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SunRay Renewable Energy: Private equity in the sunshine

It was almost midnight in Tel Aviv on a Friday in January 2010, as Yael Talmor watched the heavy traffic flow towards the nightlife district from the 28th floor offices of SunRay Renewable Energy (SunRay). She was still at work, preparing documents for due diligence on SunPower Corporation's (SunPower) USD300mn takeover bid for SunRay. This acquisition would cement SunPower's vertical integration strategy by increasing its pipeline of solar photovoltaic (PV) generation projects by 1,200 megawatts (MW) in Southern Europe.[1]

Over 2,000 miles away, Tulika Raj-Joshi looked out over the Thames from the London office of Denham Capital Management (Denham). Tulika was also still at work, assembling piles of documents and coordinating closely with colleagues at SunRay and Denham Capital. She thought back at her MBA project at London Business School (LBS). SunRay, then a newly formed business, had commissioned her team to conduct a strategic review of the renewable energy market in the European Union (EU).

At the helm of SunRay was Yoram Amiga, a serial entrepreneur in private equity and property investments. Subsequent to a successful career in commodities, he shifted his interest to new ventures. Working with other investment partners closely attached to the LBS community resulted in a steady flow of graduating MBAs as full-time employees as well as students for ad hoc projects at both the holding and portfolio companies.

By mid-2006, Yoram and his investment partners were looking for opportunities in renewable energy, which was expanding rapidly in the EU. Growing environmental awareness, underpinned by the Kyoto Protocol, had spurred many European governments to establish regulatory frameworks and price supports favoring the generation of power from renewable sources.

SunRay's founders saw an opportunity to leverage their professional networks in parts of Southern Europe where much renewable energy was being developed by

1. A solar PV developer pipeline is the amount of MW for which the company has optioned land and is in the process of obtaining the permit for the development of a solar PV park. See Exhibit 27.1 for a glossary of basic solar PV terminology.

This case was co-authored with Matthias Vandepitte and Lode Van Laere (both LBS MBA 2011).
We thank Michael Barnea, Robert Belke, Giles Clark, Hans Holmen, Alba Martinez, and Andres Truuvert for most valuable comments.

relatively unsophisticated local entrepreneurs. They sought to build a professional pan-European platform, based in London, which would become a leading continental producer of renewable power. However, they first needed to evaluate renewable energy generation technology and the investment environment in various European jurisdictions.

SUNRAY'S CHOICE OF SOLAR TECHNOLOGY

The first element in developing their business strategy was the choice of a core technology. Wind, biomass, geothermal, hydroelectric, solar PV, and solar thermal technology were all mature and commercially viable, while fuel cells and tidal/wave energy were not (an overview of the different technologies is provided in Exhibit 27.2). Many of these technologies had shortcomings, however. For geothermal, hydroelectric, and solar thermal generation, these included long project timescales, a heavier engineering requirement, and limited pools of suppliers. Biomass power generation was not readily scalable and was fairly risky, requiring a supply chain for feedstock and custom technology specific to the feedstock. Energy generation from wind required a higher degree of engineering and was already a mature global business with established players at a time where turbines were in short supply.

Solar PV was found particularly attractive because of its relative simplicity and the bankability of projects. The photovoltaic effect was well understood, with no patent protection on the core technology, using silicon solar cells to convert energy from sunlight to electricity. In the right locations, sunlight is abundant and predictable.[2]

The dominant solar PV technology was crystalline silicon, which accounted for over 90% of solar PV energy generation in 2006. Other technologies, such as thin film, were in far earlier stages of engineering development and market acceptance. Exhibit 27.3 shows the basic principles of solar cell technology, and Exhibit 27.4 compares solar PV technologies.

THE VALUE CHAIN OF A SOLAR PV DEVELOPER

After choosing solar PV as the technology to pursue, attention turned to a detailed understanding of the value chain in the developer's business. Solar PV is generally installed either on the roofs of buildings or in large ground-mounted parks connected directly to transmission grids. SunRay chose to focus on ground-mounted installations, which are more readily scalable. Having settled on ground-mounted solar PV, SunRay turned to understanding the development value chain, how to enter new markets, and what obstacles they might face.

The first step in developing a solar PV park is to identify a tract of land which is available, sufficiently large, relatively flat, and close to the national electricity grid. The developer will require permits to construct the park and connect it to the grid, which involves negotiating simultaneously with the landowner, local government, and the local electricity utility, taking into account economic factors as well as technical aspects such as production projections, site constraints (slopes and shadows) and grid parameters. The developer therefore needs a deep knowledge of energy legislation, regional planning and environmental procedures, power capacity, and other intricacies of the grid infrastructure in each jurisdiction where they operate.

2. *http://re.jrc.ec.europa.eu/pvgis/*

The developer must also select the construction elements of the installation. In the most basic design, the modules are installed on fixed ground-mounted structures, facing the usual direction of the sun. The efficiency of the modules can be increased with motorized trackers which turn the panels to follow the sun on either one or two axes. The solar array is connected to an existing or new local substation belonging to the local power utility, which is in turn connected to the grid by power lines (Exhibit 27.5 outlines the basic configuration of a solar PV park). In order to actually construct the site, the developer must also choose an engineering procurement and construction (EPC) contractor to install and connect all the components, and coordinate with the local utility company, which evacuates the power to the national electricity grid once the site is commissioned and enough grid capacity is available. Finally, the developer must decide whether to operate the plant independently or sell it to investors or a utility company.

SunRay believed in its ability to establish a multiregional development platform to efficiently secure suitable land and navigate the complex permit application process. Many local businessmen were already applying for permits and grid connections, but this fledgling activity was largely ad hoc, often compromised execution, and lacked a long-term view. SunRay hoped to professionalize this process on a large scale, which would require them to develop core expertise applicable to development across multiple countries.

THE EUROPEAN RENEWABLE MARKET IN 2006–2008

With the help of the LBS student team, SunRay analyzed in detail the attractiveness of various European markets. Driven by volatile and rising energy prices, global warming, and energy security concerns, the EU's European Climate Change Program mandated the increased use of renewable energy. In 2007, the EU announced the dual goals of cutting emissions by 20% below 1990 levels and generating 20% of energy from renewable sources, both by 2020.[3]

Member states could strive for these targets through three types of support systems:

- *Direct market support*—either market volume support (e.g., renewable portfolio standards) or market price support via feed-in tariffs or tax advantages
- *Investment support*—direct government subsidies or tax credits to investors in renewable energy
- *Research and development grants*—to help develop and optimize renewable generation technology.

Governments were considered unlikely to reverse their renewables incentives, since the EU targets for 2020 were viewed as challenging. Exhibit 27.6 summarizes feed-in tariff terms for the main European solar PV countries. Exhibit 27.7 shows annual installed solar PV power in Germany, Spain, and Italy in 2000–2008.

