

MERGER AND ACQUISITION OPPORTUNITIES IN THE SOLAR ENERGY MARKET

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ABSTRACT

Solar energy is important to our society in being a part of a sustainable future, but now as the business model for producing solar power has matured it has become an important source of value for forward thinking businesses. Companies across all industries are looking to solar as an alternative source of energy and revenue, and are determining where they can participate effectively. EMS companies in particular have an opportunity to capture value in this market by applying their existing expertise to solar module assembly.

Development into solar can seem foreign or even a daunting task considering the challenges facing EMS companies in today's economy. However, by understanding the solar process and the existing business model dynamics it becomes clear that the future of solar involves electronics manufacturers. This connection between EMS and solar has been validated through several precedent transactions that have occurred over the last year with more expected during 2009. These transactions are being driven both by EMS businesses who recognize the similarities between module assembly and existing electronics manufacturing processes, as well as existing solar companies that recognize the value of outsourcing this part of their business.

This paper will discuss this opportunity for EMS companies to enter the solar market through module assembly and why this is the appropriate path to pursue. First the market for solar and its existing growth expectations will be discussed. This will follow with a detailed explanation of the solar value chain and how the similarities between solar module assembly and electronics manufacturing services provide a unique opportunity for EMS companies. Finally, an outline will be given on two approaches for companies to pursue and the advantages and disadvantages of both.

This will provide the understanding needed by management of EMS companies to realize that now is the time to be considering and dedicating resources to enter the solar market.

THE SOLAR ENERGY INDUSTRY

The market for solar power is growing across the globe and the U.S. is poised to see a significant influx of solar installations in the near future. During 2008 the amount of solar power put in place worldwide grew by 61% reaching 14GW in total installations by the end of 2008¹. Germany

still remains the leading country with 5GW installed as of 2008² (Figure 1).

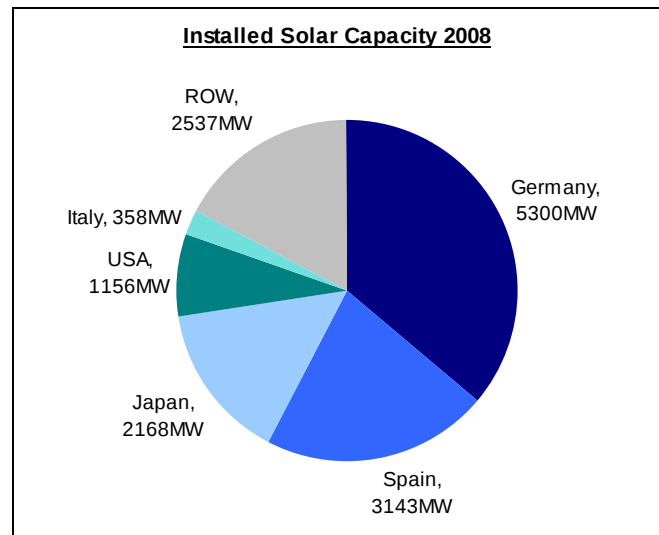


Figure 1. Installed Photovoltaic Capacity by Geography

The key factor pushing growth in solar has been the incentive structures created by governments to bridge the economic gap between traditional electricity and solar power. Today's solar technology has still not yet reached complete "grid parity" (where solar electricity based on a certain \$/kWh would be equal to the price currently paid for electricity). Therefore, without the tax incentives and rebate structures being put in place a consumer will still lean towards traditional electricity from a capital outlay and overall cost/return perspective. This explains why Germany is the leading country in installed solar power as their "feed in tariff" structure ranging from 0.32€ - 0.43€ per kWh exceeds the average cost of traditional electricity³.

In the U.S. the largest incentive that is in place currently is the Investment Tax Credit (ITC). This credit provides 30% of the capital cost of putting a solar system in place back in the form of a credit to tax. In addition for 2010 guidance has been given by the U.S. government that this credit will be available as a cash grant for applicable solar projects providing a more immediate incentive⁴. The next major incentive is the allowable accelerated depreciation that can be taken for an installed solar system. These two incentives combined can provide an approximate 40% savings of the total cost of a solar system. However, even with the tax

incentives the cost per kWh from the solar system will still be higher than traditional electricity. This is why on a state by state basis different rebate structures are given to level the costs and drive renewable energy growth.

Another factor that is potentially shifting the U.S. market towards solar are the state level Renewable Portfolio Standard (RPS) requirements. An RPS requires utilities to generate a certain amount of their electricity through renewable sources. Currently 28 states have adopted some form of RPS requirements and 5 additional states have voluntary standards⁵. The full implementation of these standards range from 2010 to 2030, but can reach as high as 40% of the total utility generation⁶. When these programs begin to be implemented (and in certain states this has already begun) it will cause the U.S. solar market to grow faster than anywhere else in the world.

