

Advanced Modelling for Project Finance

For Negotiations and Analysis

Charles T. Haskell

- ① Project finance overview
- ② Modelling conventions and advanced Excel techniques
- ③ Project economics and selected financial maths
- ④ Workbook case study
- ⑤ Due diligence of case study



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About the author

Charles Haskell began his career with the Foreign Commercial Service Division of the US Department of Commerce in Lima, Peru, as a Commercial Assistant within local industry. His primary role was to help US companies identify and access investment opportunities within local industry. His first major project was with the natural gas field, Camisea. In 1997, Charles became a Financial Analyst Intern in project finance with the Overseas Private Investment Corporation in Washington. His role was to assist directors and senior investment officers with their project review. In 1998 he was appointed Project Manager with Wartsila Development and Finance, the in-house project developer and financier of one of the world's largest manufacturers of utility grade diesel engine power plants.

He was directly responsible for analysis, structuring, negotiation and documentation for a number of sizeable projects in the Americas. In March 2000, Charles became a Project Director with Mirant Europe, a Fortune 100 energy company based in Amsterdam. He was the functional lead on all aspects of asset development for both greenfield development and acquisition activities for EMEA.

Since 2003, Charles has been Managing Director of The Vair Companies, a financial and development advisory firm servicing the infrastructure industry. (www.vaircompanies.com)

He has a BA in Economics and French from Hanover College, a Masters degree in French from Middlebury College, and Masters degree in International Finance and Accounting from Thunderbird, The American Graduate School of International Management. Charles is fluent in French and Spanish and proficient in several European languages.

Preface

When I graduated from business school in Arizona, the primary responsibility in my first job was building models for power deals in South America. I can remember how my overriding concern was on coding the model, with little, to no, understanding of the commercial implications of what I was modelling. I never took the time to lean back and look at the model critically; and, my spreadsheet skills were not proficient enough for efficient modelling speed. As I was fortunate enough to gain more and more experience in project development, my modelling skills increased but the daily aspect of my modelling activities diminished. I was always struck at the lack of understanding that many developers and managers had with the intricacies of model. Seemingly, few upper management understood how easily fractions could be manipulated with weighty consequences. In short, developers with good commercial sense, but few spreadsheet skills, were asking modellers, with little commercial background and rudimentary spreadsheet skills, to put deals together. Good deals of course get done, but could they have been done more efficiently.

The main objective of this workbook is to help bridge those two gaps. Hopefully this book will demonstrate the technical aspects of spreadsheet modelling and the commercial aspects of what the model is producing. It is my belief that good advanced modelling for negotiations and analysis is both a left and right brain activity. Former participants on my classes will have heard me refer to this concept where the modelling is the 'tree', and the analysis is the 'forest'. The difficult part is being able move quickly from the 'tree' to the 'forest' back to the 'tree.'

If you have eight hours in a day to do the modelling and analysis activity, it is more efficient to spend two hours modelling and six hours analysing, than the other way around.

The workbook will assist the reader with some basic modelling techniques. These are techniques that should help increase your modelling proficiencies. With all due respect to some readers, modelling is a generational issue. I knew one CEO who was famous for reviewing analysts' hardcopy spreadsheets with his HP 12C financial calculator. To a person, each analyst would say that the CEO had a thorough understanding of the projects, and his financial acumen was greatly respected. However, the hours he spent reviewing in this fashion could have been reduced to a fraction if he could have navigated the spreadsheet program.

To the contrary, I have countless stories of analysts looking at the model so myopically that they could not take a critical view of the commercial implications of what they were modelling. The workbook should assist the reader to take a more critical and commercial view of what is being modelled. A model should not be a full employment program for some young analyst to demonstrate how clever they can be with coding. A model needs to have the coding required to analyse the problem efficiently and robustly, little more and/or little less.

Finally, it is my hope that the workbook will tie these two elements together, and demonstrate what a powerful and efficient negotiating tool the spreadsheet can be. I repeatedly tell my clients that people sign contracts and not models, but those contracts had better represent the expectations in your model, or somebody is going to lose money. Negotiate off your model, do not model off your negotiations.

Preface

I would like to thank a few people for their assistance with this work-book. All my former colleagues at Wärtsilä Power Development and Mirant Europe. I had the great fortune to work with bright, dedicated and conscientious people. Particular thanks to David Watson, Paul Smith, Rick Owen, Barney Rush, Chris Edwards and John Gallagher. I want to thank Richard ‘Chip’ Thompson and John Varholy of Troutman Sanders and Matt Hagopian and Stewart Salt of Linklaters for allowing me to ask them many legal questions in reference to the model and project finance. A special thanks to Simo Santavirta, formerly of Mirant, now with Intergeren and John Richter and Morten Siersted of F1F9. Their combined technical modelling assistance and input cannot be overvalued. I would also like to thank Elizabeth Gray of Euromoney Books who has been very gracious with her time and understanding as I put this book together.

Thanks also to the Euromoney family of companies that has given me a platform from where to present and to teach courses on these techniques. I want to thank all my clients at The Vair Companies for giving me the opportunity to put these techniques to work for the projects. And finally, a very warm and loving thank you to my wife and two children who allowed me to lock myself away in my office over the past months to compile this book.

Charles T. Haskell

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Amsterdam, The Netherlands

Module 1: Project finance overview

Introduction

All financial models that use an electronic spreadsheet generally have three basic components:

1. Inputs, or assumptions;
2. Coding engine, or 'The Black Box'; and
3. Desired outputs, or the results.

The genesis of a good model is an exercise in reverse engineering. The design, layout, coding and execution of the model should start with the primary goal of arriving at the third point above – the desired outputs. It should not be an exercise in 'an electronic stroll in the financial woods' to see where we will ultimately arrive.

The primary precept of this workbook is that there are two ways to approach a model and the deal that this model represents:

You can model off the negotiations, or you can negotiate off the model. You always want to be performing the latter, never the former.

A good dealmaker could use chess as a metaphor for the 'art of negotiations'. The better chess player will usually be able to assess the board quickly and plan a series of potential moves ahead using the available pieces. To negotiate a deal well, the negotiator must be able to take a dynamic view of the deal, analysing how a myriad of possibilities and probabilities can unfold. A good model should be able to reflect accurately and quickly the impact of these various possibilities and probabilities on the end result – the desired outputs. The more robust, dynamic and flexible the model, the more valuable it is to every stage of the deal process.

Therefore, to build an effective project finance model, the modeller needs to have a good understanding of the elements of project finance, not to mention an absolute understanding of the specific project that will seek approval and investors. Remember that, ultimately, it is the deal structure and its respective contracts to which investors will provide funds. The model is only a tool, albeit a very powerful tool, to represent the deal's timing, elements and contracts. Potential investors do not fund a model; they fund the deal, and its contracts, that the model represents.

Definition

Seemingly, every book on project finance starts with a definition. Since this is a workbook on a practical element of the process and not an academic study on finance, this workbook will not attempt to generate another variation of the definition:

A financing of a particular unit in which a lender is satisfied to look initially to the cash flows and earnings of that economic unit as a source of funds from which a loan will be repaid and to the assets of the economic unit as collateral for the loan.

Nevitt and Fabozzi, *Project Financing* (London: Euromoney Books, 2000)

Another definition is:

Project financing is an option granted by the financier exercisable when an entity demonstrates that it can generate cash flows in accordance with long-term forecasts. Upon exercising of the option, the entity's parent(s) or sponsor company(ies) balance sheet is no longer available for debt service. The assets, rights, and interests of

the development are usually structured into a special-purpose project vehicle (SPV) and are legally secured to the financiers as collateral.

Tinsley, *Advanced Project Financing* (London: Euromoney Books, 2000)

Richard Tinsley's definition tacitly describes the importance of the model, and both definitions help bring us to the workbook's next point:

Corporate finance is a balance sheet exercise. Project finance is a cash flow exercise.

This module will come back to this point in more detail later.

History

A broader view on the history of project finance usually incorporates centuries of discrete venture-by-venture financing. One of the more recounted stories is the Devon Silver Mines, whereby the English Crown negotiated a structure that allowed the project's initial capital provider, Italian merchant bank, Frescobaldi, to operate the mines for one year. The proceeds provided by commodities extracted were the only funds available to service the opportunity costs for Frescobaldi's capital employed. The monarchy would not provide any guarantees to the revenues from the mines. If revenue is defined by price multiplied by quantity, Frescobaldi was taking risk on both accounts: output risk (the quantity and quality of the mine extraction); and pricing risk (there were probably few hedging instruments related to the pricing of silver in 1299).

The modern project finance structure emerged in the 1970s. It was used

as a financial method to provide funds for large natural resource projects. With the introduction of the United States' Public Utility Regulatory Policy Act in 1978, known as PURPA, project related financings witnessed a rapid expansion by the advent of the Independent Power Producer (IPP) in the 1980s. Today a host of large, capital intensive projects seek funds via project financing. With each passing year, and every deal, the project financing community learns more and more about the risks associated within targeted industries and previous structures. Academics are now starting to examine the historical performance of project financing:

The limited empirical evidence that exists on project performance, however, shows that projects, particularly the larger ones with greater public sector participation, do not exhibit medium to high success rates. Instead they often exhibit budget and schedule overruns, and low equity returns.

Esty, 'Returns on Project-Financed Investments: Evolution and Managerial Implications', *Journal of Applied Corporate Finance*, spring 2002

This study continues to underscore the importance of the model to represent accurately the project financing's complexity of risks, allocation of those risks, coupled with analysing and negotiating the proper structure for risk mitigation by those parties that can best shoulder them.

Corporate finance versus project finance

In its simplest form, corporate finance is a balance sheet exercise based on the creditworthiness of an ongoing entity. Project finance is a pro forma of the cash flows exercise based on a project's future ability to generate adequate cash, providing sufficient economic rent for the opportunity

costs of the capital provided. This incremental waterfall, or cascade, of cash payments and disbursements, against incremental revenues, supports the 'cash is king' mantra of project financing.

Generally speaking, corporate finance is related to an entity that has an operating record and a suite of historical financial statements that outlines its past performances. By applying financial statement analysis and credit ratios to these historical statements, this process can assist investors on their decision to provide additional levels of requested capital, and with an associated opportunity cost. Credit agencies use a variety of ratios and analysis to arrive at their bond and credit rating systems, but it must be said that significant weight is placed on the entity's total debt to total assets in this analysis, thus on the entity's balance sheet.

After Enron's demise, credit agencies instructed other merchant power players that, to maintain current credit rating levels, they needed to address their, then, capital structure by reducing debt. While some of these players had significant ownership and control of power plants and other infrastructure assets, of which many were based on project financing with limited recourse back to their balance sheets, their trading platforms were highly contingent on maintaining investment grade credit ratings from the reporting agencies. So the process of merchant power companies strengthening their balance sheets by using cash proceeds from monetising interests in real assets to reduce corporate debt levels became an omnipresent event in 2002 and 2003. (Ultimately, many of these companies were downgraded, even after trying to comply with the agencies' requests, spawning yet another round of corporate bankruptcies and receiverships.)

Project financing, on the other hand, depends on the deal's representa-

tion in the pro forma financial statement for its numerical analysis base. By definition, a newly formed entity with a single-purpose greenfield activity has no existing historical balance sheet to analyse. The traditional project finance loan structure will rely on the project's cash flows as the primary source of repayment, with limited recourse back to the sponsor(s). The project's, not the sponsor's, assets, rights, obligations and interests are held as collateral, or security, for repayment of the loan. This is why project finance is sometimes referred to as asset-backed financing. Projects tend to have large, capital intensive, fixed assets (upon completion) that usually comprise the vast majority of the asset side of the balance sheet. The project will try to maintain few current assets. Current assets tie up cash that otherwise could be distributed.

The above paragraph may seem counter-intuitive to the statement that project finance is a cash flow exercise. As stated, projects of this nature have a propensity to be large, stationary infrastructure assets with little, or no, ability for site mobility. So, while project financings may have more elements of the mortgage-style financial instruments than many corporate financings have, it is the ability for that asset to generate cash that makes it attractive to potential lenders and investors, not the book value or replacement of the asset.

However, to say that project finance does not have an element of balance sheet and credit analysis would be simplistic. Projects, and their projected cash flows, are contractually intensive structures that rely on the various counter-parties' abilities to perform their obligations in accordance with their respective contracts' terms and conditions. Most projects are long-term affairs, so the creditworthiness, operating history and perceived longevity of the project's contracted goods and services providers is paramount.

Rationale

Given Dr Benjamin Esty's rather gloomy outlook (above) on project returns, why would any participant 'rush in where angels fear to tread'? If financial theory has taught us anything, the quick answer should have some basis in the risk versus reward profile, or 'fear versus greed'. If Dr Esty's study is correct and the returns have a great statistical variance (with an inferred negatively skewed curve to the left), then the second part of the equation should hold true: there is a statistical possibility of great returns. In a covered project (where there is party that has contracted to buy the output; more on this in Module 3), many upside potentials are contracted away in exchange for potentially higher gearing. If debt is cheaper than equity, the trade-off for increased leverage from project finance with its higher cost of debt rates should provide higher equity returns and liability limitations to project ownership.

Therefore, if it can be argued that the incentives for the differing participants are, at their core, embedded in this financial theory of risk versus reward, then a good model must be able to reflect the quantitative portion of these risks and to give insight to the qualitative aspects of the project's risks. The following paragraphs are not meant to give an exhaustive view of project financing rationales, but are to serve simply as a highlight of the more obvious advantages.

Equity

Let us assume for a moment that the project developer and the equity sponsor are one and the same. The number of contemplated developing projects that actually reach financial close, and a commercially operating date, are minuscule. By taking a portfolio approach to these projects, a developer can dilute the effect of the unrealised projects' expensed losses

against the rewards of successful projects. So it follows that if the development dollars at risk are statistically great, then the successful project's offsetting rewards should serve to counterbalance the basket of losses.

The most obvious way to increase the project's equity returns is by using a higher debt leverage ratio, or 'other people's money'. The higher the debt-to-equity ratio a project can sustain, the higher the equity-related returns will be. Also, in the short run, by using large amounts of debt capital in a project, equity may be able to advance good projects that otherwise it may have had to forego due to internal capital constraints.

There is also a credit consideration for equity's balance sheet. In theory, if a project is a well-structured, non- or limited-recourse entity, the debt may not be directly consolidated on the owner's balance sheet. This 'notes' approach to project debt allows the corporate capital structure to maintain certain required levels of debt to equity.

One overriding concern is the ability to shift a substantial amount of the project's risk to the other participants. Once a project has reached the required completion tests to obtain non-recourse financing, then the sponsor's guarantees and its balance sheet are no longer burdened by recourse-related obligations. This can be a very attractive prospect for equity.

Debt

Credit spreads on project debt are greater than corporate financings. There is a substantial amount of discussion in project financing as to whether the credit spreads adequately compensate the risk incurred by the lending community. The fact is that there are many commercial lending institutions

that continue to choose to participate in project financings. If one believes in Adam Smith's 'Invisible Hand', and that the market will find its equilibrium, then these spreads will adjust to correct levels for the risks, or the rational investor will not continue to participate.

It is important to note that lenders do not only make their money from the credit spreads, but from the host of additional fees and costs that are part and parcel of project financing. These upfront fees will significantly bolster the present value of the lender's debt facility from a Time Value of Money (TVM) perspective. Also, lenders can structure instruments, or 'sweeteners', which may create upside potential for the bank(s) and other financial institutions.

For those projects that cannot access commercial debt due to perceived unacceptably high levels of risk, these projects are forced to find alternative means of financing. The multilateral, bilateral, export credit agency and development bank lending communities provide this alternative avenue. Their mandate can be generally described as more political in scope and nature than commercial. However, many project sponsors will probably say that the 'lender of last resort' communities' ultimate all-in costs are more expensive than the commercial lenders. If this is the case, then it generally follows that the price of this debt is also more in line with the risk.

From a control standpoint, a project's lending documents exercise greater control over the entity than traditional corporate financings. The loan covenants are designed to give the bank greater monitoring over the project's activities and signal early to the lender(s) when things may appear to be going wrong.

Suppliers

Project finance is generally used to finance infrastructure projects. Infrastructure projects tend to be high-ticket items. Suppliers of goods and services will want to access a portion of those perceived spoils. However, it comes at a cost to all the participating parties in the negotiation: higher priced contracts for the project company; and greater risk assumption for the suppliers.

Performance of the suppliers is critical to the process. Sponsors and lenders will take comfort in those players who have a strong operating history, with proven technology, and a substantial balance sheet to support their contractual obligations. This makes it more difficult for new participants to break into the existing club of players, and it has all the elements of an oligopolistic market over a pure competitive market.

The experienced equity lender and supplier should forego the allure of 'low-hanging fruit'. Unless there is some explainable reason for the anomaly, a project and a price that are too good to be true generally are. A sponsor, or a potential supplier, that has substantial available resources but little to no project experience (or has not hired a staff with significant project experience) may appear on first blush to be an attractive counterparty. As the intricacies of deal start to unfold, the education of these neophytes usually ends up being more expensive than contracting with a proven entity.

Sponsors and lenders need not be fooled that they are above this same scrutiny. When project developers request pricing proposals from respective suppliers, these suppliers will also review the developer's history. Pricing sensitivity is a considerable issue in industries where there are few players. Equipment manufacturers, contractors and suppliers of raw

materials will be particularly sensitive to having their pricing structure, and associated contractual terms and conditions, openly disseminated to the market. If the supplier does not believe that the developer can see its project to fruition, the supplier(s) may become extremely cagey about providing a high level of detail in their initial response to a developer's Request For Bids (RFBs). All parties need to understand the elements of this contractual negotiation's 'cat and mouse' game starting at its inception, or there are higher probabilities that the project will be at peril in the latter stages of development and financing.

Project finance is a contractually intensive process. The need, or 'necessary evil', for third-party suppliers, particularly lawyers, cannot be underestimated. There is big difference between, 'How much is that widget?' and 'How much is it to have that widget installed by this date, at this lump-sum cost and performing within these parameters with associated guarantees? And by the way, if it does not meet these requirements, you will need to pay this much until the problem(s) is rectified.' The static response to the first question is a specific number. The dynamic response to the second question is, 'It could cost this much if these are the parameters, or it could cost this much if those parameters change; and by the way, who determines if the changes are required and we have finished it to the specifications discussed – you, me or an independent third-party expert?' If things go wrong, the above scenarios have all the classic elements for a long-drawn-out, finger-pointing session of, 'he said, she said'.

To the extent possible, these are quantitative risks that the model must be able to represent. These risks have associated opportunity costs for the project parties. Like the waterfall payments of cash, there is a sequential flow of risks to the responsible parties. If the supplier does not cover the risk contractually, then the risk falls to the lender. If not the lender,

then the final risk holder is the equity. As can be imagined, a tightly written suite of project and financing documents can help address and mitigate many of these issues. Experienced project lawyers, engineers and consultants, while expensive, are money well spent if they can stop the potential of, even more expensive, arbitration proceedings.

Government

As stated, most project financings are infrastructure-related projects. Governments, like any other entity, suffer from capital constraints. Some countries may also suffer from a shortage of technological know-how and a lack of an existing efficient infrastructure. Some level of private sector involvement can be an attractive alternative to strict public sector initiatives for governments seeking new or expanded infrastructure.

This desire for Foreign Direct Investment (FDI) by developing countries can provide some unique challenges. Many lenders will require that these governments agree to project credit enhancements, such as side-letters, currency convertibility guarantees and other guarantees to the performance and payment of the contractual parties, particularly the offtaker. In addition, some lenders will require Political Risk Insurance (PRI), adding greater expense burden to the project. Ultimately, many of these costs get passed through to the end-users. The resulting cycles are more expensive marginal and average unit pricing to those countries that can least afford it.

Unless some tax holiday is negotiated, there is a tacit relationship between the government and the project as a tax collector. Infrastructure projects are widely used at every level of a country's population and industries, making it an ideal candidate as an efficient revenue collector.

In a capitalistic society, entities (and perhaps individuals) measure success on the accumulation of currency units; the politician's currency is votes. Public utilities have an emotional element to them and a project's longevity is more likely than not to transcend election cycles and changing political power. One election cycle may have candidates touting, 'Look at the infrastructure that we have provided for you,' while the next may have candidates retorting, 'Look at the infrastructure that they have saddled on your backs'. Most people in project finance will be aware of the chronological order of events in India's Dabhol project. A project should make fundamental economic sense to the market that it will be serving.

Appropriate project size

'The solution to pollution is dilution.' The initial capital costs that are incurred to ensure a successful project can be divided into two basic components: 'hard costs' and 'soft costs'. The majority of hard costs can be classified to the direct construction or acquisition of the SPV's fixed asset, like the Engineering, Procurement and Construction (EPC) component and land. Soft costs are the other initial capital expenditure (capex) items, such as fees, expenses and taxes. Experienced project financing players know that the soft costs involved to close a deal successfully do not vary widely, no matter what the project's size. In addition, these soft costs are generally associated with the project's development phase, where moneys are at their greatest risk.

Is there a critical mass, or ratio of soft costs to hard costs, that will justify project financing, or conversely make it uneconomical? There are probably as many answers as there are projects. In the end, the sponsor's answer should be rooted in an analytical exercise of the projected costs in relation to the projected returns using all the available financing and

capital structures. An important consideration point must include to where the sponsor is willing and able to park the 'basket of risks'.

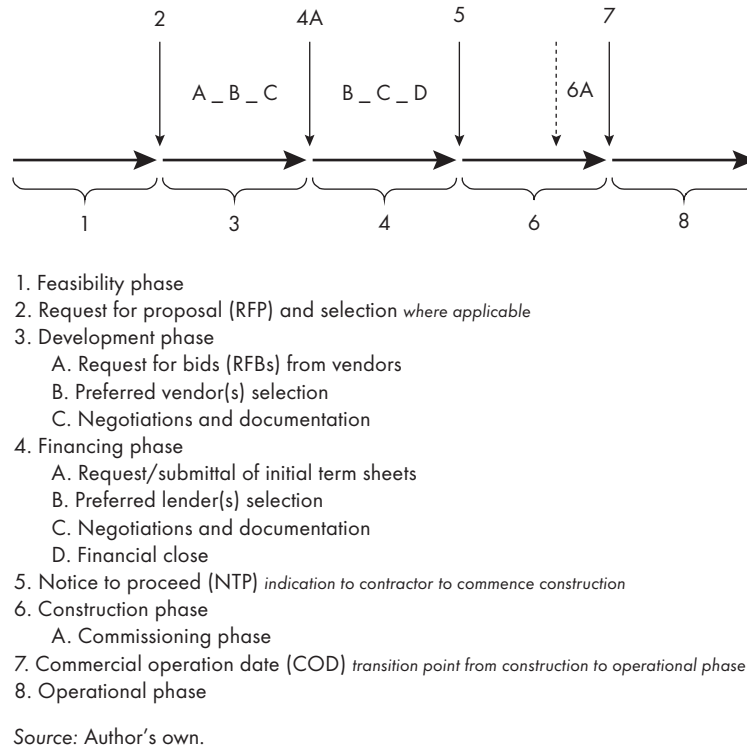
Many other arguments have been made for the pros and cons of project financing. However, the underlying theme of this workbook is that a good model is a powerful tool to assist with the analysis and the negotiations, so we will concentrate on those points that highlight that theme. The penultimate analysis is the risk versus reward profile. To a certain degree, the model should be able to address all the rationale components for either doing or not doing a project. The static view of the model is that it produces returns and ratios. The dynamic view of the model is that it can provide valuable insight to the negotiated allocation of the participating parties' risks and rewards. In his twilight years, in a response to a journalist's description of the refinery business' technical advances since Standard Oil was first incorporated, John D Rockefeller remarked, 'you know, I never cared much about the technology, I just wanted to know how it would make money'.

Project timelines

A project will go through many phases and the model must be able to grow with each of those phases. The timeline illustrated in Exhibit 1.1 is for a greenfield project. If it were a project finance used for acquisition, the construction portion and certain elements of the development phase would naturally be extracted.

Exhibit 1.2 can be viewed in two sections, before and after Notice To Proceed (NTP). The major model points before NTP are designed to discuss how the model's life evolves. The major model points after NTP are

Exhibit 1.1: Project timeline



designed to discuss the key elements that should be incorporated in the model. This workbook is intended to discuss the life of a project model until it reaches financial close, or a financing model. It is not meant to discuss an electronic model used for tracking the project's milestones after

financial close, or a monitoring model. However, it must be noted that the financing model may well be the basis for the monitoring model(s). Exhibit 1.2 is used to highlight some major timeline points and risks for a green-field/brownfield project with construction concerns.

Risks

Project finance continues to evolve as markets change and practitioners learn from past deals. As can be imagined, this means that the 'basket of risks', and how to address them, becomes increasingly substantial and complex. It can be said that present deals do 'pay for the sins of their fathers'. However, it is also important to note that deals continue to get closed and the participating parties have learned to be malleable where they must. By way of example, directly after the September 11 attacks on New York, Washington, DC and Pennsylvania, the insurance industry was no longer prepared to provide the same level of coverage and the same level of premiums to the infrastructure industries. This presented a challenge to the project finance sector and to its traditional security package insurance coverage requirements. The insurance market metamorphosis had a direct impact on the financial and guarantee requirements for both sponsors and lenders. With time, the challenges were addressed and projects continued to secure insurance and financing.

How can risk be defined? For purposes of this workbook, risks are defined as:

The probabilities and possibilities of a deviation from an expected outcome.

Exhibit 1.2: Timeline and risks

<i>Phase or event</i>	<i>Action items</i>	<i>Major risk(s)</i>	<i>Major model points</i>
1. Feasibility	Produce a general and high-level analysis for a 'go', or 'no go' decision on project	• The parameters of the feasibility are broad and raw • Decision process is based on uncertain assumptions • Project's ending results may not meet the sponsor's capital requirements • The project will not be able to find adequate lending capacity	• Usually a quick and basic analysis is required • Assumptions are based on target values • The cornerstone for a more robust model • Give a sensitivity view of the outputs in relation to their broad assumption drivers
2. RFP	When applicable, a sponsor will submit a proposal to win a bidding process, allowing the ability to pursue project	• Assumptions for bid submittal too aggressive • In the long-run, unrealistic and ultimately the project may not meet the sponsor's return requirements • RFP may require certain guarantees, like bid bonds, letter of credit (L/C) or other performance guarantees, that can be at risk if the sponsor does not finish the project	• Generate a specific number(s) to meet the bid request, generally a tariff
3. Project development	Compile all necessary elements to finance, construct and operate the project	• Project does not reach completion • Any return on development money never realised	• Forward-looking model that easily reflects existing and future developments • Balance between a robust representation of potential scenarios and an ease of use
A. RFBs	Prepare documents to which suppliers bid	• Insufficient number of suppliers	• Provide basis of bid requirement benchmarks, particularly supplier performance guarantees

Exhibit 1.2: Timeline and risks continued

<i>Phase or event</i>	<i>Action items</i>	<i>Major risk(s)</i>	<i>Major model points</i>
B. Preferred vendor selection	Review bid responses and select preferred bidder (while prudently selecting and notifying a secondary bidder)	• Initial bids are much greater than initial base case assumptions • There are no return bids	• Run sensitivity analysis of the bids in the model • Review guarantees in comparison to future financing requirements
C. Negotiations and documentation	Finalise and document negotiations with terms and conditions that will attract lenders and meet shareholder's return requirements	• Final pricing is cost prohibitive • Guarantees are not sufficient enough for non-recourse financing • Sponsor will need to enhance credit of the project with Parent Company Guarantees (PCG)	• Support negotiation process • Show impact of negotiating pricing process on project returns and ability to attract financing • Accurately reflect the final project documents
4. Financing	Prepare all documents and presentations to attract potential lenders. General series of documents and presentations are: • Teaser • Confidentiality Agreement (CA) • Information Memorandum (IM) • PowerPoint presentation to potential lenders	• Project will not generate sufficient interest from the lending community	• Sponsor's final base case model to lender accompanies IM
A. Term sheet	Two routes: 1) prepare term sheet to which lenders bid; or, 2) request term sheets from lenders.	• Project will not generate sufficient interest from the lending community	• Provide basis of financing goal benchmarks for the sponsor
B. Selection of lender	Review term sheet responses and select preferred lead arranger (while prudently selecting and notifying a secondary lender)	• Term sheets terms are much greater than initial base case assumptions • There are no return term sheets	• Run sensitivity analysis of the term sheets in the model • Review credit enhancement requirements in comparison to suppliers' guarantees

Exhibit 1.2: Timeline and risks *continued*

<i>Phase or event</i>	<i>Action items</i>	<i>Major risk(s)</i>	<i>Major model points</i>
C. Negotiations and documentation	Finalise and document negotiations with terms and conditions for financing	• Final pricing is cost prohibitive • Credit enhancement and security package requirements are not non-recourse financing	• Support negotiation process • Show impact of negotiating pricing process on project returns • Accurately reflect the final credit facility
D. Financial close	Funding of the project	• Lead arranger cannot find sufficient funds and has not taken syndication risk • No dovetail between construction loan and term, or actual project finance, loan	• Final and agreed-upon model from all parties for financing
5. NTP	Release construction firm to start building	• Complications on site access • Complications on importation of required goods	• Starting point for most loans and draw-down section of the loan
6. Construction		• Time and budget over-runs	• Show construction milestones for draw-down on construction loan • Calculate Interest During Construction (IDC) and other construction related fees
A. Commissioning	The point where the project is mechanically, or substantially, completed and can start testing its ability to meet contracted technical requirements	• Performance is not as contracted	• Introduction of working capital issues • Start of transitional phase from construction contract to operations contract
7. COD	Generally the point where the project transitions from a construction loan to a term loan	• Cannot meet completion requirements • Suppliers must meet their guarantee requirements like: bonds, letters of credit, and liquidated damages • Sponsor must meet shortfalls in guarantees	• Calculate the transition from construction loan to term loan, including the reduction of any contingencies, escrow accounts, letters of credit, or any other financial instruments that have an impact on the financial model

Exhibit 1.2: Timeline and risks continued			
Phase or event	Action items	Major risk(s)	Major model points
7. COD continued		• Project goes beyond long-stop date(s) and never reaches completion	
8. Operational	Project meets all its completion tests and is generating cash flow to service suppliers, employees, taxes and capital recovery	• Shortfalls in projected cash flows and project goes into default	• Calculate the suite of financial statements • Waterfall of cash-flows accurately represents the project

Source: Author's own.

Probability and possibility have been used for a specific reason in this definition.

A rather famous Kentucky lawyer was once in court for refusing to pay his office's utility bill. The bill was 12 times its normal and uniformed monthly charge from the past 30 years, in real pricing terms. The lawyer contended that a malfunction must have occurred within the utility's billing system. The suit went to court and, upon cross-examination, the younger lawyer for the utility stated to the defendant: 'But sir, you are a distinguished lawyer in our state, you must concede that the possibility exists of a window accidentally been left open; or perhaps, another appliance malfunctioned in your office and used an inordinate amount of electricity.' To which the defendant retorted: 'You see, you are thinking like a lawyer. I was an engineer in the United States Navy for 10 years before I went to law school, so they got me too late. The possibility, perhaps; the probability, absurd.' (As an aside, the defendant lost the case.)

The anecdote is used to illustrate a dire pitfall in models and modelling. Even if all the coding is accurate, the model is only as good as its assumptions. The model users need to take a commercial view of the project and not accept assumptions on blind faith. The modeller and the model's users must continuously verify and understand the basic mechanics behind each assumption and resulting outputs. Is there a risk of a deviation from the expected outcome? Is that risk possible, probable, or is it both?

Continuing with the definition of risk, it is important to extract the pejorative connotation of the word. The *American Heritage Dictionary*, 3rd Edition, defines risk as 'the possibility of suffering harm or loss'. In statistical measures, if the deviation around the mean is a standard bell curve, then there are equal probabilities of both upside and downside potential. If it is the negatively skewed curved risk with limited or no upside probability potential, then that must also be closely examined. There is usually a party that is willing to shoulder that risk, but for an appropriate reward.

This risk to reward profile is as critical to a model's analysis as is the model's generation of cash flows. If the appropriate supplier does not shoulder its risk, then the ultimate holder of the risk will be equity. Equity must take a prudent view of whether the risk to reward profile is in line with its capital requirements. However, lenders will assume these risks before equity, and lenders have a different view of acceptable risk. If the primary goal of equity is a non-recourse project to the sponsors, an appropriate risk distribution structure is the overriding issue to achieve proper project financing.

For example, a project may have a currency mismatch between its revenues and its capital recovery repayments. If currency devaluation occurs, the event may trigger a loan's negative covenant by the debt service coverage ratio (DSCR) falling below the specified rate. Perhaps this will trigger a lock-up in equity's distribution of funds; or worse, it creates a shortfall in the project's ability to service its incremental debt payments. If no hedging instrument has been put in place, equity may have taken the view that there is an acceptable distribution probability around the mean. By not incorporating a hedging instrument, equity believes the greater risk is acceptable with relationship to greater potential for reward. In this case, equity is willing to take the downside risk with an upside potential. It is doubtful that lenders will take the same view of this risk. If the available answers are binary and between procuring a hedging instrument or a sponsor guarantee, then one is a non-recourse financing and the other is not.

Lenders and sponsors will have different methodologies of describing and addressing project risks. Seemingly, by placing an adjective in front of the word 'risk', you have a new 'risk'. But generally speaking, project and financing risks in this industry can be categorised in 15 to 20 components.

Exhibit 1.3: Cashflow risk matrix

	16 risks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Supply/traffic/reserve																
	Market																
	Foreign exchange																
	Operating: technical																
	Operating: cost																
	Operating: management																
	Environmental																
	Infrastructure																
	Force majeure																
	Completion																
	Engineering																
	Political																
	Participant																
	Funding/interest																
	Syndication																
	Legal																
Quantity (Capacity x Output) x Price(s)	6	6	6				6		6								
= Revenue																	
Less: Gas expense			6	6	6		6	6			6						
Variable operating expense			6	6	6		6	6			6						
Fixed operating expense			6	6	6	6	6	6			6						
= Earnings before interest, taxes and depreciation (EBITDA)																	
Plus: Project loan			6												6	6	
Equity													6				
= Total sources																	
Less: Capex	6		6							6	6						
Change in working capital		6			6												
Interest			6							6				6	6		
Cash taxes												6					
Principal repayment			6						6								
= Total uses																	

Source: Adapted from Tinsley, *Advanced Project Financing*, (London: Euromoney Books, 2000).

Exhibit 1.4: Documentation/contract risk matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16 risks	Supply/traffic/reserve	Market	Foreign exchange	Operating: technical	Operating: cost	Operating: management	Environmental	Infrastructure	Force majeure	Completion	Engineering	Political	Participant	Funding/interest	Syndication	Legal
Concession								6	6	6						6
Government support			6					6								
Implementation agreement									6	6	6					6
Comfort letter (government)											6					6
SPV/JVA				6	6	6			6	6	6					
Completion support								6			6					
LSTK EPC	6								6	6						
Performance bond									6							
Maintenance bond			6													
Insurance and LDs	6							6	6	6	6	6				
PPA/Sales contract		6	6		6								6			
Fuel supply agreement	6				6											
O&M agreement				6	6	6	6									
Environmental warranties							6									
Environmental permits							6						6			6
Information memo		6								6	6	6		6		
Loan agreements								6	6					6	6	6

Exhibit 1.4: Documentation/contract risk matrix continued

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16 risks	Supply/traffic/reserve	Market	Foreign exchange	Operating: technical	Operating: cost	Operating: management	Environmental	Infrastructure	Force majeure	Completion	Engineering	Political	Participant	Funding/interest	Syndication	Legal
Political risk insurance												6				
Intercreditor agreement															6	6
FX hedging/swaps			6										6			
Offshore proceeds accounts			6									6				
Reports																
Insurance	6		6						6	6		6				
Traffic/reserves	6															
Engineering										6	6					
Environmental							6									
Tax												6		6		
Accounting													6			
Mortgages/charges																6
Trustee agreements												6	6			
Cross charges		6			6							6	6			
Permitted charge												6	6			
Legal opinion								6				6				6

Source: Adapted from Tinsley, *Advanced Project Financing*, (London: Euromoney Books, 2000).

Tinsley's matrices in his *Advanced Project Financing* book do a good job of describing the impact of risk(s) on cash flow and documentation (see Exhibits 1.3 and 1.4).

The following paragraphs will give a basic and broad overview of some project risks. It is not a comprehensive description of all the possibilities. There is a fine line between formal actuarial risk management and how project participants price goods and services and capital return requirements. It is usually based on experience, historical data and perceived future event possibilities for specific projects. Proper project risk analysis is where art meets science.

Supply risk

Supply is the raw materials and/or inputs that a project may require to perform commercially. The major risks associated with supply are: quantity, quality, price, duration and deliverability. In a covered project, the supplier of goods and services will guarantee a fixed price to deliver a specified number of quality controlled units for a set time period. One structure that can shift the supply risk away from the project is a tolling arrangement, whereby the contracted offtaker takes the supply risk and the project agrees to guarantee the conversion factor. A good example is a tolling agreement with a power plant project, whereby the plant converts a fuel to power, such as a molecule of gas to a kilowatt hour of electricity. Simply put, an offtaker agrees to pay a fee for the plant's ability to convert the fuel to electricity. The offtaker is responsible for providing the fuel and taking the electricity. The plant guarantees the ability to convert the fuel to electricity at a certain factor, usually based on the calorific content and make-up of the fuel and the plant's conversion rate. This conversion concept will be examined in greater detail later in the workbook.

Market risk

Market, or demand, risk is the risk that the project's produced good or service will not find a sufficient amount of purchasers in the market at the required price. The major risks associated with the market are: price, quantity and duration. As is described in our Devon Silver Mines example above, revenue is equal to price times quantity. In addition, for how many years can the project's good or service generate this revenue stream? At its most base strategy, a project can elect to follow one of two avenues: either a contracted offtake or submit to market forces. With a contracted offtaker strategy, the offtaker takes the market risk, including both upside and downside potential. Naturally, if the project elects to take the market demand, then this risk stays with the project. By contracting away the market risk to an offtaker, the project secures a steady revenue stream. Now the shift is from a market risk to a credit risk of this offtaker. Both lenders and sponsors need to take a prudent view of market versus credit risk with concerns to the offtaker. If the project can coerce an offtaker to agree to an uneconomic long-term contract, the project may be just postponing future market risk with more complicated ramifications. The offtaker could wither under the weight of the contract, setting up a future contract renegotiation situation, or worse, contract default.

If we take this scenario one step further, the project may have hurt its returns twice. If the regulatory and market frameworks do allow for open trading, the project contracted away any upside market potential in the earlier years, while taking the market risk, by default, in the latter years if the contract is reopened, or worse, defaulted. Couple this with a heavy debt service burden usually associated with highly geared covered projects, and the unexamined contracted offtake strategy is not the panacea that it may initially appear to be.

Currency, or foreign exchange, risk

When a project's revenue stream is generated in a currency other than the currency required to repay suppliers, lenders or equity, then the project may have a currency, or foreign exchange (FX), risk. If the project cannot find an economic hedging instrument that allows the project to match currencies at a fixed rate, and the revenue's currency devaluation occurs, then a risk in the shortfall of converted cash to service any combination of suppliers, lenders and equity may occur. Note that the description above uses 'an economic hedging instrument'. Financial theory (particularly the Black, Scholes, Merton Model) prices derivative contracts on five basic components: 1) S , value of the underlying asset; 2) X , exercise price of the underlying asset; 3) $T - t$, time to expiration; 4) r_f , risk-free rate of return; and 5) σ^2 , variance of returns on the asset.

A sensitive component to the premium pricing is the asset's volatility with regard to the expiration date of the hedging instrument. Remembering that financing for projects is usually a long-term affair, and efficient hedging instruments have much shorter lifecycles, it is easy to see how FX hedging instruments can become uneconomic rather quickly. To add to the complication, most models employ the purchasing power parity (PPP) method to forecast currency exchange rates. PPP uses the relationship of the two forecasted currencies with regards to their respective project-countries' inflation rates to present future exchange rates. This is the equivalent of arguing about 'how many angels are on a pin head'.

As we shall see in later modules, the forecasting of an escalation has a substantial impact on a model. The novice modeller, and more importantly the novice reviewer/decision maker, who does not understand the impact of escalation on a nominal model can be easily duped by changing inflation projections a few basis points to achieve small requirements

in return. Furthermore, it is a difficult assumption to argue, with many practitioners using the theatrical performance of throwing up their hands and saying, 'If I could accurately predict that for the next 15 years, I would not be in this crazy business, I would be a billionaire currency trader like Soros.'

Operation risk

Operation risk can be identified in two primary areas: technical and managerial. For the sake of this workbook, these two risks shall be aggregated and focus will be placed on the technical component. The managerial component is a difficult risk to model. It is assumed that the project's sponsor(s) will choose an operator with a strong track record, including managing the project during the operational phase. It is important to note that day-to-day management is different from project governance. It is also assumed that the equity holders will control all the project's board seats and will govern according to the shareholder agreements and the loan documents.

Usually, the primary contract between the project and the operator is an Operation and Maintenance (O&M) contract. The contract outlines how the project will meet operational parameters, contemplating both bonuses and damages if certain goals are or are not reached. Traditionally, the level of damages for non-performance that the operator is willing to take is negligent in comparison to the impact it may have on cash flows. The O&M contract's terms and conditions provide a good example of where the risk versus reward is well dictated by the market. Sponsors would like to see operators take greater responsibility for operational shortfalls by providing greater damage relief. It would be interesting to see a study on the historical statistical analysis on actual damages paid compared to the

market pricing by operators. As will be discussed later, lenders may require greater security by increased operational insurance coverage. Which party is responsible for paying the insurance premiums can be a strong negotiating point.

One key point to the O&M contract is matching operational parameters with the offtake contract when applicable. For example, if one of the offtake contract's damages are based on a minimum 88 per cent project availability and the O&M contract damages are based on a minimum 95 per cent project availability, then, on first blush, it appears that the contracted operational parameters are well covered. However, what if the SPV's damages to the offtaker for a shortfall in availability are two times greater than the damages provided by the O&M contract? Conversely, what if the bonuses paid to the O&M operator for increased availability and performance are not offset by any potential upside in the supply and offtake contracts? And, what if the availability factor for the offtake contract is based on an equal monthly aggregate figure of 1 per cent per month, or 12 per cent annually, and the O&M availability factor of 95 per cent is an annual figure, with the 'Full 5 per cent Monty' coming in one month? Continuing with this 'cheeky' metaphor, the 'well-covered' project now appears to be a bit more 'naked'. It is important that a high level of detail is applied to matching units and timing and that the model accurately reflects the operational details of the project documents.

