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Innovative Financing Techniques
to Drive the Geothermal Heat Pump Market—
Using Public Financing and Regulatory Incentives

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ABSTRACT

Geothermal heat pump project financing faces a number of challenges that are unique among the renewable energy industry. While geothermal heat pump projects can be eligible for many public financing incentives including tax credits, loan guarantees, federal grant programs, bonds, and other tax incentives, some incentives are not on par with incentives available for other technologies. Development of geothermal heat pumps may also benefit from regulatory regimes such as renewable energy standards and carbon offset programs as these programs become more defined. Innovative tax and ownership structures can provide stable project financing opportunities to overcome the challenges in the development of geothermal heat pump projects.

Introduction to Public Financing and Regulatory Landscape

Financing geothermal heat pump projects is subject to a different set of challenges than most other renewable energy projects. The combination of project scale, the unusual character of an energy facility that may be tightly integrated with building systems, and a different set of incentives has significantly limited the use of alternative financing platforms. As the industry matures and expands, it will be critical to integrate third-party ownership structures using both leasing and energy supply constructs as well as joint and syndicated ownership of projects. We examine the assorted incentives, regulatory regimes, and ownership structures that can be used to support a geothermal heat pump project.

Financing Incentives

Business Energy Investment Tax Credit

The Business Energy Investment Tax Credit (“ITC”) is available on geothermal energy properties, including geothermal heat pumps. The credit is equal to 10% of expenditures, with no maximum limit. Most other technologies, including solar, fuel cells, wind, and geothermal-to-electric projects are eligible for a 30% credit. If geothermal heat pumps were eligible for a 30% credit as well, it would significantly spur development because the ITC is a popular financing choice. Congress may be open to revisiting the ITC with respect to geothermal energy while addressing other renewable energy legislation. Geothermal heat pumps are eligible as geothermal energy property as well as equipment used to produce, distribute or use energy derived from a geothermal deposit. With respect to geothermal heat pumps, this credit applies to eligible property placed in service after October 3, 2008.

Section 1603 Grants

Cash grants under Section 1603 of the American Recovery and Reinvestment Act (“ARRA”) may be taken in lieu of the ITC. The amount of the grant would be based on the same qualifying investment calculation as the ITC.

Accelerated Depreciation

Geothermal heat pump projects could also be entitled to depreciation or amortization. In general, any property that is used in a trade or business is entitled to depreciation under Code Section 167(a). The method of deprecating tangible personal property is determined under Code Section 168. Section 168(e)(3)(B)(vi) provides an accelerated depreciation period for Code Section 48 property under Modified Accelerated Cost Recovery System (“MACRS”). Under this provision, the cost of the property is deductible through accelerated depreciation over five years. If a project owner claims the ITC or is awarded a grant under Section 1603, the amount that can be recovered through tax depreciation (the amount of depreciable basis) is reduced by 50% of the amount of the credit or grant.

Homeowner Federal Tax Credit

Homeowners are eligible for a federal tax credit for installing an ENERGY STAR qualified geothermal heat pump. The credit can total 30% of the cost of the heat pump, including installation costs, with no maximum limit. This credit expires December 31, 2016. Closed loop, open loop and direct expansion geothermal
technology can qualify. Geothermal heat pumps installed in existing homes as well as new construction can also qualify. Both principal residences and second homes can also qualify for the credit while rentals are excluded.

While there are federal incentives available for geothermal heat pump projects, there is disparate treatment of geothermal or ground source heating and cooling when compared with other sources of clean energy in the Federal incentive regime. Solar, wind, biomass, and geothermal-electric projects are all currently eligible for an investment credit equal to 30% of project cost and a geothermal heat pump project owned by a residential customer is eligible for a similar 30% investment credit. For commercial applications of geothermal heat pumps, however, the credit is only 10%.

**Loan Guarantees**

Two loan guarantee programs from the Department of Energy (“DOE”) – Innovative Renewable Technology Loan Guarantees and Commercial Renewable Technology Loan Guarantees – are available to renewable energy developers to secure financing for a wide range of renewable projects. Geothermal heat pump development projects could be eligible for these federal loan guarantees which can be as much as 80% of the total project costs. This program, however, is expensive and applied on a project by project basis, making it a poor option for ground source heating and cooling projects.