Germany

Germany was a pioneer in renewable energy. By 2006, despite lower solar irradiation levels, the country led the world in solar PV installations and had developed into

3. *Sources for this section:* IEA, Eurostat, U.S. Energy Information Administration, Kyoto targets: *http://unfccc.int/*

Europe's most mature solar PV market. This was driven by attractive solar PV feed-in tariffs, a conducive banking environment, and well-thought-through alternative energy legislation. The feed-in tariff was continuously adapted to the diminishing prices of solar PV equipment, providing transparency for future subsidies and allowing developers to plan ahead.

Spain

High and growing dependence on external supplies of energy prompted the Spanish government to promote alternative sources of energy. In 2005, it announced the *Plan de Energías Renovables en España* (Spanish Renewable Energy Plan) intended to provide at least 12% of the country's energy from renewable sources by 2010. An annual quota feed-in tariff system entitled developers to 25 years of subsidized rates for new solar panel projects connected to the national grid during that calendar year.

This scheme was well intended but flawed, with unforeseen consequences. It made solar PV very attractive, since the tariffs were generous and Spain has ample sunshine, but the program was a victim of its own success. The government received a flood of permit applications, including many from entrepreneurs lacking the technical savvy and financial resources necessary to actually complete projects. Projects rushed to connect to the grid by the annual deadline, creating an enormous backlog of applications for connection. Developers could no longer be certain that their project would connect by the year-end tariff deadline and the consequent uncertainty of revenue made project finance impossible.

In 2007 the government saw the need for a pre-screening system and imposed an escrow deposit which would be forfeited if the developer failed to build the project and connect it to the grid.[4] This further complicated matters by tripling the upfront cost, forcing a desperate sale of pending permits into an already turbulent secondary market.

In 2008, faced with a dysfunctional allocation system and the global financial crisis, the government cut the feed-in tariff for new PV plants by 30% and restricted the higher feed-in tariff to parks built and connected to the electricity grid by September 28, 2008. This resulted in a short-term peak in the price of land and permits, and much of the world's solar PV development capacity relocated albeit temporarily to Spain. The severely reduced tariff, coupled with the escrow requirement, and a complicated application process,[5] made new permit applications unattractive and the industry crashed. Worldwide solar cell demand and, therefore, prices plummeted and thousands of jobs were lost. Tariffs were subsequently cut further as the country's economic woes deepened.

Italy

Italy has limited domestic sources of energy and depends on imports. The EU Directive set the country a target of generating 25% of its electricity from renewable sources by 2010, in partial response to which the government established a fixed feed-in tariff for solar PV, guaranteed for 20 years. The rate was uneconomic for the time, however, and failed to stimulate solar PV. It was not until new legislation in July 2006 provided an

4. In May 2007, the Spanish government enacted Royal Decree 661 which levied a loan guarantee (*aval*) of EUR500,000 per 1 MW requested permit, to be deposited in a government escrow account and returned to developers only when the project was operational and connected to the electricity grid.

5. The complexity arose from centralized energy legislation which each region adopted differently and from the high opacity of local levies and other hidden costs.

attractive mix of stimuli, initially for up to 500 MW of capacity, that the Italian solar PV industry took off.

Greece

Greece was faced with emissions limits, rapidly growing electricity demand, and a fleet of high-emission coal-fired power plants. Spurred by a major blackout in 2004,[6] the government announced a modernization of its energy sector and incentives for renewable energy, with 29% of electricity to be from renewable sources by 2020, including 700 MW of solar PV capacity. This program did not operate as intended, however; by the end of 2008 its backlog of applications for solar PV permits had reached about 3 gigawatts (GW) and only 36 MW of solar PV had been installed.

SunRay saw no point in entering the established and economically less attractive German market. They decided to commit the capital necessary to build a strong organization qualified to move in parallel into Spain, Italy, and Greece. They would keep other countries—in particular, France and Israel—on their radar for early market entry when conditions were suitable and internal resources allowed.

SUNRAY'S BUSINESS MODEL

To Yoram the potential business seemed too good to be true; any electricity produced was pre-sold for 20–25 years ahead at a very attractive price guaranteed by the government and a national utility company. He sought to replicate the success of pioneers in wind generation in developing and operating an international portfolio of power generation assets.

A developer would of course require access to land with a solar PV development permit. This could be achieved through *greenfield development* (finding the land, persuading the owner to sell or lease and applying for the permit), *outright purchase* of permitted land (from financially constrained local developers), or by a joint venture with a local developer.

Spain and later Italy were attractive to institutional investors such as banks and utilities. Although fully priced, only the outright purchase was a realistic land access alternative for such institutions. The economic principle of comparative advantage resulted in a classic division of labor—local developers concentrated on obtaining solar PV permits to flip into the secondary market.

SunRay took a different approach: manage multiple local teams in parallel from a professional development office in London. Yoram's many years in commodities had sensitized him to country-specific risks. He was determined to expand quickly across regions and countries, to diversify bureaucratic risks, and to build a balanced portfolio of projects in countries that are at different stages of development. SunRay's business model would be solid, leveraging on the whole value chain of solar development from permit application to the construction and connection of solar PV parks.

BUILDING THE MANAGEMENT TEAM

For SunRay to execute such a diverse process in a new market, it vitally needed to build core expertise and complementary skills. In stark contrast to many small shoestring

6. In July 2004, a severe heat wave increased demand for air conditioning, overloading the Greek grid.

regional developers, SunRay decided to spare no expense and to pursue exceptional individuals capable of executing and delivering its bold plan of multiple parks in multiple geographies. Over the course of 2007, SunRay accumulated a core team of professionals by tapping certain founders with credibility from previous ventures and through external hires.

Recognizing the importance of in-house legal expertise, the first recruit was a senior lawyer, specialized in negotiating M&A and capital market transactions with multinational companies. At the same time, SunRay met Seán Murphy, a trained electrical engineer, head of Nomura's clean technology research and one of London's best regarded authorities in the renewable sector. Seán joined SunRay as Chief Technology Officer (CTO), complementing the small team with his extensive knowledge of the renewable industry and technology. Another key hire was the then Chairman of Enemalta, Malta's state-owned utility company responsible for providing and distributing electricity, gas, and petroleum throughout the country. In addition to hands-on utility expertise, he brought with him a broader policy perspective from his experience on the board of Eurelectric, the Brussels-based association of the European electricity industry.

Looking back at how Yoram built a team of experienced professionals around him, Seán recalls: "They all stood out in their different skills, it was just incredible."

LEARNING THE SOLAR PV GAME THE HARD WAY

While the team was applying for its first permits in Greece, it learned lessons in Spain that later proved invaluable. In Spain, SunRay was intensively searching for emerging local developers to serve as joint venture partners, while simultaneously communicating with local authorities and regional offices of the power utility. They realized that they needed a country manager with language skills and on-the-ground expertise in Spanish infrastructure. In addition, SunRay teamed up with a dynamic Cordoba-based technical consulting firm that designed state-of-the-art power structures and also had daily working relations with Spanish utility companies and government authorities. SunRay developed an opportunity-hunting team of five people in London and ten in Spain, a model which they would repeat in other countries.