CALIFORNIA SOLAR

Two specific factors are positioning California to be the largest market for solar energy in the world. One is the California Solar Initiative (CSI). The CSI is a rebate structure (similar to the feed in tariffs discussed above) that provides the economics necessary to balance solar with traditional electricity. However, the fundamental shift towards further solar installations is being caused by the upcoming RPS requirements in California. The current program is scheduling 20% of the power coming from the utility companies to be required to be sourced through renewable energy by 2010. On an order of magnitude this would represent approximately 10GW of electric capacity⁷. As of July 2009 49% of the projects that are fulfilling the RPS requirements in California are solar, so at this rate solar capacity in California could reach 5GW or more in the next few years⁸. This would equate California to Germany in total installed capacity.

With California and the new federal administration pushing renewable energy and solar it is only matter of time for other states to follow with incentive structures and the implementation of RPS for the U.S. to realize the phenomenal market potential that is expected. Therefore, companies are looking for ways that they can participate within the solar value chain in order to capture some of this value.

THE SOLAR ENERGY VALUE CHAIN

A solar project is typically initiated either with a commercial or residential customer or direct with a utility (the "Customer"). The Customer has a key decision to make as to whether they want to retain ownership of the project or whether they will let another party have this ownership. The difference is that the project owner (who will be referred to from hereon as the "Developer") will be responsible for the necessary capital outlay for all of the solar equipment and its installation. If the Customer chooses not to "own" the project they will not have the capital cost and rather will only be responsible for paying for the solar electricity. Under this approach a Power Purchase Agreement (PPA) is

created with between the Developer and the Customer. The PPA will structure how the Developer will get paid for providing the solar power produced from the installed system. The Developer is then responsible to organize the Engineering, Procurement, and Construction (EPC) for the solar project. Most Developer companies do not provide the EPC work themselves and rather outsource this function to EPC companies that act similar to general contractors and focus on this part of the value chain. The Developer will focus on securing the debt and equity financing needed to fund the capital outlay for the project while the EPC companies will design the solar system, build or source the solar modules and other necessary equipment, and arrange for the installation (typically subcontracted out to certified providers unless the EPC company has this capability internally).

As mentioned some EPC companies produce their own solar modules, but the majority source these modules from major solar module manufacturers around the globe. Although there are many varying technologies surrounding solar modules there are two main types, Crystalline cell modules and Thin Film modules. Currently over 90% of modules produced are crystalline⁹. This is mainly due to crystalline based modules having two to three times the efficiency (level of sunlight input converted into electric output) of modules utilizing Thin Film technology. On average Thin Film modules average approximately 8% efficiency while crystalline modules average around 18% efficiency¹⁰. However, Thin Film modules are becoming increasingly popular as the cost for a Thin Film module can be less than half of a crystalline one (the summary of the Solar Value Chain is presented in Figure 2).

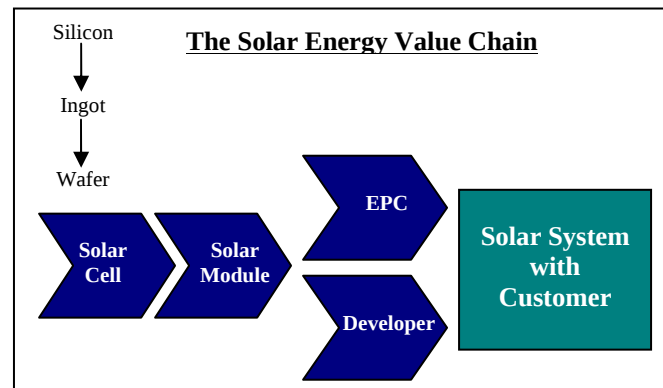


Figure 2. The Solar Energy Value Chain

SOLAR MODULE ASSEMBLY

The production of either a Thin Film or Crystalline module requires the assembly of many different pieces in order to create one solar module. The assembly of a crystalline module contains many similar functions to EMS company processes. For instance the tabbing and stringing of crystalline cells together to make a solar panel is very similar to processes used in PCB assembly (the basic solar module assembly process is outlined in Figure 3).

