Green Energy Finance

ACEF Deep Dive Workshop

Volker Bromund, 5th / 6th June 2017
1. Introduction to the Green Banking Program
   09:00 – 09:30h, speaker: Octavio B. Peralta (ADFIAP)

2. Introduction to Wind Energy
   09:30 – 09:50h, speaker: Pramod Jain, (Innovative Wind Energy, Inc.)

3. Project Structure and Financing Sources for Wind Farms
   09:50 – 10:30h, speaker: Volker Bromund (RENAČ)

4. Wind Farm Cash Flow Planning Case Study
   11:00 – 11:45h, speaker: Volker Bromund (RENAČ)

5. Panel Discussion: “Changing Landscape of Wind Energy Tariffs”
   11:45 – 12:30h, chair: Pramod Jain, (Innovative Wind Energy, Inc.)
Project structure and financing sources for wind farms
Financing options for commercial projects

- Three types of financing typically used for RE projects
  - Corporate Finance
  - Project Finance
  - Capital Market Finance

- Different markets have different financing standards
- The decision for a financing form typically depends on the maturity of
  - the financial sector
  - the energy market
  - project developer’s experience
Corporate Finance vs. Project Finance

Corporate Finance (on-balance lending)

Information about management, performance etc.

Loans based on company cash flows, company assets as collateral

Company

Investment in RE project

Project Finance (off-balance lending)

Sponsor develops the project

Equity contribution

Lender

Detailed due diligence, Cash-flow analysis etc.

Sponsor/Investors

Loan based on project cash flow only, collateral based on project cash flows and project assets
## Corporate vs. Project Finance

<table>
<thead>
<tr>
<th></th>
<th><strong>Corporate Finance</strong></th>
<th><strong>Project Finance</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loan paid back by the...</strong></td>
<td>Sponsoring company</td>
<td>Cash flows generated by project</td>
</tr>
<tr>
<td><strong>Liability</strong></td>
<td>The sponsor may / must tap all possible sources of liquidity</td>
<td>The liability of the company comprises only the equity invested in the project</td>
</tr>
<tr>
<td><strong>Bank's DD focus</strong></td>
<td>Last year's balance sheet, P&amp;L statement, company strategy and market development</td>
<td>Expected cash flows and risks of project</td>
</tr>
<tr>
<td><strong>Bank decision depends on the ...</strong></td>
<td>Creditworthiness of the sponsor</td>
<td>Volume, reliability and projectability of the project's future cash flows</td>
</tr>
</tbody>
</table>
Project Finance for commercial projects

- **Project Finance** without / with limited recourse to the sponsor
  - Project debt is provided by banks and other financial institutions, project equity is paid-in by the sponsor(s) or external Investors
  - The project’s creditworthiness and debt capacity exclusively depends on the project cashflows
  - “Non- or limited recourse”- financings without or with limited recourse to the sponsor’s balance sheet
  - Characteristics: requires stable, forecastable project cash flows, ideally from a reliable public support scheme (e.g. feed-in tariff) or a long-term power purchasing agreement, “growth engine” for green energy markets in many developed countries, knowledge-intensive, transaction costs can be high

→ The broad access to non-recourse Project Finance forms the “financial foundation“ of the unprecedented RE success story in Germany!

→ It enables not only big corporates, but especially SMEs to carry out sizeable projects without requiring strong balance sheet support
Risks in Project Finance

**Technical Risks**
- Construction Risk
- EPC Contractor
- Operation & Maintenance
- Manufacturer
- Technology Risk
- Proven Technology

**Financial Risks**
- Resource Risk
  - Availability (resource study e.g. on wind availability)
- Country Risk
  - Insurance
- Market Risk
  - Feed in Tariff
  - Price of resource
**RE – project finance structure**

**Definition / characteristics**

- Legally-independent project company
- Cash flow of the project is the main source of collateral and loan repayment
- Long-term contractual relationship
- Higher degree of leverage compared to corporate finance
Contracts in the investment phase

