WRITTEN TESTIMONY OF RAMYA SWAMINATHAN

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before the

U.S. HOUSE OF REPRESENTATIVES SUBCOMMITTEE ON ENERGY

regarding

"MODERNIZING ENERGY INFRASTRUCTURE: CHALLENGES AND OPPORTUNITIES TO EXPANDING HYDROPOWER GENERATION"

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EXECUTIVE SUMMARY

1. Hydroelectric power has proven grid reliability and stability characteristics, in addition to being a clean, emission-free, renewable form of electricity generation.
2. An increase in hydropower generating and storage capacity would be in the nation's best interest due to these characteristics.
3. There is significant potential for increases in hydroelectric generating capacity in a variety of forms, including capacity increases at existing hydro plants, new conventional hydropower, pumped hydro storage, marine and hydrokinetic generation and applications in conduits.
4. One of those forms, adding hydropower generating capability to existing non-powered dams has the potential to add as much as 12,000 MW of generating capacity.
5. The length, redundancy and opacity of the federal permitting processes that govern the timeline for new hydropower on existing dams is a significant barrier to additional capital being invested into this sector.
6. New hydropower development has faced challenges far beyond other energy technologies – both renewable and not – for this reason and others. Reducing the challenges and creating opportunities would speed the development of new hydropower throughout America.
7. Based on the success of the 2-year pilot licensing process, which this Subcommittee approved and was signed into law in 2013, as well as other licensing processes Rye Development has been through, we believe it is possible to adopt a 2-year licensing process for a significant number of projects that meet the criteria for low-impact, low-controversy projects.
8. Duplication and opacity in the overall federal process, both at FERC and USACE, must be minimized with regulatory risks throughout the overall federal permitting process being sequentially taken "off the table."

9. Non-federal hydropower development on federal dams brings quantifiable benefits to the federal government that should be valued through the extension of low cost financing to those projects and/or a federal standard offer power purchase agreement.
10. In conclusion, we see many opportunities, both legislative and regulatory, for the federal government to play an important role in overcoming impediments to increasing hydropower generating capacity, including permitting reforms, recognition for the value of Public-Private Partnerships, definitional changes that allow hydropower market access, and other economic incentives.

INTRODUCTION

Chairman Upton, Ranking Member Rush, Members of the Subcommittee, thank you for the opportunity to testify before you today on this important topic. My name is Ramya Swaminathan, and I am the CEO of Rye Development, a member of the National Hydropower Association (NHA).

I am pleased to discuss the importance of hydroelectric power, its benefits to the national electricity generation mix, and the potential for and impediments to the growth of hydropower.

NHA is a nonprofit national association dedicated to promoting clean, affordable, renewable, U.S. hydropower – including conventional hydropower, pumped hydro storage, marine and hydrokinetics, and conduit power projects. NHA represents more than 220 companies, from Fortune 500 corporations to family-owned small businesses. NHA's members include both public and investor-owned utilities, independent power producers, project developers, equipment manufacturers, other service providers and academic professionals.

Rye Development is a member of NHA and is the developer of the largest portfolio of new hydropower development projects in the United States. Our projects are located in eight states (Oregon, Pennsylvania, Ohio, West Virginia, Indiana, Kentucky, Mississippi, and Louisiana). All but one project are proposed to be located on existing dams owned by the state or the US Army Corps of Engineers. These make beneficial use of existing infrastructure by adding hydroelectric generating equipment to the existing dam. No new dams or impoundments will be constructed and the impacts of these projects on environmental and other resources are broadly agreed to be minimal and mitigable.

In addition to this portfolio of projects that will add hydropower generating capacity to existing dams, we have recently entered into a partnership with Grid America Holdings, an affiliate of the multi-national utility company, National Grid, to jointly acquire, develop, construct and operate a 393 MW pumped hydro storage project in the State of Oregon, near the California border.

THE BENEFITS OF HYDROPOWER

Hydroelectric generation is the oldest and most reliable form of renewable generation. The technology behind conventional hydroelectric generation has not changed significantly since the world's first hydroelectric power plant began operating in Appleton, Wisconsin in 1882. As our chief engineer likes to say, there's nothing very innovative about hydropower, and that's the beauty of it.