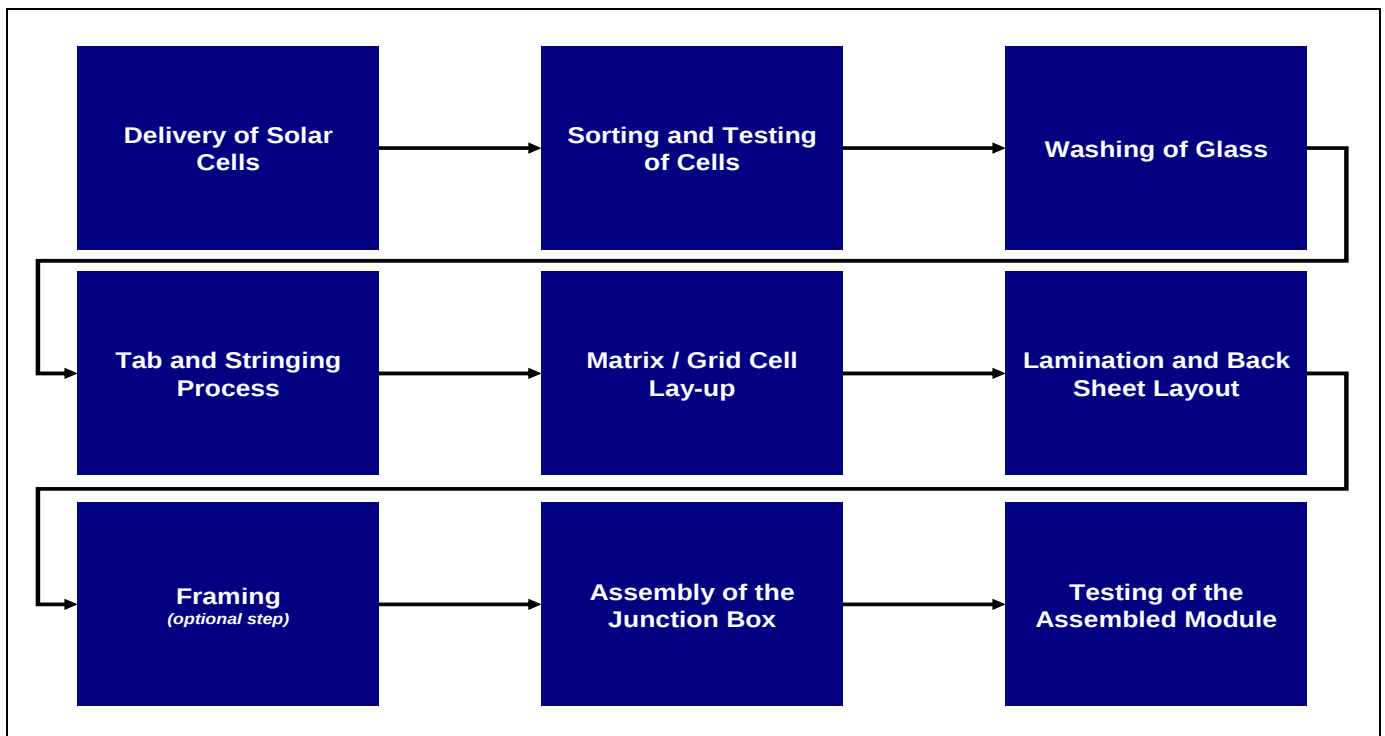


Figure 3. The Solar Module Assembly Process

EMS companies are able to utilize their existing expertise to make the assembly process for solar more efficient and cost effective.

Currently many solar companies are performing this assembly function internally much like large OEMs in the electronics industry used to be vertically integrated to include electronics manufacturing services. Similarly to the electronics industry solar companies are realizing today that the assembly of the solar modules is more effective to be outsourced. As an example BP Solar outsourced some module assembly to Celestica and recently Day4 Energy sold its assembly operations to Jabil. In addition other major solar panel producers are looking towards the outsourcing business model in order to focus on other areas of core competency.

OPPORTUNITY FOR EMS

The real opportunity that is now being presented to EMS companies is the ability to differentiate operations by adding solar module assembly. This will help gain access to a growing market and can create economic benefit even in turbulent times for electronics manufacturing. There are two methods that an EMS company can pursue in order to enter the solar market. The first is by developing the internal know-how and capabilities needed to assemble solar modules. The second is to acquire those capabilities from a vertically integrated solar company or other existing module assembly company.

While developing these capabilities internally allows a company to see the process get online from start to finish

this can be timely and costly to undertake. It is not only much faster to acquire the capabilities and necessary know-how, but it can also be less of a cost outlay depending on the learning curve of a company.

Solar companies are now willing to entertain a purchase of assembly operations as it will provide valuable working capital that these companies need to focus on technological improvements and further R&D. Therefore EMS companies should capitalize on the current trends in the market and look towards solar for future growth prospects.

REFERENCES

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- ³ Renewable Energy Sources Act (EEG) 2009
- ⁴ American Recovery and Reinvestment Act
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- ⁸ California Public Utility Commission, "Renewable Portfolio Standard Quarterly Report", July 2009
- ⁹ Photon International
- ¹⁰ Energy Information Administration (EIA)