



# **Overview of cogeneration project development**

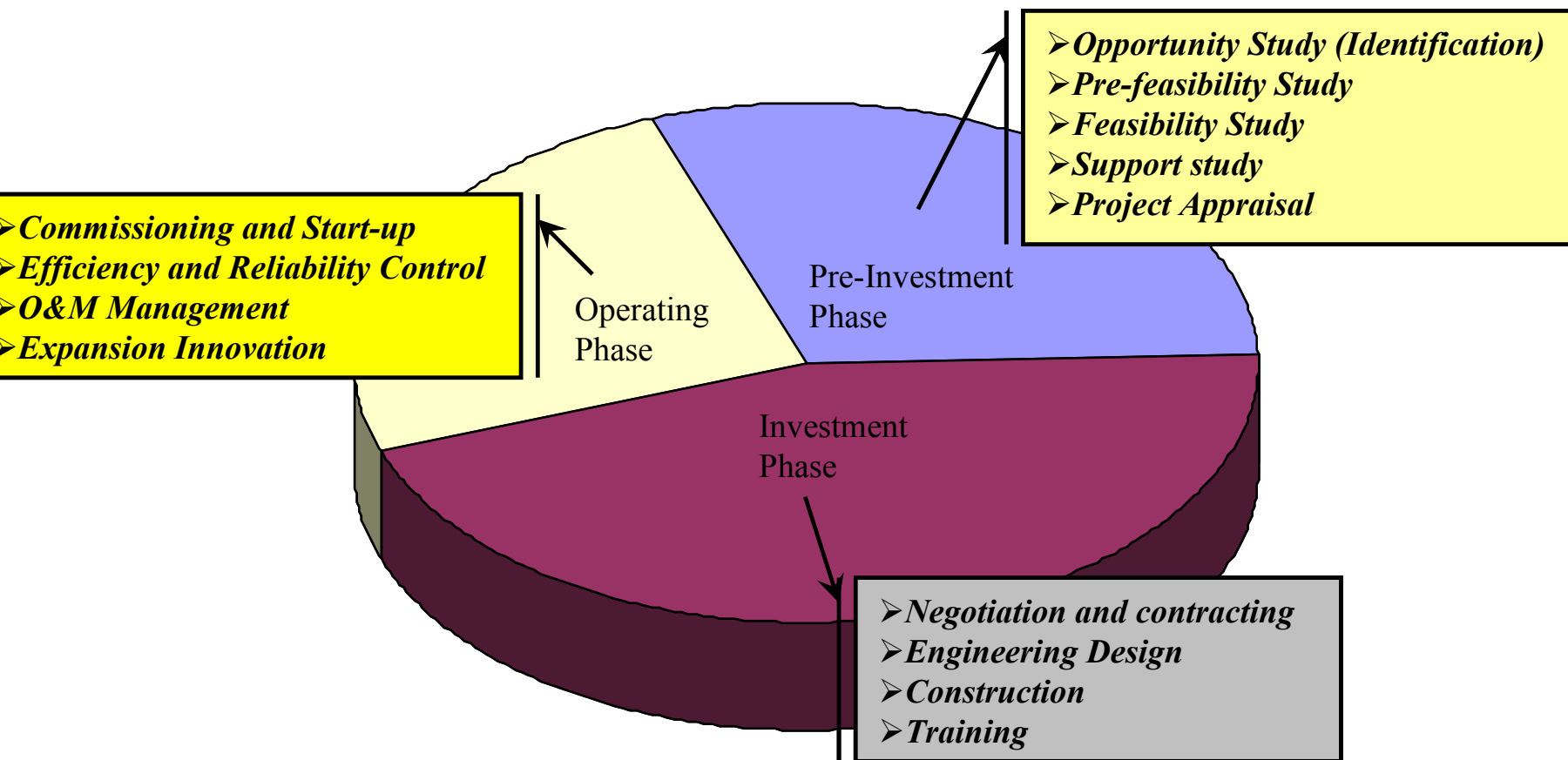
**2004 Cogeneration Week in Thailand**

**23-25 March 2004**

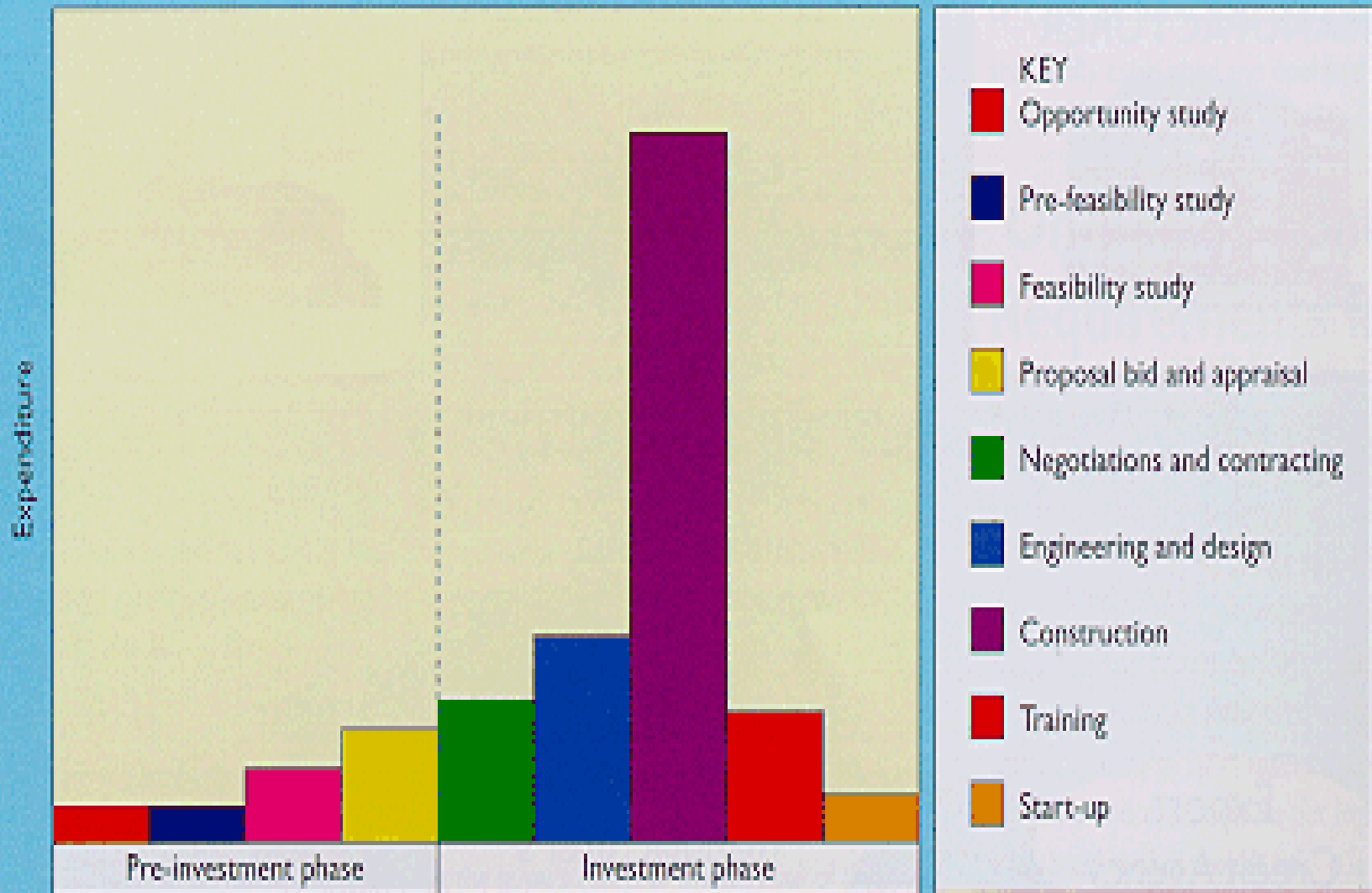
**Miracle Grand Convention Hotel, Bangkok**

**Romel M. Carlos**  
**Financial Advisor**

# Project Development Process



# Typical project life cycle expenditure





# Sustainable energy projects: development and implementation

## Steps (Success Factors):

- ◆ Assessment of needs and resources
- ◆ Identifying/assessment of partners & stakeholders
- ◆ Conduct of feasibility study
- ◆ Preparation of contracts and permits
- ◆ Tendering of equipment supply
- ◆ Financing of the project
- ◆ Detailed design, engineering and construction
- ◆ Operation and maintenance





