A Work Project, presented as part of the requirements for the Award of a Masters Degree in Finance from the Nova – School of Business and Economics.

FINANCING THE ALENTEJO SOLAR POWER PLANT – A CASE STUDY

ANTÓNIO MIGUEL SOUSA NASCIMENTO BERNARDO | #669

A Project carried out on the Finance Area, under the supervision of:

Prof. Mariana Abrantes de Sousa

JUNE 2015

General Overview

This document presents a Case Study of financing a solar power plant under a project finance scheme, allowing students to negotiate the loan proposal outside of class. On one side of the negotiating table students can assume the role of the project's manager, Ana Luz, and on the other the role of the lender, represented by its head of project finance Carlos Abrantes. The Case is divided in three parts: one common narrative and two independent sub-narratives to be assumed respectively by different groups of students. Each sub-narrative includes a set of confidential information that will be useful in a subsequent negotiation process among students. The last section of this document provides a Teaching Note presenting a summary of the case description and guideline for the negotiation exercise to be completed before class. In addition, a suggested roadmap for class discussion as well as a set of questions is presented in the Teaching Note. An Excel file with the Financial Model is attached to this document to support the simulation of the negotiations.

Keywords: photovoltaic, project finance, financial feasibility, renewable energy, debt service, cash sweep;

Acknowledgements

I owe my deepest gratitude to a number of people without whom this thesis would not be possible. It is a pleasure to thank my advisor, Professor Mariana Abrantes de Sousa, who was always available to guide me through this period with valuable insights and helpful comments during the process of writing the Case Study. My sincere thanks also goes to Mr. Diogo Ramalho and Mr. João Hipólito da Silva for helping me develop the idea for this Case Study and providing me a great internship experience. I am grateful to Mr. José Caldeira for useful insight in practical aspects of project finance and valuable pointers along the way. I want to acknowledge the input given by Professor Luís Almeida Costa about the main approaches to negotiation. I am indebted to my colleagues Diogo Rebelo, Marta Santos, Ricardo Gomes and Rita Laíns that helped me and struggled alongside me as well as to my work colleagues who made their help available to me in so many ways. Last, but definitely not the least, I must be grateful to my family and girlfriend unconditional and indispensable support.

Author: António Bernardo
Advisor: Professor Mariana Abrantes de Sousa

Financing the Alentejo Solar Power Plant (A)

In her Lisbon office in December 2014, Ana Luz, project manager at Sun Ventures, was about to receive an email from Carlos Abrantes, head of project finance at Banco Lusitano de Investimento (BLI). The email would present BLI's proposed term sheet for funding the development and construction costs of a solar power plant located in Alentejo – the Solentejo project. Assuming that BLI sends a proposal which warrants further discussion, Ana will schedule a second meeting with Carlos for face-to-face negotiations.

Background

Ana Luz was seeking financing for a 20 megawatt (MW) solar plant located in the Alentejo region of Portugal. In their first meeting at Sun Ventures headquarters, Ana presented the initiative, explaining its scope and the contractual structure, as well as the financial model with the expected drivers of return and funding needs. On the other side of the table, Carlos gave an overview of the relevant financial market conditions and debt structuring issues underlying the project finance scheme for solar projects.

At the end, after both having exchanged first impressions and clarified some doubts, Carlos concluded:

> *Thank you for inviting us to analyze this opportunity. Over the next couple of days, my team and I are going to make a preliminary valuation of the financial feasibility of this project and we will prepare a preliminary loan term sheet to email you, as soon as possible. In the meanwhile, don't hesitate to contact us in case you have further questions.*

The Solar Project

In 2012, Sun Ventures purchased a license of 20 MW from a competitor. This license originally granted by the Portuguese Government, qualifies the licensee to connect solar plants to the Portuguese electric grid under a long term power purchase agreement (PPA)[1]. Since then, Ana Luz has started the project development process: securing appropriate land, going through the construction licensing process and defining the contractual structure, including the procurement of the EPC (Engineering, Procurement and Construction) and the O&M (Operation and Maintenance) contractors.

Site Selection

The solar plant will be located in Alentejo region, close to the border with Spain (see **Exhibit 1**). Known as one of the sunniest places in Portugal and in Europe, Alentejo has an average Direct Normal

[1] This PPA was launched through a competitive public solar auction by the Portuguese State in 2010. Participants in this auction submitted a bid with a price per unit of electricity at which they were able to implement the project. Then, the government evaluated the offers on the basis of the price and other criteria and signed a power purchasing agreement with the bidder that submitted the highest price per unit of electricity.

Irradiation (DNI)[2] of 2,000 kwh/sqm per year, making it a natural choice for the site of a solar plant with a single-axis tracking system[3].

The land selection had been constrained by the need to avoid protected or agricultural areas, since it is located in the main agricultural region of Portugal. After a long search process, including more than 15 visits to different potential places[4] and a few rounds of negotiations with landowners, Ana signed a promissory contract[5] with one local farmer in exchange for an annual rent of Eur 1,200 per hectare (ha), indexed to inflation, for an available area of 76 ha. This contract will take the form of 25 years surface right agreements starting at construction and includes the option to increase the contract duration by at least 5 years up to 30 years.

Licensing process

Once the land was secured, Ana initiated the licensing procedure simultaneously with the Directorate General for Energy and Geology (DGEG) and the Portuguese electricity distribution network operator (EDP). From DGEG Ana obtained the 'Production License' – the authorization for the production of electrical energy – and received the 'Grid Reception point' from EDP – the document disclosing the point where the power produced by the solar plant is going to be injected in the national electrical grid. Then, the licensing was arranged at the municipal level and at the central level (Ministry of Environment), upon which the project was subject to an environmental impact assessment, namely whether it was located in protected or agricultural areas. Once this assessment was completed, Ana obtained a construction permit from the Alentejo Municipality. After a long and time-consuming bureaucratic process, Ana finally got the required licenses to start construction of the solar plant.

Contractual Structure

To take on the project, Ana Luz set up Solentejo, Lda (Solentejo) as a separately incorporated special-purpose vehicle, which then contracted with various counterparties for the different services required to get the project off the ground. The key players in the structure were:

- ***The Sponsor***: Sun Ventures has been the only sponsor who has funded the license purchase and all the development costs up-front for the time being as equity.
- ***EPC contractor***: EPC was subcontracted to BuildSun, a Sun Ventures's sister company, to design and construct the solar plant and its associated infrastructure, as well as commissioning under a

[2] DNI corresponds to the amount of solar radiation received per unit area by a surface that is always held perpendicular to the rays that come in a straight line from the sun at its current position in the sky.

[3] Solar tracker systems follow the sun throughout the day to minimize the angle of incidence between the incoming sun rays and a photovoltaic panel in order to maximize energy output.

[4] The distance to electricity grid access point (substation) and the slope of the land surface were additional criteria taken into consideration by Ana Luz in the search for potential places to establish the solar plant.

[5] The first stage in buying a property in Portugal is usually the signing of a promissory contract (in Portuguese: *contrato de promessa de compra e venda)*, which sets out the details of the contract such as the identity of the owner, a detailed description of the property and land boundaries, registration and tax numbers, purchase price, deposit and date of the final sale by public deed (in Portuguese: *escritura pública)*.

fixed time and a fixed price contract. BuildSun mastered the required expertise to build and operate solar plants (engineering design, integration/installation, operations) and was composed by a qualified team with 10 years of experience in solar studies. Solar modules and the remaining required components are going to be supplied and guaranteed by First Solar, BuildSun's long-standing supplier partner, who has a proven technology with over 10 gigawatts (GW) installed worldwide (**Exhibit 2** includes a brief description of First Solar and its technology). The resulting basic terms of the EPC contract are mainly comprised of:

Construction period	*Performance Bond*[6]	*Liquidated Damages*[7]	*Warranty of PR*[8]	*Price*	*Payment Schedule*
7 months and 0.15% penalty per week of delay.	10% of the price until final acceptance certificate.	Until a maximum of 15% of the price.	2% of the Price for each 1% shortfall of the PR for the first 2 years after commissioning[9].	Eur 25.2 million	10% at contract signature. 75% split in 3 milestones during construction. 5% Provisional acceptance[10] 10% Final acceptance[11].

- ***O&M contractor***: O&M was subcontracted to BuildSun Ventures, a joint venture between Sun Ventures (65%) and BuildSun (35%), which would assume full operation and maintenance services[12] with a set of specific guarantees to ensure i) a 99% annual availability[13] and ii) penalties to compensate for the profit losses. This contract was signed for an initial period of 10 years with automatic yearly renewals until year 20 under the same terms and conditions, but subject to the approval of financing institutions.
- ***Energias de Portugal (EDP)***: EDP, the Portuguese electricity operator holding an exclusive concession granted by the Portuguese State, will be responsible for paying the energy injected by Solentejo into the national grid[14].

[6] A performance bond guarantees a full and successful implementation of the contract according to pre-specified performance guidelines.

[7] The Liquidated Damages covers potential costs of construction delays or performance shortfalls, including debt service to bond holders.

[8] The performance ratio (PR) is a measure of the quality of a photovoltaic plant, independent of location. The PR is stated as a percentage and describes the relationship between the actual and theoretical energy outputs of the PV plant. It thus shows the proportion of the energy that is actually available to export to the grid after the deduction of energy loss (e.g. due to thermal losses and conduction losses) and of energy consumption for operation.

[9] A test of the project's ability to perform as planned and generates the expected cash flows.

[10] Document issued by an independent engineer after the first phase of plant testing (commissioning) certifying that pre-established minimum performance standards have been met.

[11] Document issued by an independent engineer when initial plant testing (commissioning) is complete. Once the final acceptance certificate is issued, the SPV takes charge of the plant.

[12] The O&M terms and conditions include a long-term involvement and responsibility of contractor for full O&M services including: preventive maintenance; supply and installation of spare parts; corrective maintenance; operation of the plant; cleaning of the plant; preventive and corrective maintenance of the civil works and fences; grass cutting; system-monitoring and reporting; technical report elaboration; and security and surveillance services.

[13] The availability of the installation is measured as the time during which it is ready to operate when the radiation conditions are adequate for it to operate.

[14] According to the rating agencies reports, EDP has a stable outlook due to its relevance in the Portuguese electricity market and a low risk profile: S&P: BB+; Moody's: Baa3; Fitch: BBB-. Source: **EDP**. Rating de Crédito. http://www.edp.pt/pt/investidores/financiamento/rating/ (accessed April 26, 2015).

Operation of the solar plant

Expected to be operational by January 2016, the solar plant will be able to generate up to 38,400 MWh per year[15] (based on a P50 scenario[16]) sufficient to power an average of 19,840 households and to displace an estimated 33,234 metric tons of carbon dioxide over the next 25 years. Notice that this power generation may decline over the course of time, due to the degradation of the thin-film solar modules[17].

Due to the 20 MW license, Solentejo benefits from a PPA with a feed-in tariff (FiT) of 148 Eur/MWh (2014 prices), indexed to inflation, applicable to the first 22 GWh per installed MW (or 440,000 MWh) delivered to the grid and subject to a limit of 15 years.

The operating costs refer mainly to the property lease and to the O&M contract set with BuildSun Ventures, in which a fixed annual price of Eur 135,744 was established for the first five years, followed by a fixed annual price of Eur 187,872 from that moment onwards, indexed to inflation.

Financing the project

The Solar plant's total capital requirements were budgeted to be Eur 42.8 million. So far, Sun Ventures, as part of its equity commitment, has financed Eur 14.2 million upon the 20 MW license purchase[18]. Ana Luz is now seeking to fulfill the remaining Eur 28.6 million with debt in order to finance the EPC contract (Eur 25.2 million) and the development fees (Eur 3.4 million)[19].

Background of Sun Ventures

History

Sun Ventures was set up in 2007 as a renewable energy company focused on the development of solar powered projects. The company, headquartered in Lisbon, became successfully positioned in the Iberian Peninsula solar sector and three years later, in 2010, it was acquired by the Green Partners Group, an investment fund with a strong focus on the renewable energy sector. This acquisition allowed Green Partners Group to strategically expand its business to the solar sector, which until then had only been

[15] 38,400 MWh per year is calculated considering an average DNI of 2,000 kwh/m^2, PR of 80%, output capacity of 20 MW and conversion factor of 1.2 (2,000 x 80% x 20 x 1.2 = 38,400 MWh per year). The PR's estimate was based on the value stated in the O&M contract and the conversion factor corresponds to the capacity of the solar inverter to be installed under the First Solar's supply contract. The inverter converts the variable direct current (DC) output of a solar panel into a frequency alternating current (AC) that can be fed into the Portuguese commercial electrical grid.

[16] The P50 scenario corresponds to the average level of annual solar-driven electricity generation that it is forecasted to be exceeded 50% of the year. This is the scenario generally considered for the sponsors' Base Case. Concerning banks, they usually follow a more conservative approach with a bank case based on a P90 scenario, corresponding in this project to 32,256 MWh per year.

[17] The financial model considers a degradation rate of 0.6% per year. However, the estimated range for degradation rates for thin-film panel technologies generally lies between 0.3% and 1.0%. The warranty provided by First Solar guarantees an annual degradation threshold of up to 1% in output during 20 years. Financially speaking, degradation of a panel is very important, because a higher degradation rate translates directly into less power produced and, therefore, reduces future cash flows.

[18] The purchase of this license was fully co-funded by the Green Partners Group – Sun Ventures's parent company.

[19] The development fees (170,000 Eur/MW) are directly paid to Sun Ventures.

focusing in hydropower and wind projects. For Sun Ventures, this marked an important step by greatly strengthening its financial capacity, a key factor to invest in projects and to speed up development.

Recent performance

From 2007 to 2013, Sun Ventures connected 6 photovoltaic (PV) technology plants to the grid, for a total installed capacity of 14 MW of power installed. In 2011, the company sold 2 solar farms with 2 MW each to a private fund. Nowadays, the company owns an operating portfolio of 10 MW, is constructing a new solar plant with an installed capacity of 5 MW (in the South of Spain) and has the current 20 MW solar plant under development in the Alentejo region of Portugal.

Sun Ventures's turnover is essentially driven by the electricity sales of its project companies and the services rendered from its operation and maintenance contracts. **Exhibit 3** includes simplified financial statements of Sun Ventures.

Background of Banco Lusitano de Investimento

History

Banco Lusitano de Investimento is a Portuguese investment bank founded in 1999 as the investment banking arm of the leading local commercial bank Banco Lusitano. This business started in Portugal, but it soon began to expand to Spain, Brazil and Portuguese-speaking African countries.

Throughout its history, the major business line of Banco Lusitano de Investimento was the advisory field. The bank sought to have a broad experience in all segments of the financial advisory services industry and to build a wide reputation – the second best investment bank in 2013 according to the Portuguese League Table[20]. Its strategy was always driven by an ambition to create long-term value investments. In Portugal, the bank gained a strong prominence serving clients in the Financial sector, in the Government sector (involving roads and hospitals) and, recently, in the Renewable Energy sector.

The project finance segment

The Banco Lusitano Group offers its clients a convenient one-stop-shop solution by combining the roles of advisory as well as arranger and ultimate lender of the deal. On the one hand, Banco Lusitano de Investimento provides consultancy services for advisory support during the initial phases of structuring a deal. On the other hand, Banco Lusitano provides arranging and lending services (the financial intermediation), which consist of granting the funds needed for the project based on the feasibility studies prepared (**Exhibit 4** shows the main type of activities offered for each of the two services categories: banking advisory and lending). Furthermore, this integration model is widespread across

[20] The reputation of an investment bank is usually assessed through the number of deals advised and the total amount of funds raised by each deal.

