UNITED STATES OF AMERICA

Before the

FEDERAL ENERGY REGULATORY COMMISSION

INTEGRATION OF VARIABLE ENERGY RESOURCES	**)**	**Docket No. RM10-11-000**

COMMENTS OF THE NATIONAL HYDROPOWER ASSOCIATION ON THE NOTICE OF INQUIRY ADDRESSING INTEGRATION OF VARIABLE ENERGY RESOURCES

The National Hydropower Association (NHA)[1] hereby submits its written comments in response to the Federal Energy Regulatory Commission's (Commission or FERC) Notice of Inquiry (NOI) issued on January 21, 2010, in FERC Docket No. RM10-11 on challenges posed by integration of increasing numbers of variable energy resources (VERs). NHA commends the Commission for its recognition of this important issue and commits to be an active participant in support of the Commission's work to address these challenges.

I. Introduction

President Obama and the Congress, as well as the states, have set ambitious energy goals for the country, seeking the short and long term benefits of significantly increased renewable energy generation, such as reduced emission of greenhouse gases and other pollutants. All

[1] NHA is a non-profit national association dedicated exclusively to advancing the interests of the U.S. hydropower industry, including conventional, pumped storage and new hydrokinetic technologies. NHA's membership consists of more than 170 organizations including public utilities, investor owned utilities, independent power producers, project developers, equipment manufacturers, environmental and engineering consultants and attorneys. In 2009, NHA established a Pumped Storage Development Council to promote the benefits of energy storage and to advocate for needed changes to facilitate increased pumped storage project development.

renewable resources (hydropower, geothermal, biomass, wind and solar) will play a critical role in meeting these goals. However, the accelerated penetration of VERs, such as wind and solar, also present challenges to the grid that become amplified as the percentage of generation from these resources increases.

In the past, system operators had only one variable of concern – load or demand. With greater amounts of VER generation, those same operators now must juggle a second variable in the reliability equation – generation or supply. Keeping this balance requires additional energy options that offer storage opportunities, increased operational flexibility and other grid reliability benefits. These are all attributes that hydropower and pumped storage projects are already providing, and with the proper incentives, can be further maximized to meet this growing need.

II. General Comments

In the comments below, NHA discusses the following: the benefits of hydropower and pumped storage projects to assist in the integration of VERs; the Denmark example of hydropower's contribution to VER integration; policies needed to incentivize pumped storage development; and the potential impact of VERs on hydropower operations.

A. Hydropower and pumped storage projects offer the grid services needed to integrate VERs, preserve and ensure system reliability and stability, and allow for increased penetration of variable renewable resources.

Conventional hydropower and pumped storage plants have several advantages as complementary resources to VERs, including energy storage, load balancing, frequency control, and incremental and decremental reserves. In addition, hydropower and pumped storage facilities are able to respond to system fluctuations quickly, even within seconds, providing a solution to "absorb" or "smooth out" the peaks and valleys seen in output from VERs.

For pumped storage specifically, there are approximately three dozen new projects under consideration – almost entirely in the western half of the country. These proposed facilities are situated in key areas where new development of VERs is occurring at a rate that will challenge the capabilities of the transmission system and existing flexible generation resources to manage.

Pumped storage is also the largest-capacity form of grid energy storage currently available. Projects generally range in size from 500-1500 MWs, an important factor considering the tremendous increase in variable renewable generation, particularly wind, which is growing at a rate of thousands of MWs per year. With the increase of VERs, pumped storage is an enabling technology that can absorb excess generation (or negative load) at times of high output and low demand, and release that stored energy during peak demand periods when it is needed.

B. A review of Europe's experience with VERs shows that hydropower and pumped storage play a critical role in integration and system reliability and stability.

Many advocates of increased renewable energy point to Denmark, which has the greatest levels of wind penetration in Europe, as an example for the United States in integrating large amounts of variable generation. While accurate, the key point that is overlooked is that Denmark's transmission system does not provide its own balancing services.

Denmark's two systems (East and West) are not linked to each other. Instead, the country depends on interconnections with Germany, Sweden and Norway for its grid stabilizing services. The system works because Germany is rich in pumped storage facilities, and Sweden and Norway have high amounts of conventional hydropower resources.

These strong electrical interconnections between Denmark, Sweden and Norway are the foundation of Denmark's ability to absorb the wind penetration it has today. This ability has much to do with the extent to which both Sweden and Norway rely on their hydropower systems,

which supplies 50 percent and nearly 100 percent of their respective generating needs from flexible hydropower units. The two countries' conventional hydropower output can be adjusted very rapidly as the variable wind power flows through the interconnections.

Studies of the power flows across the Danish interconnections during a high wind period, for example, shows a direct relationship between the high output wind energy and the power flows exported to Norway and Sweden. During a low wind event, a direct relationship can be seen between the low output wind energy and the power flows being imported from the two countries.

