



**Renewable Energy Project Finance in the U.S.:
An Overview and Midterm Outlook**

I EXECUTIVE SUMMARY

Wind, solar and geothermal energy projects in the United States are typically paid for using an approach known as “project finance.” This is a structure employed to finance capital-intensive projects that are either difficult to support on a corporate balance sheet or that become more attractive when financed on their own. Project financing structures will vary on a project-by-project basis, but renewable energy projects in the U.S. utilizing project financing generally rely upon a mix of direct equity investors, tax equity investors and project-level loans provided by a syndicate of banks.

Turbulence in the financial markets began disrupting the flow of project financing (both equity and debt) into renewable energy projects in the U.S. in the fourth quarter of 2008. Nearly two years later, the availability of project financing has improved considerably due to the thawing of the lending markets, with a return to longer tenors on term-debt, and legislative support mechanisms introduced as part of the American Recovery and Reinvestment Act (ARRA)—particularly the ITC cash grant.

In this report, we provide an update on the current terms and availability of project financing for large-scale wind, solar and geothermal projects in the U.S. and forecast the amount of project financing we expect to be sought by the sector through 2012. In analyzing where this financing is likely to come from, we address the potential impacts of the upcoming expiration of the cash grant and changes to the tax equity supply—two main themes in the renewable energy project financing arena at present.

The key **TAKEAWAYS** in this report are:

- The cash grant program has provided significant liquidity to the renewable energy sector and allowed hundreds of projects to directly monetize the 30 percent ITC without requiring a tax equity partner to do so. As of October 6, 2010, \$5.4B in cash grants had been paid out to renewable energy projects in the U.S., supporting a total investment of over \$18.0B.

Figure I-1: Cash Grants Issued Under Section 1603 (as of October 6, 2010)

Type	Number of Projects	Total Amount Awarded (M)	\$M/Project
Wind	183	\$4,590.9	\$25.1
Solar	1,047	\$387.2	\$0.4
Geothermal	21	\$266.9	\$12.7
Other	50	\$146.6	\$2.9
Cumulative	1,301	\$5,391.6	\$4.1

Source: U.S. Department of the Treasury, GTM Research

Figure I-2: Percentage Awarded By Sector

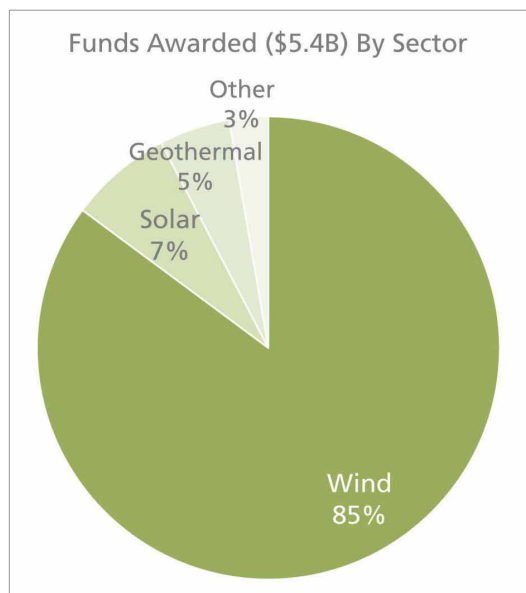
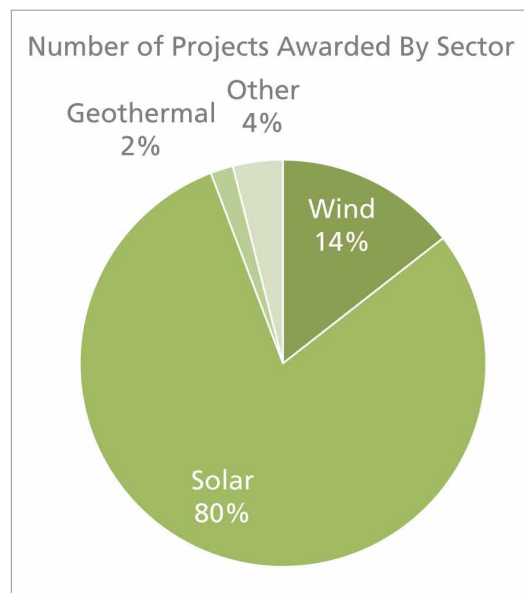


Figure I-3: Number of Awards By Sector

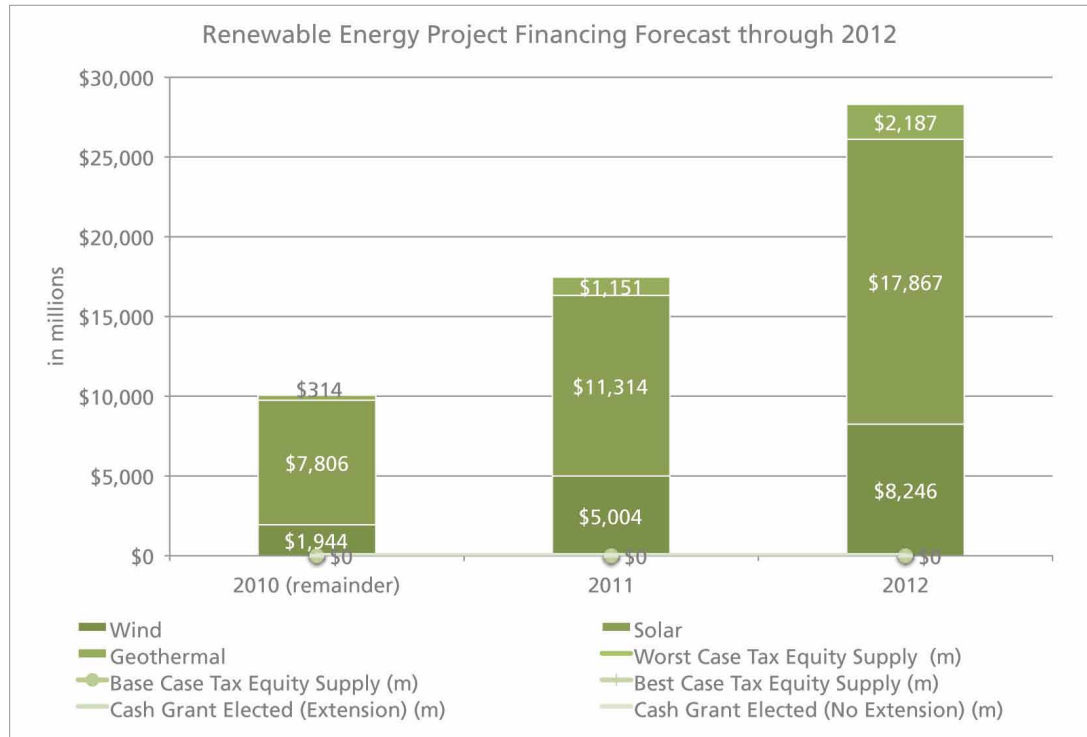


Source: U.S. Department of the Treasury, GTM Research

- The likelihood is diminishing that the grant could be extended past its December 31, 2010 deadline (to 2012, as proposed). Potential obstacles include: 1) the limited number of days remaining before Congress adjourns for the year and 2) concerns regarding cash grant recipients that are incorporating foreign-built plants and equipment into their projects.
- If the cash grant is not extended, the \$4.1B and \$6.6B in cash grants that we anticipate would have been sought by the sector in 2011 and 2012, respectively, will have to be sought in the tax equity, debt, and direct equity markets.
- The supply of tax equity to renewable energy has improved somewhat and is expected to reach ~\$3.0B for 2010 (2009: \$1.2B), but the tax equity supply for renewables is not expected to reach pre-financial crisis levels (2007: \$6.1B) for several years. Traditional tax equity investors still have limited future tax base visibility and new entrants (likely to come from the oil, technology and utility sectors) have high learning curves, which we expect to limit their contributions over the midterm. Finally, remaining tax equity investors are only providing financing to larger projects and are conducting protracted diligence in order to insulate themselves from any project risk.
- We forecast large-scale wind, solar and geothermal projects in the U.S. to seek a cumulative \$10.1B in project financing over the remainder of 2010, followed by \$17.5B in 2011 and \$28.3B in 2012—the majority (> 60 percent) being sought by the solar sector.
- For the remainder of 2010, we expect the sector to seek an additional \$2.4B in cash grants, \$1.4B in tax equity investments and \$6.3B in debt and direct equity.

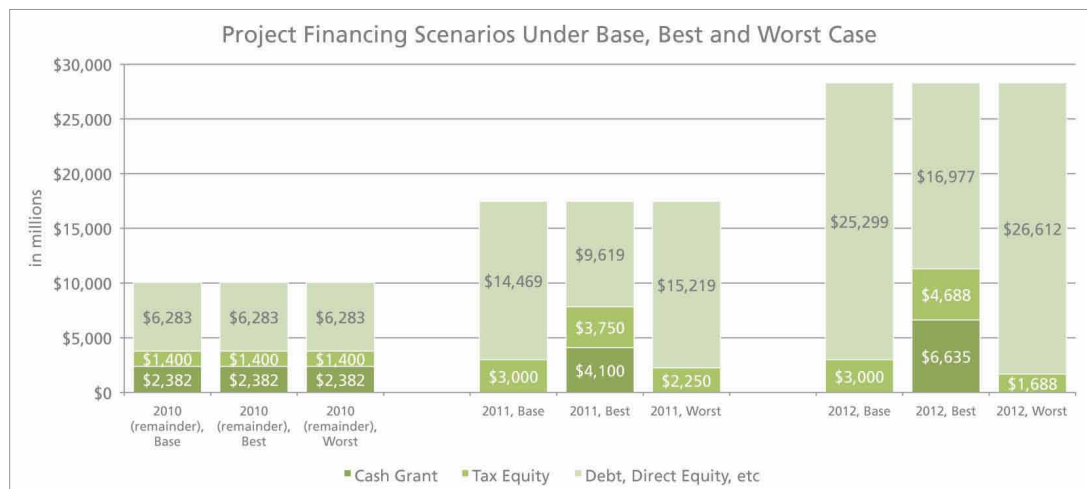
- We believe the expiration of the cash grant is likely to have the biggest negative impact on the solar sector. Of the amounts we expect would have been elected as cash grants if the grant were extended, the majority would have been sought by the solar sector (> 65%). Once the cash grant expires, most projects will still require a tax equity partner in order to monetize the ITC or PTC, and we believe wind projects are likely to be preferred over solar in a limited tax equity supply environment, hindering the solar sector's ability to monetize tax incentives.
- Conversely, we believe the potential extension of the cash grant could be the biggest boon to the solar sector, improving the ease with which solar projects are able to obtain additional financing. CSP projects in particular could benefit from an extension, as 85 percent of the CSP projects we expect to seek project financing through 2012 are ≥ 100 MW, and capital-intensive projects are considered to be much easier to finance when 30 percent of the capital costs are recoverable as a direct cash grant.
- We do not expect the wind and geothermal sectors to be as heavily impacted by the expiration of the cash grant. We estimate that 25 percent of wind projects prefer the PTC to the cash grant at present regardless, and the increase in PTC/ITC election from wind that would result from the cash grant expiration could largely be met with forecast tax equity supplies through 2012. The geothermal sector continues to face difficulty in obtaining the financing necessary to even begin construction, such that a cash grant, if eventually received, is a major positive, but is not generally assumed to be an integral piece in the overall project financing.
- If the tax equity supply for renewables were to grow after 2010, we believe that the effect on renewable energy project financing would be positive, but limited. Conversely, a decrease in the tax equity supply, as per "our worst-case scenario," could have a much more profound, negative impact on the overall sector, limiting the ability to monetize the ITC or PTC across wind, solar and geothermal.
- Without knowing whether project financing supply will meet expected demand over 2012, we believe that most quality projects (i.e., by established developers with PPAs from credit-worthy off-takers) will continue to be able to access project financing at reasonable terms over the midterm. Any potential bottlenecks in project financing (whether for debt, tax equity or direct equity) are likely to come at the expense of projects from smaller projects, less-established developers, and/or projects with higher technology or development risks (i.e., geothermal and newer solar technologies).