European banking groups, since it provides more cost-competitive solutions[21] – especially advantageous for smaller projects[22], in which cash flows generated during the life of the deal may not be sufficient to absorb structuring costs.

The Portuguese green economy in the European context

> *The energy challenge is one of the greatest tests faced by Europe today. Rising energy prices and increasing dependence on energy imports jeopardize our security and our competitiveness. Key decisions have to be taken to reduce drastically our GHG (GreenHouse Gases) emissions and fight climate change. Thankfully, the 2020 strategy provides a solid and ambitious European framework for energy policy.*
>
> *Günther H. Oettinger,*
> *European Commissioner for Energy (2011)*

In line with the objective underlying the Europe Strategy 2020[23], the Portuguese Government presented, in July 2010, the National Renewable Energy Action Plan (NREAP), committing Portugal to ambitious targets and reforms for the share of renewable energy sources. Portugal undertook to reach, by 2020, the target of 31%[24] of energy obtained from renewable sources in the total amount of energy consumed (**Exhibit 5** shows the evolution of the share of renewable energy sources between 2005 and 2013, as well as a decreasing external dependence). Furthermore, the Government was also engaged in increasing energy efficiency and reducing GHG emissions in order to achieve the targets of the European policies and its own national policy commitments.

Portugal's energy policy options in terms of electricity production give priority of dispatch to renewable energy sources over conventional fossil fuel sources, both in the right to sell the electricity to the national grid and in the licensing processes. Moreover, over the course of recent years, Portugal has created a series of financial and fiscal measures to support investment in renewable energy. Some of these measures have resulted in the creation of differentiated tariffs for electricity produced in renewable plants – feed-in tariffs (FiTs) – according to the degree of maturity of the various technologies available in the national market.

In Portugal and in other EU members states, the production of electricity from renewable energy sources, such as wind and solar, has been mainly promoted through FiTs (**Exhibit 6** compares the average tariffs for wind and solar PV, the ones with higher growth in recent years, in the EU-27 in 2011 with their

[21] With a clear-cut division of the roles services, there are always additional costs concerning the transaction of roles from advisory to that of arranger. Expenses arise when the arranger requires further opinions on specific issues of the legal, fiscal, technical, and administrative documentation before making contact with lenders. In addition, there is an independent and specific fee structure to remunerate both roles, which is usually higher than the single fee structure of the integrated model.

[22] For the Portuguese project financing market, Banco Lusitano de Investimento considers that a small sized project has a financing requirement below Eur 10 M, while a medium sized project has a financing requirement in the range Eur 10 – 40 M.

[23] By 2020, the EU aims to reduce its GHG emissions by 20%, increase the share of renewable energy to at least 20% of consumption, and achieve energy savings of 20% or more.

[24] ***NREAP***. March 2011. "Portugal 2020: National Reform Programme," approved by the Council of Ministers 20 March 2011, Chapter 5 - Sustainable Growth.

long-term marginal generation costs). Although these tariffs enabled the deployment of renewables, in many cases the support systems have proven to be very costly (**Exhibit 7** shows the levelized cost of energy of wind and solar PV in Euros per MWh in Portugal in 2014). At the same time, it has been difficult for regulatory authorities to raise tariffs and prices which would cover those costs. Consequently, since the tariffs for the regulated retail electricity price are set below the corresponding costs borne by the energy companies, electricity tariff deficits have emerged in some countries. Portugal is one of them, where the tariffs paid by EDP to renewable producers are higher than the regulated consumer tariffs established by ERSE[25]. Having already high user tariffs, the resulting financial burden has been borne by EDP. At the end of 2013, the total accumulated tariff deficit of EDP estimated by ERSE was Eur 3.7 billion (2.2% of Portugal's GDP)[26]. In this regard, measures have already been taken by the Portuguese Government to address the electricity tariff deficit and to mitigate it until 2020[27].

In the third quarter of 2014, the Portuguese wholesale electricity market was, along with the Spanish market, among the most expensive ones in the EU (see **Exhibit 8**). The average quarterly base load price in these markets were above 52 Eur/MWh[28].

The promise of the Portuguese Solar sector

After a first wave of hydro energy and a second one of wind energy promotion, the new source of renewable development in Portugal has been via solar energy (**Exhibit 9** and **Exhibit 10** show the evolution of the Portuguese renewable installed capacity in MW and annual production in GWh per technology between 2006 and 2014). Currently, as of 2014, Portugal has an installed solar PV capacity of 421 MW and by 2020 it is expected to have a cumulative installed capacity of 1,000 MW, according to the target set by the Portuguese NREAP (see **Exhibit 11**). From another point of view, the Portuguese Renewable Energy Association's analysis estimated that the PV installed capacity could be much higher and reach 2,000 MW by 2020:

> *We believe that the 1,000 MW estimative is clearly lower when it is compared with the expected 'boom' for the solar PV technologies deployment, driven by decreasing PV technology costs and the increasing PV cell efficiency. There is also a complete omission of the potential to develop solar plants with 5-10 MW capacity close to large consumer centers.*[29]

For a sunny country like Portugal[30] and with no local fossil fuel deposits, investing in solar energy offers the potential to address national concerns over energy dependence on imported fuels – which represent

[25] The Portuguese Energy Services Regulatory Authority.
[26] ***European Commission***. "Electricity Tariff Deficit: Temporary or Permanent Problem in the EU?," October 2014, 30 -32.
[27] ***International Monetary Fund***. "Portugal: Letter of Intent, Memorandum of Economic and Financial Policies, and Technical Memorandum of Understanding," March 28, 2014.
[28] ***European Commission***. "Quarterly report on European Electricity Markets," September 2014, 12.
[29] Adapted from: ***APREN***. "Comentários da APREN à versão final do plano nacional de acção para as energias renováveis," March 2010, 3 (document in Portuguese).
[30] Portugal is one of the Europe's countries with most solar energy exposure, with an average DNI between 1,600 and 2,100 kWh/sqm per year.

a big part of Portugal's external imbalances, contributing to a record high current account deficit of 9.7% of GDP in 2008. The energy trade deficit of EUR 6,232 million in 2013 still amounted to -3.7% of GDP, though down from -4.6% a few years earlier (as depicted in **Exhibit 12**). Reducing energy imports is seen as key to achieve the sustained current account surpluses necessary to repay Portugal's considerable external debt.

Global Project Finance deals

The world of project finance that funds vital infrastructures has been hardly booming. The problem is that the financial crisis has been followed by a bank retrenchment from the field, without non-bank institutions filling the finance gap[31]. The weight of banking can be gauged by its share in global project finance (see **Exhibit 13**). In that context, infrastructure financing by banks has been curtailed as part of a bank deleveraging process which is still in course – prior to the collapse of Lehman Brothers, September 2008, bank loans comprised around 75% of the project finance deals, whereas since then the weight of bank loans has decreased to an average of 65%. This is particularly the case for Portuguese and European banks, which had traditionally played a significant international role in infrastructure financing prior to the global financial crisis. Their balance-sheet repair and capital-ratio adjustment after the onset of the euro-zone crisis have been achieved mainly by retrenchment on the asset side of their balance sheets, by unwinding existing positions and shunning new commitments (see **Exhibit 14**). Such propensity to retrench has been widespread among banks in crisis-afflicted countries, given the higher levels of balance-sheet risk aversion. Remaining uncertainties about the economic recovery, coupled with prospective regulatory changes (e.g. Basel III) penalizing liquidity and maturity mismatches in deposit-taking institutions, have led banks to reduce leverage, to shorten finance terms, and to raise counterparty credit requirements across the board.

The "perfect storm" of increased capital requirements under the Basel III regulations, banking downgrades and Eurozone instability have increased the underlying cost of bank lending, especially for the long term. Recent bank rating downgrades reflect the risks now priced into the banking sector, particularly those exposed to the riskier end of European Government debt. Basel III requires banks to hold more equity capital and capital for long-term loans, increasing the cost of long-term funding, and therefore limiting the credit availability and increasing the pricing of long-term debt[32]. Despite these margin increases, long-term project finance is currently still available and affordable due to falling Euribor rates (see **Exhibit 15** for the evolution of the Euribor 12 month rate on last day of each year from 2005 to 2014).

[31] Non-bank institutions are pension funds, insurance companies, mutual funds and sovereign wealth funds for example.

[32] With Basel III fully implemented by 2019, it is likely that there will be further impacts on costs of bank funding from this legislation in the upcoming years and therefore additional increases in margins and reduced availability of long-term bank debt.

Some figures about asset financing in the renewable energy sector[33]

In the renewable sector there are different ways of asset financing: (i) on-balance-sheet financing of projects by utilities, independent power producers and developers; (ii) non-recourse project finance involving a mixture of bank debt and equity; and (iii) other options such as leasing or bond financing.

For the first time since 2011, there was an increase in 2014 in the value of utility-scale renewable energy – projects larger than 1 MW. The global asset financing jumped 10% from 2013 levels, to $170.7 billion, but still below the peak of $181.2 billion reached in 2011. In 2014, on-balance-sheet financing made up 68% of the total, at $116.3 billion – up from the previous year's $112 billion, but four percentage points smaller as a proportion of the total –, while non-recourse project finance made up a little less than 32% of the total, at $53.9 billion – up from $42 billion and 28% in 2013 (**Exhibit 16** shows the global renewable energy asset finance by type of security).

In 2014, China was the world's largest renewable energy asset finance market, followed by Europe and by the US. Compared to the previous year, China was up 23% to $73 billion, Europe was up 15% to $36.2 billion – but still significantly below the annual figures attained during the 2007-12 period –, while the US was down 25%, amounting to $15.5 billion (see **Exhibit 17**).

A breakdown of 2014's global activity among different technology groups (as shown in **Exhibit 18**) reveals that both wind and solar energy had an increase in asset finance commitments in comparison with the previous year. Wind was up 10% to $92.4 billion and solar was up 15% to $62.8 billion.

Preparing to negotiate

After the first meeting with Carlos, Ana learned of the standardized procedures creditors use when assessing the credit worthiness and bankability of an initial project financing proposal. As Ana awaits the email from BLI, she remembers the project financing pre-requisites Carlos mentioned, which are most likely to become the center of discussion in the forthcoming negotiation, as well as his concerns about financing on a limited recourse basis, namely:

i. Sustainable economics: a clearly identifiable demand for the Project's outputs of goods or services is essential in order to justify the investment and the credit. As a general rule, project finance lenders will not lend money unless there is a stable projected revenue stream and net operational cash flow that can be dedicated entirely for purposes of ensuring repayment of the loans.
ii. Identifiable risks: during the Project's economic life, there are, at least, three phases characterized by distinct risk profiles: the development phase, the construction phase and the operating phase once the project is launched. An unidentified and unmitigated risk in each of these phases could potentially jeopardize the stability of the project. Very often, this risk analysis is combined with a more quantitative analysis to test the project's robustness to adverse changes in the key drivers that determine operating cash flows.

[33] Figures retrieved from ***Bloomberg New Energy Financing***. "Global trends in renewable energy investment," 2015, 50-57.

iii. Political, legal and regulatory environment: the long-term importance of the project to the country, the stability of the legal and regulatory system (i.e., the risk of a potential change in law), the availability of permits and their approval by the local government, as well as the enforceability of contracts and guarantees are vital factors for many project finance transactions taking place.

iv. Strength of sponsors: the sponsors' track record of execution of similar transactions is evaluated as well as the experience in the respective business sectors, along with financial strength, contribution of equity and stand-by equity that might be added in the form of equity or mezzanine finance.

If these elements above are in line with the bank expectations, Ana believes there is common ground to define an acceptable risk profile for the deal, including the proposed leverage, debt size and repayment schedule making the project bankable. Additionally, she also knows that upon meeting these first pre-conditions there will be further discussion on how project lenders will impose operational restrictions, such as the ability to make equity distributions only after the payment of operating expenses, debt service and the requirement to "sweep"[34] a percentage of additional cash flow for debt repayment.

If Ana and Carlos reach an agreement on the arranging mandate under agreed terms and conditions, then BLI will start working on the information memorandum to be presented to other potential lenders and begin negotiations on credit agreement and loan documentation.

At the end of the day, the decision whether to reinvest project cash flows will not be in the hands of Sun Ventures, since it will require the lenders' consent. However, among the available financing solutions, Ana believes the project finance scheme is the most appropriate and widely used in renewable energy projects. Nonetheless, she knows project financing is document-intensive, time-consuming and expensive to consummate, requiring the involvement of a team of advisors from different areas of expertise concerning the legal, technical and insurance aspects[35].

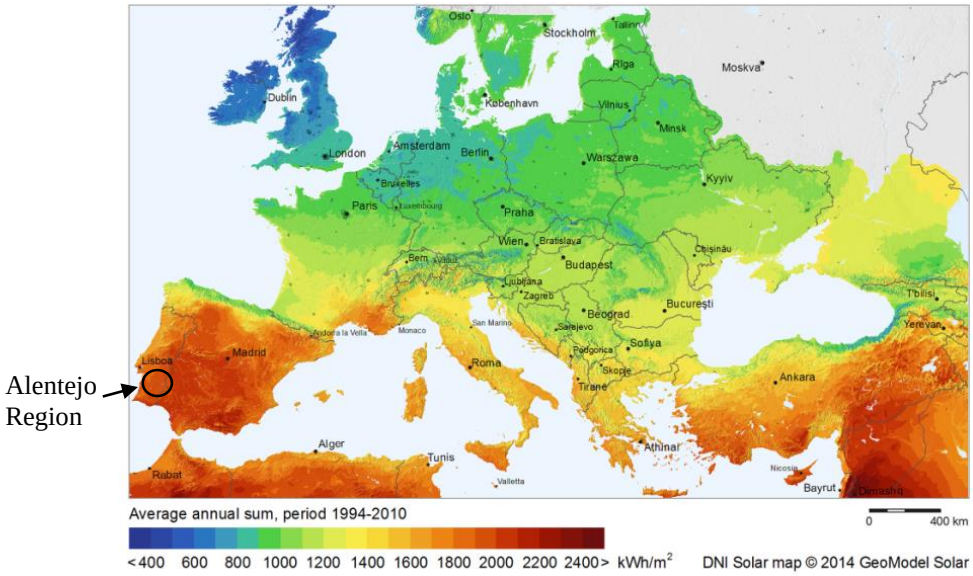
In addition, banks often take different views of the project risks than the sponsors, resulting in the bank's base case, and that is reflected in the terms and conditions they include in their financing proposal. Furthermore, since Sun Ventures has never dealt with Banco Lusitano de Investimento before, Ana is wondering whether Carlos and the bank's Credit Committee have a positive perspective of the Solentejo project on which Ana and the sponsor have been working so hard for so long.

While Ana is sitting in her office wondering about all the terms and conditions that could be embedded in the bank's term sheet, as well as counter offers with which she might respond, a sound from her smartphone disturbs her thoughts and from the screen she can see a new incoming email from Carlos with the subject "Proposed loan term sheet for Solentejo solar plant"...

[34] Sweep is a covenant that requires all or a specified fraction of available cash flow to be used for debt service, including prepayments of principal.

