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June 15, 2007

The Honorable John D. Dingell
Chairman, House Committee on Energy and Commerce

The Honorable Rick Boucher
Chairman, Subcommittee on Energy and Air Quality

RE: National Hydropower Association Response on Possible "Portfolio Standards" Bill (Submitted via e-mail)

Dear Chairmen Dingell and Boucher:

On behalf of the National Hydropower Association (NHA) and the members we represent, I am submitting comments in response to your May 24, 2007 letter regarding portfolio standard proposals. NHA appreciates the opportunity to address how hydropower and new waterpower technologies may be treated under a national renewable energy requirement imposed on the electricity generation sector.

NHA is a member-based trade association dedicated to promoting the nation's largest renewable resource and advancing the interests of the hydropower industry and the consumers they serve. NHA represents 61 percent of Federal Energy Regulatory Commission-licensed domestic, hydroelectric capacity. NHA also advocates on behalf of the new waterpower technologies – ocean, tidal and in-stream power.

In a brief but direct response to your inquiry about the value of considering a portfolio standards bill, **NHA is on record supporting a renewable energy portfolio standard that explicitly recognizes hydropower as a renewable resource and provides opportunities for environmentally responsible development of new hydropower and waterpower resources in the United States.**

The following comments are intended to provide a general overview of the merits of including full hydropower coverage in any energy or environmental regulatory proposal requiring the electricity industry to obtain a certain percentage of its deliverable power from designated generation sources. Our long standing interest in the RPS debate has been to ensure that hydropower is included as a renewable energy resource eligible to meet the program's requirements. It is from this context that we respond to your request for information.

Background
Over the last decade, hydropower producers and the consumers they serve have been actively promoting hydropower's role in energy and environmental discussions. During the electric utility restructuring debates leading to both the Energy Policy Act of 1992 and the Energy Policy Act of 2005, hydropower interests worked tirelessly to ensure that hydropower and its numerous benefits to energy production, water control, irrigation and recreation activities were recognized in new production and investment tax credits and other incentives to promote renewable energy development

While incentives for additional development were included in EPAct 2005, hydropower's full potential is not yet realized. The current tax and bond incentives apply to efficiency gains and capacity additions at existing licensed projects, and to some development of non-powered dam sites, with restrictions. Additionally, the PTC incentive available represents half the value offered other renewable technologies. Furthermore, in various federal and state programs, hydropower is treated inconsistently and, at times, dismissed entirely as a renewable energy resource.

From NHA's perspective, the primary question is not whether a portfolio standard should be adopted, but whether or not Congress will count hydropower as an eligible renewable energy resource for purposes of meeting national energy and environmental goals.

Making the Case for Hydropower as a Renewable Resource Eligible to Meet RPS (and other) Requirements
Under the very first question of the **purpose of portfolio standards proposals**, NHA responds that Congress should pursue policies to motivate the development of the nation's domestic renewable energy resources to address both energy needs and environmental goals. Renewable portfolio mandate approaches are intended to provide a minimum market for renewable resources, and thereby supply environmental, fuel diversity, energy security and economic development benefits.

NHA also recognizes the benefits to the country of increased renewable development through alternative energy portfolio standard proposals, such as a clean energy portfolio standard. This approach builds on the model of a traditional RPS, but gives credit to additional non-emitting technologies and activities, including fossil generation with carbon capture, and new nuclear generation. Supporters of this approach claim that it would result in more emission-free electricity generation than a simple RPS, but at a lower cost and that it would provide explicit credit for demand reduction and efficiency efforts.

In response to the question on **portfolio inclusions and exclusions**, NHA recommends that additional hydropower and waterpower technologies be allowed to contribute to meeting the portfolio requirement. Various RPS proposals in Congress and in the states have been inconsistent in their treatment of hydropower. Many state RPS programs either include small hydropower (less than 30 MW, as in the case of

California) or have excluded it altogether. Congressional proposals have generally excluded all hydropower capacity from the base amount to which the RPS is applied and some have counted 'incremental hydropower' in the definition of qualifying renewable resources.

For example, incremental hydropower is defined in current proposals as new electric generation achieved at an existing non-federal hydropower facility through efficiency upgrades or additions of new capacity. Excluded from the RPS credit in these same proposals are new hydropower projects at existing non-power dams and the new technologies, including ocean, tidal and in-stream power. NHA strongly encourages the inclusion of these technologies.