Figure I-4: Renewable Energy Project Financing Forecast through 2012



Source: GTM Research

Figure I-5: Project Financing Scenarios (Base, Best and Worst Case)



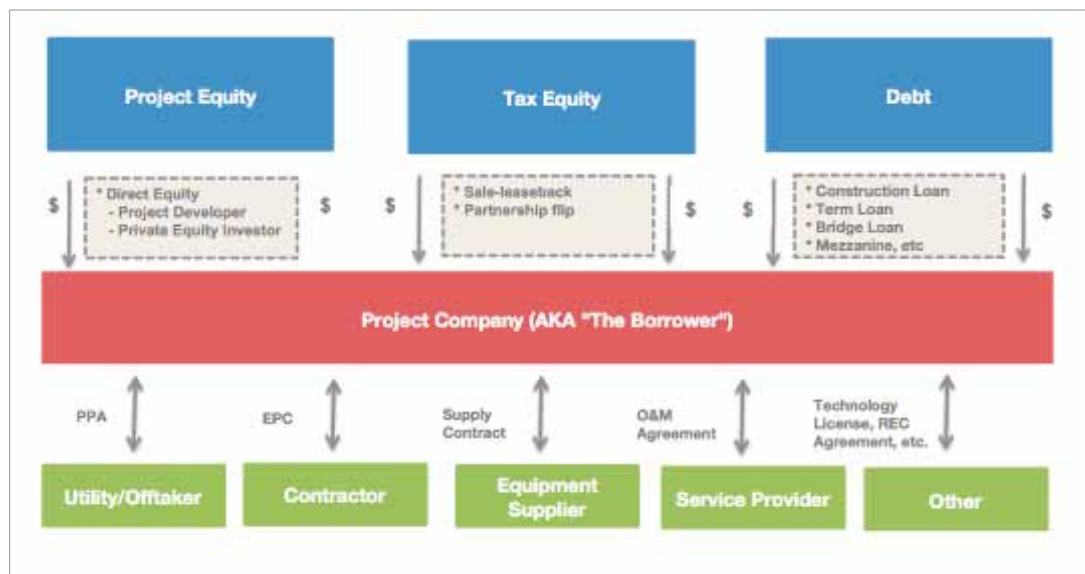
Source: GTM Research

II OVERVIEW

Project finance is a structure employed to finance capital-intensive projects that are either difficult to support on a corporate balance sheet or that have become more attractive when financed on their own. Renewable energy projects in the United States are typically financed using project finance and generally include a mix of project equity investors, tax equity investors and project-level loans provided by a syndicate of banks. Terms set forth by both lenders and equity investors are based on the project’s perceived riskiness and its expected future cash flows.

The project finance structure revolves around the creation of a “project company.” The project company holds all of the project’s assets, including its contractual rights and obligations. The project company is typically a limited-liability company (LLC) or, in some cases, a limited partnership (LLP). Project-level loans are usually non-recourse, meaning that they are secured by the project’s assets and paid off by the project’s cash flow: the investors’ assets are shielded should the project be unable to meet loan repayment terms.

Figure II-1: Typical Project Finance Structure for Renewable Energy in the U.S.



Source: GTM Research

Most renewable energy projects require a signed power purchase agreement (PPA) in order to reach financial close and commence construction. The commercial terms of the PPA and the engineering, procurement and construction (EPC) contract, together with the project’s associated market and technology risks, will largely determine whether lenders consider the project “financeable.” The maturing of the wind power market in recent years has allowed some major wind parks to receive project financing in the absence of a long-term PPA (known as “merchant projects”), but solar and geothermal projects rarely receive financing in advance of a PPA being signed.

i Direct Equity

Project equity (aka “cash equity” or “private equity”) is supplied by private equity firms or the developers themselves. Direct equity investors invest a specified amount in a project in return for a certain stake in the project’s future cash flows.

ii Tax Equity

Renewable energy project developers typically do not have tax liabilities large enough to efficiently capture the full amount of tax credits available for large projects. To circumvent this issue, project developers can pair with a tax equity partner that is better able to utilize a project’s tax benefits. Traditionally, tax equity investors have been large investment banks, commercial banks and insurance companies with a high tax burden that seek to offset some portion of their expected tax liability.

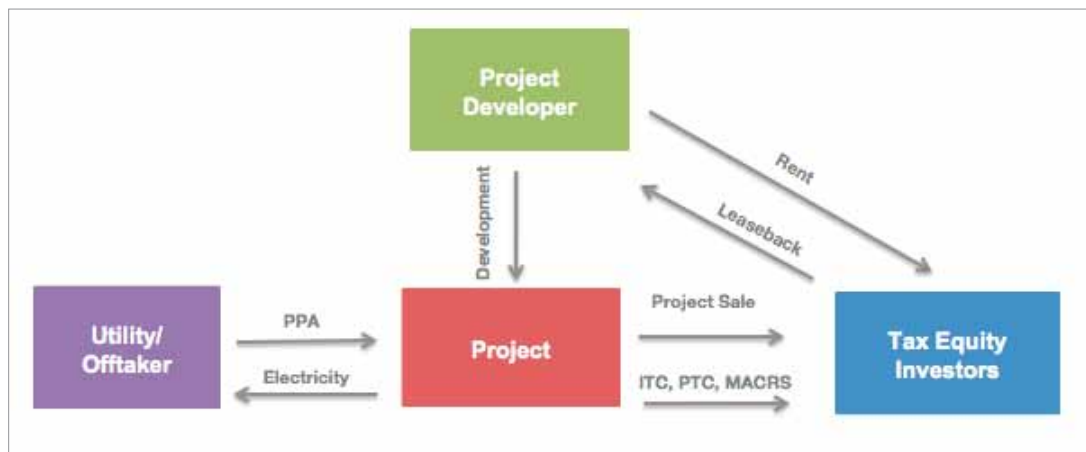
The two primary tax equity financing structures of renewable energy projects in the U.S. are the sale-leaseback model and the partnership flip model.

The sale-leaseback model allows a project developer to recoup its entire investment in a project, eliminating the need to invest directly. In this model, the developer finances and installs a project and then immediately sells it to a tax equity investor at full value. The tax equity investor then leases the project back to the developer at a fixed rate for a period exceeding the PPA schedule. The developer uses PPA revenue to fund rent payments to the tax equity investor, who also claims all tax benefits associated with the project. At the end of the lease term, the tax equity investor either remains the owner of the project or the developer can buy the project back at its residual value.

The benefit of the sale-leaseback model is that the tax equity investor is able to pass tax savings on to the project developer in the form of lower rent payments. In turn, lower rent payments result in a lower PPA price and lower rates charged to end customers.

ii.1 Sale-Leaseback Model

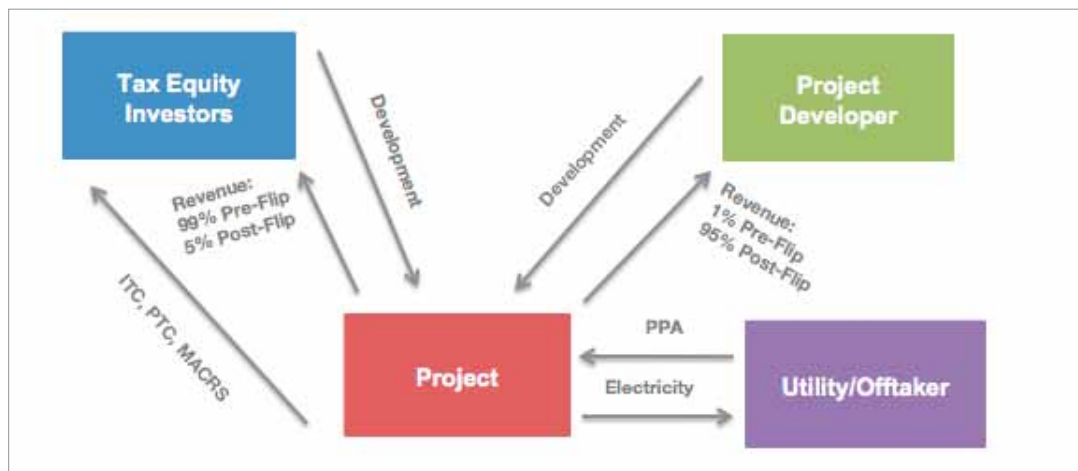
Figure II-2: Typical Sale-Leaseback Model



Source: GTM Research

ii.2 Partnership flip model

Figure II-3: Typical Partnership-Flip Model



Source: GTM Research

A partnership-flip model is structurally more complex than a sale-leaseback model, but gives more freedom to the project developer within the partnership. The project developer and tax equity investor form a partnership company (typically a limited-liability company), through which they co-own a project. The partnership becomes the formal owner of the project, receiving all associated revenue and tax credit. Once formed, the partnership will negotiate over the distribution of revenues and tax credits, which is done on a project-by-project basis. In all cases, the tax equity investor requires a certain rate of return within a certain time frame (typically six to ten years). For example, during this timeframe the tax equity investor may claim 99 percent of revenue and tax incentives within the partnership and the developer just one percent. Once the tax equity investor achieves its required return, the partnership structure flips

and the developer may receive 95 percent of revenue and the tax equity investor receives five percent.

A benefit of the partnership-flip model is that the project developer receives assistance in financing the construction of the project from the tax-equity investor; financing is often difficult to source for large-scale projects.

iii Debt

Project debt is supplied by a bank or a syndicate of banks, which lend against the expected future cash flow of a project. Debt packages inevitably vary by project size and technology, but most solar, wind and geothermal projects incorporate one or more of the following:

- a. Term Loans: Term loans are a basic vanilla commercial loan. Term loans typically have fixed interest rates with monthly or quarterly repayments.