- Engineering, procurement, construction (EPC)
- Turbine supply agreement
- Project development-/ BoP-contract
- Grid connection-/ Grid usage agreement
- Capital procurement contracts (if any)

alt. "Multi-Contracting" (attention: interfaces !)
Contracts in the operating phase

Operating agreements
- Offtake-agreement / PPA
- Land rights contracts
- O&M-/ operating agreements
- Insurance contracts

Financing agreements
- Project finance loan agreement
- Shareholder agreement
Wind farm cash flow planning case study
Introduction to the case

- Super Wind Investor Ltd. (“SWI”) got the opportunity to acquire a used Vestas V44 600kW turbine that has been installed in Northern Germany 14 years ago.

- The turbine is operating under the German renewable energy feed-in tariff scheme (EEG–Renewable Energy Act) which is remunerating the turbine for a period of at least 20 years from the commissioning date.

- SWI can operate the turbine for at least 6 additional years under the same conditions as before (same feed-in tariff).

- SWI considers an investment under the pre-condition that it can raise a bank loan for co-financing.

- Turbine acquisition date shall be 01 January 2017.

- Let’s show SWI how to evaluate the project from a banker’s perspective!
Overview of project input parameters

- **Turbine purchase cost:** EUR 230,000
- **Average historic energy production:** 1,100 MWh p.a.
  - Availability losses: 5.0% p.a.
  - Electrical losses: 2.0% p.a.
- **Feed-in tariff:** EUR 91 / MWh until 31 December 2022 (for 6 years)
- **Operating cost per year:**
  - O&M contract Vestas: EUR 20,000, indexed with 2.0% p.a.
  - Caretaker / maintenance man: EUR 2,400, indexed with 2.0% p.a.
  - Electricity consumption cost: EUR 1,200, indexed with 2.0% p.a.
  - Land leases: 8.0% of the electricity revenues
  - Insurance cost: EUR 2,200, indexed with 2.0% p.a.
  - Accounting / annual report: EUR 1,500, indexed with 2.0% p.a.
  - Dismantling cost: EUR 40,000, accumulated in years 5 & 6
Cash flow estimation
Principle of Cash Flow (CF) planning

- **Initial investment outlay.** The upfront cost of the renewable energy technology and all other fixed assets.

- **Operating cash flows over the project life.** → *To be evaluated…*

Case Study: Investment Cost Budget

- The total upfront **investment cost** for the used wind turbine is **EUR 230,000**.

- The investor can provide **EUR 90,000** of **equity**.

- He needs a **bank loan** of

  - **EUR 230,000** Investment
  - **EUR 90,000** Equity
  - **EUR 140,000** Bank loan
Step 1: Revenue calculation

Principle of cash flow planning

<table>
<thead>
<tr>
<th>Revenues (+)</th>
<th>Operational Costs (-)</th>
<th>Taxes (-)</th>
<th>CADS (=)</th>
</tr>
</thead>
</table>

- Under the project finance approach, cash flow positions follow a hierarchy called cash flow waterfall.
- This concept requires annual revenues to cover periodical costs in a strict order.

Case study: Revenue calculation

- **Annual energy production:**
  - 1,100.0 MWh Gross production
  - 55.0 MWh 5.0% Availability loss
  - 20.9 MWh 2.0% Electricity loss
  - \(1,024.0\) MWh Net output

- **Feed-in tariff: EUR 91.0 / MWh**

- **Electricity revenues p.a.:**
  - \(1,024\) MWh \(\times\) EUR 91.0 = **EUR 93,193**

- No revenues for green energy certificates in Germany

- Interest income depends on reserve account size

* CADS: Cash Available for Debt Service
Step 2: Calculation of operational costs and taxes

Principle of cash flow planning

- Under the project finance approach, cash flow positions follow a hierarchy called cash flow waterfall.
- This concept requires annual revenues to cover periodical costs in a strict order.