# Early competent advice

- ◆ Seek professional advice at early stage on:
  - technical matters
  - structuring of the project
  - sourcing and mobilisation of funds
  
- ◆ Key advisers:
  - technical
  - financial
  - legal





# Assessment of needs and resources

- ◆ Assessment of needs and market
- ◆ Assessment of resources
  - Survey of fuel resources: primary and potential back-up
  - Logistics and fuel handling
  - Characteristics of fuel
- ◆ Assessment of technology and supply
  - Comparative costs and benefits
  - Technical reliability
  - Manufacturer's capability
  - Environmental considerations





# Assessment of partners/stakeholders

- ◆ Sponsors
  - 100% facility owned, JV, or third party implementation
- ◆ Off-takers of energy produced
  - Captive
  - Export of energy to grid and/or other customers
- ◆ Government
  - Favorable regulatory policies
  - Appropriate incentives and subsidies
- ◆ General public, local community, NGOs
  - Awareness, acceptance and support





# Conduct of feasibility study

- ✦ Provide optimum configuration & alternative options
  - Current and future energy requirements
  - Availability of resources within the facility
  - Integration with existing equipment
  
- ✦ Clear, comprehensive, and accurate financial model showing:
  - all costs
  - project/shareholder returns
  - lender coverage ratios
  - conservative assumptions
  
- ✦ Use of Sensitivity analysis demonstrating project viability at different scenarios



# Preparation of contracts and permits

- ◆ Checklist for contracts, licenses, permits and consents necessary for development
- ◆ Rigorous planning with realistic time schedule
- ◆ Legally sound contractual arrangements that allow for:
  - Performance guarantees
  - Liquidated damages
  - Arbitration at an acceptable neutral location
- ◆ Soundly conceived projects may fail because of problems related to permits and consents





# Tendering of equipment supply

- ◆ Systematic approach using internationally accepted procurement procedures for the required equipment and services supply
- ◆ Tender document details the scope and specification of the equipment and services supply
- ◆ Supply offer should provide provision for:
  - After-sales service
  - Spare parts
  - Training of operators





# Financing of the project

- ◆ Prepare financial plan appropriate to the size, structure and nature of the project
- ◆ Prepare project information memorandum
- ◆ Conduct proper risk mitigation and allocation
- ◆ Aim is to attain financial close with terms agreeable to both developers and lenders



# Detailed design, engineering and construction

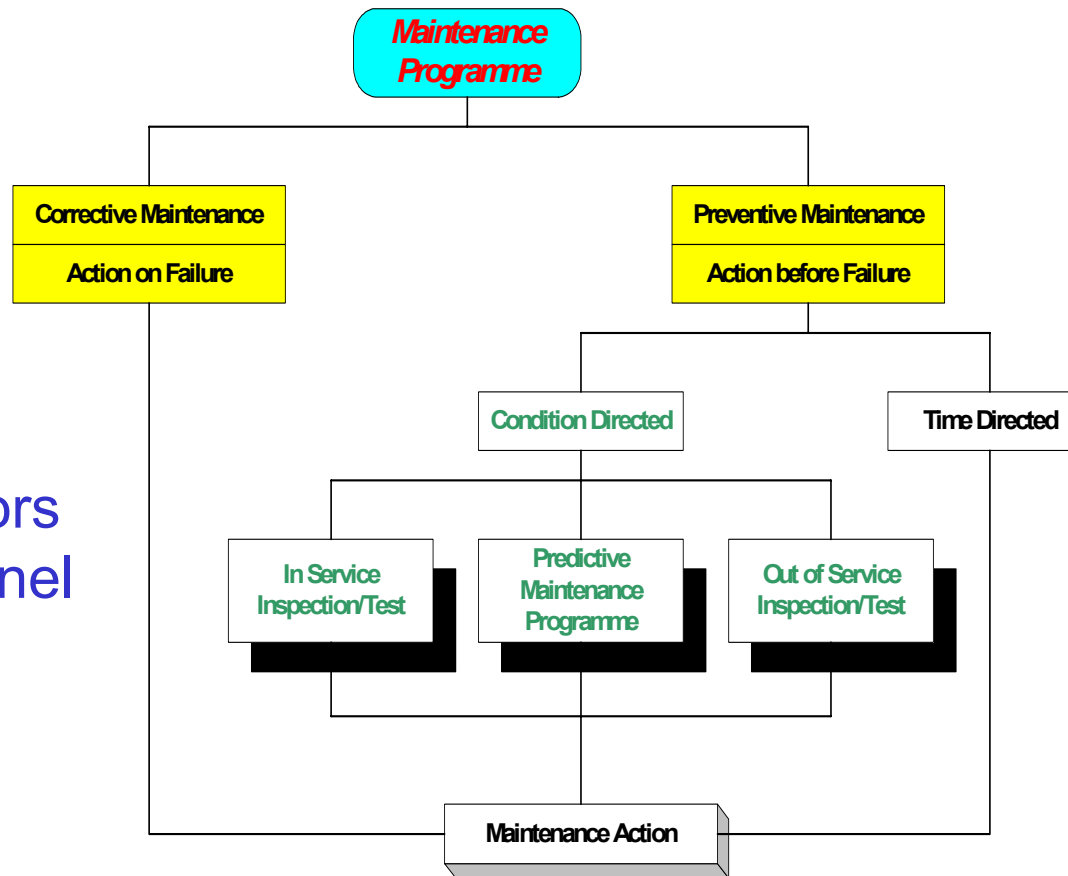
- ◆ Creation of project management team
- ◆ Input and guidance of owner's engineers
- ◆ Evaluate plant performance vs. guaranteed technical specification by EPC contractors



