



## **Analysis of Project Finance Requirements Implicit in Existing State and Proposed Federal Renewable Energy Mandates**

### **Executive Summary**

The U.S. Partnership for Renewable Energy Finance (“PREF”) seeks to provide information to policymakers that will aid in fulfilling U.S. objectives for the expansion of supply and use of renewable energy. The members of US PREF have prepared this summary of the capital implications of state and federal renewable energy mandates in response to specific questions and in an effort to highlight the magnitude of renewable finance needs and requirements implicit in current and proposed legislation.

- According to third-party research<sup>1</sup>, \$356Bn of capital expenditure would be required by 2020 to meet the Federal Renewable Electricity Standard (“RES”) in the American Clean Energy and Security Act of 2009 (“ACES”), also known as Waxman-Markey. This implies an average annual investment of \$32Bn, as compared to aggregate U.S. new-build, asset financings of \$10.9Bn in 2008 and \$5.3Bn annualized for 2009 (based on data through the end of the third quarter)<sup>2</sup>
- Assuming 80/20 (debt/equity), approximately \$285Bn in debt and \$71Bn in equity would be needed to meet the 2020 target
- Assuming loan-loss reserve rates of 5% for conventional renewables and 10% for innovative renewables, the current DOE guarantee would cover only \$74Bn in loans (provided that the \$2Bn diverted to “cash-for-clunkers” is replenished)
- If this funding is not replenished, loans supported by guarantees would drop by nearly 55% to \$34Bn
- Based on the above assumption of \$285Bn in total debt and \$74Bn in DOE-guaranteed loans, approximately \$211Bn of the debt portion of the capital structure would require sources of funding other than DOE-guaranteed debt. This figure climbs to \$251Bn if the \$2Bn directed to cash-for-clunkers is not restored.

### **Capital Requirements for RPS/RES Mandates**

Planned additions to renewable energy supply to meet state renewable portfolio standards (“RPS”) are targeted at 383 million MWh, with an implied cost of \$303Bn. To satisfy the Federal RES included in ACES, construction of sufficient generating capacity to produce an incremental 67 million MWh annually would be required at an estimated cost of \$53Bn. The total build-out of 450 million MWh in annual supply would cost \$356Bn (See Exhibit 1 below).

The methodology supporting these calculations is as follows: Retail power sales are assumed to rise to 4.1 billion MWh by 2020. Of this, non-qualified hydro could generate 248 million MWh. EIA forecasts estimate that by 2020 there could also be an additional 55 million MWh of electricity generated from new nuclear. Subtracting the output of non-qualified hydro and new nuclear plants yields a retail electricity suppliers<sup>1</sup> aggregate base amount of 3.8 billion MWh in 2020. In 2020, 15

<sup>1</sup> Bernstein Research, *U.S. Utilities: Will the United States Regulate CO2?*, July 15, 2009.

<sup>2</sup> New Energy Finance

percent of the base amount is to be supplied from renewable resources (assuming 5 percent energy efficiency), which would require renewable generation of 574 million MWh in that year. With existing renewable capacity annually supplying 124 million MWh, additions of 450 million MWh would be required by 2020.<sup>3</sup>

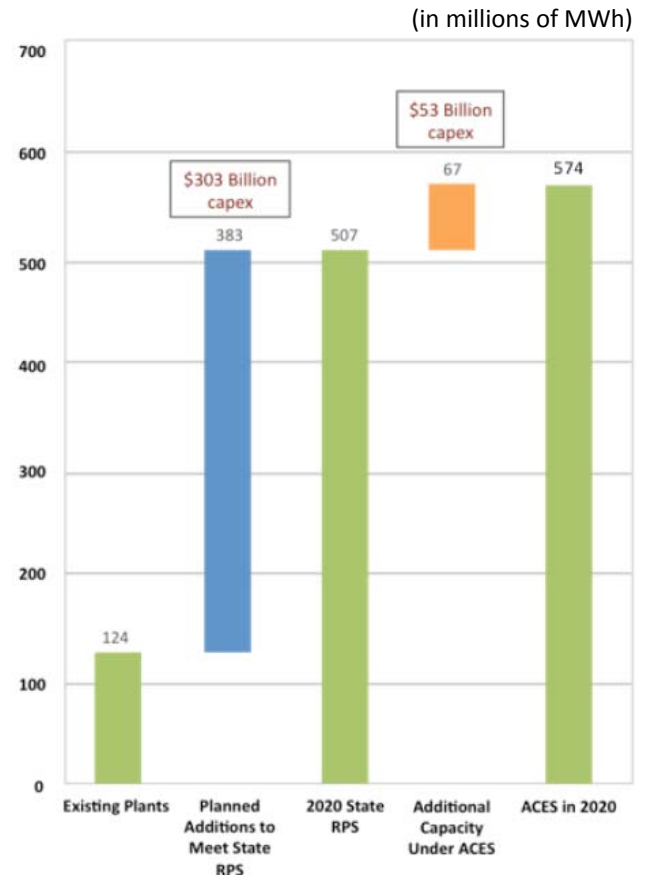
In addition, the assumption of 55 million MWh of new nuclear supply implies incremental nuclear generating capacity of nearly 7 GW (assuming 90% capacity factor), or 5 to 8 nuclear units to be built and operating by 2020. This effectively assumes at a minimum that four finalists in the DOE loan guarantee process complete their projects on schedule. If any of this capacity is not built, the RES baseline amount would be higher, and therefore more renewable generation would be needed to reach the 15% standard.