### Case study: operational costs, taxes

- Detailed cost schedule for all six operating years:

<table>
<thead>
<tr>
<th>Year</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>O&amp;M Contract Vestas</td>
<td>20,000</td>
<td>20,400</td>
<td>20,808</td>
<td>21,224</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance Man</td>
<td>2,400</td>
<td>2,448</td>
<td>2,497</td>
<td>2,547</td>
<td>2,598</td>
<td>2,650</td>
</tr>
<tr>
<td>Electricity Consumption</td>
<td>1,200</td>
<td>1,224</td>
<td>1,248</td>
<td>1,273</td>
<td>1,299</td>
<td>1,325</td>
</tr>
<tr>
<td>Land Leases</td>
<td>7,455</td>
<td>7,455</td>
<td>7,455</td>
<td>7,455</td>
<td>7,455</td>
<td>7,455</td>
</tr>
<tr>
<td>Insurance</td>
<td>2,200</td>
<td>2,244</td>
<td>2,289</td>
<td>2,335</td>
<td>2,381</td>
<td>2,429</td>
</tr>
<tr>
<td>Dismantling costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Accounting</td>
<td>1,500</td>
<td>1,530</td>
<td>1,561</td>
<td>1,592</td>
<td>1,624</td>
<td>1,656</td>
</tr>
<tr>
<td>Trade Tax</td>
<td>-6,745</td>
<td>-6,682</td>
<td>-6,617</td>
<td>-6,552</td>
<td>-6,676</td>
<td>-6,657</td>
</tr>
<tr>
<td>EBITDA</td>
<td>51,693</td>
<td>51,210</td>
<td>50,717</td>
<td>50,215</td>
<td>51,160</td>
<td>51,020</td>
</tr>
<tr>
<td>Income Tax</td>
<td>-7,936</td>
<td>-7,855</td>
<td>-7,773</td>
<td>-7,688</td>
<td>-7,833</td>
<td>-7,806</td>
</tr>
</tbody>
</table>

- All costs increase at 2% p.a., except land leases.
- O&M payments are stopped two years before the project ends.
- Taxes are calculated from P/L statement.

*EBITDA: Earnings Before Interest, Tax, Depreciation and Amortization
### Case study: cash flow available for debt service (CADS)

<table>
<thead>
<tr>
<th>Year</th>
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<tr>
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<td>2019</td>
<td>2020</td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>Park Output Potential</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
</tr>
<tr>
<td>Availability Losses</td>
<td>5.0%</td>
<td>5.0%</td>
<td>5.0%</td>
<td>5.0%</td>
<td>5.0%</td>
<td>5.0%</td>
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<tr>
<td>Electrical Losses</td>
<td>2.0%</td>
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<td>2.0%</td>
<td>2.0%</td>
<td>2.0%</td>
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</tr>
<tr>
<td>Net Output</td>
<td>1,024</td>
<td>1,024</td>
<td>1,024</td>
<td>1,024</td>
<td>1,024</td>
<td>1,024</td>
</tr>
<tr>
<td>Electricity Price</td>
<td>91.00</td>
<td>91.00</td>
<td>91.00</td>
<td>91.00</td>
<td>91.00</td>
<td>91.00</td>
</tr>
<tr>
<td>Electricity Revenues</td>
<td>93,193</td>
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<td>93,193</td>
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<td>93,193</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td><strong>93,193</strong></td>
<td><strong>93,193</strong></td>
<td><strong>93,193</strong></td>
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<td>1,592</td>
<td>1,624</td>
<td>1,656</td>
</tr>
<tr>
<td><strong>Total Operating Costs</strong></td>
<td><strong>-34,755</strong></td>
<td><strong>-35,301</strong></td>
<td><strong>-35,858</strong></td>
<td><strong>-36,426</strong></td>
<td><strong>-35,357</strong></td>
<td><strong>-35,515</strong></td>
</tr>
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<td>-7,688</td>
<td>-7,833</td>
<td>-7,806</td>
</tr>
<tr>
<td><strong>CADS</strong></td>
<td>43,757</td>
<td>43,355</td>
<td>42,945</td>
<td>42,526</td>
<td>43,327</td>
<td>43,215</td>
</tr>
</tbody>
</table>
Step 4: From CADS (Cash Available for Debt Service) to ECF (Equity Cash Flow)