Hydropower accounts for approximately 7 percent of the nation's total electricity generation, generates power in every region of the country, and is, by far, the largest form of energy storage available and used in the United States and around the world. As this Committee stated in the report on H.R. 8, the inherent benefits of hydropower include: energy security, stability, and reliability, environmental protection and enhancement, and recreation.

The benefits that hydroelectric generation provides to the electric grid are unique and numerous. In addition to pure generating capacity, hydropower and pumped storage provide essential grid reliability and stability services, such as load following, firming for other more intermittent sources of power through energy storage, voltage and frequency support, and blackstart capability in times of outage.

The addition of significant amounts of <u>new</u> hydropower generating capacity to our nation's energy mix will provide all of these mentioned grid benefits as well as a meaningful amount of economic activity in the regions of development, additional emissions-free clean energy, and in the case of new hydro development on existing dams, much-needed private investment into our aging dam infrastructure and its ongoing maintenance.

POTENTIAL FOR NEW HYDROPOWER

There is significant potential for increasing hydropower generating capacity. The Department of Energy's "Hydropower Vision" report suggests that hydropower capacity can be increased by close to

50% by 2050, which would represent a cumulative economic investment of $148 billion and more than 195,000 related jobs. Increases in capacity could come from efficiency improvements and responsible expansion of existing hydropower projects, pumped hydro storage, marine and hydrokinetic generation, applications in conduits and new hydropower added to existing non-powered dams.

The headline number for the potential for new hydropower on existing dams is compelling: there are over 80,000 dams in the United States and only three percent (3%) of them have hydropower generating capacity. The supply of non-powered dams that can provide incremental generating capacity is essentially unbounded even if a significant fraction of the remaining of 77,600 are excluded from consideration.

The Department of Energy estimates that adding generating capacity to existing dams in this type of low-impact development could add as much as 12,000 MW to the nation's electricity stack.

The benefits of this form of hydropower development include:

1. Direct employment. The construction of hydropower projects on existing dams has the potential to create approximately 150 – 300 jobs per project during an average construction period of between 1½ and 3 years.
2. Direct purchase of goods and services. Many goods and services used in construction must be procured locally (e.g. concrete, fuel, riprap, gravel, etc.), which is a benefit to local and regional businesses.
3. Indirect Economic Impact. Additional benefits to local communities include the "multiplier effect" from the economic activity generated by direct employment and purchase of goods and services locally.
4. Private investment into aging dam infrastructure. The addition of newly constructed hydropower facilities on an existing dam provides a number of enhancements, both structural

and operational, to the dam itself. These inure to the benefit of the dam owner and, by enhancing the stability of the dam, contribute to the public benefit.

REGULATORY IMPEDIMENTS TO NEW HYDROPOWER DEVELOPMENT

The timeline for a new hydropower development project to reach commercial operation is between 10 and 13 years, which is almost unmatched in the power generation space. Most of this time is taken by permitting. Federal permitting can account for 8 to 10 years (FERC licensing for 5 – 6 years and USACE permitting for 2 – 4 years) of that time, with the average construction period being between 1.5 and 3 years. Other renewable energy resources, and indeed fossil fuel generation, can effectively progress from inception to operation in less than half that time. It is possible to advance solar, wind, and even combined cycle plants from concept to being operational within 2 or 3 years.

This disparity of timelines to commercial operation presents a formidable challenge to new hydropower development. Private investors in the power generation space find the length and complexity of hydropower's timeline difficult to manage. As a result, hydropower development becomes expensive due to the compounding of interest costs over long periods coupled with the unclear risk profile. When faced with these factors, many investors to choose to invest in other forms of generation with far shorter timelines and clearer risk assessments.

Only nuclear and geothermal generation have regulatory processes that are comparable in length and complexity to what new hydropower on existing USACE dams must undergo. However, the impacts of building new hydropower on existing dams are not comparable to the risks of building a new nuclear or geothermal plant. These dams already exist, and the projects are proposed on already disturbed ground. Hydraulic impacts are typically limited to the stretch of the river a few thousand feet upstream and downstream of the existing dam; terrestrial impacts are typically limited to the area of ground

disturbance, which is usually small as there is no dam being built, only a relatively small powerhouse and appurtenances, including transmission lines, and construction access.