Environmental risk

Environmental risk assessment and impact on projects will only continue to compound substantially in scope in the future. Like managerial risk, environmental risk can be a difficult assumption to model. The financial impact that environmental litigation could possibly levy against a project

has potential to be astronomical, but by how much is anyone's guess. With each year that passes the probability of a project becoming the poster child of a judicial system's example for crimes against Mother Nature rises. The initial defendants of the United States Super Fund case were most likely astounded by the weight of the legislation, as were the corporate defendants represented by Robert Duvall's character in *A Civil Action*.

This workbook is not taking lightly the importance of safeguards for the environment and the world's population. It is merely pointing out the difficulty of assigning a modelling assumption to the process, most notably assigning a financial assumption value of indemnifications and insurances that are either given or received by the project. The unassuming country which agrees to an asset transfer structure may be unwittingly accepting environmental risk, while believing that it is receiving a project for free, long past the sponsor's reaping the project's early discounting and time value of money benefits.

An important component of any project financing is the Environmental Impact Assessment (EIA), outlining the project's direct and indirect impact on its surroundings. A significant operational environmental risk assignment should be placed on the O&M operator. In some cases, the contemplation of this risk can be addressed in financial instruments that will safeguard against these potential future risks, such as sinking funds and site rehabilitation reserves. The trick is not in structuring the instrument, but in determining how much to reserve. Usually some form of environmental reporting will be required in the term loan document's covenants.

Infrastructure risk

This is an almost oxymoronic term when we consider that most project

financing is undertaken to build infrastructure. Infrastructure risk may also be described as transportation and delivery risk, or interconnection risk. The most obvious examples would be an adequate port receiving facility and transportation system to accommodate the delivery of large equipment such as generators and turbines for power projects. Once the equipment has arrived on site, the power project will need to be able to access fuel readily and connect to the grid in order to deliver the power easily. Sometimes the existing pipelines, substations and transmissions lines can be considerable distances. Difficulties in acquiring the necessary permits, easements and rights-of-way could translate to delays in the project's completion. Contractually, these parameters and responsibilities need to be well defined by the controlling parties. Many times this lynchpin is the host government. From the modeller's point of view it is important that the model reflects each contract's responsibility in concerns to these items and assigns costs appropriately.

***Force majeure* risk**

No risk is more nebulous, or is a source of more consternation, than *force majeure* risk. *Force majeure* becomes the 'stray cats and dogs kennel' of those risks that cannot find other appropriate homes. It has been labelled with more ominous terms, like 'Acts of God' or 'Acts of Nature' and 'Acts of Man'. The legal community has also arrived at wordsmithing other difficult events with clauses like Material Adverse Change (MAC) or Material Adverse Effect (MAE). These clauses are meant to ring-fence these issues with qualifiable language that gives counter-parties some comfort. Many practitioners, both equity and lender, will admit that neither is very content with this legal drafting language, but, like a spice, once it is added to a cooking pot of terms and conditions, it is difficult to extract.

Force majeure risk can range from natural disasters, like earthquakes and floods, to crime. One of the more interesting *force majeure* clauses incorporates strikes. Some vendors, especially those that have unions with strong collective bargaining, will claim *force majeure* relief for plant strikes. The push back from the purchaser is that they have no control over the vendor's relationship with their employees and they should not be asked to accept strikes as *force majeure*. The vendor's response is that they cannot be held hostage by their unions if they realise that the company has guarantees and liquidated damages associated with delivery delays in their contracts. In many cases this is a deal breaker for construction-related companies. Obviously, *force majeure* can take many forms. Projects can buy *force majeure* insurance, but this risk management product tends to be expensive and cost-prohibitive. However, line item insurance costs for risks like *force majeure*, as well as political risk (described below), can help benchmark a project's required returns for capital employed.

Completion risk

For a greenfield project, completion risk may be considered the most critical risk assessment. There are few things that have less value than a project that is 95 per cent completed but cannot produce a single unit for revenue. The fundamental concern is that the project is completed on or under time, on or under budget, and within contracted performance parameters. Debt facilities, during both the construction loan and term loan period, are based on pro forma numbers. If the ending reality does not meet the previously agreed expectations, then there could be mismatches in the project's ability to service the opportunity costs for the capital employed.

An added complexity is the refinancing risk that a construction loan will not be 'taken-out' by a term loan. During the construction loan, there is no cash to service either the principal or the interest. The construction interest, known as Interest During Construction (IDC), is capitalised and must be serviced by additional capital from the term loan and/or equity that 'takes-out' the construction loan. If there is a delay, the IDC will continue to escalate beyond the projected number to be serviced by the term loan and/or additional equity funds. Neither the lenders nor the equity wants to be held hostage during the construction period for any additional and 'unforeseen' budgeting items or time delays. Finally, if upon completion the project does not perform to the predetermined specifications, it could suffer shortfalls in cash generation, triggering payment difficulties from the beginning.

The quick answer is that these potential problems in cash shortfalls must be covered by someone, but the real question is by whom and how? Most sponsors and lenders will state that the primary source should be those parties who have the greatest control of this process – in many cases this is the EPC contractor. The preferred mechanism would be unlimited cash, structured in some form of easily accessible Liquidated Damages (LDs) to service potential completion risks. However, there are few, if any, contractors who will assume that much risk, so a series of levels, or caps, are placed in the contract to limit the upside risk to the contractor. If the sponsor cannot convince the lender that the contractor's contractual responsibilities should be sufficient to give the lender completion risk comfort, then the lender may request additional support from the sponsor in the form of guarantees, insurance policies, reserve funds and so on.

All parties concerned will be very sensitive to what determines project completion and when there is a shift of contractual risk from one party to another. There are safeguard measures that will be put in place, such as milestone payments linked to work completed during the construction phase, retention payments, performance bonds and complex completion tests, to name a few. However, there is always an element of risk inherent in the construction and completion phase, no matter what the structuring efficiencies. The issue is which party holds the most risk given their reward, or potential reward, for holding that risk, and are they capable of managing that risk?

Technology risk

One common thread to most project finance deals is that the financial community prefers projects with proven technology. The promised increased efficiency from the Original Equipment Manufacturer (OEM) to promote products stemming from its research and development activities coupled with the desire for lenders to finance technology that has an operational history are directly at odds with each other. From the sponsor's standpoint, the allure of increased efficiency can translate to greater profits, thus the attraction to employ new technology. This 'guinea pig' aspect of the project has a great deal of potential risk. If the OEM has a desire to introduce new technology to the market, and the buyer is not supporting the project on its balance sheet, then the OEM should be willing to provide an extensive support package to the project. The model needs to be able to run cost-benefit analysis scenarios of the relationship between the equipment pricing and guarantees with regard to potential financing facility size reduction, credit spreads and additional security requirements. This could have significant impact on the project's ratios and returns.

Once the introduction of the sponsors' parent company guarantees is broached to support the project's use of new technology, the financing starts to move from project to corporate. The model needs to assist the sponsors and lenders to decide whether the rewards outweigh the risks and whether they have been convinced to take an inordinate amount of technology risk that should be shouldered by the OEM. An additional ancillary, but critical, concern must be how comfortable the contractor is in constructing the project with this new equipment and all its implied intricacies. If the EPC contract moves from a single point of contact to a host of contacts, it introduces the likelihood of complications for future assignment of LDs.

Political risk

It can be argued that the majority of projects undertaken by sponsors in countries, other than their home country, use project finance to mitigate political risk. Political risk has a tendency to be used as a 'catch-all' phrase for all country risks associated with FDI, sometimes referred to as sovereign risk. Generally speaking, political risk is a qualifiable risk that the model has difficulty quantifying. Many political risks are carved out and participants will seek *force majeure* relief. However, there is a well-established risk management community that offers various financial products to support challenging projects. As stated, these insurance policies are known as political risk insurance. The multilateral and bilateral financing community is a primary provider of these insurances, such as the World Bank's Multilateral Investment Guarantee Agency, or MIGA.

Broadly speaking, the political risk management industry has three definable categories: Currency Inconvertibility and Transfer (CIT); War and Insurrection (W&I); and Nationalisation and Creeping Expropriation (NCE).

CIT risk will not allow for the purchase and transfer of the appropriate currencies for offshore debt service and cash disbursements. CIT should not be confused with currency devaluation. While a project may have been properly structured for exchange rates and devaluation, CIT risks will not allow for sufficient funds to be transferred to service contractual capital and operation repayment requirements. W&I addresses civil violence and disturbances. Special attention should be paid to sabotage and terrorism. NCE can have subtle differences among the differing risk management providers, but loosely defined it is a project that is nationalised without having received proper compensation. Creeping expropriation has a subtler context, whereby the project is gradually squeezed by incremental changes that affect the project's cash position. Specific consideration must be given to a review of how 'Change in Law' clauses are drafted, particularly any changes in taxes.

Financial risk

For the financial risk section we will describe the risk in three subcategories: interest rate risk; creditworthiness; and syndication risk.

Interest rate risk

Financial institutions are intermediaries that must purchase, and repay, the money that they lend. The credit spread that banks charge for acting as this intermediary is one of their main revenue streams. Typically, the banks source their money at a floating interest rate, known as FLR. Banks will want to try to minimise this risk to their revenue, so they will pass this floating rate to the borrower. A project that has no hedging instrument to this FLR has a risk to its cash flows. There are various treasury skills that can be employed to mitigate this risk, but the most obvious is to swap a floating rate for a fixed rate. In its most base explanation, an institution

will sell a derivative to the project that provides, or swaps, a fixed interest rate for the project's FLR for a fee. Generally, the swap is quoted as a spread of basis points applied on the loan amount.

Creditworthiness

Project finance looks to the strength of the project's cash flows to service its capital and not the creditworthiness of the SPV's balance sheet. In a true, non-recourse financing, the sponsors' balance sheets are not employed as a backstop to the project. However, it is an overly simplistic view to say that project finance does not have a considerable element of credit analysis. To the contrary, with traditional corporate finance there is usually one balance sheet to consider – the prospective borrower. In project finance, the quality of the cash flows relies on the project contracts and the counter-parties' abilities to perform them. The actual credit analysis is more complex, if for no other reason than the number of players involved. A thorough view of the project's participants' creditworthiness must be considered.

Syndication risk

As stated, project finance tends to be used for large financings, like infrastructure projects, with expansive capital requirements. Single banks usually cannot absorb the entire financing of these large projects and seek to find other institutions to take pieces, or tranches, of the financing. This syndication process, or the selling down of the loan, is not without its risks to either the bank and/or the borrower. Greenfield projects generally have two distinct financing periods – the construction phase and the operational phase – and thus they generally have two distinct financing conditions with certain specific risks. There are various strategies to approaching the financing process, from enlisting financial advisers at the onset who assist comprehensively with the project's entire financing

process, to sponsors structuring their own term sheets and managing the process internally with close consultation with their arranger bank(s). In the latter case, the arranging banks usually have a strong and long relationship with the project's sponsors.

Two major financing risks are: the lack of interest from the financing community with the offering, also known as underwriting risk; and take-out risk where the construction loan does not have pre-arranged conditions to be serviced by a term loan once the project has achieved its Commercial Operation Date (COD). The simplest method of mitigating the take-out risk is to structure and to arrange the two loans simultaneously. However, commercial reasons may dictate that sponsors and lenders are willing to start construction without having finalised the terms and conditions of the term loan. A common driver is related to time constraints within the concessions' and permits' terms, requiring the project to start construction and become operational before certain dates, or risk losing the rights to perform.

The other aforementioned risk, underwriting risk, will be a source for major discussions between the arranging bank(s) and the project's sponsor(s). If there is not sufficient interest in the deal, then which party will make up the shortfall in required capital? If the banks will not take underwriting risk, then the additional shortfall will need to be met by additional equity. This will change the leverage ratios and drive down initially modelled equity returns of the project. By passing underwriting risk to the lead arranger(s) to fund shortfalls that they cannot sell in the market, additional risk will be placed on their books by perhaps overweighting internal country, industry and company targets. The lenders will want additional compensation for taking this risk. Additionally, given the length of time from first mandate to financial close (sometimes years) and moving

market conditions, term sheets may have ‘outs’ and ‘market flex’ that could change initial deal parameters, pricing and structures. As stated, the project finance model is a pro forma exercise and it is difficult to reflect these issues accurately, but the model must be able to address sensitivities and scenarios related to these risks.

Structures

One modelling component meriting greater discussion is the SPV’s optimal tax and accounting structure, both for onshore and offshore flow of funds. This should be a headline item for the model and its construction. If not properly coded, the litany of tax and accounting codes endemic to each country and project will widely affect model outputs. The issues can range from ‘trapped cash’ to thin-capitalisation rules to withholding taxes for repatriating funds, among others. Additional examples are countries with value-added tax (VAT) and its working capital timing issues, or countries with balance sheet-related taxes influencing one-time decisions on expenses or capitalised items, or currency translations and asset revaluations due to inflationary pressures.

It is difficult, if not impossible, to know all the codes, conventions and laws for each project’s host country. A critical first step is to consult with a local expert, or experts, to get a comprehensive understanding of these rules and regulations. This is a critical and often neglected foundation to the model. If not approached correctly, the project’s developers will be negotiating contracts on faulty assumptions that will invariably have serious, and usually negative, consequences for the project’s results, some perhaps being fatal flaws. Project structure selection should closely consider the optimal desired outcome from all

existing and potential participants with regard to pricing, returns and liabilities.

A central issue to the three basic business entities – single proprietorships, partnerships and corporations – is the relationship between taxation and liability limitations. Business structures have become more complex with the advent of entities like Limited Liability Corporations (LLCs), Limited Liability Partnerships (LLPs) and Master Limited Partnerships (MLPs), to name a few. The SPV should be structured in a way that optimises tax treatment while also minimising the limitation of loss to the shares of the entity. To this end, the project model should naturally represent the returns generated by the SPV at the project level; however, the SPV must be concerned about actually distributing cash back to the lenders and sponsors. This is especially pertinent if the project’s equity will seek to sell interest in the project to other parties.

To the extent possible, a forward looking strategy as to whom potential investors may be, and their tax regime, can help to entice and to negotiate with future potential investors with efficient entity structures. For those projects that have governmental derived concessions, it is important to understand the mechanics of structures like a BOO, BOOT, BLT and so on. For example, how does the transfer, ‘T’, work in a Build, Own, Operate and Transfer (BOOT). Does the project transfer with any residual value, and is it encumbered with liabilities like environmental clean-up? As previously mentioned, a government concession that includes a transfer of the project at the concession’s end may be giving the sponsors clemency if all the potential liabilities transfer with it. These structural issues have a significant part in the model’s creation.

Contracts and documents

In its most complex form, project financing has numerous and varied contracts and documents, but for our purposes we shall concentrate on the major contracts and documents that are indicative to most major deals. They are:

1. Construction contract
2. Feedstock, or fuel supply contract
3. Offtake contract
4. Operations and maintenance contract
5. Shareholder's agreement
6. Financing documents

Before we take a closer look at the commercial issues in the contracts and documents and their representation in the model, let us review the definition of a contract.

The underlying premise of a contract is based on an offer and the acceptance of that offer with a promise to perform and to comply with the accompanying terms and conditions. Barron's *Legal Dictionary* describes a contract as 'a promise, or set of promises, for breach of which the law gives a remedy, or a performance of which the law in some way recognises as a duty'. The definition continues to state that the essentials of the contract are 'parties competent to contract, a proper subject-matter, consideration mutuality of agreement, and mutuality of obligation'.

From a contractual standpoint, the risk allocation analysis has four major points:

1. Does the counter-party have the technical competence and suffi-

cient creditworthiness?

2. Do the terms and conditions of the contract properly pass-through the intended risks?
3. What are the minimum thresholds and limits on liabilities to the counter-party?
4. Where and how is the contract enforced?

Construction contract

The construction contract can have differing names but we shall use the EPC acronym defined above. The EPC contract defines the time, cost and performance required to build and complete the project's operating asset. The main elements are:

1. Price
2. Payment terms
3. Damages associated with
4. Late or non-completion of the asset
5. Cost overruns
6. Inadequate performance of the finished asset

The model needs to be able to address the financial impact of each of the above risks listed in points 4, 5 and 6. The pro forma model will naturally have the price of the EPC contract and use the performance parameters to drive cash inflows and outflows of the SPV. This EPC price will probably constitute the majority of the initial capex. The contract's time to completion and payment schedule, or milestone payments, will be a main driver in determining the project's IDC and timing of returns. The conversion factor of the feedstock to the offtake unit will drive operational revenues and expenses, and capital recovery.

As stated, a greenfield project has no ability to service the construction debt. The IDC will be serviced by the term loan and/or equity upon completion of the construction phase. The gearing, coverage ratios and terms and conditions of the term loan are greatly contingent on the EPC contractor's ability to perform the terms and conditions of its contract. If the contract does not perform to the schedule and budget outlined, the model needs to be able to reflect these differences. This will help in negotiating appropriate LDs with the contractor, followed by financing terms with the lenders.

Feedstock, or fuel supply contract

The supply of raw materials, or inputs, is typically a significant cost to the project. The main concerns are:

1. Price (currency of payment and terms)
2. Quantity
3. Quality and rejection
4. Duration
5. Delivery
6. Availability
7. Commission supply
8. Non-performance

Matching the technical and operational parameters of the offtake requirements with the feedstock is the underlying principle behind this contract. If it is a pass-through contract, whereby the total feedstock costs are shouldered by the offtaker, then it is critical that these components are well defined and understood. The model should convert feedstock to offtake quantities at the appropriate units. The model must also take care to

code differing levels of operational and efficiency parameters in relation to the project's asset capabilities.

Offtake contract

If it is a covered project, the offtake contract provides the project, and the model, with the principal revenue driver. The main elements are:

1. Pricing elements (currency of payment and terms)
2. Quantity or volume
3. Quality and rejection
4. Duration
5. Delivery
6. Availability
7. Non-performance

A project that is not taking price and demand risk, or merchant risk, from the market will have an offtake contract. The model will primarily use this contract to compute the revenue stream. The offtake contract generally provides the backbone of the economic rationale for the project. As with the feedstock and operation and maintenance contracts, it is important that the model be able to match differing technical parameters with the model's cash flows. If the operational expenditures are a pass-through contractual construction to the offtaker, then careful consideration should be given to uniformity in the model's units and timing.

Operations and maintenance contract

Once a project has reached completion of the construction phase, the operational and maintenance of the asset needs to be addressed. This is

usually known as the O&M contract. The major points of this contract are:

1. Pricing elements (currency of payment and terms)
2. Incentives
3. Duration
4. Availability
5. Non-performance

Usually, for each industry there is a standard to which the operator must adhere. For example, power plant contracts may have a clause stating that the operator must meet Prudent Utility Practices (PUP). One major element is that the availability meets the demand requirements of the off-take agreement, as was discussed above. It is also important to note that, as with feedstock, the O&M contract is an operational contract whose payment is before the lenders' debt service payments.

From the lenders' perspective, careful attention should be paid to these contracts when the counter-party is also a sponsor. Pricing may allow for some sense of pre-tax equity returns before the lenders are getting paid. The sponsor should take care to make sure that any incentive bonuses for additional availability or efficiencies are actually beneficial to the project's cash flows. An offtake agreement that has a capped quantity amount, or a feedstock contract that has a take-or-pay for a specified amount, may not allow for increased benefit to the project's cash. Alternatively, if the O&M provides for a bonus payment without an offsetting benefit, it may actually hurt the project's returns.

Shareholder's agreement

This is the governing document of the SPV. From the model's perspec-

tive, the agreement's most important element is how cash distribution to the equity holders is structured. The governing and decision-making procedures, while important, are more legal in nature and have little impact on the model. The main elements are:

1. Purpose and structure of the SPV
2. Ownership (including percentages)
3. Share classifications (if any – eg, A shares versus B shares)
4. Cash distribution
5. Additional capital call procedures
6. Exiting (eg, right of first refusal, call and put options, etc.)
7. Governance (eg, board selection, meetings, management, voting, etc.)
8. Dispute resolution
9. Governing law

The need to understand how the cash is distributed is a rather obvious requirement from a project level perspective. From a sponsor's point of view, if share classes have differing triggers for distribution, this needs to be modelled and understood. Different classes may have different risks, thus different reward parameters. The same discount rate for each share class may not be appropriate. Also, if the exit strategy is contingent on financial parameters, such as call and put options structures in relationship to the project's net present value, the sponsor's model must be able to accommodate these scenarios.

Financing documents

There are many financing documents. They can range from very high-level term sheets, with only a few pages, to highly complex credit facilities. We

are going to concentrate briefly on only the actual loan document in this section. If the financing is a greenfield project, it is quite probable that there are two distinct financings: a construction phase followed by a term loan phase. Again, for the sake of simplicity, we will address these two phases together. The major components of the loan documents are:

1. Loan amount, or facilities (differing tranches, if any)
2. Currency (hedging requirements)
3. Drawdown schedule (mainly for construction loan)
4. Repayment (for construction the COD is critical and take-out)
5. Prepayment
6. Interest rates and fees (hedging requirements)
7. Taxes
8. Financial ratios and triggers (usually in covenants or default)
9. Other covenants
10. Default
11. Support requirements (security packages – eg, insurances, debt service reserve accounts, letters of credit, etc.)
12. Non-commercial legal clauses (eg, reps and warrants, language, governing law, arbitration, etc.)

This is by no means meant to serve as an exhaustive list of potential loan facility elements. The financial and modelling implications of the insurances will also be addressed in later modules, but for the purposes of this section they are incorporated in the security package of the loan documents. This list is only to serve as a general overview of the major principles and elements. Elements not listed above but previously mentioned are underwriting risk and market changes to the interest rates. The loan document's financial implications to the model are one of the main thrusts of this workbook .

It becomes quickly obvious from these simple definitions of the major project documents and contracts above that they are not mutually exclusive. They cannot be negotiated in a vacuum. A good project must negotiate project documents in consort with each other, while always keeping a close watch on the future financing documents. A good model will be one of the key elements in those negotiations. Let us return again to the main precept of the workbook: always negotiate off the model.

Module 2: Modelling conventions and advanced Excel techniques

Introduction points on Excel

Before getting started with the case and model, it is good to review some modelling techniques, shortcut keys and layout designs that will be used throughout the workbook.

Module 2 fonts and symbols

For the rest of this module we will use the following fonts and symbols to describe Excel procedures (unless otherwise stated):

- Alt** Bold and underlined font is a key on the keyboard
- View** Bold and underlined font letter of word is for Toolbar or menu command
- '** Right arrow is: 'followed by', as in **Alt** **'** **View**
- ±** Plus sign is pressing keys at the same time, for example **Ctrl** **±** **R**
- IF*** Capitals, bold and italics denote an embedded Excel function

Mouseless Excel

Whenever possible, it is best not to use the mouse. Using keystrokes is a more efficient way to manipulate Excel, or most programs for that matter. So let us look at some techniques that will allow quick navigation and coding without the mouse.

After having opened an Excel workbook, the most essential navigation keys are the **Alt** and the **Ctrl** keys.

Alt key

The very top of the worksheet page is known as the Toolbar. You will notice that certain letters of the Toolbar are underlined. Pressing the **Alt** button will access the Toolbar, then allow for navigation. After pressing the **Alt**, followed by the key of the underlined letter, the action will pull down the menu of that particular item. For example, if we wanted to change the actual elements of the Toolbar, we can access that command in the **Toolbar** menu by using **Alt** **'** **View**, followed by **Toolbar** to modify the elements of the Toolbar. Once the **Alt** is pressed it has moved from the worksheet area to activating the Toolbar area (noted by raised menu words on Toolbar, starting with **File**). The underlined letters are now active and can be used to navigate each of the Toolbar menus.

Ctrl key

Once a pull down menu has been accessed you will notice to the right of some items there is a 'hot key' shortcut that performs the task without the need of the mouse. Normally the keys are a combination of **Ctrl** **±** or F keys, like **F11**. The majority of these shortcut strokes will be in the **Edit** menu, for example the **Ctrl** **±** **R** shortcut will fill coding, or numbers, in the highlighted cells to the right. (The **Alt** series of commands for this action item is **Ctrl** **'** **Edit** **'** **Fill** **'** **Right**.)

We will review some of these commands in greater depth as this module progresses, but for the moment let us make a quick list.

Summary of shortcuts

<u>Ctrl + B</u>	Turns Bold on/off
<u>Ctrl + U</u>	Turns Underline on/off
<u>Ctrl + I</u>	Turns Italics on/off
<u>Ctrl + ;</u>	Enters the date
<u>Ctrl + :</u>	Enters the time
<u>Ctrl + 1</u>	Format cell
<u>Ctrl + 2</u>	Bold
<u>Ctrl + 3</u>	Italics
<u>Ctrl + 4</u>	Underline
<u>Ctrl + 7</u>	Hides/activates Toolbar
<u>Ctrl + 9</u>	Hides rows
<u>Ctrl + 0</u> (Zero)	Hides columns
<u>Ctrl + Home</u>	Goes to top of worksheet
<u>Ctrl + End</u>	Goes to bottom of worksheet
<u>Ctrl + PgUp</u>	Goes to worksheets to the left
<u>Ctrl + PgDn</u>	Goes to worksheets to the right
<u>Ctrl + Tab</u>	Changes between opening worksheets
<u>Ctrl + [</u>	Finds Precedent
<u>Ctrl +]</u>	Finds Dependent
<u>Ctrl + ' </u>	Toggles between viewing/not viewing coding
<u>F2</u>	Activates Calculation Coding Bar
<u>F3</u>	Paste Names in Coding
<u>F4</u>	Anchoring cells (\$F\$4), rows (F\$4) and columns (\$F4)
<u>F5</u>	Returns to last item, known as 'Go To'
<u>F7</u>	Spell Check
<u>F9</u>	Manual Calculation (when activated)
<u>F11</u>	Quick Graph (defaults to bar graphs)
<u>Shift + Space Bar</u>	Selects row

<u>Ctrl + Space Bar</u>	Selects columns
<u>Alt + Space Bar</u>	Activates Maximise and Minimise of program windows
<u>Shift + Arrows</u>	Highlights cell selections
<u>Shift + Ctrl + Arrows</u>	Highlights to end of the section
<u>Ctrl + R</u>	Fills Right
<u>Ctrl + D</u>	Fills Down
<u>Ctrl + C</u>	Copy
<u>Ctrl + V</u>	Paste
<u>Ctrl + X</u>	Cuts and removes the section
<u>Ctrl + Z</u>	Undoes last command
<u>Ctrl + S</u>	Saves the document
<u>Ctrl + P</u>	Prints document
<u>Alt ' T ' U ' T</u>	Traces Precedents
<u>Alt ' T ' U ' D</u>	Traces Dependents
<u>Alt ' T ' U ' A</u>	Removes all Tracing Arrows
<u>Alt ' _ +</u>	Activates Sum function
<u>Alt + F2</u>	Save As
<u>Alt + F4</u>	Closes program
<u>Shift + Alt + F1</u>	Creates new worksheet
<u>Shift + Ctrl + 7</u>	Borders cells
<u>Shift + Ctrl + '+'</u>	Inserts cells, columns and rows
<u>Shift + Ctrl + '-'</u>	Deletes cells, columns and rows

Model layout

If you are in a position to review and audit models, you will see many and varied layouts for models. Some models, and layouts, are better than others, but the common denominator of the better models is their ease of navigation. A robust model does not need to be overly complex and difficult to

Frontsheet of worksheet Example 2.1

	A	B	C	D	E	F		H		J	K	L	M	N		P		R		T		V
1	EXAMPLE 2.1													31-Dec-2005	31-Dec-2006	31-Dec-2007	31-Dec-2008	31-Dec-2009	31-Dec-2010	31-Dec-2011	31-Dec-2012	31-Dec-2013
2					Date									0	1	2	3	4	5	6	7	8
3					Period																	
4					ToC			Name	Doc	Inv	Cons	Units	Esc									
5																						
6	I	OPERATIONS																				
7		Power purchasing agreement																				
8		Capacity payments																				
9		Plus: Fixed O&M Charge					FOMC	PPA	CTH	1.9290	\$/kW/Month	3.00%		1.9869	2.0465	2.1079	2.1711	2.2362	2.3033	2.3724	2.4436	
10																						
11																						
12																						
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36																						

I. Name in Column F labels the name used for either a cell, row or column. Here, Cell I8 is named FOMC for Fixed O&M Charge. Naming a cell, row or columns is the same as anchoring using F4

II. Doc is for the document from where the input is derived. PPA is the Power Purchasing Agreement

III. Inv is individual, or the party verifying the assumption or input

IV. Cons is constant. The figure should come from the assumption page. In this case it is the monthly revenue charge from the PPA. Note the naming in Cell I8, normally this name would also come from the assumption page

V. Units are the units for the constant in the previous column (I), the constant will always be a number, usually coded in accounting format

VI. Esc is escalation. This is the escalation factor, if any. This will also come from the assumption page

VIII. Cells that are border and in light yellow are inputs or assumptions

IX. Numbers that are in black are coded here the coding is =FOMC*((1+esc)*period), or =I8\$*((1+\$K\$8)*O3)

X. The period is the marker for each year. Notice it starts with 0 and then continues to 20. The period can be used for escalation and discount coding

XI. The date will be driven from another page but here it is an input. Notice that dates are end of year

XII. Additional items

- 1) The worksheet is on 'freeze' in Cell J5.
- 2) Columns A through D have separate formats
- 3) Columns F through K are smaller fonts at 8
- 4) After the last column, AG, all other columns are hidden
- 5) The coding in Cell A1 will repeat the worksheet ID below
- 6) Cell E4 is a hyperlink back to the Table of Contents (ToC)
- 7) The page setup will repeat Columns A - K and Rows 1 -3
- 8) Setup is landscape and two pages wide
- 9) Data Grouping collapses rows and columns

view. There are many ways to lay out a model. The workbook's case model will use the following worksheet order:

1. Table of Contents (with Hyperlinks)
2. Summary Page
3. Glossary
4. Logbook
5. Assumptions
6. Engine Sheets
7. Financial Statement Sheets

8. Graphs

Except for a few pages, each worksheet will have a design like that in the worksheet Example 2.1 which can be viewed on the accompanying CD. We have reproduced the frontsheet of Example 2.1 here.

You will note the Excel comment boxes that give added information to the formatting.

I Comment – Naming

By naming a cell, column or row, the modeller can alleviate mismatching errors that may occur. Use the **F3** key to retrieve named cells, rows and columns. Naming serves the same function as using the **F4** key, or anchoring. Now is a good point to review the **F4** function. Once a cell has been coded and before pressing enter, the cells can be anchored by pressing **F4**. However, pressing the **F4** more than once will change the anchor mode employed.

Example:

If you have typed =B4 in a cell followed by:

F4 once, you get =\$B\$4 which anchors the entire cell, or naming a cell
F4 twice, you get =B\$4 which anchors the row (Row 4), or naming a row
F4 three times, you get =\$B4 which anchors the column (Column B), or naming a column
F4 four times, you get =B4 which clears the anchors

In the case study, we will use the naming technique only a few times to demonstrate the technique, then we shall generally use the **F4** technique. By having numeric coding with **F4** anchors versus naming, it is easier to describe teaching points. Good models will use both techniques. The advantage of naming cells is that you can mimic exactly the tariff sheets from contracts to ensure the model represents the contracts accurately. The disadvantage is that by having a long list of names the modelling can become unwieldy.

II Comment – Doc

Doc is an abbreviation for document. In Example 2.1, the abbreviation

in column H, PPA, is the initials for Power Purchasing Agreement. By labelling the document associated with the model inputs and coding, it is easier to find what document is being represented and to verify its parameters.

III Comment – Inv

Inv is the abbreviation for individual. This is the contact person to verify the assumption. This column will usually be coded with initials. These initials will be defined in the Glossary like the documents. At times the verifying individual could be the modeller.

IV Comment – Cons

Cons is the abbreviation for constant. In Example 2.1, the constant is the Fixed Operations and Maintenance Charge (FOMC). By placing the constant in column J, we can easily escalate the pricing (as is prescribed in the contract) uniformly. Pay close attention to how the contracts are written. Perhaps there is a base price assigned at the contract signing that is subject to escalation immediately after the signing. If the project takes two years to build, the contract will already be subject to two years of escalation before operations even begin.

V Comment – Units

The model will generally use the accounting category for each number, but without any currency assignment. It is not necessarily the case that each number will be an accounting, or cash, figure, so it is best to label them separately. Ultimately, however, the final output will be some form of cash. By labelling the units it is easier to make sure that they are

appropriately and accurately used to reach the desired cash outcome.

VI Comment – Esc

Esc is the abbreviation for escalation. For those elements that need escalating, by placing in column L it makes the coding and visual disclosure easier. Be forewarned that escalation in a pro forma can be a tricky and sometimes contentious point.

VII Comment – Column M

This column is served as an anchoring mechanism. The beginning of most accounts is coded from the account's ending balance from the previous period. The anchoring mechanism is a starting point for the accounts to begin with a zero.

VIII Comment – Assumption Cell Format

Input and assumption cells will have a border and be in light yellow or shaded.

IX Comment – Colour Coding

Numbers that are coded in black are directly coded on that particular worksheet. Rows that are coded in bright yellow mark a caution. Other colours will be pointed out in the workbook.

X Comment – Time Period

The number sequencing along with corresponding dates will be helpful in

coding escalation and discount factors. Look at the coding in Example 2.1 to see how the period has been used to escalate the FOMC. (Hint: Try using the **F2** and **Alt ' T ' U ' T** hot keys to audit and examine the coding more easily.)

XI Comment – Date

The date in Example 2.1 is hard coding in the worksheet for the layout example. In the case study, the dates will be driven from the assumptions.

XII Comment – Additional Items

1. Freeze – By activating a cell, in the example Cell J5, and using **Alt ' Window ' Freeze** the model has locked the movement of columns A through to I and rows 1 through to 4. As you navigate through the model's outer years, you will still be able view the row and column headings and descriptions.
2. Columns A through to D – Each of the columns is coded with a different font and alignment. The easiest way to do this is by using **Ctrl + Space Bar** that highlights the desired column, then use the appropriate **Ctrl** to format accordingly.
3. Columns F through to K – The font size for these columns are 8 (eight).
4. Hiding Columns – This is a 20-year model. The columns after AG are hidden. The method is **Ctrl + Space Bar** in Column AH, **Ctrl + Shift + 'Right Arrow'**, then **Ctrl + 0** (Zero). By hiding these columns it will make copying and filling an easier task.
5. Worksheet Heading Link – By typing in the formula `'=RIGHT(CELL('filename', $A$1), LEN(CELL('filename', $A$1)))` -

SEARCH(']', CELL('filename', \$A\$1)))' in Cell A1, whatever is typed as a title in the tab for the worksheet will appear in Cell A1 as the title.

6. Hyperlink – In Cell E4 is typed 'ToC', which stands for Table of Contents, it is its own worksheet page. The Table of Contents worksheet needs to be created before the hyperlink can be activated. Once created, ToC will be typed in each Cell E4. Right click Cell E4 and select **H**yperlink. Once opened, select 'P**l**ace in This Document', then choose ToC. Now any time that you select ToC, it will take you directly to that worksheet. Make a Table of Contents that lists each worksheet, and repeat the Hyperlink process above to link the heading in the Worksheets' Cell A1's. This will allow for easy navigation, especially for multiple worksheet files.
7. Repeating Columns and Rows in Printing – Generally models are quite large horizontally and will not fit on one page. You can format the printing set-up so that no matter how many pages there are it will repeat prescribed columns and rows. We will always repeat Columns A to K and Rows 1 to 4. **A**lt ' _ **F**ile ' _ **P**age S**e**tup opens the Page Setup. **R**ight C**u**rser to the Sheet Page and highlight the appropriate columns and rows to repeat.
8. Landscape – Also in the Page Setup, under Sheet, it is set to landscape and 'Fit to 2: page(s) wide'. The number pages of 'tall' will vary from worksheet to worksheet.
9. Data Grouping – Use the **C**trl + **S**pace **B**ar to highlight Columns F to I. Select **A**lt ' _ **D**ata, then **G**roup and Outline then **G**roup. Repeat this task for Columns F to L. By grouping these columns together, we can collapse down columns and rows, making printing and viewing more efficient. When we are no longer concerned with these columns on a regular basis, we can keep them perpetually collapsed. The grouping of rows will tend to be more subjective.

Not every single keystroke action has been laid out. Remember to use **Tab** or **Alt + 'Underlined Letter'** to navigate dialog boxes. This is universal to the dialog boxes so it has not been explained for every action.

Coding

In this section, we will go over some basic Excel coding and techniques that will be used in the case study model. Review the accompanying CD for exercises (under Data_2) and then the suggested answers for each of these sections below. The spreadsheets are set on manual calculation, so you will need to enter **F9** to calculate inputs and changes.

The Paste function

The odds are that if you want to code something in Excel, or have a problem that needs solving, Redmond, Washington, has already thought of the problem and has placed it in the Paste function. For example, you could find the financial maths for the payment of annuity and code accordingly, or you could use the **PMT** function in the Paste function (as stated above, the fonts that are Capitals, Bold and in Italics for the rest of this module will denote Excel's embedded functions). The main problem is that unless you are a proficient and regular user of Excel and the Paste function, it can be difficult to decipher the instructions. You can access the Paste function by **A**lt ' _ **I**nsert ' _ **P**aste **F**unction.

Sum, Min, Max and Average

Besides the basic four mathematical functions of Addition, Subtraction, Multiplication and Division (+, -, /, *), Excel will do many other simple

equations, like exponentials (x^y) or roots ($x^{1/y}$). It will also do other basic functions like sum and average a series of numbers, or find the minimum and maximum in that series. The function coding is **SUM**, **AVERAGE**, **MIN** and **MAX**, respectively.

Logic functions

The most common logic function is the **IF**. The most basic **IF** function is a simple nodal point that if true then A, if not true then B. These are known as testing conditions. Each of the logic functions uses these condition parameters. You can also embed logic functions within logic functions. This is known as nesting. For example, if the parameters are 1 = A, 2 = B and 3 = C and you want an **IF** function that selects the letters from the corresponding number, the following code will achieve this: =IF(Cell = 1, A, IF(Cell = 2, B, C)). Excel offers other techniques to do this, like pull down menus; however, the above example is to illustrate that Excel has many functions to solve like problems. It becomes a question of repetition and Excel usage to find which are the most efficient methods without being overly complex.

Escalation coding

There are two ways to code exponents. The first method is multiplying the previous period's result by one plus the escalation factor [$Z = Y * (1 + X)$, with X being the escalation factor and Y being the previous period's figure or amount]. Or, we can add one plus to the escalation and raise it to the period to calculate the corresponding period's escalation factor. The Excel program coding uses the **^** (**Shift + 6**) to calculate exponentials. Remember to honour algebraic rules with parenthesis. We will try to use the exponential method as much as possible [Period Escalation = ((1

+ X) ^ A), with A being the period]. The example will continue from the logic example above.

Flag technique

By using some nodal indicator, in our case a binary point of 1 or 0, we can 'flag' whether a series is being utilised or not. We shall still continue with logic function and the escalation examples above for the flag exercise. The maths is simple: a number multiplied by itself is itself and a number multiplied by zero is zero. In the flag exercise we will calculate the escalated value of the contract for each appropriate year. If you change the number of the years of the contract the output should change accordingly. The flag technique can also be used with logic functions. For example, =**IF**(Flag = 1, then the desired series, 0). In the answer section of the flag exercise, you will notice a 'check' row. Review this technique's coding. Excel will allow you to code text by placing quotations around the text, 'text', so that you can determine if the model is coding correctly. In the exercise you will notice that the first logic function creates a flag if the two lines are not equal to each other. The second **IF** function sums the flags. If the flags do not equal zero then the cell generates a 'problem' text. The most obvious use of this checking, or auditing, technique will be with the balance sheet and pass-through contracts. Now is also a good time to use the **F2**, **Alt ' T ' U ' T** and **Alt ' T ' U ' A** hot keys, again to audit and examine the coding more easily. You may also want to try your hand at the **Ctrl + I** and **F5** auditing navigation techniques. The more you practise these techniques, the more natural they will become during the case study starting in Module 4.

Transpose

The **TRANSPOSE** function takes a horizontal array of numbers and transposes them vertically, or vice versa. There are three methods of transposing an array of numbers: right click the array; Paste Special; or Paste function.

Method 1 – Right click

Highlight the array that is to be transposed. Go to the cell to where the array is being transposed and right click the first cell, scroll down to the **Transpose** and enter. The action will transpose only the values and not the coding, or formulas. It is not recommended to transpose formulas from other workbooks or it will create a link, but transposing values is an effective and efficient method of bringing numbers from other Excel documents that are not in the desired array format.

Method 2 – Paste Special

As with the right click method, highlight the array to be transposed and enter **Ctrl + C**, for copy. Go to the first cell and enter **Alt + Edit + Paste Special** which brings up the Paste Special dialog box. **Alt + Transpose** will tick the correct box. Depending whether you want to transpose **Values** and **Formulas**, use the **Alt +** technique for the desired action and tap to enter.

Method 3 – Paste function

This method is a bit trickier. Highlight the desired area to where you want the figures to be transposed. It is important that the numbers of cells highlighted equal the same number of cells being transposed. Either insert the Paste function, or type the word **TRANSPOSE** and highlight the cells to be transposed, using the appropriate parenthesis. You must tap **Shift + Ctrl + Enter** simultaneously or the action will not occur.

Payment function

Excel will calculate the equal payments, interest and principal payments, for an annuity with the **PMT** function. Sometimes it easier to code your own formulas than to use the Excel Paste function, but this is not one of those cases. When you open the **PMT** function you will note some categories are bold: Interest Rate, r (**Rate**); Number of Periods, $m * n$ (**Nper**); and Principal, P (**Pv**). There are two non-bold categories: Residual Value (a bullet payment) (**Fv**); and timing of payments (**type**). A 1 will calculate the payment at the beginning of the year. A 0 (zero) will calculate the payment in arrears. If no assumption is entered for type, the payment function defaults and the payment is in arrears. Categories in bold denote required assumption fields, non-bold fields are optional for the function to calculate; however, they may be necessary to meet the requirements of the problem. For example, if the loan has a bullet repayment, or the modeller would like to assume some figure to be refinanced, then the **Fv** is required. It is important to note that the **Nper** is an equal number of periods, not years. This is also true for the interest rate. Assume that you have a 10-year ($n = 10$), semi-annual repayment ($m = 2$) annuity with an annual rate of 5 per cent ($r = .05$). It is important that you have set up the problem to answer the question. The number of periods is twenty (20); $m * n$, or $2 * 10 = 20$. The rate is two hundred and fifty basis points; r/n , or $.0500/2 = .0250$.