Principle of cash flow planning

<table>
<thead>
<tr>
<th>Cash Flow Available for Debt Service (CADS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Service</td>
</tr>
<tr>
<td>( - )</td>
</tr>
<tr>
<td>DSRA ( - )</td>
</tr>
<tr>
<td>( = ) Equity Cash Flow (ECF)</td>
</tr>
</tbody>
</table>

- **CADS** is predominantly used to meet the project’s annual debt service.
- Debt service consists of the scheduled **annual interest** and **debt repayments**.
- Debt holders usually demand an additional **Debt Service Reserve Account (DSRA)**.
- **DSRA**: 6-months debt service.

Case study: Debt service

- The bank loan of EUR 140,000 is to be repaid in annual installments:
  - Year 1: - EUR 20,000  →  EUR 120,000
  - Year 2: - EUR 40,000  →  EUR  80,000
  - Year 3: - EUR 40,000  →  EUR  40,000
  - Year 4: - EUR 40,000  →  EUR    0

- Loan tenor is usually shorter than project tenor (here: 4y < 6y)
  → **risk buffer**

- **Interest rate**: 3.5% p.a.
### Case Study: Equity Cash Flow (ECF)

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2017</td>
<td>2018</td>
<td>2019</td>
<td>2020</td>
<td>2021</td>
<td>2022</td>
</tr>
<tr>
<td>CADS</td>
<td>54,791</td>
<td>54,210</td>
<td>53,443</td>
<td>52,667</td>
<td>53,110</td>
<td>52,998</td>
</tr>
<tr>
<td>Redemption</td>
<td>-20,000</td>
<td>-40,000</td>
<td>-40,000</td>
<td>-40,000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Interest</td>
<td>-4,900</td>
<td>-4,200</td>
<td>-2,800</td>
<td>-1,400</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Debt Service</td>
<td>-24,900</td>
<td>-44,200</td>
<td>-42,800</td>
<td>-41,400</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cash before DSRA</td>
<td>29,891</td>
<td>10,010</td>
<td>10,643</td>
<td>11,267</td>
<td>53,110</td>
<td>52,998</td>
</tr>
<tr>
<td>Cash incl. DSRA</td>
<td>29,891</td>
<td>32,110</td>
<td>32,043</td>
<td>31,967</td>
<td>53,110</td>
<td>52,998</td>
</tr>
<tr>
<td>DSRA Target</td>
<td>22,100</td>
<td>21,400</td>
<td>20,700</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DSRA Actual</td>
<td>22,100</td>
<td>21,400</td>
<td>20,700</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Equity Cash Flow (ECF)</td>
<td>7,791</td>
<td>10,710</td>
<td>11,343</td>
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<td>52,998</td>
</tr>
</tbody>
</table>

- Interest rate is only applied to the outstanding loan amount.
- DSRA (Target) is calculated as 50% of next year’s debt service.
- DSRA (Actual) is the actual ("real") cash reserve amount that the turbine was able to accumulate in the respective period.
- Annual ECFs can be distributed to the equity investor.
Key financial project ratios
Key financial project ratios - DSCR

The **Debt Service Cover Ratio** (DSCR) indicates, to what extent CADS exceeds the scheduled debt service in a given period.

### Case study: DSCRs

- To calculate the DSCRs for the sample project, we divide the annual CADS by the total debt service.
  - Sample calculation for year 1:
    - $DSCR_1 = \text{EUR 54,791} / \text{EUR 24,900}$
    - $DSCR_1 = 2.20$
  - All DSCR values need to be $>1$ for a project to be bankable.

