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Wind Power Investment Guidelines

Wind Power Financing Training Guidebook

Technical Assistance to the Electricity and Renewable Energy Authority

Ministry of Industry and Trade

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List of abbreviations

A

ADSCR: Annual Debt Service Coverage ·

AEP: Annual Energy Production ·

B

BoP: Balance of Plant ·

C

C: Capital ·

CADS: Cash available for debt service ·

CAPM: Capital Asset Pricing Model ·

cCF: Constant Cash Flow ·

CF: Cash Flow ·

CM: Correlation Matrix ·

COC: Cost of Capital ·

COD: Commercial Operation Date ·

COR: Correlation ·

COV: Covariance ·

D

D: Debt ·

DF: Discount Factor ·

DS: Debt Service ·

DSCR: Debt service Cover Ratio ·

E

E: Equity ·

E(Ri): Expected Return ·

E(X): Expected Outcome ·

EAD: Exposure At Default ·

E_i: Energy Yield ·

EL: Expected Loss · ,

EPC: Engineering and Procurement Contractor ·

ES: Expected Shortfall ·

EV: Entity Value ·

F

FiT: Feed-in tariffs ·

G

GE: General Electric ·

I

I: Initial Absolute Investment ·

IEC: International Electrotechnical Commission ·

IRR: Internal Rate of Return ·

ISP: Independent Service Provider ·

K

KF: Capitalization Factor ·

L

L: Leverage ·

LCOE: Levilized Cost Of Energy ·

LD: Liquidated Damage ·

LGD: Loss Given Default ·

LPM: Lower Partial Moments · ,

M

M: Market Portfolio ·

MPT: Modern Portfolio Theory ·

MWh: Megawatt hours ·

N

NPV: Net Present Value ·

O

O&M: Operations and Maintainence Agreement ·

OEM: Original Equipment Manufacturers ·

OPEx: Operational Expenditure ·

P

P&L: Profit and Loss Account ·

P&S: Procurement and Service ·

PV: Present Value ·

PV_{cCF}: Present Value of a Regular Payment ·

Q

Q: Quantity ·

R

r: Interest rate ·

Rev: Revenue ·

Rf: Risk free rate ·

ROA: Return on Assets ·

ROE: Return On Equity · ,

ROI: Return on Investment ·

RP: Risk Premium ·

rSD: Relative standard deviation ·

S

SPA: Shareholder or Sales and Purchase Agreement ·

T

t: Time ·

TSA: Turbine supply agreement ·

U

uCF: Uniform cash flow ·

UL: Unexpected Loss ·

V

VaR: Value at Risk ·

VAT: Value Added Tax ·

W

WACC: Weighted Average Cost of Capital ·

WC: Working Capital ·

WTG: Wind Turbine Generator ·

Y

YTD: Yield to Date ·

YTM: Yield to Maturity ·

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Introduction

Introduction

Wind power financing can be divided into two main parts: fundraising and valuation.

Fundraising is concerned with the general question "How to finance a project?", while the valuation process is centred on the question "How much financing can be raised?".

Wind power financing will focus on the options in which a project can be financed and the way cash flows can be evaluated using standard concepts. The mind map below is a representation of the topics and chapters that will be discussed in further detail throughout this guidebook.

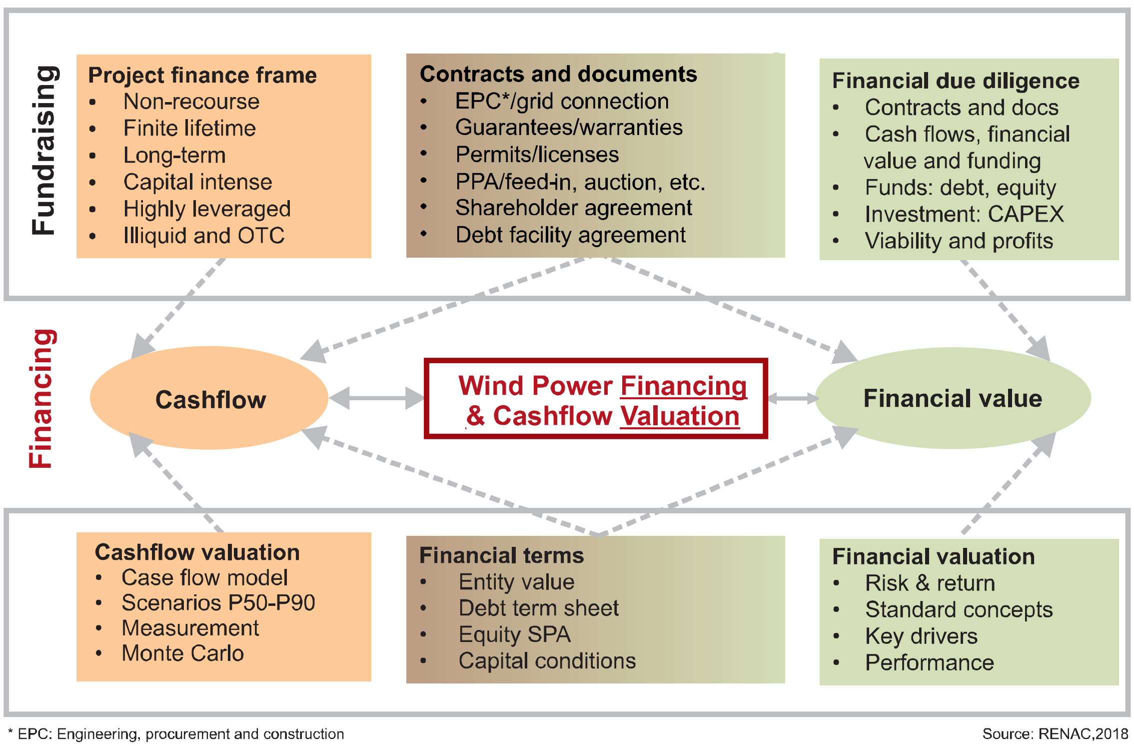


Figure 1: Overview of the topics to be covered in this guidebook.

Chapter 1 provides a brief overview of the basics of wind power financing by introducing the concepts and relations of cash flows and present values. Additionally, selected standard key financial terms will be explained to provide a basic foundation for the following chapters.

Following this, Chapter 2 will cover the fundraising aspect of wind power financing. Project finance frames, contracts and financial due diligence are the three main aspects of this chapter.

Chapter 3 focuses on the relationship between project cash flows and financial valuation of wind power financing. The integral risks in a wind power project will also be touched upon in this chapter.

Chapter 4 aims to cover cash flow valuation as well as some advanced valuation concepts. After an overview of main financial terms used later in the chapter, the process of using these valuation concepts will be discussed.

A stereotypical midsize wind turbine or wind power generator (WTG) consists of several main hardware components: the foundation, tower, gearbox/ nacelle, as well as the three blades. Furthermore, it requires a necessary periphery of farm-internal cabling and access roads, areas for crane works and security spacing. External cabling to the substation, which often requires one or more transformers to connect to the power distribution grid to operate the WTG or farm, is also necessary. WTGs are regularly installed in groups that constitute wind farms or fields.

The wind turbine is the most important asset in any wind power project as it is the generator of returns. Although different manufacturers of wind turbines exist, most follow the same standard design: three upwind blades with a horizontal axis in relation with its foundation and a grid connection to feed the produced energy into the grid.

Since the 1980s, there has been a continuous and significant growth in hub height, installed or rated capacity, rotor diameter and of the economic efficacy of wind turbines. The increases in both hub heights and rotor diameters to current dimensions have allowed a more than hundred-fold increase in rated power.

Turbine manufacturers with major market shares include: Vestas, Siemens/Gamesa, General Electric (GE), Goldwind, Enercon, Nordex/Acciona, Senvion, United Power, Envision, Suzlon and Ming Yang. These have accumulated more than three quarters of the global installed wind power capacity of 540 GW (2017) in China, the USA, Germany, India, Spain, the UK and France. These countries led the market for new installed capacity amounting to 53 GW in 2017.

Wind power business case in terms of cash flows

From an economic perspective, the business case for wind power generated from wind turbine generators (WTG) can be categorized as a:

- mid- to large-scale, capital intense, long-term, real asset infrastructure investment
- that regularly qualifies for non-recourse, off-balance, stand-alone project financing.

From a financial perspective, the WTG can be understood as:

- the financial value that defines the funding capacity or project value of wind energy
- based (as for most other investments) on the project's future cash flows that
- the project is expected to generate over the course of its economic lifetime.

The cash flows generated by a wind power project can be separated into:

- expected future cash inflows such as fundraising of debt and equity or revenues
- and cash outflows such as investments or operational expenses and capital services.

Inflows add financial value to the project while outflows reduce financial value.

The generic wind power business case can be divided into two very different phases:

- the initial, relatively short-term investment and financing phase
- and the long-term operational phase (with long-term operational cash flows).

The financial value of wind power is based on future project cashflows

1. **2 Types of cash flows**: i. **Inflows** (add value) and ii. **Outflows** (reduce value)
2. **2 Phases**: I. Investment & Financing and II. Operation (Revenues & Costs)

I. Inv & Fin

I. 2 Activities: i. Fundraising (Sources of funds) and ii. Investing Funds (Uses of funds)
- **a. 2 (main) Sources**: i. Debt (banks) and ii. Equity (investors)
- **b. 2 (main) Uses**: i. Capital expenditures and ii. Development costs

II. Operation

II. 2 Value drivers: i. Price (Tariff) and ii. Quantity (AEP) driving Revenues
- **a. 2 (main)** Costs: i. Operational expenditures & ii. Costs of capital (COC)
- **b. 2 (main)** COC: i. Debt service and ii. Equity cashflow (Dividends)

3. **2 Margin drivers**: i. Sources (Debt + Equity) less ii. Uses of funds (Investing)

Figure 2: Cash flows in a project during its various phases. Source: RENAC, 2018.

During each phase, different activities drive the corresponding cash inflows and outflows.

Cash inflows and outflows in the initial investment and financing phase are determined by:

- The financing activity or fundraising providing the main sources of funds (inflows), including funds from banks (whose loans amount to debt) and investments (equity).
- The investment activity which concerns the uses of raised funds, invested mainly into capital expenditure (CAPEX) and the preceding development costs and their financing costs.

Cash in- and outflows during the long-term operational phase are characterized by the main cash inflows from revenues, determined by two main value drivers:

- Price per unit sold or tariff paid per unit produced (in kWh or MWh).
- Quantity sold or output measured in kWh or MWh as annual energy production (AEP).

And the two main types of cash outflows (or costs\expenses) in the operational phase are:

- Operational expenditures (OPEX), especially operation and maintenance of WTGs.
- Cost of capital (COC), which mainly consists of i) debt service, and ii) equity cash flow.

The project margin results as the difference of total funding (source of funds) and total initial investments (uses of funds). Thus, the margin is mainly driven by the amount of debt and equity raised and CAPEX (including development costs and its financing) spent in the initial financing and investment phase. Figure 4 shows the main phases and corresponding cash flows to the margin.

In the context of financial valuation only effective cash flows matter, while some major costs such as depreciation or provisions have no direct effect on the liquidity, but they can create accounting tax shields and impact the liquidity indirectly via changing tax payments.

01

Basics of wind power financing

1 Basics of wind power financing

This chapter covers basics in financing wind power projects and addresses questions like:

1. How is the financing process of a wind power project structured in general?
2. How can the present value of a project be derived?
3. What are the relevant valuation concepts and return measures?
4. Who are the key players involved in financing a wind power project?

1.1 Wind power financing: fundraising and evaluation

Wind power financing includes two main aspects:

- a qualitative fundraising process and
- a quantitative valuation process.

While the former addresses the question on how wind power projects can be financed from different avenues, the latter focuses on how the amount of financing needed is calculated. The decision process in order to determine the amount of funding that is necessary or optimal depends on differing investors' preferences for risk and return as well as the project's technical and legal requirements, environmental impacts as well as other parameters. Thus, the qualitative fundraising process substantially affects the quantitative valuation. On the other hand, the target to maximize funding exerts certain restrictions on fundraising choices. Therefore, both issues should carefully be planned and considered in their entirety.

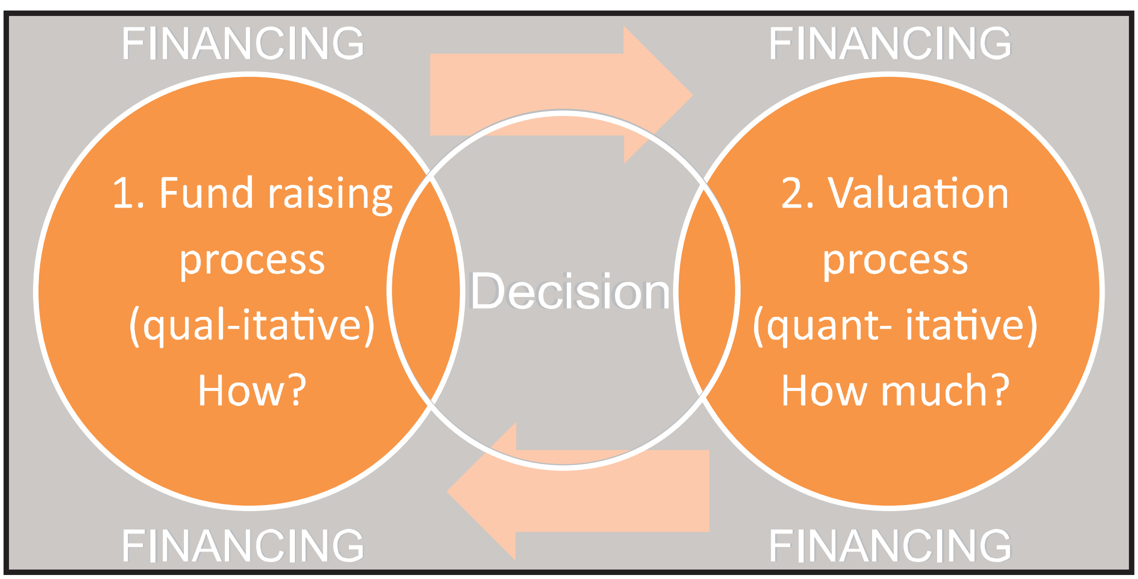


Figure 3: Fundraising and valuation processes in wind power financing. Source: RENAC, 2018.

Time value of money or present value

To identify and understand the value of time, a concept is required to quantify the effect of time on the financial value (cash flows), known as the present value (PV) or discounted value.

The idea behind the concept of present value (PV) is that the current value of money, cash flow or financial resource is worth more at the present day than the same amount of money is worth in the future. This is because funds or (financial) resources that are available in the present could and should always be used in a productive manner to constantly generate or add value to its initial stock. If the funds are invested elsewhere or given away and are therefore no longer available to generate value or interest, this loss of value/interest would then be the opportunity cost. To compensate the asset owner for foregone opportunity costs, an (risk-adjusted) interest rate is usually charged to discount future cash flow. Discounting can be determined by the multiplication of the cash flow with the discount factor ($[1+rate]^{-time}$), how often depends on how far in time the cash flow occurs. This is equal to the division by the capitalization factor ($[1+rate]^{+time}$). It follows that increasing the discount or interest rate (r) reduces the discount factor and the present value.

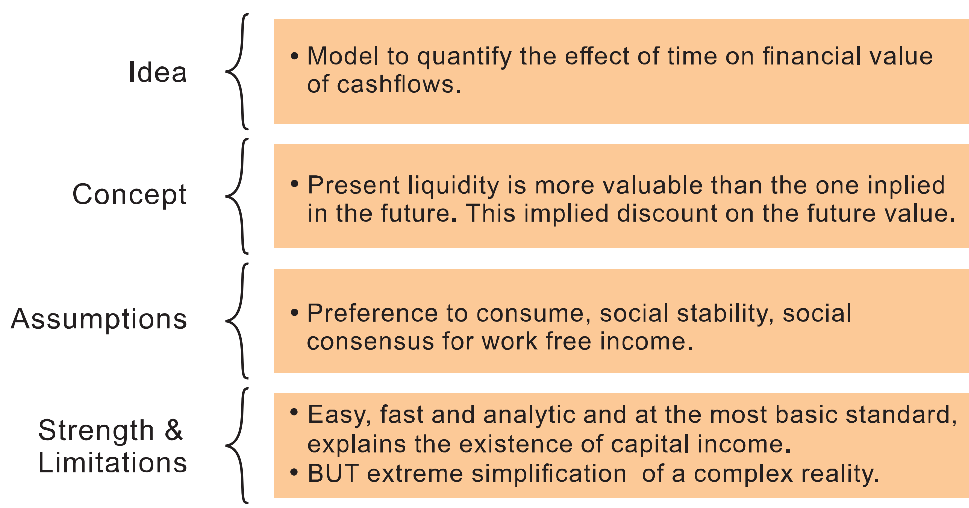


Figure 4: The basics of the present value concept. Source: RENAC, 2018.

The concept of present value (PV) is a widely accepted financial standard (used in accounting as well for “fair value” or impairment tests) and can explain the existence of capital income (interests). However, it remains a simplification of a much more complex reality. The strength of adopting it, is its ease of use, standardization and transparency. Nevertheless, the concept of PV relies on assumptions such as the preference to consume over saving and social stability.