# Operation and maintenance

## O/M through:

- ◆ Reputable O/M contractors
- ◆ Trained in-house personnel





# Financing routes

## Self Financing:

- ★ Company uses internal funds to finance investment.
  - Funds come from existing cash reserves.

## On Balance Sheet Financing:

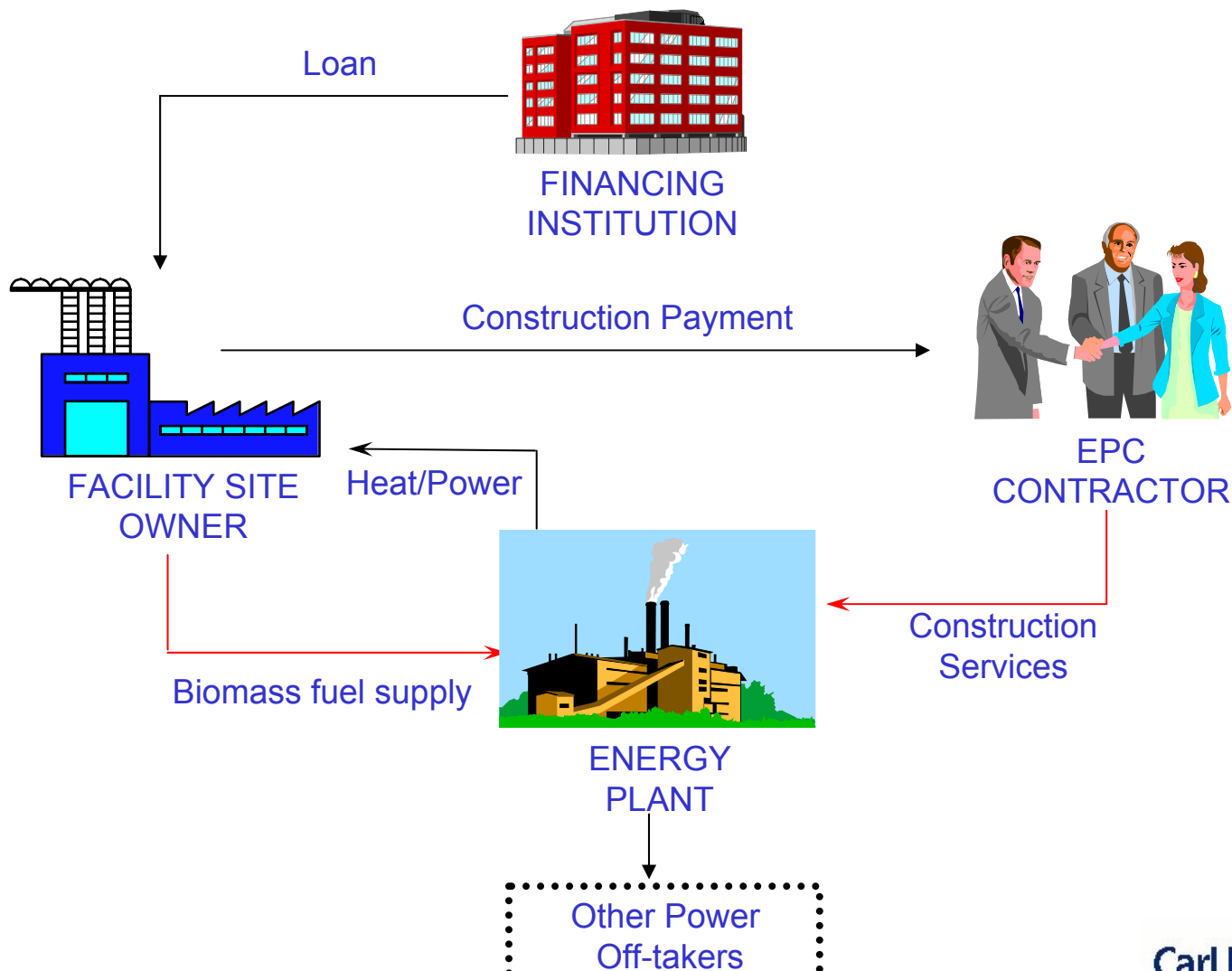
- ★ Firm takes out a loan to finance the investment.
- ★ Firm reflects loan on its balance sheet.