Term loans for renewable energy projects are typically “long term,” with maturity dates generally between 10 and 20 years (though tenors dropped significantly directly following the financial crisis). The collateral for term-loans is typically the project itself.

- b. **Construction Loans:** The potential risks and returns to an investor during the construction period differ from those expected once a project has reached commercial operation. As such, most large renewable energy projects have a construction loan component in the overall project-financing package. Construction loans are generally distributed in several installments. After the first installment, and through the term of the construction loan, the borrower makes interest-only payments on the installments received to date. When construction is complete, payment is due for the entire amount. In some cases, construction loans will automatically convert to term loans once commercial operation is reached. The interest rate on construction loans is generally higher than on term loans.
- c. **Equity Bridge Loan:** Equity bridge loans have grown in popularity since the introduction of the ITC cash grant in

2009. Because cash grants (which cover 30 percent of a project’s installed cost) are made 60 days after the project commences operation, developers still need bridge financing to get through the project’s construction phase. Equity bridge financing is often furnished by equity investors until the grant comes through, at which time the investor is typically repaid. Cash grant bridge loan spreads are similar to term debt spreads, if not somewhat lower.

iv Other

Although we focus on the main project financing instruments used for U.S. renewable energy projects in this report, there are several additional financing instruments available: 144A bonds, Clean Energy Renewable Bonds (CREBs), which are available to co-ops and municipalities, Class B memberships, and prepaid service contracts, to name a few.

III LEGISLATIVE SUPPORT MECHANISMS

i Federal ITC

Originally established by the Energy Tax Act of 1978, the federal Investment Tax Credit (ITC) has been critical to the financing and build-out of renewable energy projects in the United States. The ITC offers a 30 percent federal income tax credit to individuals or businesses that make investments in renewable energy projects, including solar, wind and geothermal power. For taxpayers with sufficient tax liability, this effectively reduces the capital cost of a renewable energy project by 30 percent.

ii Federal PTC

The federal production tax credit (PTC), originally enacted in 1992, is a per-kilowatt-hour tax credit for electricity generated by wind, geothermal and other qualifying renewable projects (excluding solar) which is then sold by the taxpayer during the taxable year. Since its inception, the PTC has expired and been renewed several times. The current tax credit awarded for wind and geothermal power is 2.2 cents/kWh, which is awarded for the project's first ten years of operation.

iii DOE Loan Guarantee

The Federal Loan Guarantee Program was created under the Energy Policy Act of 2005 to encourage the development of innovative energy projects by helping companies obtain affordable financing. The program provides loan guarantees for up to 80 percent of a project's capital costs for projects that avoid, reduce or sequester air pollutants or GHG emissions, or employ innovative technology. In

2009, as part of the ARRA, Section 1705 of Title XVII was created to promote the rapid deployment of renewable energy projects and electric power transmission, including those using commercial technologies.

iv Accelerated Depreciation (MACRS)

In addition to the ITC or PTC, owners (both commercial and industrial) of a renewable energy project are also able to accelerate the depreciation of qualifying renewable energy equipment through the Modified Accelerated Cost Recovery System (MACRS). MACRS allows owners to depreciate the project over a five-year period, as opposed to straight-line depreciation based on the typically much longer expected life of renewable energy projects. MACRS becomes a significant tax benefit, reducing the owner's taxable income considerably in the first years of operation and thus improving the project's overall return. For instance, an estimated 50 percent of a solar PV system's installed cost can be recovered when combining MACRS with the 30 percent ITC. The Small Business Jobs and Credit Act of 2010 has extended "50% bonus depreciation" through the end of 2010, thus providing additional depreciation benefits for projects placed in service this year.

v Federal Stimulus: EESA and ARRA

Following the collapse of the financial markets in the fourth quarter of 2008, two key pieces of legislation were enacted in the United States that included provisions for the renewable energy sector: The Emergency Economic Stabilization Act (EESA) and the American Recovery and Reinvestment Act (ARRA). In

v.1 EESA

The Emergency Economic Stabilization Act (EESA) was enacted in October of 2008 in order to inject capital into banks, provide liquidity to the credit markets and restore confidence in the U.S. financial markets. The EESA included several renewable-energy-specific provisions, including: 1) an eight-year solar ITC extension to 2016; 2) a one-year wind PTC extension to 2009; and 3) the allowance of the ITC to count against a project owner's alternative minimum tax.

v.2 ARRA

The American Recovery and Reinvestment Act (ARRA) was signed into law in February 2009 as a \$787B economic recovery package in government spending, tax incentives and other financial assistance targeted to create and preserve jobs and spur near- and long-term economic growth. Under the Act, the energy efficiency and renewable energy sectors are to receive billions in new funding and additional tax credit incentives. Some of the tax-based provisions include: 1) the extension of the PTC expiration by three years over the EESA extensions (to 2012 for wind and 2013 for other technologies; solar deadline is unchanged at 2016); 2) allowing the PTC to be converted into a 30 percent ITC over 2012; and 3) allowing federal cash grants to be taken in lieu of the ITC.

v.3 Section 1603: Cash Grant in Lieu of ITC

The cash grant (in lieu of the ITC) was created under the ARRA to counteract the drop in the supply of tax equity that began in 2008. Under Section 1603 of the ARRA, project developers may receive a direct cash grant in lieu of the ITC for renewable energy projects (new solar, wind, geothermal and other qualified

technologies) also equivalent to 30 percent of the project's capital costs. In order to qualify for the cash grant, projects must commence construction (typically defined as expending at least five percent of total expected capital cost) in 2010 and must be completed by a deadline. The deadline is 2012 for wind farms, 2013 for geothermal and 2016 for solar. An application for a cash grant may be submitted to the Department of the Treasury only after the facility is placed in service. Payments are typically made within 60 days from the later of the date of the complete application or the date the property is placed in service. Cash grant eligibility generally follows the same criteria as ITC eligibility. Non-business energy property and residential energy property do not qualify for cash grants, but they do qualify for the ITC under the same provisions. As of October 6, 2010, the U.S. Department of the Treasury had awarded \$5.4B in cash grants, the majority of which (some 85 percent) went to wind developers.

vi Comparing the PTC, ITC, Cash Grant and DOE Loan Guarantee

The PTC, ITC (and ITC cash grant) and DOE Loan Guarantees have aided renewable energy projects in accessing financing, but the applicability or attractiveness of each incentive can vary depending on the technology at hand.

Projects with a higher capital cost and lower capacity factor tend to favor the ITC, while projects with a lower capital cost and high capacity factor favor the PTC. A higher capacity factor means that more PTC units are generated, while lower installed costs result in the

associated PTC units adding up to a higher percentage of installed costs. A study by the Lawrence Berkeley National Laboratory (March 2009) finds that wind projects that cost \$1.5M/MW or less are likely to receive more value from the PTC, while projects that cost more than \$2.5M/MW are likely better off with the ITC. Electing the PTC, as opposed to the ITC, often provides better returns to geothermal projects, as well. Geothermal power has a capacity factor of up to 95 percent and the PTC provides more value in nearly all cases. Solar power is eligible for the ITC only, not the PTC.

The ITC vs. PTC argument has been significantly altered by the introduction of the ITC cash grant. Solar, wind and geothermal projects may elect the 30 percent direct cash grant over the ITC or PTC, regardless of expected returns. The appeal of the cash grant over the

ITC or PTC is that it is not dependent upon having a tax liability, and thus projects without taxable income are able to benefit directly from the incentive without requiring a tax equity investor.

Although the difference in financing cost between a DOE loan guarantee and a non-DOE loan guarantee is approximately 150bp, general sentiment is that it doesn't make sense for proven technologies to apply for the DOE loan guarantees because the process is so drawn out. Wind projects, for instance, are able to access financing without DOE loan guarantees and waiting on DOE loan guarantees could delay the project. Geothermal and some solar projects, however, are finding it necessary to apply for the loan guarantees in order to access more favorable debt financing terms.

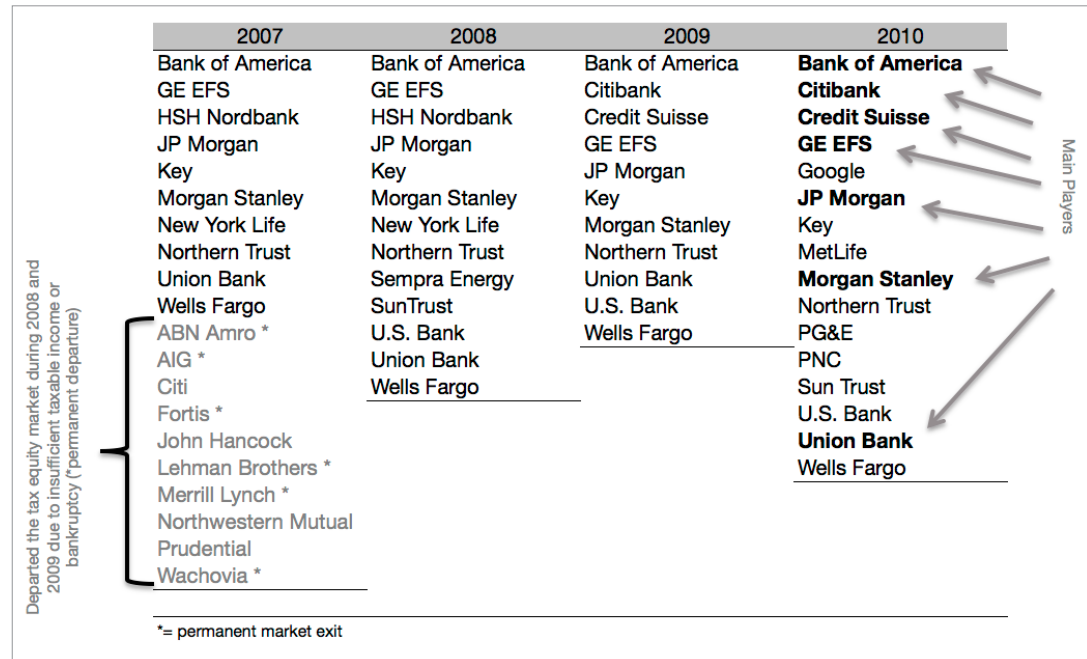
IV MAIN PLAYERS IN THE U.S. TAX EQUITY AND DEBT MARKETS

i Tax Equity

The renewable energy tax equity market started to take shape in 2005 as U.S. banks and insurance companies sought to reap the tax benefits allotted to renewable energy projects that the developers were largely unable to internalize. Up until the market collapse in 2008, tax equity investors were particularly drawn to wind and geothermal deals (wind and geothermal being considered advanced technologies with relatively high capacity factors), and partnership flips were common. Tax equity investors are still active in the U.S. wind market but the number of players shrunk considerably during the financial crisis.