Fundraising

The prospect of realizing a project margin is essential for project sponsors to initiate a project. Financing is usually provided by lenders (banks) and equity investors. To secure competitive funding, developers need to know and understand the financial needs of capital providers.

Financing requirements are expressed in contractual relations that detail the conditions of payments to service the invested capital (C). These conditions are translated into financial valuation as investing funds (of debt and equity) at the present day that require future long-term payments (of capital interest and repayment). This can be understood as an exchange of present day's secure funds for risky future returns, explaining the necessity for project developers to understand the present value perspective and risk assessment underlying the expected return capital providers require from projects currently under development.

Successful communication and fundraising improves significantly if project developers and project financers can talk in the same business language and know each other's constraints.

1.2 Selected basic financial terms, concepts and return measures

To provide a common basis of understanding, this section introduces common basic cash flow concepts and return measures as shown in Figure 7. These would then be discussed briefly in the following section. Further information can be found in most standard financial literature.

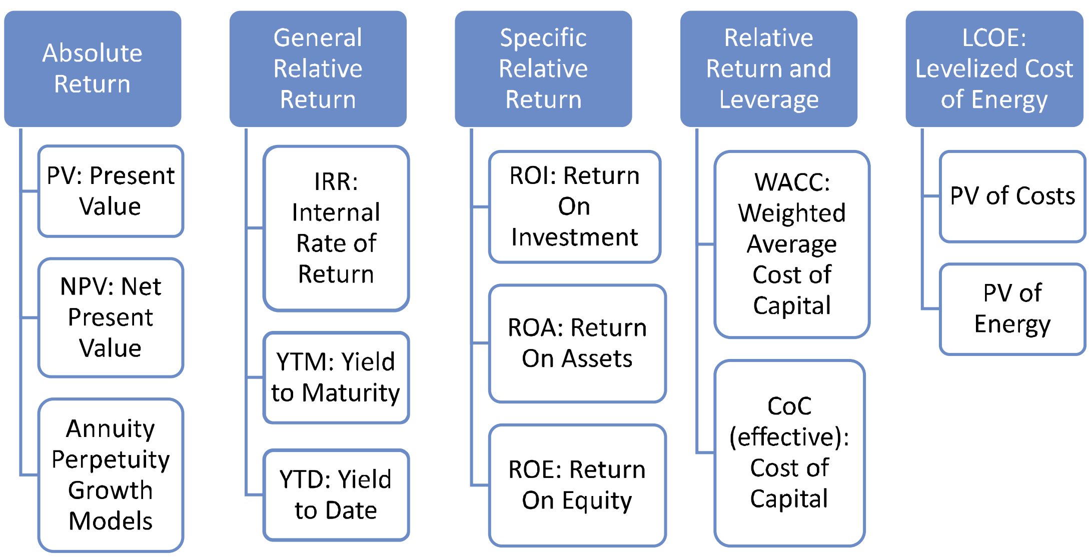


Figure 5: Basic cash flow concepts and terms. Source: RENAC, 2018.

Absolute return

The absolute return refers to the concept of capitalization that an asset or investment (e.g. a wind power project) is expected to produce future cash flows/return over a period of time (e.g. asset life time) measured in currency as physical unit. The amount of expected future cash flows usually increases and decreases with the risk associated to the investment. Absolute returns of the same currency are directly comparable and independent of a reference base, benchmark or index/market performance (unlike relative returns, see below).

The present value (PV) concept reverses capitalization by discounting future cash flows at the required risk-adequate rate of return (r) at which they are expected to produce cash flows as return. The risk-adjusted expected return compensates for the foregone opportunity cost.

Therefore, the present value of a single future cash flow (PV(CF)) can be computed as the future cash flow (CF) multiplied by the discount factor ($DF = (1+r)^{-t} = 1/(1+r)^{t}$) or divided by the capitalization factor ($KF = (1+r)^{t}$), with a division being the reverse operation of a multiplication.

Equation 1: Calculating the present values of a single future cash flow.

$$PV(CF, r, t) = CF*DF = CF/KF = CF*(1+r)^{-t} = CF/(1+r)^{t} \quad \text{with } DF = (1+r)^{-t} = 1/(1+r)^{t} = 1/KF$$

The present value is a function of three inputs: i) cash flow (CF), ii) discount rate (r), iii) time (t). Any row (stream or vector) of multiple future cash flows is simply the sum (∑) of each single cash flow discounted with its corresponding discount factor. This can be formalized as:

Equation 2: Present value of a sum of cash flows.

$$PV = \sum \{CF_t*DF(r, t)\} = \sum \{CF_t*(1+r)^{-t}\} \quad \text{with } t = 1,2,3,\ldots n \text{ denoting different CFs in time}$$

The **net present value** (NPV) is the sum of the present value of all future cash inflows and the present day's cash outflow ($CF_0=I$) – made in (T_0) – as an initial investment to purchase the asset that will produce future cash flows. Thus, a positive NPV serves as an indicator for an (profitable) investment or project in which the investment produces more return than the expected/required return (r) with which its future cash flows are discounted, and can be formalized as:

Equation 3: Calculating the net present value.

$$NPV = \sum \{CF_t*(1+r)^{-t}\} - CF_0 = PV - I \qquad \text{with } t = 1,2,3,\ldots n \text{ and } CF_0=I$$

Relative return (in general)

Relative returns are future cash flows (or absolute returns) measured or referenced relative to major initial cash outflows (CF_0) in the investment phase (T_0) like the initial investment (I). Therefore, relative returns are percentage numbers without absolute monetary unit (currency) unlike the NPV. For example, an investment of -100 million ($I = CF_0$) that produces a single expected future cash flow (CF) of +120 million in the next period equals a relative cash flow of +120% (= 120M/100M), relative to the investment of 100M. The (relative) return or interest of 20% (= 120M/100M - 100M/100M) results by deduction of the repayment of initial investment relative to itself, given as the following formula:

Equation 4: Calculating the relative return.

r = CF/I-I/I = (CF-I)/I = CF/I-1 relating a single cash flow (CF) to the initial investment (I)

The **internal rate of return** (IRR) is a relative return measure expressing the average periodical return produced by the cash flows of an asset, relative to its investment. The IRR is defined as the discount rate (r) that returns an NPV of 0, expressed in the following formal equation:

Equation 5: Iterating the internal rate of return (IRR).

$NPV = 0 = \sum \{CF_t*(1+IRR)^{-t}\} - I$ solved for IRR with no closed formal solution

The IRR is commonly used in practice but implies the unrealistic assumption that investments with different IRRs can reinvest produced cash flows at their different IRRs instead of the market-offered rate. Comparing investments with different initial investment volume, lifetime or cash flow structures, therefore can be misleading. The IRR using the market-offered rate as reinvestment assumption is called modified IRR (mIRR). Calculating the IRR formally translates into solving a polynomial equation of n^{th} order, which can yield up to n-many solutions. No analytically closed solution for more than two cash flows (n>2) exist, which is why the solution is usually approximated with iterative methods such as Gaussian or Newton iteration.

Specific relative return

The **return on investment** (ROI) is a measure that is used to derive the relative return rates on the overall or total investment. The ROI uses the relative return approach (IRR) for multiple future (total) free cash flow (FCF) generated by the total investment costs (I_T) differing from the total funding capacity. It expresses the (relative) return attributed to the total investment (I_T).

Equation 6: Calculating the return on investment (ROI).

$ROI = (FCF-I_T)/I_T$ for a single FCF, and: $0 = \sum \{FCF_t*(1+ROI)^{-t}\}-I_T$ for multiple FCFs

The **return on assets** (ROA) is the ratio of net income (NI) over total assets (TA) derived during a certain period of time. Thus, it serves as an indicator of how efficient a company is using its total assets in terms of accounting statements: balance and profit and loss account (P&L).

Equation 7: Calculating the return on assets (ROA).

$ROA = (NI-TA)/TA$ for a single NAI: $0 = \sum \{NAI_t*(1+ROA)^{-t}\}-AV$ for multiple NAIs

The **return on equity** (ROE) relates equity cash flow (ECF) disbursed on equity (dividends) to the value of equity (E). Because the equity value changes over time as shares are traded, the change in value produces an additional cash flow when the shares are sold.

Equation 8: Calculating the return on equity (ROE).

$ROE = (ECF-E)/E$ for a single ECF, and: $0 = \sum \{ECF_t*(1+ROE)^{-t}\}-E$ for multiple ECFs

The **return on debt** (ROD) consequently relates debt service (DS) to the value of debt (D). Because the value of debt changes predictably over time as debt is redeemed according to a fixed repayment schedule set up in T_0, unforeseen changes (risks) are less likely as for equity.

Equation 9: Calculating the return on debt (ROD).

$ROD = (DS-D)/D$ for a single DS, and: $0 = \sum \{DS_t*(1+ROD)^{-t}\}-D$ for multiple DSs

The **cost of capital** (COC) accounts for all cash outflows caused by employing different types of capital (such as equity, debt or other mezzanine/hybrid or alternative forms of financing). This includes payments of all interest and all redemptions and all fees for all types of capital, debt service (DS) and equity cash flow (ECF), and in specific cases, capital services for other hybrid capital forms. Other cash flows only include the interest for the necessary repayments of the principal transaction costs of initial capital raising and refinancing, running fees or upfront fees, as well as possible tax effects of the financing. Thus, COC relates free cash flows to the total funding capacity, given as the formula:

Equation 10: Iterating the cost of capital (COC).

$0 = \sum \{(DS+ECF)_t / (1+COC)^t \} - (D+E) = \sum \{(FCF)_t / (1+COC)^t\}-C$ with $DS+ECF = FCF$, $D+E = C$

Relative return and leverage

The **weighted average cost of capital** (WACC) defines the cost of total capital (C = D+E) as weighted interests or cost of debt (r_d) and equity (r_e) weighted with the capital volumes of debt and equity divided by total capital (C = D+E). The concept of WACC excludes repayments of capital from the cost of capital as this applies to corporate finance. As the lifespan of corporations are assumed to be infinite, they are assumed to always be able to repay capital by refinancing (rollover), unlike short-term projects.

Equation 11: Calculating the weighted average cost of capital (WACC).

$WACC = (r_d*D+r_e*E)/C= r_d*D/C+r_e*E/C = r_d*w_d+r_e*w_e$ with $C = D+E$, $E/C = w_e$, $D/C = w_d$

$WACC = (r_d*w_d/w_e+r_e)*w_e = (r_d*L+r_e)/(L+1)$ with $L = w_d/w_e$, $w_e = 1-w_d = 1/(L+1)$

$Tax\text{-}WACC = r_d*D/C*(1-r_t)+r_e*E/C$ with deductible cost of debt at tax rate (r_t)

WACC implies a constant relation of debt to equity, termed leverage ($L = D/E = w_d/w_e$). Projects have a limited lifetime equal to the economic life of a specific asset (wind turbine). Hence, projects need to repay the initial invested capital during the project's lifetime, with debt being repaid faster than equity. This causes the leverage to change over time. Thus, the assumptions on which WACC (developed for corporate finance) is based upon do not hold true in project finance and, therefore, WACC should be used with appropriate hindsight in project finance.

Since COC accounts not only for interests but also for repayments and fees, it usually exceeds WACC. Therefore, discounting free project cash flow with WACC instead of COC results in an overestimation of the project value. It is important to consider that the COC employs the IRR approach applied on total capital service (DS + ECF = FCF) relative to total capital (C= EV= D+E), equal to total funding capacity, respecting all costs resulting from funding the project.

Levelized cost of energy (LCOE)

On a pure cost-based approach, the LCOE calculates the present value of all costs, mainly: i) CAPEX, ii) COC, and iii) OPEX, including fuel, carbon and decommissioning expenses (FCDEX) related to the installation of a productive asset (e.g. a wind turbine). These are then divided by the present value of the energy produced by the asset over its lifetime, e.g. annual energy production (AEP), while the discount rate used for discounting is COC accounting for all of the SPV's financing costs from raising debt and equity in the initial investment phase.

Equation 12: Calculating the levelized cost of energy (LCOE).

$$LCOE = \sum \{(CAPEX + OPEX + FCDEX)_t*(1+COC)^{-t}\} / \sum \{(AEP)_t*(1+COC)^{-t}\} \quad \text{for } t = 1,2,3,\ldots n$$

LCOE can be understood as the average price of an energy unit produced (usually given as kilo- or megawatt-hour) over the asset's productive lifetime. LCOE has to be lower than the average energy price paid per unit to render the project profitable. LCOE are exclusively cost-based, do not account for revenues and thus cannot express the profitability of a project except the project's target margin or profit is considered as a cost item in the CAPEX (or OPEX).

1.3 Perspectives of Developers, Lenders, Investors, Original Equipment Manufacturers

Four key players involved in a wind power project are: developers, lenders, investors and manufacturers, alongside other stakeholders. Although all key players are working on the same project, they usually have opposing views on it and are driven by differing motivations.

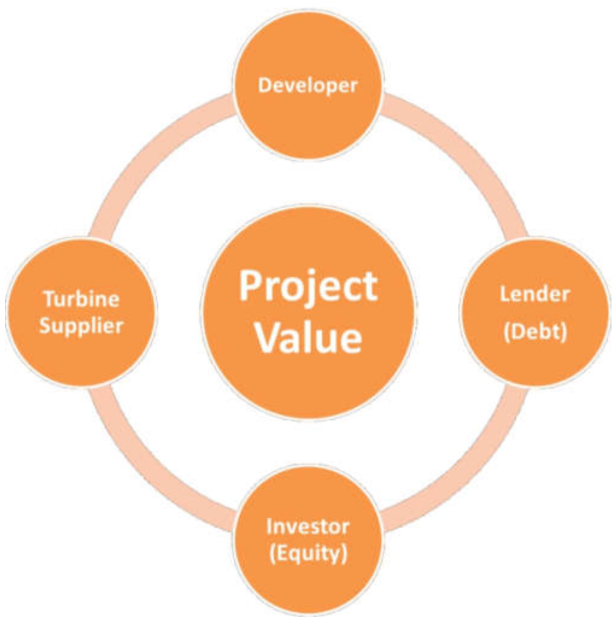


Figure 6: The four key players of a wind power project. Source. RENAC, 2018.

Developers maximize their value by minimizing capital expenditure (CAPEX) and maximizing funding (e.g. maximize debt- and equity-volume). CAPEX refers to all funds necessary to purchase all physical hardware and related services to become operative within the wind power project. Minimizing CAPEX using the most amount of funding possible also maximizes the developer's project margin.

Lenders maximize the security of their investment with a given, fixed return by determining the required interest rate via restrictive capital conditions, reducing the offered debt volume and risk in the loan.

Investors maximize their return by lowering the equity invested because dividends received are determined by operative project cash flows. Reducing the initial equity volume invested in turn increases the expected return on equity invested as dividends remain unchanged.

Original equipment manufacturers (OEM) maximize their value by selling real assets, i.e. wind turbine generators (WTG), at a high price to the project (or SPV (single purpose vehicle)), which reduces the developer's margin as a reduction of funding cuts a sponsor's project margin.

1.4 Project cash flows, project value and project funding

In this section, the relationship between future cash flows and the present value (PV) of wind projects will be discussed. The present value of a wind project comes from the (discounted) future project cash flows.

As mentioned, cash flows can be broken down into two main phases: the investment phase and the operational phase. The short investment phase is preceded by the development phase, which usually consumes two to five years before the wind farm starts production. For simplicity's sake, the development phase is also considered to be part of the investment phase because in this phase only cash outflows occur, and this can be understood as an investment.

During the **operating phase**, future cash flows are determined from revenues derived from the project, i.e. the OPEX and COC. In other words, revenues obtained from the project itself cover the OPEX and COC incurred during a project. The relationship of the COC and the OPEX to cash flows can be determined as follows:

- REV - OPEX = FCF

⇨ Subtracting the OPEX from revenues returns yields to the free cash flow to firm (FCF)

- FCF = DS + ECF or ECF = FCF - DS

⇨ The FCF is equivalent to debt service (DS) plus equity cash flow (ECF)

Future cashflows and present value of wind power projects

<u>Present value</u> <u>(PV) of a wind project comes from (discounted)</u> **<u>future project cashflows</u>**

Operation

1. **Operating phase =** future project cashflows: <u>Revenues, OPEX and COC</u>:
    1. **Rev – OPEX = FCF** (reads: Revenues minus OPEX equals Free Cashflow to Firm)
    2. **FCF = DS + ECF** (= Debt Service + Equity cashflow) or: ECF = FCF - DS

Inv. & Fin

2. **Investment Phase** (Uses) & **Financing Phase** (Sources) = present project value: Debt & Equity
    1. **D = PV of DS** discounted at Cost of Debt or Debt Rate over Debt Tenor
    2. **E = PV of ECF** discounted at Cost of Equity or Expected Equity Return over Equity Tenor
    3. **EV = PV of FCF** discounted at effective cost of capital incl. debt rate and equity return
3. **Margin (M)** = EV – I = Entity Value less Investment = Sources less uses = Margin
    1. **EV = D + E** = Sources = Entity Value = Debt + Equity
    2. **I = Dvl + CapEx = Uses** = Invest = Developm. Cost (Dvl) + Capital Expenditures (CAPEX)

Figure 7: Relationship between future cash flows and the present value of wind power projects. Source: RENAC, 2018.