[35] It is not atypical that advisories, lenders, consultants and attorneys' fees for all parties equal several percentage points of the amount of the loan commitment.

Exhibit 1: Annual sum of Direct Normal Irradiation (kWh/sqm), average from 1994 to 2010.



Source: **SolarGIS**. Maps of Direct normal irradiation. http://solargis.info/doc/free-solar-radiation-maps-DNI (accessed April 24, 2015).

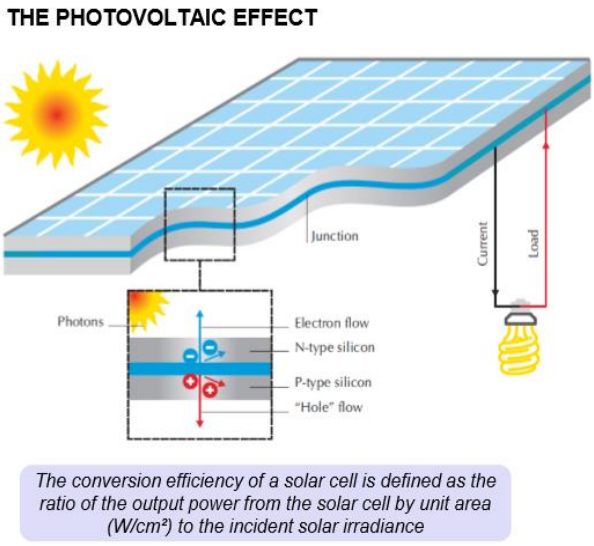
Exhibit 2: First Solar's thin-film technology

2.1 Company description

First Solar is an American company, a leader in the development and manufacture of solar modules. The company, founded in 1999, has its headquarters in Phoenix (Arizona) and has been quoting on the Nasdaq Stock Exchange from November 2006.

Source: **First Solar**. http://www.firstsolar.com/en (accessed April 24, 2015).

2.2 Inside a photovoltaic cell

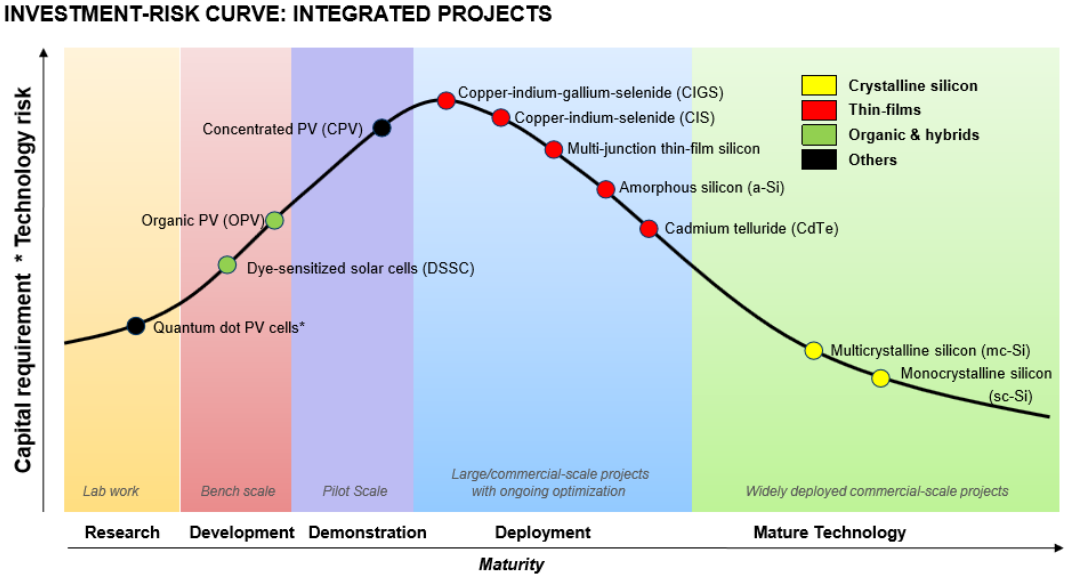


- Light shining onto a semiconductor such as silicon (Si) generates electron-hole pairs.
- Electron-hole pairs are separated spatially by an internal electrical field created by introducing special impurities into the semiconductor.
- This separation creates negative charges on one side of the interface and positive charges on the other side, generating a voltage and direct current (DC) when connected to a load.
- Photovoltaic cells are interconnected to form PV modules with a power capacity of up to several hundred watts. Photovoltaic modules are then combined to form PV systems.
- The unit watt-peak is often used to express the costs or efficiency of Solar PV because the output of a PV cells varies according to solar irradiance and ambient temperature.

Source: ***SBC Energy Institute***. "Solar Photovoltaic Factbook," September, 2013.

2.3 Investment-risk curve for photovoltaic technologies

The various photovoltaic technologies are at different stages of maturity, from laboratory experiments to commercial systems. First Solar will supply solar modules with the Cadmium Telluride (CdTe) thin-film technology to Solentejo.



Source: ***SBC Energy Institute***. "Solar Photovoltaic Factbook," September, 2013.

2.4 Market comparison between crystalline silicon and thin-films technologies (2013)

	Thin-film	***Crystalline silicon***
Efficiency	4 – 17%*	14 – 20%
Average module price per watt peak	$0.85	$1.1
Market share	10-15%	85-90%

* Cadmium Telluride (CdTe) thin-film solar cells can reach efficiencies of up to 16.7%.

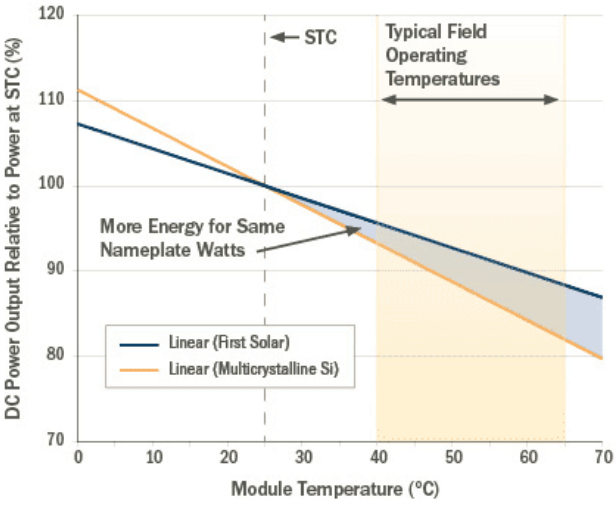
Source: Adapted from ***SBC Energy Institute***. "Solar Photovoltaic Factbook," September, 2013.

2.5 Thin-film proven performance advantage over crystalline silicon solar modules

At temperatures above 25°C, First Solar modules produce more energy than competing solar modules due to a superior temperature coefficient.

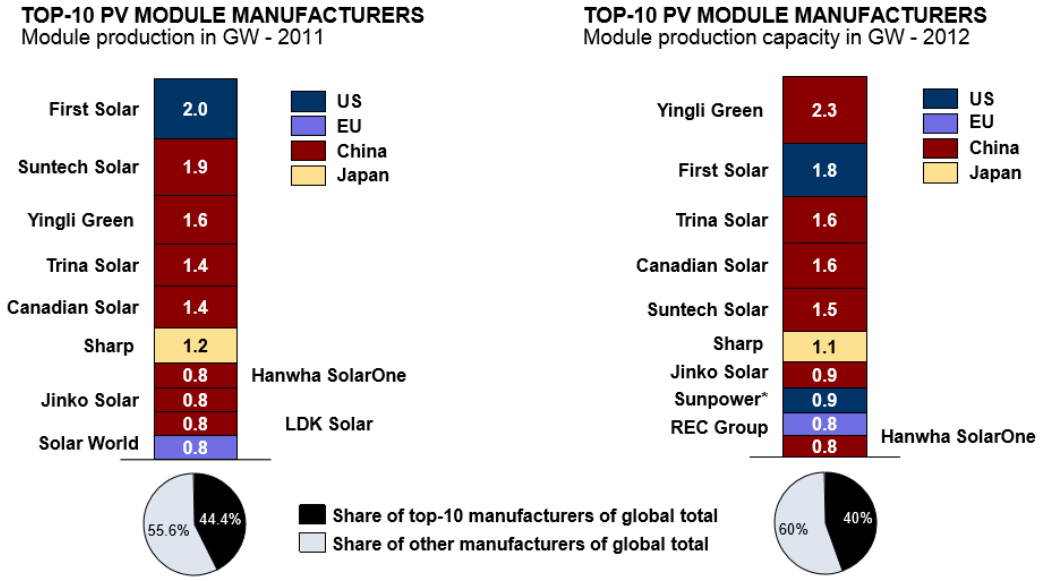
This proven performance advantage provides stronger plant performance in high temperature climates, where more than 90% of a plant's generation will occur when module temperatures are above 25°C – giving First Solar modules a proven performance advantage.

As a result of First Solar's superior performance in high temperature and high humidity climates, First Solar power plants produce up to 8% more annual energy than competing power plants with the same nameplate capacity, improving bankable returns for our customers and partners.



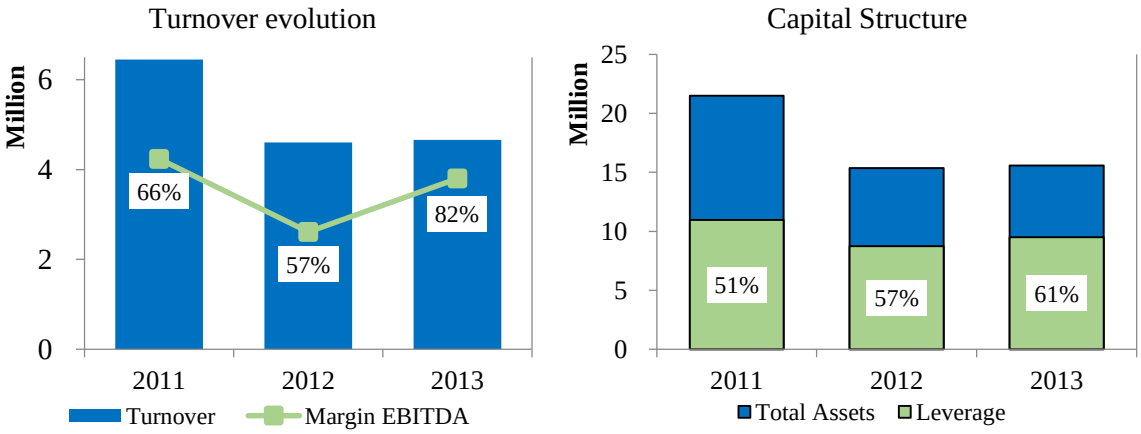
Source: **First Solar**. http://www.firstsolar.com/Home/Technologies-and-Capabilities/PV-Modules/First-Solar-Series-3-Black-Module (accessed May 20, 2015).

2.6 PV manufactures league tables of 2011 and 2012



Source: ***SBC Energy Institute***. "Solar Photovoltaic Factbook," September, 2013.

Exhibit 3: Financials of Sun Ventures



Source: **Sun Ventures** records.

Exhibit 4: Types of services proposed by Banco Lusitano Group

Banco Lusitano de Investimento (Advisory services)	✓ Analysis of technical aspects (together with technical advisors) ✓ Analysis of regulatory and legislative aspects (together with lawyers) ✓ Development of the contractual assumptions for risk allocation ✓ Preparation of the business plan, the financial model and the assumption scenarios for performing sensitivity analysis ✓ Determination of the financing needs ✓ Identification of sources and forms of debt and equity capital ✓ Organization and negotiation of the financing terms, including project security, external support and guarantees
Banco Lusitano (Lending services)	✓ Arranging, structuring and underwriting bank financing ✓ Granting pool financing (lending), marketing the transaction to other lenders and attracting participations ✓ Agency services, maintaining documentation, monitoring use of funds by the borrower and holding the bank accounts of the project company and acting as single point of contact, or "controlling creditor"

Source: **Banco Lusitano Group** records.

Exhibit 5: Distribution of the renewable energy sources from 2005 to 2013, as well as a decreasing external dependence.

	Distribution of the renewable sources in the total amount of energy consumed (ktoe)								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Gross final consumption of energy (GFCE)	**19,400**	**19,127**	**19,298**	**18,877**	**18,645**	**18,583**	**17,768**	**16,627**	**16,334**
Distribution of renewable energy sources (RES)	3,792	3,979	4,233	4,332	4,554	4,492	4,371	4,098	4,198
Electricity	1,252	1,350	1,499	1,598	1,742	1,955	2,144	2,174	2,238
Heating and cooling sectors	2,529	2,546	2,602	2,600	2,595	2,218	2,210	1,905	1,936
Transport sector	11	83	131	134	218	319	17	18	25
% of RES in GFCE	**19.5%**	**20.8%**	**21.9%**	**22.9%**	**24.4%**	**24.2%**	**24.6%**	**24.6%**	**25.7%**

Source: **DGEG**. February 2015 Renováveis – Estatísticas Rápidas. http://www.dgeg.pt/ (accessed May 16, 2015)

Exhibit 6: Comparison of tariffs for wind onshore and solar PV (average to maximum remuneration) in the EU-27 in 2011 with their long-term marginal generation costs (minimum to average costs).

