Assessing Risk for Renewable Power

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Investment in Renewable Power

- In 2013 Global New Investment in Renewable Power and Fuels (ex-hydro) reached **$214 Billion**
  - $108 Bio in Solar, $ 80 Bio in Wind
- **$ 133.4 Bio** (approx. 62%) of the new investment was applied to **Asset Finance** (i.e. funding for new build)
  - On Balance Sheet, Project Finance, Bonds & leasing
- Additional **$ 53.7 Bio** were invested via **Mergers & Acquisitions**

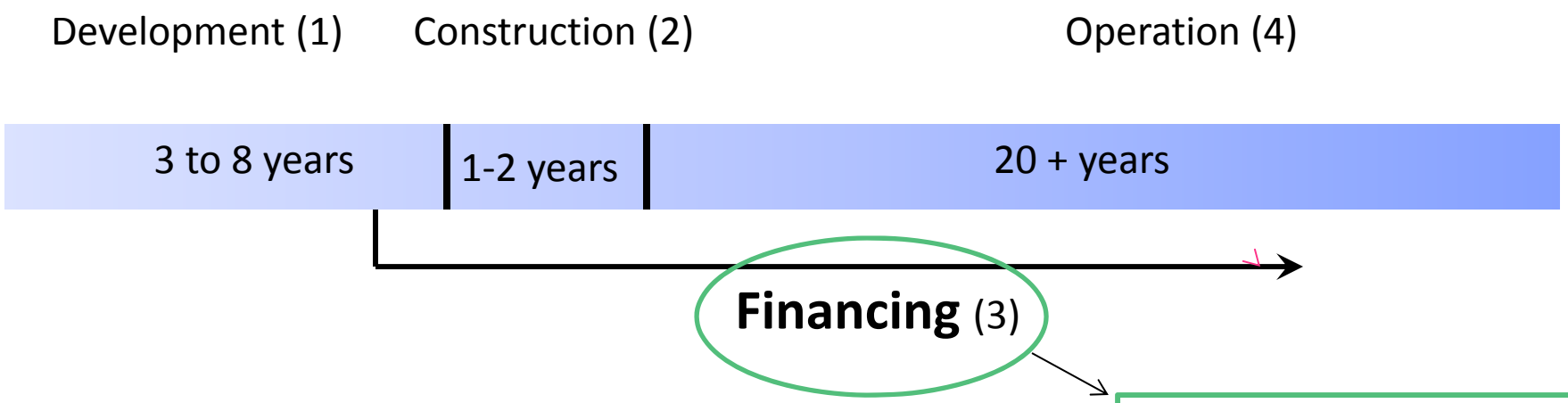
Investment in Renewable Power

- **How** do Investors assess project / investment opportunities?
- **What** is the process?
- How do they arrive to the **Decision** to take an investment risk?

Scope and Objective

- Due diligence is a fundamental part of the decision making process for all stakeholders in a project and is essential for a Risk – Reward Analysis
- Due diligence covers all key areas associated with main project drivers and risks
- The objective of this presentation is to discuss key risks in Renewable Power from the Investors' point of view, identify the main areas for Due Diligence - focusing on Technical aspects - , explore the interrelation between those areas, and the role of stakeholders in due diligence

Context – Project Phases



- **Stakeholders**: Involvement & Risk Exposure
  - Government (Phases 0 to 4)
  - Developers (Phase 1)
  - Equity Investors (Phases 1 to 4)
  - Debt Investors (Phases 2, 3, 4)
  - Utilities (Phases 3, 4)
  - Consumers (Phases 3, 4)

Risk Management Principles

Risks are Not to be Avoided but to be Managed……

1. Identify
2. Measure
3. Quantify
4. Mitigate
5. Price

Due Diligence

→ **Technical**
→ Legal
→ Financial
→ Market
→ Environmental & Social
→ Insurance