The initial cash flows (EV = D+E = C) of the financing volume in the investment and financing phase is a result of present values of the operational cash flows (FCF = DS + ECF) in the operating phase. The financing volume (source of funds) determines with the initial investment (uses of funds) the project margin (M = EV - I equal to EV = I + M). Both the financing volume and initial investment are market prices, independent of each other. This states that the financing volume depends on the future productive capacity of the project, monetized in project cash flows, and does not depend on the initial investment volume.

The relationship between D, E and EV to PVs of DS, ECF and FCF are as follows:

- D = PV of DS discounted at the cost of debt (debt rate) over debt tenor.
- E = PV of ECF discounted at cost of equity (equity return) over equity tenor.
- EV = PV of FCF discounted at cost of capital (COC) over project lifetime.

The **margin (M)** results by subtracting the amount invested (I) from the entity value (EV) or total financing volume, i.e. sources of funds less uses of funds. Initial investment costs comprise capital expenditures and development costs. In arbitrage-free markets, the EV compares to the sum of debt (D) and equity (E), formalized as: EV = D+E = C.

Decisions: During the investment phase, important decisions affecting the project's future viability are made. These include the turbine choice, the layout of the wind farm, contract and conditions for operations and management, grid connectivity etc., as shown in Figure 10. The cash inflows during the investment phase result from raising debt and equity (financing volumes) whereas cash outflows result from development costs and from CAPEX purchase of hardware, including the necessary periphery and construction services of the project.

The **operational phase** commences at commissioning date of the wind farm at its commercial operation date (COD). After COD the project starts generating its first revenues (cash inflows) by selling the produced energy at the contracted FiT (tariff) or price (P) given in a power purchase agreement (PPA) between the SPV and the off-taker, and incurs operational costs (OPEX) to pay for all services and goods provided. The operational phase lasts from the first year until the end of the economic lifetime of the turbines (usually 20-25 years). During this long-term period, cash inflows from revenues (Rev) are continuously generated by selling the the annual energy production (AEP) at a given tariff or price (P) or tariff.

Revenues are driven by the price (P) paid for the produced energy at and by the quantity (Q) produced/sold (annual energy production, AEP) by the plant. The revenues (Rev) generated are the product of the price per unit (P) multiplied by the quantity of units sold (Q) or AEP, formalized in equation 13:

Equation 13: Calculating revenue from tariff or price (P) and AEP or quantity (Q).

Rev = P*Q (as shown in *Figure 10*)

Operational costs (OPEX) are covered by the generated revenues to keep the project running. As a rough rule of thumb, the OPEX usually amounts to approximately a sixth and up to a third of revenues depending on country, project, location, technology, time and other factors. Countries with higher cost of capital (COC) tend to compensate COC with lower OPEX. The remaining cash flow (revenues less OPEX) is called free cash flow to firm (FCF=DS+ECF) and is regularly split into debt service (DS) and equity cash flow (ECF). Figure 10 illustrates the zero-sum relationship of revenues financing OPEX, DS and ECF, formalized: REV-(OPEX+DS+ECF)=0.

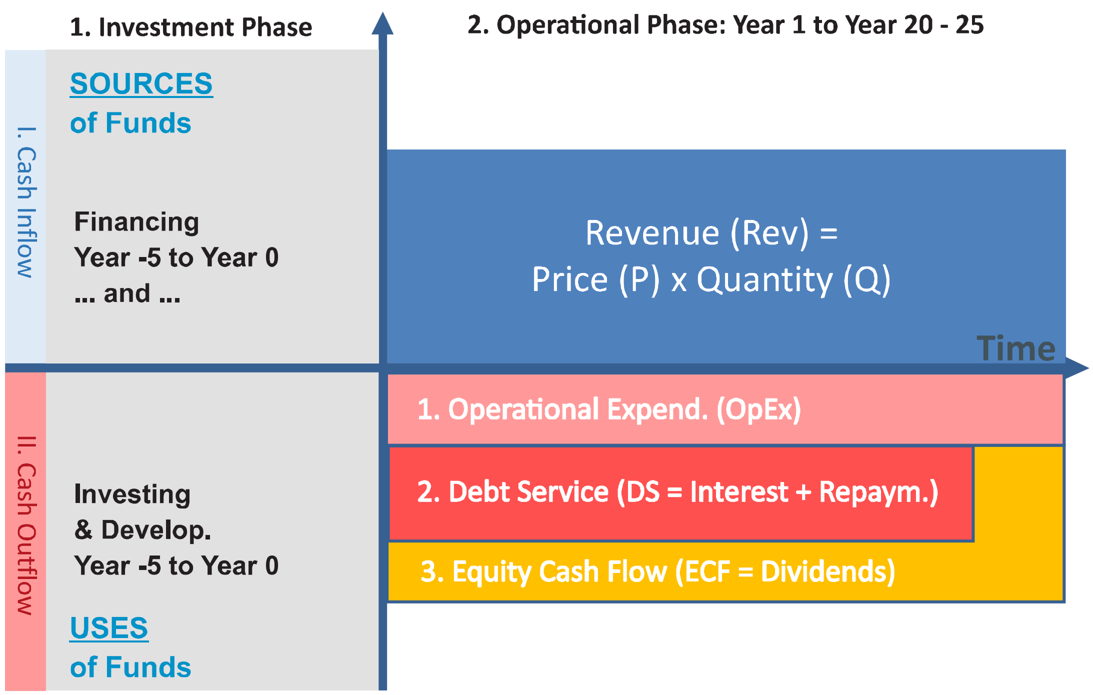


Figure 8: Cash inflows and outflows during the investment phase. Source: RENAC, 2016.

As shown in Figure 10 two cash flows of DS and ECF will be spent in the future - to service the initially invested capital or financing volumes of debt and equity - on paying interests on outstanding debt and dividends on equity, as well as on successively repaying the outstanding debt and equity. As equity is formally not repaid, dividends can be calculatorily divided into payments of the required rate of return (or interests) and repayment of the principal.

As shown in Figure 11 in more detail, future revenues (cash inflows) in the operational phase cover all cash outflows of operational expenses - such as fixed and variable OPEX and taxes - and capital cost such debt repayments and interests and dividends on equity. These future cash payment of debt service and equity dividends (together COC) are precisely what funds the present day's debt and equity volume raised in the investment and financing phase. In turn, this process allows for the payment of the manufacturer's bills in the present day. In other words: the cash inflows that the SPV's or project's assets (turbines) are supposed to generate become the future cash flows that allow for the initial financing to pay the all investment costs necessary to purchase the project's turbines (and all other necessary hardware and services until COD) in the first place.

The approach, where the financing volume is determined by future project cash flows is called: **value- or cash flow-based project financing**. Value-based financing volumes are therefore independent from investment costs and are not based on the investment costs. A typical project financing usually employs two main types of capital i. debt and ii. equity, both possessing different capital conditions. Debt has a limited fixed income and therefore avoids risk as much as possible, while equity seeks high return and has to bear the associated risks.

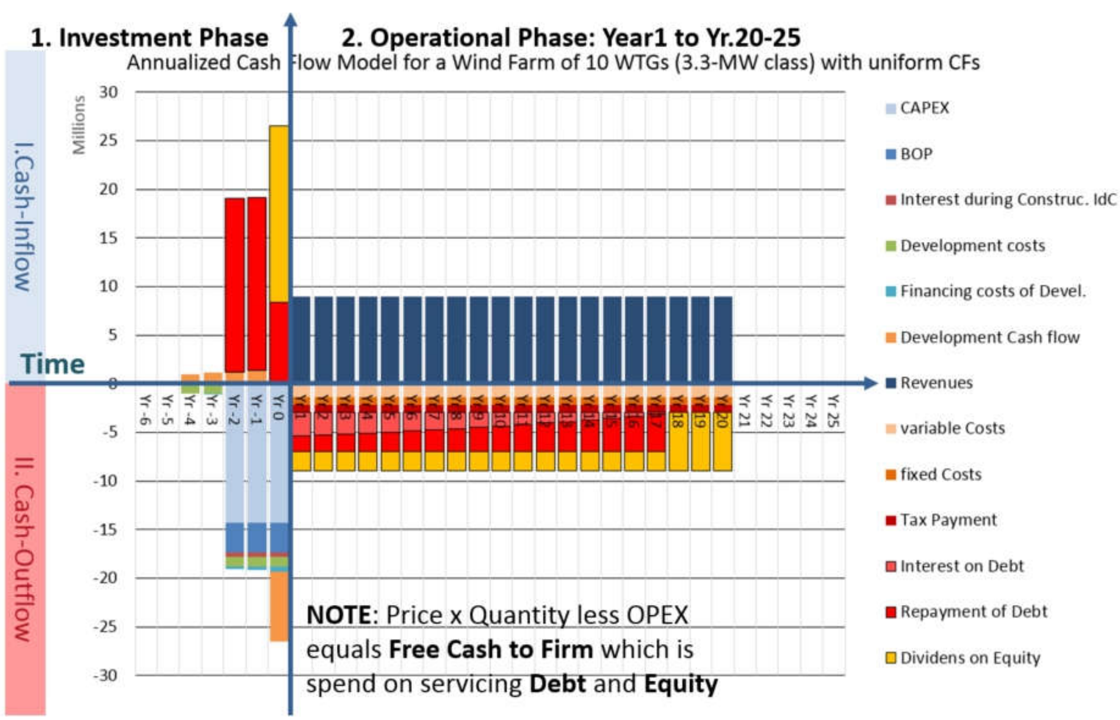


Figure 9: Future revenue cash inflows during the operational phase funds the present day's investments. Source: RENAC, 2016.

The institutional capital market provides further types of funding. Another main form of funding is regularly provided from **entity investors**, who do not require or wish for any debt funding in the project. Consequently, entity investors are interested in debt free projects. Their investment can be understood as providing debt and equity combined. Therefore, they provide/invest approximately the amount equal to the sum of debt and equity and are consequently entitled to receive the sum of debt service and equity cash flow in return. As stated above, this is equivalent to the amount of free cash flow to firm (FCF).

The generalizing figure 12 depicts the present value-relationship between future free projects cash flows (FCF=DS+ECF) and today's financing volumes (EV=D+E). In arbitrage-free markets, the type of funding is inconsequential when deriving the market value of the project. In other words, funding a project with debt (D) and equity (E) should be comparable in terms of today's (present) value to funding the same project via entity investors providing the entity value (EV). If this is not met, arbitrage is possible and projects will be traded until the gap in the value closes.

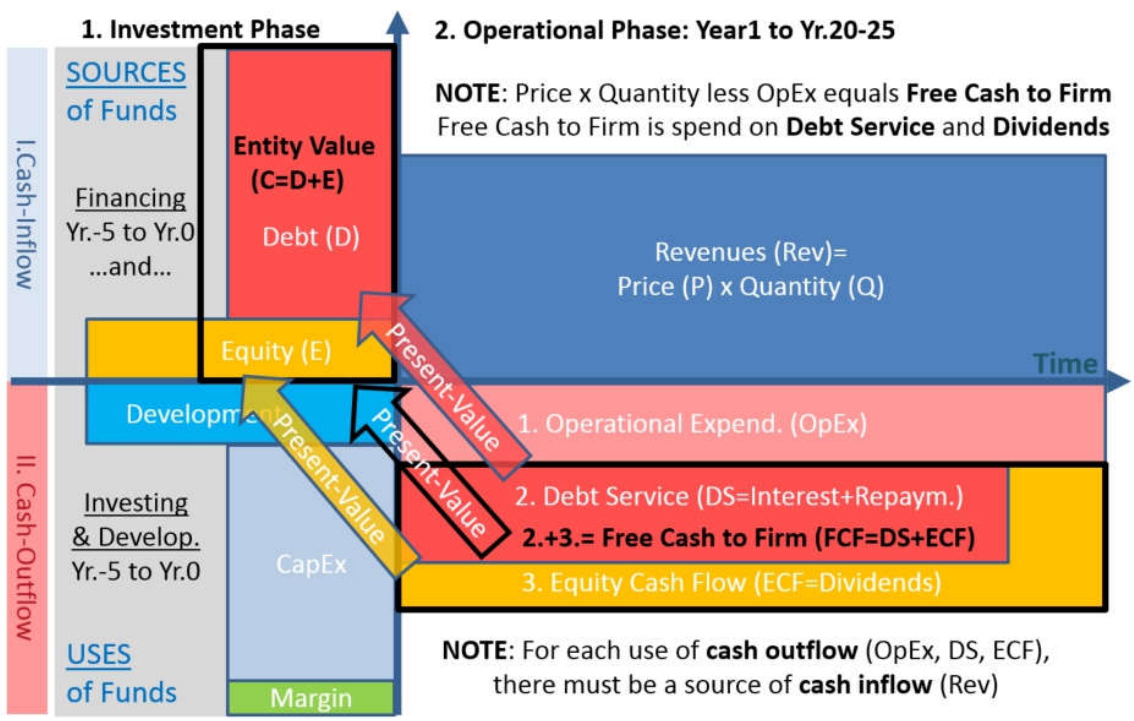


Figure 10: Relation of PV to FCF and entity value (EV = D+E). Source: RENAC, 2018.

Consequently, the capital conditions of entity investors differ from debt and equity in terms of tenor, interest rate, DSCR and alike but compare in terms of (present) value, because FCF equals DS plus ECF, thus the (present) value of FCF has to equal the (present) value of debt plus equity (but all three discounted at different rates). In functioning arbitrage-free capital markets, the resulting initial investment volume or entity value of a project that an entity investor is willing to invest should be close to the sum of what debt and equity investors would be willing to provide. In this instance, it would make no difference to the developer which type of funding is chosen, as the total funding volume remains the same. Nevertheless, multiple factors determine the conditions investors require their investment targets to adhere to in practice. Therefore, the funding volumes can differ by a significant amount.

Developers - on the financing side - need to carefully compare all bank term sheets received in a finance tendering including as well different SPA-offers from equity investors in order to find the most relaxed funding to maximize the project value and margin. On the investment side - to maximize the project value and margin - the developer needs to assess which turbine type offered for from different manufacturers is the most attractive in terms of minimizing the expenses of the turbine's purchase price and maintenance costs with regard to its given AEP.

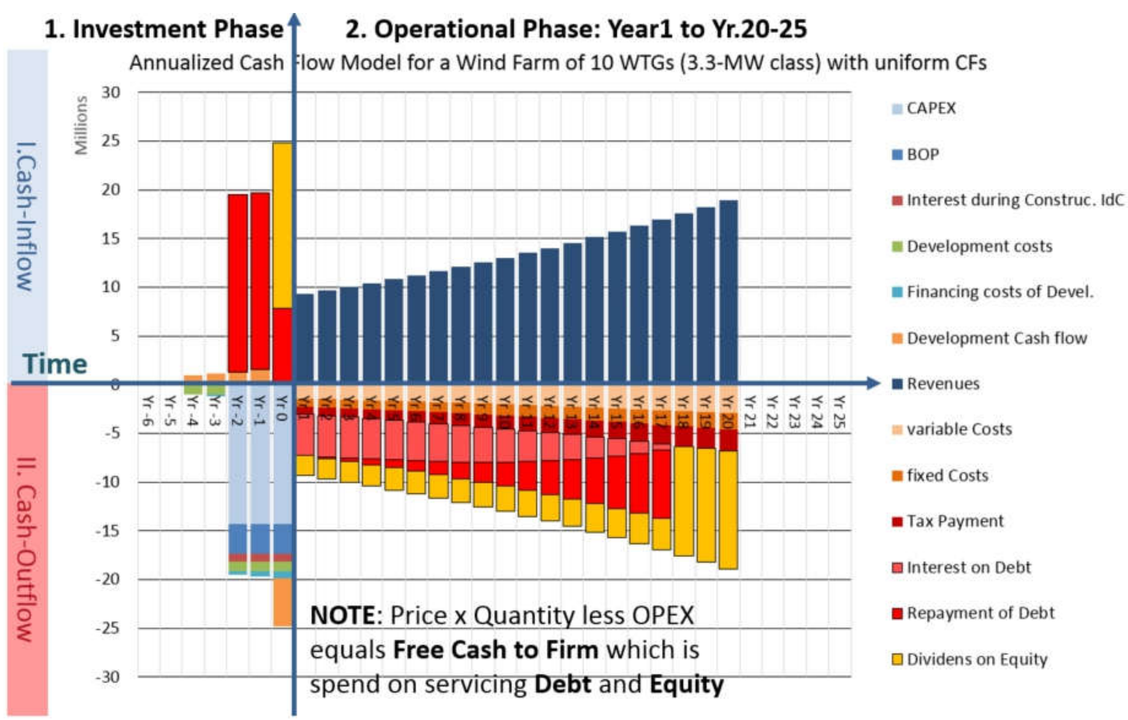


Figure 11: Uniform project cash flows, project value with inflation. Source: RENAC, 2018

Figure 13 shows in more detail the same uniform cash flows including inflation as given in figure 11 without inflation. Assuming inflation is affecting all project cash flows i.e. revenues, (fixed and variable) OPEX and taxes, the present value of the project remains theoretically unchanged if the cost of capital (COC) increase with inflation in a way that additional free cash from inflating revenues is exactly compensated by corresponding increased OPEX and capital costs resulting in higher payments of debt interests and higher required dividend payments.