The federal permitting regime for new hydropower on existing USACE dams has two major parts: the FERC license and the USACE processes.

FERC Licensing

In our experience, the FERC licensing process takes 5 – 6 years from preliminary permit to license order. The Hydropower Regulatory Efficiency Act of 2013 (HREA, H.R. 267, 113th Congress; P.L. 113-23) made multiple references to increasing the efficiency of the FERC licensing process and directed the FERC to investigate the feasibility of a two-year licensing process for hydropower development and non-powered dams.

In May of 2014, FFP Project 92, LLC, a project company for which Rye Development is the agent, requested approval to use the two-year licensing process for a proposed project on Kentucky River Lock & Dam 11. In August of 2014, FERC granted that request, and our project became the only project nationwide selected to advance through the two-year licensing process. In May of 2016, the FERC granted a license order to FFP Project 92, LLC for its proposed project, marking the successful completion of the two-year licensing process.

Based on our successful experience with the two-year licensing process and our experience filing 22 other final license applications with the FERC and receiving 11 license orders, we believe that it is possible to shorten the FERC licensing process to two years for a narrowly defined yet nationally significant set of projects. All would be low-controversy projects that have impacts that are widely understood to be minimal and mitigable. This does not mean they would all be small projects; with hydropower, size and impact are not directly correlated.

In our view, there are two critical requirements for the successful adoption of the two-year process:

1. Limiting projects that qualify for that expedited treatment to those that meet an objective, predetermined set of criteria that is applicable to a larger number of projects than the pilot project solicitation.
2. Imposing strict and published timelines for all parties involved, including the applicant and FERC staff. This was very successfully implemented by FERC during the two-year pilot process.

USACE Regulatory Process

The USACE is the owner of many of the non-powered dams best suited for hydropower development in the country. Developers who propose projects on USACE dams must go through more federal permitting at the USACE, typically after FERC license, which can add another 2 to 4 years to the 5 – 6 years spent in FERC licensing. Before infrastructure construction can begin, Section 404 permits (required by Section 404 of the Clean Water Act) for "dredge and fill" activities must be granted (usually at all projects, not just at those on USACE dams) and Section 408 permissions to modify the USACE dam itself must also be granted.

There have been a number of recent legislative and administrative developments that are positive steps toward the rationalizing the USACE permitting regime and its interaction with FERC licensing. The Water Resources Reform and Development Act of 2014 (P.L. 113-121) mandated that the USACE prioritize the development of non-federal hydropower at federal dams. The USACE has also entered into an MOU with the FERC to prioritize coordination between these agencies.

However, from a developer's perspective, these steps have not yet resulted in a "right-sized" federal permitting process: the overall timeline is still too long and the combined permitting process does not sequentially take risks "off the table" for the investor. Important project parameters are left unresolved until very late (i.e. the 7th or even 8th year of a combined federal permitting cycle).

There are still redundancies between the FERC licensing process and the USACE permitting regime, for example, the duplicative application of NEPA, first by the FERC at the licensing phase and then subsequently by the USACE, triggered by the Section 404 permit. In particular, the parameter that is most at stake for a hydropower developer is the water quality standard, which determines the amount of water ultimately that will be available for passage through the turbines and therefore, determine the amount of generation (revenue) at any given project. From a planning perspective, understanding the volume of water allowed to be used is necessary for designing the project. From a commercial perspective, this is an absolutely critical parameter that would best be known as early as possible and is a risk that needs to be taken "off the table" at the earliest point in the process regulators have the ability to do so.

Pursuant to the Clean Water Act, the state in which the project discharges water must either grant or waive a Section 401 permit, without which the FERC license order cannot be granted. For our project that borders Mr. McKinley's district and Mr. Johnson's, we require permits from both West Virginia and Ohio. The FERC license order incorporates the terms and conditions of the State-issued Section 401 permit as mandatory conditions.

