

Financing Renewable Energy Project

Presented by

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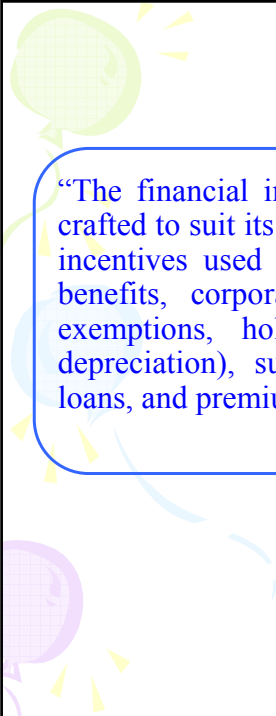
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Barriers risks?

“Financial risk management is a key element of any commercial investment in conventional energy ..., yet little attention has been paid to its use in the development of renewable energy technologies, particularly in developing countries, ... if used transfer certain types of risks away from investors and lender.”

Monique Barbut
Director
Division of Technology, Industry and Economics
UNEP

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“The financial incentive package for each country is carefully crafted to suit its economic, legal, and fiscal system. The types of incentives used include concessional import duties, excise tax benefits, corporate and income tax benefits (including tax exemptions, holidays, credits, and deduction as well as depreciation), subsidies against investment cost, low interest loans, and premium power purchase prices.”

World Bank Discussion Paper No. 391

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Type of Finance

- Private Finance
- Grants
- Risk capital
- Mezzanine Finance
- Corporate Finance
- Project Finance
- Participation Finance
- Risk Finance/
Insurance Structures
- Consumer Finance
- Third-party Finance

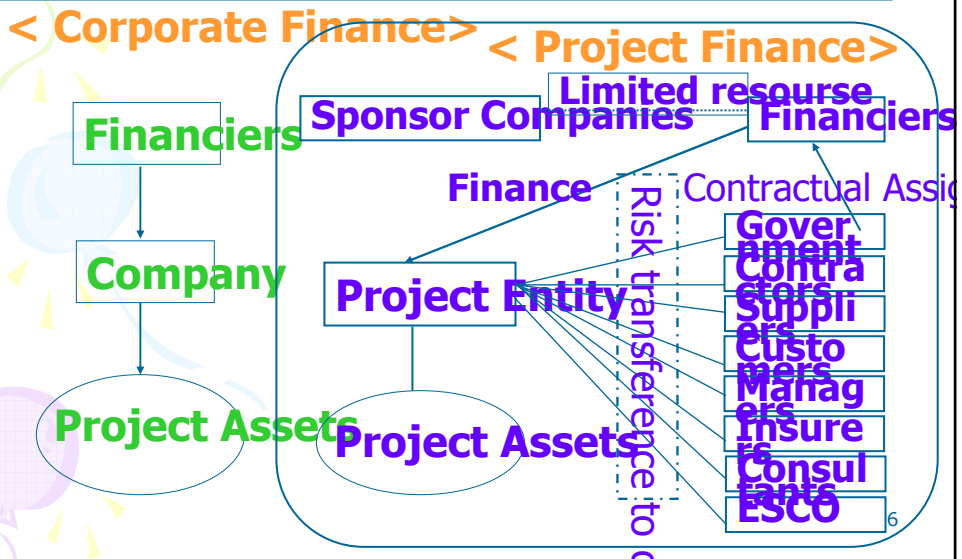
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Project Finance (PF)

- ✚ Funding of major capital
- ✚ Cashflow of the project as sources of fund for repayment
- ✚ Asset of the project as collateral
- ✚ Risk management through transference (allocate to parties best able and willing to accept)

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Corporate Finance Comparison with Project Finance





Major Risk & Management

- Major risk categories
(throughout project cycle)
- Control of risks
(identifying, analyzing, allocating)

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Project Feasibility Analysis

- Financial aspect
- Marketing aspect
- Technical aspect
- Management aspect

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Major Risk Categories (throughout project cycle)

Project Cycle

Project Identification



Project Development



Project Appraisal



Project Implementation



Project Operation

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Typical Barriers

- High transaction
- Relatively small size
- Low marginal return
- Perceived weak credit worthiness of companies
- Resource availability and supply risk
- Country risk (political & economy instability)
- Lack of legal and Institutional Frameworks to support RE projects
- Analytical barriers (quality&availability information)
- Cognitive barriers
- Other priority investment
- Unfamiliarity with technologies
- Collateral problem
- Lack of expertise in company
- FI lack of knowledge
- Benefit sharing
- Cultural