States; by 2009 there were just 11. The number of tax equity investors fell as a result of insolvencies, bankruptcies and consolidations (e.g., AIG, Lehman Brothers, Merrill Lynch, etc.) and weakened tax bases. The number of players is likely to remain limited for several reasons. First, only companies with prohibitively large tax liabilities are able to absorb the tax credits. Even for companies that survived the financial crisis, most came out the other end with an eroded profitability base and thus a weakened tax-equity appetite. Second, barriers to non-institutional investors (aka “passive-loss” and “at-risk” rules) make it challenging for individuals to take the PTC and ITC directly on their personal income taxes. This largely excludes high net-worth individuals with large tax equity appetites from forming tax equity partnerships.

Figure IV-1: Main Players in the U.S. Tax Equity Market for Renewable Energy



Source: GTM Research

In 2007 there were approximately 20 active tax equity investors in the United

As financial markets have become more stable and banks’ taxable incomes have risen, the tax equity appetite has improved somewhat. By our count, there are 16 active

tax equity investors in the renewable sector in the U.S. today. Of these, we consider the top seven to be: JP Morgan, Citibank, Credit Suisse, Bank of America, GE Energy Financial Services, Union Bank and Morgan Stanley. Non-traditional players are also starting to enter the tax equity market, including technology behemoth Google and utility PG&E, but new entrants are still “testing the waters” and their contributions to the tax equity supply have been comparatively small.

Lenders to U.S. renewable energy projects have largely been foreign banks and insurance companies and their affiliates. Of the 26 main players active in the market over 2010, just six are U.S.-based: Citibank, John Hancock, Key Bank, Morgan Stanley, Prudential and Union Bank. The strong presence of foreign banks is largely a result of foreign lenders having considerable experience in the renewable energy sector while being generally excluded from the tax equity market due to the lack of a U.S. tax base.

ii Debt

Figure IV-2: Main Players in the U.S. Debt Market for Renewable Energy

2007	2008	2009	2010
Banco Santander	Banco Espirito Santo	Banco Espirito Santo	Banco Santander
Bayern LB	Banco Sabadell	Banco Santander	Bank of Montreal
BBVA	BBVA	BNP Paribas	Barclays
Dexia	BTMU	BTMU	BBVA
Fortis	Calyon (Credit Agricole)	Calyon (Credit Agricole)	BTMU
HSH Nordbank	Citibank	CoBank	Caja Madrid
JPMorgan Chase	Dexia	Credit Suisse	Citibank
Mizuho	HSH Nordbank	Dexia	Credit Agricole
Natixis	ING	Helaba	Credit Suisse
Nord/LB	Lloyds TSB	HSH Nordbank	Deutsche Bank
Prudential	Morgan Stanley	John Hancock	Dexia
RBS	Nord/LB	Key Bank	Helaba
Union	Prudential	LBBW	ING
	RBS	Lloyds TSB	John Hancock
	Scotia Bank	Nord/LB	Key Bank
	UniCredit	Prudential	LBBW
	Union	RBS	Morgan Stanley
		Scotia Bank	Natixis
		Societe Generale	Prudential
		UniCredit	Rabobank
		Union	RBS
		WestLB	Societe Generale
			UniCredit
			Union
			WestLB
			= Non-US entity

Source: GTM Research

European banks, in particular, have been instrumental in providing liquidity to some of the largest wind and solar project financings in the U.S. to date. Spanish banks Banco Santander and Grupo BBVA have actively participated in debt syndications for solar and wind for the past several years, even throughout the financial crisis. Dexia, based in Belgium, has been one of the most active players in U.S. wind debt financings, and other frequent lenders include Scottish RBS and German Nord/LB and HSH Nordbank.

The number of U.S. lenders to renewable energy projects has increased in recent years, filling the gap left in available financing as European banks began to scale back their exposure to the U.S. markets in 2008 and 2009. U.S. lenders are also often active in the tax equity market, including Union Bank, Citibank and Morgan Stanley. Union Bank, a wholly owned subsidiary of BTMU, has had a particularly strong presence in the debt financing of U.S. renewable energy projects over the past several years.

Outlined below are the main lenders active in the debt syndicates of major U.S. wind, solar and geothermal project financings since 2007.

iii Non-Traditional Investors

There is growing interest in investing in renewable energy projects outside of traditional financial firms as profitable companies seek to take direct advantage of the PTC, ITC (includes cash grant) and MACRs. New entrants to the renewable energy tax equity market are likely to include oil and gas, high-tech, industrial companies and utilities. Internet behemoth Google announced in May of

2010 that it made a \$38.8M direct equity investment in two wind farms in North Dakota developed by NextEra Energy Resources. This was Google's first tax equity investment in a renewable project and marked a departure from Google's typical investment style, which has focused on investments in early-stage renewable companies, such as BrightSource (solar), Makani Power (wind) and AltaRock (geothermal). Google's entrance into tax equity is a positive indicator, but insiders question the speed with which non-traditional tax equity investors will enter the market: new entrants have a high learning curve, which is likely to limit the magnitude of their initial investments over the midterm.

Utilities are also increasingly opting to own renewable energy projects themselves. Utilities can take the PTC for wind and geothermal and are now able to take the ITC directly, thus increasing the appeal of developing projects on their own land (and, depending on the state, helping utilities to meet renewable portfolio standard [RPS] goals). Some utilities that have gone the direct ownership route include Duke Energy, Pacific Gas and Electric, and Southern California Edison.

V TERMS AND AVAILABILITY

The availability of debt, tax equity and direct equity to renewable energy projects constricted considerably as a result of the financial crisis, placing upward pressure on the returns expected by lenders and investors. Although the availability and terms associated with renewable project financing in the U.S. improved considerably toward the end of 2009 and throughout 2010, the project financing market remains in transition. Below, we outline the current returns expected by lenders, tax equity investors and direct equity investors for large-scale solar (PV and CSP), wind and geothermal, along with general availability. Our estimates are based on discussions with banks, project developers, law firms and recent deal announcements.

Figure V-1: Estimates of Current Debt and Equity Terms and Availability

TYPE	RATE	AVAILABILITY
Debt (term)	275bp upfront fee + :	
Wind	LIBOR + 250bp-300bp	HIGH
Solar PV	6.5% - 7.5%	FAIR to HIGH
CSP	7.5% - 10.0%	LOW
Geothermal	8.0% -12.0%	LOW
Tax Equity (unlevered)		
Wind	7.0% - 10.0%	FAIR
Solar PV	9.0% - 13.0%	FAIR to LOW
CSP	12.0% - 15.0%	LOW
Geothermal	10.0% - 12.0%	LOW
Tax Equity (levered)		
Wind	10.0% - 13.0%	FAIR
Solar PV	13.0% - 20.0%	FAIR to LOW
CSP	15.0% - 18.0%	LOW
Geothermal	13.0% - 15.0%	LOW
Direct Equity*		
Wind	6.5% - 14.5%	HIGH
Solar PV	7.0% - 18.5%	FAIR
CSP	15.0% - 20.0%	FAIR to LOW
Geothermal	10.0% - 15.0%	LOW
* Range for both sponsors and private equity		

Source: GTM Research

i Debt

Bank debt (term, construction and bridge loan) availability is considered high for high-quality wind projects and fair to high for high-quality PV projects. High-quality projects are generally investment-grade projects with PPAs from creditworthy

off-takers. Debt financing availability for CSP and geothermal, though available for best-in-class developers and projects, is comparatively lower as a result of the higher associated technology and resource development risks. Cash grant bridge loan spreads are similar to term debt spreads, if not somewhat lower.

Spreads on term debt for high quality wind projects were ~200bp to 300bp above LIBOR in 2008, expanding to 300bp to 350bp in 2009 as banks adopted more conservative lending practices. Spreads have trended downward in 2010 as the debt markets continue to thaw: wind project spreads are between 250bp and 300bp, with an upfront fee of ~275bp. Expected returns are higher for solar (both PV and CSP), at between 6.5 percent and 10.0 percent. Geothermal developers with proven resources and a strong track record (mainly Ormat) are able to secure project debt in the 8.0 percent to 12.0 percent range.

Tenors on term debt were drastically reduced in 2008 and over 2009, in some instances to five or seven years under “mini-perm” deals. Debt tenors are now being pushed back to the 10- to 15-year range, with European banks typically offering the longest tenors.

ii Tax Equity

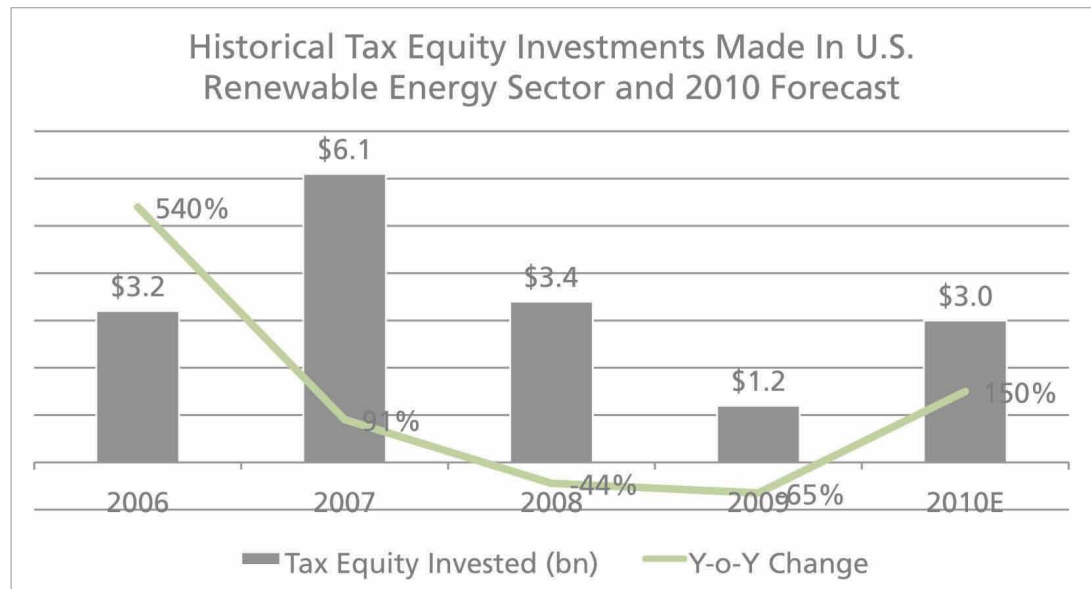
While there is some correlation between interest rates and tax equity yields, tax equity yields are driven more directly by supply and demand. The tax equity supply for renewables in the U.S. essentially disappeared in late 2008 through much of 2009, but has begun to experience a resurgence as banks return to profitability. Tax equity availability

is fair for quality wind projects but still difficult to attain for solar PV projects, newer solar technologies and riskier geothermal projects. In particular, it is difficult to attain tax equity financing for smaller projects (less than \$100M).

