Water tends to attract people who place a high value on protecting water quality, while the Federal Energy Regulatory Commission's (FERC) Office of Hydropower Licensing tends to attract people who place a high value on encouraging the development of hydropower."); Gary J. Newell & Ransom E. Ted Davis, Thompson Coburn LLP, "Second Generation" Regulatory Capture as an Explanatory Factor in the Performance of Regional Transmission Organizations, Presentation to the Center for Research in Regulated Industries Advanced Workshop in Regulation and Competition (May 15, 2008), at 13–17, https://sites.hks.harvard.edu/hepg/Papers/Dec2008HEPG/Susan_Kelly_paper.pdf [https://perma.cc/S827-Q6QJ] (noting the possible capture of FERC-created entities in the electric transmission industry).

[103] Steamboaters v. Fed. Energy Regulatory Comm'n, 759 F.2d 1382, 1386 (9th Cir. 1985).

[104] *Id.* at 1391–92.

"new dam" in his application for the exemption.[105] Yet, the Ninth Circuit upheld FERC's determination that the project constituted "repairs" to an "existing dam" and, therefore, held that the project qualified for an exemption.[106] The court reasoned that the proposed "repairs" would not result in a "material increase in the hydraulic *height* of the existing wooden dam."[107]

Although the *Steamboaters* decision does not allow an entirely new obstruction to impede a waterway while maintaining the distinction of "existing dam,"[108] at a minimum, it allows future developers to make dams much more enduring. Developers may propose substantial "repairs" to an existing dam that would make the structure far less likely, or at least much more expensive, to ever be decommissioned and removed, while still enjoying the lax environmental regulatory standards of an exemption. Although a dam's height and size may not be altered, the ability to change the nature of a dam to a much more permanent structure undermines the theory that allowing projects to be built on existing dams will not have long term negative effects.

Perhaps most alarming, however, is that FERC represented the interests of the hydropower developer in this case by arguing for a broad interpretation of the "existing dam" requirement.[109]

IV. THE EXEMPTION'S ELECTRICITY OUTPUT-BASED REQUIREMENT IS INCONSISTENT WITH CONGRESS'S GOAL OF PROMOTING HYDROPOWER DEVELOPMENT AND SHOULD BE REPLACED

Although considerable evidence exists to discredit the assumption that small hydropower projects should warrant less regulatory oversight,[110] incentivizing developers to choose a cleaner source of energy is certainly a noble goal.[111] In this way, the small hydropower exemption is a step in the right direction for Congress, as it minimizes start-up and compliance costs for small hydropower developers. Yet, because the exemption only applies to projects that produce ten MW of power or less, Congress is not only promoting small hydropower in an inefficient way, but it is also deterring improvements to existing small hydropower projects.

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[105] *Id.*

[106] *Id.* at 1391.

[107] *Id.* at 1392 (emphasis added).

[108] *Id.* at 1391–92.

[109] *See id.* at 1385–87, 1390–92.

[110] *See supra* Part II.

[111] Although "[t]here is an ongoing debate about whether hydropower should be characterized as 'renewable.'" KELSI BRACMORT ET AL., CONG. RESEARCH SERV., R42579, HYDROPOWER: FEDERAL AND NONFEDERAL INVESTMENT 3 (2015), https://fas.org/sgp/crs/misc/R42579.pdf [https://perma.cc/74ZT-DHMY].

A. The Ten MW Requirement Fails to Effectively Promote Hydropower Development Because It Deters Efficient Energy Developers and Incentivizes Inefficient Ones

As previously noted, some hydropower projects are capable of generating only a very small amount of electricity but have dire environmental and cultural consequences—recall the example of the Great Works and Veazie Projects.[112] Other projects may produce a large amount of clean energy, while having a relatively small impact on the surrounding environment. Keeping this in mind, it is apparent that creating a streamlined licensing process, but allowing only projects that produce a small amount of energy (ten MW or less) to qualify for it, is an inefficient way to achieve Congress's goal of "promot[ing] hydropower development in the United States."[113]