Hydropower's Potential

Hydropower projects produce power in nearly every state, providing close to 80,000 MW or 77% of the total net electricity generation from renewables and 83% of the nation's renewable energy capacity. Millions of homes are powered by electricity from hydropower resources.

Importantly, with appropriate incentives significant additional clean energy from hydropower is readily available – mostly without any new dams. Incentives, such as the federal production tax credit, along with state renewable portfolio standards are needed to encourage this growth. The Electric Power Research Institute (EPRI), in a recently released report, found great potential from efficiency improvements and capacity upgrades at existing projects, adding hydropower to some existing non-powered dams (only about 2% of dams in the U.S. produce power) and significant new capacity gains from emerging waterpower technologies such as ocean, tidal and in-stream projects.

According to the EPRI report, **the potential for increases in generation capacity, mostly without the need to build new dams, is conservatively estimated as 23,000 MW by 2025[1], with an overall estimate of 85,000 to 95,000 MW, with appropriate public policy support.** This includes:

2,300 MW of capacity gains at existing conventional hydropower;
5,000 MW of new conventional hydropower at existing non-powered dams;
2,700 MW of new small and low head power conventional hydropower (<30 MW installed capacity);
10,000 MW from ocean wave energy technologies; and
3,000 MW from hydrokinetic technologies (river-based).

(These estimates do not include a full assessment of ocean resources or conduit power resources, which have yet to be completely studied.)

[1] To put this in perspective, the total installed generating capacity for wind is approximately 9000 MW.

Hydropower's Role in Combating Climate Change
A fairly structured national RPS could empower hydropower to make a significant contribution to solving the climate problem. Reducing greenhouse gas emissions will require the use of all of the climate friendly technologies currently available, as well as new technologies.

Among its many benefits in providing low-cost and reliable energy, hydropower – both conventional and the emerging waterpower technologies – emits little or no harmful atmospheric emissions or greenhouse gases. Hydropower's current avoided carbon emissions in the U.S. are estimated to be nearly 160,000,000 metric tons.

Hydropower provides significant benefits and potentially even greater benefits in the future, if properly supported. Beyond the fact that it is renewable, climate friendly, and domestic, hydropower offers some advantages over other resource options.

Hydropower provides significant base-load generation, peaking capacity, and ancillary services to bolster the reliability, stability, and resilience of the nation's transmission system. This includes frequency control, regulation, load following, spinning reserve, supplemental reserve and blackstart capability. The August 2003 blackout on the east coast exemplified these benefits. Hydropower projects in New York and elsewhere remained online and were critical in restoring power to the area.

In addition, as the U.S. significantly increases the amount of renewable resources in its overall portfolio, hydropower offers another significant advantage. Hydropower is one of the few resources that can 'firm' intermittent or non-dispatchable resource such as wind. As the development of wind, solar and other intermittent resources grows, as is widely expected, the need for 'firming' resources will become even more important. Without this 'firming' resource, the value of intermittent or non-dispatchable resources is greatly reduced.

Recommendations
To maximize the benefits of hydropower and waterpower technologies and to fully utilize these important energy resources, NHA seeks congressional support for an RPS that:

- Includes new hydropower at existing non-hydropower dams in the definition of qualifying renewable resources.
- Excludes all existing hydropower capacity from the base amount to which the RPS is applied.
- Includes "incremental hydropower" in the definition of qualifying renewable resources.
- Includes new technologies and ocean, tidal, wave and hydrokinetic instream technologies as a qualifying renewable resource.

Conclusion
In conclusion, providing federal policy leadership for the continued and expanded development of hydropower and the emerging waterpower technologies will greatly benefit the nation's effort to increase domestic sources of energy.

The enormous challenge of climate change and the sheer magnitude of the amount of clean energy needed to stabilize atmospheric concentrations of carbon dioxide require that we focus on the environmental contributions of hydropower, a readily available source of clean energy, more so than we ever have in the past. We simply do not have the luxury of excluding viable clean energy options from our mix of tools in the fight against climate change.

If Congress elects to motivate the development of renewable or clean energy resources through a national mandate, then NHA calls upon policymakers to treat hydropower as fairly and equitably as any other renewable or clean energy resource. Final mandate definitions should include incremental hydropower, hydropower at existing non-powered dams and the new hydropower technologies – ocean, tidal and instream hydrokinetic power.