Sum(Index) function

While the **PMT** function is an extremely useful tool to calculate an annuity payment, it must be tricked to model the aggregate periods, allowing for an annualised model. We also want to be able to manipulate payment periods. The effective annual interest rate for semi-annual payments is not the same as a quarterly payments' interest rate. The effective interest

rate from an annual rate is: the effective rate equals one plus the rate divided per the number of periods raised to the same number of periods minus one $[(1 + (r/m))^m - 1]$. For example, the effective rate for a semi-annual loan at 5.0000 per cent is 5.0625 per cent. The effective rate for the same loan with quarterly payments is 5.0945 per cent. While this may seem small here, it can be substantial with large loans. You will note an example on the **SUM(INDEX)** worksheet page. You will notice that it is not appropriate to use the effective rate in lieu of aggregating periods to match payment terms. There is a differential in the annual payment amounts.

Goal Seek

Excel has a series of powerful tools that can assist the modeller. One of these tools is the **Goal Seek** under the **Tools** in the **Toolbar**. This function will find a desired output by changing an assumption driver. The key is to understand which is the independent variable and which is the dependent variable. In the accompanying workbook exercises to this module, we are trying to find what is the principal amount that will generate a period payment of 100, given the existing parameters. The dependent variable is the annuity period payment. The independent variable is the principal amount in our example, but it could have been any of the other variables. The most obvious second choice would be the interest rates.

Tables

As stated, Excel has strong analysis tools. Another of these tools is the **Data_ ' _Table**. The **Table** function will allow the modeller to pick one or two independent variables and see how multiple changes will impact on the desired output, the dependent variable, in a matrix form. For a two

variable matrix table, both independent variables must be drivers of the output or the table will not work. However, it is not important that the independent variables be direct drivers. In other words, assumption A (an independent variable) can drive coding B that drives output C. By using A as an assumption axis in the **Data_ ' _Table**, you can build a matrix table with output C. The tables give the modeller an ability to look at multiple scenarios at once. You will note in the example we have modelled the interest rate as the x-axis and principal as the y-axis, with the output being the annuity payment. The inputs on the axis can be changed after the table is coded. Once output ranges are narrowed the tables can serve as a way of running a series of **Goal Seeks** at once.

VLOOKUP

The **VLOOKUP** function allows the modeller to create a series of data, either vertically or horizontally, and matches a range of numbers (the leftmost column of the table array) with the correlating number from the desired column. Look at the matrix table below for a basic example:

Column 1	Column 2	Column 3
1	100	75%
2	300	80%
3	750	90%

If we code the **VLOOKUP** to match value 2 with column 3, it will return a value of 80 per cent. Remember that the function will always choose from the leftmost column and that column must be in ascending order for the function to work. If you were to change the coding to look for the matching value in column 2, the result would be 300. It is not necessary that the

requested lookup value be an input; it can be a coded output that may be subject to change. This will be more clear as you do the **VLOOKUP** exercise for the Weighted Average Cost of Capital (WACC). Do not worry if you are not familiar with the WACC maths, the exercise walks you through the steps and the WACC is explained in more detail in Module 3. **HLOOKUP** will not be explained in great detail. The concepts are the same as the **VLOOKUP**, just revert the columns to rows and use the same method.

Conditional Formatting

The Conditional Formatting option is in the Toolbar under **Alt + Format + Conditional Formatting** and can help to flag problems in the model, or pressure points in the negotiations. The dialog box brings a series of commands that will allow you to format cells based on conditions. For the case study in Module 4, we shall format cells in red that flag problems or issues. In the CD exercises, condition the WACC cell to turn red when the WACC is greater than 10 per cent. You will also practise the Goal Seek function to find an assumption driver that will change the WACC to greater than 10 per cent.

Manual calculations

Generally speaking, it is best to keep the Excel model set on manual. You

can set the Excel program to manual calculation by **Alt + Format + Options**. Once the dialog box is open, go to Calculation and **Alt + Manual**. This action will tick the box. Now each time you want to calculate the worksheet press **F9**. **Shift + F9** will calculate the whole workbook. When a model is on automatic calculation it can slow down the coding process to wait for the ready mode. This is especially true when a model has a variety of tables that need to be calculated.

Summary

This module has touched on only a few actions that Excel can perform. However, the items outlined should be more than sufficient to build a robust model. Models should not be a 'full employment' exercise for an analyst. Financial models that use too many Excel techniques can become too cumbersome and difficult to navigate. The point of a financial model is not to be modelling for the sake of modelling. The goal is to provide information to all parties in the most efficient manner possible. This module should provide ample guidance to the required Excel techniques to code a good project finance model. One final note is that project finance models are circular by nature. We will not go into great detail on coding macros, although the final product will have a macro to calculate to circular references in the case study.

Module 3: Project economics and selected financial maths

Microeconomics

To understand the economic foundations of the project finance model, it is useful to review some basic economic concepts. A fundamental component of microeconomic theory is the concept of fixed and variable expenses. Reference was made in Module 1 to 'covered' projects, or projects that have a creditworthy entity to purchase the project's output. A closer examination should be made of offtaker output purchase mechanics in relation to the project's operational profile. As we shall see, this relationship will have significant influence on the average unit price and the marginal unit price of the product being sold. When discussing a covered project, this average unit price, at determined output levels, should allow the project's required revenues to service the capital, no matter what the operational profile of the project. With a covered project, it is important to consider capital recovery, both debt service and equity returns, as fixed line item expenses. For this module we will use certain elements of the workbook's case study, a power plant, to examine these concepts.

The Power Purchasing Agreement (PPA) payment structure, or tariff, for the project is divided into four components:

1. The Capital Recovery payment
2. Fixed Operation and Maintenance (FOM) payment
3. Variable Operation and Maintenance (VOM) payment
4. Fuel charges.

These four elements can be placed in one of two categories: a capacity charge; or a variable charge, sometimes referred to as an energy charge in the power industry. Capital recovery and FOM are placed in the capacity charge category, while VOM and fuel charges are energy charges. The pricing elements of these two categories, matched with the operational

profile, are the bases of the average unit cost. The capacity charge is priced in US dollars per installed capacity of the power plant per month, or US\$/kW/month. The energy charge is priced in US cents per kilowatt hour produced, or US¢/kWh. The energy charge resembles the microeconomic marginal cost concept. By pricing the capacity charge in monthly payments, or time and availability-based payments, and not on the units produced, the project is guaranteed a fixed monthly income stream. However, the number of units produced and purchased will help drive the average unit price of the capacity charge.

The monthly capacity charge times 12 (for the number of contractual months in a year) divided by the annual output level of kilowatt hours will determine the average unit price for the PPA's capacity component. With an entirely covered project, the less output the offtaker contracts the greater the average unit price; however, the total annual capacity charge revenue stream to the project is always constant. Mathematically, the higher the denominator the lower the average, and vice versa. One hundred divided by 1 is 100, and 100 divided by 100 is 1. Simple but important.

$$\text{Average capacity charge's unit price} = (\text{Monthly capacity charge} \times 12) / \text{Annual output at that capacity factor}$$

The energy charge, or tariff, is a linear relationship on usage. This will mean that the tariff price and the average unit price are the same. From a modelling, and accounting, perspective, revenue and expenses have the same basic formula:

$$\text{Revenue (R)} = \text{Price (P)} \text{ times Quantity (Q)}$$

or

$$R = P \times Q$$

and

$$\text{Expense (E)} = \text{Price (P)} \text{ times Quantity (Q)}$$

or

$$E = P \times Q$$

If the project is a true pass-through structure, and we regard all capital recovery as fixed line expenses, then the individual revenue streams should equal the corresponding line item expense(s). For example, no matter what the operational profile of the plant, the fuel charge revenue should equal the fuel expense. This concept will be considered later. Let us concentrate for the moment on the economic concepts of the revenue portion in relation to the plant output, or the capacity factor.

For a start, let us look at a car as an example. Most cars quote higher fuel efficiencies for motorway driving over city driving. The constant nature of motorway driving reduces fuel consumption. Be careful with usage factors and make sure that you have an understanding of the operational profile. Two identical plants that have an annual run rate of 50 per cent may not have the same efficiency. Let us say that one plant only runs during peak hours of the day (meaning when power demand is at its greatest) during the work week, while the other is strictly a seasonal plant that runs continuously six months a year. One is driving on the motorway half of the year and the other is driving in the city all year. They will not have the same efficiencies, operations and consumption patterns.

Examining a few examples will help to illustrate the above concept. First, review some basic energy nomenclature in Exhibit 3.1 before continuing. At this point, for those readers who do not have an energy background, it is not important that you understand the detailed concepts of each unit,

Exhibit 3.1: General terms

Power

1 kilowatt (kW)	1,000 watts
1 megawatt (MW)	1,000 kilowatts (kW)
1 gigawatt (GW)	1,000 megawatts (MW)
1 terawatt (TW)	1,000 gigawatts (GW)

Time

1 year	8,760 hours
1 year	365 days
1 year	12 months

Calorific content

1 million british thermal units (MMBtus)	1,000,000 Btus
--	----------------

but it is critical that you can match the conversion factors.

This is a good point to take a moment and to describe the concept of ‘salt’. As stated, project finance is generally used for infrastructure projects. Infrastructure projects generally provide commodity type goods and services. With commodities and utilities, the two primary concerns of consumers are price and security of supply. Modelling is naturally easier when the modeller has industry experience. For those times that this is not the case, the modeller, at a minimum, needs to pay close attention to matching units appropriately (and then finding competent technical help to explain and verify more difficult concepts).

Power, like water and transportation and salt, are all generally commodities. The consumer wants to make sure that when the power switch is turned on the power flows at the best price possible. Few consumers

are going to pay an additional 30 per cent premium for designer salt and the same can be said for power. The pedant will state that consumers pay extra for sea salt, and for Morton's over the generic brand. Power industry players will say the same about 'green' energy, but for the sake of this workbook, let us stay with the workbook's concept of salt. As with salt, the project developer who can meet the technical parameters, negotiate more economical contracts and perform better financial engineering will drive down the cost basis for the project's good or service. This should ultimately make the project cheaper and more attractive to other participants.

When looking at a project's revenue stream, and its average unit pricing basis, in comparison to the overall market fundamentals, remember the concept of salt. Make sure your units are correct. These units must flow through the model correctly. And, in the end, the model's residual and final output is accurately coded cash.

In Module 4 we shall introduce the workbook's case in greater detail, but for the moment let us take a look at some of the general plant parameters and tariff structure.

The project is a 280MW (I.a) gas-fired power plant. With a 95 per cent capacity factor (I.b), or annual generation of 2.3 TWh (I.d., or 2,330,160MWh divided by 1,000,000 to convert from MWh to TWh), we can assume it is a base load plant, or running almost continuously all year (this concept is addressed later in this module). This annual generation output provides the quantity, Q, which is required to drive both operational revenue and expenses.

Exhibit 3.2: General plant parameters, tariffs and income statement

I. General plant parameters

a Installed plant capacity	280	MW
b Plant capacity factor	95.00%	
c Hours per year	8760	
d Annual electrical output	2,330,160	MWh
e MW to kW conversion factor	1,000	kW/MW
f Annual electrical output	2,330,160,000	kWh
g Operational months	12	

II. Tariffs from the Off-Take Agreement, (Power Purchase Agreement, PPA)

		Actual tariff	Tariff in cents/kWh
a Power plant capacity charge	US\$/kW/month	13.0000	1.8745
b Fixed O&M charge	US\$/kW/month	1.9097	0.2754
c Variable O&M charge	cents/kWh	0.5000	0.5000
d Fuel charge	cents/kWh	3.9375	3.9375
e Total tariff		6.5874	

III. Income statement

Year 1

The price, P , is determined by the PPA (II). We can now see the practical pricing elements of the previously stated capacity payments and energy payments concepts. The capacity tariff is US\$14.9097 kW/month (II.a plus II.b). The energy tariff is 4.4375 cents/kWh (II.c plus II.d). You will quickly note that the units are not uniform. It is not presently possible to aggregate the four components to a single pricing measurement of cents/kWh. To understand the price per kWh we must convert the capacity payment from US\$/kW/month to cents/kWh. Fortunately, we have all the necessary units to perform the task. Those of you who studied chemistry at secondary school may remember calculating molar weights by eliminating units. We shall use the same technique. By starting with US\$/kW/month and using the annual output in kWh at a 95 per cent capacity factor, we can derive the capacity tariffs in cents/kWh (see Equation 1).

Equation 1

$$\frac{13.500 \text{ US\$}}{1 \text{ kW/month}} \times \frac{12 \text{ months}}{1 \text{ year}} \times \frac{1000 \text{ kW}}{1 \text{ MW}} \times \frac{280 \text{ MW}}{1 \text{ US\$}} \times \frac{100 \text{ cents}}{1 \text{ US\$}} \times \frac{1}{280 \text{ MW}} \\ \times \frac{1 \text{ MW}}{1000 \text{ kW}} \times \frac{1}{95\%} \times \frac{1 \text{ year}}{8760 \text{ hours}} = \frac{1.8754 \text{ cents}}{\text{kWh}}$$

Now that all the units are uniform, we can aggregate the four components and arrive at a unit price for the power.

Again, if $R = P \times Q$, we can now calculate the revenue for this year 1 (one) of the project. We shall use the total cents/kWh price later to look at the project in comparison to the market. When modelling the project it is generally best to use the tariff as defined in the contract. In this case we shall have two price coding mechanisms. One mechanism is for the capacity payments (see Equation 2) and the other is for the energy payments (see Equation 3).

Equation 2

$$\frac{14.9097 \text{ US\$}}{1 \text{ kW/month}} \times \frac{12 \text{ months}}{1 \text{ year}} \times \frac{280 \text{ MW}}{1 \text{ MW}} \times \frac{1000 \text{ kW}}{1 \text{ MW}} = \frac{\text{US\$ } 50,096,592}{1 \text{ year}}$$

Equation 3

$$\frac{4.4375 \text{ cents}}{1 \text{ kWh}} \times \frac{2,330,160,000 \text{ kWh}}{1 \text{ Year}} \times \frac{1 \text{ US\$}}{100 \text{ cents}} = \frac{\text{US\$ } 103,400,850}{1 \text{ year}}$$

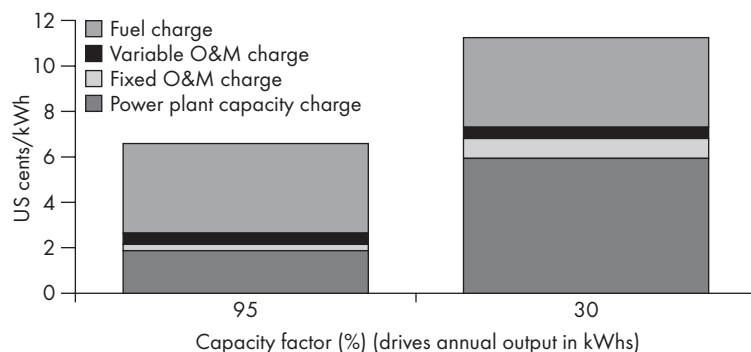
In these two equations we have aggregated the respective components to arrive at the two separate revenues. In the model we shall have four separate revenue line items. The sum of the four revenue items is the total revenue for the project in year 1.

The critical point is to understand how the capacity factor will affect the respective individual line items. Let us look at this from an average unit price in cents/kWh at two different capacity factors (see Exhibit 3.3).

By changing the capacity factor from 95 per cent to 30 per cent, notice that the total average unit price rises from 6.59 cents/kWh to 11.25 cents/kWh. If we examine the graph further, you will notice that the average unit price of the two variable costs is the same and the two capacity payments, or fixed costs, are what drives the average price up. The reason is, the 30 per cent capacity factor reduced the total annual output from 2,330.1 GWh/year to 735.8 GWh/year. When we divide a fixed line item figure by a decreasing number the result is an increased average unit price.

Let us now look at the same capacity factor's effect on annual revenues in Exhibit 3.4.

Exhibit 3.3: Average unit price in US cents/kWh at different capacity factors

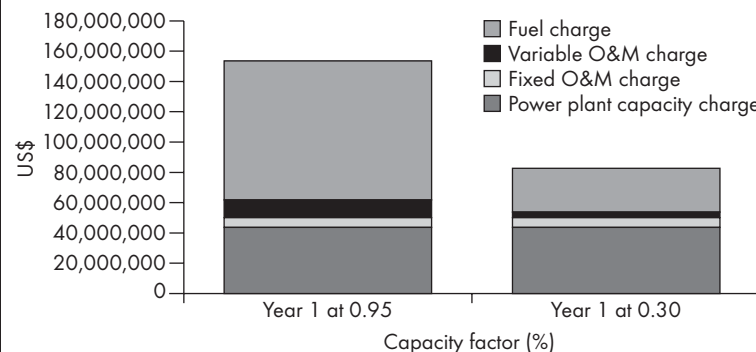


Source: Author's own.

Notice that the annual Power Plant Capacity Charge revenue remains at US\$43,680,000, no matter the capacity factor. The capacity portion tariff is based on the installed capacity of the plant and not the operational profile. No matter if the plant runs at 10 per cent or 90 per cent per year, the fixed costs are assured. In this case our fixed costs will also include capital recovery of both the debt and the equity. The average unit price, or market risk, is shouldered by the offtaker. It is the energy components that vary in this example. The more the plant runs, the more gas it uses. And, if structured correctly for a covered project, this gas charge is passed through to the offtaker. (We are assuming simplistically that the gas contract's price is uniform, along with the heat rate for converting gas power, no matter what the operational profile; under normal practices, this would not be the case.)

To illustrate the point further, look at Exhibit 3.5. You will quickly notice that the Total Fixed Costs remain the same, no matter the capacity factor.

Exhibit 3.4: Total annual revenue in US\$ at different capacity factors



Source: Author's own.

You may also notice that the workbook has used costs instead of revenue for this exhibit's headers. If this is a real pass-through covered project, the revenues and the costs should match.

From Exhibit 3.5, we can generate two graphs that will help to illustrate the point further. In Exhibit 3.6, we can easily see the linear relationship of the fixed costs and variable costs. (The variable costs are linear because they do not incorporate any plant inefficiencies or pricing differentials for the different capacity factors.) In Exhibit 3.7, the reduction in the plant's output on the average fixed costs and total average costs is instantly visible. We shall use Exhibit 3.7 later in this module as an overlay on the market's fundamentals to illustrate another point.

Exhibit 3.5: Costs at different capacity factors

Capacity factor	Output 'Q' (kWh)	Total fixed costs 'TFC' (US\$)	Total variable costs 'TVC' (US\$)	Total costs 'TC' (US\$)	Average fixed costs 'AFC' (cents/kWh)	Average variable costs 'AVC' (cents/kWh)	Average total costs 'ATC' (cents/kWh)	Marginal costs 'MC' (cents/kWh)
1%	24,528,000	50,096,592	1,088,430	51,185,022	204.2425	4.4375	208.6800	
10%	245,280,000	50,096,592	10,884,300	60,980,892	20.4242	4.4375	24.8617	4.4375
20%	490,560,000	50,096,592	21,768,600	71,865,192	10.2121	4.4375	14.6496	4.4375
30%	735,840,000	50,096,592	32,652,900	82,749,492	6.8081	4.4375	11.2456	4.4375
40%	981,120,000	50,096,592	43,537,200	93,633,792	5.1061	4.4375	9.5436	4.4375
50%	1,226,400,000	50,096,592	54,421,500	104,518,092	4.0848	4.4375	8.5223	4.4375
60%	1,471,680,000	50,096,592	65,305,800	115,402,392	3.4040	4.4375	7.8415	4.4375
70%	1,716,960,000	50,096,592	76,190,100	126,286,692	2.9177	4.4375	7.3552	4.4375
80%	1,962,240,000	50,096,592	87,074,400	137,170,992	2.5530	4.4375	6.9905	4.4375
90%	2,207,520,000	50,096,592	97,958,700	148,055,292	2.2694	4.4375	6.7069	4.4375
95%	2,330,160,000	50,096,592	103,400,850	153,497,442	2.1499	4.4375	6.5874	4.4375

Exhibit 3.6: Total annual costs in US\$ at different capacity factors

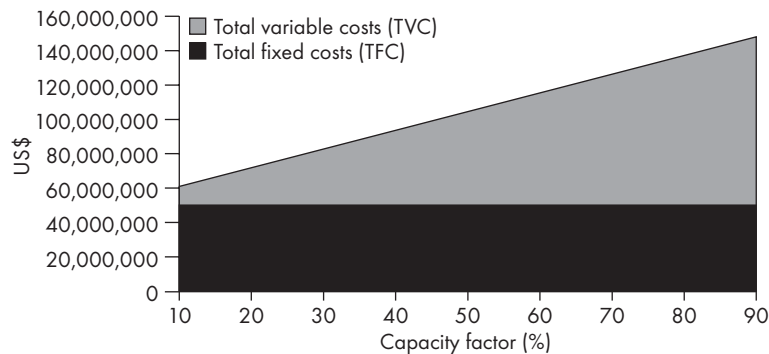
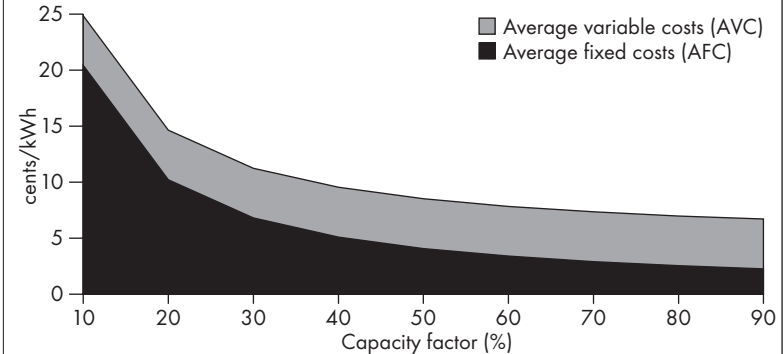


Exhibit 3.7: Total average unit price in cents/kWh at different capacity factors



Market fundamentals

In Module 1 we discussed the importance of credit analysis to the contract counter-parties. When looking at the fundamentals of the market, it is important to see how the individual project will fit in with the greater supply and demand of the market. If we are concerned about the credit-worthiness and ability of counter-parties to perform their respective contracts, we should be equally concerned that the project makes sound economic sense to the market it is serving. The allure of short-term gains to a long-term incongruence can be disastrous.

Let us take an elementary view of the power market and the merit order of dispatch of power plants. Again, as will be stated throughout this workbook, these fundamental concepts can be generally applied to most industries that use project financing. If born on solely economic merits, the project with the best pricing, with technically prudent equipment, should be the most favoured project.

One aspect of the power industry that makes it more complex than others is the inability of power to be stored. This changes some of the power's important pricing elements in relation to other commodities, most importantly the convenience curve, y , but that is beyond the scope of this workbook. Conceptually, you can discuss the storage of fuel on site that is easily and readily converted to power, such as coal and gas. And, as technology advances with batteries and fuel cells, there may be more storage components in the industry in the future. However, in the immediate, once electrons are generated they need to go somewhere for consumption, or be lost.

Even though power cannot be stored it does not mean that it is not subject to the basic concepts of supply and demand. More saliently, if the

supply curve is fixed and demand goes up, so does the price.

In most countries, power is an omnipresent part of our daily lives. Even at 3 am, there is a certain minimum of electricity that must be available to power streetlights, traffic lights and so on for a modern society to function. This type of usage is known as base load power. As a community starts its daily activities, the need for power increases until it reaches its highest threshold hours. This is known as peak load power. Those hours that ramp up to the peak load hours and that ramp back down to base load are known as the intermediate load hours, or shoulder hours (see Exhibit 3.8).

If we aggregate all these days, we can arrive at an annual capacity requirement view of the system based on 8760 hours per year. (For our purposes this is a simplified view of a system. It does not assume any seasonal

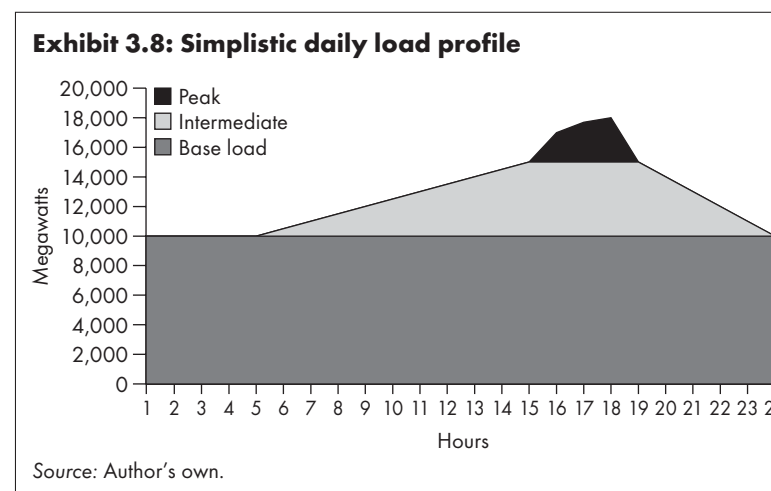
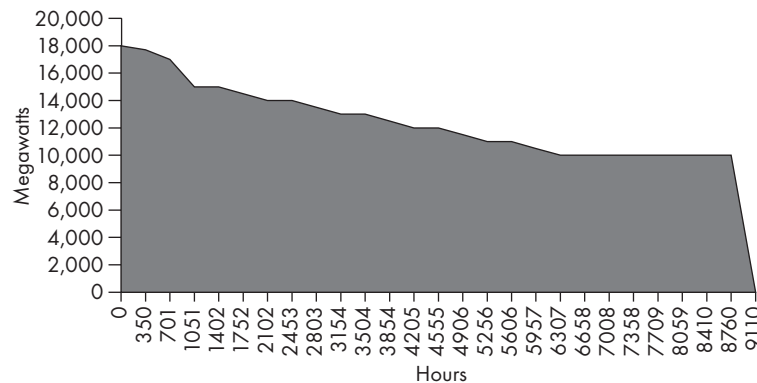


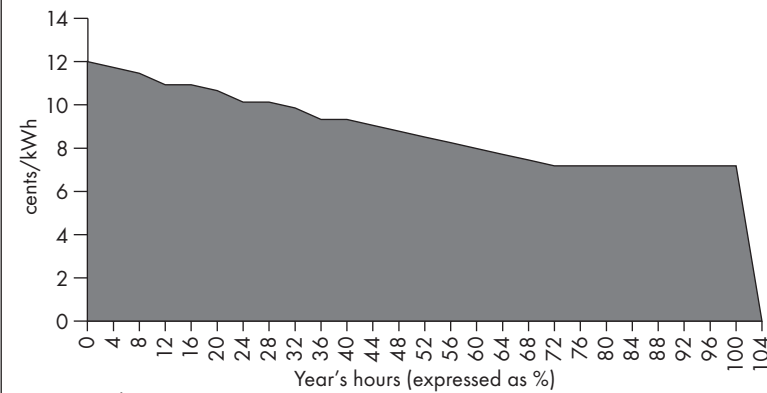
Exhibit 3.9: Simplistic yearly load curve in megawatts



Source: Author's own.

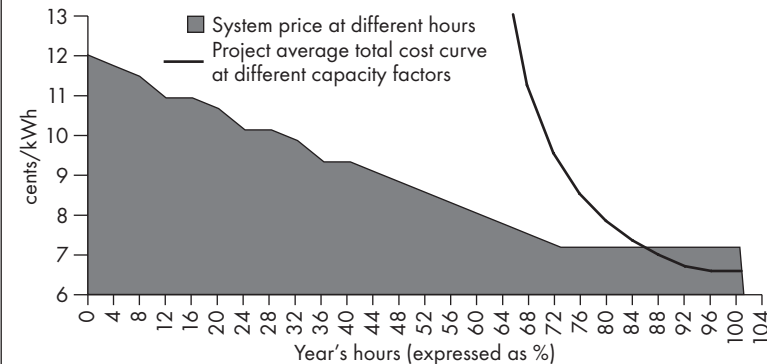
changes, nor any differentials in weekday and weekend power demands.) Furthermore, we can apply percentages to the x-axis' hours to analyse hours in relation to capacity factors. As was stated, the greater the demand, the greater the prices. Each marginal hour of power produced will have a discrete pricing. Perhaps some base load hours have the same price, but as the demand ramps up, notice that the price also ramps up. If every unit dispatched gets the marginal units price, then during those peaking hours the base load plants make even more money on the margin. If we overlay our total average cost curve from Exhibit 3.7 on to Exhibit 3.10, we arrive at Exhibit 3.11 and we can see if the project makes economic sense to the system. By applying the curve, we notice that the plant should be economically beneficial to the system at the 95 per cent capacity factor.

Exhibit 3.10: Simplistic pricing of load curve in cents/kWh



Source: Author's own.

Exhibit 3.11: System prices versus the project's average total costs at differing capacity factors



Source: Author's own.

As can be well imagined, pricing strategies and how the system's regulatory framework functions are important factors, but these are also beyond the scope of this workbook. In our example the offtaker is shouldering the market risk. However, we should be concerned that the offtaker could come under some market pressure in the future if it is signing uneconomical contracts. Also, in the preliminary stages of negotiations with the offtaker, it is paramount to have an understanding of the market. By changing technologies and capacity factors in relation to pricing and capital recovery, perhaps it makes more sense to try to service other parts of the market like the peak hours. We shall come to this a little later.

At the moment, our view is only looking at the system's current supply and demand situation. We must look to a forecasted period to see if this beneficial pricing situation continues to be the case. The PPA will normally have some form of escalation in the tariff calculations. If it is a pass-through project, this escalation is probably matching those factors embedded in the operational contracts of the project.

In liberalised markets where there is open trading of commodities, future real pricing curves will either demonstrate a long-term increase (contango) or decrease (backwardation) in commodity prices. It can be difficult to rectify the trading view of a pricing curve with the asset development view of the same pricing curve. Anybody that has ever asked their trading and marketing desk to give them a long-term fundamental view of a market will understand this. The desk will say, 'Look, if you don't like today's 20-year price view, just come back tomorrow and it will change.' This is not a flippant remark; it is just how their business views a market. The reasoning is that forward and future pricing curves are based on the market at that moment. Short-term market volatility will change the trading desk's long-term pricing view. Also, many markets' trends are real

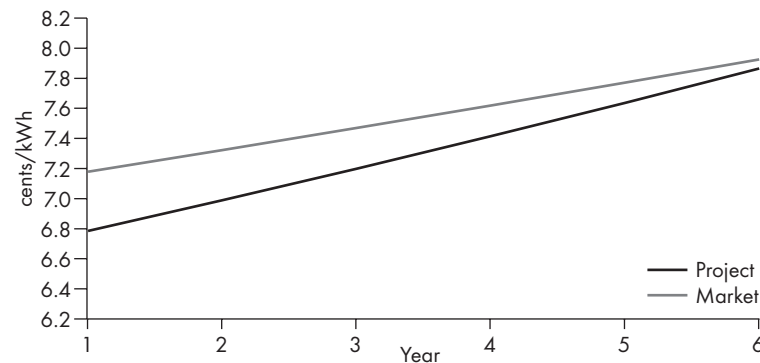
pricing curves in backwardation, with a perceived view of increased efficiencies bringing down real prices in the long run. This is not a very attractive scenario for long-term assets that are taking market risk.

There are a host of consultants that will give views on markets. They will run sophisticated econometric models that balance input selections and prices with plant efficiencies matching demand and supply side scenarios to determine system prices. The assumptions and timings to these variables can be difficult to derive. For instance, what if there are political motivations to decommissioning large base, load nuclear units? The economic rationale to taking these plants offline may be non-existent. It can be a tricky internal deliberation to build a power plant worth hundreds and millions of dollars based on current political whims and speculation. For our purposes, most of the players will have employed outside consultants to assist in this analysis. If perceived wholesale base load pricing is at 7.1788 US cents/kWh and the project's price is at 6.7850 US cents/kWh (after a two-year construction schedule), then the project appears to make economic sense for the offtaker who is taking the market risk. And, if the perceived market price growth is 2 per cent annually, given our escalated PPA pricing, the project is economical for the first six years (see Exhibit 3.12).

Remember that this is a 20-year contract for the offtaker. What happens if we carry out these two pricing curves for the full 20 years at their current escalation rates? (See Exhibit 3.13).

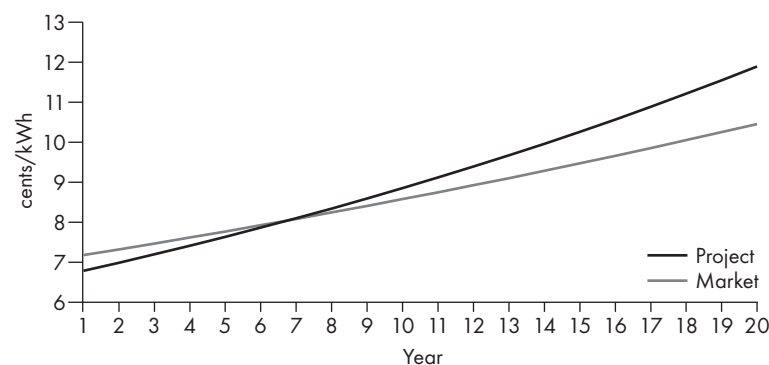
You will note that the project's PPA price to the offtaker outstrips this particular view of the market after year 6. Is the project setting itself up for a long-term default by putting the burden on the offtaker? Is this actually a long-term project credit risk? How credible is the market view?

Exhibit 3.12: Project PPA price versus forecasted base load market price for 6 years



Source: Author's own.

Exhibit 3.13: Project PPA price versus forecasted base load market price for 20 years



Source: Author's own.

What are the issues behind the PPA's escalation? We shall take a more in-depth view of these issues in Module 5.

Time Value of Money

Project finance models are based on a present value analysis. Let us take a few moments to review the principles behind the Time Value of Money (TVM) theory. The basis of TVM is that a dollar today is worth more than a dollar tomorrow. The underlying concept is based on the risk-free rate and associated opportunity costs. A dollar today can be put to immediate use, earning the risk-free rate minimum. The investment promise of that same dollar being received in the future should be viewed with some level of scepticism. There is no certainty that we shall ever receive that dollar in the future. The value of that future dollar will have a discount factor applied to its value to adjust for the scepticism, or risk. Not every investor will apply the same discount factor, having different perceptions of the investment risk levels.

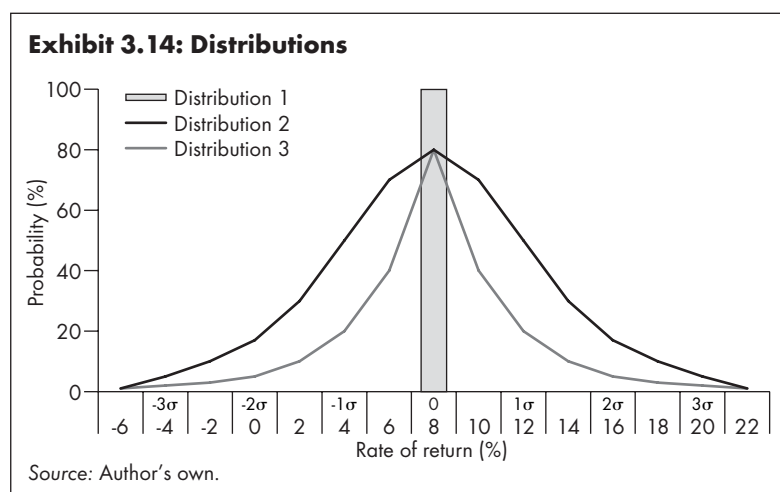
This concept of a discount rate and capital's opportunity cost has the same basis. By investing today with the promise of future returns, capital foregoes the opportunity of investing in other opportunities, most importantly a risk-free instrument. (We shall not debate whether there is such a thing as a risk-free rate, but we shall assume that there are risk-free government securities.)

If capital has the opportunity to invest in two like projects, it will need to weigh the perceived risks for each project against the promised return.

Risk versus reward

This concept of risk versus reward, sometimes known as ‘fear versus greed’, should be a primary basis for any investment criteria. If the two investments have the same reward profile, the rational investor will choose the investment with the least risk. However, ‘beauty is in the eye of the beholder’, and investors will generally not view rewards and risks in the same light.

It is important to understand whether the perceived risk is symmetrical, eg, a standard bell curve, or skewed to one side of the mean, eg, kurtosis. If it is a standard bell curve, the risk of upside potential is just as great as the risk of downside potential. This concept goes back to our discussions in Module 1. Is risk good or is it bad? Every investor will have different views on this perceived risk. The rational investor will pay different amounts for the three different distributions in the bell curve. While all three have a mean return of 8 per cent, they have different distributions around the



mean, with Distribution 1 being a risk-free rate (see Exhibit 3.14).

As time increases, the discount factor becomes greater, holding with the dollar today versus the dollar tomorrow concept. By summing the investment's series of pro forma generated cash flows, we arrive at a present value of the investment. Financial theory states that if the present value of the cash flows minus the initial investment is positive, then the investment or project should be undertaken. The trick is arriving at an appropriate series of pro forma cash flows, the numerator, and the appropriate discount rate, the denominator. This method is called the Discounted Cash Flow (DCF) method.

Discounted Cash Flow

The DCF method is a puissant method of analysing investments. But, as stated, it can be difficult to calculate. Once the basic mechanics are understood, the difficulty comes with determining the appropriate assumptions to use. This is where the art meets the science of valuation. Most newly minted MBAs when asked will knee-jerk react to stating that the Net Present Value (NPV) is the preferred method for capital budgeting and analysis. It is difficult to argue against the merits of NPV in relation to other methods in an academic setting. The DCF method can also be used for an alternative method known as the Internal Rate of Return (IRR). We shall discuss both methods below.

Net Present Value

NPV is the sum of the present values of cash inflows and the present values of cash outflows.

Equation 4

$$NPV = -I + \frac{\sum CF_t}{(1+r)^t}$$

You will note the initial investment, $-I$, is not discounted. If the initial investment is the only cumulative cash outflow and it is the starting point for the DCF analysis, then by default its value is a present value. (For a more technical view, you can discount the $-I$ by the appropriate discount rate of $(1+r)^0$, whereby any number raised to the power of zero is one, so that $-I/1$ is $-I$.) Special consideration must be made for those investments that have a prolonged distribution of capital. This will be the case for many project finance investments, particularly during the construction phase, and we shall look at this point in later modules.

The sum of the discounted cash flows, $\sum CF_t/(1+r)^t$, is rather straightforward. By summing up the incremental cash flows at their appropriate discount rate in time, we arrive at the Present Value (PV). When we add the initial investment to the present value of the cash flows, we have an NPV. If the NPV is positive it will create value, if it is negative it will destroy value. Generally, these future cash flows are driven by assumptions that have a certain level of risk. This is the first issue with a DCF method. The numerator, or PV of the cash flows, is only as good as the model's assumptions that drive these figures. In addition, the model must be careful to use the appropriate cash flow with regard to the discount factor that is being employed. In other words, is the cash flow available to all investors, or just some investors, and what is the percentage mix of these investors' claims to these cash flows? Some form of Free Cash Flow (FCF) is the accepted form, but there are several nuances as to how it is

calculated. We will not explore the FCF question in great detail. Our model will use a flow-to-equity model approach.

This brings us to the next hurdle – arriving at an appropriate discount rate, r , to calculate the PV. For the NPV calculation, one of the most common methods is the Weighted Average Cost of Capital.

Weighted Average Cost of Capital

Equation 5

$$WACC = r_e \times \frac{S}{V} + r_d \times \frac{B}{V} \times (1 - T_c)$$

Investors will require return for the opportunity use of their capital. Given their different claims on the investment, these different investors will have different reward requirements. Most notably, debt should have lesser return requirements than equity, so their opportunity costs should be less. Remember that debt normally has a scheduled plan, or amortisation, of interest received and principal repaid, and debt should be paid before any equity claims. Debt may also have liens, or claims, to the asset that is being financed. This can be considered extra security. Pure equity is regulated to the residual cash flow no matter the amount, or lack thereof.

In calculating the cash flow to arrive at an enterprise value, it is to account for tax-adjusted interest payments, depreciation, capex and change in working capital. The market value of the debt (where and when available) is subtracted from the enterprise value to arrive at the equity value. From a corporate finance modelling perspective, maintaining a uniform level of debt to equity may be the stated corporate goal, making a one-time

Weighted Average Cost of Capital (WACC) calculation more meaningful. The plain vanilla corporate bond with principal redemption and refinancings makes this a plausible strategy and modelling exercise. Remember that corporations are generally treated as ongoing entities, and project finance entities have a single stated purpose with a finite life.

Let us take a closer look at how the WACC is calculated with the Capital Asset Pricing Model (CAPM) and its relevance to project finance. Looking at the second half of Equation 5, we notice the cost of debt, r_d , multiplied by one minus the tax rate and the debt, B , to total value, V , ratio. The cost of debt should be the rate that the entity can currently get in the market. In corporate finance, the B/V ratio will generally be a target ratio, while with the project finance entity it will be the initial gearing that the project can achieve. Now we arrive at the first dilemma; SPVs will generally not have a bullet loan, a single principal repayment at the end debt schedule. Rather, they will have a principal repayment schedule that will change the weight of debt to equity every year. Also, the equity book values may vary over the life of the project based on issues, like the ability to distribute initial capital, or more importantly, not being able to distribute all the dividends, causing an increase in the retained earnings account, and equity. Projects are not generally traded on the open market, so the book value will have more importance in determining the value of the equity, including the retained earnings balance.

Remember that the cost of debt is the prevailing rate that an entity can achieve in the market at that period in time, not its historical interest rates. If 10 years out the project has repaid a large portion of its loan and the B/V ratio is significantly less, does it make sense to use the same interest rate over the life of the project? If the financial stress of the project is greatly reduced, then the interest rate that it could obtain should

be reduced. Also, the greater weight of equity (assuming that equity account stays the same from initial capitalisation), due to the loan repayment, will increase the WACC, causing greater discount to the project in the later years and a lower NPV. But, remember that project finance entity is a single purpose vehicle that should not be accessing capital in future years anyway, so perhaps the initial WACC should be maintained throughout the NPV modelling exercise.