The ten MW energy output requirement bars the most efficient developers—those whose proposed projects produce a high amount of electricity but with a relatively low environmental impact—from utilizing the exemption. Thus, instead of being rewarded for their efficiency, these developers are left to undergo the burdensome and costly process of obtaining a FERC license. At the same time, the output requirement incentivizes inefficient developers—those whose proposed projects have a low energy output and a relatively high environmental impact—by allowing them to qualify for the exemption. Therefore, Congress is not only missing an opportunity to get the most bang (electricity) for its buck (environmental cost), but it is also failing to promote the development of high-output projects.

B. The Ten MW Requirement Fails to Effectively Promote Hydropower Development Because It Deters Developers from Making Improvements in Efficiency at Exempted Projects

By allowing only projects producing ten MW or less to qualify for the exemption, Congress is effectively discouraging developers from improving the efficiency of existing dams by installing more efficient hydropower equipment.

The Department of Energy estimates that developers could "double U.S. annual hydropower generation" (increasing energy production from hydropower by 20,000 MW) by taking advantage of undeveloped hydropower opportunities on existing dams.[114] These opportunities include increasing the energy generation capacity at existing dams by utilizing more efficient hydropower equipment, which produces

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[112] *See supra* Section II.A.

[113] S. REP. NO. 113-38, at 1 (2013).

[114] DOUGLAS G. HALL ET AL., U.S. DEP'T OF ENERGY, DOE-ID-11263, FEASIBILITY ASSESSMENT OF THE WATER ENERGY RESOURCES OF THE UNITED STATES FOR NEW LOW POWER AND SMALL HYDRO CLASSES OF HYDROELECTRIC PLANTS 23 (2006), https://energy.gov/sites/prod/files/2013/12/f5/doewater-11263.pdf [https://perma.cc/2LTW-TGBV].

more power given the same amount of water.[115] For example, the Bonneville Power Administration replaced fifty-year-old turbine equipment in the Chief Joseph Dam in Washington with newer, more efficient equipment and increased the dam's output by forty MW.[116] Developers operating dams that are already exempt may choose not to utilize newer technology out of fear that it may bring their project's output above the ten MW threshold, thereby causing them to lose their exempt status. In this way, the exemption further frustrates Congress's goal of promoting the development of hydropower.

Therefore, instead of simply expanding the energy output threshold, as Congress most recently did with the HREA,[117] lawmakers would best serve the goals of development and efficiency by changing the exemption requirement to a metric that captures either energy output and environmental cost, or one that simply captures environmental cost alone. Choosing either of these options would not only incentivize developers to pursue more efficient projects, but would also increase the total amount of energy produced from hydropower by allowing higher-output projects to qualify for the less burdensome exemption process. The next section discusses the adoption of such a metric.

V. AN EXEMPTION REQUIREMENT THAT MEASURES FLOW MODIFICATION WOULD BETTER SERVE THE GOALS OF EFFICIENCY AND DEVELOPMENT OF HYDROPOWER

Although the full extent of environmental harm is notoriously difficult to predict,[118] using even a single metric that captures some aspect of biophysical impact as part of the exemption requirement would more effectively promote the goals of hydropower efficiency and development. Such a metric could be used either in combination with the current energy-output metric—measured in potential megawatts of energy produced—or simply by itself.

A. "Flow Modification" as a Metric for Environmental Impact

Because "[d]ams disrupt the natural flow of water and sediments through a river system,"[119] a common metric used to assess the biophysical impact of a dam is the potential for "flow modification."[120] To measure this impact, researchers "estimate the fraction of annual [water] runoff controlled by each hydropower project," which

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[115] *See id.* at 21–24, 35.

[116] *More Powerful Hydro Turbine Heads for Washington*, BONNEVILLE POWER ADMIN. (May 10, 2010, 12:00 AM), https://www.bpa.gov/news/newsroom/Pages/More-powerful-hydro-turbine-heads-for-Washington.aspx [https://perma.cc/QC6F-C4GJ].