<table>
<thead>
<tr>
<th>DSCR&lt;sub&gt;t&lt;/sub&gt;</th>
<th>CADS&lt;sub&gt;t&lt;/sub&gt;</th>
<th>Debt Service&lt;sub&gt;t&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLCR&lt;sub&gt;t&lt;/sub&gt;</td>
<td>PV of CADS&lt;sub&gt;t&lt;/sub&gt; over Loan Life</td>
<td>Debt Outstanding&lt;sub&gt;t&lt;/sub&gt;</td>
</tr>
<tr>
<td>PLCR&lt;sub&gt;t&lt;/sub&gt;</td>
<td>PV of CADS&lt;sub&gt;t&lt;/sub&gt; over Project Life</td>
<td>Debt Outstanding&lt;sub&gt;t&lt;/sub&gt;</td>
</tr>
</tbody>
</table>
The **Loan Life Cover Ratio** (LLCR) and the **Project Life Cover Ratio** (PLCR) take an aggregated view on the project putting the present value (PV) of the respective CADS values into relation to the outstanding debt.

- loan life considered for LLCR
- project life considered for PLCR

### Case study: LLCR, PLCR

- **Sample LLCR calculation (year 3):**
  \[
  LLCR_3 = \frac{53,443 + 52,667}{1,035 + 1,035^2} = \frac{106,110}{80,000} = 1.326
  \]

- **LLCR$_3$ = 1.26**

- **Sample PLCR calculation (year 3):**
  \[
  PLCR_3 = \frac{53,443 + 52,667 + 53,110 + 52,998}{1,035 + 1,035^2 + 1,035^3 + 1,035^4} = \frac{212,928}{248,832} = 0.859
  \]

- **PLCR$_3$ = 2.44**

- **LLCR >1**: project surpluses more than sufficient to cover aggregate debt service over the loan life.
- **PLCR** shows additional potential to stretch tenors in case a loan restructuring is needed.
Evaluation of case results
Case study: Overview of all project ratios

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
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<tr>
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<td>-40,000</td>
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<td>0</td>
</tr>
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<td>Interest</td>
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<td>0</td>
</tr>
<tr>
<td>Debt Service</td>
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<td>-44,200</td>
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<td>21,400</td>
<td>20,700</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DSRA Actual</td>
<td>22,100</td>
<td>21,400</td>
<td>20,700</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Equity Cash Flow (ECF)</td>
<td>7,791</td>
<td>10,710</td>
<td>11,343</td>
<td>31,967</td>
<td>53,110</td>
<td>52,998</td>
</tr>
<tr>
<td>DSCR</td>
<td>2.20</td>
<td>1.23</td>
<td>1.25</td>
<td>1.27</td>
<td>n/n</td>
<td>n/n</td>
</tr>
<tr>
<td>LLCR</td>
<td>1.41</td>
<td>1.25</td>
<td>1.26</td>
<td>1.27</td>
<td>n/n</td>
<td>n/n</td>
</tr>
<tr>
<td>PLCR</td>
<td>2.04</td>
<td>2.01</td>
<td>2.44</td>
<td>3.71</td>
<td>n/n</td>
<td>n/n</td>
</tr>
</tbody>
</table>

Key results of ratio analysis

| Ø-DSCR | 1.49 | Ø-LLCR | 1.30 | Ø-PLCR | 2.55 |
| Min-DSCR | 1.23 | Min-LLCR | 1.25 | Min-PLCR | 2.01 |

All minimum values observed in year 2.

Project looks financially feasible from a lender’s perspective!
Do you have any questions?
Thank you!

Renewables Academy (RENAC)
Schönhauser Allee 10-11
D-10119 Berlin
Tel:  +49 30 52 689 58-85
Fax:  +49 30 52 689 58-99
boensch@renac.de