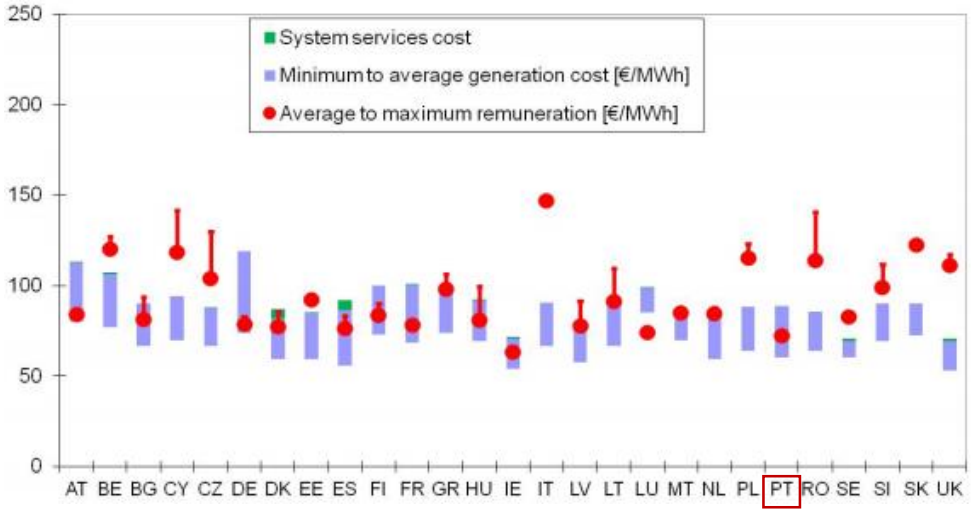


Figure 1: Wind onshore

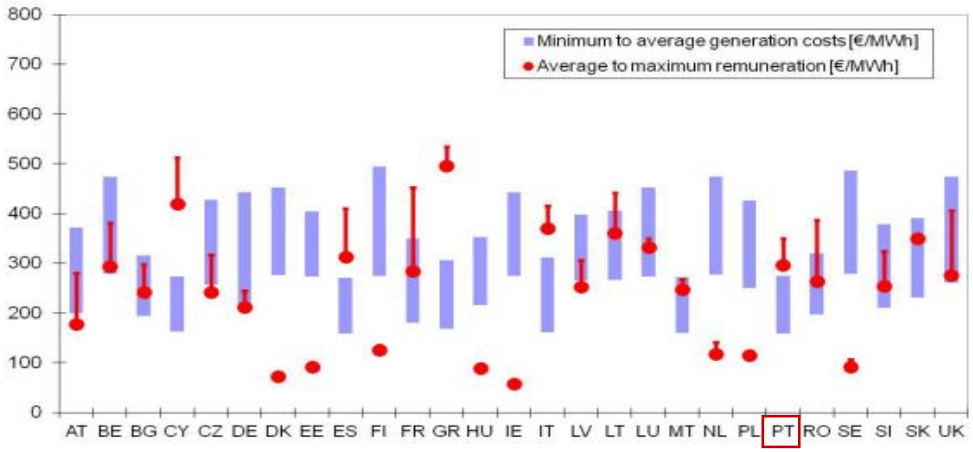
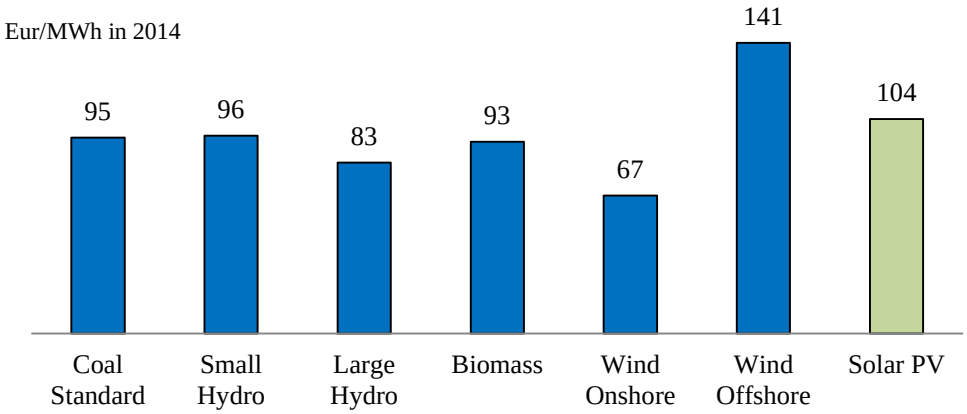


Figure 2: Solar PV

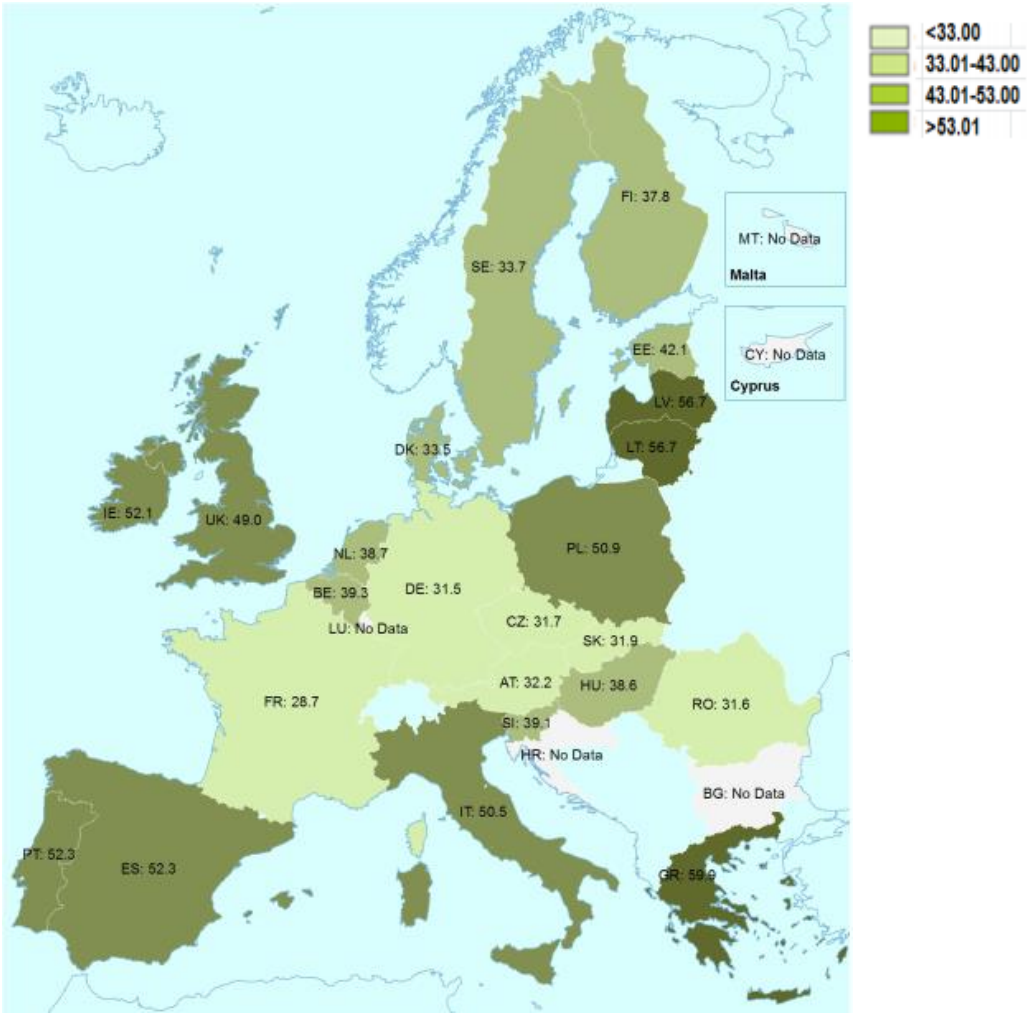
Source: ***ECOFYS, and Fraunhofer ISI***. 2011. "RE-Shaping: Shaping an effective and efficient European renewable energy market", October 1, 2011, 34 – 46.

Exhibit 7: Levelized cost of energy (LCOE) by technology in Euros per MWh in 2014 in Portugal. The LCOE represents the per-MW hour cost (in real euros) of building and operating a power plant over an assumed financial life and duty cycle.



Source: ***EDP Renewables***. "Offshore wind development," October, 2014.

Exhibit 8: Comparison of the average wholesale base-load electricity prices (Eur/kWh) in the first half of 2014.



Source: ***European Commission***. "Quarterly report on European Electricity Markets," September 2014, 12.

Exhibit 9: The evolution of the Portuguese renewable installed capacity (MW) from 2006 to 2014.

	Installed capacity in MW								
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Hydro	4,848	4,853	4,857	4,884	4,898	5,332	5,539	5,535	5,566
> 30 MW	4,234	4,234	4,234	4,234	4,234	4,666	4,877	4,877	4,908
≤ 30 MW	614	619	623	651	664	667	662	658	658
Wind	1,699	2,464	3,058	3,564	3,914	4,378	4,531	4,731	4,953
Biomass	335	348	350	408	592	575	564	564	564
Photovoltaic	**3**	**15**	**62**	**110**	**134**	**175**	**244**	**299**	**421**
Others*	123	130	131	139	149	165	177	182	190
Total Renewable	**7,008**	**1,809**	**8,458**	**9,106**	**9,687**	**10,626**	**11,054**	**11,311**	**11,694**

** Includes Municipal Solid Waste, Biogas and geothermal energy.*

Source: **DGEG**. February 2015 Renováveis – Estatísticas Rápidas. http://www.dgeg.pt/ (accessed May 16, 2015)

Exhibit 10: The evolution of the Portuguese renewable annual production (GWh) from 2006 to 2014.

	Total electricity production in GWh								
	2006	2007	2008	2009	2010	2011	2012	2013	2014
Hydro	11,467	10,449	7,298	9,009	16,547	12,114	6,660	14,868	16,455
> 30MW	9,884	9,405	6,281	7,648	14,454	10,615	5,683	12,931	14,223
≤ 30MW	1,582	1,044	1,017	1,361	2,093	1,499	977	1,937	2,232
Wind	2,926	4,036	5,757	7,577	9,182	9,162	10,260	12,015	12,099
Biomass	1,380	1,549	1,500	1,713	2,226	2,467	2,496	2,516	2,487
Photovoltaic	**5**	**24**	**41**	**160**	**215**	**282**	**393**	**479**	**639**
Others*	410	534	543	556	585	667	600	732	723
Total Renewable	**16,188**	**16,593**	**15,140**	**19,016**	**28,754**	**24,692**	**20,410**	**30,610**	**32,400**
Gross Production +Net Importation	53,934	54,319	54,901	54,259	56,316	54,697	53,470	53,310	53,224
% of renewables	30.0%	30.5%	27.6%	35.0%	51.1%	45.1%	38.2%	57.4%	60.8%

** Includes Municipal Solid Waste, Biogas and geothermal energy.*

Source: **DGEG**. February 2015 Renováveis – Estatísticas Rápidas. http://www.dgeg.pt/ (accessed May 16, 2015)

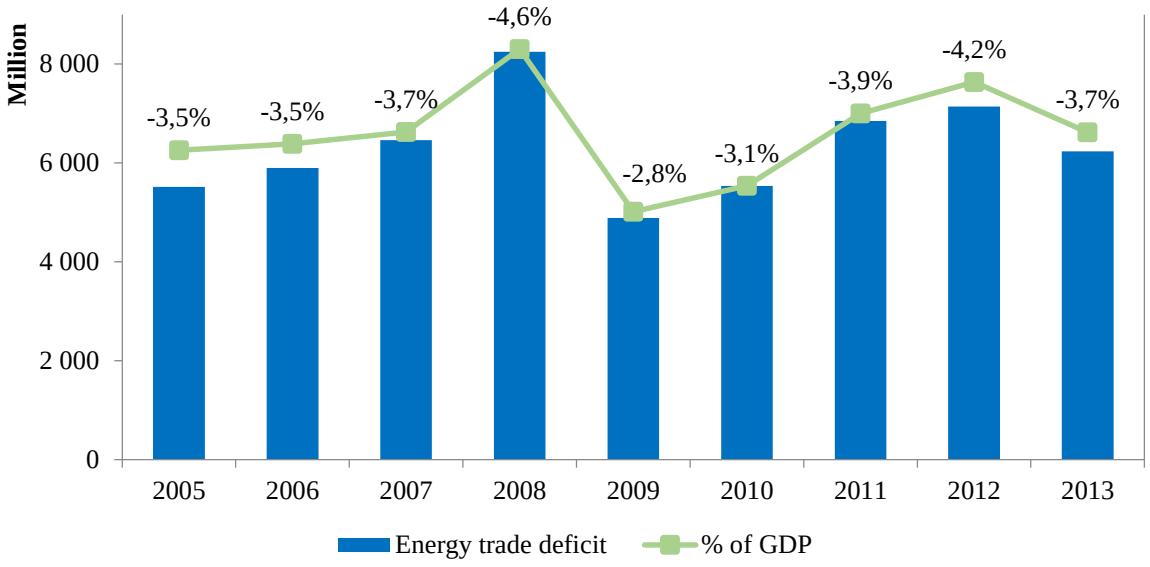
Exhibit 11: Comparison of the installed capacity (MW) and annual production (GWh) per renewable technology for 2010 (DGEG's historical data) and 2020 (NREAP's estimative).

	2010 DGEG		**2020 NREAP**	
	Potência (MW)	*Energia (GWh)*	*Potência (MW)*	*Energia (GWh)*
Hydro	4,898	16,547	9,548	14,073
Wind	3,914	9,182	6,875	14,596
Onshore	3,914	9,182	6,800	14,416
Offshore	-	-	75	180
Biomass	592	2,226	952	3,516
Photovoltaic	**134**	**215**	**1,000**	**1,475**
Geothermal	29	197	75	488
Waves	-	-	250	437
Total	**9,567**	**28,367**	**18,700**	**34,585**

Sources:

- **DGEG**. February 2015 Renováveis – Estatísticas Rápidas. http://www.dgeg.pt/ (accessed May 16, 2015).
- ***NREAP***. March 2011. "Portugal 2020: National Reform Programme," approved by the Council of Ministers 20 March 2011, Chapter 5 - Sustainable Growth.

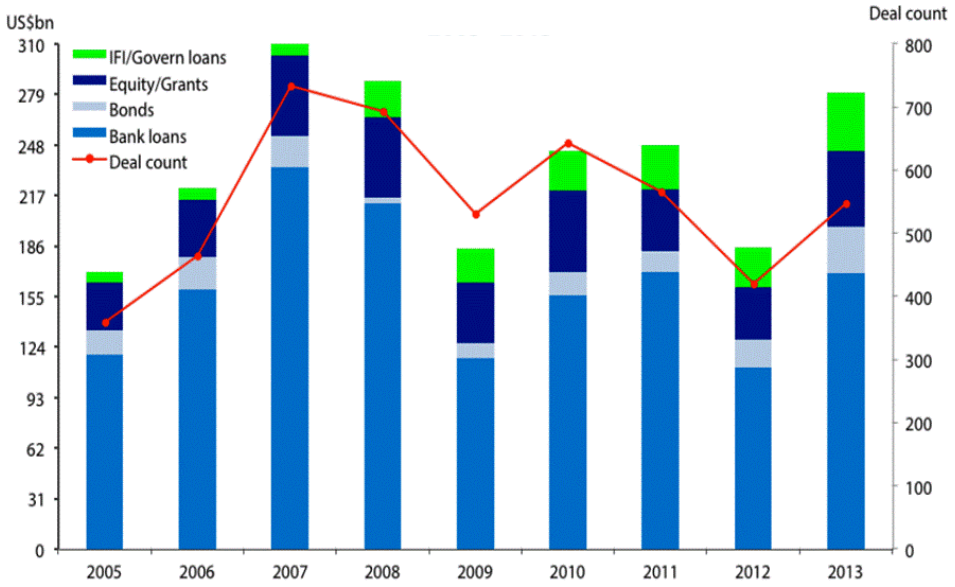
Exhibit 12: Portugal's net energy trade balance as percentage of GDP.



Data sources:

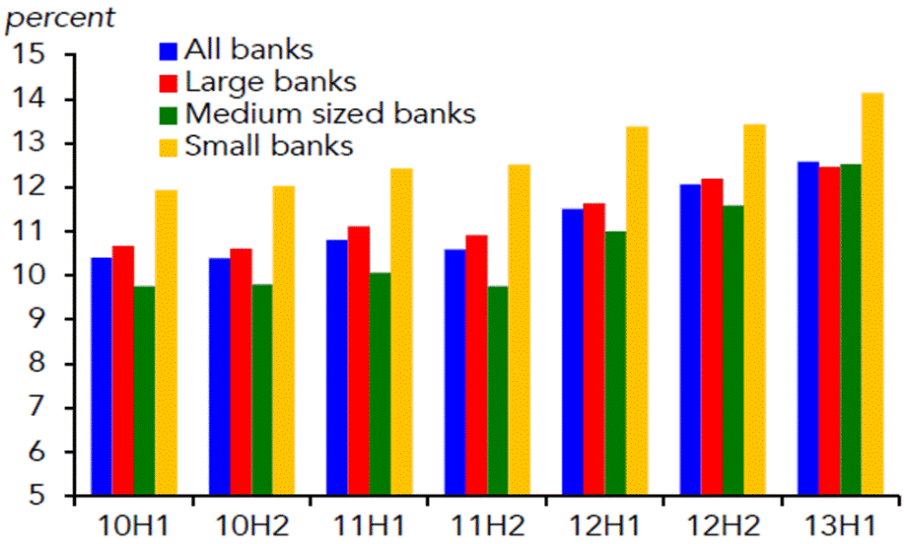
- **Banco de Portugal**, Annual National Accounts.
- ***DGEG.*** "Energia em Portugal," May 2015, Appendix 4.