In less than two years, SunRay looked at well over a hundred opportunities throughout Spain. They learned how to deal with third-party agents, how to assess site-specific risks, and what core questions to ask—in the process developing a way of efficiently assessing potential sites. In the end, however, SunRay did not build a single project in Spain. Neither joint ventures nor outright acquisition permits worked out; most permits available on the secondary market did not survive their rigorous due diligence and SunRay was constrained by its core philosophy of employing high financial gearing. As Seán commented:

> "Because the founders of SunRay came from investment or financial backgrounds, we were finely tuned to the concept of bankable quality. Since we always knew that we would need bank debt to finance 80% or more of the project costs, we could only ever look at projects where we had managed risks (permit application, equipment selection, energy yield forecasts, etc.) sufficiently well that we could reliably ask a bank for finance. Our perspective was quite different to those project sponsors and investors chasing hot money where their selection criteria were more lenient than ours. Having a relentless focus on risk and a drive for quality

> projects may have lost us opportunities in the raging hot Spanish market, but proved the single most valuable asset when it came to capitalizing on the Italian opportunity."

As described above, the bull market in Spanish solar PV ended in 2008. Yoram realized that SunRay had entered Spain too late. The experience influenced the team in Greece and Italy but also pushed them to commit resources to markets which were in their infancy and even lacked solar PV legislation, such as France and Israel.

SCALING UP THE BUSINESS ACROSS SOUTHERN EUROPE

SunRay had entered Greece through a partnership with the Greek Orthodox Church, which had immense political muscle and was the largest landowner in the country. Backed by a local bank, a qualified engineering company, and a well-regarded law firm, SunRay applied for a total of 69 MW of solar PV capacity in June 2007. The considerable legal expertise of SunRay London ensured that the legal structure for making the applications was economically efficient, albeit convoluted.

By mid-2007, solar PV was becoming increasingly attractive in Italy, with its ideal climatic conditions and improved fee-in tariff, although some regions were politically unstable and administratively constrained. As in Spain, SunRay's strategy was to identify local engineering consultancy groups to obtain market intelligence and identify suitable sites. A caravan of international investors seeking opportunities had already pulled up where the sun shines the brightest: Sicily and Puglia, the heel of Italy. While not underestimating the attraction of southern Italy, SunRay also looked to Lazio, the region centered on Rome, where it became a market pioneer in August 2007.

UNDER THE UMBRELLA OF PRIVATE EQUITY

The search for capital

By the end of 2007, Spain, Italy, and Greece had taught the team how capital intensive solar development can really be. Much seed capital is required even before starting construction—for permit applications, options on land, legal costs, engineering surveys, and financial deposits. While completed projects can be highly geared on the basis of their secure long-term revenues, anyone developing a pipeline of permit applications needs to spend non-recoverable money upfront. The actual construction is even more capital intensive, of course, even if a partial line of credit is available from the EPC.

SunRay wasn't finding it cheap to run a multicountry operation with uncompromising standards; it needed more funding. The founders contemplated raising money on a project basis with local partners and spoke to several family offices about funding development at a country level. Eventually, they decided to raise money at the holding company level, either from private equity or a large corporation. This would avoid the need for multiple contracts and negotiations, while providing SunRay the greatest flexibility in using the proceeds.

As the management team were quite experienced in finance, they had no trouble preparing an effective presentation and started contacting potential investors. Even though SunRay had not yet built a single solar park, it was on its way to receiving its first permit in Italy. Its key messages were:

— SunRay has in place a unique platform of centralized expertise in London (systemic processes of project development, solar engineering, and project finance), while locating more regional expertise (land sourcing, interpretation of planning regulations) "in the field".

— Achieving an after-tax leveraged IRR in excess of 20% on a pipeline of about 230 MW of potential solar developments in three different countries.
— Revenue is not at risk, as the feed-in tariffs were backed by governments for 20 to 25 years, operational risk is very limited, and construction risk would be hedged by working with blue chip EPC contractors capable of providing contractual performance guarantees.

In November 2007, SunRay met the president of a major American conglomerate which, once it understood the concept and the business plan, offered SunRay up to USD300mn. The funding would use either a classic pre-money valuation structure or a combination of project level funding and equity for general and administrative (G&A) development expenses at the holding company level. SunRay realized that a strong brand and solid balance sheet would be a tremendous boost to building the business. However, SunRay also saw that it and the conglomerate had different business philosophies and that the approval process for investment decisions would be slow. Yoram commented:

> "They saw SunRay purely as a developer business and not as a capital portfolio business, which was the opposite of what we intended to be. Secondly, we felt we would be a small fish in a big pond as they were investing in many different businesses. Finally, we looked for an investor that could make a quick decision when opportunities would arise and therefore we opted for private equity."

The private equity solution became available when Yoram pitched SunRay to Denham Capital, which had recently hired Louis van Pletsen to establish its London office. Louis was formerly Managing Director at Nomura, where he was a colleague of Seán Murphy and the investment banker to one of SunRay's founders.

Denham Capital: Unlocking value dislocation

Denham was a global private equity firm focused on energy and commodities with over USD4.25bn in assets under management in 2008. The firm was founded in 2003 by Stu Porter, its CEO and Chairman, when he left the Harvard Management Co., where he was responsible for investments in energy and commodities. Denham typically invested USD75mn to USD200mn in its portfolio companies. It was headquartered in Boston, with additional offices in Houston, Short Hills (NJ), São Paulo, and London (Exhibit 27.8 provides an overview of Denham's funds and portfolio).

Denham's business model was to continuously seek investments with dislocations of value. Tulika Raj-Joshi, now a vice president at the firm, explains:

> "Value dislocation exists between a development asset and an operating asset. It is the difference between the cost of de-risking an asset and the value of the operating asset. This is particularly the case in renewable energy, as development assets will ultimately generate a predictable earnings stream once they reach an operational stage and generate income based on long-term government-mandated feed-in tariffs. Therefore, in the case of SunRay, Denham Capital focused on intelligently mitigating the risks of the development stage assets."

Denham has a particularly keen understanding of the risks inherent in the development business, as most of its investment officers are industry experts with an operational background, which differentiates them from many purely financial investors.

In 2007, Scott Mackin, partner and head of the Power & Renewables group at Denham, was investigating solar PV as a potential investment theme. The firm had spotted the potential to capture the significant dislocation of value inherent in European solar PV. Scott and Louis saw the parallels with wind generation, which also benefited from government supports and declining equipment costs. They started evaluating a large number of European solar PV opportunities, with the key prerequisite of a solid but highly entrepreneurial team with the skills to deliver on its promises. In January 2008, Scott flew from his office in New Jersey to meet the dozen different solar management teams identified. On Tuesday the 22nd, it was SunRay's turn to pitch their business plan to Denham.

The negotiation with Denham Capital

During the meeting it only took about 2 hours for the SunRay team to convince Scott and Louis that SunRay was the company Denham was looking for. Denham's initial reluctance about a CEO without a solar or energy background was overcome by Yoram's confidence and overall experience. Louis recalls:

> "The reason why I was attracted to financially back SunRay was because Yoram had a sense of urgency and impatience. His vision, passion and momentum make things move."