# Biomass Energy Project

## On Balance Sheet Financing Model

### Facility Owner-Operated and Financed





# Financing routes

## Project Financing:

“Raising of funds to finance an economically separable capital investment project in which the providers of the funds look primarily to the cash flow from the project as the source of funds to service their loans and provide a return on their equity invested in the project.”

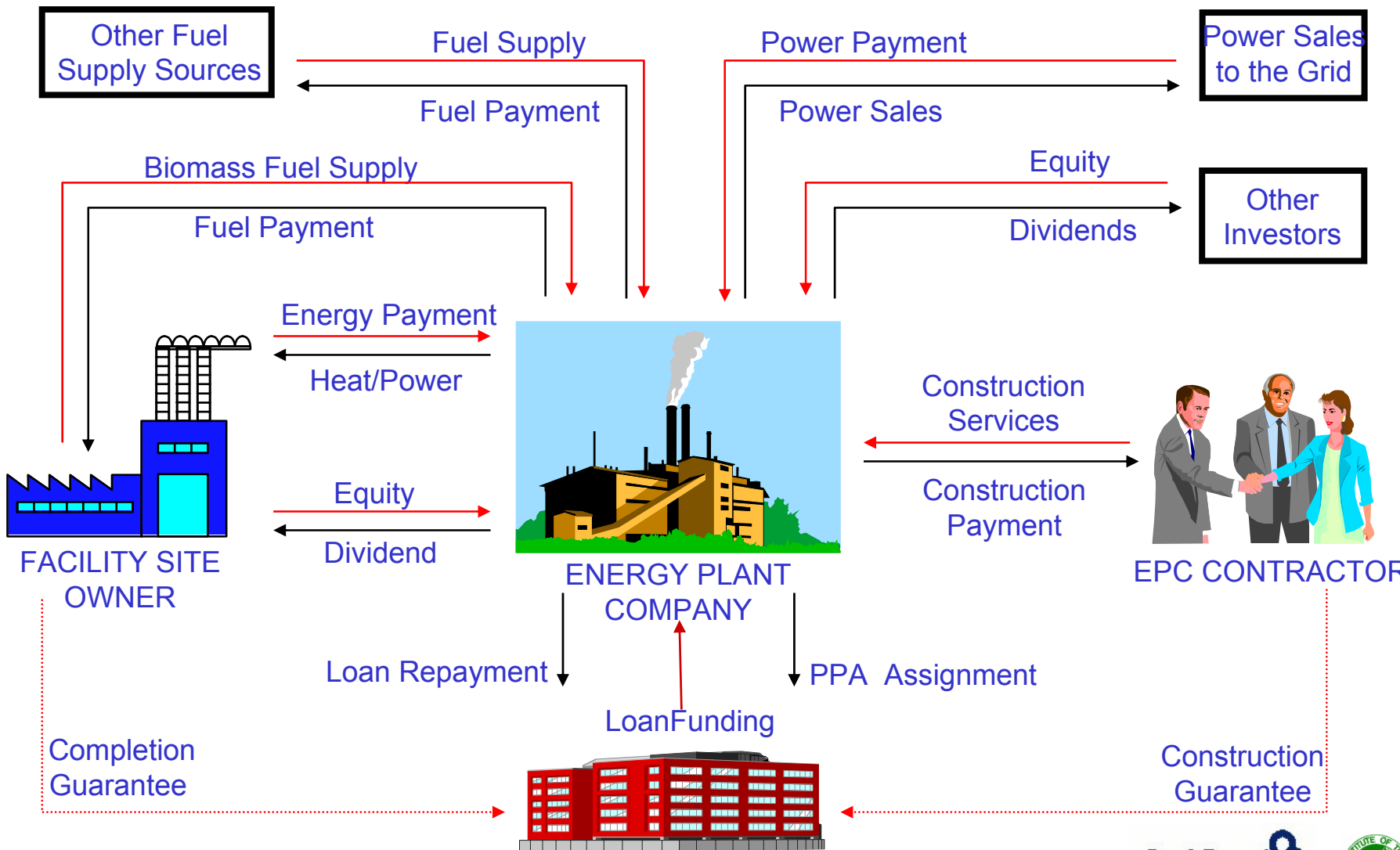
(Wall Street Journal, 30 April, 1993)