Exhibit 13: Global Project Finance Market by source of funding from 2005 to 2013.



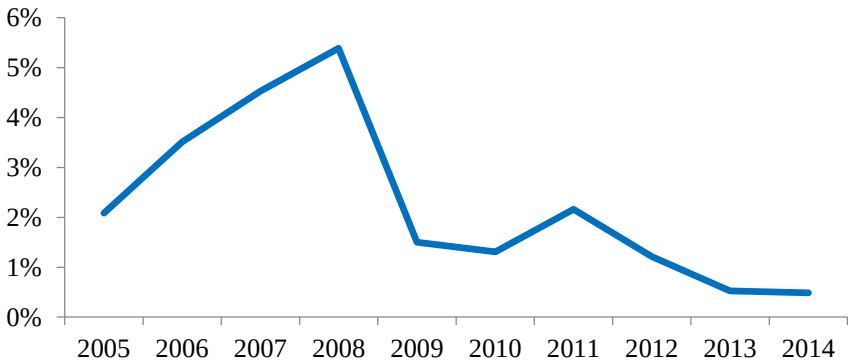
Source: **Canuto, Otaviano**. 2014. "Liquidity Glut, Infrastructure Finance Drought and Development Banks." *The World Post*, Chart 2.

Exhibit 14: Euro-area banking system reported tier 1 ratios from the first half of 2010 to 2013.



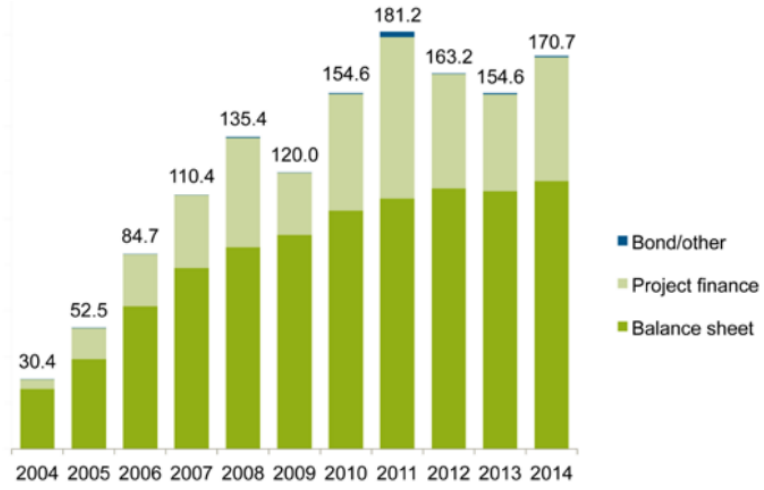
Source: **Canuto, Otaviano**. 2014. "Liquidity Glut, Infrastructure Finance Drought and Development Banks." *The World Post*, Chart 3.

Exhibit 15: Euribor 12 month rate on last day of each year, from 2005 to 2014.



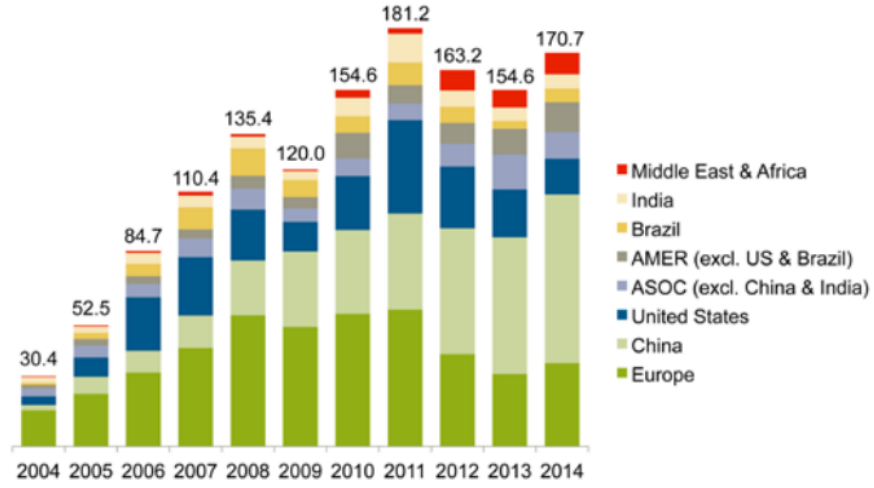
Data source: **Bloomberg**.

Exhibit 16: Asset Financing new investment in renewable energy by type of security, from 2004 to 2014, $BN.



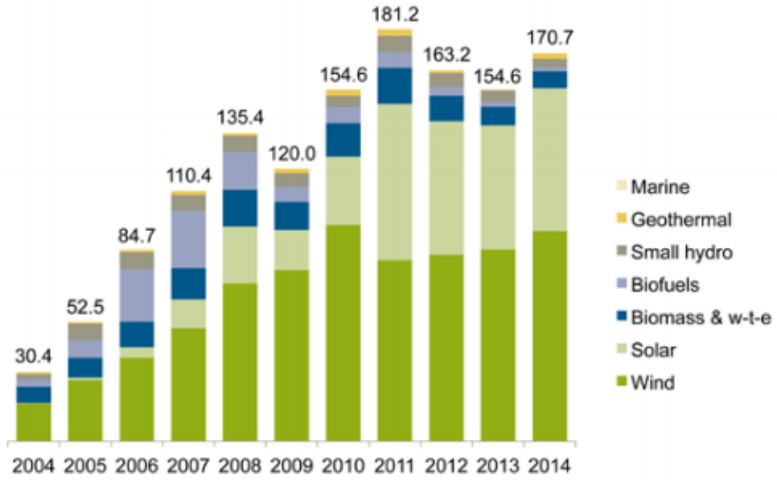
Source: ***Bloomberg New Energy Finance***. "Global Trends in Renewable Energy Investment 2015," figure 33.

Exhibit 17: Asset Financing new investment in renewable energy by region, from 2004 to 2014, $BN.



Source: ***Bloomberg New Energy Finance***. "Global Trends in Renewable Energy Investment 2015," figure 34.

Exhibit 18: Asset Financing new investment in renewable energy by sector, from 2004 to 2014, $BN.



Source: ***Bloomberg New Energy Finance***. "Global Trends in Renewable Energy Investment 2015," figure 35.

Financing the Alentejo Solar Power Plant (B-1): Bank's confidential for Carlos

After carefully assessing the Solentejo's feasibility, Carlos Abrantes looked over a standard term sheet for financing a solar photovoltaic (PV) renewable energy project. He would have to fill in several items, including the loan characteristics – amount, maturity, interest rate, repayment schedule – as well as its structural features - financial ratios, fee structure, and cash sweep mechanism. Besides all these items, the template's boilerplate provisions were based on the current norms for a solar PV financing, so Carlos believed those should be accepted by the client Ana Luz. Those provisions included:

- ✓ 'Cash flow waterfall' provision: operating expenses and taxes are top payment priority, followed by interests, hedging costs, and principal repayment. These are followed by set asides in the reserve accounts, a possible cash sweep of senior debt, and lastly distribution to shareholders;
- ✓ Debt Service Reserve Account (DSRA): this shall have sufficient funds to cover the following debt service explicit on the corresponding term loan repayment;
- ✓ Conditions for distributions to shareholders: the Debt Service Cover Ratio (DSCR) must be higher than the minimum set in the Finance Contract, which determines the debt structure, and the DSRA must be fully funded;
- ✓ Default ratios: default if either DSCR < 1.05x or LLCR < 1.10x;
- ✓ Grace period: this shall not surpass the construction period of the solar power plant;
- ✓ Basic contract provisions: such as representations, conditions precedent, covenants and events of default, accordingly to the actual requirements for similar projects.

Carlos's main concerns were then focused on pinpointing the remaining loan terms that would satisfy both Banco Lusitano's credit committee and Sun Ventures's shareholders. Although Carlos did not know the exact requirements of Sun Ventures shareholders regarding, for instance, their IRR, he knew how to design a project finance deal in accordance to the BLI's structuring policies for the Portuguese PV sector. The features upon which Carlos based his decisions to structure the Solentejo's project loan are as follows:

- ✓ Facility amount: this should correspond to a maximum debt-to-equity ratio of 75:25 (in the Sources and Uses of Funds) and should satisfy a minimum level of the DSCR of 1.25x under a P50 scenario and 1.15x for a P90 scenario, assuming a reasonable panel degradation;
- ✓ Maturity: this shall not surpass the maturity date of the guaranteed feed-in tariff period, leaving a "tail period" between the end of the loan contract and the end of the sales contract. As a benchmark, a longer tail period provides lenders with a higher safety margin;

- ✓ Interest rate: Euribor[36] plus the Margin. The interest margin can either be fixed or variable[37] for the entire term of the loan repayment period and shall lie between 200 bps[38] and 360 bps;
- ✓ Repayment profile: repaid on an annual amortizing basis, starting 12 months from the first day of the operating period. The repayment plan shall be in accordance with the Final Maturity and should be structured in accordance with the debt sizing criteria above mentioned;
- ✓ Success fee[39]: it should range from 1.50 % to 2.50 % on the facility amount;
- ✓ Administrative fee[40]: it should be fixed at an annual price ranging from Eur 50,000-75,000;
- ✓ Cash sweep mechanism: 40% to 80% of the excess cash flow after debt service shall be used to prepay the facility throughout its maturity.

Concurrently, Carlos considered the previously assessed risk profile of Solentejo in making his decisions. Having reviewed the loan structure, Carlos wondered about which of the proposed terms would be more likely to cause an unenthusiastic reaction from Ana during the course of the negotiation. As such, Carlos assessed which of the loan conditions could be softened as well as which counter-offers he would be willing to consider in order to achieve a proper alignment of interests and fair risk/returns between Sun Ventures and BLI. The recent deals of BLI for the PV sector in Portugal have ranged between EUR 1.4-1.7 million per MW financed.

As he entered figures into the term sheet template, Carlos kept wondering if he would face competition from other banks for this deal. When he asked Ana whether she was talking to other banks, she had replied cryptically, "We are seeking the best funding option". In fact, there had been a fierce competition among banks to lend to established-technology solar energy projects.

[36] Euribor is the average rate at which selected Eurozone banks lend money in the interbank market.

[37] The variable margin can be linked either to time or to the level of DSCR ratios for each year. As regards to the margin-time relationship, the most common solution is to provide for an increasing margin after the grace period. As far as margin-cover ratios are concerned, in certain projects, interest is established based on the level reached by DSCR coefficients: the higher the coefficients, the lower the spreads applied to the base rate, and vice-versa.

[38] The 200 bps is the minimum all-in spread required by Banco Lusitano given its current cost of long-term funding and cost of capital for project finance loans in the PV sector in Portugal.

[39] The success fee is paid once the planning mandate has led to a successful conclusion. The level of the success fee will be inversely proportional to the size of the project.

[40] The administrative fee charged is to cover expenses related to record keeping and administering a credit agreement.

Financing the Alentejo Solar Power Plant (B-2): Sponsor's confidential for Ana

As she prepared to negotiate with Banco Lusitano de Investimento (BLI), Ana Luz – responsible for arranging the project financing to be acceptable to shareholders – reflected upon the advantages and drawbacks of the two proposal loan term sheets that she already had in hand. Over the past several weeks, Ana had held meetings with three banks besides BLI, and two of them had presented final term sheets. Carlos was not exactly aware of these offers; when he had asked Ana whether she was talking to other banks, Ana had responded as cryptically as she could, "We are seeking the best funding option".

Ana reviewed the term sheets that she had received from Banco Agricola Português (BAP) and International China Bank (ICB) as depicted in **Exhibit 1**. The term sheets were nearly identical with respect to several provisions, which according to Sun Ventures's attorney were consistent with the current standards for solar PV financing, and were also expected to be included in BLI proposal. These standards include:

- ✓ 'Cash flow waterfall' provision: operating expenses and taxes are the top payment priority, followed by interests, hedging costs, and principal repayment. These are followed by set asides in the reserve accounts, a possible cash sweep of senior debt, and lastly distribution to shareholders;
- ✓ Debt Service Reserve Account (DSRA): this shall have sufficient funds to cover the following debt service explicit on the corresponding term loan repayment;
- ✓ Conditions for distributions to shareholders: the Debt Service Cover Ratio (DSCR) must be higher than the minimum set in the Finance Contract, which determines the debt sizing, and the DSRA must be fully funded;
- ✓ Default ratios: default if either DSCR < 1.05x or LLCR < 1.10x;
- ✓ Grace period: this shall not surpass the construction period of the solar power plant;
- ✓ Basic contract provisions: such as representations, conditions precedent, covenants and events of default, accordingly with the actual requirements for similar projects.

Besides that, on the one hand, the ICB's term sheet implied to bring in a "Chinese flavor", i.e., a Chinese PV equipment manufacturer. Although Ana was open to that possibility, she wondered whether this new Chinese partner could offer a lower equipment price for the same terms and conditions already set under BuildSun's long-standing partnership with First Solar. On the other hand, the BAP's proposal imposed some constraints on the payment of development fees as part of Solentejo's funding needs. Ana suspected that it could be related with the fact that both the EPC and O&M partners were sister companies, since they were subcontracted within the same group as Sun Ventures – Green Partners Group.

In the meanwhile, Ana asked her attorney for advice on how to approach the upcoming negotiation with BLI, in light of the two offers she had in hand. His reply was as follows:

You need to find a balance between Green Partners's and the banks' interests. Try to put yourself in their shoes and think about which conditions you would like to have satisfied. For instance, from the sponsors' perspective, what is the minimum leverage and debt tenor you would be willing to accept? And what about the maximum annual debt service and fee structure? From the banks' standpoint, in which contractual terms would make you feel more comfortable to finance this initiative? At the end of the day, it all depends on the subjective perception about the relevance of a given project risk in influencing the values of operating cash flows. I don't have the required financial expertise to assess the economic convenience for each party, however, I think that these two offers serve as a good basis for the upcoming negotiation with BLI as well as for the alignment of interests within Green Partners Group.

Ana had negotiated hard with both BAP and ICB and did not believe that she could further improve their terms. Frankly, Ana was not sure of which of the two proposals she would choose if she was not able to negotiate better arrangements with BLI. As a last resort, Ana had always the option of selling the 20 MW power generation license.

Exhibit 1: Analysis of Term Sheets from BAP and ICB.