[117] *See supra* notes 53–54 and accompanying text.

[118] *See supra* notes 78, 83, 85–86 and accompanying text.

[119] Kibler & Tullos, *supra* note 18, at 3108.

[120] *See* Desiree Tullos et al., *Perspectives on the Salience and Magnitude of Dam Impacts for Hydro Development Scenarios in China*, 3 WATER ALTERNATIVES 71, 74 tbl.1 (2010) ("[F]low is considered the 'master' variable in regulating ecosystems.") (citation omitted).

essentially gives researchers a rough estimate of the amount of water that a given hydropower project may immediately affect, providing a quantitative assessment—expressed as percentage of annual runoff—of a dam's potential to impact its surrounding physical environment.[121] This figure has been used by researchers as an objective metric in assessing the impact of both existing and proposed dams.[122] Additionally, because the metric is expressed as a simple unit, it could easily replace the ten MW output-based metric currently in place. For example, Congress could allow only dams with the capacity to control twenty percent or less of mean annual flow to qualify for the exemption.[123]

Not only is this metric one that is already commonly used, but it also appears to be relatively easy to measure. Percentage of annual runoff can be determined by measuring the volume of water diverted or stored by a dam.[124] This figure is determined by recording water discharge,[125] which can be done with inexpensive equipment commonly used by the U.S. Geological Survey.[126]

Because this metric is already commonly used and can be measured without great effort, it should be relatively easy for developers to adapt to the new requirement. In addition, the ease and low cost of obtaining this measurement would be consistent with Congress's goal in creating the exemption, which was to lessen the burden and cost of developing small hydropower projects. When considering the potential benefits—increases in hydropower efficiency and overall energy production—any additional cost in complying with the new exemption requirement would quickly be outweighed.

B. Other Potential Metrics

Although the biophysical impact of dams is of great concern, it is possible that lawmakers are more concerned with either the socio-economic or geopolitical effects of small hydropower projects. In that case, metrics are also readily available to measure both of these effects. For example, the socio-economic impact of a

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[121] *See* Kibler & Tullos, *supra* note 18, at 3108.

[122] *See id.* at 3105–06; *see also* Philip H. Brown et al., *Modeling the Costs and Benefits of Dam Construction from a Multidisciplinary Perspective*, 90 J. ENVTL. MGMT. S303, S304–05, S307 (Supp. III 2009).

[123] In fact, one study even developed a six-point scale to show the biophysical impact of hydropower projects and divided the scale based on percentage of annual runoff controlled. *See* Brown, *supra* note 122, at S304–05, S307 tbl.4.

[124] *See* Kibler & Tullos, supra note 18, at 3108.

[125] *See id.*

[126] Ronald L. Rickman & Neal D. Fujii, An Introduction to Measuring Water Flow and Reporting Water Use for Large-Scale Stream-Diversion Ditches in Hawai'i, Presentation on Behalf of the U.S. Geological Survey & the Haw. Comm'n on Water Resource Mgmt. (Oct. 2, 2014), at 53, https://hi.water.usgs.gov/studies/ditch_Q/ditch_overview_2014_1002.pdf [https://perma.cc/E3QP-34NK].

hydropower project may be measured by the cost of forced resettlement of displaced peoples in the river basin, expressed as percentage of watershed GDP.[127] Likewise, the geopolitical impact of a project may be measured by the "[s]hare of basin population affected" by the operation of the hydropower project, expressed "as a percentage of the entire basin population."[128] In addition, a wide range of metrics have been used to measure the impact of hydropower projects from each of these three perspectives (biophysical, socio-economic, and geopolitical),[129] and methods have been developed to account for all three at once.[130] But, using a combination of several additional metrics for the exemption requirement may increase the start-up costs for developers and, therefore, would likely run counter to the interests of Congress.

Ultimately, the adoption of any of the metrics discussed above as the requirement for exemption eligibility—as compared to the current power-output metric—for a new small hydropower project would better promote the development of efficient hydropower and increased energy production from such projects.