Recap

Answer the following questions on the basics of wind power financing

1. Combine the concepts of PV, discount rates of free cash flow to firm (FCF), debt service (DS) and equity cash flow (ECF) into a simple equation.
2. Suggest how the project margin can be derived from cash flows using a formula.
3. Which costs are more relevant for debt and equity: OPEX or COC?
4. Why is the effective COC higher than the simple WACC?

(WACC: weighted average cost of capital, COC: cost of capital, FCF: free cash flow to firm, DS: debt service, ECF: equity cash flow, OPEX: operational expenditures.)

Solutions

1. Combine the concepts of present value (PV), discount rates of free cash flow to firm (FCF), debt service (DS) and equity cash flow (ECF) into a simple equation.

PV (FCF) at eff. COC = PV (DS) at debt rate + PV (ECF) at equity return

2. Suggest how the project margin can be derived from cash flows using a formula

Project margin = Debt + Equity - (CAPEX + development) = PV(DS) at rate debt + PV(ECF) at return equity - (CAPEX + development)

3. Which costs are more relevant for debt and equity: OPEX or COC?

OPEX only contribute a fraction of revenues as the residual (of revenues) is paid on servicing debt and equity. In wind power projects, OPEX are around 15-35% of revenues. Cash flows on capital service are 2 to 5 times higher (65%/35% to 85%/15%) than those spent on operation.

4. Why is the effective COC higher than the simple WACC?

Unlike the COC, the WACC assumes “growing concern” for corporate finance, which implies infinite, constant or continuously growing (=uniform) cash flows. Based on this assumption, projects have a finite lifetime and have to fully repay all debt during this period, whereas in corporate finance, debt can be rolled over. The additional cash spent on redemption increases the total cash outflow and the effective capital cost.

Supplementary exercise

Answer the following questions with the help of the following equations. (All formulas have been edited in a manner to ensure that that the numeric part can be copied to Excel for verification.)

(The equations needed to calculate the NPV and PV are once again repeated here for ease of calculation):

$NPV = -CF_0+PV = - I+PV$

$PV = \sum \{CF_i *DF(r, t)\} = \sum \{CF_i/(1+r)^t\}$ with $DF(r, t) = 1/(1+r)^t$

1. Calculate the PV and NPV at 5% (0.05) and 10% (0.10) using equations given above.

Cash flow over time	**PV & NPV at 5% (0.05)**	**PV & NPV at 10% (0.10)**
Pay in t0 - 50 get in t1 +10 get in t2 +20 get in t3 +30	PV = +10/(1+0.05)^1 +20/(1+0.05)^2 +30/(1+0.05)^3 PV = +53.6 NPV = -50+53.6 = 3.6	PV = +10/(1+0.10)^1 +20/(1+0.10)^2 +30/(1+0.10)^3 PV = +48.2 NPV = -50 + 48.2 = -1.8

2. Pay 50, get 12 for 5 yrs. Calculate the PV & NPV at 5% & 10%. Use annuity factor.

Cash flow over time	**PV & NPV at 5% (0.05)**	**PV & NPV at 10% (0.10)**
Pay in t0 - 50 get in t1 +12 get in t2 +12 get in t3 +12 get in t4 +12 get in t5 +12	PV = +12*AF = 12*(1-1.05^-5)/0.05 = 12*4.33 = 52.0 NPV = -50+52.0 = 2.0	PV= +12*AF = 12*(1-1.10^-5)/0.10 = 12*3.79 = 45.5 NPV = -50+45.5 = -4.5

3. Pay 100, get 121 in t2 (0 in t1). Calculate IRR, YTM, YTD and PV at 10% in t1.

IRR = ((121/100)^(1/2))-1 = 10%
In t1: YTM_{t1} = 121/100-1 = 21%

YTD_{t1} = 0/100 = 0%

PV = 121*1.10^-1 = 110

4. Pay 80 for a stock, get a dividend of 4. Calculate PV and NPV at 5% and 10%.

PV & NPV at 5% (0.05)	PV & NPV at 10% (0.10).
PV = +4/0.05 = 80 NPV = - 80+80 = 0	PV = +4/0.1 = 40 NPV = - 80+40 = -40

5. What is the return on investment (ROI)?

   It is the internal rate of return (IRR) of free project cash flows on total capital invested. This is equivalent to the sum of debt and equity.

6. What does the return on assets (ROA) refer to?

   It refers to the IRR of free cash from asset on asset value (book values).

7. What does return on equity (ROE) mean?

   It can be defined as the IRR of dividends on equity.

8. What is the WACC?

   debt/(debt + equity)*debt rate + equity/(debt + equity)*equity rate

9. What is the COC?

   IRR of capital interests and repayments on capital volume.

10. What is the LCOE?

    Levelized cost of energy: present value of all costs divided by present value of energy.

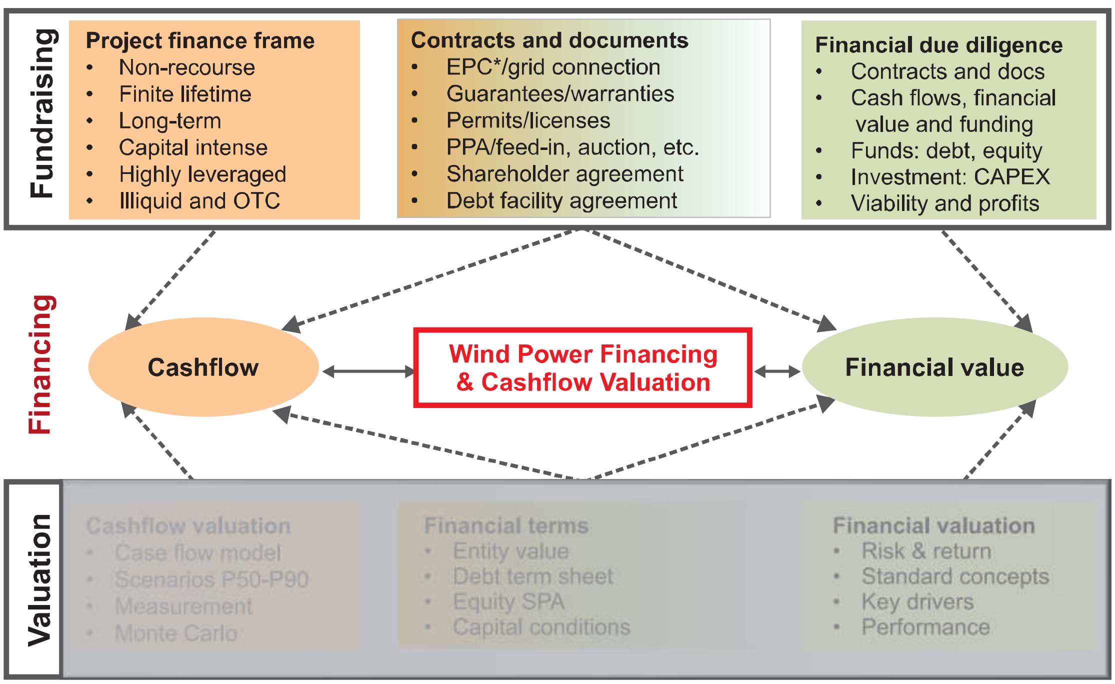
*costs include: investment costs, operational costs and capital costs (repayment and interests)

02

Wind power finance process

2 Wind power finance process (Fundraising)

This chapter gives an introduction to the wind power financing process. In the first subsection, wind power project finance – including the key players for wind project finance – will be discussed. This subsection will also cover the sources and types of financing available, as well as the differences between the wind power finance process and corporate finance. Following this, the methods, structure and contracts of wind power financial due diligence will be addressed in depth. The end of the chapter focuses on the contracts between the SPV (single purpose vehicle) and other players.



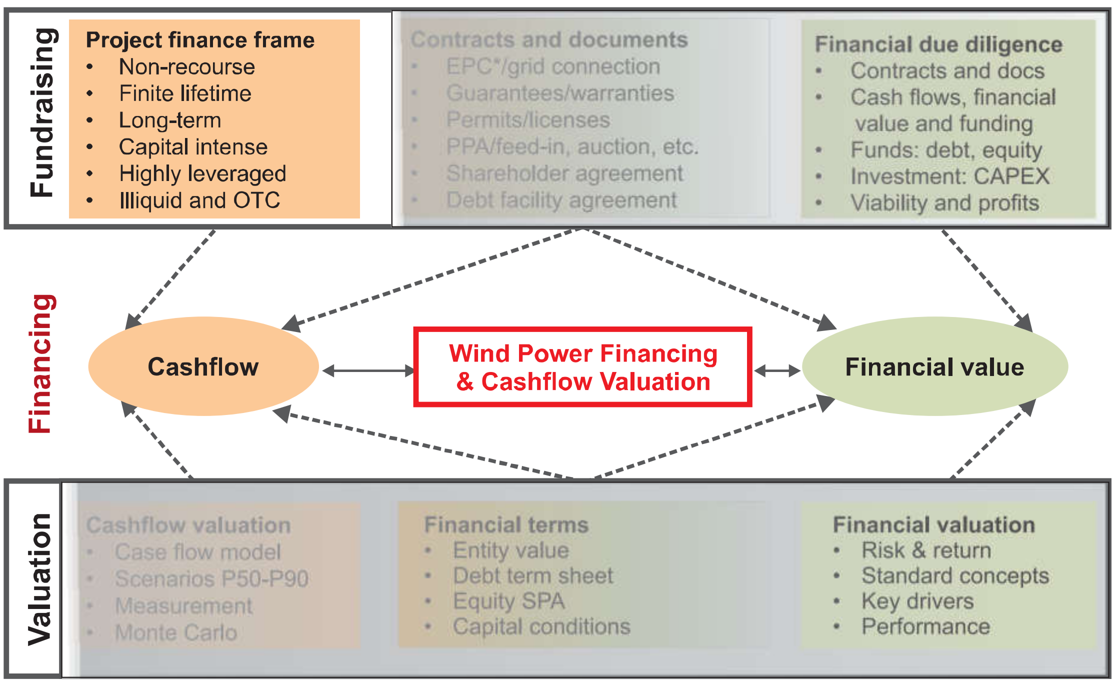
* EPC: Engineering, procurement and construction

This chapter aims to answer the following questions:

1. What is project finance and how can it be delimited from other types of finance such as corporate finance?
2. Who are the participants in project finance?
3. What structures and contracts are in place to enable project finance?
4. What are some sources and types of project financing?

2.1 Wind power project finance frame

The term "project finance" has no single definition but refers to projects that carry certain specific qualities. It usually includes a long-term, capital intense financing of a clearly defined project with a finite lifetime. This is accomplished via a legal entity called the single purpose vehicle (SPV) that acts as a borrower. These projects are often highly leveraged with non-recourse loans. A non-recourse loan implies that the only collateral for lenders is the project cash flow and, as such, all of an SPV's assets are pledged so that in the case of a default the lenders assume control. This protects shareholders under non-recourse financing from excessive project risks.



* EPC: Engineering, procurement and construction

Although a broadly accepted definition of project finance is lacking, here are some common features it covers as defined by various renowned institutions:

- "off-balance-sheet financing of the project, which will not affect the credit of the shareholders or the government contracting authority and shifts some of the project risk to the lenders in exchange for which the lenders obtain a higher margin than for normal corporate lending" (World Bank Group, 2016).
- "lenders and investors rely either exclusively ("non-recourse" financing) or mainly ("limited recourse" financing) on the cash flow generated by the project to repay their loans and earn a return on their investments" (European PPP Expertise Centre, 2015).

2.1.1 Purpose of wind power project finance

The purpose of project finance is to enable long-term, non-recourse debt finance of risky projects catering to industrial or infrastructure needs. It provides lenders with the necessary comfort (risk protection) and high leverage to boost the project's equity returns to attractive levels. These aims are accomplished by incorporating non-recourse finance while also protecting equity investors from excessive project risks, which means that equity investors can lose their investment but are not obliged to cover default costs exceeding their initial investment in the case of a default.

Thus, project finance serves as a vehicle to align the preferences of debt and equity with the individual and complex return and risk structures of large (infrastructure) projects. Size is an important and attractive factor as it enables scale effects in fees to reduce transaction costs relative to the total project financing volume.

2.1.2 Delimitation to corporate finance

Project finance can be differentiated from corporate finance based on the following dimensions:

- Type of capital:
    - Finite – time horizon matches life of project for project finance as opposed to corporate finance where the lifetime period is assumed to be infinite.
- Cost of capital:
    - Relatively higher for project finance as compared to corporate finance.
- Capital volume:
    - Project finance might require critical mass to cover high transaction costs.
- Financing vehicle:
    - The single/special purpose entity/vehicle, SPV, acts as the financing vehicle in project finance.
- Financial structures:
    - Highly tailored structures are intrinsic to project finance. Typically, these structures cannot be re-used for other projects owing to their specificity.
- Transaction costs for financing:
    - Project finance would usually have higher costs as compared to corporate finance due to extensive documentation and a longer gestation period.
- Lenders:
    - Capital investment decisions have to be highly transparent to creditors unlike corporate finance in which a certain degree of obscurity is tolerated
- Lenders basis for credit evaluation:

- In order to perform credit evaluation, a technical and economic feasibility study is carried out. The evaluation focuses on the project's assets, cash flow and contractual arrangements.

- Investor/lender base:
  - There is a smaller base group for project finance as opposed to corporate finance and the former is typically limited in secondary markets.
  - Dividend policy and reinvestment decisions: fixed dividend policy means immediate pay out and no reinvestment allowed.

2.1.3 Participants

The participants in project finance are numerous and may have different views on the same project. Their responsibilities and roles are dependent on the countries they are operating in. The main participants in project finance include:

1. Governments (governments may take several roles, especially in centralized countries).
2. Project sponsor(s) or developer(s).
3. Project company, special/single purpose vehicle (SPV).
4. Lender(s) or debt investor(s) (commercial banks).
5. Shareholder(s) or equity investors (retail or institutional investors).
6. Contractor or Engineering & Procurement Contractor (EPC) delivers turn-key ready project to investors.
7. Operator and manufacturer, O&M/supplier(s).
8. Off-taker or grid operator via tariff system or power purchase agreement (PPA).
9. Others: multilateral agencies (WB, IFC, EBRD), capital markets, export credit agency (ECA), financial and legal advisers, public support schemes and subsidies, plus others.

2.1.4 Structure and contracts

The Figure below shows the nexus of contracts between various parties and the project company (SPV) in a wind power project. Sponsors and general partners (Equity) as well as third party investors finance the wind power project. In addition, banks may also provide project debt financing. Local authorities or governments handle the granting of permits for contracts to proceed. Examples of such permits include building permissions as well as operational and environmental licenses. Other necessary contracts include land lease contracts for the right to build on land belonging to other landowners. Insurance contracts are also secured to help protect projects against the risks they incur during their lifespan (which includes the construction, operation and decommissioning phases).

Nevertheless, it must be taken into consideration that not every party has necessarily a direct contract with the project company. For instance, the turbine supplier is accountable for delivering the WTGs and negotiates a turbine supply agreement either with the EPC contractor (engineering, procurement and construction) or with the project company (SPV) depending on whether the EPC in- or excludes the turbine supply agreement (TSA). The turbine supplier (OEM) regularly also assumes the role of the technical service provider if competitive, independent service providers (ISP) are excluded by lender's capital requirements. In this instance, the turbine supplier (OEM) provides a full-service operation and maintenance agreement (O&M) to the SPV. Differing or overlapping roles are often observed between the project developer, sponsor and final equity investor and sometimes even the EPC-Contractor.

Some turbine manufacturers even operate project development units, can act as sponsor and ECP-Contractor as well, thereby covering the whole value-chain of a wind power project.

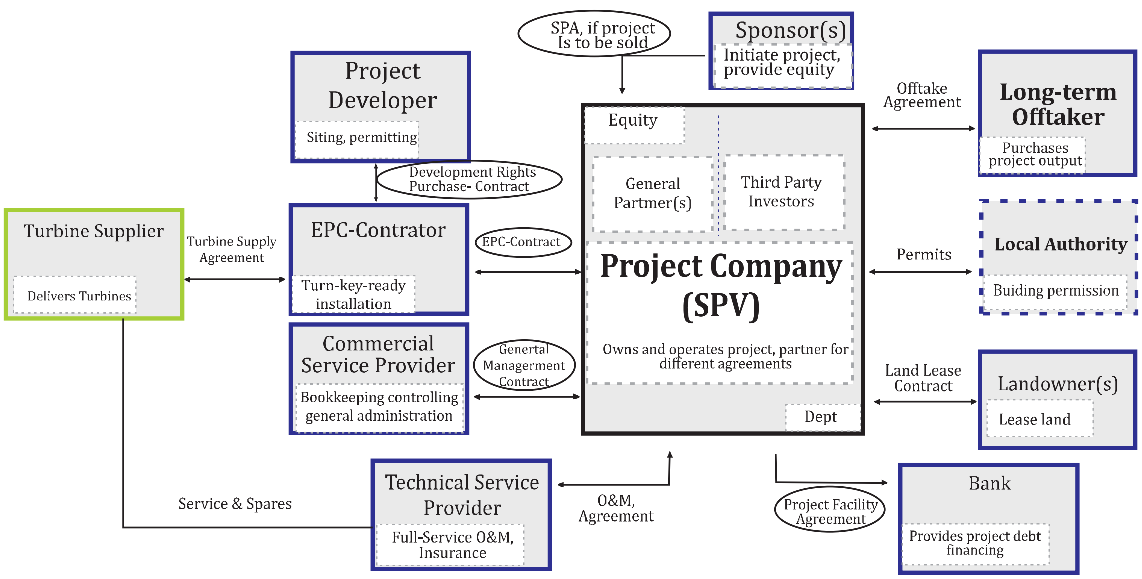


Figure 12: Nexus of contracts for a project company. Source: ENERTRAG AG, 2005.