Thank you for your consideration of our comments and recommendations.

Sincerely,

Linda Church Ciocci
Executive Director
National Hydropower Association

Attachment: Executive Summary of *Assessment of Waterpower Potential and Development Needs.* EPRI, Palo Alto, CA: 2007. 1014762.

EXECUTIVE SUMMARY

Waterpower includes generation from conventional hydroelectric facilities as well as generation from the emerging technologies that access the energy potential of river, tidal, ocean and constructed waterway currents, and the energy of ocean waves and thermal gradients. Existing conventional hydropower generation represents 75 percent of the U.S. renewable energy generation (over 270,000 GWH) and the opportunity exists to expand this resource. The potential for waterpower expansion—at existing hydroelectric facilities, at dams without powerhouses, and from the emerging next generation of waterpower technologies—is substantial, as presented and discussed herein. The potential increase in generation capacity is conservatively estimated as 23,000 MW by 2025. This includes:

- 2,700 MW of new small and low power conventional hydropower (< 30 MW installed capacity);
- 2,300 MW capacity gains at existing conventional hydropower;
- 5,000 MW of new conventional hydropower at existing non-powered dams;
- 10,000 MW from ocean wave energy technologies; and
- 3,000 MW from hydrokinetic technologies.

These estimates could be significantly increased if economic incentives and regulatory processing for the waterpower technology industry are enhanced. The overall resource potential, based on resource assessments conducted by the U.S. Department of Energy (DOE), EPRI and industry is estimated to range from 85,000 to 95,000 MW.

In the near term or next 5-year period, it is conservatively estimated (Table E-1) that gains in capacity could exceed 700 MW while the next generation of waterpower technologies are developed. Furthermore, existing conventional hydropower can also be enhanced by improvements in generation efficiency, which has been estimated to range from 2 to 5 percent or more. This would increase current annual conventional hydropower generation approximately 5,300 to 14,000 GWH, depending on annual hydrology (current conventional hydropower generation ranges from an average annual low of ~261,000 GWH and an average annual high of ~293,000). By 2025, the total annual waterpower generation will see an increase of ~79,000 to 89,000 GWH, when generation from the emerging waterpower technologies is included. This annual additional generation is equivalent to the current power needs of almost 8 million households based on 2001 DOE residential power consumption estimates[2] or nearly the current annual generation from all other renewable technologies (~89,000 GWH in 2004).

[2] DOE, Energy Information Agency 2001 Resident Energy Consumption Survey. See: ftp://ftp.eia.doe.gov/pub/consumption/residential/2001ce_tables/enduse_consump2001.pdf

Table E-1
Estimated Waterpower Technology Capacity Gains, 2006-2010 (MW)

Waterpower Technology Class	2006	2007	2008	2009	2010	Cumulative
Capacity gains at existing hydropower facilities	76[3]	90	75[4]	75	59	375
New hydro at existing dams	--	--	--	--	25	25
Small and low power hydro	--	--	--	50	75	125
Hydrokinetic	--	0.2	--	4.8	110	115
Ocean Wave Energy	--	--	3	1	80	84
Yearly Capacity Gain (MW)	76	90.2	78	131	395	724

Realization of the potential requires a concerted effort of research, development, demonstration, and deployment (RDD&D) by the public and private sectors. In the near-term (to 2010), the focus is on maximizing performance of existing facilities along with new capacity additions. This can be achieved through economic stimuli, such as Production Tax Credits (PTCs) and Clean Renewable Energy Bonds (CREBs), and the initiation of RDD&D. Near-term RDD&D includes programs that focus on improved environmental performance and commercialization of new hydrokinetic and ocean energy technologies. In the longer-term, or by 2025, the RDD&D, economic stimuli, and regulatory enhancement will achieve substantial conventional hydropower gains. During this period, the deployment of the next generation of waterpower technologies will also contribute by accessing the hydrokinetic and ocean energy potential.

