



# Financing of Renewable Systems

Workshop on Renewable Energy

Indian Institute of Technology, Mumbai

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# Agenda



- Advantages of Renewable Energy (RE)
- Characteristics of RE
- Financing Instruments for RE Projects
- Broad Categories of RE Finance Available from Banks
- Conclusions

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# Advantages of Renewable Energy (RE)



- Increases Energy Security
- Reduces Import Dependence and promotes self sufficiency
- Environmentally benign source of energy production
- Leads to reduced Emission of Green House Gases
- Provides both on grid and off-grid solutions
- Promotes local industries and generates rural employment

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# Characteristics of RE



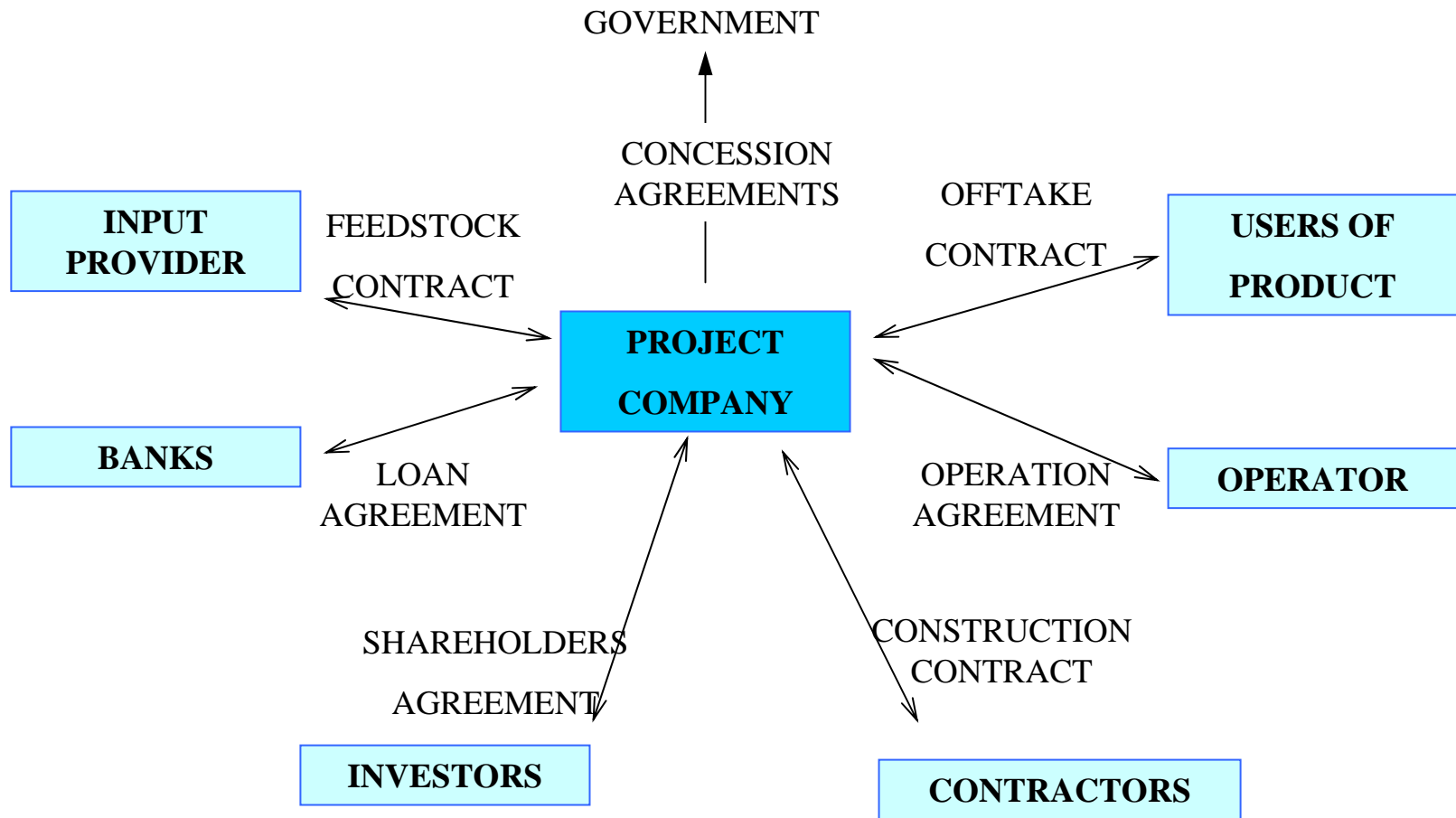
- RE projects are capital intensive and hence are sensitive to the
  - Structure and
  - Cost of financing
- RE Finance is not only different for the distinct types of RE Technologies but is much more segmented by the
  - Size of projects and
  - The type of debtor

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# Typical Project Structure



# Capital Structure of a RE Project



<b>S.No.</b>	<b>Instrument</b>	<b>Percentage of Project Cost</b>	<b>Costs / Tenor</b>
1.	<b>Grants (if applicable)</b>	0%-20%	Nil
2.	<b>Equity</b>	15% - 30%	14% - 20% Equity IRR
3.	<b>Subordinate Debt</b>	0% – 20%	Maturity 7 to 15 years Typical Cost : 10% to 15%
4.	<b>Senior Debt</b>	50% - 80%	Maturity 5 to 12 years Typical Cost 9% to 12%

**The percentages, pricing and tenors mentioned above are typical to Asian Countries only.**

- Project Developers generally can obtain capital for the up-front cost of developing a RE Project through
  - Equity Financing
  - Debt Financing
  - Mezzanine Financing
  - Grants
  - Innovative Financing Instruments
- It is worth noting that the above mentioned providers of capital would view and analyze projects and firms very differently.