2.1.5 Cash flows as value drivers

Financial value is rooted in future project cash flows and is realized in the investment phase prior to commissioning of a project. In other words, the long-term future cash flows of a project determine today's financing volume/capacity to finance today's investment costs.

The financial value of wind power is based on future project cashflows

1. **2 Types of cashflows**: i. **Inflows** (add value) and ii. **Outflows** (reduce value)
2. **2 Phases**: I. Investment & Financing and II. Operation (Revenues & Costs)

I. Inv & Fin

- **I. 2 Activities**: i. Fundraising (Sources of funds) and ii. Investing funds (Uses of funds)
  - **a. 2 (main) Sources**: i. Debt (banks) and ii. Equity (investors)
  - **b. 2 (main) Uses**: i. Capital expenditures and ii. Development costs

II. Operation

- **II. 2 Value drivers**: i. Price (Tariff) and ii. Quantity (AEP) driving Revenues
  - **a. 2 (main) Costs**: i. Operational expenditures & ii. Costs of capital (COC)
  - **b. 2 (main) COC**: i. Debt service and ii. Equity cashflow (Dividends)

3. **2 Margin drivers**: i. Sources (Debt + Equity) less ii. Uses of funds (Investing)

Figure 13: Project cash flows in a wind power project. Source: RENAC, 2018.

The two main investment costs in a project are CAPEX in construction and development costs. To finance these costs in the investment phase, equity and debt must be funded from shareholders (equity) and lenders/banks (debt), or from the capital markets (entity investors).

The debt volume is often derived from a conservative (P70- to P90-) perspective on future free cash flows. In this context, P70 and P90 means the probability of energy production exceeding a specific annual energy production with the indicated likelihood of 70% and 90% respectively. Lenders rely upon conservative banking estimate on production (AEP) when deciding how much to invest in a project to protect against risks causing possible defaults on debt service. The debt volume is derived from conservative estimates of revenues less OPEX (and taxes) of the next 12-18 years (debt tenor). However, equity is derived from the most likely future free P50-revenues less OPEX, taxes and debt service (equal to equity cash flow) for 20-25 years.

2.1.6 Sources of financing

Project finance is based on future project cash flows. Typical sources of finance are:

- Equity: private equity, institutional, closed end funds/low volume, high risk and return.
- Mezzanine: private equity, family business/low volume, medium risk.
- Debt: banks or multilaterals/high volume, low risk and return.
- Entity value: insurer, pension funds/high volume moderate risk and return.

Investment costs and CAPEX (uses of funds) are the market prices of suppliers and manufacturers. Project financing volumes (sources of funds) are market prices of capital and based on future project cash flows. Uses and sources of funds are therefore generally independent of each other, except regulation rules connect funding to investment.

2.1.7 Types of financing

Three typical forms of financing a wind power project exist. These include:

- Internal on balance with (full) recourse (corporate finance).
- Internal or external off balance, non-recourse (project finance).
- External capital market-based financing (market finance).

Financing on the sponsor's balance sheet (corporate finance)

Utilities or other sponsors with a strong financing capacity will finance small to medium-sized wind farms using their own cash/financing resources. These investment costs are derived from corporate financing or operating cash flows. Project debt is secured through the assets in the sponsor's balance. This manner of financing presents many benefits. These are characterized by easy, low transaction and capital costs, flexible financing structures, as well as "full recourse" to the sponsor's balance sheet (sponsor bears the default risk).

Project finance with limited or without recourse to the sponsor (project finance)

Large and risky projects developed by firms without access to corporate finance at reasonable costs are usually based on project finance. In this case, project debt is repaid during the operational phase of the wind power project, i.e. once the construction of the project has been completed.

While project debt is provided by banks and other financial institutions, project equity is paid for or invested by project sponsors or external investors. The project's creditworthiness and debt capacity exclusively depends on the project cash flows.

Financing using capital market products (market finance)

Instead of referring to project finance via commercial banks (financial intermediary), large infrastructure investments could try to access the capital directly (such as Eurotunnel). Financing using capital market products could employ project bonds placed directly at the capital market without intermediaries or employ forms of mezzanine capital like Breeze I-IV from the insurance company Unicredit Group.

Recap

Answer the following questions about wind power project finance

1. Name six key aspects of project finance.
2. Explain the general purpose of project finance.
3. Name five major participants in project financing.
4. Name four important relationships between two parties in project finance.
5. Briefly explain four differences between project and corporate finance.
6. Briefly explain three sources and three types of financing.

Solutions

1. Name six key aspects of project finance.
   Project finance is characterized by its non-recourse and often long-term, capital intense, infrastructure related, highly leveraged, risky nature.

2. Explain the general purpose of project finance.
   Its purpose is to enable projects that are difficult to realize due to their long-term and capital intense nature by shielding the equity investor from excessive project risk using a non-recourse legal structure.

3. Name five major participants in project financing.
   Main participants are: the government for permits or tariff schemes, project sponsors to develop a project in an SPV, shareholders and banks to finance CAPEX paid to the contractor (EPC) or manufacturer. This is done in order to ensure that the project would be able to pay the OPEX of operators/suppliers from revenues paid by the off-taker (tariff/PPA) that consultants (wind experts) helped to assess.

4. Name four important relationships between two parties in a project finance.
   Looking at a typical structure: the SPV is funded by equity and debt investors in the investment phase and invests these funds in hardware from manufacturers and in the services of suppliers in order to realize/build the project and enable its long-term operational phase, which itself is based on costs or payments for permissions and long-term land lease and grid connection and other contracts that are paid from the revenues of selling energy.

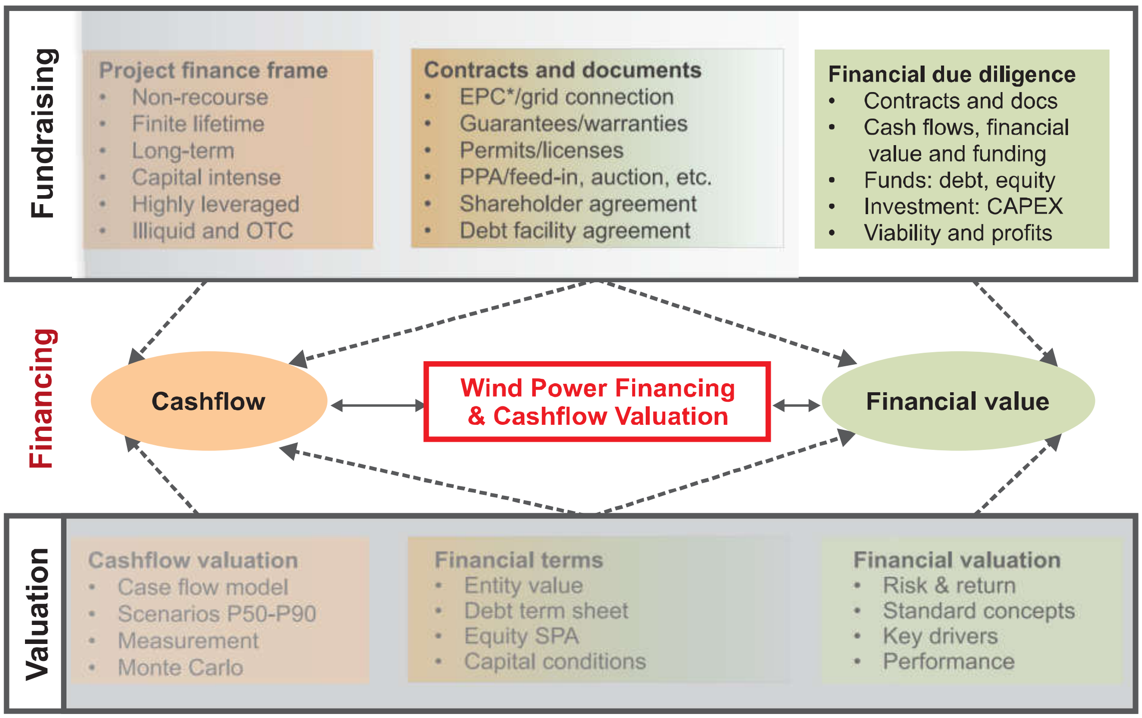
5. Explain briefly four differences between project and corporate finance.
   It is a non-recourse type of financing with a finite lifetime incorporating highly

transparent uses of funds and a highly tailored but illiquid nature of transaction with resulting transaction costs.

6. Explain briefly three sources and three types of financing.

   Debt from banks, equity from shareholders or entity value from large institutions can be used to finance a project internally off balance (non-recourse), or on balance or externally via the capital.

2.2 Wind Power Financial Due Diligence



* EPC: Engineering, procurement and construction

Source: RENAC, 2018

There is no standard definition that fully encompasses the meaning of financial due diligence. Key features of the technical term “financial due diligence” regularly comprise that it…

- is a transaction-oriented assessment (for buyers or sellers).
- is analysed in terms of financial return and risks of the target company.
- considers past performances and future prospects by analysing the consistency of company accounts, assets and liabilities and (if available) historic financial statements and reports.
- integrates further main findings of other due diligence reports in financial terms.
- verifies a project’s viability and whether it fits into the buyer’s strategy.

2.2.1 Purpose of financial due diligence

The purpose of financial due diligence can be described as the task to assess the viability of a project in a financing transaction. This assessment should be carried out according to the client’s aims or investment strategy by investigating the target’s financial history and projected future. Historic corporate reports and industry data and forecasts are key to conducting this analysis. Financial due diligence aims to identify financial key drivers of cash flows and financial value to quantify return and risk of a concrete project based on other due diligence findings, reviews, financial analysis and interviews. In the end, the findings are summarized in a comprehensive final report.

Financial due diligence should be governed by several general principles of behaviour (SCRIPT):

Substance (over form), **C**omprehensiveness, **R**igor, **I**ndependence, **P**rudence, **T**ransparency

These principles are no standard definition and differ by location, company and author, but provide an indication of the intention behind executing a financial due diligence.

2.2.2 Delimitation to corporate finance

Financial due diligence differs in its objective to corporate finance (e.g. from an audit). It is used to analyse return and risk (or the financial viability) of a target firm using differing methods in cooperation with the client (buyer or seller). Unlike an audit, it is not a guaranteed service and differs markedly from a tax/legal/operative/technical/human/ environmental due diligence. The following section highlights the main points of the above-mentioned forms of due diligence and from it we can observe the delimitation of financial due diligence to other types of due diligence.

Delimitation of financial due diligence to other types of due diligence

In the following subsection, a short overview of different types of due diligence will be given to highlight the difference to financial due diligence in terms of content and purpose.

- *Tax due diligence*
  - Review of the project's tax status and analysis of potential risks.
  - Tax planning related to the project's life cycle.
- *Legal due diligence*
  - Analysis of the legal and contractual relationships of the project company relative to its environment.
  - Review of the internal legal status of the project company.
  - Analysis of change of law risks.
- *Wind resource due diligence*
  - Analysis of wind regime on-site and annual energy production (AEP) predictions.

- Evaluation of uncertainties in AEP and its effect on business case.

- *Technical and environmental due diligence*
  - Analysis of wind farm layout, chosen technology and supervision of construction process.
  - Review of environmental study and permits.

- *Insurance due diligence*
  - Analyses if the insurance cover is adequate and covers all risks not borne by project contracts.

2.2.3 Methods, milestones and key issues of financial due diligence

Methods regularly used in a financial due diligence include reviews of historical data (such as financial statements), plus advanced financial analysis based on review results and internal interviews with relevant key positions. Institutions such as banks should already possess or build up the capacity to do an even more comprehensive form of due diligence than stipulated below.

The major milestones for an externalized financial due diligence process are:

1. Pitching to a buyer or seller (if outsourced to an external consultant).
2. Initializing and preparing communication documents and protocols.
3. Planning: scope/timeline/milestones and data gathering.
4. Main Part: financial analysis of return/risk, objectives/strategies/viability.
5. Result: drafts and final report.

There are several key issues in financial due diligence that affect the financial value of wind power. These include:

1. Real estate rights.
2. Permitting (federal, state and local).
3. Curtailment risks.
4. Force majeure (also known as “Act of God”).
5. Performance guarantees.
6. Termination rights.

2.2.4 Structure and contracts

To conduct wind power financial due diligence, several important project documents should be analysed to assess the financial risk and returns of the project. These documents would have to be considered to assess the performance of previous projects as well as the financial background of the company. Furthermore, the nexus of contracts as discussed in Chapter 2.1.5 should be made available for the due diligence process. By evaluating these documents in their entirety, a more thorough financial due diligence would result. The contracts should include:

1. Governmental permits/approvals.
2. Land leases and easements.
3. Equipment supply agreements.
4. Construction (balance of plant, BOP) contracts.
5. Warranty agreements.
6. Operation and maintenance contract (O&M).
7. Power purchase agreement (PPA).
8. Interconnection agreement.
9. Independent assessments (environmental, engineering, resources).

Recap

<u>Answer the following questions on wind power financial due diligence</u>

1. Which major aspects should a definition of financial due diligence cover?
2. What is the main purpose of financial due diligence?
3. How is one able to delimit financial due diligence from other types of due diligence (legal, tax, technical, HR, environmental)?
4. What does SCRIPT stand for?
5. What are the major milestones in the financial due diligence process?
6. Which methods are often used to gather necessary information for financial due diligence?
7. Name four main issues and four main documents for a financial due diligence?

<u>Solutions</u>

1. Which major aspects should a definition of financial due diligence cover?

   It should cover the verification and viability of a project through the assessment of risk as derived from future cash flows and accounts. This is usually done by the buyer/investor/bank prior to transactions.

2. What is the main purpose of financial due diligence?

   Its main purpose is to verify the viability of the investment and to quantify if expected return compensates risk from a financial perspective. It is crucial to understanding and evaluating the business case and its causal relations that will produce (return) and affect (risk) the project's resulting cash flows.

3. How is one able to delimit financial due diligence from other types of due diligence (legal, tax, technical, HR, environmental)?

   Financial due diligence uses the outcomes of other types of due diligences (legal, tax, technical, HR, environmental) as inputs to quantify the financial prospectus of the project. It focuses on the translation of given information into monetary values.

4. What does SCRIPT stand for?

   Substance, comprehensiveness, rigor, independence, prudence, transparency

5. What are the major milestones in the financial due diligence process?

In an externalized financial due diligence process, pitching a buyer or seller should be the first milestone. This should be followed by initializing and preparing the communication strategy. Planning the scope, timeline and data gathering would come next.

During the financial due diligence process itself, the returns/risks as well as the objectives/strategies and viability is financially analysed. Finally, interim drafts would need to be aligned and the final report checked and communicated.

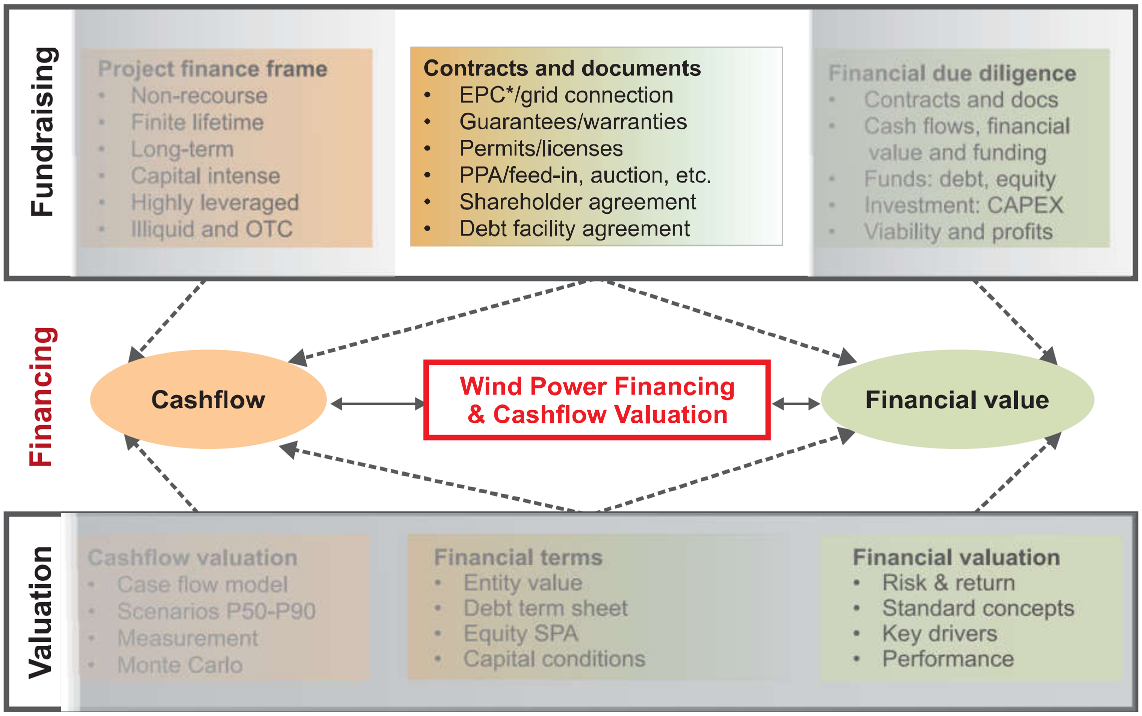
6. Which methods are often used to gather necessary information for financial due diligence?

