Investment in Waste Treatment – Project Implementation Steps

Wroclaw 23.5.2012 – REMOWE Workshop

- *Jussi-Pekka Aittola*

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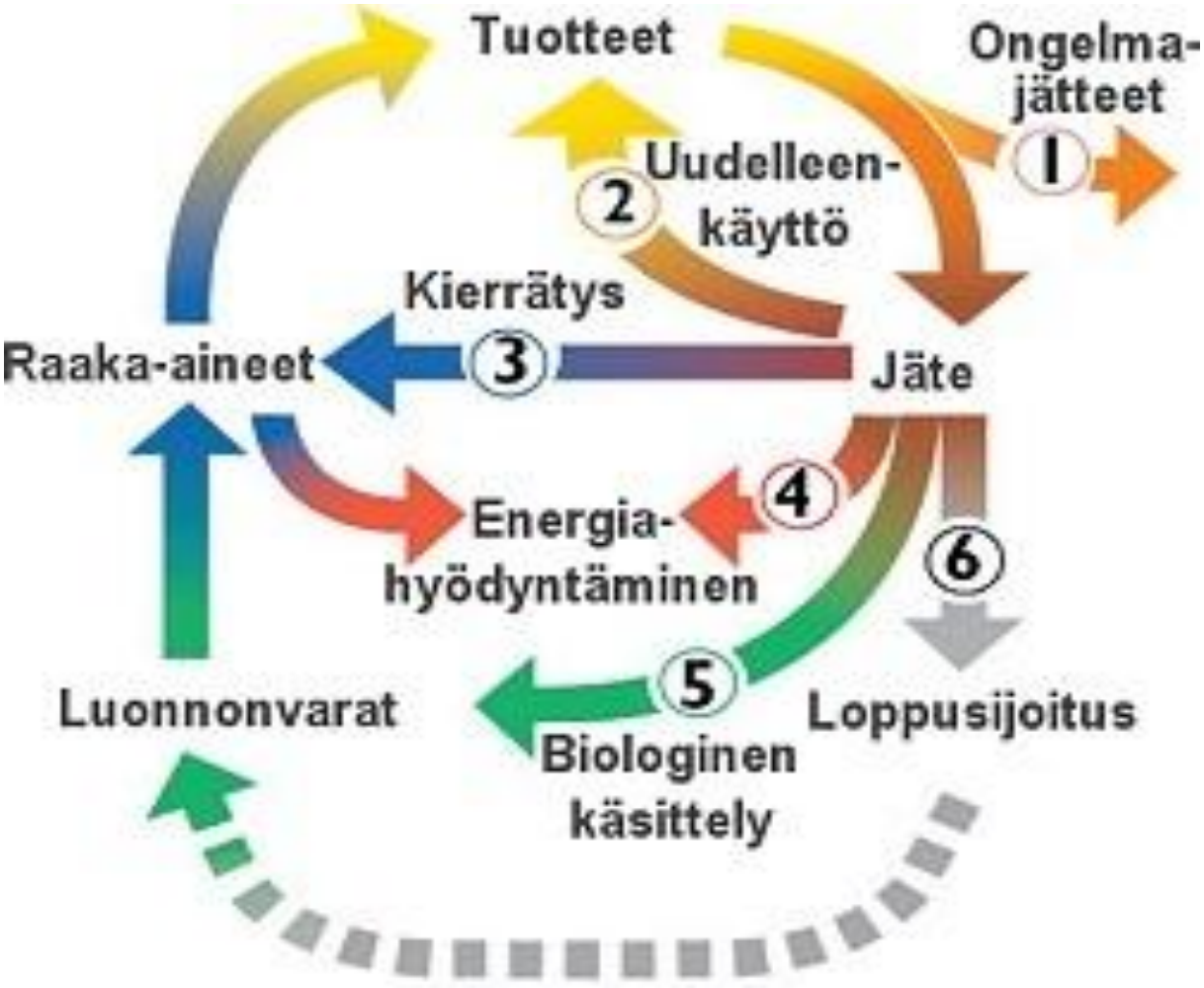
Jätteenpoltto käsittelyhierarkiassa – ”EKOSYKLI”

(Kuva: Jätelaitosyhdistys)