	Banco Agrícola Português	**International Chinese Bank**
Facility Amount	▪ D/E = 65:35; ▪ Min DSCR = 1.25x (P50 scenario); ▪ Min DSCR = 1.10x (P90 scenario); ▪ Maturity 11 years; ▪ Facility amount = Eur 30.5M.	▪ D/E = 75:25; ▪ Min DSCR = 1.20x (P50 scenario); ▪ Min DSCR = 1.10x (P90 scenario); ▪ Maturity 13 years; ▪ Facility amount = Eur 36 M.
Facilities Margins	Euribor + Margin. Margins: ▪ 250 bps until (and including) the 5th year after Financial Close; ▪ 350 bps from the 6th until the Final Maturity.	Euribor + Margin Margins under a P50 scenario: ▪ 200 bps if: DSCR > 1.40; ▪ 250 bps if: 1.30x ≤ DSCR ≤ 1.40x; ▪ 300 bps if: 1.20x ≤ DSCR < 1.30x. Margins under a P90 scenario: ▪ 200 bps if: DSCR > 1.30; ▪ 250 bps if: 1.20x ≤ DSCR ≤ 1.30x; ▪ 300 bps if: 1.10x ≤ DSCR < 1.20x.
Fees	▪ Success = 1,5% (on the Loan Facility); ▪ Administrative = Eur 50,000 per year.	▪ Success = 2,5% (on the Loan Facility); ▪ Administrative = Eur 65,000 per year.
Cash Sweep Mechanism	80% of the excess cash flow after debt service shall be used to prepay the facility throughout its maturity.	40% of the excess cash flow after debt service shall be used to prepay the facility throughout its maturity.
Other Key provisions		Requires a "Chinese flavour".
Additional notes	▪ The Portuguese BAP was in 2013 the best investment bank according to the Portuguese League Table. ▪ BAP had participated with Sun Ventures in the financing of those 2 solar farms which were later sold in 2011. ▪ Recently, BAP has been rumored for not being 'hands-on' and offering an inappropriate project monitoring.	▪ ICB is a well positioned bank in China, however, it has no previous experience in the Portuguese renewable energy sector. ▪ ICB has on course an internationalization strategy through a set of business acquisitions and financing of potential targets in Europe.

Source: **Sun Ventures** records.

June 2015
Masters in Finance - Thesis

Author: António Bernardo
Advisor: Professor Mariana Abrantes de Sousa

Financing the Alentejo Solar Power Plant

Teaching Note

Synopsis

The case opens with Ana Luz, project manager at Sun Ventures, a renewable energy company focused on the development of solar powered projects, preparing to receive a loan proposal from Carlos Abrantes, head of project finance at Banco Lusitano de Investimento, a Portuguese Investment Bank, for funding the Solentejo project - fictional solar power plant located in Alentejo Region of Portugal. Ana has made all the efforts to bring this solar project to life, and is now seeking debt to finance the Solentejo's development and construction costs.

The case describes the main phases of the usual process of developing a solar power plant in Portugal, portraying the background of Sun Ventures and Banco Lusitano de Investimento as a typical solar developer and investment bank, respectively. The context of the Portuguese green economy is introduced, including the renewable energy program – expected targets and reforms for the renewable energy sector underlying the Europe Strategy 2020 to reduce the dependence on net imports of fossil energy – and energy regulatory issues around the setting of feed-in tariffs, by the Governments, to promote the generation of electricity from renewable energy sources. Along with this, the case provides a brief overview of the global project finance market as well as some figures on the financing of the renewable energy sector. In closing, the general guidelines for assessing the credit worthiness and bankability of a project financing proposal in the renewable energy sector are outlined.

The teaching plan is structured around an exercise – completed before class – in which pairs of students assume the roles of Ana Luz and Carlos Abrantes, respectively, in order to negotiate a loan term sheet. Note that roles are assigned in the accompanying (B) cases in which students should first read the respective (B) case and then prepare a proposal to negotiate terms and conditions of the loan.

Intended audience and learning objectives

This case is aimed at graduate students taking an advanced finance course, either in project or corporate finance. Some of the possible learning objectives are:

- Building an understanding of how the project financing structure and debt sizing are modelled.
- Identifying the project risks and returns to the various parties and discussing its credit worthiness for a financing proposal.
- Exploring tradeoffs confronting sponsors with the typical terms and conditions for project financing presented by the banks.
- Reinforcing comprehension of project finance logic, which results from triangulation between: 1) financial leverage required to meet shareholders' IRR target; 2) minimum level of financial

performance ratios acceptable to the lenders – depending on their risk perception about the project; 3) lenders' remuneration in terms of fees and margins; and 4) market norms / conditions (e.g., regulatory, political and legal environment as well as banks' "long-term funding appetite").

- Considering negotiation strategies in a situation where: i) both parties view leverage as a crucial outcome, but have some room for negotiating around other issues perceived as more important by one party than the other (e.g., cash sweep); ii) the lender lacks knowledge about the shareholder's BATNA (Best Alternative to a Negotiated Agreement); and iii) the sponsor seeks to lower funding costs and lengthen tenor while the lender seeks adequate net loan pricing, shorter tenors hand tight credit risk monitoring and enforcement mechanisms.
- Highlighting the importance of project finance to the development of renewable energy technologies, a topic of current interest in many countries which are addressing environmental and energy security concerns.

Negotiation Exercise

This negotiation exercise is designed to take place before the case discussion in class. A suggested guideline, consisting of 3 phases, is hereby presented.

Phase 1 - Setting up working groups

Depending on the class size, the instructor forms groups of 2 to 4 people at most, attempting to have the same number of Bank Groups and Sponsor Groups. The negotiation exercise involves two randomly assigned pairs, with one pair assuming the Carlos Abrantes role (the Bank Group) and the other Ana Luz's (the Sponsor Group). For each assigned role, the instructor will then send the respective case supplement (B), containing confidential information for Carlos and Ana, respectively.

Phase 2 – Setting target outcomes

Before the two sides meet to negotiate, students will work on the financial model attached to this case to try to maximize their respective payoff. Students who belong to the Sponsor Groups will try to identify their optimal solution, as will the other students playing the role of the Banks, accordingly with the confidential guidelines each group has from their respective (B) case[41].

Within the deadline determined by the instructor, both Groups will complete and submit a poll (to be seen by their instructor only, not by their respective counter-parties) disclosing their target outcomes – aspirational but plausible - for the upcoming negotiation. The Bank Groups will complete a poll that

[41] The financial model attached with the case allows students to test scenarios by changing a large number of variables on the Debt Structuring sheet. Nonetheless, it is important to point out that some industrial variables (e.g. operating revenue) must not be modified during the negotiation exercise because any adjustment to these numbers has to be corroborated through technical due diligence, a process which has not yet been carried out at this initial stage. Furthermore, the instructor should encourage students to focus their attention only on the Summary and Debt Structuring sheets in the model, to prevent them from spending too much time analyzing the other spreadsheets and relative *formulae* in each, since it would simply distract them from the real objective of this case study.

specifies the target outcomes for their loan proposal: 1) leverage; 2) tenor of the facility; 3) margin; 4) fees charged; 5) cash sweep; 6) any other provisions. The Sponsor Groups, besides setting their target outcomes for those 6 items to be covered in Banks's proposal, also have to specify another item: 7) which of the three options (described in the "Sponsor's confidential" B-2 case) they will pursue – Banco Agrícola Português, International Chinese Bank, or selling the license – if they cannot reach an acceptable deal with Banco Lusitano de Investimento.

Phase 3 - Negotiation

This phase starts with the Bank Groups sending an email to their counter-party (copying the instructor) in which they indicate their position on the 5 items to be covered in their loan proposal[42]. Then, the groups will meet to negotiate. Once finished, the Sponsor Groups will have to complete another poll presenting the outcome of the negotiation: deal or no deal, and if a deal, which agreement was reached with respect to the same negotiating issues. All of these procedures should be completed before a specified deadline set by the instructor before the discussion class.

Suggested instructions for students and poll questions are provided in an Appendix to this teaching note.

Roadmap for discussing in class

A suggested 80-minute teaching plan has 6 sections, structured as follows:

10 Minutes	1. Summary and debrief of outcomes of negotiations between each Sponsor-Bank pair
15 Minutes	2. Assessment of bargaining situation
20 Minutes	3. Discussion of project risks and project feasibility and bankability from Sponsor's and the Bank's specific perspective
20 Minutes	4. Discussion and analysis of individual financial terms and conditions
10 Minutes	5. Reflections on bargaining strategies and tactics
5 Minutes	6. Concluding remarks: Summarizing key lessons learned through this case

1. Summary and debrief of outcomes between each Sponsor-Bank pair

Start by sharing a few summary statistics for the class, for example: i) percentage of groups that did not reach an agreement with Banco Lusitano de Investimento; ii) average loan amount for those who did reach agreement; iii) the higher and lower sponsor's IRRs. Debrief a few groups – for example, a 'no deal' outcome, a high sponsor IRR, and a low loan amount – asking each side, "What happened?". When the "agreed price" varies widely among the negotiation pairs, the instructor might also ask, "Are you sure you were all buying and selling the 'same car'?".

2. Assessment bargaining situation

The following suggested questions aim to contextualize the case for class discussion.

[42] Notice that the terms and conditions of these items does not necessarily have to be the same as the ones previously set.

Who are the main project Parties and the key project contracts?

Students are asked to prepare a diagram of the project contracts in order to better understand the contractual structure and to present it in a visual form (as in **Figure 1**), taking special care to distinguish the different roles of the various contractual parties with similar names, as is typical in project finance. Alternatively, the instructor may distribute the diagram at the beginning of the assignment to facilitate the analysis.

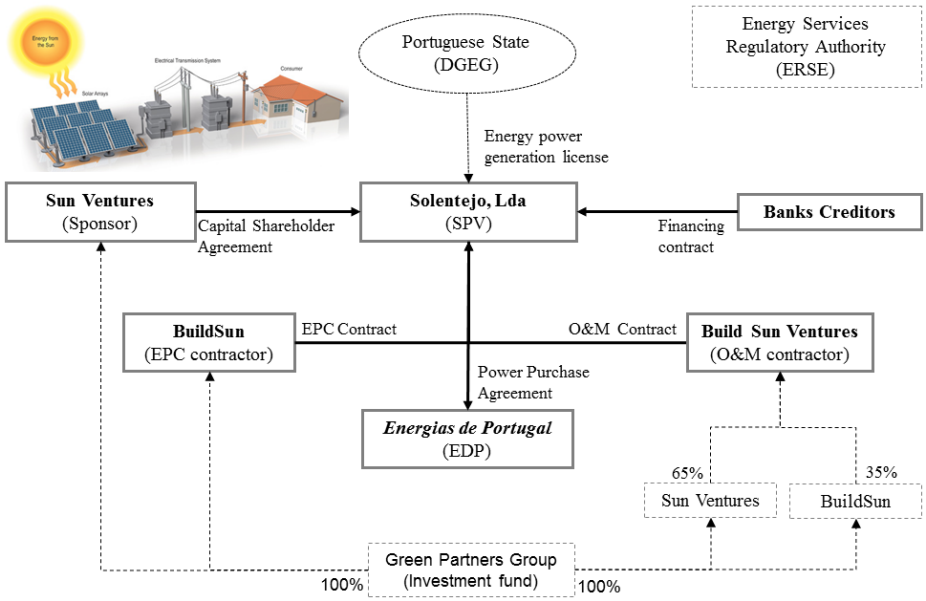


Figure 1: Contractual Diagram for Solentejo's project.

Why is project finance adequate for solar power initiatives?

Project finance is the typical scheme employed to finance capital-intensive projects – such as solar power plants. Although sunlight is free, generating electricity by capturing the sun's rays requires high up-front capital costs during the solar plant installation that might be either difficult to be financed on-balance sheet of the sponsor or too costly when financed on their own. However, it is important to stress out that project finance lenders never want to be the first to finance an untested technology, meaning that solar power initiatives need to have an established-technology in order to be eligible for project financing.

How does the current project financing landscape look like for banks?

The banking sector has been undergoing regulatory changes aimed at tackling riskier banking activities and to prevent a repeat of the bankruptcies and bail-outs of 2008. Basel III, for instance, requires banks to hold more equity and capital for long-term loans, increasing the cost of long-term funding and therefore limiting credit availability and increasing the pricing of long-term debt. Along with the bank rating downgrades and Eurozone instability, the underlying cost to banks of lending has been further increased, especially long-term, due to the uncertainty perceived in the banking sector. However, with the downward movement in Euribor swap rates that have outweighed those increases in margins, the

long-term project finance has still been available and affordable. Looking ahead, nobody knows how long Euribor will remain low and when it will increase. However, one thing is sure: with Basel III fully implemented by 2019 it is likely that there will be further impacts on the costs of bank funding from this legislation over the next few years and therefore additional increases in loan margins and reduced availability of long-term bank debt.

How aggressively does Banco Lusitano de Investimento want to bid for Solentejo's project? Why? What do they want in the future?

A couple of reasons may lead Banco Lusitano de Investimento to be rather aggressive when bidding for Solentejo's project. First and foremost, this initiative could be their first deal with Sun Ventures and therefore mark the beginning of a long term relationship which is fundamental within the renewable energy sector. Second, when looking ahead, one should also take into consideration the large potential for solar development in the upcoming years – expected to increase from 421 MW in 2014 to 1,000 MW by 2020, according to the target set by the Portuguese NREAP – which might lead Banco Lusitano to establish additional partnerships with Sun Ventures. Notice that the energy policy underlying the Europe Strategy 2020 gives the renewable industry a fair 'business case certainty', essential to attract further investment and financing in this sector. Therefore, given the current context of the Portuguese economy, it is unlikely that Banco Lusitano and other banks will have better financing opportunities in Portugal than the existing ones in the renewable energy sector, at least in the short-term. Third, the financing required for the Solentejo project is in accordance with the recent deals of Banco Lusitano for the PV sector in Portugal, which have ranged between Eur 1.4-1.7 million per MW financed. Last but not least, although closing a deal is always a plus for any bank's reputation, in this case, it would also strengthen the prominence of Banco Lusitano in the Portuguese solar energy sector.

What criteria should Ana use to select the bank besides the quantitative figures such as loan pricing?

The other factors that Ana should focus on when selecting a bank are the following: i) the experience from previous or current partnerships; ii) the organization's reputation; iii) the know-how in the renewable energy sector, especially in solar; and not least important iv) experience in financing projects in Portugal. Additionally, if possible, Ana should take into consideration the bank's contract monitoring expertise, albeit subjective and difficult to assess when there is no experience from previous transactions, it is fundamental to know the bank's experience in handling project stresses and coordinating inter-creditor decision making as well as the timely approval of drawdown requests, waivers, consents and amendments.

3. Discuss project's risks and feasibility from the Sponsors' and Banks' specific perspectives.

Prior to negotiating the loan proposal, both the Bank Groups and Sponsor Groups should devote some time analyzing all the possible risks Solentejo project could bear during its economic life. The life cycle of solar projects involve long-term investments with a clear-cut separation between the construction

phase, when the project is not yet able to generate cash, and the operational phase. These phases have very distinct risk profiles and impact the future outcome of this initiative in different ways. The following **Table 1** summarizes the strategies that Ana Luz took to mitigate some of the risks that could arise during the life cycle of the Solentejo project.

Risk	Mitigation strategy	Allocation to
Construction Phase		
Non completion	Performance bond.	BuildSun
Completion with cost overruns	Fixed price EPC contract.	
Delayed completion	Penalties per week of delay, liquidity damages.	
Completion with performance deficiency	Warranty of PR for the first 2 years after commissioning, liquidity damages.	BuildSun / First Solar
Licensing	Construction's permit from the Alentejo Municipality.	Sun Ventures
Operation Phase		
Panel underperformance	Panel warranty.	First Solar / BuildSun
Market (Revenue)	Power Purchase Agreement.	EDP
Operating	O&M contract.	BuildSun Ventures
O&M contractor underperform	Penalties to compensate the profit losses.	
O&M cost increase	Fixed O&M contract.	
Licensing	▪ Land promissory contract up to 30 years; ▪ Production License from DGEG; ▪ Grid Reception point from EDP.	Sun Ventures

Table 1: Classification of some project's as well as the strategies for their allocation.