The initiatives discussed herein support the Energy-Water Nexus Roadmap and are consistent with the directives of the Energy Policy Act of 2005. In fact, the Energy Policy Act of 2005 (Title IX, Section 931) directs the Secretary of Energy to:

> *(D) Hydropower. –…conduct a program of research, development, demonstration and commercial application for cost competitive technologies that enable the development of new and incremental hydropower capacity, adding to the diversity of the energy supply of the United States, including: (i) Fish-friendly large turbines. (ii) Advanced technologies to enhance environmental performance and yield greater energy efficiencies.*
> *(E) Miscellaneous Projects. – The Secretary shall conduct research, development, demonstration, and commercial application programs for – (i) ocean energy, including wave energy (…) and (iv) kinetic hydro turbines.*

Commercialization of new technologies and capital-intensive energy projects requires time and RDD&D. For example, over a nearly 30-year period (1978-2006), U.S. wind energy RDD&D has resulted in 9,100 MW of installed wind capacity (Figure E-). Similar long-term success is projected from an investment in waterpower RDD&D (Figure E-).

[3] Based on certified and pending filings with FERC for Production Tax Credits (PTCs) as of October 2006.
[4] Assumes that PTCs and Clean Renewable Energy Bonds (CREBs) are extended to 2015.

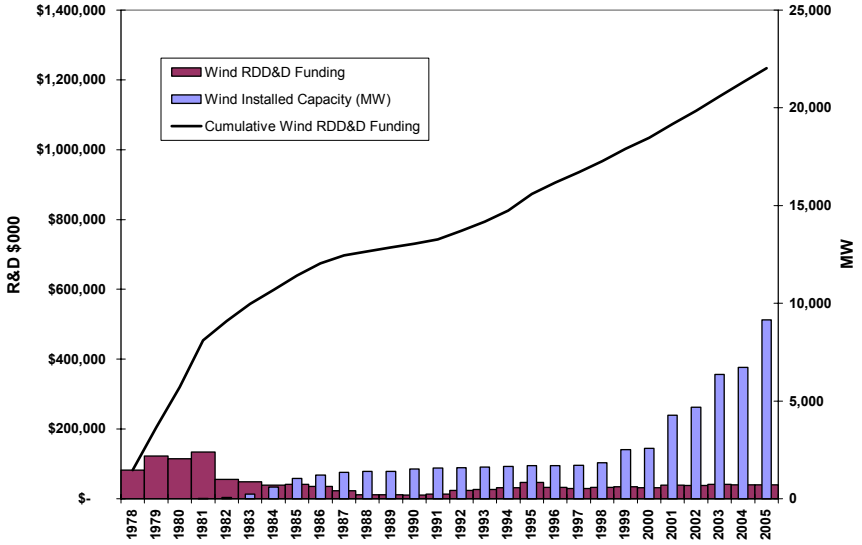

Figure E-1
Wind Energy RDD&D Funding and Realized Capacity: 1978-2006 (DOE/EIA 2006; DOE 2006b; http://www1.eere.energy.gov/windandhydro/wind_budget.html).

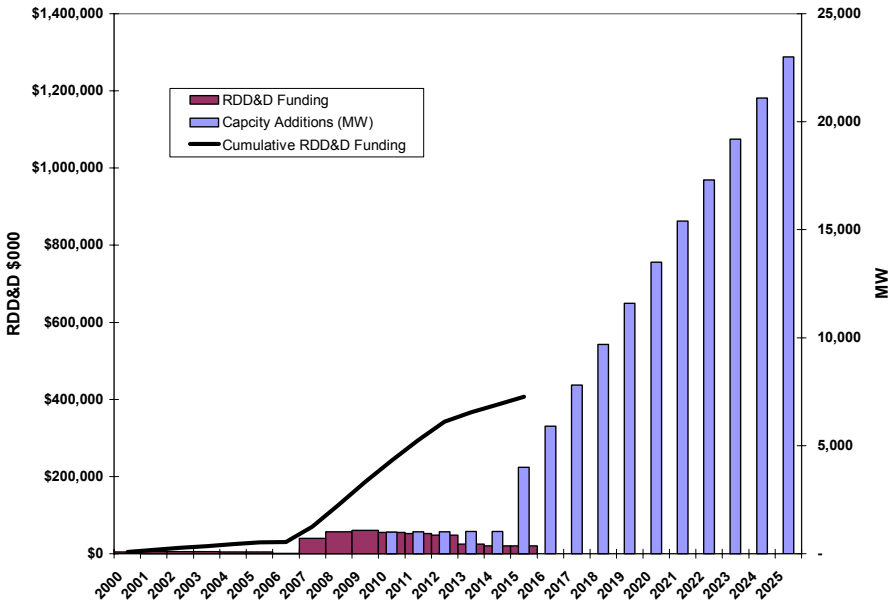

Figure E-2
Estimated Advanced Waterpower Energy Initiative (AWEI) RDD&D Annual (2007 to 2015) Funding and Capacity Gains by 2025.