Raising funds for a project where return on investment for providers come solely from project cash flow.





# Biomass Energy Project Project Finance Model Financing Directly to Project





# Successful financing: Key points

## Reliability of off-take of product/service:

- ✦ Credibility and reliability of off-takers
- ✦ Price to be paid for sales of energy
  - Price escalation, indexation
- ✦ Long term security of income for project:
  - “Power Purchase Agreement” (PPA) or similar arrangements



# Successful financing: Key points

## Security of fuel/feedstock supply:

- ✦ Thorough study indicating availability of fuel/feedstock supply for the duration of the project
- ✦ Evidence that sufficient fuel supply has been secured beyond financing period
- ✦ Biomass project: a long-term dedicated supply contract is necessary, reflecting:
  - Price and escalation
  - Guarantees
  - Penalties for non-compliance



# Successful financing: Key points

## Proper mitigation and allocation of risks:

- ✦ Sustainable energy projects are considered new and perceived to be risky by financing institutions
- ✦ Use of appropriate and effective mitigation measures
- ✦ Allocate risks to parties best able to manage them





# Successful financing: Key points

## Reputation/strength of sponsors:

- ✦ Track record and experience in developing and implementing successful projects
- ✦ Transparent shareholding structure consisting of reputable companies or individuals
- ✦ Provision of:
  - guarantees
  - other forms of security





# Successful financing: Key points

- ◆ Commercial viability and technical feasibility
- ◆ Result of financial analysis should reflect:
  - Sufficient return to equity provided by sponsors
  - Minimum debt service coverage ratios
  - Conservative assumptions and likely scenarios
- ◆ Selected technology should be:
  - Commercially proven
  - Successfully implemented in similar environment
  - Efficient and environmentally beneficial