However, the Bank Groups, when assessing the credit worthiness of Solentejo, might have a different view regarding those mitigation strategies and might even raise other concerns that were not addressed by Ana yet. Indeed, the financial terms and conditions proposed by the Bank Groups will certainly depend on their perception about the risk profile of the project, as will the expectations about the Sponsor's IRR. The following **Table 2** summarizes some of the concerns that are most likely to become the center of discussion in the negotiation as well as the possible arguments raised by each party to ease or support the concern degree.

Concerns	Concern degree	Possible arguments	
		Ana Luz	Carlos Abrantes
Capacity and strength of the EPC contractor – BuildSun		▪ "BuildSun mastered the required expertise to build solar plants"; ▪ "Qualified team with 10 years-experience"; ▪ Turn-key contract under fixed-time, fixed-price and guarantees; ▪ The group formed by Sun Ventures and BuildSun provides an integrated business model designed to offer competitive solutions in the various stages of solar energy projects: from prospection, licensing and development to the construction and operation phases.	▪ BuildSun is a Sun Venture's sister company; ▪ Potential for conflicts of interest; ▪ To what extent are the EPC contract penalties and guarantees reasonable and reliable? What if Green Partners Group defaults? ▪ Are construction and commissioning risks really transferred to an unrelated third party?
Capacity and strength of the O&M contractor – BuildSun Ventures		▪ BuildSun and Sun Ventures, through their joint venture, took on the O&M risk as one of their areas of expertise: ✓ Sun Ventures has an operating portfolio of 10 MW; ✓ "BuildSun mastered the required expertise to operate solar plants";	▪ BuildSun Ventures is an affiliate of Sun Ventures (65%); ▪ Potential for conflicts of interest; ▪ Is operating risk really transferred to an unrelated third party? What if Green Partners Group defaults?

		▪ Full O&M contract under fixed-time, fixed-price and guarantees; ▪ O&M budget is a small component of the cost structure.	
Technology supplier – First Solar		▪ "Proven technology with over 10 GW installed worldwide"; ▪ Among the top-10 module manufactures; ▪ Thin-film solar modules have proven a performance advantage over conventional crystalline silicon solar panels in high temperature climates; ▪ Additionally, provides a 20-year warranty on the performance of its modules; ▪ Publicly traded in NASDAQ Stock Exchange.	▪ According to the investment-risk curve, thin-film is a riskier technology than Crystalline (Deployment stage vs Mature technology).
Strength of sponsors – Sun Ventures		▪ Commitment to the project: ✓ Eur 14.2 million as equity; ✓ Obtained the required licenses to start construction and operation of the solar plant; ✓ The time invested in developing. ▪ Renewable energy company focused on the development of solar powered projects; ▪ 14 MW of power installed in the Iberian Peninsula.	▪ Financially dependent from Green Partners Group; ▪ Lack of experience in developing solar projects with installed capacity higher than 5 MW.
Political, legal and regulatory environment - Portuguese Government		▪ Political commitment to renewable energy promotion shown by the NREAP underlying the Europe Strategy 2020; ▪ Electricity production gives priority of dispatch to renewable energy sources over conventional fossil fuel sources; ▪ Electricity market is regulated by ERSE.	▪ Due to the existent tariff deficit, the current PPA can be renegotiated.
Credit risk of the PPA - EDP		▪ Volume-based and variable duration FiT; ▪ The current project's FiT does not seem to overpay when comparing with the levelized cost of energy for the solar PV. As such, it is more likely to have the older awarded FiTs renegotiated first (in 2011 the average remuneration was 300 Eur/MWh); ▪ EDP has a stable outlook and a low risk profile (S&P: BB+; Moody's: Baa3; Fitch: BBB-).	▪ Although the corresponding costs with the PPA are borne by EDP, it is the Portuguese Government who determines the value of the feed-in tariff paid to the renewable producers.
Financial risk - Banks		▪ Euribor swap rates have been falling.	▪ Increased cost of the long-term funding; ▪ Banking regulatory changes.
Solar irradiation		▪ The solar tracker system allows generating more energy than fixed mounting systems.	▪ Site specific data would be preferable, since the solar data available (DNI) corresponds to the average of the 1994-2010 period for the Alentejo region.
Legend	 Low concern	 Medium concern	 High concern

Table 2: Summary of some possible concerns as well as arguments that might be raised by Ana and Carlos.

Recall that creditors lend money for the development of an initiative solely based on its specific risks and future cash flows. As such, if there are risks that have not been anticipated or properly hedged, the ability of the project to repay costs, debt service, and dividends to shareholders can be potentially jeopardized.

4. Discussion and analysis of individual financial terms and conditions

How will the Bank Groups reflect their risk valuation in their financial proposal? Discuss the financial terms that are more likely to impact the bank's DSCR and sponsor's IRR.

After having assessed the Solentejo's risks, the Bank Groups must start by defining the debt and equity mix to use to finance the structure. Notice that banks lend money depending on the difference between the cash flow and the amount of the debt service – that is the DSCR. Therefore, the more risk-averse the lenders are, the more they would insist on a higher minimum level of DSCR required for this initiative in order to provide them with a safety margin against unexpected circumstances that could shrink the project's cash flows available for debt service. As such, if the proposed financial structure is too aggressive with respect to the level of project risk, the Bank Groups can ask for an increase in the pricing of the financing (e.g. margin, success fee, or administrative fee) and/or a greater equity contribution from the Sponsor Groups. Although banks have to protect the bankability of the deal as well as to try to increase their remuneration in terms of fees and margins, their financing proposal also has to allow for adequate project leverage and remuneration to shareholders, such that a deal might be achieved between both parties.

The loan repayment profile also reflects the perceived project risk. The greater the risk is, the lower the loan tenor proposed will be, since banks would insist on a higher tail, and/or the higher the cash sweep mechanism to ensure that the loan is repaid before the end of the guaranteed stream of revenues. Notice that the repayment profile is critical given that DSCR is a direct function of the period over which the loan is amortized. The shorter this period is, the higher the annual debt service will be and the more likely it is that DSCR will be below the minimum level set by the bank. If this happens, the bank is likely to offer a smaller amount of debt and/or more demanding contract terms. From the sponsor's point of view, it is important to bear in mind that they will benefit from longer loan tenors as well as lower DSCR and cash sweep covenants, aiming for early cash distributions to increase their equity IRR.

When assessing the risk of the loan repayment profile, the Bank Groups might also take into account the average life of the loan – that is, how long, in average yearly terms, it takes for the loan to be repaid by its contractual debt service, which includes interest, capital, fees and cash sweep. As such, depending on how the loan repayments are determined, it could be possible to have the same loan with different average term to maturity simply by structuring it with higher early repayments or with a cash sweep. The formula is as follows: Loan's average life $= \frac{\sum_{t=1}^{n} t \times DS_t}{L}$, where n is the total number of repayments, t is the time corresponding to the repayment, DS_t is the debt service in time t, and L is the loan amount. The following **Table 3** shows some alternative scenarios for the expected level of DSCR, loan's average life and sponsor's IRR by combining likely financial structures for Solentejo's project with different loan repayment profiles. In accordance to Banco Lusitano's structuring policies, these are based on a

P50 scenario, a grace period of 1 year, a fixed margin of 280 bps, a success fee of 2.0% and an annual administrative fee of Eur 62,500, to simplify the propensity to come up with several alternatives.

Facility Amount Leverage	**Tenor + Cash Sweep**	**11 years + 40% sweep**	**11 years + 80% sweep**	**13 years + 40% sweep**	**13 years + 80% sweep**
Eur 30.5 M D/E = 65:35	Min. DSCR	1.29x	1.29x	1.43x	1.43x
	Avg. DSCR	1.33x	1.34x	1.63x	1.61x
	Loan avg. life	6.11	5.58	6.44	5.58
	Equity IRR	8.47%	8.23%	8.64%	8.26%
Eur 36 M D/E = 75:25	Min. DSCR	1.11x*	1.11x*	1.25x	1.25x
	Avg. DSCR	1.12x	1.13x	1.45x	1.37x
	Loan avg. life	6.50	6.24	6.90	6.25
	Equity IRR	9.20%	9.28%	9.96%	9.51%
Eur 33.3 M D/E = 70:30	Min. DSCR	1.19x*	1.20x*	1.33x	1.33x
	Avg. DSCR	1.21x	1.23x	1.46x	1.55x
	Loan avg. life	6.31	5.92	6.68	5.92
	Equity IRR	8.40%	8.67%	9.29%	8.84%

**Recall that the loan proposal should satisfy a minimum DSCR of 1.25x under a P50 scenario.*

Table 3: Examples of some financial scenarios.

Which variables should be considered to test the robustness of Solentejo?

Having established a base case, both the Bank Groups and Sponsor Groups should assess the robustness of Solentejo to adverse changes in the key parameters that can influence operating cash flows, IRR and cover ratios. One method largely considered by banks is to verify how much each parameter needs to change until the minimum project's DSCR equals 1 (the break-even point). As a result, if the variation needed to trigger a project default – that is a DSCR lower than 1 – is so extreme that it becomes very unlikely, the project would prove sufficiently robustness in the face of events that could give rise to such changes. Although it is theoretically possible to generate an infinite number of scenarios, one must also limit this number to a manageable level. In what concerns solar projects, the reduction on the PPA sales tariff and its combination with an extension of the loan tenor are the parameters usually tested. As an example, the following **Table 4** tests the robustness of the Solentejo concerning those 2 parameters under a capital structure of 70:30 and a 13 years loan tenor with a cash sweep of 40% (one of the scenarios presented in Table 3):

	Base Case	**Worst case scenarios**	
		PPA tariff	*Combining the reduction on the PPA tariff with the maximum extension of the loan maturity*
Reduction (%)	-	-27%	-36%
Maturity (years)	13	13	15
Min. DSCR	1.33x	1.00x	1.00x
Avg. DSCR	1.46x	1.07x	1.06x
Loan avg. life	6.68	7.57	8.39
Project IRR	7.42%	4.68%	3.86%
Equity IRR	9.29%	4.31%	2.90%

Table 4: Sensitivity analysis results.

Discuss the 3 options available for Ana: i) Banco Agrícola Português; ii) International Chinese Bank; iii) Selling the license.[43]

The following **Table 5** summarizes some of the pros and cons that students might argue after comparing the financial proposal of Banco Agrícola Português with the one of International Chinese Bank.

	Banco Agrícola Português	**International Chinese Bank**
Pros	▪ Lower fee structure; ▪ Experience from two previous financing partnerships.	▪ ICB's terms matched the required funding and offered a substantially better financing conditions: ✓ Higher leverage; ✓ Longer tenor; ✓ Lower cash sweep; ✓ Margin is linked to the project performance; ▪ Higher equity IRR for Sun Ventures's shareholders.
Cons	▪ Rumors for not being 'hands-on'; ▪ Limits the payment of development fees as part of funding needs.	▪ No previous experience in the Portuguese renewable energy sector; ▪ Green Partners Group might not accept the Chinese alternative due to the following concerns: ✓ Unlikely to reach better financial conditions than the ones agreed with BuildSun (their subsidiary); ✓ The long-established partnership with First Solar; ✓ First Solar is also well-positioned among the top-10 PV module manufacturers.

Table 5: Comparison of the BAP and ICB financial proposals.

Regarding the option of selling the generation license, although the Case Study does not mention if there are any interested bidders, the license has an expected market price based on its PPA and the LCOE for the solar PV sector in 2014. Starting with the difference between the current feed-in tariff of 148 Eur/MWh and the LCOE of 104 Eur/MWh (according to **Exhibit 7**), the expected market price is 44 Eur/MWh. However, in order for it to be comparable with the value of the previous license, one needs to multiply this expected market price per MWh by the maximum amount of energy subsidized (also in MWh) allowable through the PPA. As a result, knowing that the PPA grants the feed-in tariff to the first 440,000 MWh delivered to the electrical grid (22,000 MWh per each installed MW), one might conclude that a fair price of the license in market terms as of 2014 would be Eur 19.36 M. Therefore, if Ana were able to sell the license at that price in 2014, Sun Venture's shareholders would get a return of 16.76% over a 2-year time horizon (recall that the license was purchased in 2012 by Eur 14.20 M). Nonetheless, it is important to stress out that this return can be either higher or lower depending on the expectations of the bidder in terms of its respective LCOE and risk perception of a possible tariff reduction.

[43] For class discussion, the instructor can show the summary term sheets of Banco Agrícola Português and International Chinese Bank (given in the "Sponsor's confidential" B-2 case) and get a few groups on the sponsor's side comment on how they thought about these proposals. Notice that the Bank Groups might be unaware of these offers.

5. Reflections on bargaining tactics

The Instructor might use the following to question students what they learnt from the simulation negotiation exercise:

- Which bargaining tactics were used by the Sponsor Groups? And the Bank Groups?
- When, if ever, would it make sense for the Sponsor Groups to disclose the existence of their offers from Banco Agrícola Português and International Chinese Bank?
- In a negotiation like this, would "hard-ball" tactics – for example, intransigent refusal to modify positions – ever make sense?

In the renewable energy as well as in the infrastructure sector in general, sponsors have to work with banks for a long time under long term financing contracts – there is no separation without compensation – so chemistry matters, as does setting the right tone for the relationship during early negotiations.

Assignment Questions

1) Prepare a diagram of the project, the main project Parties and the key project contracts.
2) Why is project finance adequate for solar power initiatives?
3) How does the current project financing landscape look like for banks?
4) How aggressively does Banco Lusitano de Investimento want to bid for Solentejo's project? Why? What do they want from this project in the future?
5) What criteria should Ana use to select a bank besides the quantitative figures such as loan pricing?
6) Please discuss project's risks and feasibility from the Sponsor's and Bank's specific perspectives.
    a. What are the risks associated with Solentejo?
    b. Have the risks been adequately managed and mitigated?
    c. What arguments can Ana use to overcome the top concerns of the Banks?
    d. What are Carlos top concerns and how could he overcome them?
7) Define and justify your base case scenario underlying your proposal as well as its robustness.
8) (*Only for the sponsor Groups*) If no agreement is reached with Banco Lusitano, what do you think would be your best option? The BAP financial proposal? The ICB's? Or would it be better to consider selling the license?

References

REN21. 2015. "The first decade: 2004 – 2014", 5 – 21.

IEA. 2014. "Technology Roadmap: Solar Photovoltaic Energy".

IFC. 2012. "Utility Scale Solar Power Plants: A guide for developers and investors," February.

Jordan, Dirk, and **Sarah Kurtz**. 2012. "Photovoltaic Degradation Rates – An Analytical Review." *Progress in Photovoltaics: Research and Applications*.

Gardner, David, and **James Wright**. "Project Finance," Chapter 12. HSBC.

Aasgaard, Anne. 2010. "Project Finance and Photovoltaic power plants." Master Thesis Norges Handelshøyskole.