For unleveraged projects (not incorporating a debt component), tax equity investors are currently expecting returns of between seven percent and ten percent on quality wind projects, nine percent to thirteen percent for solar PV, twelve percent to fifteen percent for CSP, and ten percent to twelve percent for geothermal. In a partnership-flip deal, incorporating debt at the project level reduces the amount of tax equity that can be raised, as lenders’ claims typically come before equity investors’ claims in the case of default, putting a tax equity investor at risk of being “squeezed out” before reaching its targeted return. As a result, leveraged projects generally increase tax equity investors’ expected returns by ~300bp.

The supply of tax equity to the U.S. renewable energy sector reached a high in 2007 at \$6.1B, falling to \$3.4B in 2008 as the financial crisis set in, and reaching a low of \$1.2B in 2009 as the crisis played out. The amount of tax equity supplied to the renewable energy sector has improved over 2010 and is expected to reach \$3.0B by year’s end. The tax equity investments seen in the sector today are focused primarily on wind projects, although interest in opportunities for solar and wind appears to be increasing. While this growth is a positive trend, tax equity demand remains far below pre-crisis levels.

Figure V-2: Historical Tax Equity Investments Made in U.S. Renewable Energy Sector and 2010 Forecast



Source: Source: U.S. PREF, GTM Research

iii Direct Equity

Direct equity investments are a component of nearly all project financings, either by the project sponsor (typically the developer) or private equity investors. The amount a sponsor contributes to a project will depend on the amount of (typically lower-cost) debt that can be secured, the availability of tax equity and private equity, and the strength of the sponsor’s own balance sheet. Expected returns vary widely on

direct equity investments and sponsors may accept lower returns in order to close PPAs. At present, expected returns on direct equity largely fall in the range of 6.5 percent to 14.5 percent for wind, seven percent to 18.5 percent for solar PV, 15 percent to 20 percent for CSP, and 10 percent to 15 percent for geothermal.

VI IMPACTS OF THE CASH GRANT PROGRAM

The option to monetize the ITC in the form of a direct cash grant has provided significant liquidity to the renewable energy market since its introduction in 2009. As of October 6, 2010, a total of \$5.4B had been distributed to developers of wind, solar, geothermal and other qualifying renewable energy projects in the U.S. Of this, some \$2.0B was allotted in 2009 and \$3.4B was allotted through October 6, 2010. With the cash grant representing some 30 percent of a project’s capital costs, the \$5.4B allotted has supported investment of over \$18.0B across the sector.

The vast majority—approximately 85 percent—of the allotted funds to date have gone to the wind sector (large- and small-scale), at \$4.6B. Solar (PV and CSP) projects were awarded \$387.2M, followed by geothermal (geothermal energy and geothermal heat pumps) with \$266.9M. The remaining \$146.6M was allotted to other forms of renewable energy, largely biomass. On a total number of projects basis, the solar sector received the most awards at 1047 projects, followed by wind at 183 projects.

Figure VI-1: Cash Grants Issued Under Section 1603 (as of October 6, 2010)

Type	Number of Projects	Total Amount Awarded (M)	\$M/Project
Wind	183	\$4,590.9	\$25.1
Solar	1,047	\$387.2	\$0.4
Geothermal	21	\$266.9	\$12.7
Other	50	\$146.6	\$2.9
Cumulative	1,301	\$5,391.6	\$4.1

Figure VI-2: Percentage Awarded By Sector

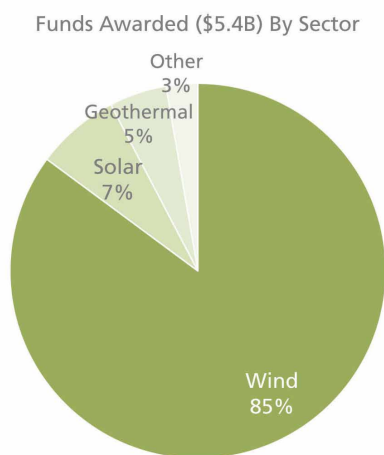
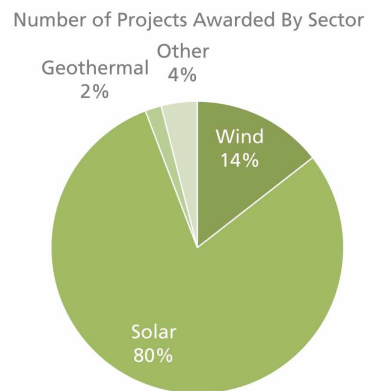


Figure VI-3: Number of Awards By Sector



Source: U.S. Department of the Treasury, GTM Research

i Wind Cash Grants

Figure VI-4: Cash Grants to Select Large-Scale Wind Projects (as of October 6, 2010)

Project	Developer	Capacity (MW)	Grant (\$m)	Est. \$/MW (m)
Armenia Mountain	AES	100.5	69.5	2.3
Barton	Iberdrola	160.0	93.4	1.9
Barton Chapel	Iberdrola	120.0	72.6	2.0
BlackStone	Horizon	102.0	55.2	1.8
Bull Creek	Eurus Energy	180.0	91.4	1.7
Cohocton	First Wind	87.5	52.4	2.0
Crystal Lake III	NextEra	66.0	36.3	1.8
Day County	NextEra	99.0	54.5	1.8
Dry Lake	Iberdrola	63.0	31.1	1.7
Dutch Hill	First Wind	37.5	22.3	2.0
EcoGrove	Acciona	100.5	67.9	2.3
Elk City	NextEra	98.9	52.3	1.8
Eurus Combine Hills	Eurus Energy	63.0	39.1	2.1
Farmers City	Iberdrola	146.0	85.0	1.9
Glacier II	NaturEner	103.5	62.2	2.0
Grand Ridge II	Invenergy	51.0	32.3	2.1
Grand Ridge III	Invenergy	49.5	32.1	2.2
Gulf Wind	Pattern Energy	283.2	178.0	2.1
Hay Canyon	Iberdrola	100.8	47.1	1.6
High Lonesome Mesa	Edison Mission	100.0	53.6	1.8
Highland	EverPower	62.5	42.2	2.3
Hoosier	enXco	106.0	69.6	2.2
Inadale	E.On	197.0	94.2	1.6
Locust Ridge II	Iberdrola	102.0	59.2	1.9
Lost Creek	Wind Capital Group	150.0	107.0	2.4
Lost Lakes	Horizon	101.0	55.5	1.8
Luverne	Otter Tail Power	49.5	30.2	2.0
Meadow Lake	Horizon	199.7	113.2	1.9
Moraine II	Iberdrola	49.5	28.0	1.9
Noble Altona	Noble Environmental Power	97.5	67.8	2.3
Noble Chateaugay	Noble Environmental Power	106.5	71.8	2.2
Noble Wethersfield	Noble Environmental Power	126.0	81.7	2.2
Northern Colorado	NextEra	174.3	99.9	1.9
Panther Creek III	E.On	199.5	107.6	1.8
Pebble Springs	Iberdrola	98.7	46.5	1.6
Penascal	Iberdrola	201.6	114.1	1.9

Project	Developer	Capacity (MW)	Grant (\$m)	Est. \$/MW (m)
Pyron	E.On	249.0	121.9	1.6
Rail Splitter	Horizon	100.5	61.4	2.0
Rugby Wind	Iberdrola	149.0	73.1	1.6
Star Point	Iberdrola	98.7	46.5	1.6
Stetson	First Wind	57.0	40.4	2.4
Streator-Cayuga Ridge	Iberdrola	300.0	170.1	1.9
Sunray	Valero	40.5	26.2	2.2
Vansycle II	NextEra	98.9	55.4	1.9
Wheat Field	Horizon	96.6	47.7	1.6
Wild Horse	Puget Sound Energy	44.0	28.7	2.2
Windy Flats	Cannon Power	29.9	19.4	2.2
	Total	5,397.3	3,107.3	1.9

Source: U.S. Department of the Treasury, GTM Research

Up until March 1, 2010, 64 percent of all 2009 large-scale wind projects that were eligible for the grant had elected, or planned to elect, the grant rather than the PTC or ITC (Lawrence Berkeley National Laboratory). Twenty large-scale wind developers submitted applications for 5.4 GW of wind power, receiving cumulative cash grants of more than \$3.1B. Assuming 30 percent of installed capital costs were recouped, this points to an average installed cost of \$1.9M/MW for large-scale wind projects in U.S. The top three beneficiaries of the cash grant amongst wind developers (as of October 6, 2010) are: Iberdrola (\$866.5M awarded), E.On (\$323.7M awarded) and Horizon (\$333.1M awarded).

ii Solar Cash Grants

The nameplate capacity of individual PV projects that have received grants has varied widely, ranging from 700 watts up

to 25 MWac for NextEra's (formerly Florida Power and Light) Desoto project. Several solar-thermal projects received cash grants as well, including Areva's 5.0 MW Kimberlina plant. Assuming 30 percent of installed capital costs were recouped, the \$125.6M awarded to some 68.3 MW of large-scale solar projects points to an average installed cost of \$6.1M/MW when PV and CSP projects are combined. Installed costs for utility-scale PV alone are closer to a range of \$3.5M/MW to \$4.5M/MW (between \$4.0M/MW and \$7.0M/MW for rooftop) while CSP, depending on technology employed, typically ranges from \$2.5M/MW to \$6.0M/MW (CLFR and dish-engine at the lower end; parabolic trough and power tower at the higher).

Figure VI-5: Cash Grants to Select Large-Scale Solar (as of October 6, 2010)

Project	Developer	Capacity (MW)	Grant (\$M)	Est. \$/MW (M)
Blythe	First Solar / NRG Solar	21.0	18.1	2.9
Desoto & Space Coast	NextEra (formerly FPL)	35.0	62.4	5.9
Kimberlina*	Areva	5.0	13.9	9.3
Kolaniku*	Sopogy	0.8	4.8	21.3
Maricopa*	Tessera Solar	1.5	7.0	15.7
Sierra Sun Tower*	eSolar	5.0	19.5	13.0
Total		68.3	125.8	6.1
* solar thermal				

Source: U.S. Department of the Treasury, GTM Research

iii Geothermal Cash Grants

All four of the qualifying geothermal power plants eligible for the grant in 2009 elected the grant rather than the PTC or ITC as of March 1, 2010. The \$152.3M awarded to geothermal project developers went toward the build-out of 125 MW of geothermal power, representing an installed cost of ~\$4.1M/MW.

extended or amended. Legislation has been introduced to extend the deadline of the program in both its present form and with amendments.

General sentiment among project developers, banks and law firms is that the odds of a cash grant extension are dimming.