# Successful financing: Key points

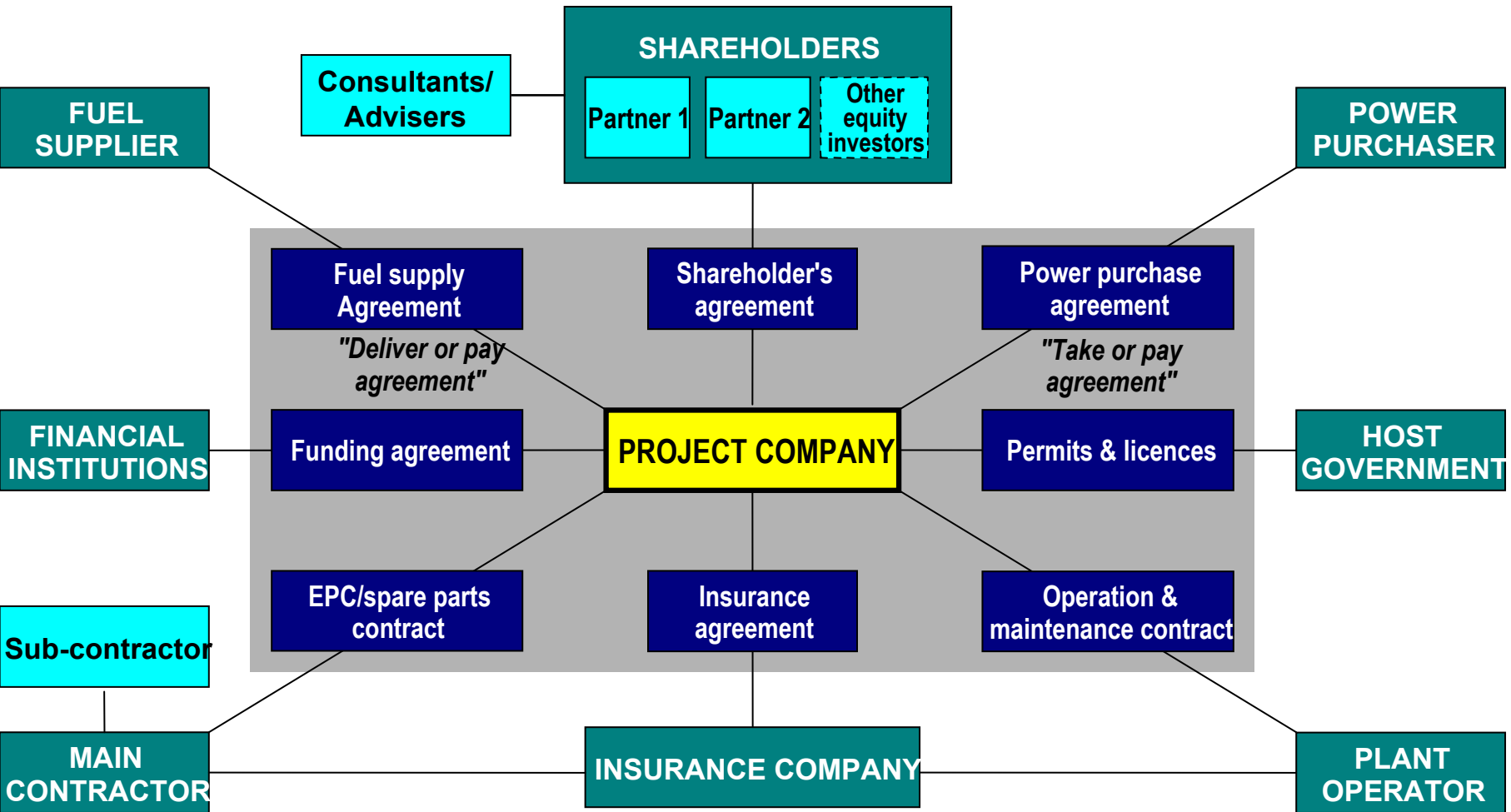
## Careful Structuring of the Contractual Arrangements

- ✦ Rigorous conceptual analysis and planning
- ✦ Sound and comprehensive security arrangements
- ✦ Principal contractual partners who have strong track record
- ✦ Terms of contracts should exceed debt repayment period plus reasonable margin for unforeseen events
- ✦ Comprehensive project documentation





# Stakeholders





# Successful financing: Key points

## Reliability and Capability of Technology Suppliers

- ◆ Deliver equipment according to specifications
- ◆ Contractors to complete project as specified in implementation schedule
- ◆ Parameters for technical reliability of energy generation systems:
  - proven technology
  - appropriate design criteria
  - flexibility in use of supplementary fuels
  - system efficiency
  - comprehensive technology transfer mechanism





# Risk allocation and mitigation matrix

Risk	Allocation							Mitigation
	Govt.	Sponsors	Project Company	Third Party Contractor/Supplier	Project Lenders	Insurers	Performance & other bond banks or insurers	
<b>1. Political/Country</b>								<ul style="list-style-type: none"> <li>Political risk insurance from ECA or multilateral development agencies</li> <li>Regulatory framework supporting sustainable energy projects</li> <li>BOI privileges for green field projects</li> </ul>
Change in law	✓		✓			✓		
Development/permitting approvals	✓	✓	✓					
Adverse govt. action/inaction	✓	✓	✓			✓		
Corporate taxation			✓					
Expropriation			✓			✓		
Political force majeure events	✓					✓	✓	
<b>2. Sponsor</b>								<ul style="list-style-type: none"> <li>Sponsors to provide equity and pre-completion guarantee</li> <li>Experience in supporting renewable energy projects</li> </ul>
Competence and reliability		✓						
Equity at risk		✓						
Pre-completion guarantees		✓					✓	

□





Contd.....