IRENA. 2012. *Renewable energy technologies: cost analysis series*. Vol. 1: Power Sector, issue 4/5, *Solar Photovoltaics.*

U.S. Department of Energy. 2012. "SunShot Vision Study," February.

WSGR. 2010. "Project Finance Primer for Renewable Energy and Clean Tech Projects," August.

McKinsey. 2012. "Solar power: Darkest before dawn," May.

DBRS. 2014. "Rating Solar Power Projects," December.

SBC Energy Institute. 2013. "Solar Photovoltaic Factbook," September.

Bloomberg New Energy Finance. 2015. "Global Trends in Renewable Energy Investment 2015".

Canuto, Otaviano. 2014. "Liquidity Glut, Infrastructure Finance Drought and Development Banks." *The World Post*. May 11.

Bolger, Andrew. 2015. "Long-term investors eye project finance pot." *Financial Times*. January 28.

EY. 2012. "Liquidity constraints set to hamper project finance deals," February.

NREAP. March 2011. "Portugal 2020: National Reform Programme," approved by the Council of Ministers 20 March 2011, Chapter 5 - Sustainable Growth.

DGEG. February 2015 Renováveis – Estatísticas Rápidas. http://www.dgeg.pt/ (accessed May 16, 2015).

International Monetary Fund. "Portugal: Letter of Intent, Memorandum of Economic and Financial Policies, and Technical Memorandum of Understanding," March 28, 2014.

PPP Lusofonia. 2014. "Devil in the Divergence – energy trade deficit," August 9.

European Commission. "Quarterly report on European Electricity Markets," September 2014, 12.

ECOFYS, and Fraunhofer ISI. 2011. "RE-Shaping: Shaping an effective and efficient European renewable energy market", October 1, 2011, 34 – 46.

KPMG. 2011. "Basel III: Issues and implications".

Suggested readings

Gatti, Stefano. 2013. *Project Finance in theory and practice: Designing, Structuring, and Financing Private and Public Projects*. 2nd ed. London: Elsevier.

Raiffa, Howard, John Richardson, and **David Metcalfe**. 2007. *Negotiation Analysis: The Science and Art of Collaborative Decision Making*. Cambridge: Harvard University Press.

A Work Project, presented as part of the requirements for the Award of a Masters Degree in Finance from the Nova – School of Business and Economics.

FINANCING THE ALENTEJO SOLAR POWER PLANT – A CASE STUDY

ADDITIONAL APPENDIX

ANTÓNIO MIGUEL SOUSA NASCIMENTO BERNARDO | #669

A Project carried out on the Finance Area, under the supervision of:

Prof. Mariana Abrantes de Sousa

JUNE 2015

ADDITIONAL APPENDIX

Simulation Pool

Poll: Target outcomes for the Bank Groups

Before you begin bargaining, and before sending an email proposal to your Sponsor Group counterparty, please complete the following poll specifying your target outcomes for the negotiation. Your responses do not need to reflect your opening positions; they should represent realistic outcomes that you hope to achieve after bargaining. Note that this poll will be seen by your instructor only, not by your counterparty.

1. How much leverage are you proposing? Maximum facility amount? Minimum DSCR?
2. Maximum tenor of the facility?
3. Minimum Margin?
4. Minimum fees charged?
5. Minimum cash sweep?
6. Other provisions beyond the ones previously stated? If yes, please specify any other terms that you are targeting.

Poll: Target outcomes for the Sponsor Groups

Before you read the email with proposed terms sent by your Bank Group counterparty, please complete the following poll specifying your target outcomes for the negotiation. Your responses do not need to reflect your opening positions; they should represent realistic outcomes that you hope to achieve after bargaining. Note that this poll will be seen by your instructor only, not by your counterparty.

1. What is the minimum equity IRR are you targeting?
2. How much leverage are you targeting? Minimum facility amount? Maximum DSCR?
3. Minimum tenor of the facility?
4. Maximum margin?
5. Maximum fees charged?
6. Maximum cash sweep?
7. Other provisions beyond the ones previously stated? If yes, please specify any other terms that you are targeting.
8. If you cannot reach an agreement with Banco Lusitano de Investimento, which financing proposal will you select? A = Banco Agrícola Português , B = International Chinese Bank, C = Sell the license.

Poll: Negotiation outcomes

Please send only one poll response per team; the Bank Group side does not need to complete this poll.

1. Did you reach an agreement on the financing by Banco Lusitano de Investimento? If “no”, you can ignore all questions that follow. (A = yes, B = no)
2. How much leverage did you agree upon? Maximum facility amount? Minimum DSCR?
3. Tenor of the facility?
4. Margin?
5. Fees charged?
6. Cash sweep?
7. Please specify any other terms that you agreed upon.

Glossary

The instructor may distribute the following glossary with the assignment to facilitate the comprehension and analysis of the Case Study.

Affiliate	A foreign operation either a branch or foreign incorporated subsidiary. A corporation that directly (or indirectly) controls or is controlled by another corporation.
Agency Agreement	A legal agreement between a borrower, a group of lenders, and one or more agent banks governing the rights and responsibilities of the agent(s) in the transaction. The agency agreement is an integral part of a syndicated loan.
Agent	The bank responsible for administering a project financing.
All-In Rate	The interest rate including the loan spread, commitment fees, and other up-front fees.
Amortization	Reduction of capital or up–front expenses (capitalized) over time, often with an equal amount per annum.
Arranger	A bank or other financial institution responsible for originating and syndicating a loan transaction.
Availability Period	The period during which a loan is available for drawdown.
Available Cash Flow	Total cash sources less total cash uses before payment of debt service.
Average Loan Life	The average maturity for all repayments weighted by the principal outstanding
Bankable	Capable of being financed.
Base Case	A cash flow projection with variables measured at their expected values.
Base Load Plant	A power plant that runs all the time, as opposed to a plant that is used only in times of peak electricity requirements (a peaking plant).
Base Rate	On a variable rate loan, it is the key underlying rate to which lenders add a spread to come up with a total lending rate for the borrower.
Basel Accord	The Basel Committee on Banking Supervison's regulatory framework of capital standards for banks, established in 1988 to protect bank owners, depositors, creditors, and deposit insurers (e.g., Governments) against financial distress.
Basis Point	One-hundredth of one percent (1/100 * 1%, or 0.0001).
Break Even	The reduction of a project finance net cash flow to zero by changing an input variable such as the output price or input costs.
Capacity	The amount of energy, measured in kilowatts, that a plant or system is capable of producing.
Capital Expenditures (CapEx)	Long-term expenditures for property, plant, and equipment.
Completion	The date on which the project's cash flows become the primary method of repayment. It occurs after commissioning.
Completion Guarantee	A guarantee that ensures a project will achieve physical and/or financial completion. A turnkey contractor guarantees physical completion (achievement of certain operating performance). The guarantees are normally secured by performance bonds and/or penalties in the form of liquidated damages. Alternatively, project sponsors sometimes provide lenders with completion guarantees by agreeing to pay the scheduled debt service in the event the project company does not or cannot pay.
Commissioning	A test of the project's ability to perform as planned and generates the expected cash flows. In a limited-recourse deal, it is the time when the project moves from a full recourse to a nonrecourse financing.

Conditions Precedent (CPs)	A set of preconditions that must be satisfied before the borrower can request drawdown or other credit facilities be made available under a lending agreement.
Covenant	An agreement by a borrower to undertake (a positive covenant) or not to undertake (a negative covenant) a specific action. Breaching a covenant is considered an event of default.
Creditworthy	The risk of default on a debt obligation by that entity is considered low.
Current Account Balance	The current account shows flows of goods, services, primary and secondary income between residents and non-residents.
Cushion	The extra amount of net cash flow remaining after expected debt service.
Debt	The obligation to repay an agreed amount of money.
Debt Capacity	The total amount of debt a company can prudently support given its earnings expectations, equity base, and asset liquidation value.
Debt to Equity Ratio (D:E Ratio)	A ratio of a company's debt to its total capitalization. The higher this ratio the greater the financial leverage of the company.
Debt Service	Principal repayments plus interest and fees payable; usually expressed as the annual amount due per calendar or financial year.
Debt Service Coverage Ratio (DSCR)	A quantitative measure used by lenders to determine whether a project's prospective net cash flow from operations can support (make timely service payment on) a given amount of debt at the indicated potentially available terms. For any given debt service period, the debt service coverage ratio is defined as the cash available for debt service (CADS) divided by the total amount of debt service.
Debt Service Reserve Account (DSRA)	A reserve account set up to ensure the timely payment of principal and interest.
Default	When a covenant has been broken or an adverse event has occurred. A monetary default occurs when a repayment is not made on time. A technical default occurs when a project parameter is outside defined or agreed-upon limits, or a legal matter is not yet resolved.
Dispatch	The schedule of production for all the generating units on a power system, generally varying from moment to moment to match the production with power requirements. As a verb, to dispatch means to direct the plant to produce power.
Due Diligence	Bank lenders to a project will undertake a thorough assessment of the transaction which covers financial, legal, technical, and insurance aspects of the project in order to ensure that there are no undisclosed or potential problems.
Equity	In a project financing, the cash or assets contributed by the sponsors. In accounting, the difference between total assets and total liabilities.
Event of Default	Any event that entitles the lender to cancel a debt facility, declare all amounts owed by the debtor to become immediately due and payable, and/or enforce security.
Fee	A fixed amount or a percentage of an underwriting or principal charged as part of a financing.
Feed-in tariff (FiT)	A renewable energy policy that typically offers a guarantee of: i) payments to project owners for total kWh of renewable electricity produced, ii) access to the grid; and iii) stable, long-term contracts.
Financial Close	The date on which all project contracts and financing documentation are signed and conditions precedent to initial drawing of the debt have been satisfied or waived.
Financial Viability	The ability of a project to provide acceptable returns to equity holders and to service its debt on time and in full.

Financing Agreements	The documents which provide the project financing and sponsor support for the project as defined by the project contracts.
Force Majeure	An excuse for contractual nonperformance due to events beyond the control of either party. These events are either "acts of God" (floods, fires, or other natural disasters) or political risks (war, strikes, riots, expropriation, breach of contract, etc.). Contractual performance is forgiven or extended by the period of force majeure.
Full Recourse	No matter what risk event occurs, the borrower agrees to repay the debt. By definition, this is not a project financing unless the borrower's sole asset is the project.
Funding Risk	The impact on project cash flow from higher funding costs or lack of availability of funds.
Gearing	A measure of leverage such as the ratio of debt to equity or debt to total capitalization.
Grace Period	The period within which a default is resolved without incurring penalty interest or other charges. A period during which interest or principal is not yet payable; it usually occurs after startup, commissioning, and completion in a project financing.
Greenfield	Refers to a project being conceived and executed where no project company, assets, or operations exist. A greenfield site or project location is one where no infrastructure exists to support the project.
Independent Engineer (IE)	A consulting firm that helps lenders by evaluating the technical aspects of a project (e.g., completion schedule, technical feasibility, etc.).
Indicative Terms	The likely commercial terms upon which a bank will lend, subject to its internal credit approval or other conditions. It is not a firm offer to lend or arrange a loan.
Information Memorandum	A document that describes the project and the financing details; it is issued in connection with a loan syndication.
Interest Rate	The percentage payable to the lender calculated at an annual rate on the principal amount outstanding on a loan.
Internal Rate of Return (IRR)	The discount rate that makes the net present value equal to zero. Multiple IRRs occur mathematically if the periodic cash flows change signs more than once.
Joint Venture	A business venture owned by two or more other business ventures.
League Tables	A ranking of lenders and advisors according to the underwriting, final take, or number of project finance loans or advisory mandates completed during a given period.
Letter of Credit (LC)	A financial instrument issued by a financial institution for the benefit of a customer under which the financial institution agrees to pay money to the beneficiary thereof upon demand or upon the occurrence of specified event.
Leverage	The level of debt expressed as a percentage of equity or as a ratio to equity.
Limited Recourse	Under certain conditions (related to legal, financial, or operating conditions), lenders have access to the sponsors' credit or other legal security to fulfill a project's debt obligations. There is usually recourse in the event of fraud, misrepresentation, or nondisclosure. For this reason, and because lenders often have some kind of recourse prior to completion, nonrecourse is often described as "limited-recourse" financing.
Liquidated Damages (LDs)	Specific and limited amounts that a contracting party is required to pay to another contracting party in the event an agreed-upon area of performance is not achieved.
Load Factor	A utilities average demand as a percentage of peak demand.
Loan Amortization	The scheduled repayment of loan principal. A loan amortization schedule specifies the amounts of principal to be repaid and the dates on which repayments are to be made.
Loan Life Cover Ratio (LLCR)	The net present value of cash available for debt service (CADS) from the calculation date to the final maturity of the debt facilities divided by the principal outstanding on the calculation date.

Mandated Bank	The bank given the authority to proceed into the marketplace on behalf of the borrower, on the basis of the terms and condition set out in the mandate letter. The mandated bank is often referred to as the arranger in the Euromarkets and the administrative agent in the United States.
Margin	The amount expressed as a percent per annum above the interest rate basis or cost of funds.
Maturity	The final date a project finance loan is repayable.
Mezzanine Debt	Refers to a type of debt which is between senior debt and equity. The cost of mezzanine debt is greater than senior debt as there is more risk involved.
Negative Covenants	Promises by the borrower in a loan agreement to abstain from undertaking certain actions.
Nonrecourse	The lenders rely on the project's cash flows and security over the project vehicle's assets as the only means to repay debt service.
Operations and Maintenance (O&M) Agreement	A contract obligating a party to operate and maintain a project.
Positive Covenants	Promises made under a loan agreement by the borrower to undertake certain actions.
Power Purchase Agreement (PPA)	A contract for a large customer to buy electricity from a power plant. This is usually the most important contract underlying the construction and operation of a power plant.
Principal	The quantity of the outstanding project financing due to be paid.
Project Company	A special-purpose vehicle created to develop, own, and operate a project.
Special Purpose Vehicle (SPV)	An entity established for a particular purpose, such as obtaining off-balance sheet financing, gaining tax advantages, or isolating the sponsors' other assets from the project's creditors.
Sensitivity Analysis	Analysis of how changing an input variable in a financial model affects the value, performance, or solvency of a given project.
Shareholders Agreement	The generic term for any contract between two or more shareholders governing their conduct in relation to the corporation, or partnership, in which they own shares.
Stand-by equity	A standby commitment involving a specific amount of money callable by lenders for the purpose of covering cost overruns until completion.
Tenor	The number of years a loan is outstanding (i.e., the final maturity or term).
Term Sheet	A document that outlines in general terms the key agreements to be contained in a legal document; other terms loosely associated and often used interchangeably are a letter of understanding (LOU) and a memorandum of understanding (MOU)
Turnkey Contract	A construction contract that provides for the complete engineering, procurement, construction, and start-up of a facility by a certain date, for a fixed price and at guaranteed performance levels.
Warranty	A guarantee that a given fact will exist at some future date, as promised.

Sources:

- **HBS**. Project Finance Portal. http://www.people.hbs.edu/besty/projfinportal/glossary.htm (accessed Jun 1, 2015);
- **EIA**. Glossary. http://www.eia.gov/tools/glossary/?id=electricity (accessed Jun 1, 2015);
- **Gatti, Stefano**. 2013. *Project Finance in theory and practice: Designing, Structuring, and Financing Private and Public Projects*. 2nd ed. London: Elsevier.