Reviews of financial reports, financial analysis, interviews and forecasts are regularly employed. New SPVs without historical data rely especially on wind studies and long-term operational contracts.

7. Name four key issues and four main documents for a financial due diligence?

To ensure returns, the main risks that have to be covered include: issues with real estate and permitting rights, curtailment and force majeure, employing performance guarantees and termination rights. These issues are settled in contracts such as: the EPC, governmental permits and private (land lease and interconnection) contracts for construction and operation or a PPA and warranty agreements.

2.3 Contracts in wind power projects



* EPC: Engineering, procurement and construction

Source: RENAC, 2018

This section focuses on main contracts in wind power projects. The following contracts will be analysed in detail:

1. Engineering, procurement and construction (EPC) contracts and turbine supply agreements.
2. Grid connection agreements.
3. Power purchase agreements (PPA) or feed-in quotas or auctions tariffs.
4. Operations and maintenance agreements (O&M).
5. Land lease contracts.
6. Shareholder or sale and purchase agreements (SPA).
7. Project facility agreements (credit/loan).
8. Contracts with advisors: wind study, technical, legal, environmental reports.

2.3.1 Engineering, procurement and construction (EPC) and turbine supply agreement (TSA)

Engineering, procurement and construction contract (EPC)

The engineering, procurement and construction contract (EPC) is an agreement with a project management and/or construction company that purchases the turbines and/or peripheral hardware and constructs the entire wind farm on a turn-key basis.

The undertaking of construction risks between the project company and the contractor is a crucial element of a financeable project. In general, a creditworthy contractor must undertake the most significant construction risks in project financing.

Engineering, procurement, construction and the process of testing or start-up (often executed by the OEM), are four broad, general phases of project construction. Construction related contracts are usually structured to cover these phases (all-in-one or separately). In wind farm projects, the so-called EPC contracts combine the three stages of construction (engineering, procurement and construction) under one contract.

FIDIC: International Federation of Consulting Engineers

International EPC contracts are usually designed to follow the International Federation of Consulting Engineers (FIDIC) Standards. FIDIC was founded in 1913 and publishes standard sample contracts and forms on international construction projects. These include the FIDIC "Yellow Book" for power stations and engineering projects and the FIDIC "Silver Book", which was created in 1999 for turn-key projects. The goals and issues covered by the FIDIC Silver Book contract is given below.

FIDIC Silver Book contract: main goals

A project finance transaction is based on predictability of construction price, construction schedule and project performance. This requires the contractor to provide the complete scope of construction work for a project for a fixed price. This has to be completed and delivered by a pre-determined date and the output of the wind farm should be at previously agreed-upon levels. The FIDIC Silver Book contract aims to standardize these contract conditions and clauses for turn-key projects.

Standardization is achieved through the use of a fixed price contract with a clearly defined completion date. In it, the contractor is obliged to decide how the works for the project should be carried out. By doing so, the contractor fully bears the completion risk. The contractor must be creditworthy for this risk.

FIDIC Silver Book contract: main points

In return for granting predictability to the project company, contractors usually charge a risk premium. In addition, this may be supplemented by bonus payment clauses that can be agreed to motivate the contractor to complete the project before the scheduled completion date.

Standard conditions of FIDIC Silver Book

Standard conditions of FIDIC Silver Book contracts include the use of the contract document. This is a very short document highlighting the contract parties, the construction project, as well as the conditions and/or annexes to the contract.

- Schedule 1 – The Particular Conditions
- Schedule 2 – The General Conditions
- Schedule 3 – The Employer's Requirements

The particular and general conditions as seen in Schedule 1 and 2 of the FIDIC Silver Book are highlighted in the Table below.

1. General Provisions	11. Defects Liability
2. The Employer	12. Tests After Completion
3. The Employer's Administration	13. Variations and Adjustments
4. The Contractor	14. Contract Price and Payment
5. Design	15. Termination by Employer
6. Staff and Labour	16. Suspension and Termination by Contractor
7. Plant, Materials and Workmanship	17. Risk and Responsibility
8. Commencement, Delays and Suspension	18. Insurance
9. Tests On Completion	19. Force Majeure
10. Employer's Taking Over	20. Claims, Disputes and Arbitration

Table 1: Conditions of Schedule 1 and 2 in the FIDIC Silver Book. Source: fidic.org.

Wind project related annexes from Schedule 1 – The Particular Conditions are given in Table 2 below.

Annex 1: Power curve warranty for wind turbine
Annex 2: Turbine supply agreement
Annex 3: Form of performance guarantee
Annex 4: Schedule of payments
Annex 5: Form of direct agreement
Annex 6: Insurance details
Annex 7: Form of cut-through agreement
Annex 8: Escrow agreement
Annex 9: Initial project construction timetable

Table 2: Wind project related annexes from Schedule 1 – The Particular Conditions. Source: FIDIC Silver Book.

Schedule 3 – The Employer's Requirements refers to a project company or SPV. The employer's requirements describe the scope of work and functional specifications for wind turbines. These include the supply, transportation, installation, commissioning and warranties of the wind turbines and/or associated balance of plant for generating electricity and transmission to the electricity network. The schedule contains a detailed description of all technical hardware and services that the contractor has to deliver and procure under the EPC contract.

Appendix 1: Drawings and type approval certificates
Appendix 2: Building permits
Appendix 3: Environmental compensation plan
Appendix 4: Grid compliance specification
Appendix 5: Site investigation reports
Appendix 6: Spare parts
Appendix 7: Typical civil and electrical quality plans
Appendix 8: Wind farm electrical losses calculation

Table 3: Wind project related annexes to Schedule 3 – Appendices Employer's Requirement. Source: FIDIC Silver Book.

Turbine supply agreement

This subsection focuses on the usual warranties included in the turbine supply agreement. The general warranty period in turbine supply agreements usually lasts between two and five years. The liquidated damage payments (LDs) must be sufficient and established in the agreement.

The **power curve warranty** usually covers 95% of AEP (Annual Energy Production) which is derived with reference to the theoretical/warranted power curve.

Common issues concerning the power curve warranty

The warranties provided according to the AEP are based on many assumptions. Assumptions about wind speed distribution and/or air density are uncertain as they are dependent on the situation on-site and the differences in power curve values.

In addition, it remains unclear if the inferior performance of a specific wind turbine can realistically be proven. With reference to the International Electrotechnical Commission (IEC) 61400-12(-1) publication, the difference in performance is not measurable for all wind turbine generators after installation (due to roughness, barriers, turbulences). Therefore, a site calibration according to IEC prior to installation or special alternative procedures is necessary. This would then serve as a baseline for future efficiency measurements.

In the case of proven non-compliance, damage payments will be based on relative generation yield losses. In practice, the energy yield is usually reduced to an amount equal to the warranted performance.

The **availability warranty** issued by the OEM usually covers 95% to 98% of wind availability referenced to the whole wind farm or a single wind turbine generator (WTG). Portfolio warranties, which are usually granted to entire wind farms usually carry a higher availability warranty (98%) than single asset/turbine warranties. This is because the likelihood that all turbines in a single wind farm (portfolio) break down at the same time is much lower compared to a single turbine breaking down. Warranties are often issued in combination with a separate maintenance contract concluded with the manufacturer (e.g. the OEM such as Vestas, Siemens, GE, Goldwin or others).

Noise level/emission warranties are strongly linked to the time of the year the wind farm is in operation as well as the energy output. If the noise level exceeds the amount as stipulated in the operation license, the license would then be revoked.

Lastly, the warranty for the delivery period and availability of spare parts must also be stipulated in the turbine supply agreement.

2.3.2 Grid connection agreement

The grid connection agreement with a local medium/high voltage grid operator allows the wind farm to be connected to the electric power system so that its output can be distributed. In many cases, a separate grid usage agreement is necessary in addition to the grid connection agreement.

2.3.3 Power purchase agreement (PPA) or feed-in quotas or auctions tariffs

The PPA is a contract between the SPV and the buyer who purchases the facility's electrical energy output. In order to reduce off-take risk and ensure the project's bankability, this agreement should contain a defined purchase price for each kilowatt-hour (kWh) of generated energy for the duration of the project. The price has to be high enough to satisfy capital return and requirements.

2.3.4 Operations and maintenance agreement (O&M)

The operations and maintenance agreement (O&M) is a contract with a technical service company operating and maintaining the wind farm for the life of the project

Overview of operations and maintenance agreements

In a similar fashion to the construction contracts, O&M agreements in project financings have to provide the project company with a facility that performs within certain agreed performance criteria and at a fixed or reasonable cost. They have to be creditworthy in order for the project company to gain financing in the first place.

Typical contents of the wind farm O&M agreement might include:

- A detailed scope of work for all works necessary to operate the wind farm.
- Performance (i.e. turbine availability) guarantees.
- Liquidated damages for failure to satisfy performance guarantees.

If operating costs exceed previous estimates, the additional money needed for operations will need to come from maintenance reserve accounts.

Link between the O&M agreement, manufacturer warranties and insurance contracts

O&M providers should serve to guarantee the operational readiness of the wind turbine generators and all related equipment for the duration of the contract (this usually lasts between 5 to 15 years). During this period, the O&M providers are obliged to repair any arising faults at its own expense and to replace any components that are beyond repair within the constraints of availability. They are also obliged to collaborate in realizing compensation for claims against insurers. However, in the case of "force majeure" (Act of God), the providers are not obliged to conduct repair works at their own expense.

The obligation to repair does not apply in cases of damage liable to remedy under guarantee or for defects arising during the manufacture of the affected parts. In this case, the project company shall assert claims to compensation against the manufacturer for the affected parts of the installation. O&M providers might assist during compensation claims against plant manufacturers.

Should the availability of the wind farm installations affected by the repairs fall below the agreed percentage (95-98%), the O&M provider is required to compensate for the actual losses sustained up to an agreed percentage of the sales value based on the average annual yield of the affected installation. This occurs on the condition that indemnities are not paid in the context of the manufacturer's guarantee.

The O&M service can be purchased from the original equipment manufacturer (OEM) or an independent service provider (ISP).

Lenders often prefer or require long-term O&M contracts compared to the more expensive OEM as the former avoids spare part-risks or service defaults. Nevertheless, this comes at a higher cost, less debt and equity and a reduced project value.

Availability warranty

The availability warranty is defined as the number of times the WTG is not available due to manufacturer's fault relative the number of times it is available in a single operating year.

- Different calculation formulas, exclusion periods (e.g. service, etc.) and reference periods (month, year, warrantee period) can lead to different yield losses/compensation payments even with similar guaranteed values.
- Availability based on yield ≠ availability based on time; usually, yield availability < time availability.
- Damage payments in case of proven non-compliance are usually based on time relative generation yield losses.

Recap

Answer the following questions on the O&M agreement

1. What contents should be covered by an O&M agreement?
2. What is the difference between an OEM and an ISP?
3. What benefits to contract does the OEM bring as the O&M provider? What is the disadvantage of using the OEM as the O&M service provider compared to using an independent service provider (ISP)?

Solutions

1. What contents should be covered by an O&M agreement?
   A detailed scope of work, a performance guarantee, sufficient liquidated damages and optimally a maintenance reserve account (MRA).

2. What is the difference between an OEM and an Independent Service Provider (ISP)?

   The original equipment manufacturer produces the WTG and spare parts while an independent service provider only has the knowledge on its maintenance.

3. What benefits to contract does the OEM bring as the O&M provider? What is the disadvantage of using the OEM as the O&M service provider compared to using an independent service provider (ISP)?

   Benefits the OEM brings include spare part availability, big balance sheets, low default risks, deep technological knowledge, as well as the provision of a long-term contract to ease lenders. However, this comes at a higher cost compared to independent service providers.

2.3.5 Land lease contracts

The purpose of land lease contracts is to define the relationship between project companies and landowners to ensure access to the wind resource (in case land plots are not purchased).

Land lease agreements, options and purchase

The two options to land access and to get the right to install wind turbines on land for developers are through purchasing or leasing.

Purchasing: Land ownership has the advantage of providing long-term control of the project site, which would allow for new projects to be constructed after the useful life of the original project without the need to negotiate a new lease. Purchasing increases upfront investment cost but avoids operational lease costs and increases debt and equity value.

Leasing: On the other hand, leasing increases operating lease cost and reduces debt and equity value but avoids increased upfront investment cost for the land purchase. A prerequisite for any wind project development is the long-term access of the project company to the wind resource through long-term land rights or purchases.

Developers usually try to obtain long-term land leases for their projects. Two lease phases are often involved: the option phase and the long-term lease phase.

The purpose of the option agreement is to determine if a land plot has a strong wind resource. The developer must gain access to the land to install wind measurement equipment.

A long-term lease phase will be opted for when testing during the option phase reveals a good wind resource and other factors indicate the project is feasible. If not, the option agreement can expire. Short-term option phase and long-term lease agreement can also be included in a single agreement.

Reasons to lease: Landowners might be interested in leasing their land to wind farm projects for a few main reasons. Firstly, an increased income may be obtained through the wind farm project. At the same time, most of the leased land stays available for farming around the turbines, since in typical multi-turbine projects less than 5% of the land is occupied.

Income diversification is yet another advantage of leasing land for wind farm projects as whether a farmer's fields lie fallow (due to seasonal changes, etc.) or are in production, a farmer will receive continuous payments from the lease.

Leasing land also provides the opportunity for economic development in the local community. Wind energy development can support the development of the local economy through the creation of skilled jobs, including manufacturing turbines or building and operating wind power projects, and through increased tax income to the local community.

Major issues to be addressed in a lease

Contract Content (Elisabeth Haub School of Law, 2011)

- **Term of the lease.** Wind power leases generally last from 20 to 50 years and usually include the option for extending the lease. A typical wind power project is productive between 15 to 25 years.
- **Area leased.** “The lease should clearly state where wind turbines, roads, construction storage areas, and operations and maintenance areas can be located. Because construction and major repairs require more activity on the land than routine operations, the lease should include a provision for temporary land use during such periods for equipment storage, cranes, and other construction, operations, and maintenance activities.” (Elisabeth Haub School of Law, 2011 pp. 8.)
- **Approved uses.** The lease should stipulate what land uses are retained by the owner for the area encompassing the turbines. The landowner typically reserves the right to continue to grow crops, raise cattle or otherwise use the land.
- **Access.** The wind power facility needs to be accessible both by land and via electrical cabling. Easements are frequently used for this purpose. Additional payments may be made for these items, particularly if a different landowner owns the land where the roads or cables cross.
- **Decommissioning.** Provisions for decommissioning the project at the end of the operational stage should be included in the lease. These provisions include: removing wind turbines, wiring which penetrates above-ground, as well as the superficial layer of foundations for the turbine and returning the land as nearly as is practical to its original condition.
- **Assignment.** Granting the developer the right to sell, assign, encumber, transfer or grant easements under the lease without the landowner’s consent, especially to the financing parties.

Lease Payment

- **Remuneration.** Pricing can be agreed upon in numerous ways, depending on the individual requirements of the landlord and the developer.
- **Principle remuneration options** are:
    - **Fixed lease** payments with periodical step-ups and/or indexation.
    - **Variable lease** payments are defined as a percentage of total wind farm revenues, often including a minimum payment.
    - **Upfront payment** and small fixed or variable payments over time.
    - **Combinations** of the above-mentioned options: often some part of the land lease payment is paid upfront, while some part remains as annual payment.

Recap

Answer the following questions on land lease contracts

1. Which two principle options allow access to wind through land?
2. Why do lease contracts often have two phases and a developer's option?
3. Which remuneration options are common for land lease contracts?
4. What are some of the typical contents of a land lease contract?
5. What is the better solution economically?

Solutions

1. Which two principle options allow access to wind through land?
   Land purchase or land lease for the project developer.

2. Why do lease contracts often have two phases and a developer's option?

   The purpose of the option phase is to determine if a land plot has a strong wind resource. On the other hand, the long-term phase comes about due to successful testing during the option phase determining that the wind project is feasible.

3. Which remuneration options are common for land lease contracts?
   A variety of options are available including upfront payments, fixed payments, variable operational payments or a combination of these options.

4. What are some of the typical contents of a land lease contract?
   Proven area specification, lease tenor, remuneration access-, use- and assignment-rights, decommissioning obligations, plus special options and clauses.

5. What is the better solution economically?
   This depends on the commercial conditions of the lease agreement and the price to access financing to pay for an upfront lease prepayment.