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Risk Management Instruments

- Contracts (gov., suppliers, consultant, ESCO)
- Insurance / Reinsurance
- Credit enhancement products (Guarantee)
- Alternative risk transfer instruments (various type of asset backed securities)
- Private sector risk management
- Risk pooling
- Securitization structure
- Bundling small projects (reduce transaction cost)
- Carbon Finance Guarantee

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Incentive & Other Program in Thailand

- | | |
|---|------------------|
| ■ DSM Program | ■ SPP |
| ■ EE Labeling & Standard | ■ VSPP |
| ■ Public-Private Sectors Partnership through ESCOs) | ■ CDM |
| ■ Energy Audits for factories & buildings | ■ R&D |
| ■ Training & PR | ■ EE&RE Targets |
| ■ ESCOs | ■ Feed in Tariff |
| | ■ Soft Loan |
| | ■ 30% Grant |

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Biomass Project

: Case Study

- Plant capacity : 7.0 MW (net)
- Raw material : Rice husk
- Investment cost : 445 MB.
 - Land and land improvement 3 MB.
 - Building 28 MB.
 - Machinery 358 MB.
 - Pre-operation 56 MB.
- Approximate CERs 25,000 tCO₂/yr

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Biomass Project

: Barriers

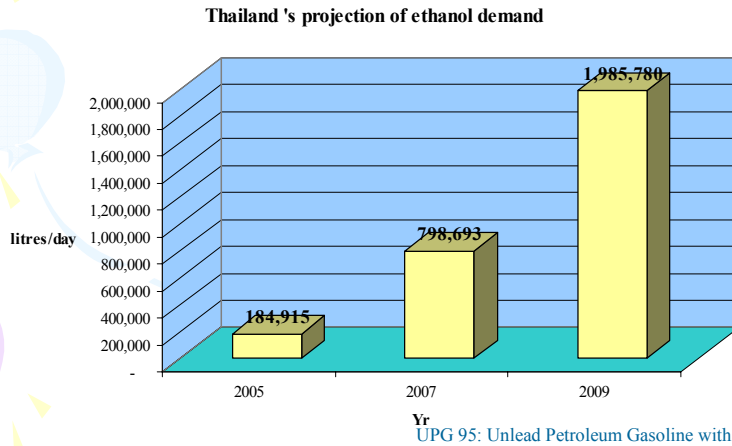
Project Barriers

- Security of raw material
- Technology
 - Proven technology
 - Efficiency
 - Contractor
 - EPC (Turn-key)
- High Investment Cost
- External Barriers
 - Government Policy
 - Commercial Bank Policy

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Ethanol Project : Demand

- Government policy : deplete all of UPG 95* consumption with gasohol (comprising a mixture of gasoline and ethanol) by yr.2007



Ethanol Project : Supply

- Total licensee 24 plants, registered capacity 4.985 Million litres/day
- Yr.2006 : **operate only 3 plants** with total production capacity **0.285** Million litres/day

Ethanol Project : Barriers

- Uncertainty in raw material
- Technology
 - Proven technology
 - Efficiency
 - Contractor
 - EPC (Turn-key)
- Marketing
 - Uncertainty price
 - Buying agreement (non-firmed)

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Ethanol Project : Case Study

- Plant capacity : 200,000 litres/day
- Raw material : tapioca
- Investment cost : 35 M. US\$
 - Land and land improvement 3.25 M. US\$
 - Building 0.75 M. US\$
 - Machinery 24.13 M. US\$
 - Pre-operation 1.63 M. US\$
 - Stock of raw material 0.50 M. US\$
 - Working capital 4.25 M. US\$
 - Contingency 0.50 M. US\$

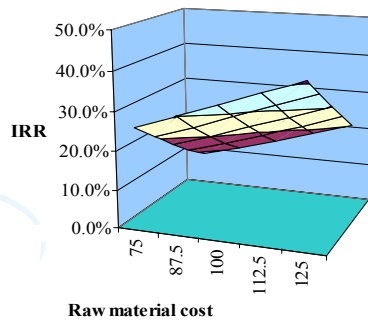
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Ethanol Project

: Project IRR

Raw material cost (US\$/ton)	Ethanol price (cent/litre)				
	47.5	50	52.5	55	57.5
75	26.6%	30.2%	33.9%	37.5%	41.1%
87.5	21.5%	25.0%	28.6%	32.2%	35.8%
100	16.6%	20.0%	23.5%	26.9%	30.5%
112.5	12.2%	15.3%	18.6%	21.9%	25.4%
125	8.3%	11.2%	14.1%	17.3%	20.5%

Revenue : Ethanol Project



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Removal of Barriers

- Security of raw material ➡ Through Contracts
- Technology ➡ Through proven technologies/
Bank guideline
- Marketing ➡ Through Contracts
- High Investment Cost ➡ Equity Fund

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