Yoram managed to reassure Denham that SunRay had strong commercial relations with project financiers, regional EPCs, and suppliers. The business was supported by strong local engineering and development teams with strong ethics and technical competence. However, what Scott found as key was "that SunRay understood how development really works—a logistical exercise which requires relentless focus and adjustment."

Denham saw that SunRay had solid technological and market knowledge, a formulated project appraisal process, and a determination to grow the business aggressively, including expansion to additional countries under investigation.[7]

By the end of their second meeting, the two firms were well on their way to striking a deal, negotiated chiefly between Denham and another founder of SunRay. The private equity firm committed to deploy USD200mn by 2012 in SunRay's development portfolio, at project level lifecycle IRRs exceeding 20%, with an expectation of exiting via a sale based on contracted cash flows to a buyer whose discount rate is about 10%. Denham considered the co-incentivized management team as highly competent and reached an agreement with Yoram to add personnel in senior solar project management and procurement. Two days after the second meeting, Yoram flew with Scott to visit SunRay's local teams and operations on the ground in the different countries.

Denham agreed to commit an immediate short-term loan of USD3mn,[8] and up to USD200mn in expansion capital within 60 days, conditional on successful completion of a due diligence program consisting of four major steps:

7. The Czech Republic, France, and Israel.
8. The short-term loan was to fund SunRay's operations until closing the definitive financing. The main commitment of USD200mn was to be drawn over time, with each draw subject to approval by Denham.

1. Verify the costs, efficiencies, degradation, and market assumptions presented by SunRay, for which Denham retained CH2M HILL, a consultant with expertise in solar project development and manufacturing. Denham also asked CH2M HILL to qualify equipment vendors for early projects.
2. Verify the tariff regimes and potential land, regulatory, and tax issues in Italy, Spain, and Greece.
3. Perform a background check on key SunRay employees.
4. Verify assumptions regarding debt project finance with solar project lenders.

Denham's target return depends on the risk associated with the investment and other considerations. In this case Denham's base case was an exit wherein its investment is sold for a multiple of 3× its original investment, of which substantial amounts would go to management and founders. Denham structured its investment as preferred equity, the return on which would be realized entirely upon exit. Management and founders would receive an increasing share of the exit proceeds after certain minimum returns to Denham were achieved.

To ensure a more structured and risk-based approach at SunRay, Denham took total control of the board.[9] Scott explains:

> "We put in a process for funding projects and financing G&A expenses once requested by SunRay management. Both G&A budget and project funding requests had to be approved by Denham's investment committee (IC) in two steps—first as an 'introduction' of the request and second as a 'vote' or approval of the request. This structure forced the business development team to act less opportunistically and to apply more controls to the planning and budget. Not to hold up the process from SunRay's perspective, formal IC meetings were held weekly, and requests could be turned around very quickly for short-fuse business opportunities. When SunRay wanted to purchase a piece of land, for example, its finance team prepared the documents for discussion, including the details of the permit, and identification of the EPC provider and potential financiers."

The financial firepower provided by private equity proved more than sufficient for SunRay to roll out its business plan, recruit top-quality people, and build relationships with its suppliers.

MONTALTO DI CASTRO: BUILDING THE LARGEST SOLAR POWER PARK IN EUROPE

Getting the local community involved

SunRay used a grassroots approach to entering markets, working closely with local authorities and communities. Giora Salita, a long-time manager at several of Yoram's businesses had joined to run SunRay's operations. Giora hired regional local teams that understood the local environment and knew the basics of solar PV. Away from his home in London, he spent most of his time in the field screening sites and co-development opportunities. He introduced analytical tools and processes to efficiently advance new opportunities and compile a continuously updated map of field intelligence for manage-

9. The board consisted of three representatives from Denham (Scott, Louis, and Todd Bright) and two from SunRay.

ment in London. SunRay later applied these scalable project development techniques in other countries and considered them some of its main competitive advantages and differentiators.

Giora explains how SunRay managed to scale its business in multiple countries in parallel:

> "It doesn't matter how smart you are, how charismatic you are, it's an intelligence gathering, information process. and deep pockets business. Our local managers have to be there in the trenches 24/7 gathering and processing vast amounts of information. Every single day we are in the office is a waste of time. In the morning you option the land, in the evenings you dine with businessmen, decision-makers, to get market intelligence. When you manage a campaign, you double-check, day in day out, because these deals can disappear overnight and one small mistake can kill millions. People are the core of any business but particularly of this one. They need to be very fast and ultra-diligent at the same time."

The first book Giora gave his newly hired Italian managers to read was *Alexander the Great's Art of Strategy* by Partha Bose (Gotham Books, 2003). The techniques used by Alexander to move quickly and establish a vast empire set SunRay's strategy on how to engage and eventually team up with third parties, how to set up offices close to the decision makers, and how to hire reliable employees. SunRay needed self-sufficient streetwise negotiators who could be trusted, and sought to retain them with attractive performance-related incentive packages. Giora summarizes: "There is nothing complicated about what we did. It is all about people relationships, integrity, and accountability. Down to basics."

The team found a very suitable piece of land close to the electricity grid in the northern part of the region of Lazio, near Montalto di Castro and the Alto Lazio nuclear plant, which was 70% built but never used after a national referendum in 1987 prohibited nuclear generation in Italy. At the heart of the business strategy was a genuine working partnership with the local community, which would benefit in several ways; a state-of-the-art renewable energy installation would improve the image of the town and its surroundings and SunRay had committed to recruit half the construction and maintenance workforce locally and to contribute a stated share of its electricity revenues towards the construction of local hospitals and schools. Furthermore, SunRay would build a permanent visitor center at the project, allowing visitors to view the plant and the control room and learn about the project, its benefits, and solar power and renewable energy, in general. The facilities would be able to accommodate as many as 100–150 visitors at a time.

On August 4, 2008 SunRay received the exciting news that the *autorizzazione unica* permit for a 24 MW solar PV installation in Montalto di Castro had been approved. With the permit in hand, SunRay faced two more important milestones: finding a supplier and contractor to build the park and a bank to provide the debt finance.

Finding a supplier

SunRay faced a significant challenge in finding a good supplier of modules and an EPC. Many candidates had a limited understanding of solar PV technology and negotiations were difficult because demand from the Spanish market was strong at the time.

Solar modules were at a premium due to a global shortage of silicon, rooted in the 2000 semiconductor bubble. During the boom, manufacturers committed to multibillion dollar capacity expansions, which they were unable to use once the semiconductor market collapsed. As the manufacturers were reluctant to build new capacity and it took 2–3 years to build a new factory, it was not until 2009–2010 that supply met demand (Exhibit 27.9 shows polysilicon projections for 2007–2012).

In 2007, manufacturers of solar modules were clearly in the driver's seat. The industry, dominated by about 20 companies, was running at capacity and making fantastic margins. Polysilicon was in short supply, solar modules were pre-sold, and the average lead time was 18 months from order to delivery.

SunRay had started attending trade fairs to build its credibility, become familiar with the latest technology, and meet the top suppliers. One such supplier was SunPower, a top-tier manufacturer based in California with its own EPC division. It was considered the "Rolls Royce" of the solar industry and offered SunRay not just solar modules, but also credibility in the eyes of potential providers of project finance.