Analyses conducted herein have found that realization of waterpower's potential could be accomplished with the following endeavors:

- Establishing a public-private sector program called the Advanced Water Energy Initiative (AWEI), which would provide RDD&D guidance and funding support of $212 million (short-term); $377 million through 2015. The AWEI would be designed to achieve near-term conventional hydropower gains while fostering the development and commercialization of waterpower technologies that produce energy from hydrokinetics and ocean wave resources.
- Extending the Production Tax Credit (PTC) and Clean Renewable Energy Bond (CREB) programs to 2015. These economic incentives would foster (1) investment in modernizing the infrastructure at existing hydropower facilities, and (2) installing new facilities at existing dams.

In addition to these endeavors, although not evaluated in detail in this assessment, regulatory process enhancements that expedite project licensing could also contribute to realizing the potential of this domestic energy resource.

The AWEI would provide the requisite structure and guidance for the needed RDD&D discussed herein. This initiative addresses the needs using the successful technology development models employed by other renewable energy sectors, such as wind and biomass. The AWEI would have three major components (Table E-2):

1. Waterpower Realization Committee—to provide the initial guidance and future oversight to benchmark results of the RDD&D in terms of real waterpower capacity and generation gains.
2. Waterpower Performance Initiatives—RDD&D efforts that would improve the efficiency and environmental performance of conventional hydropower technologies.
3. Waterpower Technology Development —RDD&D that would advance hydrokinetic and ocean energy technology development in four program areas.

Table E-2
Advanced Water Energy Initiative Funding ($M).

	Waterpower RDD&D Program Area	2007	2008	2009	2010	Total
1	Waterpower Realization Committee	1	1	1	1	4
2a	Advanced Water Energy Science	13	13	13	13	52
2b	Hydropower Environmental Performance	7	8	8	8	31
2c	Hydropower Operational Performance	6	11	11	11	39
3a	Hydrokinetic Resource Assessment	3	1	0	0	4
3b	Hydrokinetic Environmental Profiling	2	4	4	4	14
3c	Hydrokinetic Technology Improvement	8	19	23	8	58
3d	Advanced Ocean Energy Technology Development	0	0	0	10	10
	Total RDD&D Funding	40	57	60	55	212

Needed near-term (2007 to 2010) estimated RDD&D funding totals $212 million. The long-term estimate through 2015 is $377 million. Implementation of this program requires reestablishing U.S. Department of Energy (DOE) funding for waterpower research, which was eliminated

beginning FY 2007. Federal funding support would also contribute to reversing a long-term decline in DOE's budget authority for energy R&D, a decline that the U.S. Government Accountability Office (GAO) has recently noted to have declined in real terms by over 85 percent since 1978[5].

The importance of the PTCs is based on their history of supporting capacity development in the wind industry, as demonstrated in Figure E-3. Conventional hydropower could be expected to follow the same economic incentive trend (Figure E-). The next-generation waterpower—the hydrokinetic and ocean wave energy technologies that are not yet commercial—will require similar support to achieve their potential.

