BEIRUT-COPENHAGEN CITY COORPERATION WASTE-TO-ENERGY AND SOLID WASTE MANAGEMENT, OCTOBER 2016

CO-CREATION WORKSHOP

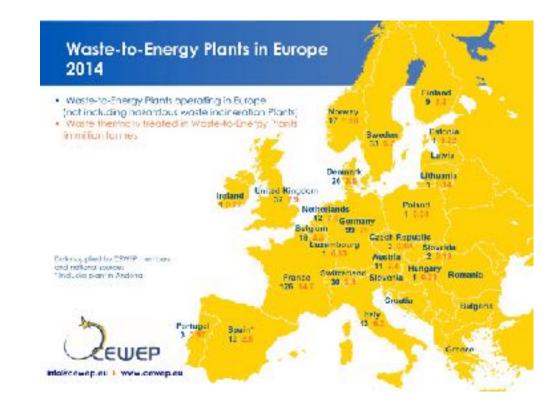
THE WAY TO SECURE AN HIGH QUALITY WASTE-TO-ENERGY PLANT IN BEIRUT

JØRGEN HAUKOHL, RAMBOLL, INDEPENDENT CONSULT

IDEA TO REALITY

Project structure schemes:

- Technical, environmental and financial analysis
- Conceptual design and layout
- Procurement planning and project structuring
- Management of the procurement process
- Preparation of tender documents, bid evaluation and contract negotiations
- Owners Engineer / EPC: Contract management, design supervision, coordination, works supervision and commissioning
- O&M support





HOW TO PREPARE A SUCCESSFUL PROJECT? PROJECT DEVELOPMENT PROCESS





WASTE STRATEGY WASTE QUANTITY AND QUALITY





STAKEHOLDERS TO BE CONSIDERED

AUTHORITIES

- Local Governments
- Planning Authorities
- Environmental Authorities
- Health Authorities
- Traffic Authorities

COMMUNITY - Environmental NGOs

- Nature/wildlife NGOs
- Community Groups
- Neighbouring citizens
- Local scavengers

MSW INCINERATION

WASTE SECTOR

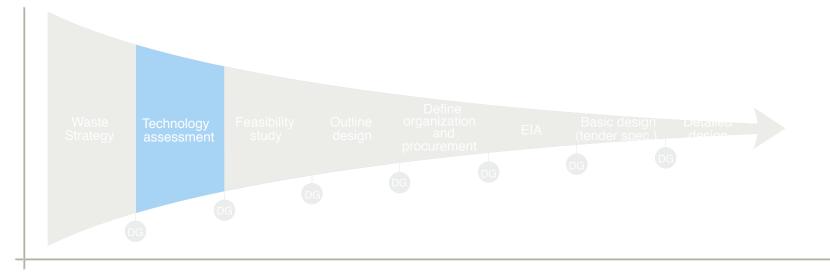
- Waste generators
- Waste recycling companies
- Waste collecting companies
- Other treatment plants
- Landfill operators

ENERGY SECTOR

- Power producers
- Power distr. company
- Industries selling heat/power
- District heating company
- Power/energy consumers