2.3.6 Shareholder or sale and purchase agreement (SPA)

The shareholder or sales and purchase agreement (SPA) is concluded between the owner(s) of the project company and defines their rights and obligations. When the project is sold, it is formed between the sponsors of the project and the project company.

Buying projects or development work

Two types of deals exist for buying projects or development work: share deals and asset deals. Share deals are preferred by sellers as they provide tax advantages and all risks and responsibilities are transferred to the buyer. Buyers prefer asset deals, as the sale of each asset individually is complicated. Furthermore, asset deals are fully taxable on the seller’s level, which is advantageous for the buyer. The following diagram highlights the differences between share and asset deals.

Share Deal

- Preferred by the seller
- Provides tax advantages for the seller
- Transfer of all risks and responsibilities
- Substantial level of representations and warranties
- Difficult for the buyer, because step-up is not possible

Asset Deal

- Fully taxable on the seller‘s level
- Buyer has automatic step-up
- Separate sale of each asset is complicated
- Purchase of partnerships are always treated like asset deals for tax purposes

Figure 14. The differences between share deals and asset deals. Source: RENAC, 2006. Adapted from Achleitner, 2002.

Sale and purchasing agreements (SPA) – specifications

The SPA outlines several specific conditions that both the buyer and seller must adhere to within the transaction. These include a thorough description on items to be purchased, the price to be paid, the payment mode, plus representations and warranties. The following Figure presents aspects of the SPA contract that are usually detailed.

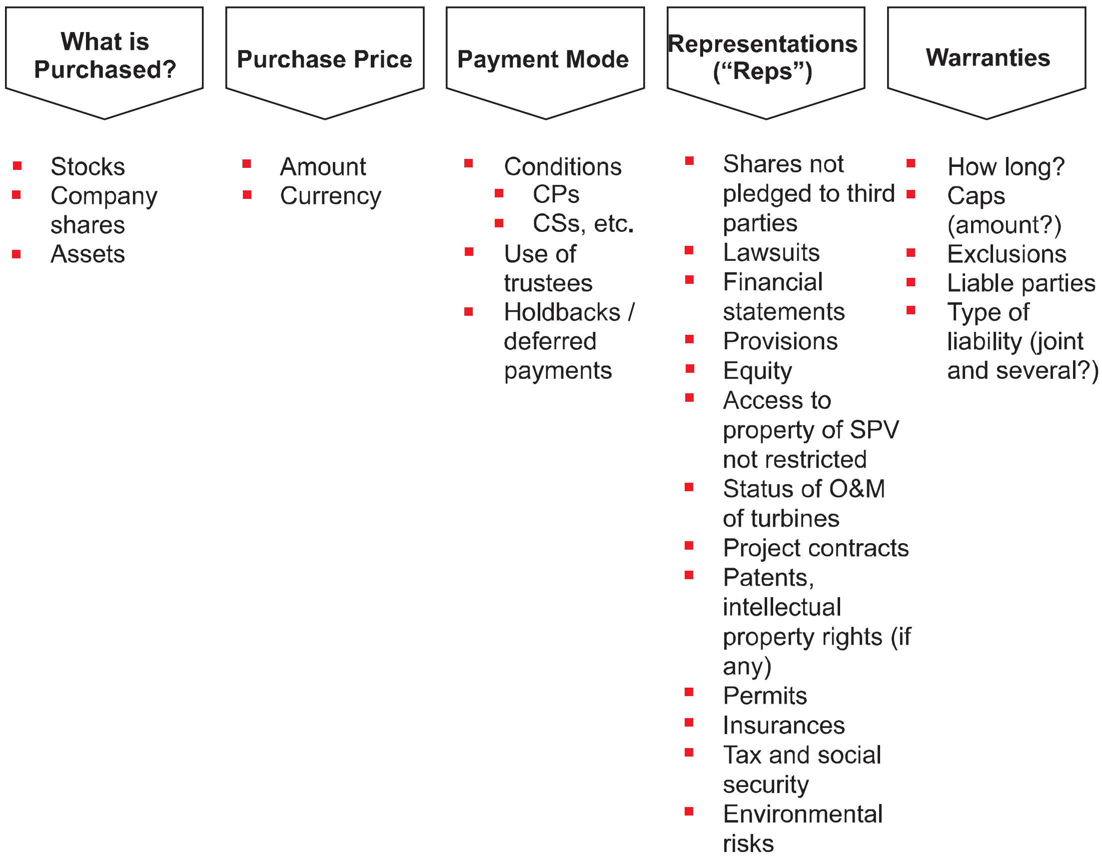


Figure 15: Specific conditions of the SPA that buyers and sellers must adhere to. Source: RENAC, 2006. Adapted from Achleitner, 2002.

Important clauses in the shareholder agreement

Several clauses in the SPA stress upon specific conditions buyers and sellers must adhere to. Clauses detailing the shares bought or sold are crucial to frame in this context. Some sellers have different types of shares, e.g. ordinary shares and preference shares. This is particularly important in terms of financial compensation in the event of liquidation where the holder of preference shares will get a higher priority or a greater claim to assets in a project. Many will also receive a fixed dividend distribution. In addition, holders of preference shares will also get an increase in the control rights of payments in case of arrears. The SPA further elaborates the conditions under which shares are sold. Absolute conditions like not allowing the disposal of shares in favour of third parties are clearly stated in the agreement. Other important clauses include the approved transfer modes to defined parties and exit regulations. The latter details the payout of shareholders and pre-emptive rights, as well as requirements and rights to sell, including “tag along” and “drag along” scenarios.

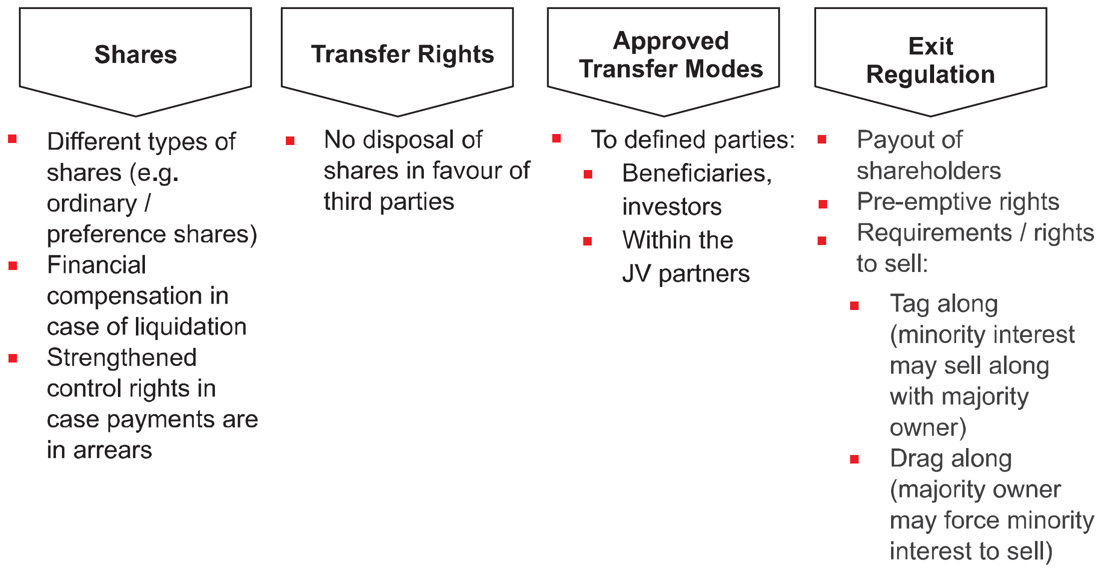


Figure 16: Clauses in the SPA detailing transfer rights and exit regulations. Source: RENAC, 2006. Adapted from Achleitner, 2002.

Contracts between joint venture partners

Several contracts exist between joint venture partners in a wind power project. A summary of the various agreements and contracts are given in the Figure below.

Shareholder agreements encapsulate the legal regulations and the types of shares available for buying/selling in the project. Approved modes of transfer (to specific parties), pre-emptive rights and additional stipulations on forced share transfer are also detailed in the agreement. Information on other governing bodies that might have a stake in the project is also included in the agreement.

A joint venture agreement serves to establish a commercial enterprise between two or more stakeholders in a project to achieve a specific target, e.g. a fully operational farm. In a wind power project, this may refer to the agreements between the developer of the wind power turbines, the SPV and the operational management. The agreement details the financing capabilities of the project including how every stakeholder is accountable for the project's financial gains, losses and costs. The joint venture agreement covers corporate governance, the relationship between shareholders (including exit clauses) and the manner in which a supervisory board/investment committee is formed.

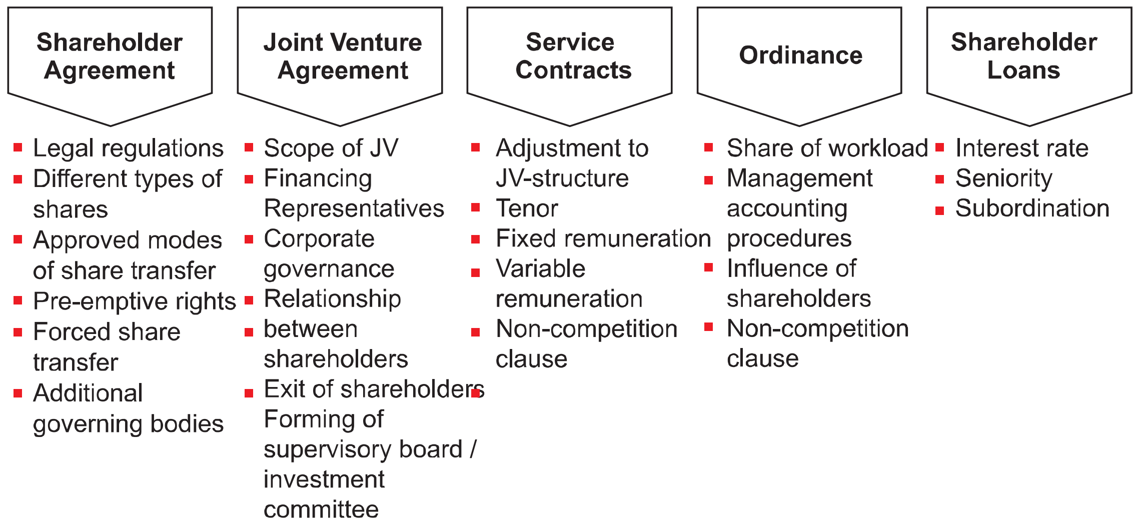


Figure 17: Some other contracts included in a joint venture agreement. Source: RENAC, 2006. Adapted from Achleitner, 2002.

Recap

Answer the following questions on the shareholder and sale and purchase agreements

1. What are the two main transaction modes to acquire equity and what are the differences between them?
2. What should be specified in an SPA? Name some typical clauses of the SPA.
3. What other contracts beside the SPA often exist between joint venture partners?

Solutions

1. What are the two main transaction modes to acquire equity and what is the difference?

   A share deal is the purchase of a securitized part of a company with all risks and an asset deal in the transfer of single assets and where only risk is attached to the asset.

2. What should be specified in an SPA and which clauses are common?

   An SPA specifies: the asset, price, payment mode, reps and warranties.

   Typical clauses are: shares, transfer rights, approved transfer mode and exit options.

3. What other contracts beside the SPA often exist between joint venture partners?

   Joint venture agreements, related service, ordinance contracts and often shareholder loans.

2.3.7 Project facility agreements (credit/loan)

The project facility agreement is the loan agreement under which the financing bank(s) provide debt for the project to finance the initial investment costs to build a project.

Facility or credit agreement and features

The project facility agreement comprises regulation of:

1. Facility purpose, loan amount, tenor, interest margins and bank fee.
2. Disbursement and repayment schedules.
3. "Conditions precedent" to be met before first drawdown.
4. Provision of collateral.
5. "Covenants" (e.g. DSCR, minimum debt-to-equity ratio, etc.).
6. Definition of "events of default".
7. Reporting obligations of the borrower.
8. In emerging countries, equator principles might be applicable.

The security package (collateral) can include: the pledge agreements for WTGs, infrastructure, material contracts, as well as the project, debt service and maintenance reserve accounts.

Basic contracts in wind power projects

Facility (or credit agreement: selected features)

The debt service cover ratio (DSCR) is a static metric that banks use for debt sizing (a certain minimum value would not be tested). The target value of the DSCR depends on the bank's "risk appetite" given by a minimum or average DSCR (>1.10 – 1.50) on an (P70-P95) expected energy production from wind resource assessment. The DSCR can be calculated by dividing the free cash flow to firm (FCF) in time (t) by the debt service within that same time frame.

Equation 14. Calculating the debt service cover ratio

DSCR = FCF/DS = free cash flow to firm/debt service

<u>Credit decision making</u>: there are a few essential prerequisites that need to be met prior to the credit decision-making process. Usually, two independent and precise wind resource assessments are carried out for the proposed wind site by certified consultants. Additionally, a full information cash flow forecast (including a business plan) for the duration of the project,

a recourse-free building permit and a full set of valid project rights and contracts for turn-key ready installations are needed. Before financial close is achieved and the first drawdown from the credit facility can be made, the bank and its consultants perform a full (legal, technical and financial) due diligence of the whole project to ensure that all major risks have been appropriately addressed. Based on this information, a credit analyst will assign a credit rating to the project.

Bank term sheets

Bank term sheets serve as the basis for facility agreements. The terms and conditions presented in the bank term sheet are indicative.

The granting of any finance or guarantee will be subject to the approval of the bank’s internal credit committees. Furthermore, it is also dependent on the revision, negotiation and execution, on satisfactory terms, of the entire documentation related to the project (including detailed financial forecasts). The due diligence processes on the project’s legal, technical, wind, environmental, financial, fiscal and insurance issues, as well as its market conditions (e.g. interest rates, lending conditions in general), are also subject to the internal credit committee’s approval. The bank term sheet is a legally non-binding document but it is used as a template to later conceptualize legally binding documents.

Contents of the bank term sheet

The content of the bank term sheet may be altered based on the project’s needs. Some basic contents include the outline of construction or term loan facility as well as conditions precedent to the first drawdown of each new wind farm. Other conditions of the bank term sheet may include, but are not limited to, the following:

- Certification of representations and warranties.
- Satisfactory legal opinions.
- Security in full force and effect.
- Turbine supply agreements on acceptable terms to the lenders.
- All material project agreements (including contracts for the sale of electricity) in full force and effect.
- Project accounts have been established.
- Lenders are satisfied with the conclusions arising from the wind, technical, insurance and legal due diligence.
- Financial model including data from all the wind farms where drawdowns have been made, has been received and accepted by the lenders, and shows the following:

i. P75 wind resource scenario: minimum and average annual debt service coverage ratio (ADSCR) of >1.20x

ii. P90 wind resource scenario: minimum ADSCR of >1.10x

- All required authorizations, permissions and licenses required for the construction and operation of the project, including environmental permits and approvals, as well as any licenses required for the sale of energy to the national electricity (the "Licenses"), have been obtained. However, the borrower will be able, for a limited number of wind farms, to draw funds having not met terms satisfactory to the lenders.
- Lenders acceptance of the insurance policies.
- Absence of events of default or potential events of default.

Outline of construction/term loan facility if a default occurs

There are a few standard conditions for the construction or term loan facility in the event of a default, including:

- Breach of any: payment obligation due, or principal, interests, fees or other concepts under this financing.
- Default of the borrower's obligations under the finance contracts.
- Termination or loss of any required permit for the operation of the wind farms.
- Early termination of any of the contracts for the sale of electricity with the electricity off-taker.
- Validity and enforceability of the security is no longer in effect.
- Representations and warranties are no longer applicable or in effect.
- Insolvency of the borrower.

Bearing this in mind, a cross default will occur if the following scenarios take place:

- Until the commercial operational date (COD) of the last wind farm of a borrower, the sponsor has no longer a direct or indirect 100% shareholder interest in such borrower.
- Until the COD of the last wind farm of the project, the sponsor has no longer a direct or indirect shareholder interest of at least 75% in the borrower whose wind farms have reached COD. Reduction to 75% will be subject to prior lenders' consent, with such consent not to be unreasonably withheld or delayed.
- From the COD of the last wind farm of the project, if the sponsor has no longer a direct or indirect shareholder interest of at least 51% in such borrower.
- Abandonment of any of the wind farms.

Real world example of bank term sheets in a western European country

The following Table shows a real-world example of bank term sheets of an international commercial bank. It outlines the construction- and term-loan facility.

Borrowers	Each of the SPVs that own and operate, or will own and operate, each of the wind farms that comprise the overall project.
Shareholders	Name of shareholders.
Guarantors	If the Borrower wants to draw funds having not obtained all the authorisations, permits or consents required for the construction and operation of the project, including environmental permits and approvals, the Shareholders will provide a Completion Guarantee – in form and terms satisfactory to the Lenders – until all licences have been obtained.
Purpose	To (re)finance the wind farms under operation, to finance the construction and operation of defined wind farms that conform the Project, finance interest and fees accrued during construction.
Mandated lead arranger	The term sheet issuing bank.
Lenders	The term sheet issuing bank plus participating banks to be agreed.
Bank underwriting commitment	100% of the Senior Debt requirements of the Borrower(s) subject to a maximum amount of [xx] million Euros.
Hedge provider	The hedge providing bank.
Type of facility	Construction/Term Loan.
Currency	Euro.
Final maturity	The term of each Construction/Term Loan will be initially xy years from Commencement Operating Date (COD). The maintenance of this term is subject to the fulfilment of the Intermediate Test.