SunRay and SunPower verbally agreed an EPC price for Montalto di Castro Phase I (24 MW), but the crash of the Spanish solar PV market in late 2008 sharply reduced module prices. The reduction amounted to a staggering EUR400,000 per MW or EUR9.6mn for all of Phase I. Under the extreme market circumstances and in the absence of a contract, SunPower were perplexed when Yoram did not renegotiate a more realistic price. In part it was his commodity background, where your word is your commitment, and perhaps he also counted on a larger contract for the additional 60 MW of Montalto di Castro Phases II and III. Still, without a fully signed EPC contract, SunPower started building in February 2009. This was a sign to Lazio and other regional Italian communities that SunRay was delivering on its promises.

Project finance: Securing the money and the project

In parallel, SunRay had to secure project financing for Montalto di Castro, but time was against them. On September 15, 2008 Lehman Brothers filed for bankruptcy, sending global financial markets into meltdown, and freezing the supply of debt. As the firm realized that it would be extremely difficult to raise debt finance in the credit crunch, they hired Tim Corfield from Deutsche Bank, where he was responsible for debt financing for solar projects in Spain.

Tim assembled a team of current SunRay employees, retained outside consultants to help build an extremely detailed project finance model of the Montalto di Castro project, and put significant efforts into creating a formal information memorandum for the project. After Lehman, not a single bank wanted to engage with SunRay, and Tim realized that solar PV was fairly new to most banks. "SunRay only had one chance to present a compelling business case and we made it rather a good one," he told the management. The information memorandum set out extensive information regarding the project, SunRay, Denham, suppliers, and contractors, and SunRay hired a top-tier advisory team to boost its credibility.[10] In November 2008 SunRay went on a roadshow to meet 10 different banks, and in February 2009, together with Denham, decided on the banking group.[11]

10. Allen & Overy, Fichtner, and Deloitte.

11. The mandated lead arrangers were Banca Infrastrutture, Innovazione e Sviluppo, Société Générale, and WestLB AG, with SACE, the leading Italian credit insurer, participating as partial guarantor of the Société Générale tranche.

While project finance was being discussed, Denham's investment committee and SunRay's management team had to make a difficult decision. The construction schedule of Montalto di Castro was well behind schedule, because the bank group had delayed its decision due to the negative financial climate and the group's unfamiliarity with solar PV. The profitability of the project depended on the extremely favorable feed-in tariffs available only if it was connected to the grid before the end of 2009. If SunRay wanted to finalize the construction by the end of 2009, the EPC contractor had to start immediately. SunPower was already committed to the project and offered SunRay a 30-day credit facility. Tim Corfield explains:

> "It was a very stressful time and however much you push the bankers, they do what they want to do. You cannot force them because in the end you are borrowing 80 to 85% of the funds, the vast majority of the money."

By August 2009, the project schedule and projected financial returns were in jeopardy. SunPower had signed the contract for pre-construction work 3 months earlier, had commenced construction, and thus had committed a significant amount of money, which it might lose if construction were stopped. Fortunately, the interests of SunPower, SunRay. and Denham were aligned.

SunPower agreed to continue construction and granted more generous payment terms. In exchange it required the right to take possession of the park if financing did not materialize and a "no-shop" period during which it could obtain information about SunRay's business with a view to an acquisition.

This deal saved the Montalto di Castro project. The bank group finally approved EUR120mn of project finance for Phase I in September 2009—the biggest solar PV project finance deal in Europe in 2009.[12] More important, the ability of SunRay—a new company without a track record—to secure project finance during a credit crisis reaffirmed that the project counts—not just the sponsor's balance sheet. With bank funding secured, the park was completed and connected to the electricity grid well before the December 2009 deadline for securing the higher Italian feed-in tariff.

THE DECISION TO EXIT

As its business matured, SunRay required a more efficient capital structure to accommodate its reduced risk profile. Private equity had been an effective source of capital to expand the company (buying land, the permitting process, supporting business development) but was not ideal to fund recoverable assets (the construction of PV solar parks). SunRay estimated that it would have to pre-fund up to 25% of the entire cost of each project with equity capital before funding with project finance. With a weak project finance market, SunRay would eventually need to sell operating PV parks in part or in full to realize the returns that were expected.

However, for an eventual IPO to yield the maximum value, SunRay would need to own operating assets as well as its strong pipeline of projects, which would require far larger capital injections by Denham. It seemed that the company needed access to a large permanent balance sheet, such as that of an established corporate player, to best equip it to take a further leap and build a large portfolio of solar assets.

SunPower had supported the Montalto di Castro project throughout, and SunRay's management team had shown itself capable of delivering on its promises. Finally,

12. In February 2010 *Project Finance* magazine recognized SunRay's financing as the 2009 European Solar Deal of the Year.

Yoram received the call he had anticipated for quite a while. The President of SunPower asked if SunRay was for sale; but, only when he mentioned an indicative bid price of USD300mn did SunRay and Denham believe that his interest was serious. The 1,200 MW pipeline of solar projects that SunRay had built up over 3 years appealed to the module manufacturer and would fit perfectly in its vertical integration strategy. SunPower was not looking to own the parks it developed, but could sell completed parks to fund new projects, recognizing revenue from module sales along the way.

It was SunRay's annual gathering in Rome, with the entire management rank in attendance and where SunPower's top brass were invited to join. Chaired by SunPower's president, SunRay's managers and country heads presented in turn, brainstormed, and strategized the "day after". A new partnership was formed with Via del Babuino as a backdrop. In his taxi to the airport after the meetings, Yoram reflected on SunRay's brief but eventual life and the challenges still ahead of him.

On February 11, 2010 SunPower announced the signing of a definitive agreement to acquire SunRay Renewable Energy. By that time SunRay had a staff of 70, operating from offices in seven countries, all of whom became new employees of SunPower. Exhibit 27.10 shows the timeline of SunRay from the founding of the company till the exit.

SUNRAY'S SPIRIT STILL ALIVE

Back in the Tel Aviv office, Yael juggled her routine work and the immense paperwork for an acquisition by a publicly listed U.S. company. Although SunRay was about to be acquired, the management team continued looking for new and creative ways to finance its business,[13] and opportunities to expand it with additional focus on Israel and elsewhere.

While Israel was a pioneer in clean technology, it trailed in the number of active installations. The country was heavily dependent on imports of oil and coal and, although enormous offshore gas reserves were recently discovered, the government set a goal to diversify its energy mix to include 10% from renewable sources. With an average of 2,000 hours of sunshine per year, solar power seemed the best way to achieve this goal.

Recalling the painful experience of missing the train in Spain, SunRay decided not only to enter Israel before it had passed any legislation, but to help shape it. The company has been sharing the lessons from its experience throughout Europe to promote a liberal and well-considered legislative framework. Led by a committed CEO with energy sector expertise and backed by the company's extensive international skills and experience, SunRay, now part of SunPower, should be well positioned to develop solar PV in the home country of its founders, writing a new chapter for a venture that was shaped in the corridors of London Business School.