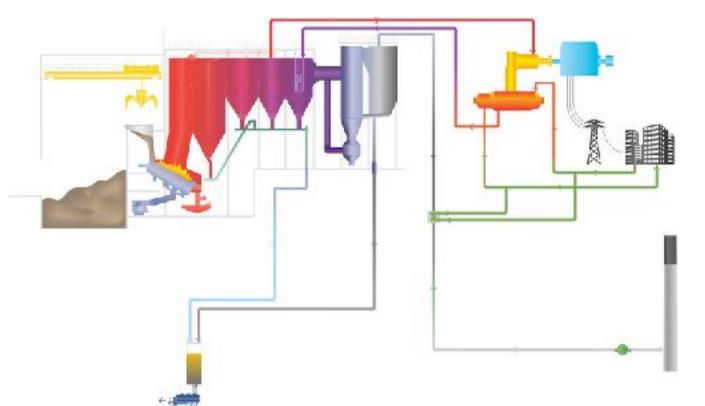


TECHNOLOGY ASSESSMENT



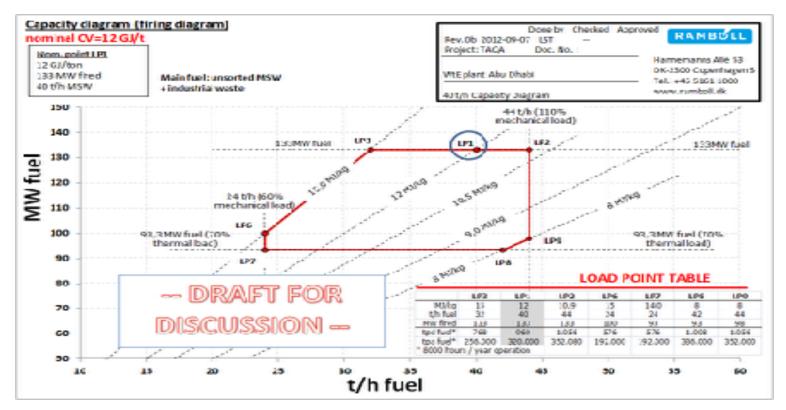


WTE FACILITY PROCESS DESIGN





CAPACITY DIAGRAM - PRINCIPLE



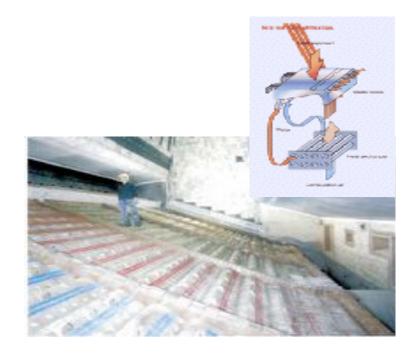
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JØRGEN HAUKOHL - CO-CREATION WORKSHOP - BEIRUT 10-10-2016

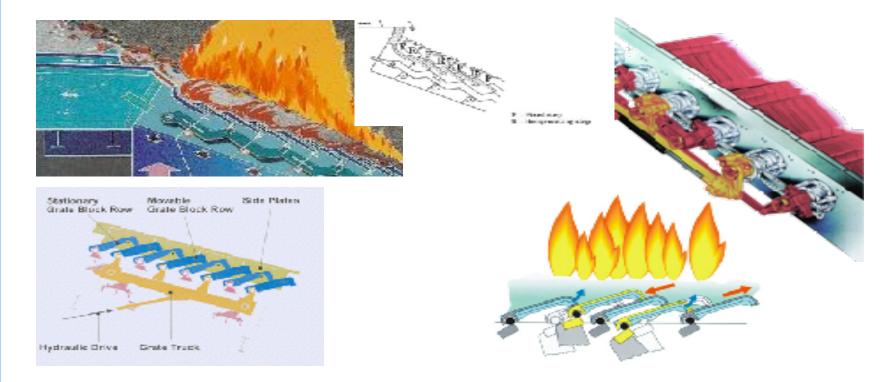
GRATE - SYSTEM

- Robust and proven design
- Advanced ACC system (Automatic Combustion Control)
- Lower burn-out (1-1.5%)
- Water cooling if high calorific value
- Suppliers (worldwide):
 - Martin
 - Hitachi Zosen
 - Fisia Babcock
 - Keppel Seghers
 - Babcock & Wilcox Vølund