"STRUCTURE" OF ENERGY PRODUCTION: 2010 ->

	POWER PLANTS Electricity production only	**ENERGY PRODUCTION - CHP** in Industry and in Municipalities	**WASTE TO ENERGY** WtE PLANTS	**RENEWABLE ENERGY SOURCES**
Aim of the operation	Electricity (Power) Production	Energy Production, CHP "Low calorific value Fuel" utilization	Waste Destruction, Energy production	Minimization of the Environmental Impact in Energy Production
"Fuels"	Well defined, like Oil, Gas, Coal, Biomass, Peat	Coal, Bark, Peat, Wood, Stumps, Biogas, Sludge, Low Grade Biofuels, SRF, RDF, PDF, etc.	Mixed Waste, MSW, Demolition Wood, Low Grade Fuels	Solar, Wind, Wave, Hydro, etc
Operational Criteria	• Energy Efficiency • MW_e, GWh/a • Euro/MWh	• Energy production, GWh/a • MW_e, MW_t • End Products t/a (ashes,.. etc.) • Low Emissions	• Destroying capacity, t/h, t/a • Emissions • End Products, t/a. • Destroying Cost, Euro/t • Energy Production, GWh/a	• Investment cost, Euro/MWh • Energy Efficiency • Energy Production, GWh/a
Environmental/ Emission requirements	"Moderate"	"Some/Medium stipulated"	"Very Stringent"	"Some/Medium stipulated"
Risk of the operation	"Moderate"	"Medium"	"High"	"Medium/High"

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Waste-to-energy

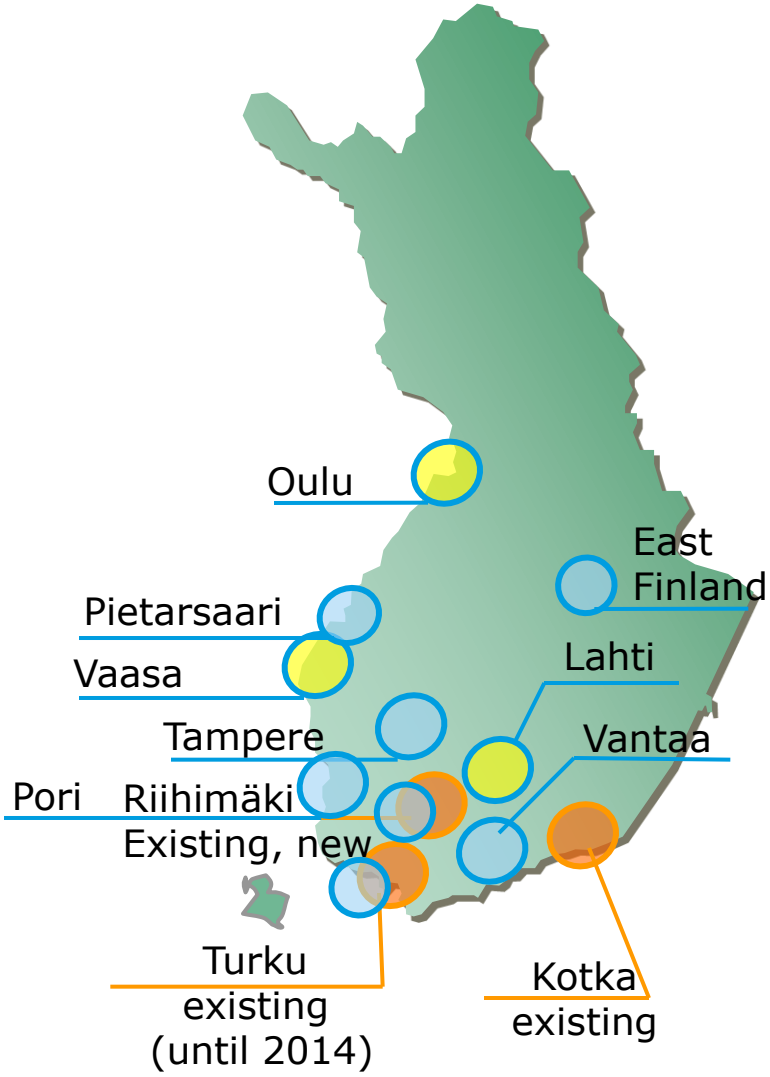
WASTE to ENERGY in FINLAND. Market view

- Total amount of MSW:
  - 2,5 - 3,0 Mt/a
  - → 55 % to landfill
  - → 33 % to recycling
  - → 12 % to energy
- Government target until 2016
  - Total waste to energy capacity would be 1 200 000 t/a
    - → 4 - 5 new W to E plants, still

Planning phase or under investment discussion

Existing plant

Plant under construction



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FISIA BABCOCK ENVIRONMENT GmbH
IMPREGILO GROUP

BAT-requirements regarding emissions
How to interpret them?