Let us take a moment to look at the left side of Equation 5, or the cost of equity, r_e , multiplied equity to total value ratio, S/V . As previously stated, the CAPM method is a standard technique to assess the cost of equity. Take a moment to review the components of the CAPM in Equation 6.

Equation 6

$$\begin{aligned} \text{CAPM} &= r_f + \beta \times (r_m - r_f) \\ \beta &= \text{Cov}(r_a, r_m) / r_m \end{aligned}$$

By multiplying the Market Risk Premium (MRP), or market return, r_m , minus the risk-free rate, r_f , by the Beta, β , or the covariance of the asset to the market, plus the risk-free rate, we arrive at the cost of equity (see Exhibit 3.15).

There are many moving parts that we should discuss. Which market should you use for the r_m , the sponsor's market, the project's market or a world market indices? How many years of that market should you use to arrive at the market return? What do you use for the r_a , the greenfield project finance asset has no history, do you use a proxy? Should the β be levered or unlevered? What is the prevailing risk-free rate that should be used, and should CAPM be recalculated every time the prevailing rate is adjusted? If the project is paying down debt and reducing financial stress,

Exhibit 3.15: General assumptions

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
3		I. GENERAL ASSUMPTIONS																
4	A	Initial Investment, I	\$ (1,000)															
5	B	Free Cash Flow, FCF	\$ 200															
6	C	Risk Free Rate, r_f	3.40%															
7	D	Beta, β	1.20															
8	E	Market Risk Premium, MRP	8.00%															
9	F	Corporate Tax Rate, T_c	38.00%															
10	G	Cost of Debt, r_d	7.50%															
11	H	Debt to Total Value, B/V	70.00%															
12	$I = 1 - H$	Equity to Total Value, S/V	30.00%															
13	$J = A \times I$	Initial Equity	\$ (300)															
14	$K = A \times H$	Initial Debt	\$ (700)															
15	$L = C + (D \times E)$	Cost of Equity, r_e	13.00%															
16	$M = (L \times I) + [(G \times H) \times (1 - F)]$	Weighted Average Cost of Capital, WACC	7.16%															
17	N	Annual Growth after Year 1, g	2.00%															
18																		
19	O	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
20	$P = A$	Initial Investment, I	\$ (1,000)															
21	$Q = B$, Then $B \times (1 + \$N\%)$	Free Cash Flow, FCF		\$ 200	\$ 204	\$ 208	\$ 212	\$ 216	\$ 221	\$ 225	\$ 230	\$ 234	\$ 239	\$ 244	\$ 249	\$ 254	\$ 259	\$ 264
22	$R = P + Q$	Cash Flows	\$ (1,000)	\$ 200	\$ 204	\$ 208	\$ 212	\$ 216	\$ 221	\$ 225	\$ 230	\$ 234	\$ 239	\$ 244	\$ 249	\$ 254	\$ 259	\$ 264
23	$S = (1 + \$M\%)^n \times O$	Discount Rate	1.0000	1.0716	1.1482	1.2304	1.3184	1.4127	1.5138	1.6221	1.7382	1.8626	1.9958	2.1386	2.2917	2.4556	2.6313	2.8196
24	$T = R / S$	Discounted Cash Flow	\$ (1,000)	\$ 187	\$ 178	\$ 169	\$ 161	\$ 153	\$ 146	\$ 139	\$ 132	\$ 126	\$ 120	\$ 114	\$ 109	\$ 103	\$ 98	\$ 94
25	$U = \text{Sum of Row } T$	Net Present Value	\$ 1,028															
26	$V = K$	Initial Debt (Assumes debt at par value)	\$ (700)															
27	$W = U + V$	Increased Value to Equity	\$ 328															

could that affect the β in later years, and should the β be adjusted accordingly? In reality, there are just as many answers as there are questions, if not more, and many sophisticated ways of looking at the problem. Should the sponsor use its cost of equity?

In the academic setting, the conversation may be a stimulating one, but when the sponsor is in the project approval process it becomes an ethereal dialogue that can quickly lose relevance. In reality, at the end of the evaluation, many, if not most, sponsors will apply a hurdle rate as their cost of equity. Even more to the point, certain sponsors will add a country risk premium to the equity hurdle rate, increasing the discount factor even more. By default, if the sponsor is using a hurdle rate, it is using an Internal Rate of Return method.

Internal Rate of Return

The Internal Rate of Return (IRR) is the discount rate applied to the cash flow that will return a NPV of zero when added to the initial investment. As stated, this is sometimes known as the hurdle rate. If a project's IRR is less than the sponsor's return on capital requirements, then the project has passed the sponsor's hurdle rate.

Equation 7

$$0 = -I + \frac{\sum CF_t}{(1 + IRR)^t}$$

Continuing with the example that we used for the NPV section, let us generate an IRR (see Exhibit 3.16).

Exhibit 3.16: General assumptions

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
30		I. GENERAL ASSUMPTIONS																
31	<i>A</i>	Initial Investment, <i>I</i>	\$ (1,000)															
32	<i>B</i>	Free Cash Flow, <i>FCF</i>	\$ 225															
33	<i>C</i>	Cost of Debt, <i>r_d</i>	7.50%															
34	<i>D</i>	Debt Term, <i>n</i>	15															
35	<i>E</i>	Annual Payments, <i>m</i>	1															
36	$F = D \times E$	Number of Payments, <i>m x n</i>	15															
37	<i>G</i>	Debt to Total Value, <i>B/V</i>	70.00%															
38	$H = I - G$	Equity to Total Value, <i>S/V</i>	30.00%															
39	$I = A \times H$	Initial Equity	\$ (300)															
40	$J = A \times G$	Initial Debt	\$ (700)															
41	<i>K</i>	Cost of Equity, <i>r_e</i>	13.00%															
42	<i>L</i>	Annual Growth after Year 1, <i>g</i>	2.00%															
43	<i>M</i>	Debt Service, Type	Annuity															
44	$N = PMT[C, F, J]$	Debt Service, Payment	\$ 79.3															
45																		
46	<i>O</i>	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
47	$P = J$	Initial Debt	\$ (700.0)															
48	$Q = P$, then $Q_{i,j} - S_{i,j}$	Principal, Beginning Balance		\$ (700.0)	\$ (673.2)	\$ (644.4)	\$ (613.4)	\$ (580.1)	\$ (544.3)	\$ (505.9)	\$ (464.5)	\$ (420.0)	\$ (372.2)	\$ (320.8)	\$ (265.6)	\$ (206.2)	\$ (142.4)	\$ (73.8)
49	$R = Q \times SC\$$	Interest Payment		\$ (52.5)	\$ (50.5)	\$ (48.3)	\$ (46.0)	\$ (43.5)	\$ (40.8)	\$ (37.9)	\$ (34.8)	\$ (31.5)	\$ (27.9)	\$ (24.1)	\$ (19.9)	\$ (15.5)	\$ (10.7)	\$ (5.5)
50	$S = T - R$	Principal Repayment		\$ (26.8)	\$ (28.8)	\$ (31.0)	\$ (33.3)	\$ (35.8)	\$ (38.5)	\$ (41.4)	\$ (44.5)	\$ (47.8)	\$ (51.4)	\$ (55.2)	\$ (59.4)	\$ (63.8)	\$ (68.6)	\$ (73.8)
51	$T = PMT[C, F, J]$	Debt Service		\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)	\$ (79.3)
52																		
53	$U = I$	Initial Equity	\$ (300.0)															
54	V , Then $V_{i,j} \times (1 + \$\$)$	Free Cash Flow		\$ 90.0	\$ 91.8	\$ 93.6	\$ 95.5	\$ 97.4	\$ 99.4	\$ 101.4	\$ 103.4	\$ 105.4	\$ 107.6	\$ 109.7	\$ 111.9	\$ 114.1	\$ 116.4	\$ 118.8
55	$W = S$	Principal Repayment		\$ (26.8)	\$ (28.8)	\$ (31.0)	\$ (33.3)	\$ (35.8)	\$ (38.5)	\$ (41.4)	\$ (44.5)	\$ (47.8)	\$ (51.4)	\$ (55.2)	\$ (59.4)	\$ (63.8)	\$ (68.6)	\$ (73.8)
56	$X = U + V + W$	Equity Cash Flow	\$ (300)	\$ 63	\$ 63	\$ 63	\$ 62	\$ 62	\$ 61	\$ 60	\$ 59	\$ 58	\$ 56	\$ 54	\$ 53	\$ 50	\$ 48	\$ 45
57	$Y = IRR \text{ of Row } X$	IRR	19%															

NPV versus IRR

Some readers will argue the superiority of the NPV method over the IRR method. This may be true when considering short-lived asset valuation, but, generally speaking, project finance assets are long-term prospects, so the timing argument loses some of its validity in comparison to the myriad of moving parts with the CAPM method. Furthermore, from a negotiation standpoint, models that present an NPV number may be giving away too much information. If the sponsor is using a hurdle rate, and the cost of debt is explicitly known because of the financing, an NPV advertises the sponsor's hurdle rate. If the NPV number is large, and the hurdle rate is extrapolated, it gives potential new investors and suppliers greater information from where to negotiate. An IRR percentage gives an

indication of the project's returns but does not give an indication of the sponsor's internal requirements. If the project model is producing an NPV calculation and an IRR calculation, it may be inadvertently telling other parties what the sponsor 'wants' and what they can 'live with'.

Continuing Value

Another feature of corporate finance models is the Continuing Value, or CV. There are many discussions on how to calculate CV, but we shall use the formula laid out in Equation 8.

Equation 8

$$CV = \frac{FCF_{t+1} \times (1 + g)}{k - g}$$

Remember that after you have calculated the CV it still must be discounted using the previous year's discount rate. One of the main problems with the DCF approach is deciding how many years out you apply the CV. If you apply it too early, a majority of value is incorporated in CV. If you apply too far out, the assumptions may not be terribly valid. The main point for the CV is that it is the figure that represents the entity at a steady state mode and in perpetuity. This is generally not the case for projects. They have a finite life, so a CV is usually inappropriate. For this reason, project models' timeline should represent the life of the project. However, they may have a Terminal Value, or TV, associated with them. And, it may be difficult to determine what the life of the project is. Is it the economically useful life of the assets, or is it tied to some contract or concession? Equity will normally take a more aggressive view of the asset's life than debt.

Terminal Value

Terminal Value (TV) is different from a CV in that a CV assumes that the entity will perform at this level, with a certain growth factor, in perpetuity. This may not be appropriate for projects and their financings, especially

if the project has an offtake contract. All projects have a finite economic life. This is not to say that the project cannot continue making revenue after an explicit contractual arrangement; however, sooner or later a project's economic life will no longer be viable. Projects with many moving parts have a greater chance of mechanical failure. For example, generally speaking, hydro-electrical plants will last longer than gas-fired plants, as there are fewer moving parts and no thermal pressure on the system. A solid-state project with appropriate maintenance paid from operational cash, like a road, could have an economic life that is much longer than its revenue contract. Unlike corporate finance, projects do not reinvest retained earnings for new assets, so once the project asset's economic life is depleted, so are the cash flows. For this reason, a TV may be required. For example, are there any environmental clean-up issues that need to be addressed, and if so, who will pay for those costs? Practically speaking, the discount rate applied to those outer years is so significant that many people just choose to ignore the TV, but at the project's end, if required cash is not available, it will represent a real significant cash issue to someone. And the closer to that TV date, the greater the opportunity cost to the cash. This is a negotiating point to someone, somewhere. Another TV issue is zeroing out working capital accounts. This could be a cash inflow or outflow.

Purchasing Power Parity

One major difficulty in any pro forma model is addressing future currency exchange rates (FX). Two economic theories that address ways of forecasting FX are: interest rate differentials; and inflation rate differentials, also known as the Purchasing Power Parity (PPP) theory. The theories, in simple terms, state that currencies will adjust based on the consumer's ability to invest or purchase in associated currencies. If there were not

parity, it would allow for an arbitrage opportunity, to borrow money cheaper and purchase currencies forward with no risk. Or, tariffs and taxes aside, purchase the same product at the cheapest currency available.

For example, if a hammer costs €10 in Spain and \$10 in the United States, but the exchange rate was \$1.25/€1, you would purchase the hammer in the United States for €8 ($8 = 10 / 1.25$) and sell it in Spain for €9.75 (assuming €1 shipping and handling charges) and make €0.75 per hammer ($0.9375 = 1.25 \times 0.75$), and you would still be undercutting the existing market. From this example, we can see that at an FX rate of \$1.25/€1.00, hammers should cost around \$10 and €8, respectively. This concept is the basis of PPP, which uses inflation, a driver of prices going

forward, to derive future FX rates. The future rate, F , is the spot rate, S , times one plus domestic inflation, I_d , raised to the period, m , divided by one plus foreign inflation, I_f , raised to the period. $[F = S \times ((1 + I_d)^m) / ((1 + I_f)^m)]$.

Summary

In the accompanying CD, you will find some simple models labelled Data 3–2 to 3–5. Review these models to see some basic numeric representation of the concepts discussed above. The next two modules of the workbook will tie all the concepts together by using a case study.

Module 4: Building the project finance model: case study

Introduction

For the next two modules, we shall be using a case study to build a model. In this module we shall build the model from an equity point of view. In Module 5 we will review the model from a due diligence viewpoint. All the electronic information you will need is on the accompanying CD. You will find in Module 4:

1. Project Documents Folder
 - a) Project Documents
 - b) Project Documents Answers
2. Exercises for Module 4 Folder
 - c) 14 separate exercises
3. Answers for Module 4 Folder
 - d) 14 separate answers
 - e) Answer Base
4. Master Model for Module 4 Folder
 - f) Project Vair Master

All Excel documents are read-only, so you must save your changes to a separate file. All macros before Exercise 4.8 have been deleted.

Before getting started with the case study, a few clerical points must be made. This case is based on a power plant. For those readers who have previous power industry experience you will be asked to suspend belief a few times for the sake of teaching points and order of magnitude. These points will be readdressed in Module 5's due diligence exercise. The underlying point of this module's exercises is to build an equity case for presentation to the lending community.

There are 14 worksheets to this module. Each worksheet will build from

the coding and answers from the previous exercises. The answers from the previous worksheets will be provided. For example, Exercise 4.5 will have the answers to the previous four exercises embedded in that exercise. Each exercise is a worksheet tab to an entire workbook. You will probably be required to seek inputs from the assumption page and code them accordingly. Most of the exercises will have some key instructions in the comment boxes on the worksheet.

The model is colour-coded. Green boxes are to be coded for the exercises. Light yellow boxes are inputs that should be derived from given documents. Blue boxes, both light and dark, are toggling techniques, macros and outputs. Bright yellow boxes for entire rows are usually place markers to remind you of coding that needs to be readdressed. For example, the cash section of the balance sheet cannot be coded until the statement of cash flows has been coded. This statement worksheet will tie together the financial statements, so you must keep it considered. You will notice on the assumption page that a macro has been pre-coded, but this will not work until after the debt calculation in Exercise 4.8 is completed. After starting with Answer 4.8 and Exercise 4.9, your spreadsheet model macro security must be set to allow for macro usage.

There are some basic modelling techniques that will not be addressed from Module 2. For example, it is expected that you will use the column hiding technique, freezing panes and other simple coding techniques outlined in Module 2 for each exercise. Normal practices would dictate that a feasibility model would be coded first and then documents and contracts be negotiated afterwards. Understandably for the sake of the exercise, the project documents that you will be using are pre-negotiated documents. Note that the project documents are purposively in an Excel spreadsheet format; keep this in mind when doing the exercises. You

should keep this supporting documents file open when doing the worksheets for reference. Remember, people sign contracts not models, so the model is representative of the contracts and documents.

The underlying objective of this module is to code the project documents as negotiated and present the model to potential investors, particularly lenders. The term sheet is the proposed terms and conditions that the sponsor will be requesting from the lending community, or more accurately, an opening negotiating position. However, the equity model has already anticipated potential points that lenders may introduce in future negotiations. While they may not be desirable to equity, there are coded in the equity model to see the potential impact to the project's returns. The more robust the model, the better it is as a negotiating tool. It is the modeller's responsibility to try to anticipate these negotiating points as best as possible. Negotiation is 90 per cent preparation.

The project

Executive summary

In November 2003, the Vair Companies (Vair) submitted a proposal in response to the Government of Wilhelminya's (GOW) Request for Proposals (RFP) for a power plant at Tombanya, dated 5 June 2003, to Build, Own and Operate (BOO) a 280 MW power plant known as the Tombanya I Power Plant, located in Clarina, Wilhelminya (the project). The bid was accompanied by a US\$250,000 bid bond. Negotiations commenced in July 2004 and a draft Power Purchase Agreement (the PPA) was initialled on 19 December 2004.

The PPA will be between the Special Purpose Vehicle (SPV) corporation,

incorporated in Wilhelminya, and Wilhelminya's only public utility, Wilhelminya Power & Light Company (WPLC) and will have a term of 20 years from Commercial Operation Date (COD). Payment will consist of a fixed monthly capacity payment and an energy payment which is based on actual energy delivered. The payment is designated entirely in US Dollars. There is a government guarantee for the obligations of WPLC and the parties have negotiated an escrow arrangement to provide security of payment to the project.

The SPV is currently incorporated as a Limited Liability Corporation (LLC), with Vair as the sole shareholder. Future equity participation is contemplated but there are no current negotiations. The project intends to be financed by non-recourse debt, with a ratio of 80/20 of debt to equity. The projected after-tax Internal Rate of Return (IRR) is attractive for the industry and region.

The project is a base load power plant intended to provide power locally and to act as one of the primary power sources to the country's existing, but ageing, generation system. Based on a base load plant factor, the all-in PPA tariff on the COD in 2007 is approximately 6.7850 US cents/kWh. Wilhelminya's base load power wholesale system price (if calculable) is generally thought to be around 6.9000 US cents/kWh in 2005 and is expected to rise annually between 2.0 per cent and 2.5 per cent.

Project description

The power plant will consist of the Combined-Cycle Gas Turbine (CCGT) Delta Power's (DP) Thunderbird® model DP007 technology of approximately 280 MWs of nameplate installed capacity. The Engineer, Procurement

and Construction (EPC) contractor will be Delta Power Construction, Inc. of Delaware (DPCI). The Operations and Maintenance (O&M) contractor will be Reliable East Africa, Ltd of Clarina, Wilhelminya (REA), with technical field service provided by Reliable, Inc. of Bristol, England (RIUK). The plant design will be based on a proven Thunderbird® design of power plants now operating in various parts of the world. The Clarina Oil Company of Wilhelminya (COC) will supply the required gas. COC is jointly owned by GOW and Sterling Oil and Gas of Houston, Texas (SOG). SOG manages the daily operations of the oil and gas sector in Wilhelminya.

Project structure

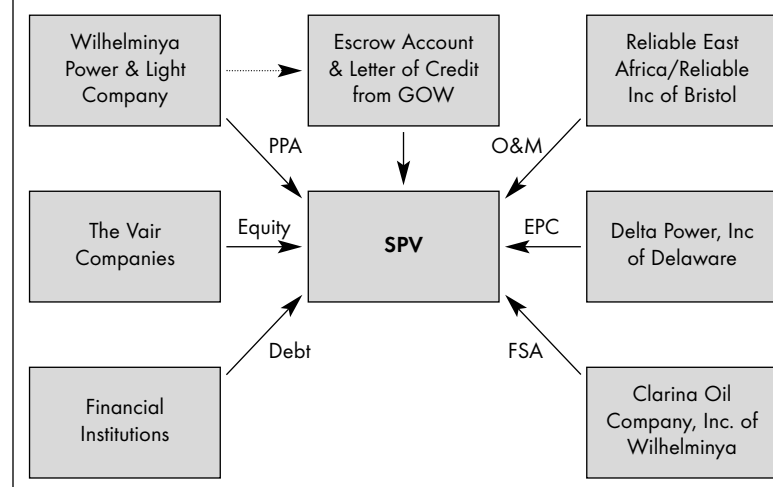
Project costs and capitalisation

The majority of the current estimated costs of the project are based on the US\$ 200 million EPC pricing component. Details are outlined in the model. Financing costs have not yet been determined but are forecasted based on Vair's previous experience in developing and financing similar projects.

Project time schedule

The PPA was initialled in December 2004 and should be signed by early January 2005, subject to financing. It is expected that final signature to the PPA will occur after Financial Close and that the signature will be a Condition Precedent (CP) to the flow of funds. However, it is not viewed as an impediment to the timetable. The PPA will have a target Effective Date, after signing, of 23 months until the COD, on 1 January 2001. The Effective Date can be expanded to 28 months from signature, after which the PPA can be terminated. The PPA also requires that the COD occurs

Exhibit 4.1: Project structure



by the Long Stop COD, which is thirty (30) months after the Signature Date of the PPA, and if it is not completed by then, the performance bond can be called and the PPA can be terminated.

Since it is intended that the developer will provide no bridge financing beyond the target-gearing ratio, debt financing will have to be secured before construction can start. All the necessary permits have been secured by the SPV. The required land has been purchased by the project.

Lump Sum Turnkey engineering, construction and procurement contract

DPCI's EPC contract is a Lump Sum Turnkey (LSTK) structure that will

take 24 months from a 1 January 2005 Financial Close (FC) date, with Notice to Proceed (NTP) to start one month from FC. The construction start date is one month after NTP and Substantial Completion (SC) that starts the Commissioning Phase is to be 19 months later. Commission will take three months for a total of 24 months construction. The contract has Liquated Damages for project delays and performance shortfalls in the plant's target output and heat rates.

Power Purchase Agreement

The PPA is a 20-year contract. Under the terms of the PPA, the price of electricity is in four components:

1. The Power Plant Capacity Charge
2. The Fixed O&M Charge
3. The Variable O&M Charge
4. The Fuel Charge.

All payments for capacity and energy will be in US Dollars. The four payment mechanisms can be aggregated in two categories: the capacity payment (1 and 2) and the energy payment (3 and 4).

1. The capacity payment

The capacity payment will be expressed in US\$/kW/Year, payable monthly, and is escalated annually. The tariff will use the nameplate installed capacity plant size as defined in the LSTK EPC to calculate the kilowatts. The capacity component is intended to cover all fixed expenses, including debt service and other financing costs, return on equity and taxes. The escalation will be indexed to the Wilhelminya's Consumer Price Index (project CPI).

2. The energy payment

The energy charge is expressed as US\$/kWh sold and metered at the point of connection to the WPLC network and is payable monthly. The energy charge will have an O&M component that will be indexed at the project CPI and a fuel component also escalated at project CPI.

Gas Supply Agreement (GSA)

Gas supplies for the project will be provided by COC on a supply-based, heat content contract, not a reserve-based, volume contract. The gas composition has been thoroughly analysed by both the EPC and O&M providers. The gas price is escalated at the project CPI. The price of gas is an all-in price to the plant wall, with both transportation and commodity components included in the price. The GSA is a 12-year contract.

Operations and Maintenance (O&M) Agreement

REA and RIB have signed a 15-year O&M contract, with a five-year renewable clause, or Evergreen Clause, with the SPV. The contract is a standard O&M agreement with the standard Prudent Utility Practices (PUP) clauses required for financing international power projects. The contract contemplates liquated damages for project delays due to scheduled maintenance services and performance shortfalls in the plant's target annual output and heat rates. Incorporated in the O&M contract is a Long-Term Service Agreement (LTSA). The LTSA addresses additional capital expenditure to maintain the plant and negates the need for a major maintenance reserve account.

Additional information

The project has procured a comprehensive risk management package for construction and operational insurances. It is awaiting a tax opinion that will allow a depreciation classification division of the plant in three separate categories. The project is confident that it will receive the opinion. Other pertinent details are included with the project documents, including macroeconomic information, contract pricing, operational parameters and tax details.

The sponsor/developer

The Vair Companies (Vair) is an internationally known project development company with a history of successfully developing power projects. The development team for Tombanya is an experienced project group that has the collective years and experience to see the project to fruition. The project team is:

- *Tom Claire, Project Director* – with over 20 years of project experience, Tom is a well-respected developer in the power sector, having developed over 5,000 MWs of power.
- *Helma Prinssen, Financial Director* – a former Managing Director of a leading Dutch bank, she has been with Vair for almost six years.
- *Breck Prewitt, EPC Lead* – with advanced degrees in both mechanical and electrical engineering, Breck has been in the power sector since graduating from a top engineering school in 1987.
- *David Sugrue, O&M Lead* – a former power plant manager for 15 years in Ireland, David came to Vair in 1996.
- *Hunt Priest, Legal* – Hunt joined Vair two years prior, he was previously a partner with Duey, Cheteam and Howe's project finance group.

- *Courtney Pryor, Accounting & Tax* – a dual Certified Public Accountant and Tax Attorney, Court trained with one of the major international accounting firms and has been doing international project and infrastructure work for 10 years.
- *David Donahue, Commercial Director for the PPA* – starting with the business development group of a major New England utility, David's last position before joining TVC in 1993 was as head of their energy services contracts.
- *Chris Matz, Commercial Director for GSA* – a petrochemical engineering graduate of South Pole University in Poland, Chris spent seven years in the North Sea with one of the oil majors before coming to Vair three years ago.
- *Steve Janes, Commercial Director for Risk* – an infrastructure insurance specialist, Steve has 13 years' industry experience.
- *Alejandro Basto, Senior Financial Analyst* – considered Vair's most experienced modeller and well known to both the lending and equity communities, Alejandro holds a Master of International Management in finance and accounting from a Southwest US institution and has 12 years of industry experience.

Selected review of the project documents

In the electronic information you will find a spreadsheet entitled 'Project Documents'. In that workbook there are nine worksheet tabs:

1. Gen – General Information
2. Dev – General Development Costs and Information
3. EPC – EPC Contract Tariff Sheet, Delivery Time Schedule and Performance Guarantees
4. PPA – Power Purchasing Agreement

5. GSA – Gas Contract
6. O&M – Operations and Maintenance (O&M) Agreement
7. Ins – Insurance Premiums for both Construction and Operation Phases
8. Taxes – Host Country Tax Regime
9. Dev Term Sheet – Term Sheet presented by the project company

We have reproduced each of these nine sheets here to help you work through them.

General Information

This tab is divided into three sections: Conversion Factors; Macroeconomic Issues; and Depreciation (see Exhibit 4.2).

The first section, Conversion Factors, may seem rather straightforward, but it is important to note that these conversion factors need to be uniformly defined terms in all the contracts. For example, one year could be 360 or 365 days, which could affect the working capital section of the cash flow. This also holds true for CPI indicators. While it is true that inflation is difficult to forecast, the greater concern is that the contracts use the same indicators. If inflation is designed as a pass-through, then all contracts must recalibrate with the same indicator on the same date. This must be defined in all the contracts. For example, the variable portion of the O&M contract will escalate at CPI as it is published in the *Wall Street Journal* on the second Monday in January every year, and this escalation will apply to the February invoice of that same year for the entire 365-day calendar year. Whatever is written in one contract, the defined term in other contracts must match exactly or there will be an inflation mismatch and a cash flow risk.

Exhibit 4.2: General assumption parameters

	A	B	C	D	E	F	G	H	I	J	K
1	GENERAL ASSUMPTION PARAMETERS										
2											
3	CONVERSION FACTORS										
4											
5		1 Year							8760	Hours	
6		1 Year							365	Days	
7		1 Year							12	Months	
8		1 Year									
9		1 Year									
10		1 Megawatt (MW)							1000	Kilowatts (kW)	
11		1 Million British Thermal Units (MMBtu)							1,000,000	Btus	
12											
13											
14											
15											
16	MACROECONOMIC ISSUES										
17		LIBOR							3.00%		
18											
19											
20		Project Country Consumer Price Index (CPI)							3.00%		
21											
22		Lender Country Consumer Price Index (CPI)							3.00%		
23											
24		Project Currency							US\$		
25											
26		Lender Currency							US\$		
27											
28											
29	DEPRECIATION										
30		Tax and Book Depreciation are the same									
31											
32		Plant & Machinery							20	Years	
33											
34		Pre-operative Expenses							7	Years	
35											
36		Buildings							12	Years	
37											
38		Local tax authorities do not allow for the distribution of earnings greater than the reported net income for the period. However, for those periods when net income is greater than the cash generated for the period, the company can use the equity account's retained earnings from previous periods, when available, to distribute up to the differential of the net income and the cash balance.									
39											
40											
41											
42											

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project Documents/Worksheet: GEN.

At the moment, there are no currency mismatches, but we do have inflation indicators that we can use to forecast currency exchange rates using the PPP method outlined in Module 3.

Note the depreciation is the same for both tax and book. It is assumed that depreciation is straight-line. This has been done for modelling ease. However, if there had been different schedules for tax and book, tax would have been the more important of the two with regard to cash flow.

Finally, let us review the wording at the bottom of the tab:

Local tax authorities do not allow for the distribution of earnings greater than the reported net income for the period. However, for those periods when net income is greater than the cash generated for the period, the company can use the equity account's retained earnings from previous periods, when available, to distribute up to the differential of the net income and the cash balance.

What does this mean in simple terms? It sets up what is known as the potential for a trapped cash scenario (see Exhibit 4.3).

The project is not allowed to distribute cash dividends beyond the reported net income. In the t-account example, year 1's net income is US\$7,919 while the cash available for distribution to equity is US\$21,477. Naturally, the project will distribute the entire US\$7,919 of the net income, but this will leave US\$13,558 of cash that can be distributed (US\$21,477 – US\$7,919 = US\$13,558). The culprit is the depreciation impact on the financial statements in the early years. Project finance is generally for large infrastructure projects, with fixed assets dominating the balance sheet. Unlike the corporate finance, there is no need, or desire, for income retention. Initially, depreciation is a benefit by reducing real cash taxes, but when this non-cash expense is added back to the cash flow, it may create a trapped cash scenario.

Exhibit 4.3: Trapped cash t-account, Years 1, 8 and 9

	A	C	E
4	Trapped Cash		
5			
6	Year 1		
7			
8	Equity – Retained Earnings, Year 1		
9		0	A – Beginning Balance
10	C – Less: Cash Dividends	7,919	B – Add: Net Income
11		0	D – Ending Balance
12			
13	Current Assets – Cash, Year 1		
14	E – Beginning Balance	0	
15	F – Add: Change in Cash	21,477	C – Less: Cash Dividends
16	G – Ending Balance	13,558	
17			
18			
19	Year 8		
20			
21	Equity – Retained Earnings, Year 8		
22		0	A – Beginning Balance
23	C – Less: Cash Dividends	22,363	B – Add: Net Income
24		616	D – Ending Balance
25			
26	Current Assets – Cash, Year 8		
27	E – Beginning Balance	82,523	
28	F – Add: Change in Cash	22,363	C – Less: Cash Dividends
29	G – Ending Balance	82,523	
30			
31			
32	Year 9		
33			
34	Equity – Retained Earnings, Year 9		
35		616	A – Beginning Balance
36	C – Less: Cash Dividends	23,850	B – Add: Net Income
37		1,117	D – Ending Balance
38			
39	Current Assets – Cash, Year 9		
40			
41	E – Beginning Balance	82,523	
42	F – Add: Change in Cash	23,234	C – Less: Cash Dividends
43	G – Ending Balance	81,907	
44			
45			

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project_Vair_Master/Worksheet: Data.

At a certain point, some depreciation will reach its end, reversing the trend of cash available for the period exceeding net income. In year 8, net income exceeds cash by US\$616,000, allowing for a build-up in the

retained earnings account. However, the project cannot use this balance in the retained earnings to release trapped cash until the following year. The following year, year 9, there is again a build-up in the retained earnings account, with net income exceeding cash by US\$1,117, but the project can only distribute up to the excess of the US\$616,000 from the previous period, or US\$23,234 plus US\$616,000 equals the US\$23,850 year cash distribution. This build-up continues in the retained earnings for year 9 because the net income exceeds releasable cash by US\$501,000 for the year.

You will need to be mindful of this when you code the cash section of the model. The main implication is: do you look at the cash the project is generating, or the cash that the project can distribute, to calculate the returns? Implicitly understood in the latter calculation is the cash timing release and the impact that it has on the project's returns. Are there any employable methods to assist the project in releasing this trapped cash?

General Development Costs and Information (see Exhibit 4.4)

The project has spent significant time, people and resources to get to financing and the sponsor would like to recoup as much of these costs as possible at Financial Close by trying to have the bank finance some of these costs, after the fact. Conceptually, there are two issues. First, when should equity's model actually start calculating the returns – once the first dollar is employed or at FC? Development dollars are relatively small in comparison to total project costs, so our model will start at FC to calculate returns. By starting at FC, the additional marginal gain in returns may make the difference between the project meeting internal hurdle constraints, or not. Second, should these costs be capitalised or expensed? (Or really, will local accounting and fiscal policy allow for capitalisation or make you expense them?)

Exhibit 4.4: General Development Costs and Information

	A	B	C	D	E	F	G	H	I	J	K	L
1	GENERAL DEVELOPMENT COSTS AND INFORMATION											
2												
3		NB										
4		<i>The information on development costs below was provided by the sponsors</i>										
5		<i>It is assumed that all information has been audited and verified</i>										
6		<i>It is also assumed that the project company has acquired all necessary permits</i>										
7												
8		PURCHASES (in USD '000s)										
9												
10											\$	700
11												
12												
13		SERVICES (in USD '000s)										
14												
15		NB										
16		<i>All figures are exclusive of the appropriate service taxes</i>										
17												
18		Legal Fees										
19												
20											\$	1,000
21											\$	3,000
22												
23												
24											\$	1,500
25											\$	4,500
26												
27											\$	6,000
28												
29											\$	188
30											\$	563
31												
32											\$	750
33												
34											\$	1,250
35											\$	3,750
36												
37											\$	5,000
38												
39												
40												

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project Documents/Worksheet: DEV.

This is an age-old argument that many technology and pharmaceutical companies must address. Is the cash related to the research and development of an asset, or product, that will produce future revenues, a capitalised asset on the balance sheet, or is it an expense? In the case of the project, if it is an expense, then the SPV may start with a Net Operating Loss (NOL) in the

first year of operations. It will, in all cases, reduce the reported net income. As we can see from the possible trapped cash scenario above, project's returns will probably be hindered by any further reduction in reported net income. By capitalising the development costs as assets, the project can try to finance these accounts at the target-gearing ratio, boosting the returns by the sponsor's cash returning at FC. The project can make the argument that the contracts will generate future revenues and therefore are an asset. Thus the contract value, at a minimum, is the value of resources employed to develop those contracts (an aggressive case can even be made that the contract's true value is the Net Present Value that these contracts can produce; this argument would surely be made if the project was being sold to other equity investors before it reaches COD).

EPC Contract Tariff Sheet, Delivery Time Schedule and Performance Guarantees (see Exhibit 4.5)

This contract will be the primary driver behind the construction loan. Pay close attention to the milestone payments. An EPC contract that is US\$200 million may be worth more to the project than an EPC contract that is US\$180 million, if the US\$200 million contract's milestone payments' timing are back weighted. The final product, the plant, will convert molecules of gas to electrons. This conversion factor is known as a heat rate. The contract states that when it is completed, the plant will convert 7,500 of Higher Heating Value (HHV) of British Thermal Units (Btus) to one-kilowatt hour (kWh). This amount is the conversion molecules basis that the project will need to purchase, a line item expense, to produce the electrons that will be sold, providing revenue. Notice the Liquidated Damages (LDs) in the contract. Are they good or are they bad? You will need to try to weigh the price of contracts in relation to overall risk of the project and the entire pricing. An EPC contract that may be more expen-

sive due to LDs may actually be cheaper once financing and insurance is considered. No contract is mutually exclusive.

Power Purchasing Agreement (see Exhibit 4.6)

Much has already been stated about PPAs in general, so we shall not spend much time here. Pay close attention to the details of the payment, escalation and invoicing. The Annual Electrical Output of 2.3 TWh is the output number the utility will take if made available. The 90 per cent Guaranteed Available Output is the minimum that the SPV must be able to provide to the utility. The contractual details on whether it is a take-or-pay contract and how the availability is measured are critical, but they are not defined here.

Exhibit 4.5: EPC Contract Tariff Sheet, Delivery Time Schedule and Performance Guarantees

	A	B	C	D	E	F	G	H	I	J	K
1	EPC CONTRACT TARIFF SHEET, DELIVERY TIME SCHEDULE, & PERFORMANCE GUARANTEES										
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											

Building the project finance model: case study

Exhibit 4.5: EPC Contract Tariff Sheet, Delivery Time Schedule and Performance Guarantees continued

[illegible]

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project Documents/Worksheet: EPC.

Exhibit 4.6: Power Purchasing Agreement

[illegible]

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project Documents/Worksheet: PPA.

Gas Contract (see Exhibit 4.7)

Note that the gas is priced on calorific, or heat, content and not on volume. Volume pricing can be a tricky item, given varying temperatures and altitude impact on volumes. You will also note that the contract is priced in millions of Btus (mmBtus) and the heat content is described in HHV, a definition that we have seen previously in the EPC contract. In the end, the model will need to negate units so that all that remains is cash,

Exhibit 4.7: Gas Contract

	A	B	C	D	E	F	G	H	I	J	K	L
1	GAS CONTRACT											
2												
3		NB										
4		The development company has entered into a long-term gas contract										
5		It is assumed that the gas contract has all the appropriate parent company guarantees for financing										
6		This is a supply contract and not a reserve contract										
7												
8		TERMS AND CONDITIONS										
9												
10		The price of the gas is the delivered price to the plant wall										
11		The gas specifications meet all the normal prudent operating requirements of the plant										
12		The quantity of gas supplied will meet the operational requirements of the plant										
13												
14												
15		TERM OF THE CONTRACT (in Years)								12		
16												
17												
18		PAYMENT TERMS (after invoicing)								45	Days	
19												
20												
21		PRICE OF GAS								\$	5.000	USD/mmBTU
22												
23												
24		HEATING VALUE CONTENT OF THE GAS								1000	HHV (BTU/cf)	
25												
26		All pricing components are subject to an annual escalation at the appropriate Consumer Pricing Indices (CPI), except where indicated,										
27		all items are subject to appropriate duties and taxes										
28												

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project Documents/Worksheet: GSA.

whether an expense or a revenue. In this case, how many molecules of gas need to be provided at a contractual heat rate to provide the required 2.3 TWh requested by the offtaker? And, as importantly, how much will that quantity of gas cost? As with all these contracts, many contractual terms have been omitted but would need to be addressed, such as the ability to reject non-compliant gas, nomination procedures, calibrating the amount of gas and so on.

Operations and Maintenance (O&M) Agreement (see Exhibit 4.8)

After the plant is built, there must be a transition from the construction phase to the operational phase of the project. It is important that there be a smooth transition from construction to operations. You will note that there is a commission phase contemplated in the contract. If the O&M contractor participates in the project during the commissioning phase of the process, it should allow for a smoother transition. The EPC contractor will want to reach what it considers to be COD as quickly as possible so it can take the liabilities associated with the contract's LDs off its book. By overlapping construction and operations, the operator can understand the plant quickly and the contractor may be able to exit the project in an efficient fashion.

In this O&M contract there are both fixed and variable expenses. The operator is taking the daily responsibility of plant operations, including minor and major maintenance outages. To ensure a quick reaction to unplanned outages, the operator will require that the plant keep a minimum inventory on site. The contractual terms of this need to be examined. What does an annual minimum actually mean? Will the operator use the entire US\$2 million spare part inventory every year? Or, perhaps even worse, is the operator able to use as many of the parts as it wishes? If the project must maintain US\$2 million and the operator is able to turn over that inventory four times in a year, that US\$2 million really translates to US\$8 million cost. We will assume that the operator can only use one set of spare parts per year.

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Exhibit 4.8: Operations and Maintenance (O&M) Agreement

	A	B	C	D	E	F	G	H	I	J	K	L
1	OPERATIONS & MAINTENANCE (O&M) AGREEMENT											
2												
3		NB										
4		The development company has entered into a long-term O&M agreement for fixed & variable components										
5		It is assumed that the O&M contract has all the appropriate parent company guarantees for financing										
6		It is also assumed that O&M contract includes all elements to allow the plant to generate cash flow										
7		e.g. cooling water, wheeling charges, etc.										
8												
9		TERM OF THE CONTRACT (in Years)									15	
10												
11		PAYMENT TERMS (after invoicing)									45	Days
12												
13		GUARANTEED ANNUAL ELECTRICAL OUTPUT									2,281,104	MWh
14												
15		GUARANTEED ANNUAL HEAT RATE									7600	HHV (Btu / kWh)
16												
17		PRICING, FIXED COMPONENT (in US\$ '000s)										
18												
19		Construction & Commission Phase										
20												
21			Initial	Spare Parts (Delivery Duty Paid, DDP)						\$	2,000	
22				level must be maintained annually								
23												
24				Pre-Commissioning Costs								
25				Capital Goods				\$	125.00			
26				Services, Local				\$	62.50			
27				Services, Foreign				\$	62.50			
28										\$	250	
29												
30				Operational Phase, Fixed Expenses								
31												
32				Capital Goods								
33				Long Term Service Agreement (LTSA)				\$	1,500			
34												
35				Local Services								
36				Personnel Expense				\$	1,780			
37												
38				Foreign Services								
39				Operations Expense				\$	500			
40												
41				General Supplies (all taxes included)								
42				Administrative Expense				\$	300			
43												
44				TOTAL FIXED COMPONENT						\$	4,080	
45												
46												
47				PRICING, VARIABLE COMPONENT (in US cents/ kWh)								
48												
49				Capital Component					0.2500		cents / kWh	
50				Local Service Component					0.1750		cents / kWh	
51				Foreign Services Component					0.0750		cents / kWh	
52										0.5000	cents / kWh	
53												
54				All pricing components are subject to an annual escalation at the appropriate Consumer Pricing Indices (CPI)								
55				Except where indicated, all items are subject to appropriate duties and taxes								
56												
57				Financable Liquidated Damages contemplated but not discussed here								
58												

Note: This worksheet can be found on the accompanying CD Rom in
Module 4/File: Project Documents/Worksheet: O&M.

Insurance Premiums for both Construction and Operation Phases (see Exhibit 4.9)

Lenders, and prudent practice, will require a certain level of insurance during both the operational and construction phases.