Figure VI-6: Cash Grants to Large-Scale Geothermal (as of October 6, 2010)

Project	Developer	Capacity (MW)	Grant (\$M)	Est. \$/MW (M)
Blue Mountain	Nevada Geothermal Power	49.5	57.9	4.0
Salt Wells	Enel	18.1	21.2	3.9
Stillwater	Enel	47.4	40.3	2.8
Thermo No 1	Raser Technologies	10.0	32.9	11.0
	Total	125.0	152.3	4.1

Source: U.S. Department of the Treasury, GTM Research

iv Will The Cash Grant Be Extended?

The cash grant program is set to expire at the end of 2010 and projects that have commenced construction (typically defined as having expended at least five percent of the total expected capital cost) prior to the deadline have until September 30, 2011 to apply. Debate has been significant with regards to whether the cash grant program will be

The House Tax Committee appears eager to extend the measure, but also to turn the grants into tax refunds to be recouped after a project is commissioned (as outlined in the Blumenauer Proposal). The outlook in the Senate is unclear, however, and potential complications include the associated costs and complaints regarding subsidies going to projects incorporating foreign-made equipment.

Figure VI-7: Cash Grant Extension Proposals

Author(s)	Proposed	Extension Type	Extension Length
Senators Dianne Feinstein & Jeff Merkley	Dec.'09	Extension of existing program	2 Years
Congressman Earl Blumenauer	Feb.'10	Refundable tax credit	2 Years
Senators Maria Cantwell & George Lemieux	Jun.'10	Extension of existing program, also allowing public utilities & REITs to claim grants	2 Years

Source: GTM Research

An extension of the cash grant in its current form is considered the best possible outcome for project developers, as it will continue to provide significant liquidity to the project financing of renewable energy projects in the U.S. The second

best outcome would be an extension of the grant as a tax refund. If the cash grant is in no way extended, project developers will need to tap the tax equity and debt markets for additional funds.

VII IMPACTS OF THE DOE LOAN GUARANTEE PROGRAM

The DOE loan guarantee program is intended to increase the availability of debt financing to renewable energy projects while minimizing borrowing costs (the cost of debt price differential for a DOE loan guarantee is estimated at 150bp), but only three awards have been made to date. The slow rollout is largely due to the application process, which requires significant paperwork and application fees, credit requirements and environmental impact studies.

Figure VII-1: DOE Loan Guarantee Awards (as of August 20, 2010)

Project	Date	Developer	Capacity (MW)	Grant (M)
Flywheel Energy Storage	8/9/10	Beacon Power	20.0	\$43.0
Kahuku Wind Farm	7/27/10	Kahuku Wind Power	30.0	\$117.0
Solar Panel Production Facility	9/4/09	Solyndra	NA	\$535.0

Source: DOE, GTM Research

On September 4, 2009, the DOE announced the finalization of a \$535M loan guarantee for Solyndra to construct a new solar panel manufacturing facility. This marked the first award of a DOE loan guarantee under the Recovery Act and Title XVII of the Energy Policy Act of 2005. The following two awards were granted nearly a year later, to Kahuku Wind Power for a 30 MW wind farm and to Beacon Power for a 20 MW flywheel storage facility. Nine applicants (excluding awards to nuclear-based technology) have received conditional commitment offers for additional renewable energy (and other innovative) projects, and now await final approval.

Figure VII-2: DOE Loan Guarantee Conditional Award, Excluding Nuclear (as of August 20, 2010)

Project	Date	Developer	Capacity (MW)	Grant (m)
Lithium-Ion Energy Storage	8/2/10	AES Energy Storage	20.0	\$17.0
2 Thin Film Production Facilities	7/3/10	Abound Solar	NA	\$400.0
Concentrated Solar Power Plant	7/3/10	Abengoa Solar	250.0	\$1,450.0
Blue Mountain Geothermal Plant	6/15/10	Nevada Geothermal*	49.5	\$98.5
Neal Hot Springs Geothermal Plant	6/10/10	U.S. Geothermal	22.0	\$102.0
Glass Production Facility	3/5/10	Sage Electrochromics	NA	\$72.0
3 Concentrated Solar Power Plants	2/22/10	BrightSource Energy	400.0	\$1,370.0
Activated Carbon Facility	12/9/09	Red River	NA	\$245.0
Expansion of Wind Turbine Facility	7/2/09	Nordic Windpower	NA	\$16.0

* Conditional award made to John Hancock Financial under FIPP program rather than project developer Nevada Geothermal Power

Source: DOE, GTM Research

When the ARRA was enacted in February 2009, the Section 1705 Loan Guarantee Program was appropriated \$6B to provide loan guarantees for renewable energy generation, renewable property manufacturing, and transmission facilities. In the summer of 2009, \$2B of the appropriation was redirected to the "Cash for Clunkers" program. The Loan Guarantee Program funds were reduced again in August 2010 when the House passed H.R. 1586 that redirected \$1.5B from the program to fund Medicaid and teachers' salaries, thereby reducing the fund pool to \$2.5B - less than half the originally intended amount.

VIII PROJECT FINANCING FORECAST THROUGH 2012

To better understand the amount of project financing likely to be sought by renewable energy projects in the U.S. over the midterm, we gauge the volume of large-scale wind, solar and geothermal projects that are currently live deals or likely to become live deals over 2012. Live deals are projects actively seeking project financing, and whose principals may be engaged in negotiations with potential financiers, but have not yet reached financial close. Live deal projects can be in various stages of development. Our live deals forecasts are based on development project databases compiled by GTM Research, Power Finance & Risk, the American Wind Energy Association (AWEA), the Solar Energy Industries Association (SEIA), the Geothermal Energy Association (GEA), and project developers' websites.

Our list should not be considered exhaustive, as it may inadvertently exclude projects that are planning to seek to obtain project financing over 2012 but whose developers have not made project details public, or projects we think are likely to be financed by alternate means (on corporate balance sheets, as part of defense spending, etc). Our lists may also inadvertently include some projects that will ultimately seek to finance projects by alternate means, or development projects that will not obtain the permitting and other requirements necessary to be considered "financeable projects." To account for this, we apply a confidence factor for each sector to account for some projects not reaching the financing stage.

i Wind

By our count, there are approximately 10,629 MW of large-scale wind projects in the U.S. that are likely to seek project financing through 2012. Most of these assets are not yet associated with financing leads and are in various stages of development, though most aim to commence commercial operation by 2013.

Figure VIII-1: U.S. Wind Projects Likely to Seek Project Financing through 2012

Developer	Project Name	Type	Location	MW
BP, Sempra	Fowler Ridge II	Wind	IN	200
Brookfield, Coram	"Unknown"	Wind	CA	102
Cannon Power Group	Aubanel Wind Farm	Wind	CA	1,000
Cape Wind Assets	Cape Wind	Wind	MA	420
Confederate Tribes Of Warm Spring	Unidentified	Wind	OR	100
Coram Energy	"Various"	Wind	CA	22
CPV	Cimarron	Wind	KS	165
CPV	Ashley	Wind	ND	200
Enel, Tradewinds	Various	Wind	TBA	1,200
enXco	Lakefield	Wind	MN	201
Everpower Renewables	Highland II	Wind	PA	50
Everpower Renewables	Howard	Wind	NY	63
Everpower Renewables	Buckeye	Wind	OH	150

First Wind	Sheffield	Wind	VT	40
First Wind	Rollins	Wind	ME	60
First Wind	Kahuku	Wind	HI	30
GE EFS	Various Wind	Wind	ID	183
Just-Wind	Logan County	Wind	SD	368
Just-Wind	Emmons County	Wind	SD	800
Horizon Wind	Various	Wind	TBA	509
Invernergy	White Oak	Wind	TBA	150
National Wind	Goodhue	Wind	MN	78
National Wind	NECO	Wind	CO	650
National Wind	Judith Highlands	Wind	MT	500
National Wind	Various	Wind	TBA	2,980
NaturEner	Rim Rock	Wind	MT	309
Noble Environmental Power	Granite Renewable	Wind	NH	99
Total MW				10,629

Source: AWEA, GTM Research

Wind projects typically seek to secure project financing after commencing construction, which may occur with or without a signed PPA. We expect wind projects that are currently under construction and in discussions with potential financiers to attempt to reach financial close by the end of 2010. For projects in advanced development that have either A) not commenced construction, or B) not signed PPAs, we expect financial close to be attempted in 2011. For projects also in advanced development but that have not yet commenced construction nor signed PPAs, and that must still clear other development hurdles, we do not expect financial close to be attempted until 2012. Based on these assumptions, we forecast that 1,137 MW of wind projects will aim to reach financial close over the remainder of 2010, followed by 3,292 MW of projects in 2011 and 6,200 MW of projects in 2012. As not all of these projects will reach completion due to development and permitting issues, we apply a declining confidence factor (90 percent for 2010, 80 percent for 2011 and 70 percent for 2012)

under the assumption that projects seeking to commence operation in the nearer-term have greater visibility with regards to project permitting and feasibility than projects further out in development pipelines.

To place a dollar value on these figures, we assume an installed cost per MW of \$1.9M, which is the average installed cost seen on large-scale wind installations awarded under the cash grant program thus far and is also in line with industry standards for large-scale wind projects (excluding offshore). Applying this cost estimate to our 2010-2012 breakdown and confidence factors, we calculate project financing of \$1.9B being sought by wind developers for the remainder of 2010, with \$5.0B being sought in 2011 and \$8.2B being sought in 2012.