# Equity Financing



- Equity can take the form of direct investment of
  - Own Resources and Capital
  - Third party Capital Inputs - e.g. risk capital by venture capital funds
- Lenders normally look for a minimum of around 20% of the project cost to come in the form of Equity
- RETs with higher risks are expected to have a corresponding higher equity ratio
- Required Characteristics of Renewable Energy Projects to attract alternative investors are
  - Returns consistent with alternative asset classes with similar risk profiles : Equity IRRs of 14% - 20%
  - Larger Scale Transactions: USD 5 to 10 mln minimum investment
  - Ability to exit – within 7-10 years
  - However specialised equity funds have been created to invest in environmentally and commercially sound RE projects

# Debt Financing



- Classical Debt Financing is done with interest rates and repayment schedules
  - Loans
    - Conventional Commercial Bank Loans
    - Credits Provided by Institutional Investors
    - Development Banks, Micro-Finance institutions and insurance companies
      - Microfinance initiatives are increasingly becoming popular and are most relevant for Solar PV and small Hydro
  - Bonds
    - Bonds are interest bearing instruments issued by companies and sold to investors in order to raise capital
    - Are a more sophisticated form of financing
    - Unless privately placed with institutions bonds require a functioning capital market, which may not be present in some developing countries

# Debt Financing



- Unlike Equity Investors, Lenders are conservative
- The Debt contract is a fixed obligation and the lender does not gain from the upsides in the project
- Lenders tend to analyse a project from a conservative perspective
- Thus RE Project developers have to structure their project in such a way that even in a conservative scenario they would be able to meet the debt obligations due to the Lenders
- Higher the risk/ uncertainties in the project higher is the interest rate charged by the Lenders

# Mezzanine Finance and Subordinate Debt



- Mezzanine Finance is a general term used to describe various financing arrangements that rank below Senior Debt
- Sub-ordinated debt is debt that ranks below the main (senior) debt in terms of its priority of payment or in liquidation.
- Its principal and interest is paid only after senior debt principal and interest is paid
- Capital Providers who invest in this instrument are usually compensated for their higher loan risk by sharing some of the upsides of the project through
  - Higher interest rates
  - Participation in the profits of the company
- Mezzanine Finance could also be in the form of preference shares
- Mezzanine Finance provides comfort to the Senior Lenders as their claims would be serviced prior to that of Mezzanine Finance providers

# Other Financing Instruments



- Soft Loans or Grants from Government
  - Viability Gap Funding : Loans/ Grants from government/ RE promotional agencies at concessional terms
  - Defrayment of set up costs: Grants to meet the set up costs of setting up an RE Project
  - Combination of Soft Loans with commercial funding such that the weighted average cost of capital is lowered
- Innovative Financing Instruments
  - Securitization of receivables from Power Off takers once the project is up and running

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# Broad Categories of RE Finance available from Banks



- Broad Categories of RE Finance available
  - Consumer and Micro-Finance for Off-grid RE Projects
  - Corporate Finance for small On-grid RE projects
  - Project Finance for large RE Projects

# Consumer and Micro Finance for Off-Grid RE Projects



- Characteristics
  - Project Cost less than INR 50 mln
  - Generally off-grid (could be grid connected in some cases)
  - Typically less than 1 MW installed capacity
  - Implemented by an individual or group of individuals thus under the ambit of Consumer/ Micro-Finance initiatives of banks
  - Potential to provide electricity to remote areas with no access to the grid
  - These are becoming popular and are most relevant for solar PV and mini-hydro
- Risks and Challenges
  - Specialised Skills needed for consumer/ Micro Finance lending
  - Limited Equity Contributions and Higher Project Development Costs
  - Credit Risk is predicated on the capacity to pay of a group of consumers rather than on an SEB/ Power Purchaser with acceptable credit quality
  - Diffuse and Diverse market
  - Technology Risk, O&M Risk
  - Small Ticket Sizes and High Transaction Costs

# Corporate Finance for small to medium On-Grid RE Projects



- Characteristics
  - Project Cost less than INR 500 mln
  - Grid Connected projects or set up for captive consumption
  - Typically less than 10 MW installed capacity
  - Implemented by an existing corporate to earn regular income or hedge the cost of electricity it has to bear
  - Set-up on the balance sheet of an existing corporate with fall back on regular cash flows
- Risks and Challenges
  - These are the projects which are most amenable to commercial bank finance however the following risks are nevertheless present
    - Technology Risk - most commercial banks will finance Equipment Purchased from select Equipment Suppliers
    - Fuel Availability Risk in the case of Biomass, Co-generation
    - Credit-worthiness of Power Purchaser

# Project Finance for Grid Connected RE Projects



- Characteristics
  - Project Cost in excess of INR 500 mln
  - Typically more than 10 MW installed capacity
  - Implemented by an SPV with limited recourse/ non recourse structure to generate power to be sold to the State Owned Grid/ third party purchasers
- Risks and Challenges
  - Long Tenor Financing requirements
  - Fixed Rate loans preferred to floating rate loans
  - Project Cash Flows are the ONLY source of repayment; therefore each risk has to be carefully analysed and mitigated
  - Adequate Mitigation of Off take/ Payment Risk is critical
  - Specialised Skills to Appraise, Structure and Syndicate such projects
  - Requires Equipment suppliers with proven track record
  - Appropriate Fuel Supply Agreements
  - Cost Competitiveness and project viability on stand-alone basis

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# Conclusions



- The Indian Government has realized the importance of RE in improving the energy security and in rural electrification
- India already has a Successful RE Program
- RE's contribution is increasing year by year
- Wind and Small Hydro ( < 25 MW) are leading the way in commercial use of RE
- Though there are barriers to be overcome the future of RE is bright in India

# Thank You

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