Exhibit 4.9: Insurance Premiums for both Construction and Operation Phases

	A	B	C	D	E	F	G	H	I	J	K	L
1	INSURANCE PREMIUMS FOR BOTH CONSTRUCTION AND OPERATION PHASES											
2												
3		NB										
4		The development company has secured all the appropriate insurance coverage financing										
5												
6												
7		PREMIUMS										
8												
9		Construction Phase										
10												
11				Builder's All Risk (BAR)							0.50%	
12				Based as a percentage on the entire EPC contract & entire pre-commission costs								
13												
14				Delay-in-Start-Up (DIS)								
15				Based as a percentage on the entire EPC contract & entire pre-commission costs							0.75%	
16												
17												
18												
19				Marine Cargo							0.25%	
20				Based as a percentage of the capital goods portion of the EPC contract & capital goods portion of the pre-commission costs								
21												
22												
23												
24				Operation Phase (Annual Premiums)								
25												
26				Operator's All Risk							\$	800
27												
28				Business Interruption (BI)							\$	500
29												
30				Third Party Liability							\$	200
31												
32				Employer's Workers Compensation							\$	200
33												
34				All construction premiums are based on the pre-taxed, invoice amounts and all premiums include taxes								
35				Construction and operational premiums are quoted taxes included								
36				All operational premiums will escalate at the project host country's CPI								
37												

Note: This worksheet can be found on the accompanying CD Rom in
Module 4/File: Project Documents/Worksheet: INS.

Exhibit 4.10: Host Country Tax Regime

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										

Note: This worksheet can be found on the accompanying CD Rom in
Module 4/File: Project Documents/Worksheet: TAXES.

The construction insurance premiums are based on the value of the associated contracts. The operational insurances are fixed line item expenses. It is assumed that the coverage provided by the insurer will, at a minimum, meet the requirements of lenders. Again, it is important to note that contracts are not mutually exclusive. A stronger EPC and O&M contract may reduce the required premiums in the insurance contracts. Stronger insurance contracts may give comfort to the lenders, reducing their risk perception of the project, thus reducing the interest rates. Again, this is something the model and scenarios must be able to address.

Host Country Tax Regime (see Exhibit 4.10)

Look closely at the taxes and how they are allocated. In particular, pay close attention to how the VAT on capital goods is calculated. The capital goods VAT is calculated on the invoice and duty tax amount, not just the invoice. VAT is not recoverable in Wilhelminya. If you are not careful, you may understate the associated taxes.

Term Sheet presented by the project company

These are the terms and conditions that the project is looking to obtain with its financing (see Exhibit 4.11).

It is doubtful that the project will expect to obtain all of these requests. But by sending the term sheet to the banks and requesting remarks, instead of requesting term sheets from the banks, it allows the project to look at the banks uniformly. Also, the term sheet is an opening position from where the project can start its negotiations with the lenders.

All contracts will have been signed in 2005 and are subject to escalation (except for the EPC) one year later in 2006, even though the project is still in construction. One overriding general point to the documents is that it is the model's job to see how these contracts perform in relation to each other and ultimately produce cash inflows and outflows to calculate the overall project economics. For each of the following exercises, you will find spreadsheets on the CD, as well as spreadsheets with accompanying answers.

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Exhibit 4.11: Term Sheet presented by the project company

	A	B	C	D	E	F	G	H	I
1	TERM SHEET PRESENTED BY THE PROJECT COMPANY								
2									
3		TARGETED LEVERAGE							
4									
5			Debt					80%	
6									
7			Equity					20%	
8									
9		FINANCIAL CLOSING DATE						January 1 2005	
10									
11		TERM							
12									
13			Construction					24 Months	
14									
15			Term					18 Years	
16									
17		INTEREST PAYMENTS							
18									
19			Construction					Monthly, to be capitalized and paid at COD by term loan and equity at targeted gearing	
20									
21			Term					Accrued interest quarterly payments in arrears	
22									
23		INTEREST RATES							
24									
25			Construction (over LIBOR)					2.00%	
26									
27			Term (over LIBOR)					1.00%	
28									
29		FLR TO FIXED SWAP RATES							
30									
31			Construction					0.25%	
32									
33			Term					0.25%	
34									
35		DRAWDOWN							
36									
37			Construction					Pro Rata with equity at targeted leverage and in accordance to the EPC Schedule	
38									
39		REPAYMENT							
40									
41			Construction					To be paid at COD from term loan and equity at targeted gearing	
42									
43			Term					Mortgage Style	
44									
45		FINANCING FEE						50 Basis Points to be paid at Financial Closing	
46									
47		COMMITMENT FEE						50 Basis Points, monthly, to be calculated monthly on the un-drawn amount of the construction loan and to be paid by the term loan and equity at the target gearing at COD	

Note: This worksheet can be found on the accompanying CD Rom in
Module 4/File: Project Documents/Worksheet: DEV TERM.

	A	B	C	D	E	F	G	H	I
48									
49		SECURITY PACKAGE							
50									
51			Insurance					Project company will maintain appropriate levels of insurance during both the construction and operational phase of the project	
52									
53			Debt Service Coverage Ratios (DSCR's)						
54									
55			Minimum					1.25x	
56									
57			Average					1.50x	
58									
59			Debt Service Reserve Account (DSRA)						
60									
61			Term					Project company will maintain an annual escrow equivalent of 1 month of the term loan's total annual debt service, over the life of the loan	
62									
63			Interest Income					Project company will receive 100 basis points at a fixed rate spread over LIBOR, based on the LIBOR at the financial closing date, in interest income based on the yearly ending balance of the DSRA	
64									
65			Letter of Credit (L/C)						
66									
67			Term					Project company will maintain an annual Letter of Credit that is the equivalent of 6 months of the term loan's total annual debt service over the life of the loan	
68									
69			Fee					Project company will pay 50 basis points at a fixed rate spread over LIBOR, based on the LIBOR at the financial closing date, in interest expense based on the yearly ending balance of the annual debt service	
70									
71			Contingency					Project company will take out a contingency account of 100 basis points based on the value of the EPC contract	
72									
73			Working Capital						
74									
75			Initial Funding					Project company will fund 10 (ten) days of working capital before COD based on the first year's proforma variable and fixed operation expenses. Funding will be debt and equity at the targeted gearing	
76									
77									
78			*NB						
79		This term sheet is meant to serve as a tool identify basic financing parameters							
80		Many legal matters have been intentionally omitted							
81		Additional security packages measures, for example pledge of shares, step-in rights, would be required							
82		These measures would be extremely important in pricing the project.							
83									

Worksheet 1

Exercise 4.1

Tom gets his team together and he asks Alejandro to read the project documents and create an assumption page. Each member of the team will need to work closely with Alejandro to help him understand how the contracts work, but Alejandro is the single point of contact for the model and all changes should be made by him. If not, Tom and his team run the risk of having more than one model.

Review the project documents and input the assumptions (in light yellow) and code the green. Not every assumption has been identified – for reasons that will become more obvious in later exercises. Also note that not every green cell has a comment box to give you a hint. Read what the cell or row identification says and think of the obvious answer. For example, total fixed expenses is probably the sum of all the fixed expense inputs (note that the insurance expense in this section is in green, requiring that it be coded from some other part of the assumption page). Pay close attention to the units and make sure that they make sense when you

code your answers. At the top of the page note that all units are US\$ '000s except where indicated. Look closely at columns H and K, as they may help you to navigate your responses.

Review

In this section one of the first topics Alejandro reviews is the cents/kWh price of the respective expenses. He then matches them to the PPA tariff. The variable O&M expense and variable O&M charge in the PPA are both 0.5000 cents/kWh. The Fixed O&M expense is 0.2481 cents/kWh and the Fixed O&M PPA charge is 0.2754 cents/kWh. Finally, the Gas Expense is 3.7500 cents/kWh and the PPA Fuel Charge is 3.9375 cents/kWh. On first blush it appears that the Variable O&M is a pass through and the project's revenues exceed expenses for both fixed O&M and gas. However, Alejandro should keep in close consultation with David Donahue, Breck Prewitt, Chris Matz and David Sugrue. Alejandro will be able to inform the parties that they understand the implications that their separate negotiations have on the entire project economics if they are not dovetailed appropriately.

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Worksheet 1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Assum																	
2																		
3																		
4					ToC		Name	Doc	Inv	Cons	Units	Esc	Aux					
5					Except where indicated in US\$ ('000s)													
6	I	PROJECT CAPITAL COSTS													FINANCING MACRO			
7	A				LSTK EPC		EPC	EPC	BP		\$		#DIV/0!		Financing fee			
8	B				Land		Land	Gen	TC		\$		#DIV/0!		Target value	Formula	Accuracy	
9	C				Custom duties & VAT		Total_VAT				\$		#DIV/0!		0	0	0.01	
10	D				Profits taxes		Total_PT				\$		#DIV/0!					
11	E				Legal fees		Legal_Fees	Dev	WHP		\$		#DIV/0!		DSRA			
12	F				Financing fees		Fin_Fees				\$		#DIV/0!		Target value	Formula	Accuracy	
13	G				Development fees		Dev_Fees	Dev	TC		\$		#DIV/0!		#REF!	#REF!	0.01	
14	H				Independent engineers (construction phase)		IE	Dev	BP		\$		#DIV/0!					
15	I				Working capital		WC				\$		#DIV/0!					
16	J				Insurance premium		Ins_Prem				\$		#DIV/0!					
17	K				Pre-commissioning costs		PC_Costs	OM	DS		\$		#DIV/0!					
18	L				Development costs		Dev_Costs	Dev	TC		\$		#DIV/0!					
19	M				Commitment fees & interest during construction ("IDC")		IDC				\$		#DIV/0!					
20	N				Debt service reserve account (DSRA)		DSRA				\$		#DIV/0!					
21	O				Contingency		Conting				\$		#DIV/0!					
22	P				Total capital costs		Cap_Cost				\$		#DIV/0!					
23																		
24																		
25	II	GENERAL PLANT PARAMETERS													RESULTS			
26	A				Installed plant capacity		IPC	EPC	BP		MW				IRRs			
27	B				Plant capacity factor		Cap_Fac	PPA	DD		%				Without trapped Cascash	#REF!		
28	C				Hours per year		Hours	Gen			Hours				With trapped cash	#REF!		
29	D				Annual electrical output		AEP_MWh				MWh							
30	E				MW to kW conversion factor		MW_Conv	Gen			kW/MW				DSCR			
31	F				Annual electrical output		AEP_kWh				kWh				With net income method			
32	G				Operational months		Months	PPA	DD		Months				Average	#REF!		
33															Minimum	#REF!		
34															With EBITDA base			
35	III	TARIFFS FROM PPA													Average	#REF!		
36	A				Number of years of PPA		PPA_Yrs	PPA	DD		Years				Minimum	#REF!		
37	B				Power plant capacity charge		PPCC	PPA	DD		\$/kW/mo		#DIV/0!					
38	C				Fixed O&M charge		FOMC	PPA	DD		\$/kW/mo		#DIV/0!					
39	D				Variable O&M charge		VO MC	PPA	DD		¢/kWh		0.0000		Financing			
40	E				Fuel charge		FC	PPA	DD		¢/kWh		0.0000		PV of the loan	#REF!		
41	F				Average unit price								#DIV/0!		Balance sheet check	#REF!		
42																		
43																		
44	IV	GAS SUPPLY AGREEMENT																
45	A				Number of years of GSA		GSA_Yrs	GSA	CM		Years							
46	B				Guaranteed plant heat rate		HR	EPC	BP		HHV (Btu/kWh)							
47	C				Heating value content of gas		HV_Gas	GSA	CM		HHV (BTU/cf)							

Worksheet 1 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
48	D					Gas quantity usage	Gas_Use				kWh/cf							
49	E					Conversion factor	MMBTU	Gen			Btu/mmBtu							
50	F					Gas price	Gas_Price	GSA	CM		\$/mmBTU							
51	G					Gas price					¢/kWh							
52										#DIV/0!								
53																		
54	V					VARIABLE EXPENSES (Non-fuel)												
55	A					Number of years of variable O&M	OM_Yrs	OM	DS		Years							
56	B					Variable O&M expense	VOME	OM	DS		¢/kWh							
57																		
58																		
59	VI					FIXED EXPENSES												
60	A					Number of years of fixed expenses	OM_Yrs	OM	DS		Years							
61	B					Personnel expense	Per_Exp	OM	DS		\$							
62	C					Long term service agreement (LTSA)	LTSA	OM	DS		\$							
63	D					Insurance expense	Ins_Exp				\$							
64	E					Operations expense	Op_Exp	OM	DS		\$							
65	H					Administrative expense	Adm_Exp	OM	DS		\$							
66	G					Total fixed expenses	TFE_\$				\$							
67	I					Total fixed expenses	TFE_¢			#DIV/0!	¢/kWh							
68																		
69																		
70	VII					WORKING CAPITAL												
71	A					Days convention	Days	Gen	TC		Days							
72	B					Beginning cash requirement (on Opex)	WC_Days	Terms	HP		Days							
73	C					Payables	Pays		TC		Days							
74	D					Receivables	Recs	PPA	DD		Days							
75	E					Beginning cash requirement (on Opex)	WC				\$							
76	F					Spare parts (DDP)	SP	OM			\$							
77	G					Total working capital	WC_\$				\$							
78																		
79																		
80	VIII					TAXES												
81	A					Corporate income tax	Inc_Tax	Taxes	CP		%							
82	B					VAT on capital goods	VAT_Cap	Taxes	CP		%							
83	C					VAT on fuel	VAT_Fuel	Taxes	CP		%							
84	D					Profits tax on local services	PT_LS	Taxes	CP		%							
85	E					Profits tax on foreign services	PT_FS	Taxes	CP		%							
86	F					Custom duties on capital goods	CD_Cap	Taxes	CP		%							
87																		
88																		
89	IX					INSURANCE												
90						<i>Construction Insurances</i>												
91	A					Builder's all risk (BAR)	BAR	Ins	SJ		%							
92	B					Delay-in-start-up (DIS)	DIS	Ins	SJ		%							
93	C					Marine cargo	MC	Ins	SJ		%							

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Worksheet 1 continued

	A	B	C	D	E	F	G	H	I		K		M		O		Q
94						Operational Insurances											
95	D					Operator's all risk	OAR	Ins	J		\$						
96	E					Business interruption (BI)	BI	Ins	J		\$						
97	F					Third party liability	TPL	Ins	SJ		\$						
98	G					Employer's workers compensation	EWG	Ins	J		\$						
99	H					TOTAL OPERATIONAL INSURANCES	TOI_\$				\$						
100																	
101																	
102	X					PROJECT TIMING											
103	A					Financial close	Fin_close	Terms	HP		Date						
104	B					Term - months	NTP_mo	EPC	BP		Month						
105	C					Notice to proceed (NTP) to EPC	NTP_date			1-Jan-00	Date						
106	D					Term - months	EPC_St_Mo	EPC	BP		Month						
107	E					EPC start	EPC_St_date			1-Jan-00	Date						
108	F					Term - months	EPC_mo	EPC	BP		Month						
109	G					Commission	EPC_date			1-Jan-00	Date						
110	H					Term - months	Comm_mo	EPC	BP		Month						
111	I					Commercial operation date (COD)	Comm_date			1-Jan-00	Date						
112	J					Lag to contract escalation start					Month						
113	K					Lag to contract escalation start				1-Jan-00	Date						
114	L					Lag to fiscal year close from COD					Month						
115	M					First fiscal year close				0-Jan-00	Date						
116						Summary											
117	N					Construction commencement date				1-Jan-00	Date						
118	O					Construction term				0	Month						
119	P					Construction completion date				1-Jan-00	Date						
120	Q					Commissioning				0	Month						
121	R					Commercial operation date				1-Jan-00	Date						
122	S					Time to COD from financial close				0	Month						
123																	
124																	
125	XI					CAPITALIZATION FOR OPERATIONAL PHASE											
126	A					Total project capitalisation				0%	%						
127	B					Senior debt	Gear	Terms	HP		%						
128	C					Owner's equity	Equity				%						
129	D					Total project capitalisation	Proj_Cap			-	\$						
130	E					Senior debt	Sr_Debt			-	\$						
131	F					Contingency				-	\$						
132	G					Adjusted senior debt				-	\$						
133	H					Tranche A - Plant				#DIV/0!	%						
134	I					Tranche A - Plant				#DIV/0!	\$						
135	J					Tranche B - Development costs				#DIV/0!	%						
136	K					Tranche B - Development costs				#DIV/0!	\$						
137	L					Tranche C - Working capital				#DIV/0!	%						
138	M					Tranche C - Working capital				#DIV/0!	\$						
139	N					Owner's equity	Equity			-	\$						
140										#DIV/0!							

This section should match the project timing. Count the months required from the documents and input accordingly, the coding has been done for you. Do you get a 24 month construction period in the end?

If project costs are 100% then equity must equal 1 minus the debt percentage

Worksheet 1 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
141																		
142																		
143	XII	FINANCING AGREEMENT																
144	A					LIBOR	LIBOR	Gen	HP		%							
145	B					Swap fee - construction	Swap_C	Terms	HP		%							
146	C					Swap fee - term	Swap_T	Terms	HP		%							
147	D					Premium spread - construction (pro rata)	Spr_C_PR	Terms	HP		%							
148	E					Premium spread - construction (equity 1st)	Spr_C_E1	Terms	HP		%							
149	F					Interest rate - construction (pro rata)	IRC_PR			0.00%	%							
150	G					Interest rate - construction (equity 1st)	IRC_E1			0.00%	%							
151	H					Premium spread - term (mortgage)	Spr_T_M	Terms	HP		%							
152	I					Premium spread - term (level principal)	Spr_T_L	Terms	HP		%							
153	J					Interest rate - senior/tranche A (mortgage)	IRT_M			0.00%	%							
154	K					Interest rate - senior/tranche A (level principal)	IRT_L			0.00%	%							
155	L					Additional spread tranche B (mortgage) over senior			HP		%							
156	M					Additional spread tranche B (level P) over senior			HP		%							
157	N					Additional spread tranche C (mortgage) over senior			HP		%							
158	O					Additional spread tranche C (level P) over senior			HP		%							
159	P					Interest rate - tranche B (mortgage)				0.00%	%							
160	Q					Interest rate - tranche B (level principal)				0.00%	%							
161	R					Interest rate - tranche C (mortgage)				0.00%	%							
162	S					Interest rate - tranche C (level principal)				0.00%	%							
163	T					Senior/tranche A Loan Term	T_Dur	Terms	HP		Years							
164	U					Tranche B loan term			HP	12	Years							
165	V					Tranche C loan term			HP	5	Years							
166	W					Construction loan term	C_Dur	Terms	HP	24	Months							
167	X					Senior/Tranche A loan repayment	T_Repay	Terms	HP		per Year							
168	Y					Tranche B loan repayment			HP	4	per Year							
169	Z					Tranche C loan repayment			HP	6	per Year							
170	AA					Construction loan repayment	C_Repay	Terms	HP		per Year							
171	AB					Commitment fee	C_Fee	Terms	HP		%							
172	AC					Premium over Libor on DSRA paid to project	DSRA_Prem	Terms	HP		%							
173	AD					Number of months for reserve	DSRA_Mo	Terms	HP		months							
174	AE					Financing fee	Fin_Fee_R	Terms	HP		%							
175	AF					Number of months for L/C calculation	LC_Mo	Terms	HP		months							
176	AG					Cost of L/C over LIBOR to project	LC_R	Terms	HP		%							
177						Contingency	Conting	Terms	HP		%							
178																		
179																		
180	XIII	GENERAL ASSUMPTIONS																
181	A					Project inflation	CPI_Local	Gen	TC		%							
182	B					Lender inflation	CPI_For	Gen	TC		%							
183	C					Project currency	Proj_Curr				US\$							
184	D					Lender currency	Lend_Curr				US\$							
185	E					Relative purchasing power parity (RPPP)				1.00								

This number of payments per year required for the respective loan, sometimes known as the m.

Once this is inputted, you must now calculate the contingency as cash cost in the project costs above

You may now want to use this number to code in the appropriate escalations above

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Worksheet 1 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
186						Depreciation								EPC				
187	F					Plant & machinery	Dep_Plant	Gen	CP		Years		1	1				
188	G					Pre-operative expenses	Dep_PreOp	Gen	CP		Years		2	2				
189	H					Buildings	Dep_Build	Gen	CP		Years		3	3				
190	I					Non-depreciable items			CP		Years		4					
191																		
192																		
193	XIV	TOGGLES																
194						Flags				0								
195						0 = Off												
196						1 = On												
197																		
198						Construction Debt				1								
199						1 = Debt/equity pro rata draw												
200						2 = Equity first draw												
201																		
202						Construction Debt				1								
203						1 = Capitalised												
204						2 = Capitalised and compounded												
205																		
206						Term Loan				1								
207						1 = Senior debt - mortgage style												
208						2 = Senior debt - level principal												
209						3 = Tranche - mortgage												
210						4 = Tranche - level principal												
211																		
212						Contingency				1								
213						1 = Equity distribution												
214						2 = Debt prepayment												
215																		
216						Passive Income				2								
217						1 = Interest on trapped cash												
218						2 = No interest on trapped cash												
219																		

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.1/Worksheet: Assum.

Worksheet 2

Exercise 4.2

Now that Alejandro has coded contract assumptions, he wants to know how the contracts will perform in relation to each other. He decides to start with the basic plant operations. As he reviews the contracts again, Alejandro realises that all the contracts are absent of taxes. He makes an appointment with Court Pryor to review project taxes and accounting.

In this section we will code the main operational contracts that drive the project's revenue and expenses. Re-review the project documents and tariff sections to see how the contracts perform. Pay particularly close attention to eliminating units so that the final output for the section is US\$ '000s. You will notice that all the drivers come from the assumption page. There are flags that track contract duration and timing. On the bottom of each section you will notice that the annual line item is divided by the electrical output, and appropriate units, to arrive at a cents/kWh price. Finally, review the tax section and make sure that the taxes are coded appropriately for each line item. If you look closely at the breakdown of the tariffs in the project documents, you will find that you have enough information to code the respective taxes for each line item. (Hint: the project documents are in spreadsheet format for a reason.)

Review

Alejandro has coded a pass-through check on the very bottom of each of the line item expenses. He quickly notices that the variable O&M is not a pass through. At the end of Worksheet 1, the project's unit revenues for gas and fixed O&M exceeded the unit expense for each of these items, and the variable O&M charge and expense matched. On first blush it seemed to Alejandro that the project was making extra money based on the team's good negoti-

ations. However, most of the operational contracts did not include taxes. Upon closer examination, Alejandro realises that the PPA unit charge for variable O&M, with escalation, is actually 0.5150 cents/kWh $[0.5000 \times ((1 + .03)^1)]$ in the first year. The O&M unit charge for Variable O&M is 0.6095 cents/kWh. This 0.0945th of a cent over time accounts for a US\$41 million deficit to the project over the life of the contract. After speaking with Chris, Alejandro knew to model capital goods taxes carefully. If he did not add the custom duty taxes to the capital goods invoiced amount for the VAT tax calculation, he would have understated fixed O&M expenses by US\$345,000 and variable O&M by US\$1.34 million for the life of the contract.

Main points

1. All assumptions should come from one worksheet page; here it is the assumption page.
2. Use the 'smell test'. If some number stands out and does not seem to make sense it probably does not. If you have an annual gas expense (the main variable expense to the project) of 94 in a US\$ '000s model, or US\$94,000, when the model generates over US\$150 million for the beginning, the odds are that something is probably wrong.
3. Make sure that you have correctly coded the escalation. If your line items do not escalate in accords to the contracts, you will be understating the revenues and expenses.
4. Make sure that you code the taxes correctly. Then, make sure the appropriate tax experts audit the model, especially if you are modelling a project outside of your company's normal tax regimes. Traditionally, this is one area where models have the most dramatic mistakes.
5. Always negotiate off the model, never model off the negotiations. By not understanding the tax impact on the variable O&M contract, the developers have negotiated an insufficient PPA charge for their energy payments.

Worksheet 2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Operations																				
2					Date									2005	2006	2007	2008	2009	2010	2011	2012
3					Period									1	0	1	2	3	4	5	6
4					ToC	Name	Doc	Inv	Costs	Units	Fsc										
5					Except where indicated in US\$ ('000s)																
6	II	GENERAL PLANT PARAMETERS																			
7	A				Installed plant capacity	IPC	EPC	BP		280	MW	0.00%									
8	B				Plant capacity factor	Cap_Fac	PPA	DD		95.00%	%	0.00%									
9	C				Hours per year	Hours	Gen			8760	Hours	0.00%									
10	D				Annual electrical output	AEP_MWh	0			2,330,160	MWh	0.00%									
11	E				MW to kW conversion factor	MW_Conv	Gen			1,000	kW/MW	0.00%									
12	F				Annual electrical output	AEP_kWh	0			2,330,160,000	kWh	0.00%									
13	G				Operational months	Months	PPA	DD		12	Months	0.00%									
14																					
15																					
16	III	TARIFFS FROM PPA																			
17	A				Number of years of PPA	PPA_Yrs	PPA	DD		20	Years	0.00%									
18	B				Power plant capacity charge	PPCC	PPA	DD		13.0000	\$/kW/mo	3.00%									
19	C				Fixed O&M charge	FOMC	PPA	DD		1.9097	\$/kW/mo	3.00%									
20	D				Variable O&M charge	VOMC	PPA	DD		0.5000	€/kWh	3.00%									
21	E				Fuel charge	FC	PPA	DD		3.9375	€/kWh	3.00%									
22	F				PPA Timing Flag Start					2007	Date										
23	G				PPA Timing Flag Stop					2027	Date										
24	H				PPA Flag									-	-	1	1	1	1	1	1
25	I				Flag Toggle											1	1	1	1	1	1
26	J				PAA Flag Use																
27																					
28																					
29	xv	REVENUES																			
30	A				Power plant capacity charge						\$										
31	B				Fixed O&M charge						\$										
32	C				Variable O&M charge						\$										
33	D				Fuel charge						\$										
34	E				Total Revenue						\$										
35	F				Total Revenue						€/kWh			-	-	-	-	-	-	-	-
36																					
37																					
38	iv	GAS SUPPLY AGREEMENT																			
39	A				Number of years of GSA	GSA_Yrs	GSA	CM		12	Years	0.00%									
40	B				Guaranteed plant heat rate	HR	EPC	BP		7,500	HHV (Btu/kWh)	0.00%									
41	C				Heating value content of gas	HV_Gas	GSA	CM		1,000	HHV (BTU/cf)	0.00%									
42	D				Gas quantity usage	Gas_Use	0			7,5000	kWh/cf	0.00%									
43	E				Conversion factor	MMBTU	Gen			1,000,000	Btu/mmBtu	0.00%									
44	F				Gas price	Gas_Price	GSA	CM		5.0000	\$/mmBTU	3.00%									
45	G				Gas price	0	0			3.7500	€/kWh	3.00%									
46	H				GSA Timing Flag Start					2007	Date										
47	I				GSA Timing Flag Stop					2019	Date										
48	H				GSA Flag									-	-	1	1	1	1	1	1
49	I				Flag Toggle											1	1	1	1	1	1
50	J				GSA Flag Use									-	-	1	1	1	1	1	1
51																					

Step 1
Help yourself make the coding easy by freezing the tab in Cell K5 -
Alt + Window, Freeze Hide the Columns after AJ using the Ctrl +
Space Bar, Shift + Ctrl + Right Cursor, Ctrl + 0 (Zero).

Code the revenue and expense(s) sections. A few points to keep in mind. The easiest way to code
this section is code Column N, keep cells highlighted, Shift + Ctrl + Right Cursor, Ctrl + R. Be mindful
of the number of taps with F4 technique that locks in columns and rows. Note that the assumption
input has been carried for you for each line item in respectice area above. For example, Revenues
will use J17J21. Be mindful of when contract starts and the escalations. Finally, you will note that
a flag has also been coded to match contract dates and timing. Think of how to use this in your model.

This is the only section of the
model where the names have
per used for coding. It is to
allow you to practise the
technique. For example, you
can code PPCC for Cell J19
and will act as though you
have coded J19 and taped
the F4 key once to code
\$J\$19. "Period" is Row 3, or
N3 with F4 tapped twice or
N\$3, locking the row while
following the column.

Worksheet 2 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
52																					
53	xvi	GAS EXPENSE																			
54	A					Gas Expense (Pre-Tax)					\$										
55	B					VAT on fuel	VAT_Fuel	Taxes	CP	5.00%	%										
56	C					VAT on Fuel					\$										
57	D					Total Gas Expense					\$										
58	E					Total Gas Expense					€/kWh			-	-	-	-	-	-	-	-
59	F					Passthrough Check								-	-	-	-	-	-	-	-
60																					
61																					
62	v	VARIABLE EXPENSES (Non-fuel)																			
63	A					Number of years of variable O&M	OM_Yrs	OM	DS	15	Years										
64	B					Variable O&M expense	VOME	OM	DS	0.5000	€/kWh	3.00%									
65	H					VOM Timing Flag Start				2007	Date										
66	I					VOM Timing Flag Stop				2022	Date										
67	H					VOM Flag								-	-	1	1	1	1	1	1
68	I					Flag Toggle				-											
69	J					VOM Flag Use								-	-	1	1	1	1	1	1
70																					
71																					
72	xvii	VARIABLE O&M EXPENSES																			
73	A					Profits tax on local services	PT_LS	Taxes	CP	12.00%	%										
74	B					Profits tax on foreign services	PT_FS	Taxes	CP	15.00%	%										
75	C					Custom duties on capital goods	CD_Cap	Taxes	CP	12.00%	%										
76	D					VAT on capital goods	VAT_Cap	Taxes	CP	10.00%	%										
77	E					Basis of Profits Tax on Local Services															
78	F					Bases of Profits Tax on Foreign Services															
79	G					Bases of Custom Duties on Capital Goods															
80	H					Variable O&M Expenses (Pre-Tax)					\$										
81	I					Profits tax on local services					\$										
82	J					Profits tax on foreign services					\$										
83	K					Custom duties on capital goods					\$										
84	L					VAT on capital goods					\$										
85	M					Variable O&M Expenses					\$										
86	N					Variable O&M Expenses					€/kWh			-	-	-	-	-	-	-	-
87	O					Passthrough Check								-	-	-	-	-	-	-	-
88																					
89																					
90	vi	FIXED EXPENSES																			
91	A					Number of years of fixed expenses	OM_Yrs	OM	DS	15	Years	0.00%									
92	B					Personnel expense	Per_Exp	OM	DS	1,780	\$	3.00%									
93	C					Long term service agreement (LTSA)	LTSA	OM	DS	1,500	\$	3.00%									
94	D					Insurance expense	Ins_Exp	0	-	1,700	\$	3.00%									
95	E					Operations expense	Op_Exp	OM	DS	500	\$	3.00%									
96	H					Administrative expense	Adm_Exp	OM	DS	300	\$	3.00%									
97	I					FOM Timing Flag Start				2007	Date										
98	J					FOM Timing Flag Stop				2022	Date										
99	K					FOM Flag								-	-	1	1	1	1	1	1
100	L					FOM Toggle				-											
101	M					FOM Flag Use								-	-	1	1	1	1	1	1
102																					

Look at this closely then look at the Variable O&M contract and see if you can find a way to code appropriately

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Worksheet 2 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
103																					
104	xviii	FIXED O&M EXPENSES																			
105	A					Profits tax on local services	PT_LS	Taxes	CP	12.00%	%										
106	B					Profits tax on foreign services	PT_FS	Taxes	CP	15.00%	%										
107	C					Custom duties on capital goods	CD_Cap	Taxes	CP	12.00%	%										
108	D					VAT on capital goods	VAT_Cap	Taxes	CP	10.00%	%										
109	E					Personnel expense					\$										
110	F					Long term service agreement (LTSA)					\$										
111	G					Insurance expense					\$										
112	H					Operations expense					\$										
113	I					Administrative expense					\$										
114	J					Total Fixed O&M Expenses (Pre-Tax)					\$										
115	K					Profits tax on local services					\$										
116	L					Profits tax on foreign services					\$										
117	M					Custom duties on capital goods					\$										
118	N					VAT on capital goods					\$										
119	O					Fixed O&M Expenses					\$										
120	P					Fixed O&M Expenses					€/kWh			-	-	-	-	-	-	-	-
121	Q					Passthrough Check								-	-	-	-	-	-	-	-

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.2/Worksheet: Operations.

Worksheet 3

Exercise 4.3

Tom and Breck are sitting at lunch when Alejandro approaches and says, 'Breck, when you have a moment, I would like to speak with you about the (LSTK) EPC contract. I am going to be working on the construction debt draw this week.' Tom suggests that Breck and Alejandro set up a meeting with Helma so that they can get her input on how she sees the financing.

In this section we will code the Interest During Construction (IDC) for the construction debt. Remember, our term sheet states that we are looking for an equity and debt pro rata draw with capitalised interest. However, this is Vair's opening position and Alejandro and Helma realise that the banks will come back with their opening position. The finance team has tried to anticipate other structures the banks may suggest. By coding these structures in the model and allowing the model to choose among these various structures, Alejandro can report to Tom and Helma the weight of these changes. In this way, the model is a more efficient and effective negotiating tool.

Review

There is a trade-off between equity placement and the IDC. If Tom and his team agree to an equity-first structure, the IDC reduces, but the discount impact is greater on the equity, reducing returns. If construction were a year or less and it is an annualised model with returns calculated on Financial Close, it may be that equity's notional value and discounted value are the same. The difficult part is assessing the qualitative risk associated with the timing of the funds. From the bank's perspective,

equity first is more desirable. Equity should realise that the risk associated with the two profiles is not the same, so equity first should be cheaper debt. Since this is a two-year construction loan and is an annualised model, the timing of an entire equity disbursement in the first year of construction, versus spreading it over two years, will have an impact on equity's returns.

Another point that must be made is the timing of EPC milestones. The more you can push the payments to the back end of the contract the better. We can now see that it is not only EPC milestone payments that impact the Time Value of Money to the model, but also the size of the IDC. As stated, the complete value of a contract is more than just the price. We shall see this again and again. The more information we can obtain from the contracts the better off we are. Now that the taxes associated with the capital goods are weighted towards the end. A good deal of the early physical construction is associated with land preparation and the equipment does not arrive until months later. As with the milestone payments, the timing of the equipment delivery will affect the size of the tax invoice, which will then have an impact on IDC.

A final philosophical note: projects are long-term prospects that usually use annualised returns. Our project has a two-year construction time, so the equity first versus pro rata will have an impact. But, as previously mentioned, what if the construction is under 12 months? If it is an annual model, equity first versus pro rata will have no financial impact on the equity discounting. To the contrary, equity first will reduce IDC, boosting overall returns and perhaps increasing the potential of a greater term loan gearing. If the sponsor is committed to the project and it can jump over the philosophical hurdle of placing its equity first, it will increase returns to the project (n.b. only in a model that has annualised returns). Also, it

Worksheet 3

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y		
1	Construction																										
2					Date									Jan-05	Feb-05	Mar-05	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05		
3					Period									1	2	3	4	5	6	7	8	9	10	11	12		
4					ToC		Name	Doc	Inv	Cost	Units	For		Hide and freeze the appropriate cells and columns													
5					Except where indicated in US\$ ('000's)																						
6	I	PROJECT CAPITAL COSTS																									
7	A				LSTK EPC		EPC	EPC	BP	200,000	\$																
8	B				Land		Land	Gen	TC	700	\$																
9	C				Custom Duties & VAT		Total_VAT				\$																
10	D				Profits Taxes		Total_PT				\$																
11	E				Legal Fees		Legal_Fees	Dev	WHP	4,000	\$																
12	F				Financing Fees		Fin_Fees				\$																
13	G				Development Fees		Dev_Fees	Dev	TC	6,000	\$																
14	H				Independent Engineers (Construction Phase)		IE	Dev	BP	750	\$																
15	I				Working Capital		WC			2,000	\$																
16	J				Insurance Premium		Ins_Prem				\$																
17	K				Pre-Commissioning Costs		PC_Costs	OM	DS	250	\$																
18	L				Development Costs		Dev_Costs	Dev	TC	5,000	\$																
19	O				Contingency		Conting			2,000	\$																
20					Total Capex for Construction Debt					220,700	\$																
21																											
22																											
23																											
24					CONSTRUCTION DRAW																						
25					LSTK EPC																						
26					Land																						
27					Custom Duties & VAT																						
28					Profits Taxes									0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
29					Legal Fees																						
30					Financing Fees																						
31					Development Fees																						
32					Independent Engineers (Construction Phase)									10.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%		
33					Working Capital																						
34					Insurance Premium																						
35					Pre-Commissioning Costs																						
36					Development Costs																						
37					Contingency																						
38																											
39					LSTK EPC																						
40					Land																						
41					Custom Duties & VAT																						
42					Profits Taxes																						
43					Legal Fees																						
44					Financing Fees																						
45					Development Fees																						
46					Independent Engineers (Construction Phase)																						
47					Working Capital																						
48					Insurance Premium																						
49					Pre-Commissioning Costs																						
50					Development Costs																						
51					Contingency																						
52					Total Capital Costs during Construction																						
53																											
54																											
55					PRO RATA DRAW																						
56					Senior Debt		Gear	Terms	HP	80%	%																
57					Owner's Equity		Equity			20%	%																
58					Construction Debt			Terms		176,560	\$																
59					Owner's Equity					44,140	\$																

In this section, you are to code the construction draw. All the information is laid out in the various project documents. You will note that the assumption section here is percentages (normally this would be coded in assumption page). As with the Variable O&M in exercise two, think of how you can use the project documents to glean the information required. You should not have any links to other documents. (Hint - try to use the transpose function as is described in Module 2). Taxes, Independent Engineers, Working Capital and Pre-Commission Costs are precoded. Think of why the taxes track with the LSTK EPC contract and the commercial reasons behind the other pre-coded timings. Even though some items are not calculated yet, we have coded for them now so they will wash correctly through the model, like the taxes. This will be come more clear later.

The percentage input of the capital costs will give you a cash draw schedule for each item and the total draw for each month. Continue to think of ways of using the F4 technique for efficient coding

In a pro rata draw equity and debt share monthly payments based on the gearing. If the F4 technique is used correctly, you can code this with one cell then copy down and across

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[illegible]

Worksheet 3 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
60																						
61																						
62						IDC & COMMITMENT FEE CALCULATIONS (PRO RATA)																
63						Construction Debt Facility					\$											
64						Debt Draw (Year 1)					\$											
65						Debt Draw (Year 2)					\$											
66						Equity Draw (Year 1)					\$											
67						Equity Draw (Year 2)					\$											
68						Total Construction Draw					\$											
69						Interest Rate - Construction (Pro Rata)	IRC_PR				5.25%	%										
70						Commitment Fee	C_Fee	Terms	HP		0.50%	%										
71						Construction Loan Repayment	C_Repay	Terms	HP	1	2	per Year										
72						Beginning Balance of Construction Facility					\$											
73						Debt Draws					\$											
74						Ending Balance of Construction Facility					\$											
75																						
76						Beginning Cumulative Draw Balance					\$											
77						Draw for the Period					\$											
78						Ending Cumulative Draw Balance					\$											
79																						
80						Interest Compounding Flag																
81																						
82						Commitment Fee for the Period					\$											
83						Interest for the Period					\$											
84						Interest & Commitment Fee for the Period					\$											
85																						
86						Beginning Bases for Interest & Fee Compounding					\$											
87						Period Interest & Fee					\$											
88						Ending Bases for Interest & Fee Compounding					\$											
89																						
90						Compounded Interest & Fee Costs					\$											
91																						
92						Pro Rata IDC & Commitment Fee					\$											
93																						
94																						
95						EQUITY FIRST DRAW																
96						Senior Debt	Gear	Terms	HP		80%	%										
97						Owner's Equity	Equity				20%	%										
98						Construction Debt Facility					\$											
99						Owner's Equity					\$											
100																						
101																						
102						IDC & COMMITMENT FEE CALCULATIONS (EQUITY FIRST)																
103						Construction Debt Facility					\$											
104						Debt Draw (Year 1)					\$											
105						Debt Draw (Year 2)					\$											
106						Equity Draw (Year 1)					\$											
107						Equity Draw (Year 2)					\$											
108						Total Construction Draw					\$											
109						Interest Rate - Construction (Equity 1st)	IRC_E1				5.25%	%										
110						Commitment Fee	C_Fee	Terms	HP		0.50%	%										
111						Construction Loan Repayment	C_Repay	Terms	HP	1	2	per Year										
112						Beginning Balance of Equity Draw					\$											
113						Equity Draws					\$											
114						Ending Balance of Equity Draw					\$											
115																						
116						Beginning Balance of Construction Facility					\$											
117						Debt Draws					\$											
118						Ending Balance of Construction Facility					\$											

What is the starting balance. The debt draw should come from Row 58. Read and understand what a commitment fee is. Use this section as the basis of for the total commitment fee.

To the converse of the commitment fee, the draw build-up is the basis of the Interest During Construction.

Calculate the Commitment Fee. The fee is quoted on an annual basis, this is a monthly charge

Think carefully on what is the difference between capitalised and compounded interest. A draw that takes place in the first month will still have interest in later months. From where should you calculate each periods interest?

What is compounded interest?

Think of ways to trick the model so that you can have the equity completely drawn down first then have the debt take over. One is an IF function. If the equity balance is greater than the period draw, then the period draw, if not, the remaining equity balance. You can then subtract the remaining draw balance from the debt. Remember that the model is not static and most allow for changes in debt size and leverage

Look at the comment box above and incorporate that in to the debt draw. Commitment Fee and IDC is generally coded like it was in the pro rata draw.

Worksheet 3 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
119																						
120						Beginning Cumulative Draw Balance					\$											
121						Draw for the Period					\$											
122						Ending Cumulative Draw Balance					\$											
123																						
124						Interest Compounding Flag				1												
125																						
126						Commitment Fee for the Period					\$											
127						Interest for the Period					\$											
128						Interest & Commitment Fee for the Period					\$											
129																						
130						Beginning Bases for Interest & Fee Compounding					\$											
131						Period Interest & Fee					\$											
132						Ending Bases for Interest & Fee Compounding					\$											
133																						
134						Compounded Interest & Fee Costs					\$			-	-	-	-	-	-	-	-	-
135																						
136						Pro Rata IDC & Commitment Fee					\$											
137																						
138																						
139						EMPLOYED OUTPUT																
140						Construction Debt Profile Flag				1												
141						IDC & Commitment Fee																
142						Equity Draw (Year 1)																
143						Equity Draw (Year 2)																
144						Debt Draw (Year 1)																
145						Debt Draw (Year 2)																
146																						
147																						
148						CONSTRUCTION DRAW GRAPHING INFORMATION																
149						Pro Rata Draw																
150						Cumulative Equity Draw								-	-	-	-	-	-	-	-	-
151						Cumulative Debt Draw								-	-	-	-	-	-	-	-	-
152						Capitalized IDC and Commitment Fee for the Period								-	-	-	-	-	-	-	-	-
153						Total								-	-	-	-	-	-	-	-	-
154																						
155						Equity First																
156						Cumulative Equity Draw								-	-	-	-	-	-	-	-	-
157						Cumulative Debt Draw								-	-	-	-	-	-	-	-	-
158						Capitalised IDC and Commitment Fee for the Period								-	-	-	-	-	-	-	-	-
159						Total								-	-	-	-	-	-	-	-	-

Look at the coding in the pro rata section for this. Think of the commercial reasons for doing this. This is an annualised model and cash flow timing is the foundation for the returns.