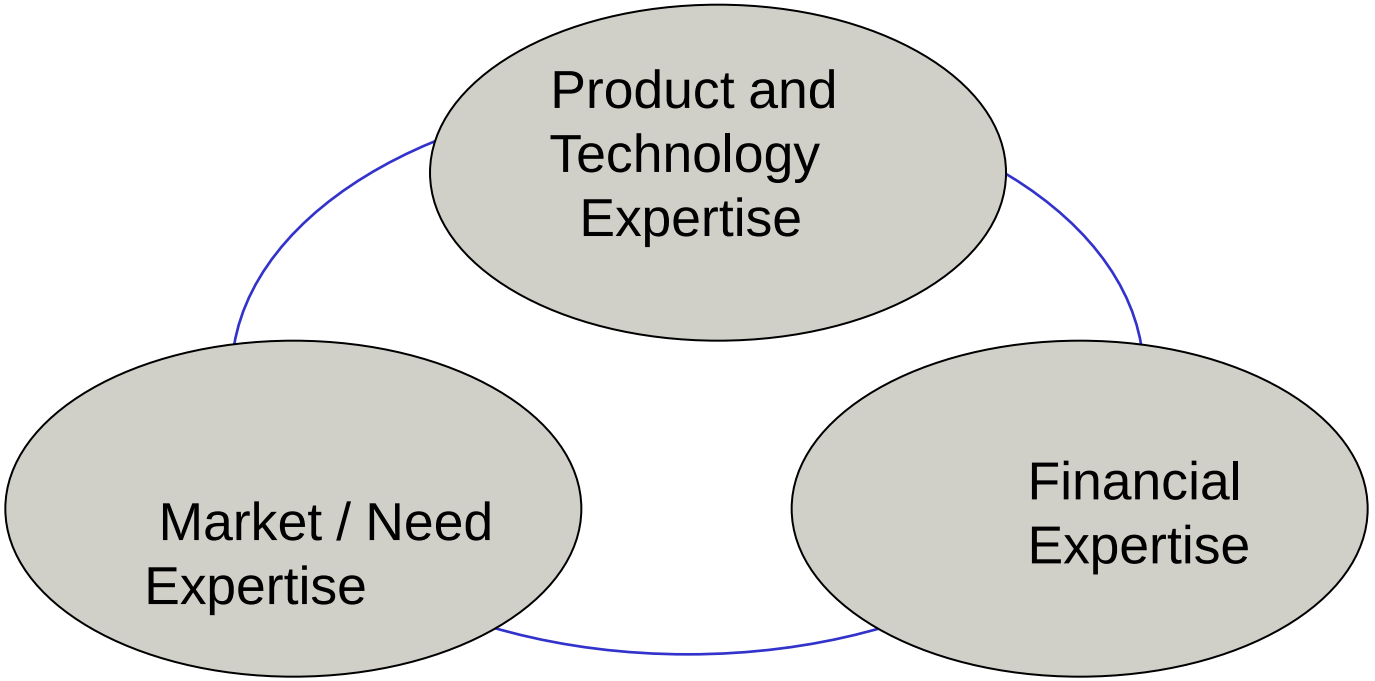
Where emission or consumption levels "associated with BAT" are presented this is to be understood as meaning that those levels represent the environmental performance that could be anticipated as a result of the application, in this sector, of the techniques described, **bearing in mind the balance of costs** and advantages inherent within the definition of BAT. **However, they are neither emission nor consumption limit values and should not be understood as such**. In some cases it may be technically possible to achieve better emission or consumption levels but due to the costs involved or cross-media considerations, they are not considered as BAT for the sector as a whole.

...

It is intended that the general BAT ... **are a reference point** against which to judge ... an existing installation or ... a proposal for a new installation.

STAKEHOLDERS AND DECISSION MAKING IN WASTE TREATMENT PROJECTS AND PROJECT INVESTMENTS

CORNERSTONES FOR INVESTMENT



WASTE MANAGEMENT DRIVERS – TREATMENT TECHNOLOGY DEVELOPMENT

1. International Regulations, Trends and Drivers

- EU 20/20/20 target, EU – Directives & Guidelines,
- Joint Implementation, CDM, GEF, Kyoto protocol
- Emission Trading years 2008 – 2012 (after 2012 ??)
- Climate Change Discussion and actions

2. National Goals & Targets & Drivers

- Policy issues (Environmental Regulation)
- Energy & Climate policy issues (fuels, emissions, etc.)
- Economic and other incentives, sanctions,