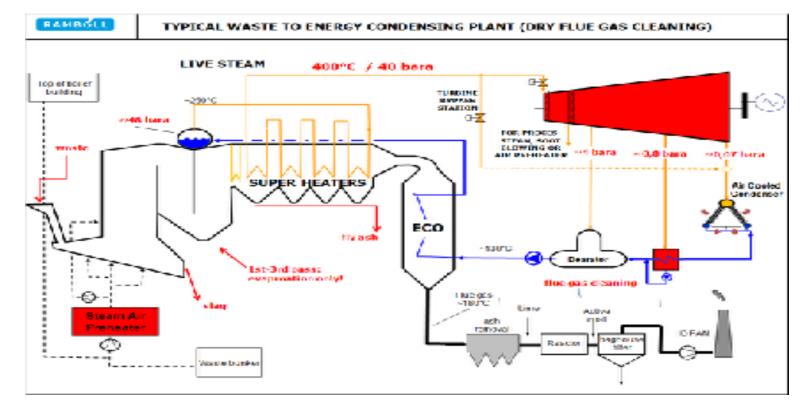
GRATE TECHNOLOGY





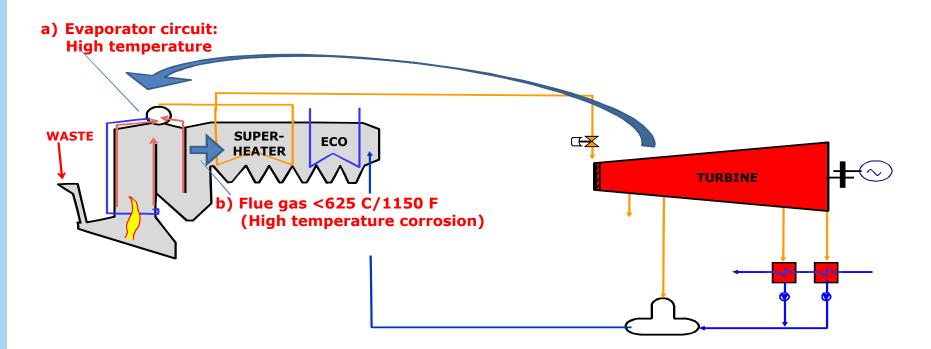


CONDENSING TURBINE (POWER)



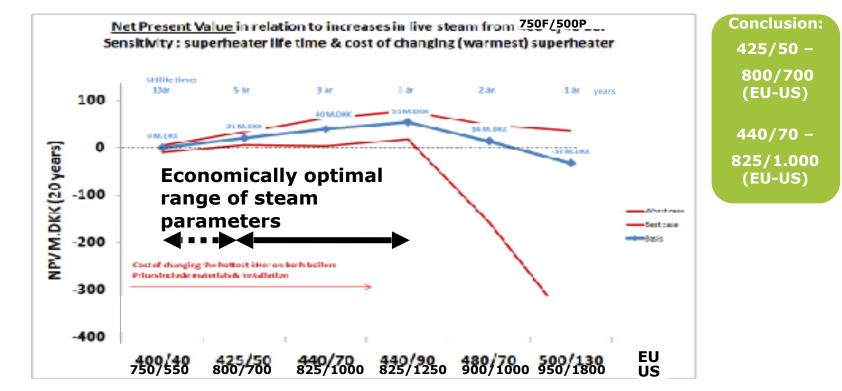
RAMBOLL

HOW TO AVOID CORROSION





SUPERHEATER OPTIMISATION



RAMBOLL

FEASIBILITY STUDY



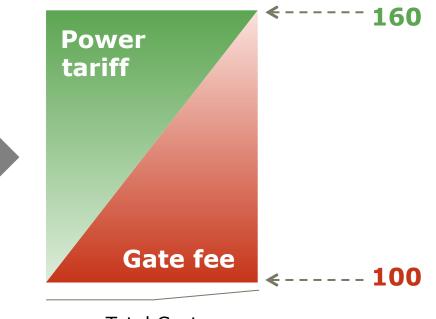
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FINANCIAL RESULTS

. EASIBILITY STUDY

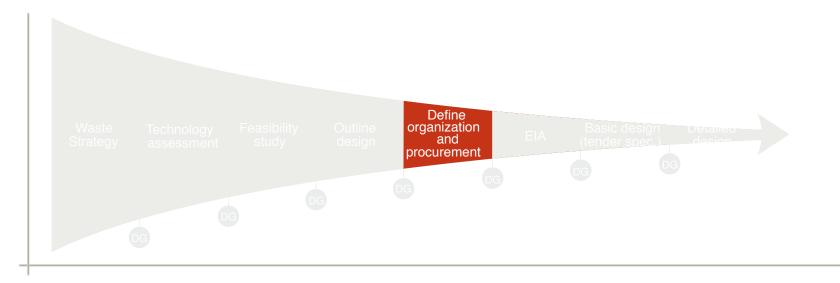
Income is determined by gate fee and power tariff