CONCLUSION

Given the growing body of evidence suggesting that small hydropower is just as environmentally harmful as its larger, politically unpopular counterpart, whether Congress should even be promoting this source of energy in the first place is unclear. It is undoubtedly true that the uncertainty such research has generated should at least prompt hydropower regulators to proceed with caution. Nonetheless, promoting the development of a cleaner, less harmful energy source is a necessary part of the global push to transition away from fossil fuels and to fight climate change.[131] And despite hydropower being "the largest renewable energy source for electricity generation in the United States,"[132] it still has more to offer. The U.S. Department of Energy has identified 5,400 sites[133] that, if developed for small hydropower, could produce as much as 20,000 additional megawatts of electricity per year, potentially resulting in a fifty percent increase of the amount currently produced.[134] For instance, in Kentucky, undeveloped hydropower sites have the potential to increase the state's electricity production from hydropower by 135 percent.[135]

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[127] *See* Tullos et al., *supra* note 119, at 75–76 tbl.1.

[128] *See id.* at 76 tbl.1.

[129] *See id.* at 74–77.

[130] *See* Brown et al., *supra* note 122, at S303–05 (describing the "Integrative Dam Assessment Modeling (IDAM) tool," which integrates all three perspectives by evaluating "[twenty-seven] different impacts of dam construction" and operation to determine the overall impact of a hydropower project).

[131] *See* John Schwartz, *Climate Deal Called Too Weak to Meet Goals*, N.Y. TIMES, Nov. 17, 2016, at A12.

[132] *Hydropower Explained: Energy from Moving Water*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/energyexplained/index.cfm?page=hydropower_home [https://perma.cc/5FPY-WA46] (last updated June 13, 2017).

[133] Many of the identified cites are in Kentucky. *See* HALL ET AL., *supra* note 114, at 26, 35.

[134] *See id.* at 23.

[135] *Id.* at 26.

With this in mind, it is clear that the goal of promoting the development of small hydropower by making it more affordable and less burdensome for developers is certainly one that is worth pursuing. The means by which Congress has chosen to do so, however, fall far short of achievement.

By creating an exemption to the cumbersome and costly hydropower licensing process but allowing only projects that produce less than ten MW of electricity to qualify for it, Congress is not only failing to provide adequate protection to the environment and communities surrounding small hydropower projects, but it is also impeding the development of projects with greater electricity-output potential for no rational reason.[136] In short, with the current output-based requirement in place, Congress is missing an opportunity to get the most bang (electricity) for its buck (environmental cost).

Therefore, this Note proposes the adoption of an alternate metric—one that measures some aspect of biophysical, socio-economic, or geopolitical impact—as the requirement for exemption eligibility. Doing so would not only further the goal of environmental responsibility, but would also serve the goal of increasing the production of electricity from hydropower. Even further, adopting such a requirement should not be overly detrimental or burdensome for regulators or industry developers, given that the recommended metrics are less expensive and already in use.[137] Although this Note advocates for the adoption of flow modification as the metric for the exemption requirement, regulators may be more concerned with other impacts of hydroelectric projects and may wish to choose other metrics. Should this be the case, additional metrics assessing the impacts of dams from various perspectives exist and may readily be adopted.[138]

By proposing more accurate criteria for determining small-hydropower exemption eligibility, this Note offers a simple solution that benefits both those who wish to increase energy output and those who wish to decrease environmental costs. Promoting the development of renewable sources of energy such as hydropower is not only a crucial part of the fight against climate change, but it is also an endeavor supported on both sides of the aisle.[139] Thus, the appeal of such a solution should be readily apparent to regulators and lawmakers.

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[136] *See* S. REP. NO. 113–38, at 3–4 (2013) (stating the change to ten MW, but offering no reason for choosing that number).

[137] *See supra* notes 118–125 and accompanying text.

[138] *See supra* Section V.B.

[139] *See supra* note 19 and accompanying text.