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.3/Worksheet: Construction.

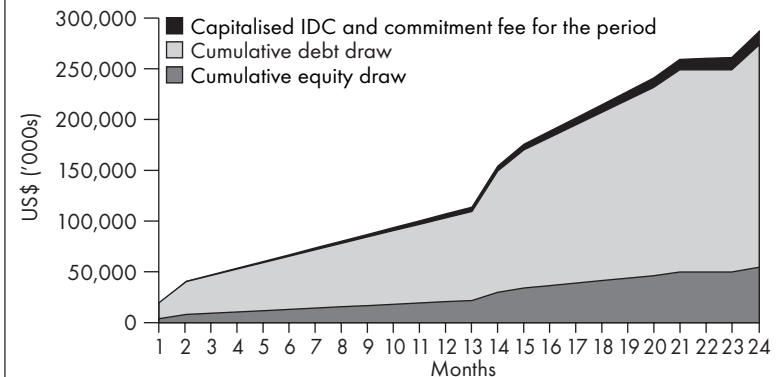
may be a strong negotiating point with debt. By giving what seems a substantial point to debt, it may help to negotiate some more sensitive issues for equity. If equity is looking for financing, they should be committed to the project anyway. Equity will probably have some recourse doing construction and the same portion, if not the entire equity, will probably be part of that commitment.

Main points

1. Timing of construction related milestone payments impacts on the model on many levels, not just the static view of the payment.
2. Taxes, followed by IDC, need to be considered when negotiating construction and construction related contracts.
3. Try to take a commercial view of construction debt profiles that may not always be the traditional stance.

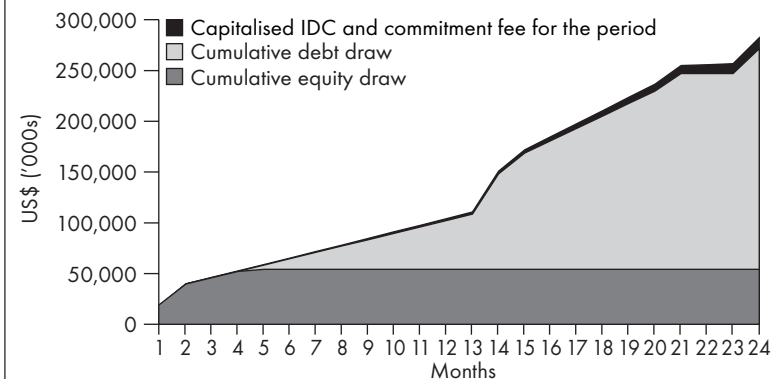
Exhibits 4.12a and 4.12b can be found on the accompanying CD Rom in Module 4/File: Project_Vair-Master/Worksheets: Pro Rata Chart and Equity First Chart.

Exhibit 4.12a: Pro rata construction debt profile



Source: Author's own.

Exhibit 4.12b: Equity first construction debt profile



Source: Author's own.

Worksheet 4

Exercise 4.4

Alejandro is trying to round out some of the capital costs that are not direct inputs but calculated based on contractual obligations and pricing. He has just finished the IDC and is now going to work on the construction phase insurance package. He calls Steve Janes, Vair's risk management expert, and they set up a meeting so Steve can explain both the construction and operational insurance premiums.

In this exercise we continue to use the project documents to code initial capital costs. Some capital costs are direct inputs from pricing, while other capital costs are a function of how contracts work with each other. Construction insurance premiums are a function of the price of the respective contracts they are insuring.

Review

This is another example of a contract's price being influenced by other contracts; in this case, the EPC and O&M contracts' pricing drives the

insurance premiums. The language in the contract allows calculating what percentage of each contract is subject to the premium. Insurance will be a requirement of the lender's security package. Again, this is an exercise of trying to trade risk for reward between the insurance provider, contractors and lenders. Alejandro calls Breck and asks why the building materials need to be procured offshore and cannot be procured in the country. Besides the additional expense of shipping the material, there is now an additional insurance expense attached. And we continue to see a build-up of IDC based on these contracts and their timing. You should now start to see the foreshadowing of additional pricing based on the components of the contracts.

Main points

1. If you have priced each premium's item based on the contract's entirety, then you have overpriced the insurance.
2. Try to understand what elements of the EPC contract could reduce the premium pricing, while also understanding if a stronger security package could reduce the perceived risk to the construction lenders, offering better terms to the project.

Worksheet 4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Insurance																				
2					Date																
3					Period																
4					ToC		Name	Desc	Inv	Cons	Units		Esc								
5					Except where indicated in US\$ ('000's)				Hide and freeze the appropriate cells and columns.												
6	ix	INSURANCE																			
7					<i>Construction Insurances</i>																
8	A				Builder's All Risk (BAR)		BAR	Ins	SJ												
9	B				Delay-in-Start-Up (DIS)		DIS	Ins	SJ												
10	C				Marine Cargo		MC	Ins	SJ												
11																					
12					<i>Basis for BAR</i>																
13					LSTK EPC		EPC	EPC	BP												
14					% Subject to BAR			EPC													
15					LSTK EPC BAR Premium																
16																					
17					Pre-Commissioning Costs		PC_Costs	OM	DS												
18					% Subject to BAR			OM													
19					Pre-Commissioning Costs BAR Premium																
20																					
21					Total BAR Premium																
22																					
23					<i>Basis for DIS</i>																
24					LSTK EPC		EPC	EPC	BP												
25					% Subject to DIS			EPC													
26					LSTK EPC DIS Premium																
27																					
28					Pre-Commissioning Costs		PC_Costs	OM	DS												
29					% Subject to DIS			OM													
30					Pre-Commission Costs DIS Premium																
31																					
32					Total DIS Premium																
33																					
34					<i>Basis for Marine Cargo</i>																
35					LSTK EPC		EPC	EPC	BP												
36					% Subject to Marine Cargo			EPC													
37					LSTK EPC Marine Cargo Premium																
38																					
39					Pre-Commissioning Costs		PC_Costs	OM	DS												
40					% Subject to Marine Cargo			OM													
41					Pre-Commission Costs Marine Cargo Premium																
42																					
43					Total Marine Cargo Premium																
44																					
45					Total Construction Premium																
46																					
47																					
48																					

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.4/Worksheet: Insurance.

Worksheet 5

Exercise 4.5

Alejandro is now growing a little concerned that the project that Vair thinks it has may not be as good as suspected. He calls Court again to set up another meeting concerning taxes. Alejandro realises that the project must pay, and finance, taxes for the development and construction phase, but he is not sure of the magnitude.

The theme that capital costs are being driven by the suite of contracts will continue in this exercise. Tax regimes are difficult to navigate. It is important that you review the tax document carefully and think about which taxes get assigned which items.

Review

Again, Alejandro sees how the assignment of contracts' price and timing components influences other line item capital costs and IDC. Can Tom and his team influence the source of labour from the contractor? Even if the notional value of the contract remains at US\$200 million, if Breck can convince the contractor to reallocate more resources to in-country services and labour the overall price of the project will be reduced due to the tax differentials. If this can be done without forfeiting the quality of the contracts and services, efforts should be made to negotiate this point. If you go back and review the milestones in the construction section, you will notice that 60 per cent of the duty taxes and capital goods VAT is in months 14 and 15. Payment and delivery now take different forms when discussing the contract. Contract structures can also mitigate tax burdens. By splitting the contract to an onshore and an offshore component, Breck may be able to mitigate some of the development taxes.

Once you have convinced yourself of the coding, take a commercial view of the output. Alejandro has just coded an additional US\$43,650 million in tax expense. When Alejandro coded in Exercise 4.1, the capital costs were at US\$221 million; now they are at US\$280 million. This additional US\$56.8 million has increased capital costs by 26.5 per cent, of which taxes account for US\$43.6 million, or 74.4 per cent. Hopefully, at this point, you see that this is a static view. The taxes have also increased IDC by US\$1.6 million, from US\$10.8 million to US\$12.4 million, accounting for a massive US\$45.2 million, or nearly 80 per cent of the increase.

Every effort should be made to obtain a tax holiday. If the host country does not have the capital, technology or expertise to build the plant and is seeking outside investors, Tom has a strong position from where to discuss the tax holiday position. However, let us look at this more closely. If Alejandro has done his job (and we are sure that he has), he will have built the model correctly to negotiate pricing inclusive of taxes. Remember that the Capacity Charge portion of the PPA is servicing debt, equity and taxes. This means that infrastructure projects are effective revenue collectors for the state. The entire country will need infrastructure services so it will be paying for the services and indirectly paying taxes. If structured correctly, the burden of the taxes will be passed on to the end-user via the capacity payment.

Continuing with this theme, if Tom comes back to the table asking for the tax holiday, the government and utility should understand that by granting a tax holiday without reopening the capacity payment price they have increased the returns to the sponsor. For the sake of discussion, let us look at a scenario. A US\$13.00 kW/month tariff generates a trapped cash 25 per cent IRR and a 6.58 cents/kWh unit price. (You are not currently able to do these calculations, but you will be able to do

them at the end of the module.) If Tom were able to negotiate a tax holiday for only the development taxes, the return would jump to nearly a 29 per cent IRR. By Goal Seeking the capacity payment to find what figure maintains the 25 per cent, we can see what price would keep the project whole. That capacity payment charge would be US\$11.9 kW/month, generating a 6.42 cents/kWh unit price. Once the holiday has been agreed, any capacity payment over US\$11.9 kW/month to which Tom and his team can get the utility to agree will increase the project's returns. If negotiated correctly, the average unit price of power will have gone down and the project returns will have gone up. But let us not fool ourselves. The overall tax revenue to the government will have been

reduced if they do not adjust the end-user prices from the project to the utility to the final consumer.

Main points

1. Project finance models must include taxes if they are to be a strong negotiating tool.
2. A pre-tax, all-equity feasibility model needs to be viewed for what it is, that is, a high-levelled view with a significant margin of error.
3. Taxes are significant costs that tend not to be coded correctly, and they have material impact on models, pricing and negotiations.

Worksheet 5

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI		
1	DevTaxes																																				
2					Date																																
3					Period																																
4					TaxC		Name	Doc	Inv	Com	Units	Est																									
5					Except where indicated in US\$ (1000s)																																
6	VIII	TAXES																																			
7	A				Corporate Income Tax		Inc_Tax	Taxes	CP	34.00%	%																										
8	B				VAT on Capital Goods		VAT_Cap	Taxes	CP	10.00%	%																										
9	C				VAT on Fuel		VAT_Fuel	Taxes	CP	5.00%	%																										
10	D				Profits Tax on Local Services		PT_LS	Taxes	CP	12.00%	%																										
11	E				Profits Tax on Foreign Services		PT_FS	Taxes	CP	15.00%	%																										
12	F				Custom Duties on Capital Goods		CD_Cap	Taxes	CP	12.00%	%																										
13																																					
14																																					
15																																					
16																																					
17																																					
18	I	PROJECT CAPITAL COSTS																																			
19	A				LSTK EPC		EPC	EPC	BP	200,000	\$																										
20	B				Land		Land	Gen	TC	700	\$																										
21	C				Custom Duties & VAT		Total_VAT				\$																										
22	D				Profits Taxes		Total_PT				\$																										
23	E				Legal Fees		Legal_Fees	Dev	WHP	4,000	\$																										
24	F				Financing Fees		Fin_Fees				\$																										
25	G				Development Fees		Dev_Fees	Dev	TC	6,000	\$																										
26	H				Independent Engineers (Construction Phase)		IE	Dev	BP	750	\$																										
27	I				Working Capital		WC			2,000	\$																										
28	J				Insurance Premium		Ins_Prem			2,893	\$																										
29	K				Pre-Commissioning Costs		PC_Costs	OM	DS	250	\$																										
30	L				Development Costs		Dev_Costs	Dev	TC	5,000	\$																										
31	M				Commitment Fees & Interest During Construction (%)		IDC			10,856	\$																										
32	N				Debt Service Reserve Account (DSRA)		DSRA				\$																										
33	O				Contingency		Conting			2,000	\$																										
34	P				Total Capital Costs		Cap_Cost			234,420	\$																										
35																																					
36																																					
37																																					
38					Custom Duties on Capital Goods																																
39					VAT on Capital Goods																																
40	C				Custom Duties & VAT		Total_VAT				\$																										
41																																					
42					Profits Tax on Local Services																																
43					Profits Tax on Foreign Services																																
44	D				Total Profits Tax		Total_PT				\$																										
45																																					
46					Total Development Taxes						\$																										
47											OK																										

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.5/Worksheet: DevTaxes.

Worksheet 6

Exercise 4.6

While Alejandro was in Court's office discussing taxes, Court mentioned the country's depreciation allowances on both book and tax. Alejandro knew that Court was trying to get an opinion on a more aggressive depreciation schedule for the plant. However, Alejandro was not convinced that this was in the project's best interest, especially if they could not structure away the trapped cash problem.

In this exercise we will code the depreciation for the project. Arguably, if done correctly, this is one of the most difficult aspects to code. There are many ways and forms in which a depreciation schedule can unfold. The desire is to optimise the depreciation tax shield with regard to cash taxes and distributable cash. Depreciation is a non-cash expense that reduces real cash taxes, while also reducing reported income. We have seen the effect it may have on 'trapped cash' above.

Court thinks he has been able to procure an opinion that will enable the project to put the plant in three depreciation classes: plant, buildings and pre-operative expenses. This will accelerate the depreciation schedule and allow for further reduction in cash taxes in the earlier years, where discounting the returns has the greatest impact. Alejandro realises ahead of time that while this is seemingly beneficial, if the project cannot structure out the trapped cash it will forfeit depreciation tax shields in later years. He has coded to see the impact by using IF functions and flags on the depreciation tab. Before starting the exercise, you should know that the tax policy allows you to add taxes to assets for the beginning asset depreciation basis. For instance the pre-operative expense for depreciation for legal fees is US\$4,570,000 – the US\$4million invoiced plus

US\$570,000 for the local and foreign profits tax.

Review

Tom and his team will argue that they will be able to get the 'trapped cash' out through some legal structure. However, Alejandro wants to see what the depreciation tax shield will do to the model if they cannot successfully structure out the trapped cash. Year 1's depreciation, with Court's aggressive stepped schedule, is US\$5.4 million for the plant. If the entire EPC contract is depreciated over 20 years, year 1's plant depreciation expense is reduced to US\$4.1 million. This US\$1.3 million differential accounts for an additional tax shield of US\$438,000 (US\$1.3 million times the 34 per cent corporate tax rate). By using a 10 per cent discount rate, the present value differential of the two schedules is over US\$4 million (with the two present values being US\$39 million and US\$35 million, respectively). If Tom cannot structure out the trapped cash, the IRR actually increases by 230 basis points when the entire EPC contract is depreciated over 20 years. You will be able to run this analysis yourself at the end of this module.

Main points

1. An aggressive depreciation schedule for tax shield purposes is only a benefit if you can use the tax shield.
2. If you cannot use depreciation, look at the schedules available to you to optimise the tax shield – faster is not always better.
3. It is a difficult thing to code for maximum flexibility, but worth the effort.
4. Note the switch employed in the contingency. This will be addressed in Module 5.

Worksheet 6

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Dep																							
2					Date																			
3					Period																			
4					ToC																			
5					Except where indicated in US\$ ('000's)	Name	Date	Inv	Cost	Units														
6	III				GENERAL ASSUMPTIONS																			
7	I				Plant & Machinery	Dep. Plant	Gen	CP	20	Years	-	1												
8	G				Pre-operative Expenses	Dep. PreOp	Gen	CP	7	Years	-	2												
9	H				Buildings	Dep. Build	Gen	CP	12	Years	-	3												
10	I				Non-Depreciable Items			CP		Years	-	4												
11																								
12																								
13	I				PROJECT CAPITAL COSTS																			
14	A				LSTK EPC	EPC	EPC	BP	200,000	\$														
15					Plant & Machinery																			
16					Pre-operative Expenses																			
17					Buildings																			
18	B				Land	Land	Gen	TC	700	\$														
19	C				Custom Duties & VAT	Tand VAT			36,221	\$														
20	D				Profits Taxes	Tand PT			7,429	\$														
21	E				Legal Fees	Legal Fees	Dev	WSP	4,000	\$														
22	F				Financing Fees	Fin. Fees				\$														
23	G				Development Fees	Dev. Fees	Dev	TC	6,000	\$														
24	H				Independent Engineers (Construction Phase)	E	Dev	BP	700	\$														
25	I				Working Capital	WC			3,000	\$														
26	J				Insurance Premium	Ins. Prem			2,893	\$														
27	K				Pre-Commissioning Costs	PC Costs	OM	DS	250	\$														
28	L				Development Costs	Dev. Costs	Dev	TC	5,000	\$														
29	M				Commitment Fees & Interest During Construction ("IDC")	IDC			12,434	\$														
30	N				Debt Service Reserve Account (DSRA)	DSRA				\$														
31	O				Contingency	Conting			2,000	\$														
32	P				Total Capital Costs	Cap. Cost			279,480	\$														
33																								
34					Date																			
35					Period																			
36					ToC																			
37																								
38					DEPRECIATION SCHEDULE																			
39					Plant & Machinery	Dep. Plant	Gen	CP																
40					Pre-operative Expenses	Dep. PreOp	Gen	CP																
41					Buildings	Dep. Build	Gen	CP																
42					Non-Depreciable Items			CP																
43					Total Assets																			
44																								
45																								
46																								
47																								
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Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.6/Worksheet: Depr.

Worksheet 7

Exercise 4.7

Helma Prinssen, the team's Financial Director, has a great deal of syndication experience. She is particularly concerned with gaining a good understanding of the different debt amortisation schedules. The project has requested a single, senior, 18-year, semi-annual mortgage-style (also known as an annuity) debt profile in its term sheet to the banks. Alejandro and Helma have discussed and come up with a cross-section of different debt schedule probabilities that the banks may return in their comments to the term sheet. Before coming up with annualised numbers, Alejandro must first code period payments and then aggregate these figure to achieve an annualised debt schedule.

Review

Annual interest rates are not always as cheap as they appear. A 5.0500 per cent annual loan is actually cheaper than a 5.0000 per cent loan paid semi-annually. The effective interest rate for a semi-annual loan is 5.0625 per cent. This may seem a small percentage difference, but on a US\$226 million loan the aggregate difference over the life of the loan is US\$4 million in greater interest payments. A rather significant number for something that is smaller than two basis points. Greater gearing is the key to greater returns, so the debt discussions with banks will be critical. Remember that if it is a simple binary situation, projects benefit from higher gearing, while banks benefit from greater spreads. The more you understand and the more you can anticipate the implied interest rate and repayment schedules, the better you can negotiate.

Main Points

1. Effective interest rates are different than the annual rates.
2. You cannot use an effective interest to replace the annual rate to obtain the annual debt service.
3. You must calculate the period rates and aggregate them.

See Exhibits 4.13a–4.13e.

Note: These worksheets can be found on the accompanying CD Rom in Module 4/File: Project_Vair-Master/Worksheets: Snr Debt Mtge Chart; Snr Debt Level P; Tranche Mortgage Chart; Tranche Level P Chart and Debt Profile Chart.

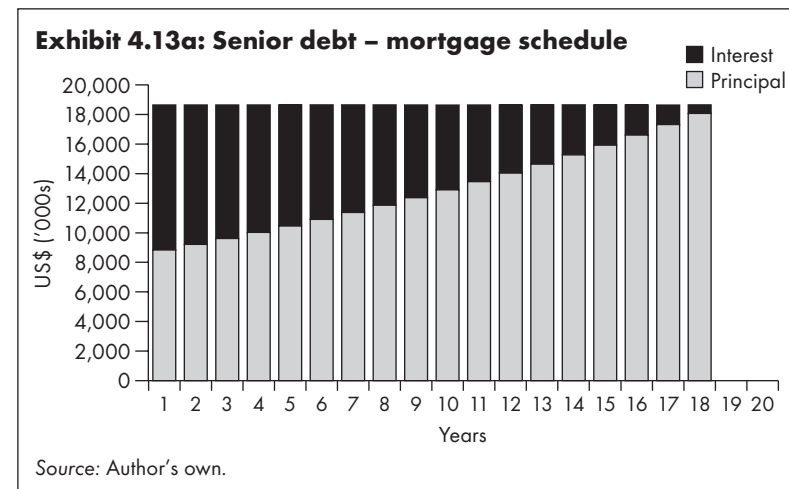
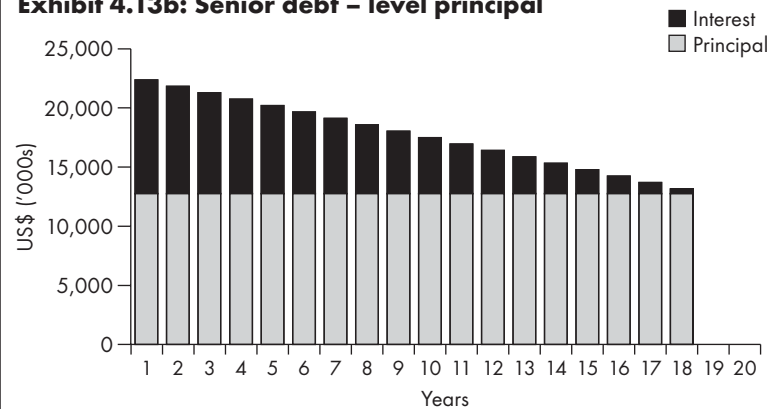
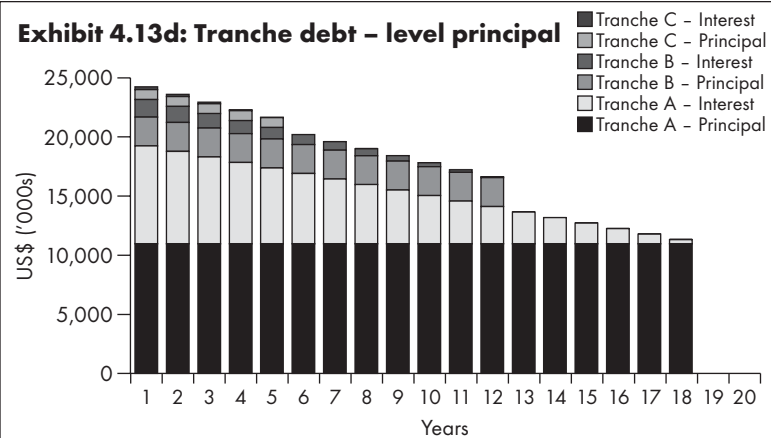


Exhibit 4.13b: Senior debt – level principal



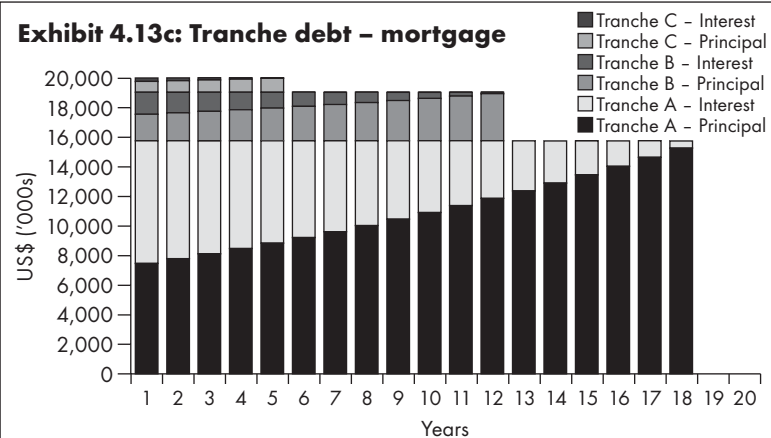
Source: Author's own.

Exhibit 4.13d: Tranche debt – level principal



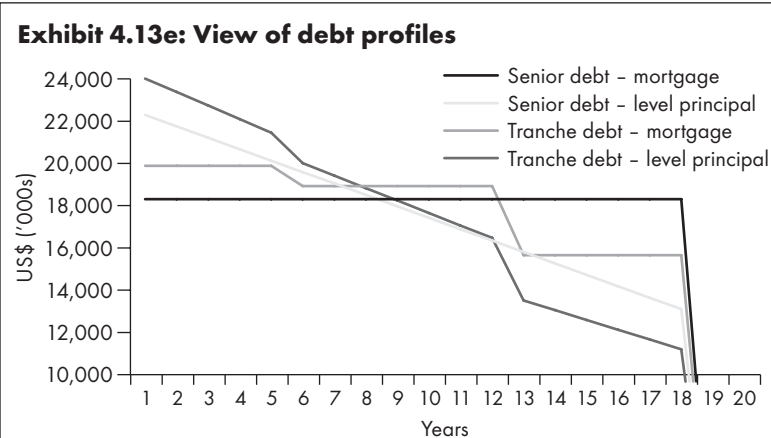
Source: Author's own.

Exhibit 4.13c: Tranche debt – mortgage



Source: Author's own.

Exhibit 4.13e: View of debt profiles



Source: Author's own.

Building the project
finance model:
case study

Worksheet 7

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	Debt Sch																		
2					Date														
3					Period														
4					ToC	Name	Doc	Inv	Cons	Units	Esc				0.0505000	0.0500000	0.0505000		
5					Except where indicated in US\$ ('000's)										1	2	2		
6	XII	FINANCING AGREEMENT													0.0505	0.050625	0.051137562		
7	A				LIBOR	LIBOR	Gen	HP	3.00%	%	-								
8	C				Swap Fee - Term	Swap_T	Terms	HP	0.25%	%	-								
9	H				Premium Spread - Term (Mortgage)	Spr_T_M	Terms	HP	1.00%	%	-								
10	I				Premium Spread - Term (Level Principal)	Spr_T_L	Terms	HP	1.00%	%	-								
11	J				Interest Rate - Senior/Tranche A (Mortgage)	IRT_M	-	-	4.25%	%	-								
12	K				Interest Rate - Senior/Tranche A (Level Principal)	IRT_L	-	-	4.25%	%	-								
13	L				Additional Spread Tranche B (Mortgage) over Senior	-	-	HP	1.00%	%	-								
14	M				Additional Spread Tranche B (Level P) over Senior	-	-	HP	1.00%	%	-								
15	N				Additional Spread Tranche C (Mortgage) over Senior	-	-	HP	2.00%	%	-								
16	O				Additional Spread Tranche C (Level P) over Senior	-	-	HP	2.00%	%	-								
17	P				Interest Rate - Tranche B (Mortgage)	-	-	-	5.25%	%	-								
18	Q				Interest Rate - Tranche B (Level Principal)	-	-	-	5.25%	%	-								
19	R				Interest Rate - Tranche C (Mortgage)	-	-	-	6.25%	%	-								
20	S				Interest Rate - Tranche C (Level Principal)	-	-	-	6.25%	%	-								
21	T				Senior/Tranche A Loan Term	T_Dur	Terms	HP	18	Years	-								
22	U				Tranche B Loan Term	-	-	HP	12	Years	-								
23	V				Tranche C Loan Term	-	-	HP	5	Years	-								
24	X				Senior/Tranche A Loan Repayment	T_Repay	Terms	HP	2	per Year	-								
25	Y				Tranche B Loan Repayment	-	-	HP	4	per Year	-								
26	Z				Tranche C Loan Repayment	-	-	HP	6	per Year	-								
27																			
28	XI	CAPITALISATION FOR OPERATIONAL PHASE																	
29	G				Adjusted Senior Debt	-	-	-	223,744	\$	-								
30	I				Tranche A - Plant	-	-	-	195,480	\$	-								
31	K				Tranche B - Development Costs	-	-	-	26,664	\$	-								
32	M				Tranche C - Working Capital	-	-	-	1,600	\$	-								
33																			
34																			

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.7/Worksheet: Debt Sch.

Worksheet 7 continued

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
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Building the project
finance model:
case study

Worksheet 7 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
100							Senior Debt - Level Principal							Senior Debt - Level Principal					
101								Start				End		Calendar	Beginning	Interest	Principal	Total Debt	Ending
102							Period	Balance	Interest	Principal	Total	Balance		Year	Balance			Service	Balance
103							1	223,744	4,755	6,215	10,970	217,529		1	223,744	9,377	12,430	21,807	211,314
104							2	217,529	4,622	6,215	10,838	211,314		2	211,314	8,849	12,430	21,279	198,883
105							3	211,314	4,490	6,215	10,706	205,098		3	198,883	8,320	12,430	20,751	186,453
106							4	205,098	4,358	6,215	10,573	198,883		4	186,453	7,792	12,430	20,222	174,023
107							5	198,883	4,226	6,215	10,441	192,668		5	174,023	7,264	12,430	19,694	161,593
108							6	192,668	4,094	6,215	10,309	186,453		6	161,593	6,736	12,430	19,166	149,162
109							7	186,453	3,962	6,215	10,177	180,238		7	149,162	6,207	12,430	18,638	136,732
110							8	180,238	3,830	6,215	10,045	174,023		8	136,732	5,679	12,430	18,109	124,302
111							9	174,023	3,698	6,215	9,913	167,808		9	124,302	5,151	12,430	17,581	111,872
112							10	167,808	3,566	6,215	9,781	161,593		10	111,872	4,622	12,430	17,053	99,442
113							11	161,593	3,434	6,215	9,649	155,378		11	99,442	4,094	12,430	16,524	87,011
114							12	155,378	3,302	6,215	9,517	149,162		12	87,011	3,566	12,430	15,996	74,581
115							13	149,162	3,170	6,215	9,385	142,947		13	74,581	3,038	12,430	15,468	62,151
116							14	142,947	3,038	6,215	9,253	136,732		14	62,151	2,509	12,430	14,940	49,721
117							15	136,732	2,906	6,215	9,121	130,517		15	49,721	1,981	12,430	14,411	37,291
118							16	130,517	2,773	6,215	8,989	124,302		16	37,291	1,453	12,430	13,883	24,860
119							17	124,302	2,641	6,215	8,857	118,087		17	24,860	924	12,430	13,355	12,430
120							18	118,087	2,509	6,215	8,724	111,872		18	12,430	396	12,430	12,826	(0)
121							19	111,872	2,377	6,215	8,592	105,657		19	(0)	-	-	-	(0)
122							20	105,657	2,245	6,215	8,460	99,442		20	(0)	-	-	-	(0)
123							21	99,442	2,113	6,215	8,328	93,227		21	(0)	-	-	-	(0)
124							22	93,227	1,981	6,215	8,196	87,011		22	(0)	-	-	-	(0)
125							23	87,011	1,849	6,215	8,064	80,796				87,959	223,744		
126							24	80,796	1,717	6,215	7,932	74,581				-	-		
127							25	74,581	1,585	6,215	7,800	68,366							
128							26	68,366	1,453	6,215	7,668	62,151							
129							27	62,151	1,321	6,215	7,536	55,936							
130							28	55,936	1,189	6,215	7,404	49,721							
131							29	49,721	1,057	6,215	7,272	43,506							
132							30	43,506	924	6,215	7,140	37,291							
133							31	37,291	792	6,215	7,008	31,076							
134							32	31,076	660	6,215	6,875	24,860							
135							33	24,860	528	6,215	6,743	18,645							
136							34	18,645	396	6,215	6,611	12,430							
137							35	12,430	264	6,215	6,479	6,215							
138							36	6,215	132	6,215	6,347	(0)							
139							37	(0)	(0)	-	(0)	(0)							
140							38	(0)	(0)	-	(0)	(0)							
141							39	(0)	(0)	-	(0)	(0)							
142							40	(0)	(0)	-	(0)	(0)							
143							41	(0)	(0)	-	(0)	(0)							
144							42	(0)	(0)	-	(0)	(0)							
145							43	(0)	(0)	-	(0)	(0)							
146							44	(0)	(0)	-	(0)	(0)							
147							45	(0)	(0)	-	(0)	(0)							
148							46	(0)	(0)	-	(0)	(0)							
149							47	(0)	(0)	-	(0)	(0)							
150							48	(0)	(0)	-	(0)	(0)							
151							49	(0)	(0)	-	(0)	(0)							
152							50	(0)	(0)	-	(0)	(0)							
153							51	(0)	(0)	-	(0)	(0)							
154							52	(0)	(0)	-	(0)	(0)							
155							53	(0)	(0)	-	(0)	(0)							
156							54	(0)	(0)	-	(0)	(0)							
157							55	(0)	(0)	-	(0)	(0)							
158							56	(0)	(0)	-	(0)	(0)							
159							57	(0)	(0)	-	(0)	(0)							
160							58	(0)	(0)	-	(0)	(0)							
161							59	(0)	(0)	-	(0)	(0)							
162							60	(0)	(0)	-	(0)	(0)							
163									87,959	223,744									
164																			

Worksheet 7 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
165								Tranche A - Mortgage								Tranche A - Mortgage				
166								Start				End		Calendar	Beginning	Interest	Principal	Total Debt	Ending	
167							Period	Balance	Interest	Principal	Total	Balance		Year	Balance			Service	Balance	
168							1	195,480						1						
169							2	-						2						
170							3	-						3						
171							4	-						4						
172							5	-						5						
173							6	-						6						
174							7	-						7						
175							8	-						8						
176							9	-						9						
177							10	-						10						
178							11	-						11						
179							12	-						12						
180							13	-						13						
181							14	-						14						
182							15	-						15						
183							16	-						16						
184							17	-						17						
185							18	-						18						
186							19	-						19						
187							20	-						20						
188							21	-						21						
189							22	-						22						
190							23	-								-	-			
191							24	-												
192							25	-												
193							26	-												
194							27	-												
195							28	-												
196							29	-												
197							30	-												
198							31	-												
199							32	-												
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204							37	-												
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206							39	-												
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209							42	-												
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212							45	-												
213							46	-												
214							47	-												
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216							49	-												
217							50	-												
218							51	-												
219							52	-												
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222							55	-												
223							56	-												
224							57	-												
225							58	-												
226							59	-												
227							60	-												
228									-			-								
229																				

Building the project
finance model:
case study

Worksheet 7 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S					
								Tranche A - Level Principal						Tranche A - Level Principal										
							Period	Start Balance	Interest	Principal	Total	End Balance		Calendar Year	Beginning Balance	Interest	Principal	Total Debt Service	Ending Balance					
230							1							1										
231							2							2										
232							3							3										
233							4							4										
234							5							5										
235							6							6										
236							7							7										
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251							22							22										
252							23													-	-			
253							24														-	-		
254							25																	
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294																								

Worksheet 7 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
295								Tranche B - Mortgage								Tranche B - Mortgage				
296								Start				End		Calendar	Beginning	Interest	Principal	Total Debt	Ending	
297							Period	Balance	Interest	Principal	Total	Balance		Year	Balance			Service	Balance	
298							1							1						
299							2							2						
300							3							3						
301							4							4						
302							5							5						
303							6							6						
304							7							7						
305							8							8						
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Building the project
finance model:
case study

Worksheet 7 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
360								Tranche B - Level Principal							Tranche B - Level Principal				
361								Start				End		Calendar		Beginning		Total Debt	
362							Period	Balance	Interest	Principal	Total	Balance		Year		Balance		Service	Ending
363							1							1					
364							2							2					
365							3							3					
366							4							4					
367							5							5					
368							6							6					
369							7							7					
370							8							8					
371							9							9					
372							10							10					
373							11							11					
374							12							12					
375							13							13					
376							14							14					
377							15							15					
378							16							16					
379							17							17					
380							18							18					
381							19							19					
382							20							20					
383							21									-	-		
384							22									-	-		
385							23												
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422							60												
423																			
424																			

Worksheet 7 continued

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	
425							Tranche C - Mortgage									Tranche C - Mortgage			
426							Start				End		Calendar	Beginning	Interest	Principal	Total Debt	Ending	
427						Period	Balance	Interest	Principal	Total	Balance		Year	Balance			Service	Balance	
428						1							1						
429						2							2						
430						3							3						
431						4							4						
432						5							5						
433						6							6						
434						7							7						
435						8							8						
436						9							9						
437						10							10						
438						11							11						
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445						18							18						
446						19							19						
447						20							20						
448						21								-	-				
449						22									-	-			
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486						59													
487						60													
488								-			-								
489																			

Building the project
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case study

Worksheet 7 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
490																			
491																			
492							Period	Start				End		Calendar	Beginning	Interest	Principal	Total Debt	Ending
493								Balance	Interest	Principal	Total	Balance		Year	Balance			Service	Balance
494							1	1,600						1					
495							2	-						2					
496							3	-						3					
497							4	-						4					
498							5	-						5					
499							6	-						6					
500							7	-						7					
501							8	-						8					
502							9	-						9					
503							10	-						10					
504							11	-						11					
505							12	-						12					
506							13	-						13					
507							14	-						14					
508							15	-						15					
509							16	-						16					
510							17	-						17					
511							18	-						18					
512							19	-						19					
513							20	-						20					
514							21	-											
515							22	-											
516							23	-											
517							24	-											
518							25	-											
519							26	-											
520							27	-											
521							28	-											
522							29	-											
523							30	-											
524							31	-											
525							32	-											
526							33	-											
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529							36	-											
530							37	-											
531							38	-											
532							39	-											
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534							41	-											
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541							48	-											
542							49	-											
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552							59	-											
553							60	-											

Worksheet 8

Exercise 4.8

Once the debt schedules have been coded, Alejandro needs to put them in a format that the model can easily manipulate for financial statements. Also, some of the additional security that the project is suggesting is a function of the debt service, most notably the Debt Service Reserve Account (DSRA) and a Letter of Credit (L/C) based on some percentage of the annual debt service. Alejandro is going to need to code the page so that he can easily change debt profiles in the model.

Review

By looking at the structures in their smallest form, Alejandro can now aggregate them to see their impact. It is much easier to review any modelling once it is in digestible components. Debt service is made up of two components, principal and interest. The sum of the parts is not always equal. Two annual debt services that equal US\$10 million do not have the same value. If one is an interest only payment and the other is US\$5 million of principal and the balance in interest, their values are different due to tax relief on interest payments, or interest times one minus the tax rate. The after-tax value of the interest only loan is US\$6.6 million [US\$10 million $\times$ (1 – 34%)], while the other after-tax debt service is US\$8.3 million [US\$5 million + (US\$5 million $\times$ (1 – 34%))]. The second debt service is more expensive to the project.

Different debt profiles have different risks to the bank, so the interest, or reward, needs to be different. From strictly a return standpoint, the model

can find the indifference price of a level principal schedule versus an annuity schedule. For example, if a project with a 4.25 per cent annuity loan generated a 37.22 per cent IRR, what would be the cost of debt for a level principal loan to maintain the same IRR, all other items being constant? By using the Goal Seek we can find that it is 2.16 per cent. However, this is a static view. It is not solely the interest that changes, but the DSRA is a function of the annual debt service, which will be higher in the first years of level principal than with annuity. This will also demand higher capitalisation costs for both debt and equity, increasing debt facility requirements (probably increasing financing fees). The L/C payment will also increase.

Perhaps, if the project cannot structure away the trapped cash situation, the level principal profile is more attractive because the project cannot use the tax shelter from the interest in the early years. This is counter-intuitive, and if the model is robust enough this could be a very interesting and unexpected negotiating point. Equity could feign a substantial give and ask for much in return. Later on in the module we shall discuss the importance of the Debt Service Coverage Ratios (DSCR) and their impact on the debt.

Main Points

1. The debt calculation is a major consideration for the model.
2. The more schedules you can code and utilise in the model, the stronger it is as a negotiating tool.
3. Debt will impact other parts of the project's economics beyond just the debt service, sometimes in counter-intuitive ways.

Building the project
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Worksheet 8

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Debt Calc																					
2					Date									2005	2006	2007	2008	2009	2010	2011	2012	2013
3					Period									-1	0	1	2	3	4	5	6	7
4					ToC		Name	Doc	Inv	Cons	Units	Exp										
5					Except where indicated in US\$ ('000's)																	
6	XIV	TERM LOAN CALCULATIONS																				
7																						
8		1	Senior Debt - Mortgage																			
9					Interest																	
10					Principal																	
11					Debt Service																	
12					Ending Balance										225,914							
13																						
14		2	Senior Debt - Level Principal																			
15					Interest																	
16					Principal																	
17					Debt Service																	
18					Ending Balance										225,914							
19																						
20					Tranche A - Mortgage																	
21					Interest																	
22					Principal																	
23					Debt Service																	
24					Ending Balance										195,480							
25																						
26					Tranche A - Level Principal																	
27					Interest																	
28					Principal																	
29					Debt Service																	
30					Ending Balance										195,480							
31																						
32					Tranche B - Mortgage																	
33					Interest																	
34					Principal																	
35					Debt Service																	
36					Ending Balance										28,834							
37																						
38					Tranche B - Level Principal																	
39					Interest																	
40					Principal																	
41					Debt Service																	
42					Ending Balance										28,834							
43																						
44					Tranche C - Mortgage																	
45					Interest																	
46					Principal																	
47					Debt Service																	
48					Ending Balance										1,600							
49																						
50					Tranche C - Level Principal																	
51					Interest																	
52					Principal																	
53					Debt Service																	
54					Ending Balance										1,600							
55																						

Take the numbers from the Debt Sch page and transpose them to the Debt Calc Page. Debt Service: Principal plus Interest equals Debt Service. By subtracting the outstanding ending balance from the previous period by the principal repayment for the period, you will arrive at the new ending balance2

By summing up the total principal repayments we can check to see if they match the ending balance in 2006, which is also the starting balance of the debt

Worksheet 8 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
56	XXV	TRANCHED DEBT SERVICES - AGGREGATED																				
57																						
58		3	Tranches Aggregated - Mortgage																			
59						Interest																
60						Principal																
61						Debt Service																
62						Ending Balance									225,914							
63																						
64		4	Tranches Aggregated - Level Principal																			
65						Interest																
66						Principal																
67						Debt Service																
68						Ending Balance									225,914							
69																						
70																						
71						Check (0 = Check Ok)									1,355,482							
72																						
73	XXV	DEBT SERVICE SCHEDULE (Switch Employed)																				
74																						
75						Senior Debt - Mortgage																
76						Interest																
77						Principal																
78						Debt Service																
79						Ending Balance																
80																						
81	XXVI	DEBT SERVICE RESERVE ACCOUNTS (DSRA)																				
82																						
83	A					LIBOR	LIBOR	Gen	HP		3.00%	%	0									
84	AC					Premium over Libor on DSRA Paid to Project	DSRA_Prem	Terms	HP		1.00%	%	0									
85	AD					Number of Months for Reserve	DSRA_Mo	Terms	HP		1	months	0									
86	AC					Financing Fee	Fin_Fee_R	Terms	HP		0.50%	%	0									
87	AE					Number of Months for L/C Calculation	LC_Mo	Terms	HP		6	months	0									
88	AF					Cost of L/C over LIBOR to Project	LC_R	Terms	HP		0.50%	%	0									
89						Number of Months					12	%										
90						Percentage of DSRA per Year					8.33%	0										
91																						
92						Annual Debt Service																
93						Required Balance																
94						Mask (1 = Debt, 0 = No Debt)																
95						Beginning Account Balance																
96						Contribution																
97						Withdrawals																
98						Ending Balance																
99																						
100						L/C Expense																
101																						
102																						
103						GRAPHING INFORMATION																
104						Mortgage Style																
105						Tranche A - Interest																
106						Tranche B - Interest																
107						Tranche C - Interest																
108						Tranche A - Principal																
109						Tranche B - Principal																
110						Tranche C - Principal																

You will need to aggregate the two debt service that have different schedules and different profiles to arrive the two total annual debt services

The final step is to be able to select the different debt profiles and schedules to see their impact on the project's returns. The method that has been used here is called nesting an IF function. You will notice the bold numbers 1, 2, 3, & 4 in Column B. These are four debt selections you will use. How nesting works is based on nodal selections. IF (X = 1, yes, (IF = 2, yes, (IF = 3, yes, 4))). The Switch, a.k.a toggle, that drives the IF function comes from the assumption page.