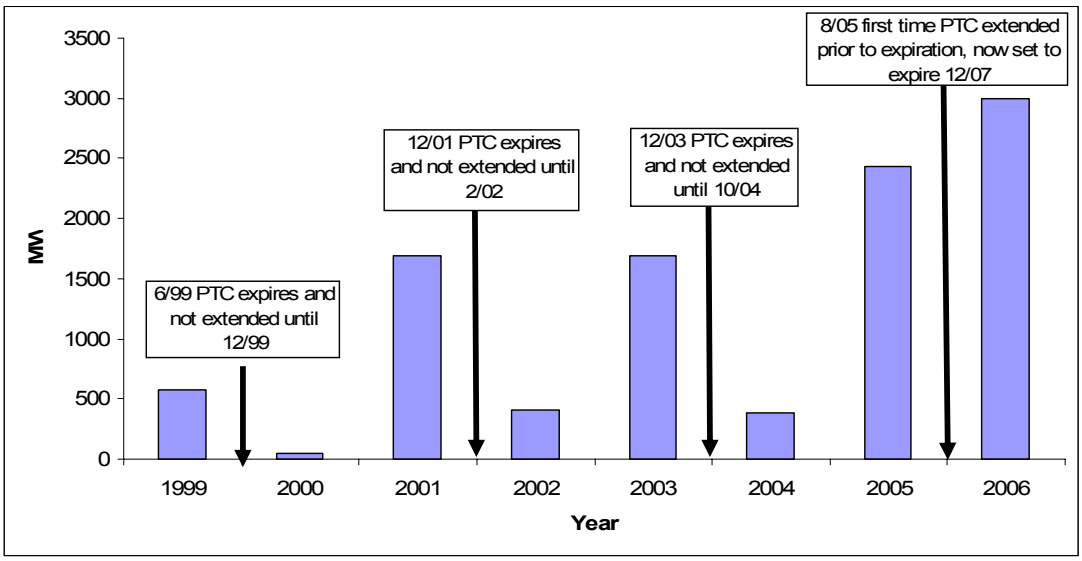

Figure E-3
Effects of PTCs on Wind Power Capacity Additions: 1999-2006 (Source: American Wind Energy Association 2005).

[5] U.S. Government Accountability Office. Report to Congressional Requestors. Department of Energy: Key Challenges Remain for Developing and Deploying Advanced Energy Technologies to Meet Future Needs. December 2006. GAO-07-106.

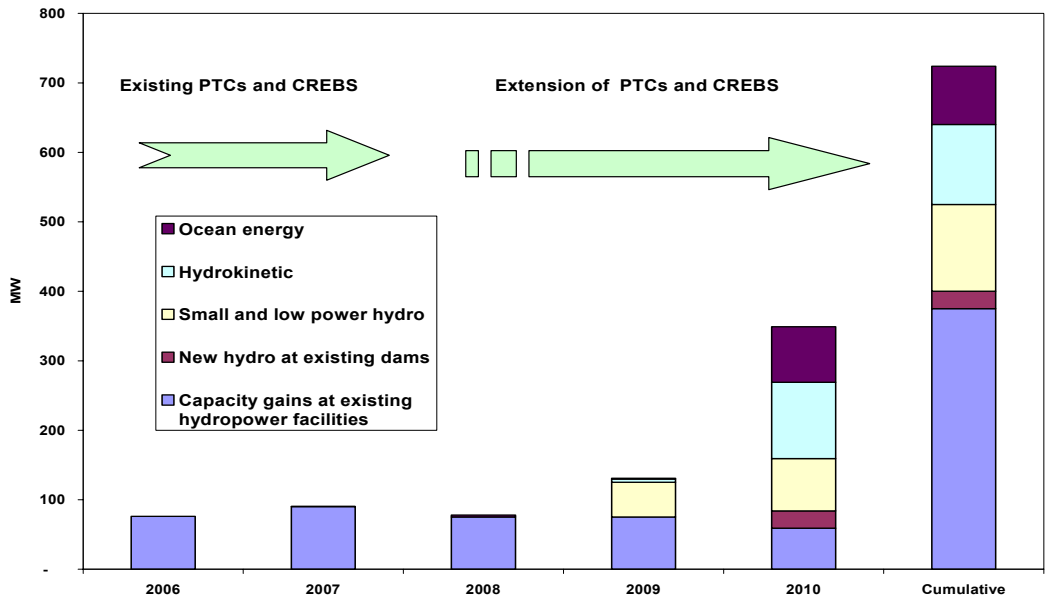

Figure E-4
Potential Short-term Realization of Waterpower Gains from PTCs and CREBS (Source: National Hydropower Association).

By moving down an RDD&D path that embraces all waterpower technologies in a comprehensive manner, the potential presented and discussed herein can be realized. This study estimates that a 10-year $377 million AWEI commitment (averaging $37 million/yr) can yield 23,000 MW of waterpower capacity by 2025. By comparison, the proposed 10-year AWEI funding level is 31 percent of the 28-year funding of the wind industry ($377 million vs. $1,200 million) and could yield more than twice as much installed capacity (23,000 MW vs. 9,100 MW) in a shorter (20- vs. 28-year) timeframe.