13. "SunPower planning to sell bonds for Italy's largest solar park," Bloomberg, October 26, 2010 *http://www.bloomberg.com/news/2010-10-26/sunpower-planning-to-sell-bonds-for-italy-s-largest-solar-park.html*

APPENDIX

EXHIBIT 27.1

SOLAR PV GLOSSARY

Array Linked collection of PV modules.

Base load The average amount of electric power that a utility must supply in any period.

Capacity The total number of ampere-hours that can be withdrawn from a fully charged battery at a specified discharge rate and temperature.

Crystalline silicon A type of PV cell made from a single crystal or polycrystalline slice of silicon.

Efficiency The ratio of output power (or energy) to input power (or energy), expressed as a percentage.

Electrical grid An integrated system of electricity distribution, usually covering a large area.

Incident light Light that shines onto the face of a solar cell or module.

Irradiation The solar radiation incident on an area over time. Equivalent to energy and usually expressed in kilowatt-hours per square meter.

Inverter (power conditioning unit or power conditioning system) In a PV system, an inverter converts DC power from the PV array/battery to AC power compatible with the utility and a.c. loads.

Joule (J) Unit of energy equal to 1/3,600 kilowatt-hours.

Module The smallest replaceable unit in a PV array. An integral encapsulated unit containing a number of interconnected solar cells.

N-type silicon Silicon material that has been doped with a material that has more electrons in its atomic structure than silicon.

One-axis tracking A system capable of rotating the PV module about one axis.

Panel A designation for a number of PV modules assembled in a single mechanical frame.

Peak load The maximum load demand on a system.

Peak sun hours The equivalent number of hours per day when solar irradiance averages 1,000 W/m^2. For example, 6 peak sun hours means that the energy received during total daylight hours equals the energy that would have been received had the irradiance for 6 hours been 1,000 W/m^2.

Peak watt (Wp) The amount of power a PV module will produce under standard test conditions (normally 1,000 W/m^2 and 25°C cell temperature).

Photovoltaic system An installation of PV modules and other components designed to produce power from sunlight and meet the power demand for a designated load.

Polycrystalline silicon A material used to make PV cells which consist of many crystals as contrasted with single-crystal silicon.

Substation A subsidiary station of an electricity generation, transmission, and distribution system where voltage is transformed from high to low or the reverse using transformers.

Transformer Converts the generator's low-voltage electricity to higher voltage levels for transmission to the load center, such as a city or factory.

Two-axis tracking A system capable of rotating independently about two axes (e.g., vertical and horizontal).

Wafer A thin sheet of semiconductor material made by mechanically sawing it from a single-crystal or multi-crystal ingot or casting

Zenith angle The angle between directly overhead and the line intersecting the sun; (90°—zenith) is the elevation angle of the sun above the horizon.

Source: http://www.pvresources.com/en/glossary.php

EXHIBIT 27.2

MAJOR WORLDWIDE RENEWABLE ENERGY TECHNOLOGIES IN 2007

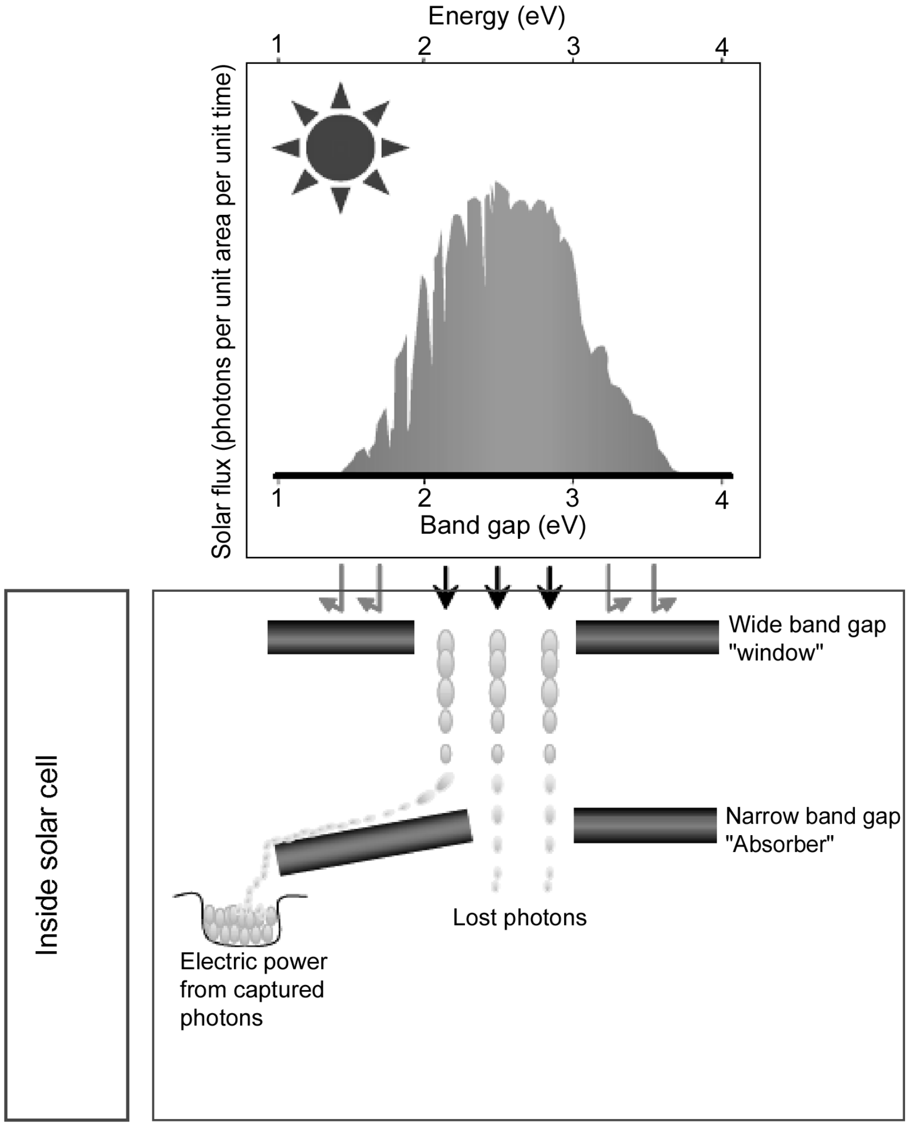
		Market size 2007	Forecast growth rates	Value Chain stages	Top companies
Mature, commercial technologies	Wind energy	74,000 MW $23bn sales	15% to 20%	Turbines, gearboxes & generators	Vestas, GE Wind, Enercon (GE), Gamesa, Suzion
	Solar Energy – Silicon Manufacturing	35,000 tons $6bn sales	30% to 35%	Silane gas, silicon production, ingots and wafer sawing	Shin-Etsu, MEMC, REC, Wacker Chemie, Tokuyama
	Solar Energy – Solar Cells and Modules	$18bn sales	15% to 20%	Solar panels, accessories, system installation	Sharp, Sanyo, Kyocera, SolarWInd, Suntech, SunPower, First Solar
	Biomass	$20bn sales	20% to 30%	Feedstock, biofuel production, distribution	Novozymes, Verbio, Biopetrol Industries, Nova Biosource
	Geothermal	<$1bn equipment sales	5% to 10%	Non-electric "Direct Heat", steam generation	Ormat, WFI Industries
Immature technologies	Fuel Cells	$1bn sales			Ballard Power, Medis Technologies, Fuelcell Energy
	Tidal / Wave power	Effectively pre-revenue			Ocean Power Technology

Source: Global Wind Energy Council, Photon International, Geothermal Industry Association, and the National Renewable Energy Council.