This debt service from above

Required balance is a function of the annual debt service and yearly percentage requirement

The beginning balance is last year's ending balance

This is the required opening balance based on the number of months the DSRA should cover according to the term sheet. This money should be funded at financial close with debt and equity. The size of the initial balance is subject to the gearing, of which the DSRA is part. This causes a circular reference, for which there is a macro

Read the L/C language in the termsheet and code

In the contribution and withdrawal section, think about it commercially. You will only keep the DSRA as long as you have debt. Once the debt is repaid you will disburse the cash. Furthermore, it is based on the annual debt service. An annuity will have constant payments, but a level principal profile will decline with each year, allowing for the release of cash from the DSRA. Review the graphs in the workbook on the debt one more time. The early timing of the principal of the principal repayments will require a greater initial DSRA.

Building the project
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case study

Worksheet 8 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
111																-	-	-	-	-	-	-
112																						
113				Level Principal																		
114					Tranche A - Interest											-	-	-	-	-	-	-
115					Tranche B - Interest											-	-	-	-	-	-	-
116					Tranche C - Interest											-	-	-	-	-	-	-
117					Tranche A - Principal											-	-	-	-	-	-	-
118					Tranche B - Principal											-	-	-	-	-	-	-
119					Tranche C - Principal											-	-	-	-	-	-	-
120																-	-	-	-	-	-	-
121				Debt Services																		
122					Senior Debt - Mortgage											-	-	-	-	-	-	-
123					Senior Debt - Level Principal											-	-	-	-	-	-	-
124					Tranche Debt - Mortgage											-	-	-	-	-	-	-
125					Tranche Debt - Level Principal											-	-	-	-	-	-	-

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.8/Worksheet: Debt Calc.

Worksheet 9

Exercise 4.9

At this point, the operational components of the model have been coded and Alejandro is ready to code the first of the three financial statement worksheets – the income statement.

Review

The income statement is just the start to the financial statements. It by no means offers a complete view of the project, but if a quick overview is wanted, it provides a great deal of information. You may have noticed the checks for the components of the PPA and its respective revenue streams with regard to their matching line item expenses. As we saw in the operations section, the project has a total shortfall of US\$59.2 million. Had the project been a complete pass through, the EBITDA would have equalled the power plant capacity charge. EBITDA is sometimes referred to as the 'line', and items are either 'above-the-line' or 'below-the-line'. Above-the-line gives an operational view of the income statement and below-the-line represents items related to the financial structure. Sometimes, analysts match above-the-line with the right side of the balance sheet, or the asset, and below-the-line with the left side of the balance sheet, or

the capitalisation structure. In our case, we can see that there is an absolute US\$59.2 million deficit to the amount of money available for taxes, debt and equity for the life of the project.

We could use the Goal Seek function to find the variable O&M charge that would render the check to zero. We know it starts at 0.59175 cents/kWh, with escalation thereafter. We can also calculate a proxy of cash available to capital investors by adding depreciation and tax-adjusted interest back to net income. This is not a precise measurement, but it does present a quick overview. Care needs to be taken when using this method, especially for countries that have balance sheet related taxes and adjustments.

Main Points

1. This is the first of the three main financial statements.
2. If depreciation exceeds net income, the odds are rather good that you are going to have a 'trapped cash' situation.
3. The exception would be if you had significant levels of debt, including subordinated debt from sponsors. If this is the case, make sure that there are no thin-capitalisation rules that demand a minimum debt to equity ratio.

Worksheet 9

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	IS					Put in Checks																	
2						Date								2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
3						Period								J	0	L	2	3	4	5	6	7	8
4						To/C																	
5						Except where indicated in US\$ ('000's)																	
6	xxvii					INCOME STATEMENT																	
7																							
8	A					Power Plant Capacity Charge																	
9	B					Fixed O&M Charge																	
10	C					Variable O&M Charge																	
11	D					Fuel Charge																	
12	E					Total Revenue																	
13																							
14	D					Total Gas Expense																	
15	M					Variable O&M Expenses																	
16						Total Variable Expenses																	
17																							
18						Gross Profit																	
19																							
20	O					Fixed O&M Expenses																	
21						Total Fixed O&M Expenses																	
22																							
23						EBITDA																	
24																							
25						Depreciation																	
26																							
27						EBIT																	
28																							
29						Interest Expense/(Income)																	
30						Interest Expense																	
31						Interest Income																	
32						L/C Fee																	
33						Totals																	
34																							
35						Earnings Before Taxes (EBT)																	
36																							
37						Taxes																	
38						Corporate Taxes																	
39																							
40						Net Income																	
41																							
42						PPA - Power Price (cents / kWh)																	
43						Power Plant Capacity Charge																	
44						Fixed O&M Charge																	
45						Variable O&M Charge																	
46						Fuel Charge																	
47																							
48						Fundamental Curve Power Price (cents / kWh)																	
49						Projected Annual Growth on Base Load Power Price																	
50						Project Spot Price Starting with 2005								6.9000	7.0380	7.1788	7.3223	7.4688	7.6182	7.7705	7.9259	8.0844	8.2461
51						Differential in Fundamental and PPA Pricing								6.9000	7.0380	7.1788	7.3223	7.4688	7.6182	7.7705	7.9259	8.0844	8.2461
52																							
53						Graphing Information																	
54						Annual PPA Price								2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
55						Fundamental Pricing Curve								6.9000	7.0380	7.1788	7.3223	7.4688	7.6182	7.7705	7.9259	8.0844	8.2461

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.9/Worksheet: IS.

Building the project finance model: case study

[illegible]

Worksheet 10

Exercise 4.10

Having completed the main income statement items and earmarking those items that he must readdress, Alejandro is ready to code the second of the financial statements – the balance sheet.

Review

Some practitioners of project finance believe that the balance sheet is frivolous, and there are many sophisticated participants who simply use a direct method cash flow statement, also known as sources and uses, as their sole financial statement. The balance sheet will help to calculate net working capital. While perhaps insignificant, changes in net working capital still have an effect on cash flow. In short, this workbook advocates a full suite of financial documents. As stated, this is particularly true in countries that have balance sheet related taxes, funding of equity accounts or revaluation of assets due to inflation, all of which have an impact on cash.

You will note that the balance sheet is not yet complete. The statement of cash flows from the next exercise will round out the financial statements, allowing for the balance sheet to balance. Balancing problems in models will usually come from one of four places: incorrect coding of current accounts; using net assets instead of gross assets; depreciation; or retained earnings. We shall address the first three of these in the next exercise.

In the balance sheet, depreciation is the accumulated depreciation of all the annual depreciation expenses. You will notice that to code the annual depreciation in the income statement the model codes the balance sheet's accumulated depreciation account. You could have also taken the annual expense directly from the depreciation schedule worksheet (depr).

The final point is to notice how the debt is recorded in the liabilities section. The principal amount of long-term debt that is to be repaid for the year has been classified as current long-term debt. If you were to aggregate the long-term debt and current long-term debt it will equal the outstanding term loan for the period. Imagine if there were some loan covenants tied to long-term debt to total assets. By moving a portion to the current account you have reduced the percentage ratio from 75 per cent to 72 per cent, and it gets substantially better over time. You cannot calculate this number presently without a full set of financial statements, and this is, of course, dependent on many factors, but be aware of it conceptually. One final note on this liability accounting method to bear in mind when coding the next exercise. Hint: is current long-term debt a current account for operational cash flow changes in net working capital, or is it principal repayment in cash flow from investing and financing?

Main Points

1. The balance sheet is a necessary worksheet.
2. If it balances, it adds legitimacy to the model.
3. If it does not balance, the odds are good that there are other coding errors.
4. It is a single point where all the accounts can be quickly reviewed.

Worksheet 10

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	BS																					
2						Date								2005	2006	2007	2008	2009	2010	2011	2012	2013
3						Period								-1	0	1	2	3	4	5	6	7
4						ToC	Name	Doc	Inv	Cons	Units	Exc										
5						Except where indicated in US\$ ('000s)																
6	xxviii	BALANCE SHEET																				
7																						
8						Assets																
9						Cash																
10						Restricted Cash	Both Cash and Restricted Cash will come from the Statement of Retained Earnings															
11						Accounts Receivable																
12						Inventory																
13						Current Assets	Hint: Inventory comes from the O&M documents, did you escalate it?															
14																						
15						Fixed Assets, gross																
16						Less: Accumulated Depreciation	This comes from the depreciation page, make sure you get the correct number for what is and what is not a depreciable asset.															
17						Fixed Assets, net																
18																						
19						Non Depreciable Assets	This also comes from the Depr page. Remember that it is Accumulated Depreciation and the Depr page calculates annual depreciation.															
20																						
21						Total Assets																
22																						
23						Liabilities																
24						Accounts Payable																
25						Current Long Term Debt	Pay attention to the line item definition and think of what it is.															
26						Current Liabilities																
27																						
28						Long Term Debt	Take in consideration the Current Long Term Debt above, they both come from the Debt Calc page, make sure you use the debt employeeed case.															
29																						
30						Total Liabilities																
31																						
32						Equity	Make sure that you use the contribution for the term period not construction.															
33						Initial Contribution																
34						Retained Earnings																
35						Total Equity	Retained earnings will come from the statement of retained earnings on the cash flow page															
36																						
37						Total Liabilities & Equity																
38																						
39						Balancer	It will not balance yet, but it must after the next exercise or there is a problem															
40																						
41																						
42							The Debt page calculates small rounding errors, but the balance sheet will balance in principal															
43																						
44																						
45																						

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.10/Worksheet: BS.

Worksheet 11

Exercise 4.11

It is now time for Alejandro to code the final document of the financial statements – the statement of cash flows. Alejandro and Helma have discussed and have decided to use the indirect method that starts with Net Income and adds back changes. By using the indirect method they can see the net income and cash available for investors, allowing for quick review of ‘trapped cash’ possibilities. If you are not comfortable with the accounting of financial statements, now may be a good time to revisit the earlier t-accounts above on the relationship between retained earnings, dividends and cash accounts. You need to ensure that you are using the correct positive or negative coding for each account.

Review

It goes without saying this is a complicated page to code, but it is probably the most critical. Owners’ documents have not been mentioned in great detail, but not only must this page represent the cash flow, but at some point the cash flows must represent the shareholders’ agreement. For example, had there been A and B class shares with different criteria for distribution, this would need to be coded, either in this exercise or the following one. Other implications could be sponsors who are also services and goods providers to the project. If the gas supplier is also the sponsor and wanted to subordinate a portion of the gas to debt, to make the project more attractive, this equity-in-kind would need to be addressed: different risks, different rewards.

However, the main issue concerning this project is the prospect of trapped cash. By using a series of logic functions in the various accounts, we can

model the cash distribution scenarios. More importantly, by placing a series of toggles in the model, the impact can be readily analysed. If you have looked closely, you may have noted that the total capital costs for the project are US\$285,669,000. If you toggle contingency as debt distribution on the assumption page, the beginning balance for total assets is US\$283,644,000. The culprit for the discrepancy is the contingency, and related expenses. The contingency is a security measure that is put in place to protect the construction debt lenders if something goes wrong. No model, especially an equity case model, is going to show any of the contingency being distributed. It would be the equivalent of saying, ‘Yes, we have a bad EPC contract and contractor, and they are not going to do their job, so we are actually going to have to disburse some of the contingency funds.’ In this project the contingency is a function of the size of the EPC contract.

There are a host of the negotiating points to address here. The bank could say, ‘Why don’t you pre-pay some of the debt at the end of the construction period with the contingency?’ To which the sponsor should retort, ‘Wait one second, I have been paying opportunity costs in the form of IDC, I believe I will just take it as an additional development fee.’ If the EPC contractor understands the process well and realises that there is a contingency account, he may start to ask for bonuses based on early completion. (The sponsor and the EPC should be discussing this anyway and working out the best way to price the contract.) This is a fine segue to the working capital issue. The project is going to need some working capital. The current term sheet suggests 10 days of operational expenses, or US\$3.16 million. The contingency could provide a perfect way to fund that portion of the project. This is particularly true if the lenders would like to structure differing tranches and one of those tranches is tied to working capital, which more than likely will have a higher cost of debt than a senior loan tied to the asset.

Exhibit 4.14: Disbursement of trapped cash, 2013

	A	B	C	D	E	F	G	H	I	J	K
47		Disbursement of Trapped Cash									
48											
49		2013									
50											
51			Cash					Current Liabilities			
52		Beginning Balance	72,645					16,481		Beginning Balance	
53		Change in Cash	9,878					494		Change in Current Liabilities	
54		End Balance	82,523					16,976		End Balance	
55											
56											
57											
58			Other Current Assets					Long-Term Debt			
59		Beginning Balance	18,977					170,582		Beginning Balance	
60		Change in Current Assets	524			Re-paid Principal		11,162			
61		End Balance	19,501					159,420		End Balance	
62											
63											
64			PPE, Net					Paid-in Capital			
65		Beginning Balance	278,285					57,134		Beginning Balance	
66				147,479	Accumulated Depreciation		0				
67		End Balance	130,806					57,134		End Balance	
68											
69											
70			Land					Retained Earnings			
71		Beginning Balance	700					0		Beginning Balance	
72		Change in Land	0					0			
73		End Balance	700					0		End Balance	
74											
75											
76								Total Equity			
77								57,134		Beginning Balance	
78								0			
79								57,134		End Balance	
80											
81			233,529						233,529		
82											
83											

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project_Vair-Master/Worksheet: Data/Table: Disbursement of Trapped Cash 2013.

The underlying point is that there is always a negotiating point and position to be addressed. On the assumption page, you may remember that we had negotiated better payment terms for receivables than for payables; intuitively we should expect to see a positive net working

capital. After year 1, there is actually a negative working capital for each year. The reason is founded in spare parts pricing escalation that negates the positive influence of the receivable over the payables. Yet, another reason to have a nominal model over a real model, and a point

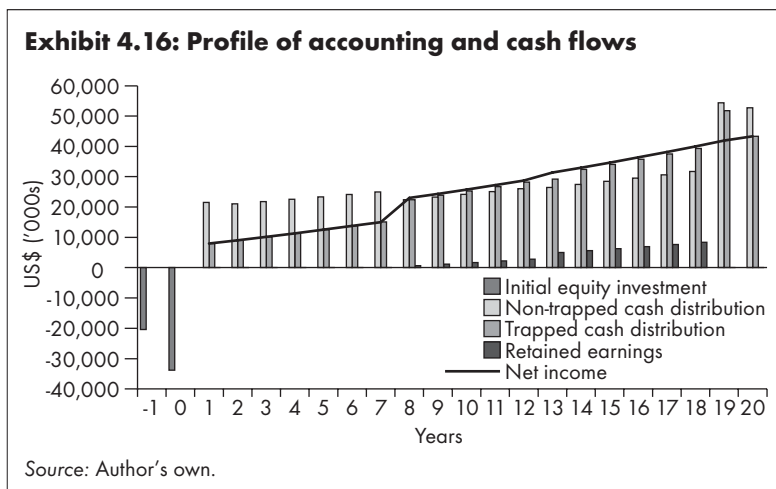
Exhibit 4.15: With no trapped cash, 2013

	A	B	C	D	E	F	G	H	I	J	K
84		2013 - With No Trapped Cash									
85											
86			Cash					Current Liabilities			
87		Beginning Balance	72,645					16,481		Beginning Balance	
88		Change in Cash	9,878	81,003	Cash Distribution			494		Change in Current Liabilities	
89		End Balance	1,520					16,976		End Balance	
90											
91											
92											
93			Other Current Assets					Long-Term Debt			
94		Beginning Balance	18,977					170,582		Beginning Balance	
95		Change in Current Assets	524			Re-paid Principal	11,162				
96		End Balance	19,501					159,420		End Balance	
97											
98											
99			PPE, Net					Paid-in Capital			
100		Beginning Balance	278,285					57,134		Beginning Balance	
101				147,479	Accumulated Depreciation	Distribution of Capital	57,134	0			
102		End Balance	130,806					0		End Balance	
103											
104											
105			Land					Retained Earnings			
106		Beginning Balance	700					0		Beginning Balance	
107		Change in Land	0			Dividends	23,869				
108		End Balance	700					-23,869		End Balance	
109											
110											
111								Total Equity			
112								57,134		Beginning Balance	
113								81,003		0	
114								-23,869		End Balance	
115											
116			152,526						152,526		
117											

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project_Vair-Master/Worksheet: Data/Table: 2013 with no Trapped Cash.

that may be worth addressing with the O&M contract. Is there a possibility to negotiate better payment terms for the O&M contractor in exchange for more attractive spare part terms that will, at a minimum, neutralise the negative net working capital? The trapped cash has a myriad of implications. Look at the coding in the answers to number 11. Convince yourself of the series of logic functions that distributes cash.

Now let us look at it commercially. The project has stated that it would be able to structure the trapped cash out. By reviewing the cash account, we can see a steady build-up of cash until it reaches a maximum of US\$81 million in 2013. Look at the 2013 t-accounts (Exhibit 4.14) to get a better understanding of the balance sheet and the cash modelling implications.



Notice that the total assets have decreased from US\$285.6 million at the end 2007 to US\$233.5 million at the end of 2013, or by US\$52.1 million. On the left side of the balance sheet, retained earnings have remained at zero and we have been repaying debt. On the right side of the balance sheet we have increased cash by over US\$75 million, while reducing the overall balance sheet. The offsetting account is the accumulated depreciation. It is a contra account. From a balance sheet standpoint, if we were to distribute all cash we would have to have a balancing effect in the equity accounts. Look at the t-accounts to see the impact (Exhibit 4.15).

From an accounting standpoint, the project would have distributed all of its initial capital and would have a negative retained earnings of US\$25.1

million. The book leverage of the project would be 117 per cent (current liabilities US\$16.9 million plus long-term debt US\$159.4 million, all divided by total assets of US\$151.2 million). While the project may be solvent, making money and servicing its debt, it would be technically bankrupt. This further emphasises why a model should have a balance sheet.

A further consideration should be the amount of interest income the trapped cash could produce. (You will note the toggle on the assumption page.) If the project cannot structure out the trapped cash, Tom and his team need to think long and hard about other negotiating issues. The project has, by default, a Debt Service Reserve Account (DSRA) in the form of trapped cash. They should try to negotiate the DSRA account away as much as possible. From a lenders' standpoint, this might well be viewed as an opportunity. If the lenders believe the economics of the project, you have a client with a strong debt capacity and a structuring problem. It could be argued that this cash is at greater risk, so a greater reward should be considered. The lenders could suggest another level of debt. If structured correctly, the sponsor could get cash out early, when the discounting to the project is the most critical, and the lenders have a performing loan with higher spreads and probably greater upfront fees.

Main Points

1. Project finance is a cash flow exercise.
2. The statement of cash flows is the real end-game.
3. Make sure you understand how cash can be distributed.
4. Start to use the model to understand the impacts on cash.

Worksheet 11

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	SCF																					
2					Date									2005	2006	2007	2008	2009	2010	2011	2012	2013
3					Period									-1	0	1	2	3	4	5	6	7
4					ToC		Name	Doc	Inv	Cash	Units	Esc										
5					Except where indicated in US\$ ('000s)																	
6	XXIX	STATEMENT OF CASH FLOWS					Add back the depreciation expense				Hide and freeze				Start with net income							
7																						
8					Cash from Operations																	
9					Net Income																	
10					Add: Depreciation																	
11					Changes in Accounts:																	
12					Restricted Cash																	
13					Accounts Receivable																	
14					Inventory																	
15					Accounts Payable																	
16					Cash Flow from Operations																	
17																						
18					Cash from Investing and Financing																	
19					Capex																	
20					Principal Repayment																	
21					Cash Flow from Investing and Financing																	
22																						
23					Cash Available for Distribution																	
24					Cash Available for Distribution																	
25																						
26																						
27	xxx	STATEMENT OF RETAINED EARNINGS					Review the t-accounts in the work book. Retained Earnings: Ending Balance = Beginning Balance + Net Income - Dividends. Do projects generally have a earnings retention policy or do they want to remit the maximum amount of dividends possible. What does the project's IM state.											Beginning balance is equal to the previous year's ending balance				
28																						
29					Beginning Balance																	
30					Net Income																	
31					Dividends, Cash																	
32					Ending Balance																	
33																						
34					Retained Earnings for the Period																	
35																						
36																						
37	xxx	CASH ACCOUNTS AND DISTRIBUTIONS					This comes from the assumption page. It is the initial cash injection for working capital. What is the rationale behind the coding on the assumption page.											Will this ever be positive. Is there a chance that Net Income could actually exceed available cash. If so what is the cause and what are the implications of a retained earnings build-up				
38																						
39					Cash Account																	
40					Beginning Balance, Cash																	
41					Net Change in Cash																	
42					Ending Balance																	
43																						
44					Restricted Cash Account																	
45					Beginning, Debt Service Reserve Account																	
46					Contribution																	
47					Withdrawals																	
48					Ending Balance, DSRA																	
49																						
50																						
51					Trapped Cash																	
52					Beginning Balance, Trapped Cash																	
53					Contributions Trapped Cash																	
54					Withdrawals from Trapped Cash																	
55					Ending Balance, Trapped Cash																	
56																						
57					Total Cash Distribution (with Trapped Cash)																	
58					Dividends																	
59					Restricted Cash Account																	
60					Total Distribution (with Trapped Cash)																	

Worksheet 11 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
61																						
62						Total Cash Distribution (without Trapped Cash)																
63						Cash Available for Distribution																
64						Restricted Cash Account																
65						Total Distribution (without Trapped Cash)																
66																						
67						Interest on Trapped Cash																
68						Passive Income																
69						Passive Income, Switch Employed																
70																						
71																						
72																						
73																						
74						FINALLY ALL OUTSTANDING LINE ITEMS AND ACCOUNTS MUST BE CODED IN THE INCOME																
75						STATEMENT AND BALANCE SHEET TO COMPLETE THE FINANCIAL STATEMENTS																
76																						
77																						

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.11/Worksheet: SCF.

Worksheet 12

Exercise 4.12

Tom has asked Helma and Alejandro to give him the financial results. Since Alejandro knows that Vair is the only shareholder, but usually considers seeking outside investors, he has created a single IRR. But Alejandro also understands that the team must meet internal requirements before final approval (and this is how the team gets its project bonus), so he calculates the IRR with both trapped and untrapped cash to give Tom a stronger position for management discussions. Alejandro is also coding in the Debt Service Coverage Ratios (DSCRs) to be able to demonstrate to the banks that the project has very strong cash flows to service the debt.

Review

At the top of the worksheet, you will notice two DSCRs. One starts with net income and the other starts with Earnings Before Interest Taxes, Depreciation and Amortisation (EBITDA). They both make a series of adjustments. Different sponsors and different banks will use different methods to calculate DSCR. This workbook is not advocating one method over another; there are plenty of internal discussions and matrices that each entity has designed. The real point is to understand the differences.

If the minimum DSCR with the net income method would not produce the same cash available as would the minimum with EBITDA method, then make sure you understand the differences. However, a model can equalise the two methods. For example, the model now demonstrates a 2.15x minimum for both the net income method and EBITDA methods. If we were to zero out the net working capital, interest income and L/C fee in the EBITDA, we could arrive at a different minimum DSCR of 2.12. Now,

if we were to goal seek a gearing ratio that would produce a 2.15x minimum for the EBITDA method to match the net income method (set DSCR minimum to 2.15 by changing the senior debt on the assumption page), we find a gearing ratio of 79/21 debt to equity, instead of the original 80 per cent. The new minimum for the net income method is now 2.18x.

Staying with this same example and resetting the gearing back to 80 per cent, with this example's EBITDA method calculation, we can restart at the 2.15x and 2.12 minimum. The debt facility for both is still US\$285,669,000 in this example, and the annual debt service is still annual annuity US\$21 million. The only difference is how we arrived at the Cash Available for Debt Service (CADS) numerator. The DSCR number is a critical issue for both lenders and borrowers. The DSCR will usually determine an acceptable level of risk in the project (remember risk versus reward) as perceived by the bank. The less risk, the less reward. While in this scenario the model demonstrates two slightly different DSCRs, it is the same project. If negotiating in a vacuum, a project with a minimum 2.15x should receive cheaper financing than a project with a 2.12x because it has less risk.

Finally, DSCRs are usually tied to loan covenants that determine distribution of cash to equity holders, so this is a sensitive issue for both parties. If you are negotiating from your position, you are only negotiating from a myopic portion of the equation. If you are negotiating from your position, while understanding the counter-parties' position and sensitivities, then you are probably negotiating from a much stronger and more informed position.

Next, you may note that the model only runs an IRR calculation and not a Net Present Value (NPV) calculation. (Review the sections on DCF and

WACC in Module 3.) If the argument holds true that most sponsors insert a hurdle rate for their cost of equity and the cost of debt and corporate tax rate are transparent, then by disclosing the NPV the project is giving too much information to the other side of the table.

Remember that cost of equity includes the owner's opportunity costs, so any positive NPV number is upside to the current equity. Currently, the project returns an IRR of 37.19 per cent (without trapped cash). This gives no information about the sponsor's internal hurdle rate. However, if the model were to produce an NPV calculation of US\$39.9 million, based on the untrapped cash, it would be a very simple modelling task to glean the number was produced with 20 per cent opportunity cost for equity. (Set up an NPV calculation using the NPV function and goal seek the discount rate to find the given NPV number.) This gives sophisticated negotiators an ability to absorb that upside from the existing shareholders.

There is a big difference between getting what you want and getting what you need. (A further point to contemplate is having different models for different negotiations, eg, equity cases and debt cases. 'I have told you everything you know, not everything that I know.') An IRR calculation gives project returns that everyone understands, but it does not give any insight

to a particular party's internal requirements, which the NPV does do.

The one codicil to this NPV discussion is to give a series of NPV calculations based on different discount rates, as not to disclose the sponsor's internal requirements. This is especially true if you believe you have a good understanding of the other parties' return requirements, at which point you can start to negotiate a premium for entering a viable project. Negotiating off the model is a back-engineering exercise. Try to understand your negotiating parties' desires and pressure points and code appropriately.

Main Points

1. This page gives the project's economics.
2. Know your audience.
3. Try to understand what their pressure points are.
4. Give them what they need to know and nothing more.
5. Negotiating from your position is good, negotiating from their position is better.

Worksheet 12

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Returns and Ratios																						
2						Date								2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
3						Period								1	2	3	4	5	6	7	8	9	10
4						ToC	Name	Doc	Inv	Cons	Units	Esc											
5						<i>Except where indicated in US\$ ('000s)</i>																	
6						DEBT SERVICE COVERAGE RATIOS																	
7																							
8						<i>Net Income Method</i>																	
9						Net Income																	
10						Depreciation																	
11						Interest Expense																	
12						Change in Net Working Capital																	
13						Cash Available for Debt Service																	
14																							
15						Debt Service																	
16																							
17						Debt Service Coverage Ratio (DSCR)																	
18																							
19						DSCR Average																	
20						DSCR Minimum																	
21																							
22						<i>EBITDA Method</i>																	
23						EBITDA																	
24						Cash Taxes																	
25						Interest Income																	
26						L/C Fee																	
27						Change in Net Working Capital																	
28						Cash Available for Debt Service																	
29																							
30						Debt Service																	
31																							
32						Debt Service Coverage Ratio (DSCR)																	
33																							
34						DSCR Average																	
35						DSCR Minimum																	
36																							
37																							
38						EQUITY INTERNAL RATE OF RETURN																	
39																							
40						<i>W/O Trapped Cash</i>																	
41						Initial Equity Investment																	
42						Contingency																	
43						Cash Distribution																	
44						IRR Calculations																	
45																							

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.12/Worksheet: Returns and Ratios.

Building the project finance model: case study

[illegible]

Building the project
finance model:
case study

Worksheet 12 continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
46					With Trapped Cash																		
47					Initial Equity Investment																		
48					Contingency																		
49					Cash Distribution																		
50					IRR Calculations																		
51																							
52					With Flags																		
53					PPA Flags																		
54					PPA Flag												1	1	1	1	1	1	1
55					Flag Toggle												-	-	-	-	-	-	-
56					PAA Flag Use												1	1	1	1	1	1	1
57																							
58					GSA Flags																		
59					GSA Flag												1	1	1	1	1	1	1
60					Flag Toggle												-	-	-	-	-	-	-
61					GSA Flag Use												1	1	1	1	1	1	1
62																							
63					VOM Flags																		
64					VOM Flag												1	1	1	1	1	1	1
65					Flag Toggle												-	-	-	-	-	-	-
66					VOM Flag Use												1	1	1	1	1	1	1
67																							
68					FOM Flags																		
69					FOM Flag												1	1	1	1	1	1	1
70					FOM Toggle												-	-	-	-	-	-	-
71					FOM Flag Use												1	1	1	1	1	1	1
72																							
73					Minimum Contract Year																		
74					Flag												1	1	1	1	1	1	1
75					IRR W/O Trapped Cash					#DIV/0!				(20,442)	(33,865)	-	-	-	-	-	-	-	-
76					IRR W/ Trapped Cash					#DIV/0!				(20,442)	(33,865)	-	-	-	-	-	-	-	-
77																							
78																							
79					GRAPHING OF RETURNS																		
80					Initial Equity Investment									(20,442)	(33,865)								
81					Net Income											8,166	9,257	10,383	11,547	12,750	13,991	15,274	
82					Non-Trapped Cash Distribution											-	-	-	-	-	-	-	-
83					Trapped Cash Distribution											-	-	-	-	-	-	-	-
84					Retained Earnings											-	-	-	-	-	-	-	-
85																							
86					Minimum DSCR in Term Sheet					1.20													
87					Cash Available for Debt Service & Distribution											-	-	-	-	-	-	-	-
88					DSCR Minimum											21,759	21,759	21,759	21,759	21,759	21,759	21,759	
89					Interest											9,537	9,167	8,782	8,381	7,962	7,525	7,069	
90					Principal											8,596	8,965	9,350	9,752	10,171	10,607	11,063	

Use the excel IRR
function to calculate

Building the project
finance model:
case study

	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI
1	1	1	1	1	1	1	1	1	1	1	1	1
-	-	-	-	-	-	-	-	-	-	-	-	-
1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
23,019	24,388	25,802	27,263	28,773	31,398	33,009	34,674	36,395	38,173	40,010	41,886	43,288
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
513	1,010	1,527	2,067	2,631	4,832	5,445	6,083	6,750	7,445	8,170	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
21,759	21,759	21,759	21,759	21,759	21,759	21,759	21,759	21,759	21,759	21,759	-	-
6,594	6,099	5,582	5,043	4,480	3,894	3,282	2,645	1,979	1,286	562	-	-
11,538	12,034	12,551	13,090	13,652	14,238	14,850	15,488	16,153	16,847	17,570	-	-

Worksheet 13

Exercise 4.13

Alejandro understands that the banks are going to be sensitive to their returns on the project. The DSCR is analogous to a credit rating, but it does not give any sense of the loan's value to the banks. The banks are as sensitive to their present value as are the sponsors. While interest is an expense to the project, it is a revenue stream to the bank. Conversely, the loan is a bank asset, as it is a liability to the project. Alejandro is going to code a loan present value, so the team can better understand the banks' position.

Review

Your first reaction may be that this is not how banks calculate their present value. Granted, but remember that the project will be sending out the Information Memorandum, term sheet and model to many banks. It is inefficient to try to model a different present value for each bank. By using

this method, there is a uniform present value from which the project team can make a uniform analysis and try to see where the bank is sensitive. Remember that the present value gives insight to banks' base return (in this case the rate at which they probably source funds, or at least a good proxy). The spread that they charge and the fees that they wish to receive is their internal discussion.

It is difficult for the project to know the banks' internal requirements, but by using this present value calculation with a single discount rate, you can easily see the impact of the timing, like financing fee rate impacts, for instance. Changes will have the same present value impact for all the banks.

Main Points

1. When trying to code to understand different counter-parties' concerns, take a uniform and constant approach.
2. This method will allow for a level comparison.

Worksheet 13

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	PV of Loan																					
2					Date									2005	2006	2007	2008	2009	2010	2011	2012	2013
3					Period									-1	0	1	2	3	4	5	6	7
4					ToC		Name	Doc	Inv	Cons	Units	Esc										
5					Except where indicated in US\$ ('000's)																	
6					PRESENT VALUE OF THE FINANCING																	
7																						
8					LIBOR		LIBOR	Gen	HP	3.00%	%											
9																						
10					Construction Loan																	
11					Financing Fee																	
12					IDC & Commitment Fee																	
13					Construction Loan Repayment																	
14					Term Loan																	
15					Interest Income																	
16					Principal Repayment																	
17					Income from Letter of Credit																	
18					Interest Paid on DSRA																	
19					TOTALS																	
20																						
21					Counter for Discount Rate									0	1	2	3	4	5	6	7	8
22					Discount Factor																	
23																						
24					Discounted Cash Flow																	
25																						
26					Present Value of Financing																	
27																						
28																						
29																						
30																						
31																						
32																						
33																						
34																						
35																						

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.13/Worksheet: PV of Loan.

Worksheet 14

Exercise 4.14

Alejandro has now completed the model and it makes sense to place all the main points on one summary page to enable quick review and summarised printout sheets.

Summary

You have now completed the equity case section of the workbook. Review other areas of the model that have not been specifically addressed due to their obvious nature. For example, you will notice each page has a hyperlink to the table of contents, from where there are hyperlinks to the rest of the workbook. Most of the pages have data groupings to compress information for printing and presentation. You have not been asked to bring all

information back to other places in the model; sometimes it has been done for you, but be aware of the navigation in the answers (use the Ctrl + [and F5 techniques for easy navigation). Review the logbook, glossary and graphing worksheet tabs in the master base spreadsheet. A clean version of the worked model is to be found on the CD as 'Answer_Base'.

Now Tom and his team are ready to send their proposed term sheet and model, along with supporting documentation, to the banks to find financing. (It is understood that Alejandro would not send this model to the banks, but a stripped down version. He may even send an electronic version of the model with values only and no coding.) In Module 5 we shall look at the model from the lenders' perspective, including due diligence of the documents and appropriate changes.

Worksheet 14

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Summary																					
2					Date									2005	2006	2007	2008	2009	2010	2011	2012	2013
3					Period									1	2	3	4	5	6	7	8	
4					ToC		Name	Doc	Inv	Cost	Units	Exc										
5					Percent where indicated in US\$ ('000s)																	
6					Income Statement																	
7					Total Revenue																	
8					Gross Profit																	
9					EBITDA																	
10					Net Income																	
11					cents/kWh																	
12																						
13					Balance Sheet																	
14					Assets																	
15					Cash																	
16					Other Current Assets																	
17					Non-Current Assets, Net																	
18					Total Assets																	
19																						
20					Liabilities																	
21					Current Liabilities																	
22					Long Term Debt																	
23																						
24					Equity																	
25					Paid-In Capital																	
26					Retained Earnings																	
27					Total Liabilities & Equity																	
28																						
29					Statement of Cash Flows																	
30					Cash Flow from Operations																	
31					Cash Flow from Investing & Financing																	
32					Change in Cash Flow for the Period																	
33																						
34					Cash Available																	
35					Cash Available for Debt Service ("CADS")																	
36					Debt Service																	
37					Debt Service Coverage Ratio ("DSCR")																	
38																						
39					Cash Available for Distribution ("CAD") w/ Trapped Cash																	
40					Cash Available for Distribution ("CAD") w/o Trapped Cash																	
41																						
42					Project Capitalization																	
43					Hard Costs																	
44					Soft Costs																	
45					Total Project Costs																	
46																						
47					Debt																	
48					Equity																	
49					Total Project Capitalization																	
50																						
51					Key Financial Summaries																	
52					Debt Service Cover Ratios ("DSCR")																	
53					Average																	
54					Minimum																	
55					Internal Rate of Return (IRR)																	
56					With Trapped Cash																	
57					Without Trapped Cash																	
58																						
59					Internal Rate of Return (IRR)																	
60					Flag Off																	
61					With Trapped Cash																	
62					Without Trapped Cash																	

Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Exercise 4.14/Worksheet: Summary.

Module 5: Due diligence of case study

Introduction

This section refers to the following information on the accompanying CD Rom in the folder Module 5.

1. Due Diligence Worksheets Folder
 - a) Due Diligence Worksheet
 - b) Selected Due Diligence Answers Folder
 - i) 1 – Due Diligence OpChgs
 - ii) 2 – Due Diligence FinChgs
 - iii) 3 – Due Diligence MktChgs
 - iv) 4 – Due Diligence ContChgs
 - v) 5 – Due Diligence PPAReNegChgs
2. Models for Module 5 Folder
 - c) Answer_Base Spreadsheet
 - d) Selected Answers for Module 5
 - i) 1 – Project Vair OpChgs
 - ii) 2 – Project Vair FinChgs
 - iii) 3 – Project Vair MktChgs
 - iv) 4 – Project Vair ContChgs
 - v) 5 – Project Vair PPAReNegChgs
 - vi) 6 – Project Vair Tables

For this section you should start with the 'Answer_Base' workbook provided on the accompanying CD, which is a replica of the 'Answer_Base' workbook we finalised in Module 4. Remember that the spreadsheets are Read Only, so you will need to save your changes separately. Also, you will need to enter the Financing Calc Macro button on the assumption page to run your changes. A good check if you have done this is to see if the Balance Sheet Check reads 'OK' or 'Problem'. You will need to keep the Project Documents Workbook from Module 4 open for the exercise.

Seeking financing

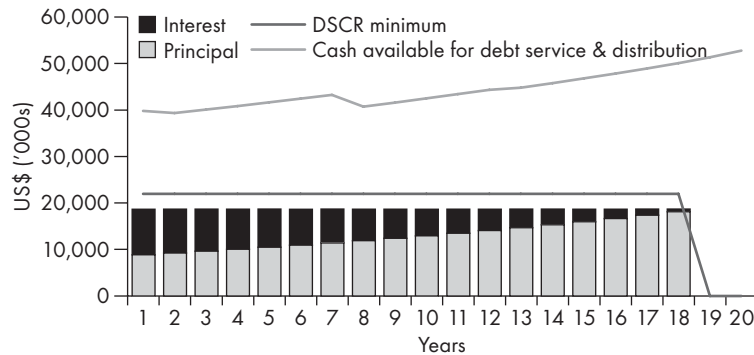
In discussion with management and his finance team, Tom has made a list of Vair's relationship banks and likely other interested institutions for the project. They have decided that too small a number would not be prudent and too large a number would be unwieldy. There is a list of nine banks they have contacted:

1. Pearce Capital of New York
2. Boyd's Bank of London
3. C. Edwards and Sons of London
4. André Banc de Paris
5. Marsh Securities of Chicago
6. Banco Vasconcelos do Lisboa
7. Santi Bank of Helsinki
8. Banchi Guisti di Milan
9. Amsterdam Group Securities Investment Mercantile Bank, known as AGSIM Bank.

Tom and his team have elected not to use a financial adviser. They believe that they have required expertise in-house to select the financing. They are now in the process of trying to select a lead arranger.

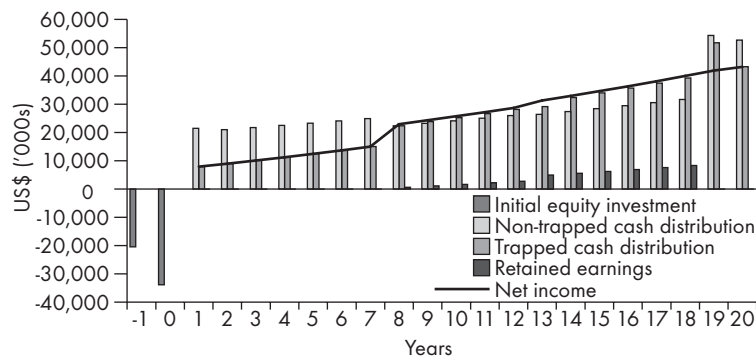
Tom and Helma started having informal discussions with their contacts at the above banks to sound out interest. Each of the banks has stated that they would like to see the Information Memorandum (IM). Helma and Alejandro prepared a two-page summary, known as a 'teaser', which they sent to their bank contacts. Hunt, Vair's in-house council, has prepared a Confidentiality and Non-Disclosure Agreement (CA) that was also sent to the respective banks. Upon return receipt of the CA, each bank was sent a numbered IM, an electronic model and a term sheet. All the banks

Exhibit 5.1: Developer's project view



Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project_Vair-Master/Worksheet: Project View Chart.