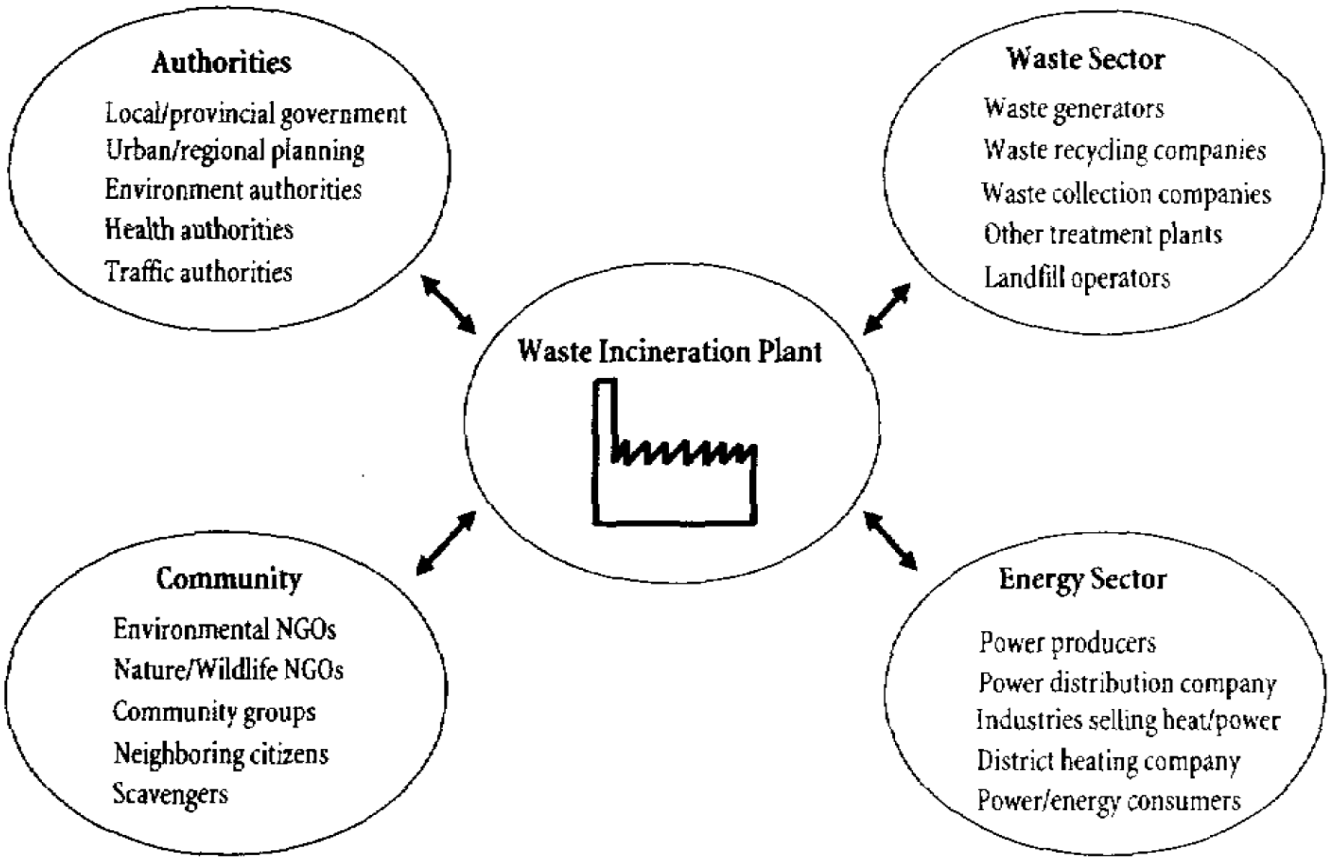
3. Country Specific Laws & Regulations – Driving Forces

- Energy & Climate Programs, forecasts.
- EU 20/20/20 target & local response, energy production & technology tradition
- Emission trading
- New Market Mechanisms

INVESTMENT RELEVANT STAKEHOLDERS

(WORLD BANK TECHNICAL PAPER NO. 462, JUNE 200)