EXHIBIT 27.3

BASICS OF SOLAR CELL TECHNOLOGIES

The upper graph shows how energy is present in sunlight, distributed across a range of energy levels. The lower portion of the diagram shows in stylized form how a solar cell works. The simplest solar cell structure is based on a pair of complementary semiconductor materials in which each one has a "band gap" within which photons of light knock electrons loose. These electrons can then be captured. Engineers can "mix and match" different pairs of materials into combinations of cells that capture energy from complementary portions of the available spectrum.



Source: Nomura, based on research material from Lawrence Berkeley National Laboratory, U.S.A.

EXHIBIT 27.4

A COMPARISON OF ALTERNATIVE SOLAR PV TECHNOLOGY SOLUTIONS IN 2007

	Technology "sub-flavours"	Typical efficiency	Manufacturing maturity	Commercial record
Crystalline silicon (poly- and mono-)	Single junction, multi- and mono- crystalline	13% to 15%*	Proven technology, scales well, accepted by customers, requires lots of silicon	Dominant technoloy (over 90% of the market)
	Heterojunction amorphous silicon on thin crystalline wafers	13% to 15%	Proven technology, good temperature gradient	
Thin film solar cells	Amorphous silicon (a-Si)	6.5%	a-Si is fully proven. Multiple other competing thin film technologies not yet proven in scale (Cadmium Telluride the closest). These technologies either use no silicon or less than 1% as much as crystalline silicon technology.	Under 10% of the market but immense R&D effort re-invigorated by demand boom and limited silicon supplies
	Micromorph (tandem junction)	10%		
	CIS/CIGS chalopyrite	10%		
	Cadmium Telluride	10%		
Next generation solutions	Dye-sensitised cells		Still at research stage. Basic physics not yet well understood. At least 5 years to full scale production	Scarcely visible on the market, but R&D continues
	Polymer based cells			

* Efficiency goes up to 19% for high efficiency back contact modules

Source: SunRay documentation.

EXHIBIT 27.5

CONFIGURATION OF MONTALTO DI CASTRO SOLAR PV PARK

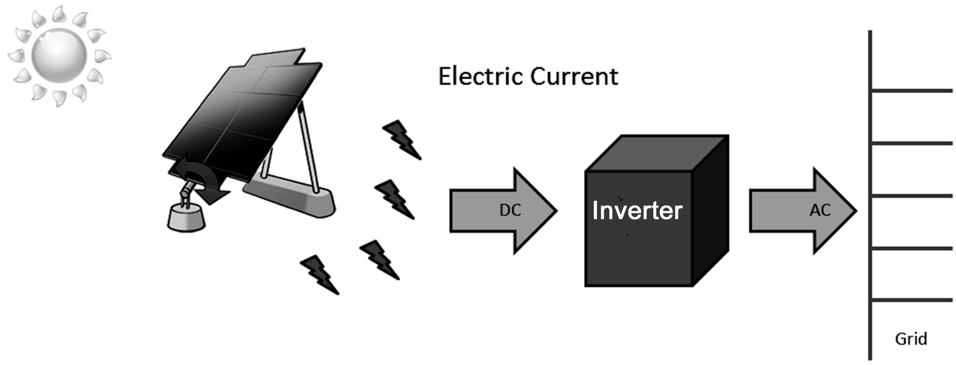


EXHIBIT 27.6

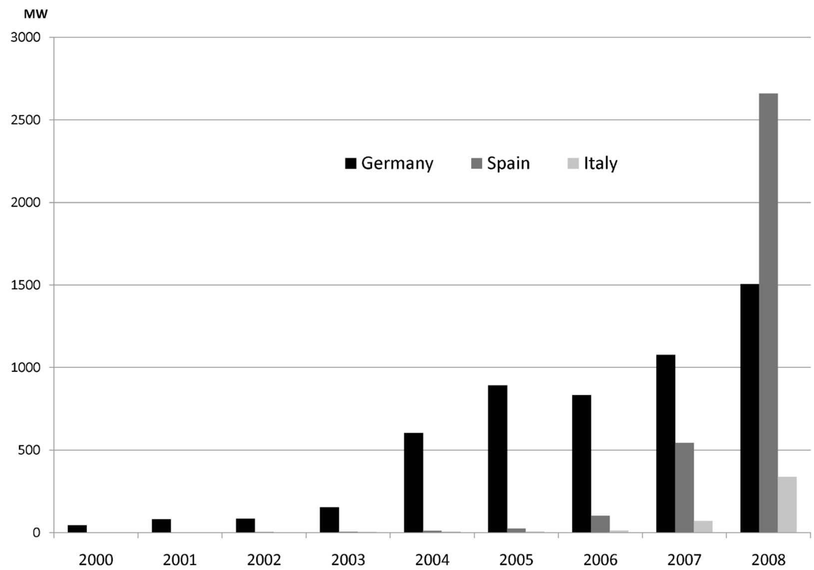
INCENTIVE PROGRAMS FOR THE MAIN EUROPEAN SOLAR PV MARKETS IN 2007

	Germany	Spain	Italy	Greece	Portugal
Peak sun hours (kWh/year)	887	1,430	1,282	1,381	1,413
Solar feed-in tariff (€/kWh)	0.59	0.44	0.49	0.4	0.317
Duration of feed-in tariff (years)	20	25	20	20	25

Source: International Energy Agency, PVGIS utility.

EXHIBIT 27.7

ANNUAL INSTALLED SOLAR PV POWER IN GERMANY, SPAIN, AND ITALY BETWEEN 2000 AND 2008

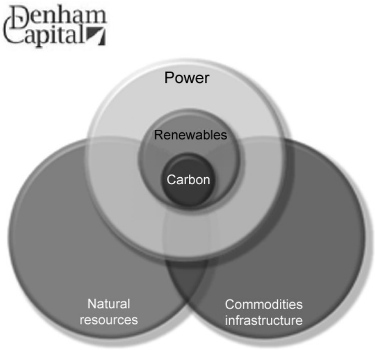


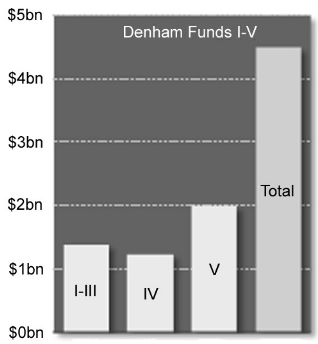
Source: International Energy Agency.