Subsequent to all the work, studies, and analysis performed by the applicant, FERC staff and contractors, and the State, and subsequent to the issuance of the FERC license at the 10 - 20% design point, the UASCE may undertake separate analysis, for which the developer may be required to perform new and different studies (beginning in the 6^{th} or 7^{th} year of a federal permitting process), and may prescribe different water quality standards from the FERC and the State after the 60% design point. At that point, the developer will have likely spent several million dollars on the development of a license and studies supporting it as well as final design engineering to the 60% point based on a set of economic criteria that may or may not be achieved under new design parameters to support the changed water quality criteria In addition to the sunk costs at that point, the developer will likely have to spend hundreds of thousands

of dollars more to determine whether the changed design parameters will lead to an economically feasible project.

There are a number of different potential solutions to the opacity and the redundancy of this combined federal process, including:

- Requiring any federal agency to adopt the NEPA analysis of another federal agency if it has analyzed the same project within a certain period of time, or
- Requiring that USACE adopt the prevailing State standards for water quality parameters applicable to the project.

FACILITATING THE DEVELOPMENT OF HYDROPOWER PUBLIC-PRIVATE PARTNERSHIPS

Non-federal hydropower development at federal dams is an avenue for the federal government to attract private capital to invest in its dam infrastructure and an example of a Public-Private Partnership.

The privately-funded construction of hydropower on an existing dam provides a number of benefits to the federal owner:

a. New construction of a powerhouse and other appurtenances at an existing dam reinforces the dam at the powerhouse and at the tie-in to the dam structure.
b. Erosion and sedimentation control on the side of the dam with the new construction will typically become the responsibility of the private developer.
c. The private developer will typically take maintenance obligations of at least the portion of the dam occupied by the powerhouse and other project elements.
d. In some projects, hydropower project elements benefit the dam, the dam owner and the ongoing operations in support of the original purpose of the dam. For example, lining of existing conduits enhances the strength and long-term serviceability of the conduits.

e. New hydropower projects typically provide recreational enhancements to existing facilities, including fishing platforms and portages.

f. Federal facilities typically require that the private developer provide electricity or pay the electric bill for the dam on which the project is located.

Taken in this context, non-federal hydropower development offers a quantifiable benefit to the federal government. The federal government could recognize the value that private capital brings in one of a few different ways:

- Providing a 20- or 30-year standard offer for the purchase of power, pursuant to published rates, for hydroelectric power sold by non-federal projects located on federal dams, or
- Making non-federal hydropower projects on federal dams eligible for low-cost financing from programs such as the Rural Utility Service (RUS) Electric Programs. Since this would take the form of a loan, the project entity would be required to pay interest to the RUS, benefiting the United States taxpayer.

Both of these actions would effectively lower the cost of the electricity produced by the relevant hydroelectric projects, providing further benefit to the local communities in which the projects are located.

ADDITIONAL OPPORTUNITIES TO EXPAND HYDROPOWER GENERATION

In addition to the regulatory impediments we face and the potential Public-Private Partnerships that we propose, there are other opportunities for the federal government to expand hydropower generation:

- Definition of "renewable energy": The current definition of "renewable energy" for Federal purchase requirements (42 US Code § 15852) includes electric energy generated from hydroelectric generation capacity achieved from increased efficiency or additions of new capacity at an existing hydroelectric project. Allowing hydropower added to non-powered dams

and pumped-storage projects would allow these types of projects to support the federal government's goals and benefit project developers.

- Section 242: The Hydropower Production Incentives Act was added to the Energy Policy Act of 2005 by this Committee. It creates an incentive for private developers to add hydropower to existing dams and conduits. We thank Congressmen McKinley and Johnson for their leadership to reauthorize the program and for their and Congressman Doyle's annual efforts to fund it.
- Tax Incentives: While not within this Committee's jurisdiction, changes to the tax code, including reestablishing parity among generation sources, would greatly improve the ability of hydropower developers to access capital.

CONCLUSION

Rye Development, as a member of NHA, thanks you for inviting our testimony on this vitally important subject and are ready to work further with you to resolve the challenges and create opportunities to expand hydropower generation. This Subcommittee worked last Congress to produce legislation that addressed the challenges hydropower developers face. We are grateful for all your efforts. We encourage you to continue working to help expand the development of low-impact, low-cost, zero-emission power. Hydropower helps to promote our national energy security by diversifying local energy portfolios, provides a tried-and-true mechanism for integrating all renewables into the grid, and with pumped storage, like our Swan Lake North project, is essential for energy storage and grid reliability.