**Department of Energy Funding for State Energy Efficiency Programs**

ARRA funding allocated to the DOE for energy efficiency programs on the state level will also provide opportunities for geothermal heat pump development. Geothermal heat pumps are uniquely positioned to qualify for many state energy efficiency programs that may not fit traditional renewable energy generation. Under ARRA, billions of dollars have been allocated to the Energy Efficiency and Conservation Block Grant Program for grants towards energy efficiency and conservation programs as well as energy installations on government buildings and to the State Energy Program for a variety of state renewable energy and energy efficiency initiatives.

**State Tax Credits and Incentives**

Many states have additional tax credits available for installation of geothermal heat pumps in both residential and commercial buildings. Other states have measures pending to create or revise tax credits for property or homeowners to install geothermal heat pumps, among other energy efficiency measures. States are also supporting energy efficiency development through grant and loan programs similar to the ARRA funding allocated to the Department of Energy to spur renewable energy development.

**Regulatory Programs**

**Renewable Energy Certificates**

A Renewable Portfolio Standard (“RPS”) requires electric utility companies within the state to supply a certain percentage of their electricity from renewable sources. At this time, approximately 30 states, including the District of Columbia, have a binding Renewable Portfolio Standard while 7 states have voluntary non-binding RPS goals. Under an RPS, certificates, called Renewable Energy Certificates (“REC”), are created by the renewable sources for each megawatt-hour of qualified renewable energy that is generated. These RECs are earned by certified renewable energy generators for each unit of electricity produced and are sold to the utility companies, usually in conjunction with the sale of electricity. Generally, RECs are issued for energy produced, not energy saved, and therefore, geothermal heat pump technology is not eligible for REC valuation under many state Renewable Portfolio Standards. However, we argue that geothermal heat pumps should be eligible to receive RECs for energy created and/or saved and there is some indication that states may be open to including geothermal heat pump technology in determining eligibility for RECs.

**Carbon Offsets**

Carbon offsets are a financial tool to incentivize and quantify reductions in greenhouse gases, often measured in metric tons of carbon dioxide-equivalent. There are two ways to obtain and trade carbon offsets. A large compliance market for carbon offsets, such as renewable portfolio standards described above, allows companies, governments, and other entities to buy carbon offsets in order to comply with caps on the total allowed amount of carbon dioxide emissions. An additional smaller voluntary market exists where individuals, companies, and governments can buy carbon offsets to mitigate their own carbon dioxide emission from sources such as electricity consumption and general transportation. Companies often buy carbon offsets to promote a “green” image and gain an edge over competitors. Carbon offsets can be obtained through investment and financial support of a renewable energy project that will reduce greenhouse gas emissions. Because the environmental benefits of geothermal heat pump projects such as greenhouse gas reduction are real, but difficult to quantify, carbon offsets are not yet commonly used in geothermal heat pump development.

**Other Programs**

**PACE Bonds**

A “PACE” bond is a “Property Assessed Clean Energy” Bond available for purchase from states, cities, and municipalities where the proceeds are disbursed in the form of a loan to commercial and residential property owners to finance energy retrofits, including efficiency measures and small renewable energy systems. The property owners receive the bond proceeds as a loan which is repaid over 20 years through an annual assessment on a property tax bill. PACE bonds are gaining attention and have been implemented in many states because they have the potential to: (1) increase the development of energy efficiency retrofits by offering advantages including lower energy bills for property owners; (2) reduce upfront costs for installation; (3) improve return on investment and positive cash flow for investors; (4) create jobs; and (5) offer low risk of loss for lenders because property tax liens are senior to mortgage debt. Roughly 20 states already authorize PACE funding with more states likely to pass similar legislation.
Direct Incentives from Utilities and Electric Companies

Some utilities or electric companies will provide additional incentives towards the installation of geothermal heat pumps by offering special rates to their customers. The leveling of demand between the warm and cold seasons allows the electric companies to sell more power in the winter, when plants are largely idle, and reduce demand in the summer, avoiding the need for the construction of new power plants.

