

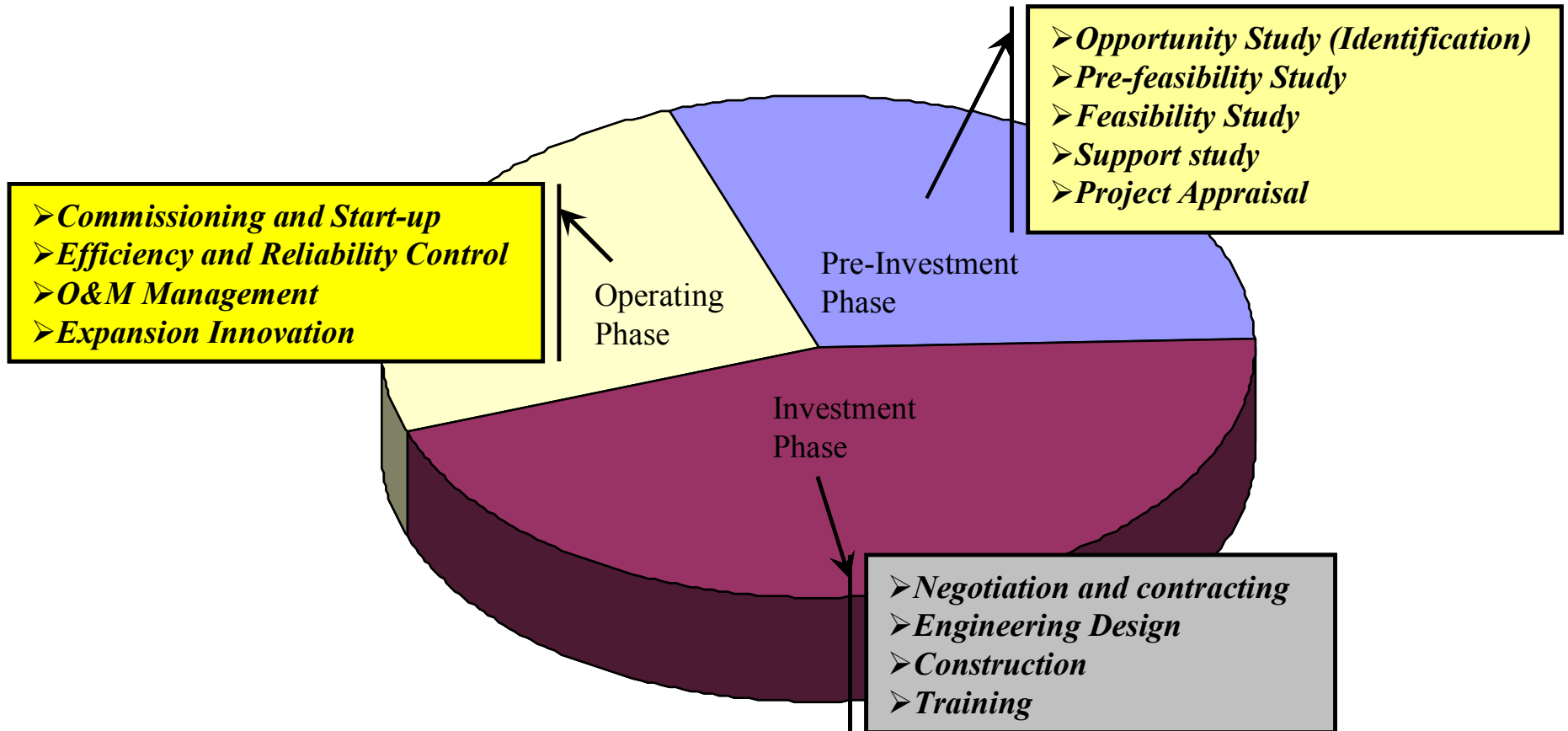


Overview of cogeneration project development

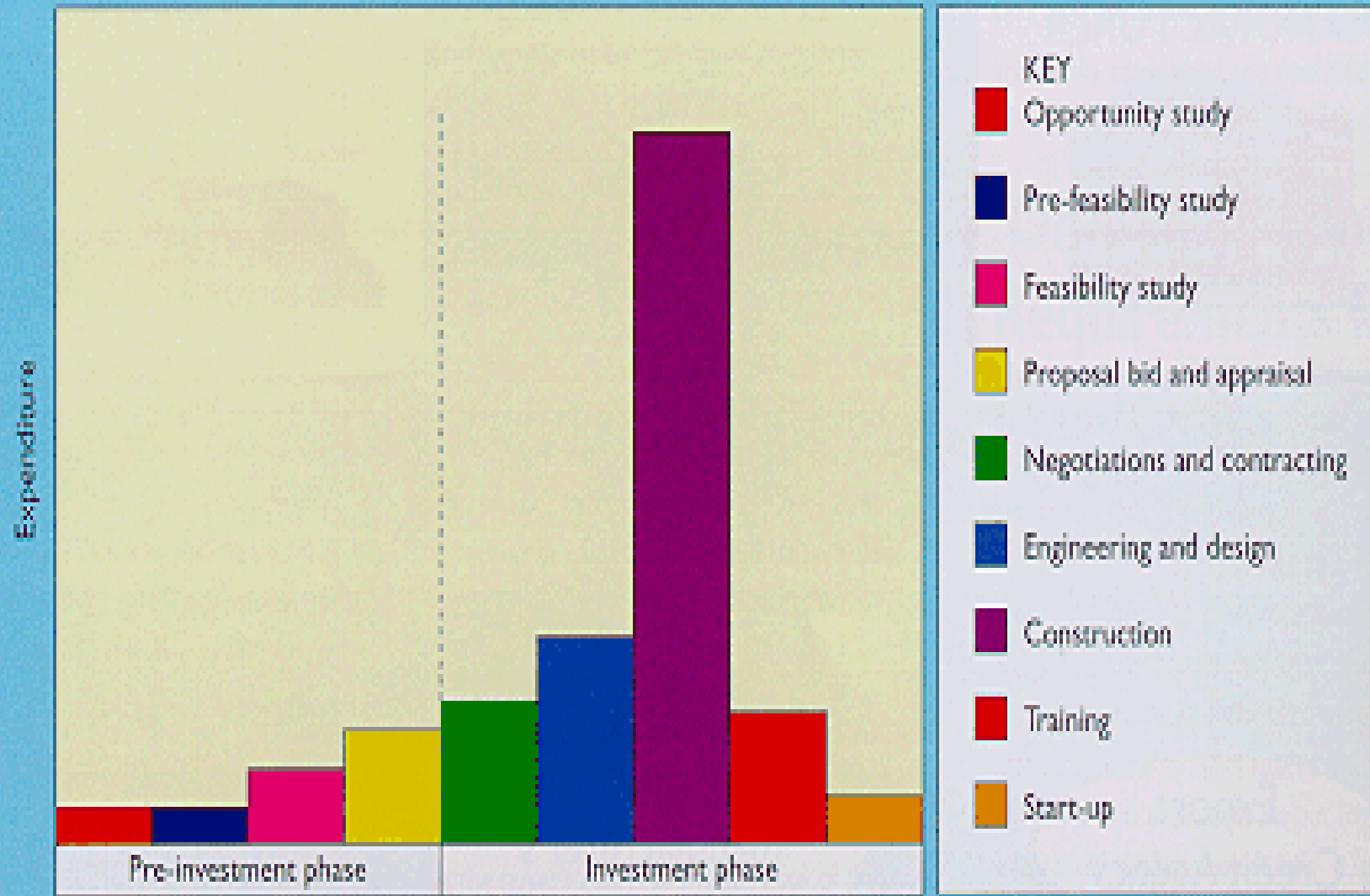
2004 Cogeneration Week in Cambodia
10-11 June 2004
Teo Hotel, Battambang

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PROJECT DEVELOPMENT PROCESS



TYPICAL PROJECT LIFE-CYCLE EXPENDITURE



Source: ETSU, Cleaner Coal Technologies: Financing, 1999



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 & 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 & 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