Figure 1 Relevant Stakeholders



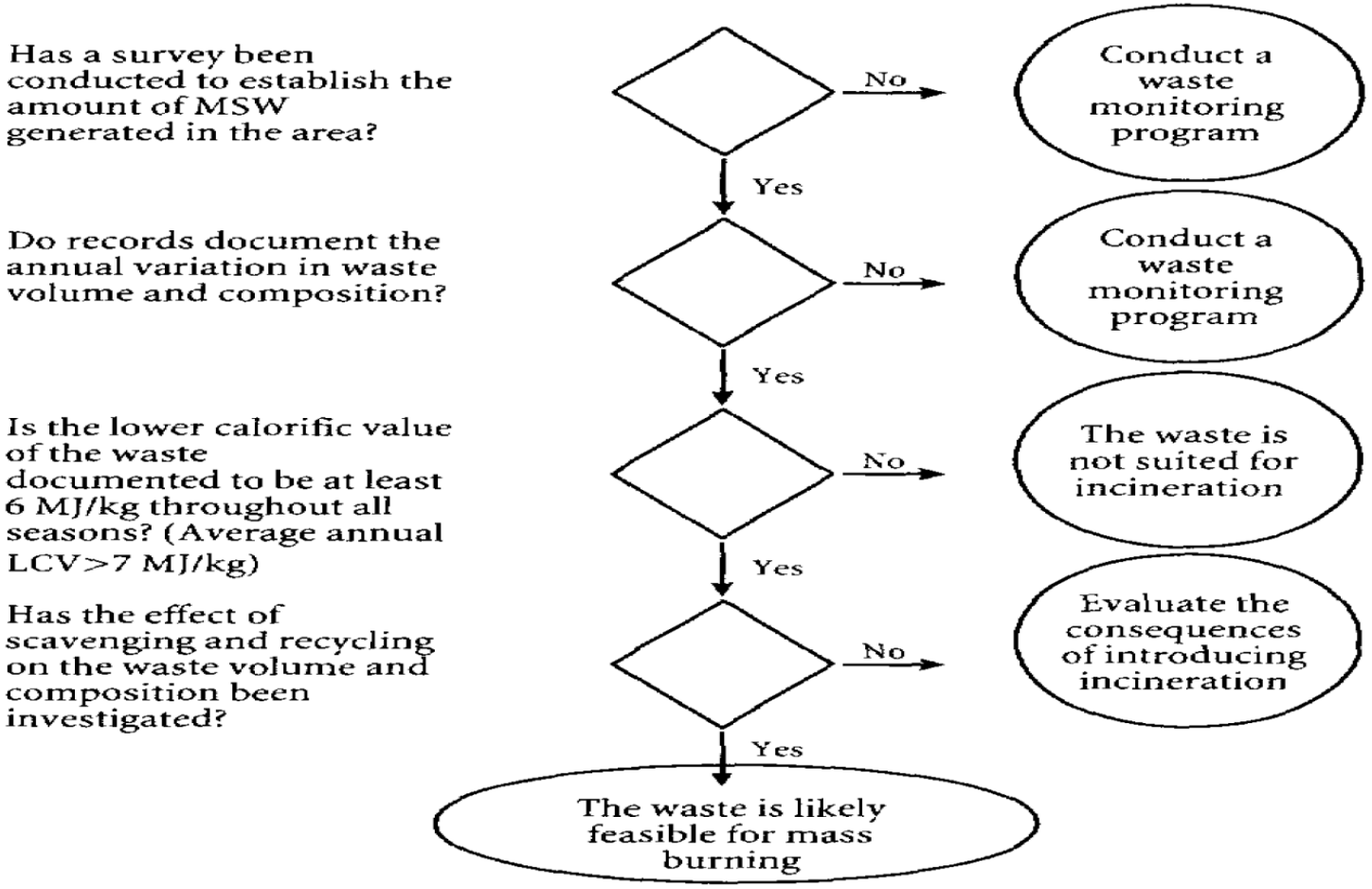
PROJECT IMPLEMENTATION PLAN AND STEPS

Figure 11 Typical Implementation Plan

Phase and Step		Purpose and Issues to Consider	Duration
Feasibility Phase	Pre-feasibility Study	Waste quantities, calorific values, capacity, siting, energy sale, organization, costs, and financing	6 months
	Political Decision	Decide whether to investigate further or to abort the project	3 months
	Feasibility Study	Waste quantities, calorific values, capacity, siting, energy sale, organization, costs, and financing in detail	6 months
	Political Decision	Decide on willingness, priority, and financing of incineration plant and necessary organizations	6 months
Project Preparation Phase	Establishment of an Organization	Establishment of an official organization and an institutional support and framework	6 months
	Tender and Financial Engineering	Detailed financial engineering, negotiation of loans or other means of financing, and selection of consultants	3 months
	Preparation of Tender Documents	Reassessment of project, specifications, prequalification of contractors, and tender documents	6 months
	Political Decision	Decision on financial package, tender documents and procedures in detail, and final go-ahead	3 months
Project Implementation Phase	Award of Contract and Negotiations	Prequalify contractors, tender documents, select most competitive bid, negotiate contract	6 months
	Construction and Supervision	Construction by selected contractor and supervision by independent consultant	2 1/2 years
	Commissioning and Startup	Test all performance specifications, settlements, commissioning, training of staff, and startup by constructor	6 months
	Operation and Maintenance	Continuous operation and maintenance of plant. Continuous procurement of spare parts and supplies.	10–20 years