With the Danish experience as background, several U.S. studies have documented how bulk-storage capacity can support the increasing development of VERs. These analyses show that not only does bulk storage add capacity and offer load balancing, but it also reduces the cost of integration. For example, a Wind Integration Study conducted for the Public Service Company of Colorado (PSCo) in 2006 reported that doubling the pumped storage capacity within the PSCo system could reduce the cost of integration by as much as $1.30/MWh in a 20 percent wind penetration case analysis.

Similarly, the Northwest Wind Integration Action Plan (Northwest Power and Conservation Council 2007) acknowledges that the increased development of wind energy in the northwest requires a corresponding increase in flexible generation, including pumped storage. The plan notes that the cost of wind integration is dependent upon several factors including the availability of flexible sources within the region's system, and calls for the Northwest Wind Integration Forum to "characterize options for augmenting system flexibility" including options for storage technologies.

C. Several policy changes, from transmission asset rates to economic incentives for development, are needed in order to see new pumped storage facilities built.

While the 31 GW of new pumped storage project proposals now before FERC demonstrates the hydropower industry's commitment to building new pumped storage capacity in support of other renewable resources, developers still face significant obstacles. These include an uncertain investment climate, long development timelines and the lack of economic incentives for development of energy storage infrastructure. These issues must be addressed in order to ensure that the proper market signals are in place to incentivize the permitting and construction of these new pumped storage plants.

Federal policies that encourage investment and stabilize the development process are needed. Although Energy Secretary Steven Chu has stated that pumped storage technology must play an integral role in our national plan to expand our clean-energy resources and integrate variable renewable energy generation into the transmission grid, the federal government currently has few programs to spur development of energy storage resources, including pumped storage. Incentives are needed that attract investors and encourage rapid development of new pumped storage projects.

Expanding the current investment and production tax credits, the possible creation of an energy storage credit, coupled with policies that recognize pumped storage as a part of the transmission system for purposes of qualifying for transmission rate incentives currently afforded to transmission system upgrades and expansions, would create the investment environment needed to encourage growth in pumped storage. This growth would displace the need for additional fossil-fuel based peaking generation, and provide the load management capacity necessary to meet our national renewable energy goals.

Additionally, policies that promote intergovernmental cooperation and create efficiencies in the permitting and licensing process, particularly for closed-loop pumped storage systems, will also add more certainty to the development process and encourage growth.

Finally, NHA members have identified other steps that are needed to encourage the development of new energy storage technologies and construction of energy storage. These include treating energy storage facilities and services on a comparable basis to traditional transmission facilities expansion for purposes of qualifying for transmission pricing incentives and participation in transmission planning processes. Although the Energy Policy Act of 2005 did recognize pumped storage as a transmission enhancement, NHA believes FERC should also consider allowing pumped storage to qualify as transmission facilities for purposes of determining eligibility for future incentives.

D. While the existing hydropower system can provide much needed support for integrating VERs, in some river basins, management decisions have resulted in reduced operational flexibility.

As discussed above, hydropower offers a variety of grid reliability benefits and ancillary services that can greatly assist in the integration of VERs. While this is true, the flexibility of hydroelectric projects is not unlimited. Hydropower facilities, both those in the federal system and those privately owned, operate in a manner to not only efficiently generate renewable electricity, but also satisfy the many non-power uses of these projects, such as flood control, water supply, fish management, habitat maintenance and restoration, irrigation and recreation. Providing non-power benefits can in certain situations restrict the operational flexibility of a project, limiting the capacity to provide needed integration services.

Additionally, a trend has developed for those non-federal projects that have recently undergone re-licensing – a loss of peaking ability. While every relicensing process has unique issues to address and

may require changes in project operations, the system-wide loss of flexibility has consequences on hydropower's role as an enabler of VER integration. NHA recommends the Commission consider these elements (i.e. store and release capability) as it examines the function of hydropower resources for VER integration, as well as the needed policy changes in support of greater VER penetration on the grid.

III. Conclusion

With the rise of renewable energy standards and other incentives for increased renewable energy generation driving the planning and commissioning of a tremendous amount of variable energy projects across the country, America's electrical energy infrastructure is in need of the ancillary services and storage capacity that hydropower and pumped storage can provide – now more than ever.

NHA supports the development and deployment of all renewable energy resources. While many of our member companies are investing in new hydropower capacity, they are also moving forward to deploy other renewable energy technologies, as well funding energy efficiency initiatives. However, our members also recognize that meeting the country's renewable energy goals will require solutions to the challenges presented by VERs. NHA believes hydropower and pumped storage projects, with the benefits they offer, are proven technologies and are key assets in successfully solving the grid reliability and stability concerns posed by increased VER generation.

NHA applauds FERC for initiating this discussion and appreciates the opportunity to provide comments on the NOI. NHA will continue to be engaged in the Commission's efforts to highlight the issues with, and address the challenges surrounding, VER integration.

Respectfully submitted,

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ASSOCIATION

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