RISK IDENTIFICATION & CLASSIFICATION

Technical Risks

1. **Technology Risk**
   - Proven technology
     - Operational track record
     - Component mix (equipment integration risk, maturity)
2. **Resource Assessment (Wind, Solar, Geothermal, etc.)**
   - Quality of information (source, methodology, length)
   - Reliability (quality of equipment, monitoring, continuity)
3. **Construction Risk**
   - Contractor(s) & Suppliers: track record, creditworthiness
   - Contractual structure: EPC or multi party
     - EPC: fixed price, date certain, turn-key, engineering, procurement and construction contract
     - Multi party: equipment supply, interconnection, balance of plant. Proper interface is critical
   - Strength of contract (s): risk allocation, level of LDs, guarantees, warranties

Technical Risks

4. Completion Risk

- Finishing construction is not the same as Completion – Completion refers to Operational capability
- All sections must be completed as per design, timely and up to required technical standards (including performance) for Commercial Operation
- Financial impact of a delayed or failed completion can be substantial and must be covered properly by a creditworthy counterpart (LDs)

5. Interconnection Risk

- Infrastructure
- Scope & Cost
- Responsibility
- Integration risks

6. Water Supply & Start up fuels

- Water: distance from site, quality, transport, rights and limitations of use
- Start-up fuel: transport, long-term contract, replacement provider

Technical Risks

6. Operating Risk

- Contractor
  - Track record of O&M contractor in the specific technology at relevant scale
  - Preferably Operator should be the EPC Contractor or Equipment Supplier
- Term of Contract
  - Customarily long-term (15+ years)
  - Minimum term should match the Warranty Period
- Performance Incentives & Penalties
  - Performance based compensation (fixed & variable components)
  - Penalties sized to compensate for actual losses
- Spare parts supply
  - Secured & Reliable Supply
  - O&M (sometimes EPC) should include a full set of on-site spares and provisions on response time for emergency services and delivery of additional spares
- Contract price
  - Market Based – critical budget item

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Examples

- Construction Delay
- Low Delay LDs
- Cash Shortfall
- Penalties
- Curtailment

Example # 1

Project A – 300MW Parabolic Trough under construction

- Geological conditions in some sections of the site are found to be more challenging than expected in the initial planning/design
  - → Foundation for the metal structures holding the mirrors have to be re-designed to adapt to actual ground conditions
  - → Early delay in construction schedule

- Power island to be imported from Europe – cargo suffers a critical incident & damage during transport
  - → Delivery is delayed by 4 months, Construction schedule is delayed, Completion delayed by 2 months
  - → Construction crew must remain on site for longer period
  - → Construction equipment (under lease) most be kept for longer term
  - → Additional costs

Example # 1 (contd.)

→Completion Delay results in loss of 2 months of Revenues

→Delay LDs are low and insufficient to cover the incremental costs

→Insurance proceeds will not be received before 120 days (net of deductible)

Result:

- Project faces Cost Overruns and a Cash Shortfall to cover Debt Service
- Project faces penalties under the PPA for failure to deliver electricity at the agreed date

Example # 2

Project B – 500MW

- Project signs PPA early in the development phase but development is slow and construction begins 2 years later than expected
  - By the time the Project achieves COD the system is nearly fully supplied
  - Demand is not expected to increase substantially in the near term and Project will have to be curtailed
  - Curtailment was not anticipated nor regulated in the PPA

Example # 2 (contd.)

- Project is not built on EPC but with multi-contract structure
  - Project limits exposure by avoiding a firm capacity commitment under the PPA
- A Project shareholder with experience in large scale hydro power (but not in solar) will be the operator from COD
  - Project limits risk of underperformance with the Off-taker by committing to deliver very low volumes under the PPA
- The PPA is Take-or-Pay
  - Off-taker is committed to buy all the electricity produced by the Project regardless of demand or minimum performance thresholds

Conclusion

Risks are there to be Managed

Proper Risk Identification, Mitigation and Monitoring are key to the successful implementation of any project

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