Figure VIII-2: Forecast Amount of Project Financing to Be Sought by U.S. Wind Sector through 2012

	2010 (remainder)	2011	2012
MW	1,137	3,292	6,200
Confidence Factor	90%	80%	70%
Cost/MW (M)	\$1.9	\$1.9	\$1.9
Financing Sought (M)	\$1,944	\$5,004	\$8,246

Source: GTM Research

Much of the costs related to technological and efficiency advances have already been pulled out of wind turbines and wind farm development. Today, installed wind costs in the U.S. are largely impacted by commodity price fluctuations (steel, etc.) and potential economies-of-scale

improvements as turbine and wind farm sizes increase. We anticipate the installed cost of one MW of large-scale wind in the U.S. will remain relatively stable (at ~\$1.9M/MW) over the near- to midterm and do not factor in MW cost inflation or deflation over 2012.

ii Solar

Figure VIII-3: U.S. Solar Projects Likely to Seek Project Financing through 2012

Developer	Project Name	Type	Location	MW
enXco	Long Island	PV	NY	13
Eurus Energy	Avenal Park	PV	CA	9
Eurus Energy	Sand Drag	PV	CA	19
Eurus Energy	Sun City	PV	CA	20
First Solar	Agua Caliente	PV	AZ	290
First Solar	AV Solar Ranch I	PV	NV	230
First Solar	Desert Stateline	PV	CA	300
First Solar	Desert Sunlight SCE	PV	CA	250
First Solar	Desert Sunlight PG&E	PV	CA	300
First Solar	PNM Projects	PV	NM	22
First Solar	Topaz	PV	CA	550
Fotowatio RV	Tucson Electronic Power	PV	AZ	25
LS Power	Centinela	PV	CA	130
NRG	Alpine	PV	CA	66
Recurrent Energy	RE Rosamund	PV	CA	20
Recurrent Energy	RE Victor Phelan	PV	CA	20
Sempra	Copper Mountain II	PV	NV	40
Sempra	Mesquite	PV	AZ	600
SunEdison	North Alamosa	PV	CO	30
SunEdison	Lea & Eddy County	PV	NM	50
SunPower	California Valley	PV	CA	250
----Non-Utility PV----	NA	PV	NA	1,400
Total MW				4,634

Developer	Project Name	Type	Location	MW
Abengoa	Mojave	CSP	CA	280
Abengoa	Solana	CSP	AZ	280
Acciona	Ft. Irwin	CSP	CA	500
Albiosa	Kingman I	CSP	AZ	100
BrightSource	Ivanpah I-III	CSP	CA	392
BrightSource	Coyote I-II	CSP	NV	400
BrightSource	SCE	CSP	CA	1,200
Inland Energy	Palmdale	CSP	CA	50
Inland Energy	Victorville	CSP	CA	50
Mohave Sun Power	Hualapai Valley	CSP	AZ	340
NextEra	Beacon	CSP	CA	250
NextEra	Sonoran	CSP	AZ	375
NextEra	Genesis	CSP	CA	250
NRG	Gaskell I-II	CSP	CA	245
Pacific Light Power	West Side Solar	CSP	HI	10
Siemens Energy	Mojave Solar	CSP	CA	553
Solar Millennium	Amargosa I-II	CSP	NV	484
Solar Millennium	Blythe	CSP	CA	1,000
Solar Millennium	Ridgecrest	CSP	CA	250
Solar Millennium	Palen	CSP	CA	500
SolarReserve	Crescent Dunes	CSP	NV	100
SolarReserve	Quartzsite	CSP	AZ	100
SolarReserve	Rice	CSP	CA	150
Tessera	Buckeye	CSP	AZ	240
Tessera	Calico II	CSP	CA	350
Tessera	Western Ranch	CSP	TX	27
Total MW				8,476

Source: GTM Research

By our count, there are approximately 13,110 MW of large-scale solar projects in the U.S. that are likely to seek project financing through 2012 - 4,634 MW of PV and 8,476 of CSP. Most of these assets are not yet associated with financing leads and remain in various stages of development.

Solar projects usually look to secure project financing prior to commencing construction, with a PPA typically being signed well in advance. We expect solar projects in advanced development stages

(i.e., with signed PPAs in place) and in discussions with potential financiers to look to reach financial close by the end of 2010. Beyond 2010, we expect solar developers to seek financial close approximately 12 months prior to a project's expected completion date (24 months for multi-stage projects). Based on these assumptions, we forecast that 608 MW of PV projects will aim to reach financial close in 2010, followed by 1,366 MW of projects in 2011 and 2,660 MW of projects in 2012. For CSP, we forecast that 1,387 MW of projects will aim to reach

financial close over the remainder of 2010, followed by 2,288 MW of projects in 2011 and 4,801 MW of projects in 2012. are expected to undergo installed cost reductions over the midterm. In line with GTM Solar forecasts, we forecast PV costs

Figure VIII-4: Forecast Amount of Project Financing to Be Sought by U.S. Solar Sector through 2012

PV	2010 (remainder)	2011	2012
MW	608	1,366	2,660
Confidence Factor	90%	80%	70%
Cost/MW (M)	\$4.0	\$3.6	\$3.3
Financing Sought (m)	\$2,189	\$3,978	\$6,168
CSP	2010 (remainder)	2011	2012
MW	1,387	2,288	4,801
Confidence Factor	90%	75%	60%
Cost/MW (M)	\$4.5	\$4.3	\$4.1
Financing Sought (M)	\$5,617	\$7,336	\$11,699

Source: Source: GTM Research

As not all of these projects will reach completion due to development and permitting issues, we apply a declining confidence factor. For PV, we apply a confidence factor of 90 percent for 2010, 80 percent for 2011 and 70 percent for 2012. For CSP, we apply a confidence factor of 90 percent for 2010, 75 percent for 2011 and 60 percent for 2012. We apply lower confidence factors for CSP than for PV in 2011 and 2012, as many of the CSP projects considered over the period are likely to have higher development risk (i.e., are likely to be sited on federal land and thus will require environmental impact studies) and technology risk (i.e., are based on less-proven power tower or dish-engine technologies).

To place a dollar value on these figures, we assume an installed cost of \$4.0M/MW for PV and \$4.5M/MW for CSP, which is in line with GTM Solar forecasts for average installed costs on large-scale PV and CSP (blended for trough and power tower/dish-engine). Both PV and CSP

to undergo a yearly price decline of nine percent in 2011 and 2012 and for CSP to decline five percent over the same period.

Applying these cost estimates and confidence factors to our 2010-2012 breakdown, we calculate project financing of \$2.2B being sought by PV projects for the remainder of 2010, \$3.9B being sought in 2011 and \$6.2B being sought in 2012. For CSP, we calculate \$5.6B being sought for the remainder of 2010, \$7.3B being sought in 2011 and \$11.7B being sought in 2012.

iii Geothermal

By our count, there are approximately 1,198 MW of large-scale geothermal energy projects in the U.S. that will seek project financing through 2012. Most of these assets are not yet associated with financing leads and are in various stages of development.

Figure VIII-5: U.S. Geothermal Projects Likely to Seek Project Financing through 2012

Developer	Project Name	Type	Location	MW
Magma Energy	Desert Queen	Geothermal	NV	36
Magma Energy	McCoy	Geothermal	NV	80
Magma Energy	Panther	Geothermal	NV	34
Magma Energy	Soda Lake	Geothermal	NV	12
Magma Energy	Thermo	Geothermal	NV	20
Nevada Geothermal	Black Warrior	Geothermal	NV	55
Nevada Geothermal	Crump Geyser	Geothermal	OR	40
Nevada Geothermal	Pumpnickel	Geothermal	NV	15
Ormat	Carson Lake	Geothermal	NV	20
Ormat	East Brawley	Geothermal	CA	30
Ormat	Jersey Valley	Geothermal	NV	15
Ormat	Mammoth II	Geothermal	CA	25
Ormat	McGinness Hills	Geothermal	NV	30
Ormat	Puna Enhancement	Geothermal	HI	8
Ormat	Tuscarora	Geothermal	NV	16
Ormat	Wister	Geothermal	CA	30
Ram Power	Clayton	Geothermal	NV	120
Ram Power	Geysers Field	Geothermal	CA	35
Ram Power	Orita II	Geothermal	CA	40
Raser Technologies	Lightning Dock	Geothermal	NM	15
Raser Technologies	Thermo 2-4	Geothermal	UT	78
Sierra Geothermal	Alum	Geothermal	NV	30
Sierra Geothermal	Barren Hills	Geothermal	NV	46
Sierra Geothermal	Reese River	Geothermal	NV	26
Sierra Geothermal	Silver Peak	Geothermal	NV	15
US Geothermal	Neal Hot Springs	Geothermal	OR	26
US Geothermal	San Emidio	Geothermal	NV	9
Vulcan	Patua	Geothermal	NV	175
Vulcan Power	Salt Wells	Geothermal	NV	117
Total MW				1,198

Source: GEA, GTM Research

Geothermal projects typically must conduct advanced exploratory drilling (in order to define the resource) prior to signing a PPA. Project financing is typically arranged prior to commencing plant construction, though not necessarily prior to drilling production wells. For projects with

PPAs under construction or in advanced development, we expect financial close to be attempted by the end of 2010. For advanced development projects without PPAs that aim to commence commercial operation by 2012, we expect project close to be attempted in 2011. For advanced development projects that

aim to commence commercial operation after 2012, we expect financial close to be attempted in 2012. Based on these assumptions, we forecast 85 MW of large-scale geothermal projects will aim to reach financial close over the remainder of 2010, followed by 351 MW of projects in 2010 and 762 MW of projects in 2012.

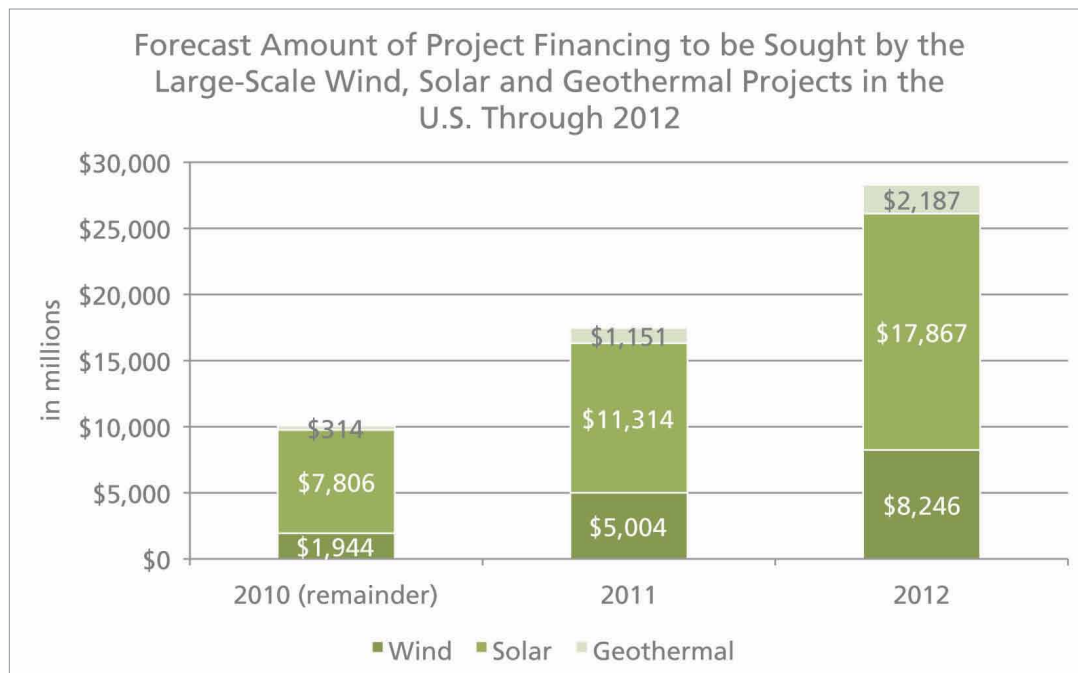
geothermal installations awarded under the cash grant program and is in line with industry standards (of between \$4.0M and \$4.5M per MW). Applying this cost estimate to our 2010-2012 breakdown and declining confidence factors, we calculate project financing of \$314.0M being sought

Figure VIII-6: Forecast Amount of Project Financing Sought by U.S. Geothermal Sector Through 2012

	2010 (remainder)	2011	2012
MW	85	351	762
Confidence Factor	90%	80%	70%
Cost/MW (M)	\$4.1	\$4.1	\$4.1
Financing Sought (M)	\$313.7	\$1,151.3	\$2,186.9

GTM Research

Figure VIII-7: Forecast Amount of Project Financing to be Sought by Large-Scale Wind, Solar and Geothermal Projects in the U.S. Through 2012



Source: GTM Research

To place a dollar value on these figures, we assume an installed cost per MW of \$4.1M for geothermal, which is the average installed cost seen on large-scale

by large-scale geothermal projects for the remainder of 2010, \$1.1B being sought in 2011 and \$2.2B being sought in 2012.