EXHIBIT 27.8

PROFILE OF DENHAM CAPITAL MANAGEMENT AS OF MAY 2008

Denham is a global private equity firm that invests in commodities, energy, and natural resources. As of May 2008, Denham had over USD4.25bn in assets under management and had committed approximately USD2bn of capital to 33 portfolio companies worldwide.





Selected Denham Investments

Natural Resources		*Power & Carbon*		*Energy Infrastructure*	
Alta Mesa Resources	Oil & Gas	StormFisher Biogas	Biogas	Greene's Energy Group	Oil services
C&C Energy	Oil & Gas	RED	Waste to energy	Tanner Companies	Oil construction
Trinity Coal	Coal	GNPower	Coal fired power	NGL	Gas storage & distribution
	Oil sands	NovusEnergy	Biomass	GAO	Oil refining
	Coal	Prometheus energy	LNG	Galveston LNG Inc.	LNG terminal & marketing
Midway United	Wood	SunRay Renewable Energy	Solar PV	Freebird	Gas storage

Source: Internal Denham Capital documentation (2008).

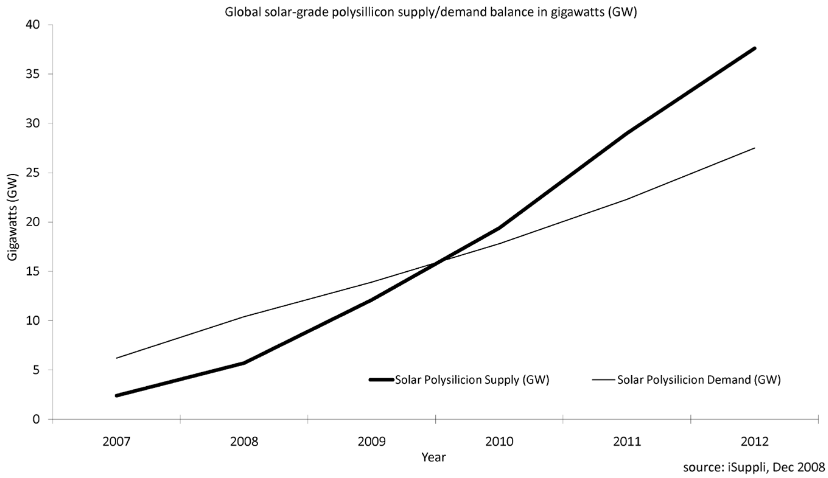
EXHIBIT 27.9

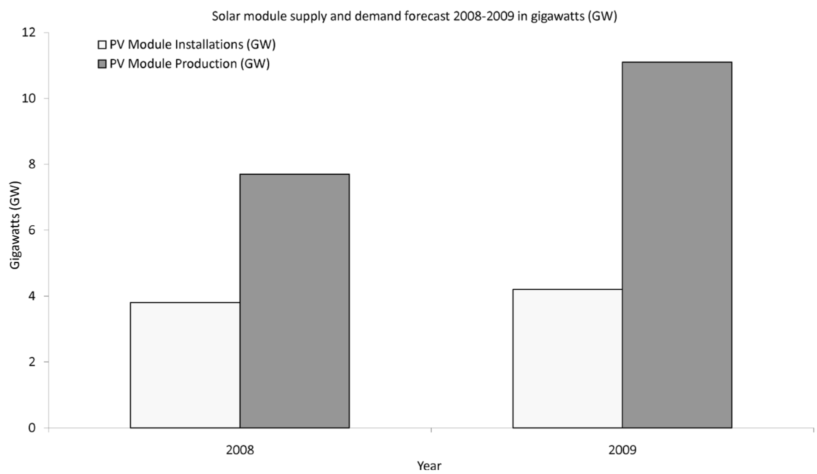
POLYSILICON PROJECTIONS IN 2007 THROUGH 2012

The increase in production of polysilicon, cells, and modules resulted in decreased prices across the supply chain. The global economic downturn and restricted access to capital was projected to limit the growth in PV installations to 4.2 GW in 2009, a year-on-year growth of only 10%. The corresponding figure for 2007 was 40%, while 2008 saw installation growth of 50%. iSuppli forecast a return in 2010 of the high growth rates that the industry had come to expect, boasting over 6 GW of installed capacity and showing potential for 10 GW in 2012. However, overcapacity was going to become a major problem for the industry.

Polysilicon production was projected to reach 100,000 Mt, or 12 GW, in 2009. Planned polysilicon capacity expansions saw that figure climb to over 250,000 Mt by 2012, or approximately 38 GW. The 2008 polysilicon price peak saw the cost reach approximately USD400 per kilogram, but this figure was expected to fall to an average of USD250/kg in 2009. Prices were forecast to fall to below USD150/kg in 2010, below USD100/kg in 2011, and below USD50/kg in 2012. At these low selling prices, it would be survival of the fittest, with only the most cost-efficient polysilicon producers being able to sell above cost.

A further problem was the vast discrepancy between PV module production and installations which resulted in module production reaching approximately 11 GW in 2009, compared with installations of 4.2 GW. Overcapacity in module production would exceed 160% in 2009.

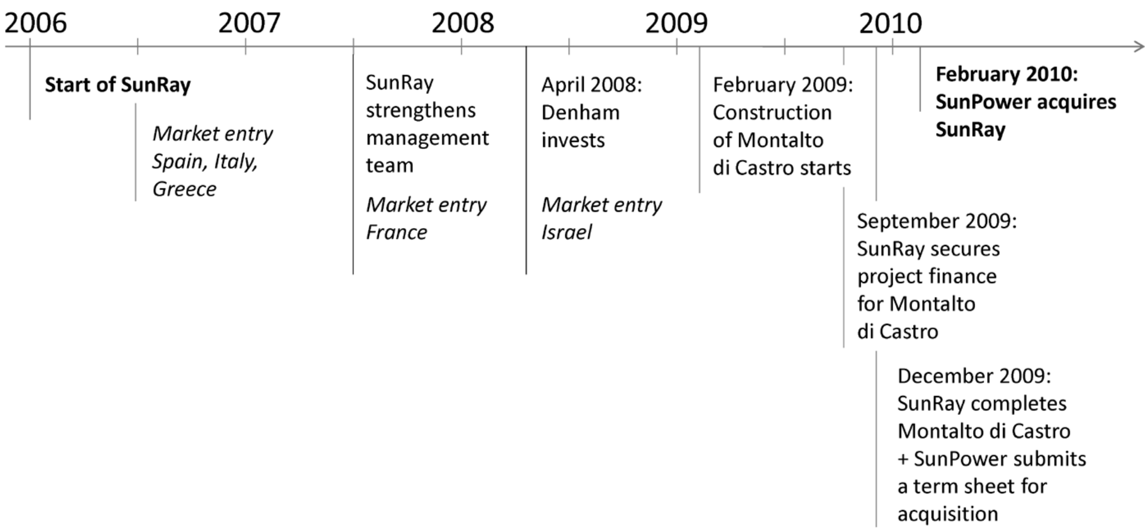




Source: iSuppli, 2009.

EXHIBIT 27.10

SUNRAY TIMELINE



Source: Internal SunRay documentation.