Maximum facility amount and debt/equity ratio	The maximum amount for each Construction/Term Loan will be the lowest of: • P75 wind resource scenario: minimum ADSCR of 1.20x • P90 wind resource scenario: minimum ADSCR of 1.10x • Debt/Equity ratio for each individual wind farm of 90/10 Initial drawdown: The maximum amount for the aggregate of the Construction/Term Loan for the initial and subsequent drawdowns for any given Construction/Term Loan will be: • P75 wind resource scenario including data of all wind farms for which drawdowns have been made: Minimum ADSCR of >1.20x • P90 wind resource scenario including data of all wind farms for which drawdowns have been made: Minimum ADSCR of >1.10x Debt/Equity ratio for each individual wind farm of at least 90/10.
Annual debt service cover ratio (ADSCR)	The ADSCR will be calculated by dividing the Cash flow Available for Debt Service for the period, by the Debt Service of the period.
Cash flow available for debt service	The Cash flow Available for Debt Service is the aggregate amount of the sum of the revenues received for all the wind farms less taxes and O&M expenses paid.
Debt service	Aggregate of all amounts in the nature of interest, fees and other financial expenses (including default interest) and repayment of principal paid or payable by the Borrower(s) relative to all Construction/Term Loans, Debt Service Facilities and VAT Facilities.
Availability	For each Construction/Term Loan, from the Financial Close up to the earliest of the following dates: a) COD of each wind farm, b) full drawdown of the Construction/Term Loan, or c) the xx.yy.zzzz at the latest.

Drawdowns	Proportionally with equity contributions, provided that the maximum Debt/Equity Ratio is not exceeded. Equity contributions may be provided in the form of share capital and subordinated debt.
Cash flow waterfall	All revenues of each wind farm, including those coming from each Construction/Term Loan, the Debt Service Facility and the equity contributions, will be deposited in the Revenue Account of each Borrower and will be applied in the following order: a. Before each COD, to fund the construction costs of the relevant wind farm. b. After the COD, to fund the O&M expenses of the relevant wind farm. c. Amounts remaining in each of the Revenue Accounts will be shared among the Borrower(s) and will be applied following this waterfall. d. Taxes and O&M expenses of any wind farm that could not cover its O&M expenses. e. Interest and fees of all Construction/Term Loans and Debt Service Facility. f. Replacement of Principal for all tranches of all Constructions Loans by Term Loans. g. Contributions to the O&M Reserve Account. h. Debt Service Facility repayments of Term Loans. i. Mandatory pre-payment. j. Voluntary pre-payment. k. Funding of the Restricted Availability Account. l. Distributions if Conditions for the Distributions are met.
Repayment	Semi-annual Repayment each 30 June and 31 December starting on the earliest of the following dates: • 6 months after COD of the wind farms that compose the project.
Voluntary pre-payment	Pre-payments under the Construction/Term Loan facilities, in proportion to pending repayments such as: • Performance liquidated damages received under the EPC contract and O&M agreement.

	• Proceeds received under Insurance Policies if not applied to the restoration of the damaged asset (except for proceeds received under third parties liabilities and business interruption). • Proceeds coming from the sale of assets where not assigned to the substitution of the asset sold. • Cash-sweep. • Restricted Availability Account (see Conditions for Distributions).
Conditions for distributions	Borrower will be entitled to make distributions provided that: • First repayment of the last wind farm in obtaining the COD has occurred. • No amount is outstanding under the Debt Reserve Facility and the O&M Reserve Account is fully funded. • Historical ADSCR not lower than 1.xx (amount based on specific case). If the historical and projected ADSCR is lower than 1.xx, all funds available after Debt Service will be transferred to the Restricted Availability Account and may only be distributed if the conditions for Distributions are met on the following distributions date. If not, they will be used for the prepayment of the amounts drawn under the Construction/Term Loan facilities. • No Event of Default or Potential Event of Default is in effect for any of the Construction/Term Loan facilities or Debt Service Facilities. • Distributions will take place on 31 December.
Interest period	Three or six months.
Interest on Drawings	Interest will be a margin over Euribor to be bid.

Margin	Construction/Term Loan facilities: • From the Financial Close to the COD: 1.20% per annum. • From the COD until the 4th anniversary of COD: 1.10% per annum. • From the fifth anniversary of COD until the eighth anniversary of COD: 1.20% per annum. • From the ninth anniversary of COD: 1.30% per annum.
Default interest	Additional 2% per annum charge.
Commitment fee	0.35% or any amount committed but not withdrawn.
Arrangement/ underwriting fee	0.90% This fee will be paid on the following dates and in the following amounts: • 50% of the arrangement/underwriting fee of each facility agreement on the first drawdown of the first facility; and • The remaining arrangement/underwriting fee of each of the other Facilities, on the earlier of (i) first drawdown of such Facility and (ii) xx.yy.zzzz.
Agent fee	xx Euros per year.
Interest rates coverage	The borrower will enter an interest rate hedging programme on Financial Close fixing rates for up to xx% of the Senior Debt during the availability period and a minimum of yy% of the Senior Debt during the following zz years.

Table 4: Outline of a sample construction/term loan facility for a European project portfolio, RENAC

Recap

Answer the following questions on project facility agreement

1. Name four main pieces of information given in a facility agreement.
2. Calculate the annual and average DSCR for a 15-year annuity of $1.0M given a 20-year tariff of $80, an OPEX of $20/MWh and an AEP of 20,000 MWh/a.
3. Name three important external consultants and their contribution.
4. What are the most important findings of external consultants?

Solutions

1. Name four main pieces of information given in a facility agreement.

   The facility agreement defines the purpose, conditions (amount, tenor, margins, fees), disbursement and repayment, conditions precedent, provision of collateral and covenants (DSCR, debt-to-equity ratio), events of default and reporting obligations.

2. Calculate the annual and average DSCR for a 15-year annuity of $1M given a 20-year tariff of 80, an OPEX of $20/MWh and an AEP of 20,000 MWh/a.

   (DS= Debt Service, FCF= Free Cash flow to Firm, tD= Debt Tenor)

   Annual DSCR = Free Cash/Debt Service = (Tariff - OPEX)*(AEP)/Debt Service = (80-20)*(20,000)/1,000,000 = 120%
   Average DSCR = Sum1.to.tD (FCF)/Sum1.to.tD (DS) = (tD*FCF)/(tD*DS) = (15*1.2)/(15*1.0) = 120%

3. Name three important external consultants and their contribution.

   Consultants that carry out wind studies are essential to assess wind supply and revenues. Likewise, legal advisors that produce legal due diligence reports ensure contracts follow commercial negotiations and technical consultants provide technical due diligence reports to ensure that the quality of hardware is maintained.

4. What are the most important findings of external consultants?

   Wind studies and technical and legal reports are usually outsourced and so is the economic basis of the business case. This may have devastating effects on the business and return of the wind power project if the wind assessment is overly optimistic or the technology used is premature or permits turn out to be legally void.

2.3.8 Procurement and service (P&S) contract

Procurement and service (P&S) contract

Business management services are provided under the P&S agreement by the P&S contractor to the project company. The P&S contractor is responsible for:

- Maintaining and safekeeping of the books and records of the project, including accounting and financial records.
- Preparing all financial statements and financial reports as required by banks and investors.
- Preparing monthly and annual forecasts for the project for approval by the investors and the lenders.
- Preparing a quarterly reconciliation of project operations.
- Establishing and maintaining bank accounts for projects, including bank accounts required by the lenders.
- Preparing requests/payment: all draw requests, distribution requests, principal and interest payment requests and similar statements required by the lenders with respect to the drawing and repayment of loans for the project and the payment of dividends and shareholder loans to investors.
- Preparation and processing of all invoices with respect to the electricity sales by the project pursuant to its power purchase agreements as well as operating costs.
- Calculation and payment of all costs and expenses of operating the project, including land rental payments, operations and maintenance payments.
- Preparation and filing of all tax forms related to the project, including income tax, sales taxes, local taxes and VAT and the payment and recovery or refund of such taxes.
- Maintaining and updating of the financial data for the financial model and for reporting issues of the project.

External consultancy for wind power projects

Usual consultants in wind power are:

1. Legal Advisor: international and/or local law firms are contracted to review the legal, tax and regulatory system and the complex contractual documentation involved.
2. Technical Expert/Lenders Engineer: individuals or firms with international reputation involved in the feasibility study, concept engineering and construction, project supervision.
3. Wind Resource Advisor: prepares/reviews wind studies for the chosen project site and provides production exceedance levels for scenario analysis.

4. Insurance Advisor: reviews the contracted insurance cover and confirms its adequacy. Controls payments of insurance premiums ex post.
5. Model Auditor: reviews the plausibility of calculation mechanisms in the financial model and audits it.

2.3.9 Insurance

This subsection covers the common insurance needed during various phases of a wind farm project. While some of the insurance coverage are specific to one phase, e.g. the property damage risk during the construction phase, others – like the Marine and Inland Cargo insurance – are applicable to more than one phase, i.e. the construction and transportation phase. In the following chapter, insurances that are specific to one phase are nested in one subsection and those that are applicable for more than one phase are explained in a combined subsection.

Insurance is usually required to cover common risks in order to attain financing. Financing includes requirements of debt and equity. The diagram below shows the potential risks that a project faces during various stages of its lifetime.

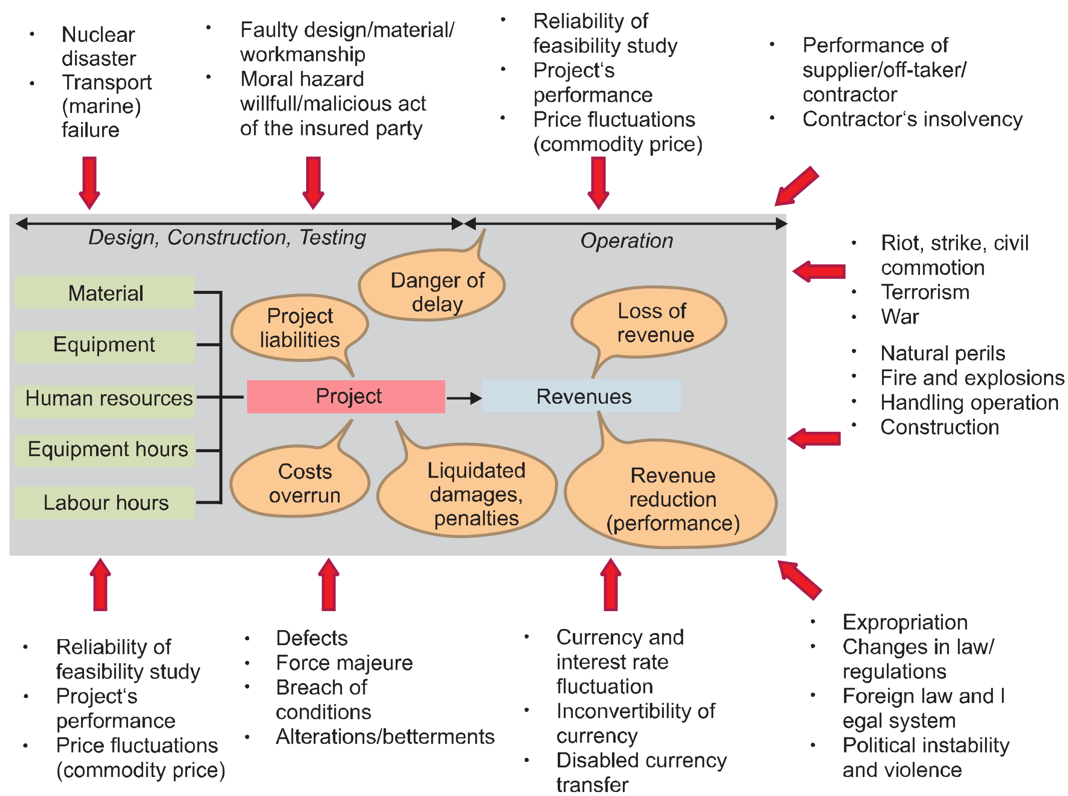


Figure 18: Risks associated with a project. Adapted from Swiss Reinsurance Company, 1999.

Construction risks

Property damage risk

In the construction phase, wind farm projects can be subject to damage risks of the following categories:

- Damages during transportation of the WTGs or peripherals.
- Damages during on-site construction and operational trial period of the WTGs.
- Damages during the construction of the peripheral installations.

Financial loss insurances can be obtained to protect against incurred financial losses through the following events:

- Delay in completion of the WTGs due to transport or installation damage.
- Delay in completion resulting from non-damage events.
- Impossibility of construction or completion, e.g. due to insolvency.

Construction and transportation insurance

"Marine/inland cargo insurance" covers against loss or damage caused to wind turbines and material during transit from shippers to the project site. This includes protection for losses sustained during unloading. It can be upgraded to a **"marine/inland advanced loss of revenue insurance"**, which insures against financial consequences of loss of revenue as a result of a delay.

The standard coverage ratio (in Germany) is four times the value of the transported goods and usually has a maximum value. Higher amounts can be insured over the counter following individual negotiations with the insurer. This additional coverage can only be contracted by the turbine supplier in combination with a marine/inland cargo insurance.

Construction insurance

The **"installation all risk insurance"** covers the wind turbines, foundations and peripheral installations to be installed against unforeseeable material damage to and loss of insured property which may occur unexpectedly and suddenly during the installation of the wind turbine.

It is common practice that the turbine supplier insures this type of risk as the supplier is contractually obliged to deliver fully installed wind turbines. Hence, the supplier has an insurable interest during installation. This means that the installation all risk insurance is bought to mitigate the risk of (financial) loss that the supplier might face. Both the project company and the lenders must rely on the creditworthiness and financial capabilities of the turbine supplier when selecting the most appropriate for the project.

The installation all risk insurance can be upgraded to an **“advanced loss of revenue insurance”**. This additionally covers the operating expenses and revenue losses because of insured installation damage. **Contractual penalty payments** can also be covered by this upgrade if they have been triggered by insured installation damage. The advanced loss of revenue insurance calculates deductibles by customary practice in days (e.g. 30). This additional coverage can only be contracted by the supplier in combination with the installation all risk insurance.

Liquidated damages (LDs) and **insolvency risk** are pertinent issues during the construction phase. As a basic principle, LD payments follows construction delays as well as inadequate performance that do not arise from insured property damage and thus cannot be insured. The non-performance of turbine suppliers and EPC contractors are not insurable. The project company and lenders must rely on the construction contracts and the included LDs. The involved parties, especially the contractors and the project company, can be subject to **liability claims**. The reason for this could be personal, property or financial damages as well as environmental damage.

Construction and operation insurance

“Third party liability insurance cover” pays damages in respect of bodily injury, material and immaterial damages caused to third parties and clients of the insured attributable to the insured activity. These risks can only be covered by the participating firms within the framework of a third party liability insurance, which should also cover environmental risks. Third party liability insurance has to be in place both during the construction and operation phases.

Operational risks and insurance

Wind farms can be subjected to **property damage risk and risk of financial losses**. This may take the form of mechanical and electrical damage to the turbines or damage to the cabling, sub-stations or transformer stations, etc. The loss of revenue resulting from the closure of the installation due to material damage to the WTG or peripheral installation and the associated standing charges or non-provision of warranty services by service providers. Property damage risk and the risk of business interruption remain with the project company and exist independently of warranty arrangements and service contracts. These risks are transferred to the SPV with the issuance of the taking over certificate either for the wind farm or each respective turbine.

“Operator’s all risks insurance” covers physical loss or damage, including machinery breakdown, to the insured property.

- **Co-insurance** (for example for terror risk) is handled differently by the various insurance companies and is often limited in amount.
- **Deductibles**: €30,000 per each loss insured (market standard).

In accordance with the risk catalogue of the **operator’s all risks insurance**, the standing charges and the financial losses (feed-in remuneration) due to business interruption caused by machinery damage insured under the operator’s all risks insurance is covered. The market standard for deductibles are five days and the indemnity period last for six months.

Sources of insurance covers

Wind farm insurances are typical industrial insurances and are usually contracted via insurance brokers, not directly via the insurer. Well known brokers include large international firms (such as Marsh and Willis) and other regional brokers with a focus on energy. Good insurance brokers will competitively tender the insurance cover in the market on behalf of the developers of a project.

Recap

Answer the following questions on insurance

1. Which two main phases require differing insurances?
2. Which insurance is necessary during construction and operation?
3. What are typical insurances during construction?
4. What are typical insurances during operation?

Solutions

1. Which two main phases require differing insurances?
   Insurance contracts for the construction phase are more complex and costly and cover more diverse risks compared to insurance for the operational phase.

2. Which insurance is necessary during construction and operation?
   Third party liability is obligatory during both phases.

3. What are typical insurances during construction?
   For transportation, Marine/Inland Cargo Insurance during building, Installation All Risk Insurance and often the Advanced Loss of Revenue Insurance is additionally required.

4. What are typical insurances during operation?
   Operator's All Risks Insurance, complementary co-insurance and Operator's Loss of Revenue Insurance.