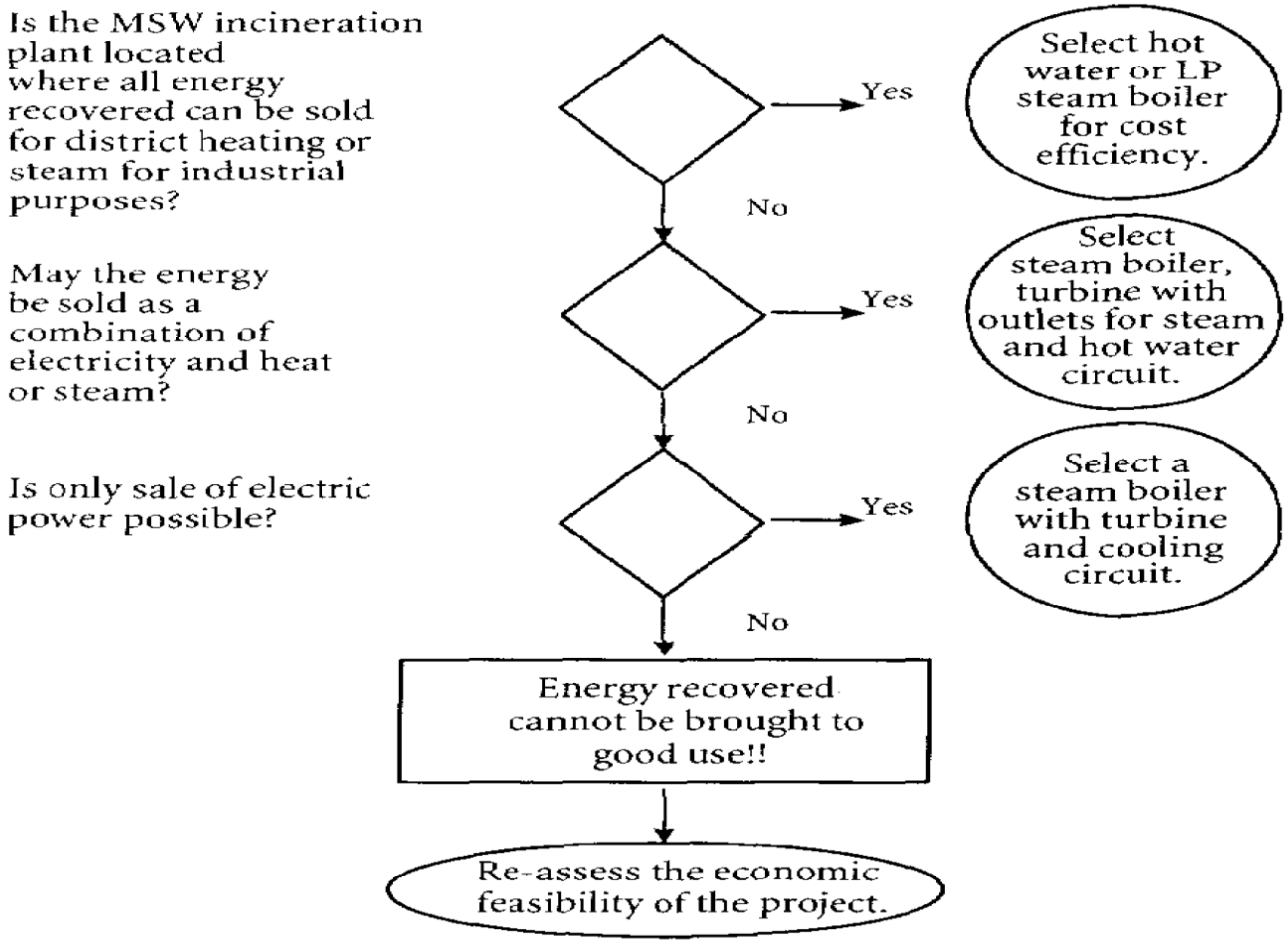
ASSESSMENT OF WASTE AS FUEL

Figure 4 Assessment of Waste as Fuel



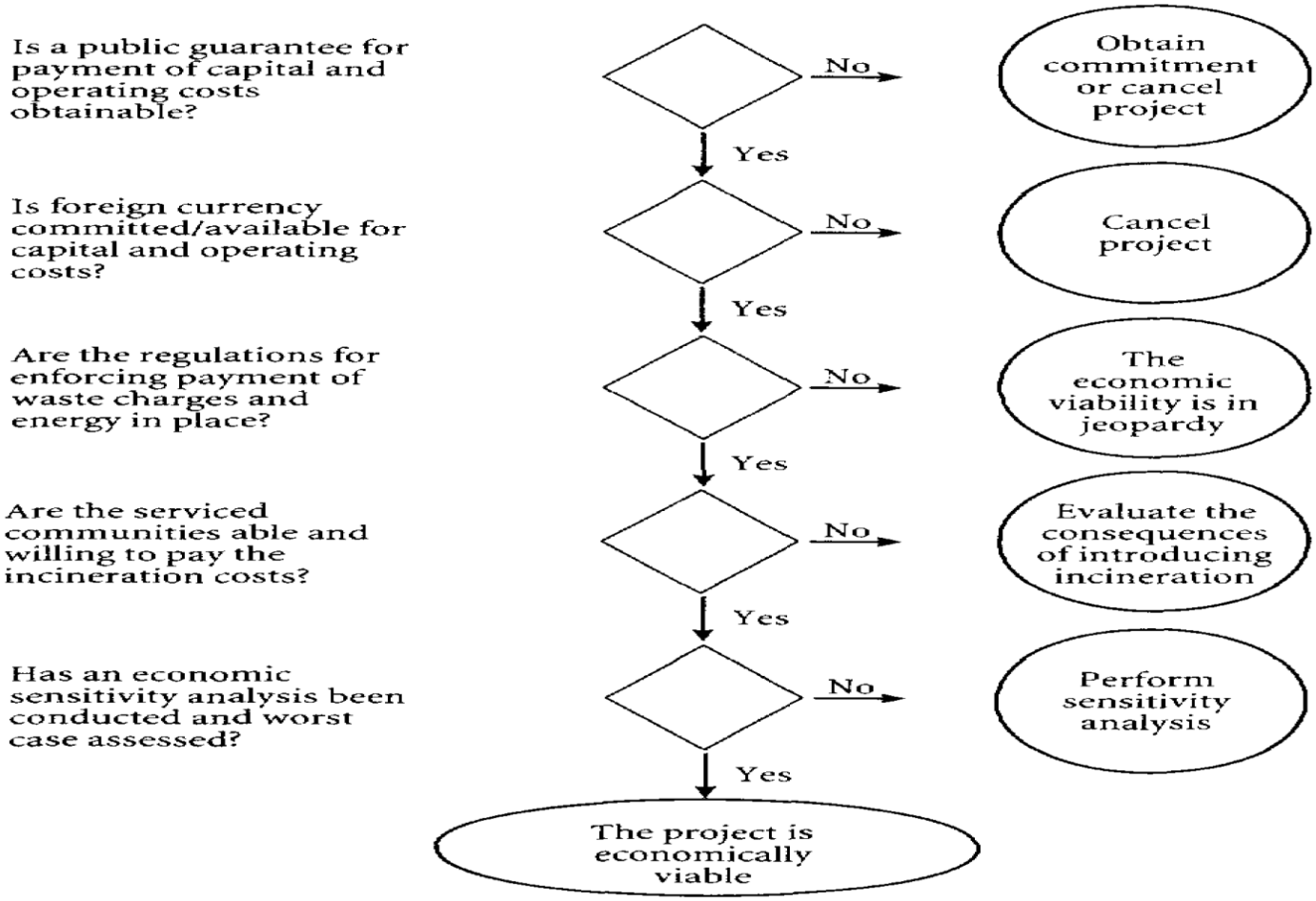
POTENTIAL SALE OF ENERGY

Figure 3 Assessment of Potential Sale of Energy



PROJECT ”GO or NOGO” - DECISSION

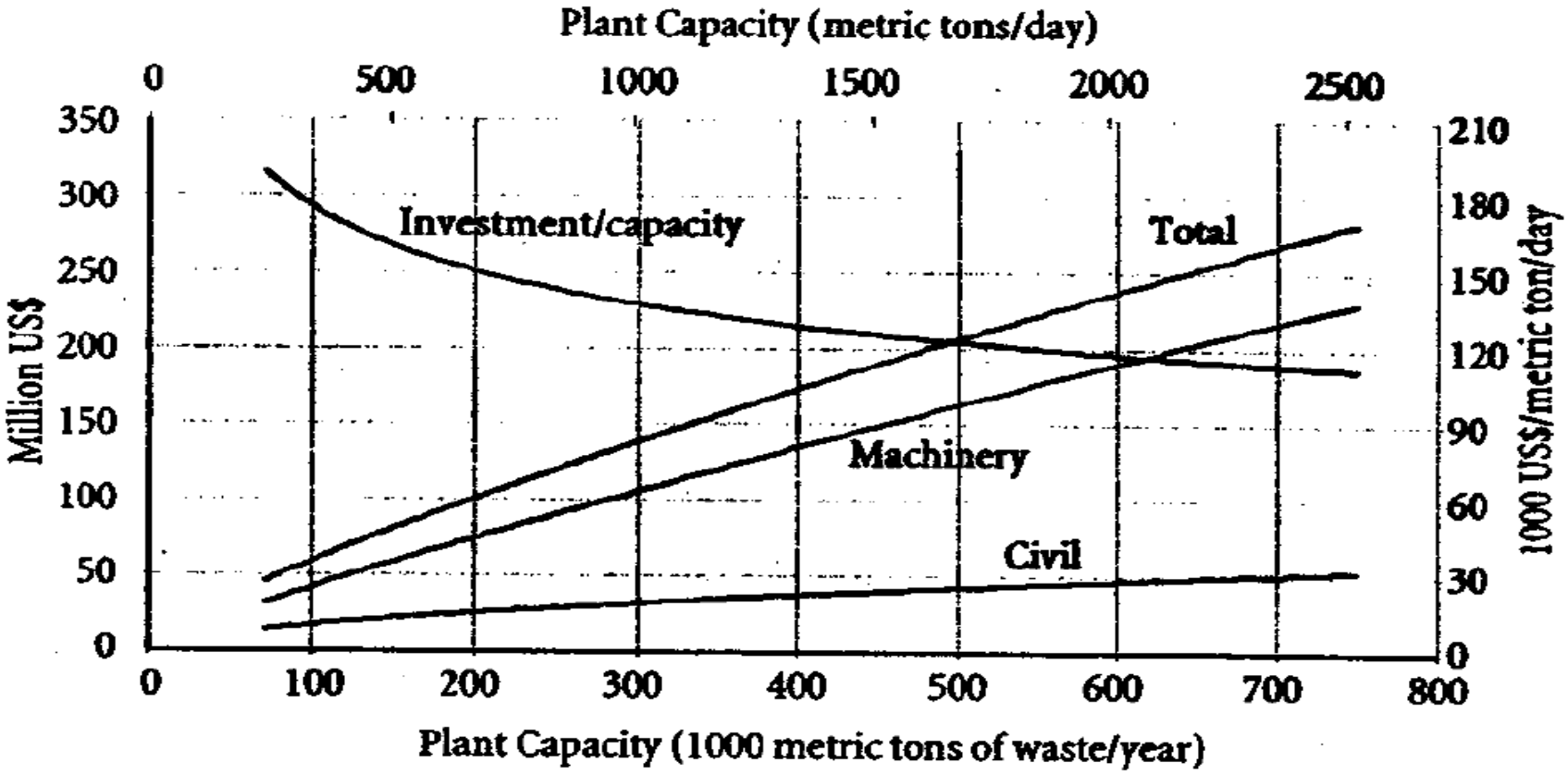
Figure 10 Assessment of Project Economy



INVESTMENT COSTS - WASTE TO ENERGY

(WORLD BANK TECHNICAL PAPER NO. 462, JUNE 2000)

Figure 4.1 Investment Costs



WASTE TO ENERGY PLANTS IN FINLAND 2010 -> IN OPERATION & "ON DRAWING BOARD"

	Location	Design (Fuel) Capacity, t/a	Fuel Type	Boiler Supplier	Contract Typ	Consulting Company	Commissioning Year	Cost M Euro