Using a simplifying assumption that all incremental renewable generation needed to comply with the RES is produced by wind facilities<sup>4</sup>, over 147 GW of new wind generation projects would need to be completed between now and 2020. This is more than 4 times the current U.S. renewable energy operating capacity. The construction targets would require annual installations averaging more than 13 GW, equivalent to over 1.5 times the amount of renewable generating capacity installed in the U.S. in 2008, which was a record year for renewable installations. Of course, wind would not be the only renewable technology used to meet the RES, but the simplifying assumption fairly reflects the concern that RES targets involve capacity additions well beyond historical levels and capital investment significantly greater than currently available funding.

### Market Implications

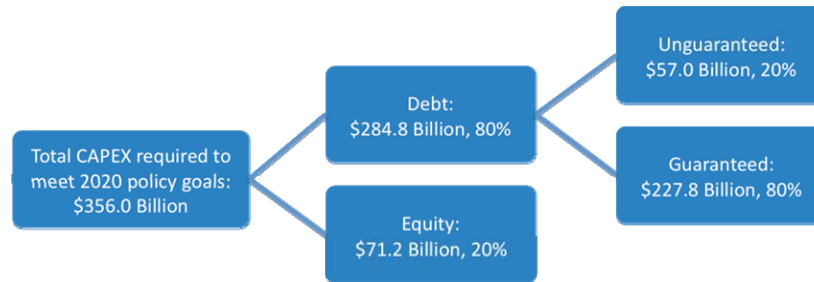
The substantial capacity additions required by RES depend on an unprecedented influx of capital into renewable energy. The DOE loan guarantee represents one mechanism designed to facilitate this flow of capital.

**Exhibit 1: Renewable Power Capacity Build Required by RES/RPS**



<sup>3</sup> Bernstein's incremental capacity estimate under the RES implicitly assumes that the RES is established on a national basis. If instead each state were required to meet the RES target from internal sources, the need for renewable capacity installations would be much greater, as states with no RPS currently would have to build their entire needs and could not procure power from states with higher RPS targets than the RES minimum.

<sup>4</sup> The nameplate capacity number assumes a 35% net capacity factor. Using Bernstein's estimate of \$356Bn, the implied all-in construction cost per kW would be \$2,426, which is on the higher end for wind farms, but the RES would be met by a number of technologies at a greater overall cost per kW.



Assuming financing on an aggregate basis at 80% debt and 20% equity, over \$71Bn in equity would be required to achieve the RES by 2020. In addition, assuming as an extreme example that the entire RES were funded through the DOE loan guarantee program, \$228Bn in guaranteed debt would be required. The DOE program is slated to support \$74Bn in guarantees for renewable energy (assuming loan-loss reserves of 5% for conventional renewables and 10% innovative renewables), which means the balance of \$211Bn in the debt portion of the capital structure must come from other sources. If the \$2Bn diverted from the DOE loan guarantee program to the “cash-for-clunkers” program is not replenished with future appropriations, loans supported by the DOE program would fall by nearly 55% to only \$34Bn, leaving a potential funding gap of \$251Bn.

The size of the DOE program and its perceived stability are critical to improving the flow of capital to renewable energy projects. If the funding in the guarantee program is viewed by the market as too small to make a substantial impact, the program will be less compelling to large sources of capital needed to finance sufficient capacity to meet the RES. In addition, any regulatory or political uncertainty surrounding the availability of government support for renewable energy may increase the perceived risk associated with renewable energy projects and thereby the cost of capital for those projects. This would unfortunately counteract government efforts to increase the flow of capital to renewable energy and hinder the evolution of renewable energy’s cost competitiveness with traditional energy sources. Both size and long-term stability of the DOE guarantee program are therefore essential to address the existing funding gap associated with the capital required to meet the RES.

To put the funding requirements in context, according to New Energy Finance, U.S. new-build asset financings across all renewable sectors totaled \$10.9Bn in 2008 and \$4.0Bn in the first three quarters of 2009.<sup>5</sup> Assuming a hypothetical run rate of \$10.9Bn per year (all asset financing), construction of the incremental capacity required to produce the 450 million MWh to be achieved under the RES would take 33 years. At a run rate comparable to the annualized \$5.3Bn of new-build asset financing in 2009, this would not be accomplished for 67 years. Put another way, an average of \$32Bn would need to be deployed on renewable capacity each year from 2009 to 2020 to meet the RES. This quantum of investment is well above historic levels (with existing government support). In 2007, which was a peak year for the U.S., new-build asset financings reached \$14.2Bn, less than half of the necessary annual investment. Moreover, the investment needed to comply with the RES is materially lower than the amount required to meet the IPCC’s climate target which is estimated to be \$135Bn per year in the U.S. Simply put, there is strong evidence to support the existence of a material funding gap in financing clean energy development in the United States over the coming years.

The members of US PREF support federal, state and local policies intended to facilitate the development of renewable energy generation in the United States. We appreciate the critical importance of meeting

<sup>5</sup> Asset financing figures reflect disclosed and completed new-build transactions.

renewable energy targets and recognize the funding challenges associated with those targets. The members of US PREF are actively engaged in evaluating funding solutions and look forward to cooperating in a constructive dialogue to address this national and global challenge.

*Paper authored by individuals at Morgan Stanley, along with input from US PREF members.*

### **About US PREF**

The objective of the US Partnership for Renewable Energy Finance (US PREF) is to unlock private capital flows to new, large-scale and distributed renewable energy projects in the United States. To achieve this objective, a group of highly experienced renewable energy financiers from financial institutions, investors, professional services firms, utilities and others, working with leading non-government organizations, have convened as US PREF. US PREF, founded in 2009 with support from the consulting firm Green Order, is a program of the American Council On Renewable Energy (ACORE), a Washington, DC - based 501 (c)(3) non-profit organization whose mission is to bring renewable energy into the mainstream of the US economy and lifestyle through research, education, convening, communications, and programs like US PREF.