Ownership Challenges and Structuring Alternatives

Given the peculiar positioning of geothermal heat pump technology which straddles the common definitions of both clean energy production and energy efficiency, there are a number of nuances to how support for these projects can be structured. Additionally, many building owners, especially those that have a clearly defined interest in the benefits of a geothermal heat system, do not have the ability to utilize the significant tax benefits associated with owning and operating a geothermal heat pump system. Here, the need for innovative structuring is acute. There are several options available, but other than the straightforward direct sale to the building owner, each requires some careful planning to ensure that the transaction and ownership structure is sound.

Lease Structure

A leasing arrangement is one approach that has been used to support the needs of both the geothermal heat pump host and a developer or ownership entity. Under this type of arrangement, a party other than the building owner owns the geothermal equipment, and possibly the full HVAC system, and leases the facility to the building owner. The arrangement allows the building owner to have a clearly defined stream of payments. These payments will be less than the expected savings created through system operations. In this arrangement, because the benefits are based entirely on actual output or offset from the geothermal system, the building host will carry much of the upside and risk associated with system operations.

A common challenge with this arrangement is the inability of the developer to use the tax attributes of the project. This can be cured through the use of a third party owner/lessor (or tax equity investor). This can be achieved through the use of a sale leaseback transaction. In a sale leaseback, the developer builds the project and then, arranges a tax sale of the facility to a third party. Typically, the developer then leases the facility back from the buyer. In the aggregate, the transaction acts much like a lending mechanism to the developer who may retain a purchase option on the facility.

Energy Supply Agreement

A similar construct is to have a third party own the facility, as in the lease structure. Rather than leasing the facility to the building owner, however, the geothermal system owner and the building owner will enter into a supply agreement where the building owner or host pays for energy output from the system, energy savings, or even heating and cooling usage.

While there are several ways to design this agreement to share risk, fundamentally the risk and reward profile in this setting is reversed. The system owner-operator carries risk associated with the system output because the building owner will be responsible only to pay a reduced rate for output as compared to what utility costs would have otherwise been. Again, as with the leasing struc-
Strategic Partnership

Figure 4. Image – Strategic Partnership.

tures, there may be another layer of structuring necessary to efficiently utilize the tax benefits associated with the deal.

A strategic partnership structure works where a third party investor or the host has the ability to use the tax attributes of a project and has an interest in some amount of long-term equity in the project.

An equity flip partnership is one of the traditional tax equity funding ownership structures. The third party or tax investor’s interest is limited to primarily a stream of returns consisting of the project’s tax attributes. There are typically a series of actual ‘flips’ in allocation. Initially 99% of tax attributes go to the Tax Investor and 1% to the Developer. Cash flows (which, subject to some other tax rules, can be independent of tax allocations) go initially 100% to the Developer. When Developer gets its capital returned cash, the split flips to some other split, possibly weighted towards Tax Investor to make the Tax Investor achieve its target return. Meanwhile, upon reaching its target return, the tax attributions will also flip with 5% remaining with the Tax Investor and 95% flowing to the Developer. Note that generally cash flow and tax allocation will be matching – with potentially another Flip of cash flow – and allocated 95/5 Developer/Tax Investor.

As deal structures become more complex, using something like the flip based structure above, or the even more challenging inverted lease mapped out below, the cost of structuring will become prohibitive for all but the very largest applications on ground source geothermal heat pumps. Project partners face similar challenges where there is a need to integrate funding from outside of the traditional capital markets, such as municipal financing. These situations may require additional financial engineering that can similarly raise planning costs.

The relative cost of financial structuring can be addressed through aggregating a portfolio of projects that will all be financed using the same set of entities. While third party investors will still require some level of diligence for each project and the project-specific counterparty risk, technology-based reviews, document preparation and deal structuring can all be streamlined, under this approach.

Conclusion

Some of the regulatory incentives and ownership structures described above have been used to drive growth in other clean energy technologies. While applying more advanced financial engineering to geothermal heat pump projects that typically require less than $5 or $10 million can be challenging due to the relative cost, finding efficient ways to make use of all available policy-based support and financing opportunities will be critical for the industry to begin a period of expansive growth.