Total Cost Per ton of waste

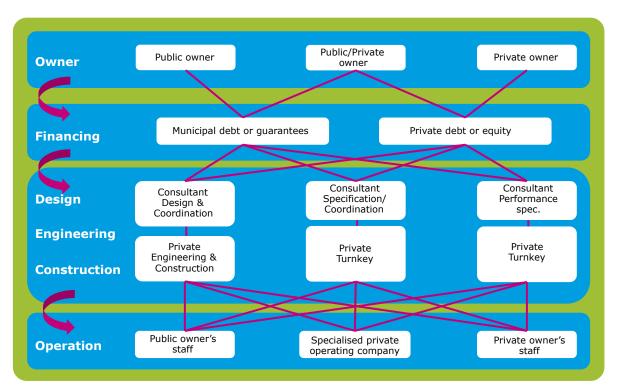


DEFINE ORGANIZATION AND PROCUREMENT





ORGANIZATIONAL DECISIONS HIERARCHY





ORGANISATIONAL OPTIONS

DB+O

DESIGN-BUILD + O&M

- One EPC contract
- Operations separate
 - Operations by operation company
- Ownership by Municipality
- Financing by Municipality

DBO

DESIGN-BUILD-OPERATE (20 YEARS)

- One EPC+Operation contract
 - Either one contractor or
 - Consortium of EPC contractor and operation company
- Ownership by Municipality
- Financing by Municipality via Banks or Bonds

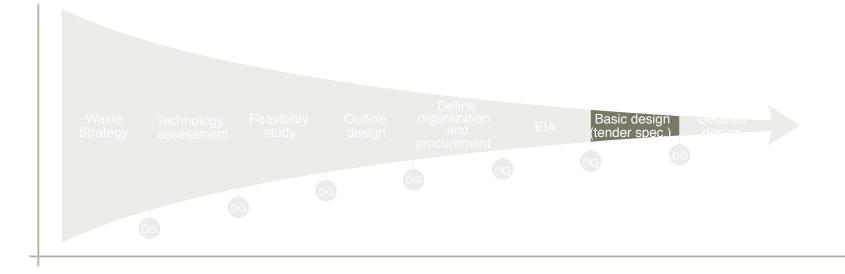
DBOO

DESIGN-BUILD-OWN-OPERATE

- Design-Build-Operate by EPC+Operation Contractor
- Ownership by Private
 Investor
- Financing by Private Investor



BASIC DESIGN (TENDER SPECIFICATION)





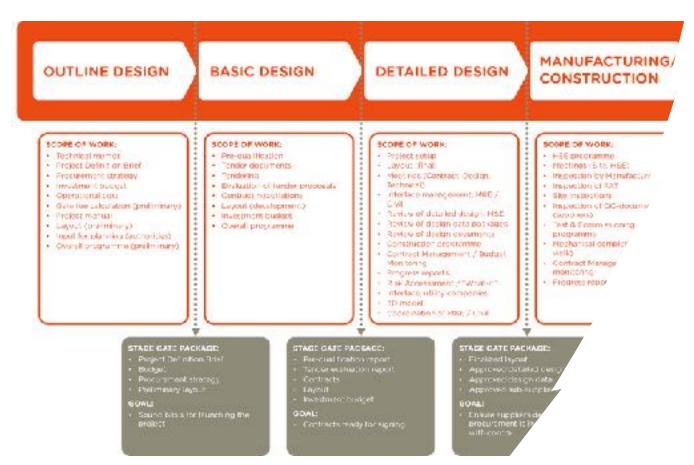
FROM FEASIBILITY TO CONTRACT

	PHASE + STEP	PURPOSE AND ISSUES TO CONSIDER
Project Preparation Phase	Establishment of an Organisation	Establishment of an official organisation and establishment of institutional support and framework.
	Tender + Financial Engineering	Detailed financial engineering, negotiation of loans or other means of financing + selection of consultants.
	Preparation of Tender Documents	Reassessment of project, specifications, pre- qualification of contractors and tender documents.
Project Implemen- tation Phase	Political Decision	Decision on financial package, tender documents and procedures in detail and final go-ahead.
	Award of Contract & Negotiations	Pre-qualification of contractors. Tender documents. Select most competitive bid. Negotiate contract.

B A S I C



THE WAY FORWARD DESIGN – TENDER-CONTRACT



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В

THANK YOU FOR YOUR ATTENTION

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CONTRACTOR OF

and in some little