As with the wind sector, much of the costs related to technology and efficiency advances have already been removed from geothermal energy development. Today, installed geothermal power costs in the U.S. are largely impacted by commodity price fluctuations (steel, etc.) and drilling expenses. We anticipate the installed cost of a MW of large-scale geothermal in the U.S. will remain relatively stable (at ~\$4.1M/MW) over the near- to midterm and do not factor in MW cost inflation or deflation through 2012.

iv Cumulative

Cumulatively, we anticipate the renewable power sector to seek \$10.1B in project financing over the remainder of 2010, \$17.5B over 2011 and \$28.3B over 2012, the majority being sought by the solar sector.

IX FINANCING AVAILABILITY FORECASTS

Of the \$55.8B in project financing we expect to be sought by large-scale wind, solar and geothermal projects in the U.S. through 2012, the amount that will be financed with debt, tax equity and direct equity will be a function of several variables, including the availability of each (which, in turn, is affected by interest rate movements and tax bases) and legislative support mechanisms. The scenarios we consider in this report focus on potential changes to the cash grant and the tax equity supply through 2012.

While there is no way to know precisely what levels of tax equity and debt will be available to renewable energy over the midterm, we postulate two scenarios: one in which the cash grant is extended through 2012 and one in which it is not.

i Cash Grant Extended

If the cash grant is extended through 2012, either in its current form or as a rebate, we expect 75 percent of wind projects to opt for the cash grant over the PTC. An estimated 65 percent to 85 percent of projects eligible for the cash grant have opted to elect the cash grant over the PTC (according to Lawrence Berkeley National Lab and industry insider estimates) and we adopt a middle-of-the-road assumption of 75 percent going forward if the cash grant is extended. We do not factor in the election of the traditional ITC over the cash grant, as electing the ITC typically requires a tax equity investor, and the general consensus is that a bird in the hand (i.e., a cash grant within 60 days of commencing operation) is preferable to two in the bush (offsetting the amount at tax time). For solar projects, we assume that 80 percent of coming projects will elect the cash grant. Solar projects do not qualify for the PTC and we assume that the vast majority of coming solar projects will elect the cash grant over the ITC, for the same reasons that were outlined for wind above. However, we factor in a 20 percent non-election factor to account for some solar projects possibly preferring the ITC or being ineligible for the cash grant.

Geothermal projects have a similar cost/benefit scenario to wind when it comes to deciding between the PTC and the ITC, and we expect some geothermal projects will find it more economic to elect the output-dependent PTC rather than the cash grant (or ITC). We factor in a cash grant election forecast of 75 percent for geothermal projects going forward if the cash grant is extended.

If the projects seeking to reach financial close by the end of 2010 are able to do so, and if they meet the minimum criteria for having "commenced construction" (which we assume they will) by December 31, 2010, we calculate that the solar, wind and geothermal sectors will elect a cumulative additional \$2.4B in cash grants over the remainder of 2010, regardless of whether or not the cash grant is extended (this would be in addition to the \$3.4B in cash grants awarded as of September 1, 2010). If the cash grant is extended through 2012, we forecast the solar, wind and geothermal sectors to elect \$4.1B in cash grants in 2011, followed by \$6.6B in 2012.

Timelines for financial close and cash grant awards likely will not align. Financial close is typically reached before a project reaches completion, whereas a

cash grant is not awarded until 60 days after a project commences commercial operation. However, the availability of cash grants makes securing a cash grant bridge loan relatively easy (for quality projects), and we assume that a project wishing to elect the cash grant will be able to obtain bridge financing as part of its overall financing package, with the anticipation that the bridge loan will be repaid once the cash grant is received.

additional \$7.7B in financing over the remainder of 2010, followed by \$13.4B in 2011 and \$21.7B in 2012. How much of this demand can be met by tax equity investments depends on the tax equity supply for renewable energy.

Some \$1.6B in tax equity has been invested in the U.S. renewable energy sector in 2010 so far, with a total tax equity investment of \$3.0B forecast for

Figure IX-1: Forecast Election of Cash Grant in Solar, Wind and Geothermal if the Cash Grant is Extended through 2012

	2010 (remainder)	2011	2012
Wind Project Financing Requirement (m)	\$1,944	\$5,004	\$8,246
Wind Projects Electing Cash Grant	75%	75%	75%
Cash Grant (as percentage of CAPEX)	30%	30%	30%
Wind Cash Grants (m)	\$437	\$1,126	\$1,855
Remaining Wind Project Financing Requirement (m)	\$1,507	\$3,878	\$6,391
Solar Project Financing Requirement (m)	\$7,806	\$11,314	\$17,867
Solar Projects Electing Cash Grant	80%	80%	80%
Cash Grant (as percentage of CAPEX)	30%	30%	30%
Solar Cash Grants (m)	\$1,873	\$2,715	\$4,288
Remaining Solar Project Financing Requirement (m)	\$5,933	\$8,598	\$13,579
Geothermal Project Financing Requirement (M)	\$314	\$1,151	\$2,187
Geothermal Projects Electing Cash Grant	75%	75%	75%
Cash Grant (as percentage of CAPEX)	30%	30%	30%
Geothermal Cash Grants (M)	\$71	\$259	\$492
Remaining Geothermal Project Financing Requirement (M)	\$243	\$892	\$1,695
Cumulative Cash Grants (M)	\$2,382	\$4,100	\$6,635
Cumulative Remaining Financing Requirements (M)	\$7,683	\$13,369	\$21,664
* Cash grant awards timelines will not sync with financial close.			

Source: GTM Research

After taking expected cash grants into account, we anticipate the solar, wind and geothermal sectors will seek an

the full year. We do not expect significant shifts to occur in the cash grant or tax equity supply over the remainder of

the year: decisions regarding tax equity investment allotments for 2010 appear largely “set” and the cash grant may be elected until December 31, 2010.

to elect the cash grant). We calculate that the solar, wind and geothermal sectors will elect a cumulative additional \$2.4B in cash grants over the remainder of 2010.

ii Cash Grant Not Extended

Figure IX-2: Forecast Election of Cash Grant in Solar, Wind and Geothermal if the Cash Grant is Not Extended through 2012

	2010 (remainder)	2011	2012
Wind Project Financing Requirement (m)	\$1,944	\$5,004	\$8,246
Wind Projects Electing Cash Grant	75%	0%	0%
Cash Grant (as percentage of CAPEX)	30%	30%	30%
Wind Cash Grants (m)	\$437	\$0	\$0
Remaining Wind Project Financing Requirement (m)	\$1,507	\$5,004	\$8,246
Solar Project Financing Requirement (m)	\$7,806	\$11,314	\$17,867
Solar Projects Electing Cash Grant	80%	0%	0%
Cash Grant (as percentage of CAPEX)	30%	30%	30%
Solar Cash Grants (m)	\$1,873	\$0	\$0
Remaining Solar Project Financing Requirement (m)	\$5,933	\$11,314	\$17,867
Geothermal Project Financing Requirement (M)	\$314	\$1,151	\$2,187
Geothermal Projects Electing Cash Grant	75%	0%	0%
Cash Grant (as percentage of CAPEX)	30%	30%	30%
Geothermal Cash Grants (M)	\$71	\$0	\$0
Remaining Geothermal Project Financing Requirement (M)	\$243	\$1,151	\$2,187
Cumulative Cash Grants (M)	\$2,382	\$0	\$0
Cumulative Remaining Financing Requirements (M)	\$7,683	\$17,469	\$28,299
* Cash grant awards timelines will not sync with financial close.			

Source: GTM Research

As the cash grant is applicable through the end of the year, we expect the same outcome for 2010 regardless of whether the cash grant is extended. We make the same assumptions for 2010 as outlined in the section above (75 percent of upcoming wind projects, 80 percent of upcoming solar projects and 75 percent of upcoming geothermal projects will opt

If the cash grant is not extended, the \$4.1B and \$6.6B in cash grants that we forecast would have been sought by the wind, solar and geothermal sectors will need to be sought in the tax equity, debt, or direct equity markets.

Some industry insiders believe that the non-extension of the cash grant could have

a negative impact on the attractiveness of renewable energy projects to tax equity of their investors and could result in a decline in the tax equity supply for renewable energy after 2010. There is some merit to this argument: the availability of the direct 30 percent cash grants lessened the overall amount that tax equity investors needed to put into a project and generally improved a project's attractiveness. (The cash grant amount could be secured in the form of a bridge loan prior to grant payment at rates similar to that on term debt). Insiders worry that equity investors may not be willing to fill the financing gap left once the cash grant expires and could curtail some investors' overall investments in the renewable energy sector. We adopt a more neutral stance on this issue, however. If the cash grant is not extended, projects will still have the ability to elect the ITC and PTC (excluding solar), and most projects will still require a tax equity partner in order to monetize these incentives. As such, we expect developers and financial institutions to continue to collaborate on ways to maximize these tax advantages (though likely at higher expected rates of return). In essence, we expect the tax equity supply to remain more a function of the health and visibility of financial institutions' tax bases and whether new tax equity investors enter the market in a substantial way.

X CONCLUSION

Nearly two years since the onset of the financial crisis, the availability of project financing to renewable energy projects in the U.S. has improved somewhat due to the thawing of the lending markets, with a return to longer tenors on term-debt, and legislative support mechanisms introduced as part of the American Recovery and Reinvestment Act (ARRA)—particularly the ITC cash grant.

However, considerable uncertainty remains as the industry awaits final word on the potential extension of the cash grant program and as tax equity markets continue to rise out of the recessionary depths. Overall, it is unclear whether the amount of project financing to be supplied to the renewable energy sector through 2012 will meet forecast demand. On the whole, we believe that most quality projects (i.e., from established developers with PPAs from creditworthy off-takers) will continue to be able to access project financing at reasonable terms over the midterm. Any potential bottlenecks in project financing (whether for debt, tax equity or direct equity) are likely to come at the expense of smaller projects, less-established developers, and/or projects with higher technology or development risks.

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