Risk	Allocation							Mitigation
	Govt.	Sponsors	Project Company	Third Party Contractor/Supplier	Project Lenders	Insurers	Performance & other bond banks or insurers	
<b>3. Construction</b>								<ul style="list-style-type: none"> <li>Fixed-price turnkey (EPC) contract with provision for liquidated damages</li> <li>Construction time insurance</li> <li>Choice of reputable contractors through internationally accepted bidding process</li> </ul>
Cost over-runs			✓	✓	✓		✓	
Timeliness and quality			✓	✓			✓	
Contractor default			✓	✓			✓	
Default by company			✓	✓				
Time, cost and scope of identified but related work and variations				✓	✓			
Increase in financing costs		✓	✓		✓			
Environmental damage	✓		✓			✓		
Force majeure						✓	✓	
<b>4. Technical</b>								<ul style="list-style-type: none"> <li>Use of proven technology</li> <li>Turnkey supplier with successful references implemented in similar environment</li> <li>Performance guarantees</li> <li>Liquidated damages</li> </ul>
Reliability of process and equipment			✓	✓			✓	
Failure to meet performance			✓	✓			✓	
Accidents during operation			✓	✓			✓	



Contd.....

Risk	Allocation							Mitigation
	Govt.	Sponsors	Project Company	Third Party Contractor/Supplier	Project Lenders	Insurers	Performance & other bond banks or insurers	
<b>5. Environmental</b>								<ul style="list-style-type: none"> <li>EIA from reputable institution</li> <li>Implementable operational environmental plan</li> <li>Public awareness campaign</li> </ul>
Environmental impact assessment (EIA)	✓		✓					
Operational environmental management			✓	✓				
Public acceptance	✓	✓	✓					
<b>6. Fuel</b>								<ul style="list-style-type: none"> <li>Fuel supply availability study</li> <li>Long-term fuel supply contract</li> <li>Storage of rice husk during lean season</li> </ul>
Availability of supply			✓	✓				
Price and future escalation			✓	✓				
Competing usage			✓	✓				
<b>7. Financial/Legal</b>								<ul style="list-style-type: none"> <li>PPA from national grid including provision for foreign exchange and fuel price fluctuation</li> <li>Equity from sponsors</li> <li>Fixed rate loans</li> <li>Hedging mechanisms such as interest swaps</li> <li>Joint venture agreement/agreement for the establishment for SPC</li> </ul>
Inflation	✓	✓	✓		✓			
Interest rate	✓	✓	✓		✓	✓		
Foreign currency exchange rate	✓	✓	✓	✓	✓	✓		
Ownership of assets			✓					
Security structure			✓		✓			
Insolvency of company		✓	✓		✓			
Breach of financing documents		✓	✓		✓			
Enforceability of security			✓		✓			





Contd.....

Risk	Allocation							Mitigation
	Govt.	Sponsors	Project Company	Third Party Contractor/ Supplier	Project Lenders	Insurers	Performance & other bond banks or insurers	
<b>8. Operation</b>								<ul style="list-style-type: none"> <li>Hiring of competent O&amp;M contractor</li> <li>Sound O&amp;M contract</li> <li>Insurance during operating life of project</li> </ul>
Company default		✓						
Termination of O&M contract by company			✓	✓				
Environmental damage - ongoing			✓			✓		
Force majeure event	✓		✓			✓		
Change in law	✓		✓	✓				
Labour issues			✓					
<b>9. Market and Revenue</b>								<ul style="list-style-type: none"> <li>PPA from national grid</li> <li>Established SPP scheme</li> <li>Long-term purchase contract for other income stream (e.g. rice husk ash, fly ash)</li> </ul>
Insufficient income			✓		✓			
Off-taker default			✓	✓	✓		✓	
Insufficient demand			✓		✓			





For more information,  
please visit COGEN 3 Website at:

<http://www.cogen3.net>

**Thank You !**