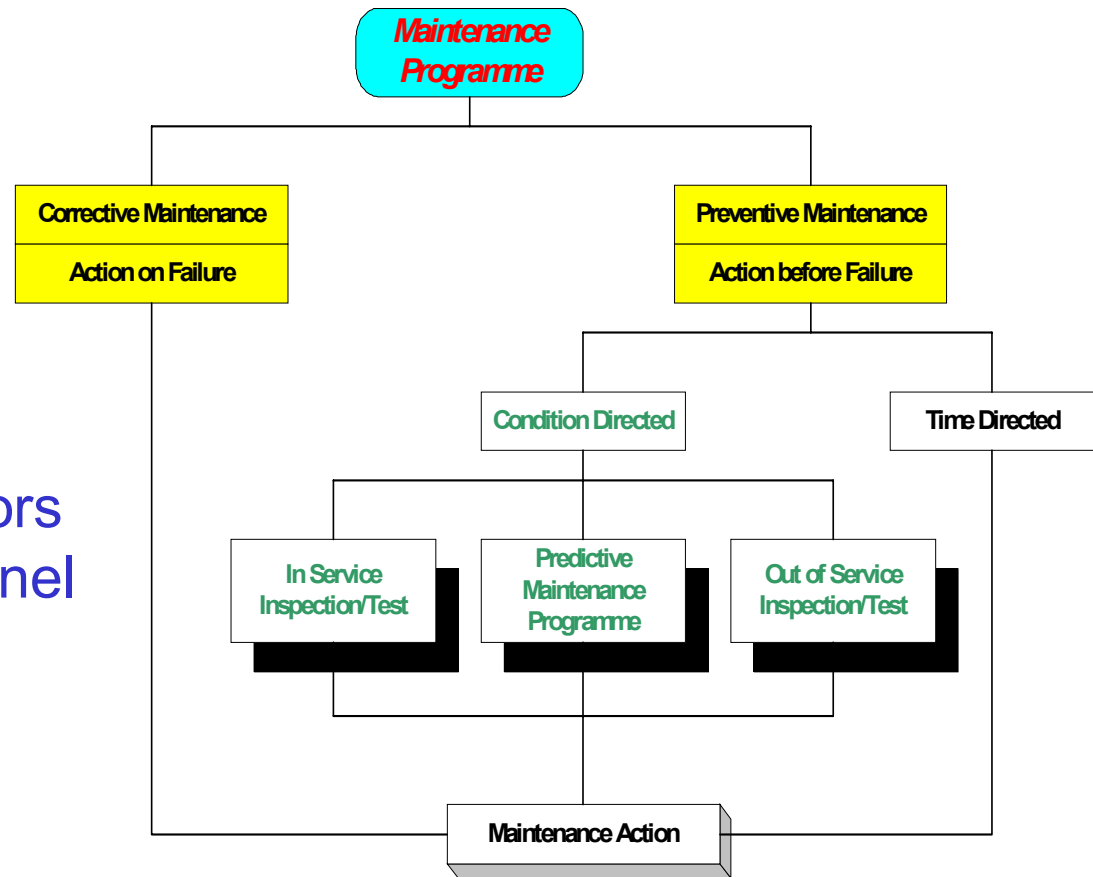




OPERATION AND MAINTENANCE

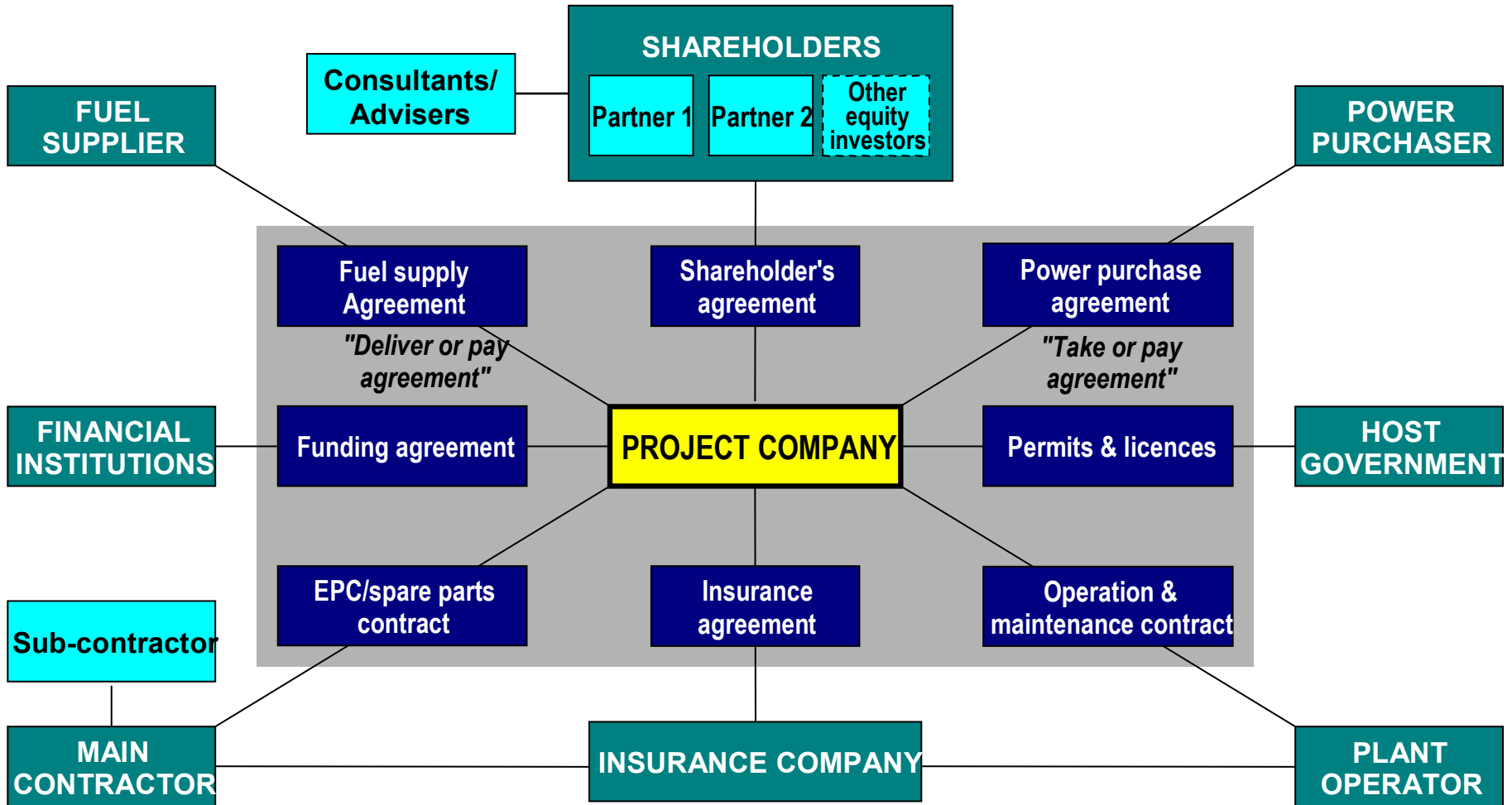
O/M through:

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





STAKEHOLDERS





Cogeneration Catalogue: Cogeneration Development Guide 2nd Edition

The Guide provides useful and relevant information on how to develop a cogeneration project. The 2nd Edition of the Cogeneration Development Guide is divided into three distinct parts:

Part I: Pre-investment Phase. A step-by-step approach on how to conduct project pre-feasibility and feasibility studies is provided. Cogeneration potentials in ASEAN and the variety of technologies used in cogeneration are covered.

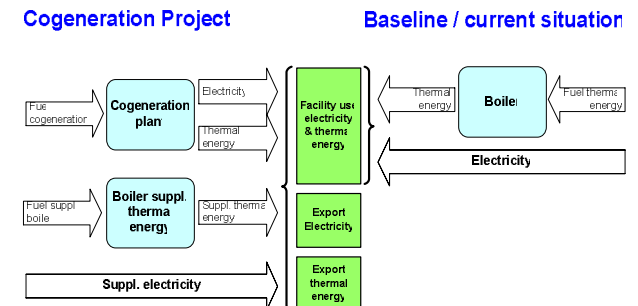
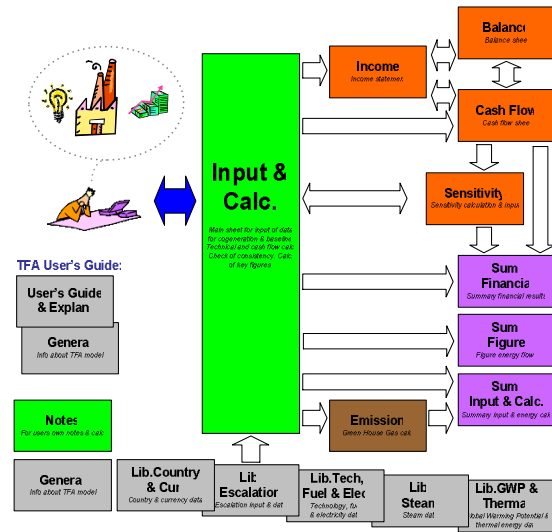
Part II: Investment Phase. Contractual issues, risk mitigation and allocation are emphasized in the Part II. Other aspects covered are:

- Simple procedure in tendering for EPC and equipment supply
- Thorough listing and evaluation of different types of financing alternatives and sources available
- Brief description of financial packaging and financial close
- Detailed design, engineering and construction of a cogeneration project

Part III: Operating Phase. The details of operation and maintenance of a cogeneration plant are outlined and described.

Technical – Financial Analysis (TFA) model

- Calculation model for technical, financial & environmental analysis of cogeneration projects
- Simple database for guidance: Cogeneration system efficiencies, fuel data, national economic data etc.
- Excel standard spreadsheet: Transparent & open model structure
- Developed by COGEN 3.
- Available for all & free





For more information,
please visit COGEN 3 Website at:

<http://www.cogen3.net>

Thank You !