Exhibit 5.2: Profile of accounting and cash flows



Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project_Vair-Master/Worksheet: Flows Chart

received the information on Friday 22 July. They have two weeks to review the information, mark up the term sheet and send it back to Helma. Tom wanted to have the banks' initial responses back to the team by Monday morning, 8 August.

During that two-week period, each bank has been given an access code to an electronic data room that contains key project documents and files. Upon receiving the information, Vair will take two weeks to review and have preliminary discussions with their preferred lead arranger. Enclosed in the documents to the banks, it is clearly stated that bids that contain syndication risk or market flex will be non-compliant. It is a bit of risk on the project's part that no bank will return an opening offer. This was a major factor in having a list of nine banks. Vair believes that the project's economics will create information interest, but they are sure that they will lose some banks with this phrasing. On one of the IM pages is displayed a graphical representation of the team's view of the project.

AGSIM Bank of the Netherlands

Sitting in his office in Midtown Manhattan (AGSIM's Project Finance Group is located in two offices, New York and London), Marc Frishman, Managing Director of AGSIM's Project Finance Group, is flipping through the IM, while in discussion with the bank's Relationship Manager for the Vair Companies, Bud Marcum. Marc and Bud put together a team of internal and external resources to address the task at hand.

- *Marc Frishman*, Managing Director of Project Finance
- *Bud Marcum*, AGSIM Bank's Relationship Manager for TVC
- *Pablo Smith*, Project Engineer

Exhibit 5.3: Due diligence sheet

	A	B	C	D	E	F	G	H	I	J	K
1	DUE DILIGENCE SHEET										
2											
3		<i>Topic</i>		<i>Development Assumption</i>		<i>Rationale</i>		<i>Change to:</i>		<i>Rationale</i>	
4	1										
5											
6	2										
7											
8	3										
9											
10	4										
11											
12	5										
13											
14	6										
15											
16	7										
17											
18	8										
19											
20	9										
21											
22	10										
23											
24	11										
25											
26	12										
27											

Due diligence of
case study

Exhibit 5.3: Due diligence sheet *continued*

	A	B	C	D	E	F	G	H	I	J	K
28	13										
29											
30	14										
31											
32	15										
33											
34	16										
35											
36	17										
37											
38	18										
39											
40	19										
41											
42	20										
43											
44	21										
45											
46	22										
47											
48	23										
49											
50	24										
51											
52	25										

Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: Due Diligence WS.

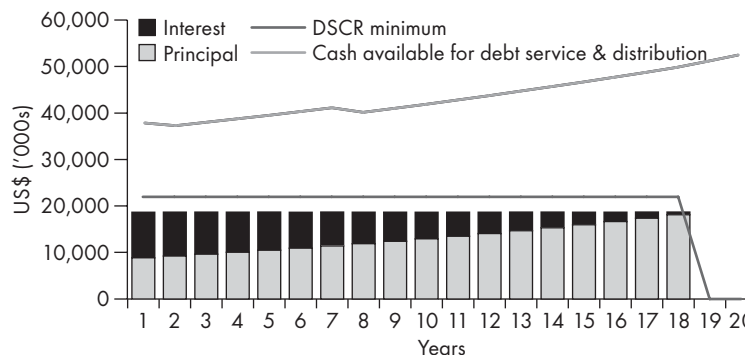
- Dave Watson, Market Consultant
- Rose Gigi, Lender's Outside Council
- Cameron Andrews, International Tax and Accounting Adviser
- John Cooney, Bank's Analyst
- Susan Blackburn, Head of Credit Analyst

AGSIM has well-tested commands and controls on running the due diligence process. The first quick action item is to look at the assumptions in the model in relation to the documents, followed by making any appropriate changes.

Exercise 5.1

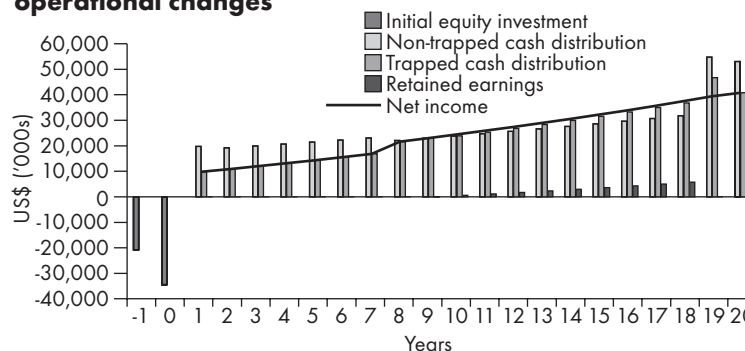
In the provided electronic information, you will find a due diligence worksheet (see Exhibit 5.1). In this exercise, document changes that you would like to make to the model using the operational contracts only and apply the changes to the model (use the Answer_Base model and then save your changes as operational changes). In this exercise you should also consider the depreciation schedule. If you make a change to the project assumption you must be able to defend it with a project document. For example, you cannot change the EPC price from US\$200 million to US\$250 million because you think the US\$/kW price is too low. The project has a contract that states that price. By changing the price of the contract, you are tacitly saying that you have an issue with the contractor's ability to perform. That risk should be represented later in the term sheet review and the cost of debt. In this exercise you are only to make operational assumption changes and not term sheet changes. You may elect to use the model's log book to see the impact of each of your single changes. In the selected review answers' log book, you will note that this is how the workbook has addressed the changes.

Exhibit 5.4: Project view with operation changes



Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 1_Project_Vair_OpChgs/Worksheet: OpChge View Chart.

Exhibit 5.5: Profile of accounting and cash flows with operational changes



Note: This worksheet can be found on the accompanying CD Rom in Module 4/File: Project_Vair-Master/Worksheet: OpChge Flow Chart.

Exhibit 5.6: Log book

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Log			ToC										
2														
3		LOG BOOK												
4														
5								Current Financial Outputs						
6								34.46%	25.36%	2.32	2.03	34,644		
7														
8								Impact to						
9		Date		Change		Inv.		Untrapped IRR	Trapped IRR	DSCR Average	DSCR Minimum	Present Value of the Loan		Model ID
10		16-Jul-05		Base		TC		37.19%	24.19%	2.38	2.15	34,647		Project_Vair_Base
11		23-Jul-05		Output from 95% to 93%		PS		37.21%	24.23%	2.38	2.15	34,640		Project_Vair_OpChgs
12		23-Jul-05		Heat Rate from 7500 to 7600		PS		36.00%	23.14%	2.32	2.10	34,644		Project_Vair_OpChgs
13		23-Jul-05		Plant Depreciation from stepped to 20-year Straight Line		CA		34.46%	25.36%	2.32	2.03	34,644		Project_Vair_OpChgs

Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 1_Project_Vair_OpChgs/Worksheet: Log.

Review of Exercise 5.1

Pablo Smith, the AGSIM's engineer, believes that the project's operational assumptions are a bit aggressive. He suggests that the bank should be using the O&M contract's guaranteed operational figures instead of the PPA and EPC figures. The O&M operator will be running the plant during the term loan phase, so those figures seem more reliable during the operational phase. While the utility will take up to 95 per cent of the plant's output, and the plant must maintain a minimum of 90 per cent annually, Pablo suggests using the guaranteed 93 per cent rate for sizing the debt capacity. Pablo also suggests changing the heat rate assumption from the EPC's 7,500 to the O&M's 7,600, citing the same reasoning as above.

Cameron has been talking to his colleagues in the tax community. He believes that the project is being overly optimistic about receiving a favourable opinion for depreciating the plant with three separate schedules. He suggests that the entire plant should be depreciated over 20 years.

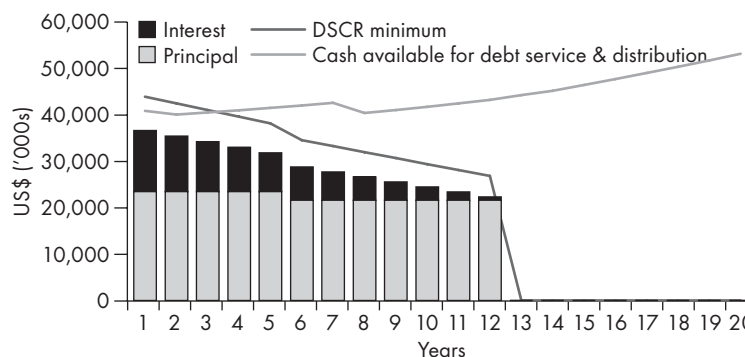
Take a look at the model with the operational changes. Actions are not always as they seem. The untrapped cash IRR has dropped by 273 basis points, but even with the operational changes the trapped cash IRR increased by 117 basis points. If the project cannot structure a vehicle to untrap the cash, the accelerated depreciation schedule is an inefficient use of the tax shield.

This might also be a good time to look at the checks in the income statement. You will now notice a deficit in gas expense. Previously, with the Variable O&M we witnessed a deficit due to an increase in Price, P , because of the lack of appropriate tax applications. Now, with a gas expense, we see that an increase in Quantity, Q , has caused the deficit. (By increasing the heat rate, it will take more molecules of gas to produce the same amount of electrons; we assume that the gas contract allows for this flexibility in volume without affecting the price.) If you remember back to Module 3, your first reaction to changing the capacity factor from 95 per cent to 93 per cent should be, 'Hold on a minute, I thought that it did not change the annual money earned for the capacity component, so the IRR should stay the same.' Well, you are correct, it stays at US\$44.9 million in year one. However, remember that all elements are not being passed through and there will be a change to the net working capital. Although the change is small (and a benefit to the project), it is yet another argument for having a balance sheet and a full set of financial statements.

Exercise 5.2

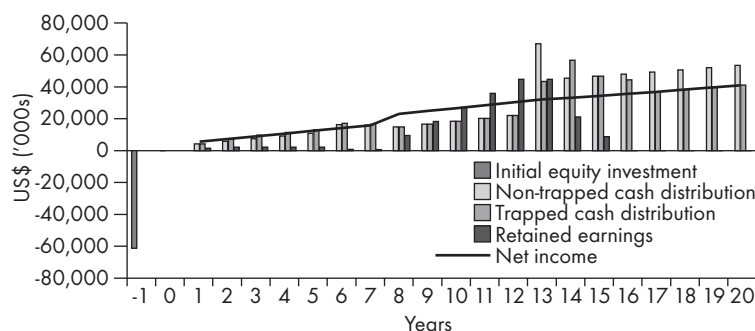
The next step is a more subjective exercise. Marc and his team must now make changes to the term sheet. They are mindful that there is competition in the market for the project, but they also must meet internal issues, especially reviewing the project's overall viability and any counter-party credit issues. Marc must walk a fine line between making changes to support his opening position (that he may be willing to negotiate later) and not pricing the deal so aggressively that he prices himself out of the initial running.

Exhibit 5.7: Project view with financial changes



Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 2_Project_Vair_FinChgs/Worksheet: FinChge View Chart.

Exhibit 5.8: Profile of accounting and cash flows with financial changes



Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 2_Project_Vair_FinChgs/Worksheet: FinChge Flow Chart.

Due diligence of
case study

Exhibit 5.9: Log book

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Log			ToC										
2														
3		LOG BOOK												
4														
5														
6								23.04%	23.56%	1.46	1.12	38,019		
7														
8														
9		Date		Change		Inv.		Untrapped IRR	Trapped IRR	DSCR Average	DSCR Minimum	Present Value of the Loan		Model ID
10		16-Jul-05		Base		TC		37.19%	24.19%	2.38	2.15	34,647		Project_Vair_Base
11		23-Jul-05		Output from 95% to 93%		PS		37.21%	24.23%	2.38	2.15	34,640		Project_Vair_OpChgs
12		23-Jul-05		Heat Rate from 7500 to 7600		PS		36.00%	23.14%	2.32	2.10	34,644		Project_Vair_OpChgs
13		23-Jul-05		Plant Depreciation from stepped to 20-year Straight Line		CA		34.46%	25.36%	2.32	2.03	34,644		Project_Vair_OpChgs
14		28-Jul-05		Construction Draw for Pro Rata to Equity First		MF		30.12%	23.31%	2.33	2.04	33,170		Project_Vair_FinChgs
15		28-Jul-05		DSRA from 1 to 6 Months		MF		29.91%	23.39%	2.28	2.00	29,709		Project_Vair_FinChgs
16		28-Jul-05		L/C Fee from 50 to 100 Bp's		MF		29.89%	23.37%	2.28	2.00	30,020		Project_Vair_FinChgs
17		28-Jul-05		Cash from 100 to 50 Bp's		MF		29.86%	23.34%	2.28	2.00	30,668		Project_Vair_FinChgs
18		28-Jul-05		Fin Fee from 50 to 150 Bp's		MF		29.61%	22.96%	2.27	1.99	33,325		Project_Vair_FinChgs
19		28-Jul-05		Initial WC from 10 to 30 Days		MF		28.71%	22.45%	2.22	1.95	33,972		Project_Vair_FinChgs
20		28-Jul-05		Loan Term from 18 to 12 Yrs		MF		22.92%	22.45%	1.53	1.44	26,395		Project_Vair_FinChgs
21		28-Jul-05		Construction Interest from 200 to 250 Bp's		MF		22.89%	22.38%	1.52	1.44	27,277		Project_Vair_FinChgs
22		28-Jul-05		Term Loan Interest from 100 to 150 Bp's		MF		22.49%	21.84%	1.49	1.41	34,422		Project_Vair_FinChgs
23		28-Jul-05		Loan Profile to Tranched Level Principal		MF		21.00%	21.57%	1.54	1.16	34,614		Project_Vair_FinChgs
24		28-Jul-05		Contingency from 1 to 10%		MF		23.04%	23.56%	1.46	1.12	38,019		Project_Vair_FinChgs

Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 2_Project_Vair_FinChgs/Worksheet: Log.

Use your operational due diligence worksheet from Exercise 5.2 and make any term sheet changes that you would like. You may change any assumption, including using any of the toggles to change items like debt profiles. However, you may not change the gearing for the moment. It must stay at 80 per cent. Also, the contingency toggle must stay on 1; by

changing it to 2, you would be changing the gearing ratio indirectly. Again, when making changes in the model you must enter the Financing Calc button. The check is to see if the model's Balance Sheet Check reads 'OK'.

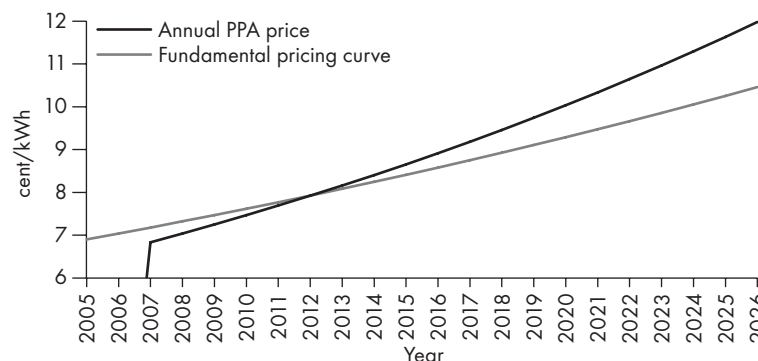
Review of Exercise 5.2

As Marc reviews the changes that his group is making to the model, he can quickly see that the project is sensitive to the term loan duration and profile. Tom and his group at Vair also are not going to like the equity-first construction debt draw because that has an immediate impact on the project's TVM calculations, more of their money is going out the door earlier. But as he further reviews the results, he does not see any aspect that is scaring him away from the project and he can start to see some of his negotiation tactics unfold.

He realises that he may have been somewhat aggressive on the Tranche Level Principal profile, but it is an opening position and he would be willing to move to a Senior Debt Level Principal or Tranching Mortgage Style profile. (Notice the changes from trapped and untrapped cash returns; as with depreciation, the interest has a tax shield benefit that is causing these changes.) However, Marc does notice considerable changes in the DSCR when making these debt profile changes. With all the financing changes, the Tranching Mortgage Style produces a minimum DSCR of 1.30 with a Loan PV of US\$40 million. The Senior Debt Level Principal produces a minimum DSCR of 1.17 with a Loan PV of US\$35 million. The Senior Debt Level Principal DSCR is unacceptable, and the Tranching Mortgage Style actually produces a higher present value. It will be an issue of convincing management that the project risk is acceptable with a mortgage style profile. Again, Marc can see more negotiation tactics unfolding.

He starts to smile to himself when he sees the results of changing the contingency from 1 per cent to 10 per cent. He is not sure whether Tom and his team have intentionally done this; but, by making the contingency so low, and Tom probably knowing that the bank will up the percentage,

Exhibit 5.10: Fundamental pricing curve versus PPA price



Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 2_Project_Vair_FinChgs/Worksheet: Price Curve Chart.

the bank has just given the sponsor an increased, and financed, development fee. In the current scenario, the contingency reverts back to the sponsor at COD as a development fee. One thing is certain, the 1.12x minimum DSCR is a non-starter. As Marc continues to ponder the unfolding scenarios, Dave Watson, the bank's market consultant, Susan Blackburn, Head of AGSIM's Credit, and John Cooney, the bank's analyst, walk into his office and Dave says, 'Marc, we need to talk about the Vair project.'

Exercise 5.3

Dave shows Marc the fundamental cents/kWh base load pricing curve of market in comparison to the project's PPA pricing over the life of the contract. (You can find these figures at the bottom of the income statement.)

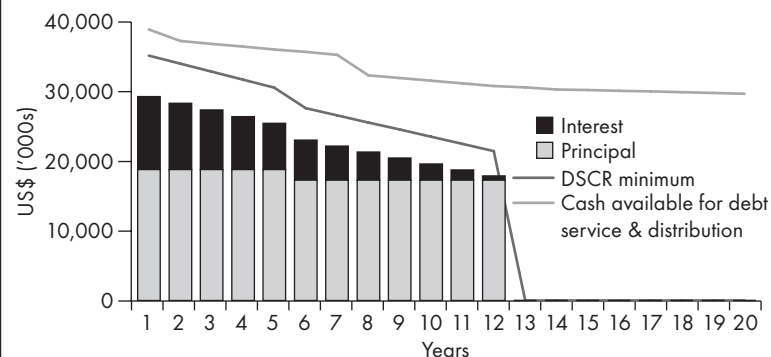
Dave believes that the base load market will grow at 2.00 per cent annually over the next 20 years. His assumptions are based on the country's forecasted growth in GDP and the existing mix of generation assets with his respective forecasted fuel prices.

As Marc reviews the graph, Dave explains that the PPA is under the market curve for the first five to seven years of the project, that the PPA price is higher than the forecasted market prices. Susan says that she believes that this will put undue strain on the utility and presents a long-term credit risk. WPLC could have trouble paying the tariff if the price is this far out of the market for the long run. Marc knows that Tom and his group will not entertain a shortened loan term to match the market survey. (A six-year tranching annuity loan produces a 12.24 per cent untrapped cash IRR and a 0.81 minimum DSCR.)

Marc can start to imagine many uncomfortable scenarios with WPLC reopening the contract in a few years; or worse, GOW feeling duped by Vair and some future government expropriating the project. Either scenario is not good for AGSIM. At this point, John makes an observation. 'Marc,' he says, 'I have been reviewing the model and I have had a hard time understanding why Vair is escalating the Plant Capacity Charge in the PPA. From an economic standpoint, it is a benefit to the project. But from a financial theory standpoint, it is not necessary. Capital has already been deployed and the Capacity Payment is meant to service that initial capital. That capital cannot escalate, so why should the Capacity Payment? The project will have already swapped out the floating rate for a fixed rate, so there is no need to escalate the Capacity Payment.'

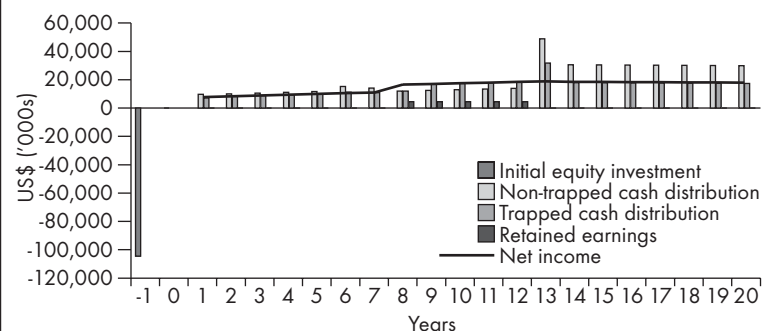
Marc can already see how the PPA negotiations went between Vair, GOW and WPLC. Vair presented a case that showed lower base load pricing to

Exhibit 5.11: Project view with market changes

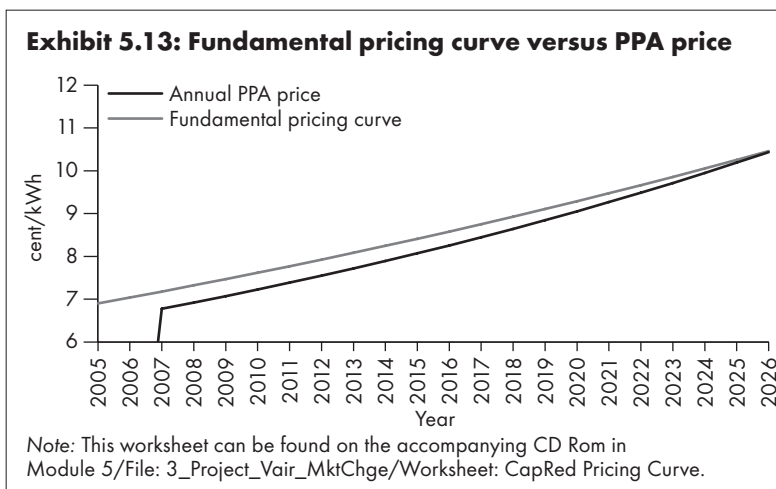


Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 3_Project_Vair_MktChge/Worksheet: MktChge View Chart.

Exhibit 5.12: Profile of accounting and cash flows with market changes



Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 3_Project_Vair_MktChge/Worksheet: MktChge Flow Chart.



an unsophisticated negotiating partner. GOW and WPLC did not fully understand the implications as they tried to entice foreign direct investment (FDI) and as they introduced market forces in their formerly planned electricity system. Marc asked the group to run a new case on this information.

Take out the escalation in the Capacity Payment and find a gearing that will produce a DSCR minimum of 1.30x.

Review of Exercise 5.3

By taking out the escalation in the capacity charge and maintaining AGSIM's first attempt at their assumption changes, the new results dropped the project's untrapped cash IRR to 17.48 per cent, but more

importantly the minimum DSCR went to 1.08. By using the Goal Seek function and searching a minimum DSCR of 1.30x, using the Senior Debt gearing ratio as the change, the project gearing result is 66 per cent. This drops the IRR to 13.98 per cent for untrapped cash and 11.63 per cent for trapped cash. However, this new PPA pricing curve is more in line with the fundamental market study.

Exercise 5.4

John meets Marc later that afternoon to discuss the results. Marc asks Bud Marcum to join them. Marc and Bud believe they know the client well and understand their return requirements. They believe the sponsor's initial model was a 'fishing expedition', and Vair wanted to see if they could attract any 'dumb money' to the table.

With a few changes to the financing, AGSIM believe that they can get the economics in line with industry returns, given Vair's historical requirements and a country view. But Marc quickly understands the 800-pound elephant in the corner that needs addressing, the contingency disbursement back to equity at the end of construction. Marc asks John to run a case that has the contingency paying down part of the construction debt at COD, reducing the requirement for the term loan. Marc also asks John to have the construction IDC not only capitalised, but also compounded. Marc wants the model to maintain the 1.30x minimum DSCR.

Review of Exercise 5.4

The IDC change was minimal. This is a good point for Marc to introduce

as one of his opening positions because he can easily give it back in negotiations. However, the contingency has a significant impact on the returns, dropping the untrapped cash IRR by 133 basis points, and the trapped cash return is now in the mid-tens. Marc realises that Tom is a good negotiator. Tom is going to tell Marc that he does not need to be concerned about trapped versus untrapped cash returns. That is an equity issue and it has no impact on the project's DSCR or its ability to service the debt. Marc should be responding that he agrees, but he has a little insight into Vair's return requirements. At 13 per cent IRR, Marc knows that Vair may maintain marginal interest in the project, but at below 11 per cent IRR, Vair might not give it the support that it needs. So yes, the bank should be concerned about trapped versus untrapped cash returns.

Finally, Marc realises that, sooner or later, he is going to have a conversation with Tom about reaching an understanding on the contingency repayment. By applying the contingency to the construction loan principal, the project can increase its gearing from 66 per cent back up to 71 per cent, and this greater ratio will increase the project's IRRs to starting levels that are getting to be more in line with Vair's probable needs. Marc also realises that Tom is not going to fall that easily for this point.

In the aggregate, Marc's argument makes sense. However, from an incremental cash flow standpoint, they have different risks. An upfront development fee at COD, which is not tied to any operational performance of the plant, is much less risky than operational cash dividends that may have trapped cash issues. There is also an underlying assumption that none of the contingency will be used during the construction. If a portion, or all, is used, then someone is going to have to make up for the shortfalls. Finally, nothing is absolute. Marc and Tom can probably come to a solution that 'splits the baby'.

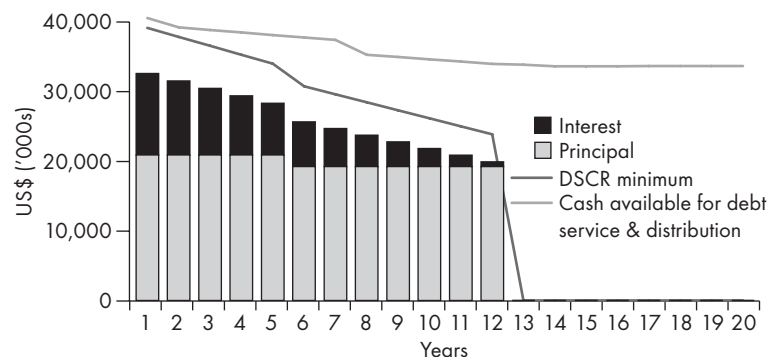
Exercise 5.5

Marc decides to give Tom a call and have a brief discussion about the project, and the PPA in particular. Marc and Tom know each other socially, and have a friendly game of squash whenever they are in town together, so he believes that he can have an open conversation. Marc points out the shortfalls in the Variable O&M, caused by the taxes (something that Tom already knew), and the gas contract, due to the heat rate assumption. He then delicately discusses the Capacity Payment escalation with regard to his group's fundamental market study. Tom tells Marc that he will look into it, but suggests that Marc just factor this into his bid proposal. Tom's team will look at all the proposals simultaneously. They hang up and Tom has been good at keeping his cards close to his chest. However, Marc realises that his points have not been lost on him. Marc knows that no matter how good the project looks, if his group continues to see overall credit risk to WPLC, based on an uneconomical PPA, AGSIM is going to have to walk away.

After hanging up with Marc, Tom calls David Donahue, PPA Commercial Lead for the Project, and Alejandro into his office to discuss his recent conversation. Tom wants to know what the impact would be of going back to WPLC and telling them they are willing to take out the escalation in PPA, if they can re-discuss the gas and O&M pricing. Also, he would like to see if he can get the PPA pricing more in line with the fundamental market curve that Marc was discussing. Finally, he would like to know what the returns look like with a minimum DSCR of 1.25x.

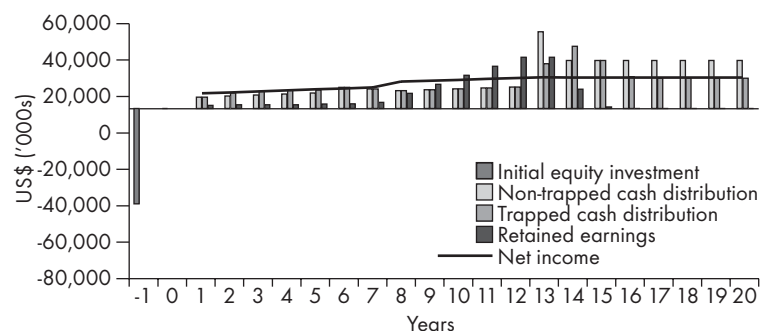
Tom realises that if he goes back to the utility to reopen, he needs to tread lightly, or risk having the whole deal fall apart on him. He can probably make the argument that the pricing curve is flatter. The curve will not rise as dramatically and the project is still under the current prices. Tom

Exhibit 5.14: Project view with PPA changes



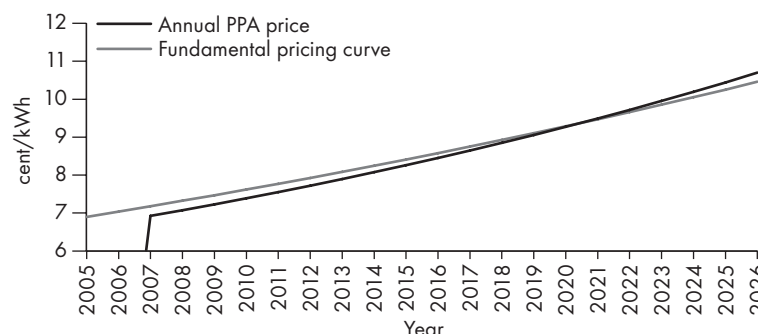
Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 5_Project_Vair_PPARENegChge/Worksheet: PPARENeg View Chart.

Exhibit 5.15: Profile of accounting and cash flows with PPA changes



Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 5_Project_Vair_PPARENegChge/Worksheet: PPARENeg Flow Chart.

Exhibit 5.16: Fundamental pricing curve versus PPA price with renegotiated PPA



Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 5_Project_Vair_PPARENegChge/Worksheet: PPARENeg Pricing Curve.

also knows the AGSIM bank well and he believes that he can get them to size the debt capacity to a minimum DSCR of 1.25x. He thinks that Marc will likely start at a range of 1.30x to 1.40x as a negotiating tactic. Tom also knows that if Marc believes that the project can support more debt it means greater present value to the bank, particularly greater fees to Marc and his team. Alejandro can find out what the required pass-through tariff components are by using Goal Seek to set the income statement checks to zero and by changing the match respective PPA components.

Review of Exercise 5.5

Tom and David can demonstrate to the utility that new PPA pricing that what they are suggesting is actually cheaper by year 3. Another argument that can be made to the utility is that, with the new suggested PPA price,

escalation is slightly over 2.00 per cent per year. (With the previous PPA the price was growing 3.00 per cent annually.) The benefit to the project is greater cash inflow in the first two years. However, the problem remains that the price of power in the PPA is still greater than David Watson's project fundamental price for five years starting in 2021, with his projected 2.00 per cent growth. As an additional exercise, Goal Seek the growth rate that will produce a 2026 equal power price. The answer is 2.11 per cent.

Tom and his team should be making their argument that the price of power will grow at a minimum of 2.15 per cent. Numbers of this nature are hard to argue for, but they are equally as hard to argue against. One final exercise is to change the growth rate on the price of power on the bottom of the income statement to 2.5 per cent. Now Goal Seek the capacity payment to equal the price of power on the curve in 2026. Look at how dramatic the change is. The new capacity charge is just over US\$ 19 kW/month, with an untrapped IRR of 28.60 per cent and a minimum DSCR of 1.61. If we Goal Seek for a minimum DSCR of 1.30x, we arrive at untrapped IRR of 55.4 per cent and 94 per cent gearing, just by moving market price escalation a mere 50 basis points. It is easy to see the enticement of introducing market, or merchant, risk into projects.

Exercise 5.6

Marc called a team meeting on Friday 5 August. The Monday deadline was looming and Marc believed that AGSIM was close to a competitive proposal (assuming that the other banks took the same prudent view of the operational contracts and shortened the loan term to meet the gas contract), but the team was going to have to put some finishing touches

to their package. And more importantly, they were going to have to start thinking about a negotiation strategy if they were selected. The group discussed the project as a team and tried to put up their collective knowledge about Vair's requirements, the bank's requirements and their view of the project risk.

It was decided that Vair was probably looking for an IRR of over 17 per cent and they would be satisfied with a return of between 17 per cent and 18 per cent. After reviewing the numbers, the group decided that they would price the deal on the untrapped cash returns. The new numbers were not so far off from each other. It would give them a better chance to get in the deal, and they could always come back to it in negotiations.

Now came the internal team discussion of project risk and target DSCRs. Marc and his team know that Vair are looking for an approximate 1.25x minimum. They were not as concerned about the DSCR average. The PPA was backed by the GOW and it was clear that WPLC needed the energy, but they still had risk concerns on how an out-of-market contract would affect the long-term viability of the project. The team believed that if the PPA concerns could be addressed, and discussed, that AGSIM could go as low as 1.20x for the minimum, but this needed to be a negotiation point. It was understood that Hunt and Rose, the two lawyers, would argue out stepped minimum DSCRs and the numbers did not need to be absolutes. The credit facility could have staggered DSCR triggers. For example, below 1.20x may mean default, but they could start locking up dividends at 1.30x. The team agreed that this was a good mechanism to give Tom and his team a more attractive DSCR than they had requested, while giving the bank more security.

Exhibit 5.17: Project IRR (untrapped cash) – gearing versus interest rate premiums

	17.37%	Interest Rate Premiums											
		1.00%	1.25%	1.50%	1.75%	2.00%	2.25%	2.50%	2.75%	3.00%	3.25%	3.50%	3.75%
Gearing	60.00%	13.75%	13.67%	13.59%	13.51%	13.43%	13.35%	13.27%	13.19%	13.11%	13.03%	12.96%	12.88%
	62.50%	14.15%	14.06%	13.97%	13.88%	13.79%	13.71%	13.62%	13.53%	13.44%	13.36%	13.27%	13.19%
	65.00%	14.58%	14.48%	14.38%	14.29%	14.19%	14.09%	13.99%	13.90%	13.80%	13.71%	13.61%	13.52%
	67.50%	15.06%	14.95%	14.84%	14.73%	14.62%	14.51%	14.41%	14.30%	14.19%	14.09%	13.98%	13.88%
	70.00%	15.58%	15.46%	15.34%	15.22%	15.10%	14.98%	14.86%	14.74%	14.62%	14.51%	14.39%	14.27%
	72.50%	16.17%	16.03%	15.89%	15.76%	15.62%	15.49%	15.36%	15.23%	15.09%	14.96%	14.84%	14.71%
	75.00%	16.82%	16.67%	16.52%	16.37%	16.21%	16.06%	15.92%	15.77%	15.62%	15.48%	15.33%	15.19%
	77.50%	17.57%	17.40%	17.23%	17.05%	16.88%	16.71%	16.55%	16.38%	16.21%	16.05%	15.89%	15.73%
	80.00%	18.44%	18.24%	18.04%	17.85%	17.65%	17.46%	17.27%	17.08%	16.89%	16.70%	16.52%	16.34%
	82.50%	19.46%	19.23%	19.00%	18.77%	18.55%	18.33%	18.11%	17.89%	17.67%	17.46%	17.25%	17.04%
	85.00%	20.70%	20.43%	20.16%	19.89%	19.63%	19.36%	19.11%	18.85%	18.60%	18.35%	18.11%	17.86%
	87.50%	22.26%	21.93%	21.60%	21.27%	20.96%	20.64%	20.33%	20.03%	19.73%	19.44%	19.15%	18.86%
	90.00%	24.31%	23.89%	23.47%	23.07%	22.67%	22.29%	21.90%	21.53%	21.16%	20.80%	20.45%	20.10%

Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 6_Project_Vair_Tables/Worksheet: Tables.

Marc could not decide whether or not to start with the tranching level principal profile, knowing that he would be willing to negotiate towards other debt profiles. He did not want to give away too many negotiating points too early, but he also did not want to price AGSIM out of the deal from the beginning. Finally, Marc was still having trouble getting his head around the deal's big picture and he asked John if he could find a way of presenting the deal concisely. John asked for a day and the team agreed to meet on Sunday afternoon to go over the final proposal.

Excel has an excellent tool to review scenarios by creating data tables. Set the model to Senior Debt Level Principal (do not forget to use the macro to recalculate and balance the balance sheet). Review Module 2 to refresh your memory on how to create tables. In large models, Excel will

sometimes have difficulty creating tables on separate worksheet tabs away from the assumption(s) employed. So, create the tables on the assumption page. Create three tables, using the senior level principal spreads as the row and gearing as the column. The three outputs will be: untrapped cash IRR; minimum DSCR; and present value of the loan (see Exhibits 5.17–5.19). Use the conditional formatting to code the tables for warnings. For example, code the shading red for any minimum DSCR that is below 1.20x and code the IRR green and bold for any IRR that is between 17 per cent and 18 per cent.

Exhibit 5.18: Minimum DSCR – gearing versus interest rate premiums

		Interest Rate Premiums											
		1.00%	1.25%	1.50%	1.75%	2.00%	2.25%	2.50%	2.75%	3.00%	3.25%	3.50%	3.75%
Gearing	1.30	1.76	1.74	1.71	1.69	1.66	1.64	1.62	1.59	1.57	1.55	1.53	1.51
	60.00%	1.69	1.66	1.64	1.62	1.59	1.57	1.55	1.53	1.51	1.49	1.47	1.45
	62.50%	1.62	1.59	1.57	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.40
	65.00%	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.38	1.36	1.34
	67.50%	1.50	1.47	1.45	1.44	1.42	1.40	1.38	1.36	1.34	1.33	1.31	1.30
	70.00%	1.44	1.42	1.40	1.38	1.37	1.35	1.33	1.31	1.30	1.28	1.27	1.25
	72.50%	1.39	1.37	1.35	1.34	1.32	1.30	1.29	1.27	1.25	1.24	1.22	1.21
	75.00%	1.34	1.33	1.31	1.29	1.28	1.26	1.24	1.23	1.21	1.20	1.18	1.17
	77.50%	1.30	1.28	1.27	1.25	1.24	1.22	1.20	1.19	1.18	1.16	1.15	1.14
	80.00%	1.26	1.24	1.23	1.21	1.20	1.18	1.17	1.15	1.14	1.13	1.11	1.10
	82.50%	1.22	1.21	1.19	1.18	1.16	1.15	1.13	1.12	1.11	1.09	1.08	1.07
	85.00%	1.19	1.17	1.16	1.14	1.13	1.12	1.10	1.09	1.08	1.06	1.05	1.04
	87.50%	1.15	1.14	1.12	1.11	1.10	1.08	1.07	1.06	1.05	1.04	1.02	1.01
	90.00%												

Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 6_Project_Vair_Tables/Worksheet: Tables.

Review of Exercise 5.6

From the tables above (Exhibits 5.17–5.19), you will note that the two teams are more sensitive to two different parameters. Vair is more concerned with gearing, while AGSIM is more concerned with interest rate premiums. For example, look at the column using a 1.75 per cent credit spread: by moving from 77.5 per cent gearing to 80.0 per cent gearing, the project gains 79 basis points in the IRR. This vertical move creates an additional US\$1.4 million in present value for the bank. The bank creates a greater present value, an additional US\$3 million, by moving horizontally on the 77.5 per cent gearing axis and increasing the credit spread to 2.00 per cent; but the IRR is under Vair's 17 per cent hurdle rate. So it is in the bank's interest to increase spreads and in the project's interest to

increase gearing. However, by increasing the gearing and the spread simultaneously to an 80 per cent gearing and a 2.00 per cent spread, the present value of the loan increases to US\$4.5 million and the project IRR increases 60 basis points, while still maintaining a 1.24 minimum DSCR.

The key to negotiating with the tables is understanding a feasible starting point coupled with a probable agreeable ending point and trying to negotiate your way to the position. For AGSIM, this means starting with a lower gearing ratio, but also a lower credit spread. By giving greater gearing to the project, the bank can ask for a greater spread, more risk more return, until they bump up against a prudent floor – here being the minimum DSCR of 1.20x. Marc would ideally like to arrive at 80 per cent gearing with a 2.50 per cent credit spread, creating US\$45.6 million of

Exhibit 5.19: Present value of the loan – gearing versus interest rate premiums

		Interest Rate Premiums											
		1.00%	1.25%	1.50%	1.75%	2.00%	2.25%	2.50%	2.75%	3.00%	3.25%	3.50%	3.75%
Gearing	31,916												
	60.00%	19,414	21,686	23,958	26,231	28,503	30,775	33,047	35,319	37,591	39,863	42,136	44,408
	62.50%	20,159	22,541	24,923	27,306	29,688	32,070	34,452	36,834	39,217	41,599	43,981	46,363
	65.00%	20,946	23,439	25,932	28,425	30,918	33,411	35,904	38,397	40,890	43,383	45,876	48,369
	67.50%	21,779	24,383	26,988	29,592	32,197	34,801	37,406	40,010	42,615	45,219	47,824	50,428
	70.00%	22,657	25,374	28,091	30,808	33,525	36,242	38,958	41,675	44,392	47,109	49,826	52,543
	72.50%	23,580	26,410	29,240	32,070	34,900	37,730	40,560	43,390	46,220	49,050	51,880	54,710
	75.00%	24,546	27,490	30,434	33,378	36,322	39,266	42,210	45,155	48,099	51,043	53,987	56,931
	77.50%	25,557	28,616	31,675	34,734	37,793	40,852	43,911	46,970	50,029	53,088	56,147	59,206
	80.00%	26,615	29,790	32,965	36,140	39,315	42,490	45,665	48,840	52,015	55,190	58,365	61,540
	82.50%	27,714	31,006	34,298	37,590	40,882	44,174	47,466	50,758	54,050	57,341	60,633	63,925
	85.00%	28,817	32,227	35,636	39,045	42,455	45,864	49,273	52,683	56,092	59,502	62,911	66,320
	87.50%	29,933	33,461	36,988	40,516	44,044	47,571	51,099	54,626	58,154	61,681	65,209	68,736
	90.00%	31,080	34,726	38,373	42,020	45,666	49,313	52,960	56,606	60,253	63,899	67,546	71,193

Note: This worksheet can be found on the accompanying CD Rom in Module 5/File: 6_Project_Vair_Tables/Worksheet: Tables.

present value and giving Vair a 17.27 per cent IRR, or 27 basis points above a perceived hurdle rate. Without saying, Tom and his team will try to argue the other way, but at the end of the day, with the assistance of the model, everyone should be able to negotiate to a position with which they can live.

Summary

You have now worked through the final module. At this point, it is the author's hope that you can see what a powerful negotiating tool Excel can be. You have created an equity case model and reviewed the model from a due diligence perspective. Remember, start with the desired outputs first and then back-engineer your way to the answer. Or, more aptly stated, start with your negotiating partners' outputs first and use the model to negotiate your way to a better deal for yourself. The more robust your model, the better it is as a negotiating tool. Always negotiate off the model, never model off the negotiations.