Operating W to E Plants								
1	Turku	50 000	MSW	Von Roll / Volund	"EPCM"	IVO Group RFI	1975/1995 until 2014	NA
2	Kotka	100 000	MSW	Seghers-Keppel	EPCM	ÅF - Enprima	2007	65
3	Ekokem 1	130 000	MSW + RSF	Fisia-Babcock	EPCM	ÅF - Poyry	2007	55 - 65
W to E plants under construction or "on drawing board"								
4	Vaasa	160 000	MSW	AEE Von Roll	EPCM	RDk-CITEC	2013	120 - 135
5	Oulu	130 000	MSW	Baumgarte Boiler Systems GmbH Standardkessel Baumgarte Group	OE	ÅF	2013	80
6	Ekokem 2	150 000	MSW + RSF	?	EPCM	ÅF	2013(4)	85 - 100
7	Vantaa	320 000	MSW	? ext. Superheating using nat. gas	EPCM	Poyry	2014	200 - 220
8	Lahti	250 000	MSW+RSF	M-Power	EPCM / OE	??	2012	160
9	Pirkanmaa	150 000	MSW	?	?	?	2014	100 - 120
12	Pietarsaari	130 000	RSF	?	?	?	2014	80
10	Pori	150 000	MSW	?	?	?	2015	?
11	SW-Finland	150 000	MSW + RSF	?	?	?	2016	?
	In Total	**1,87**	**M t/a**					

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MARKET DRIVERS in Waste Treament. W2E as an Example

- EU waste directives
- IED year 2016
- Landfill ban (2016)
- Energy recovery – waste recycling
  - EU Waste hierarchy
- Landfill volume savings
  - Volume reduction > 85%
  - Mass reduction > 75%
- Safe & hygienic end product
  - Disease vector removal

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WASTE TREATMENT HIERARCHY AND PROCESS CHAIN

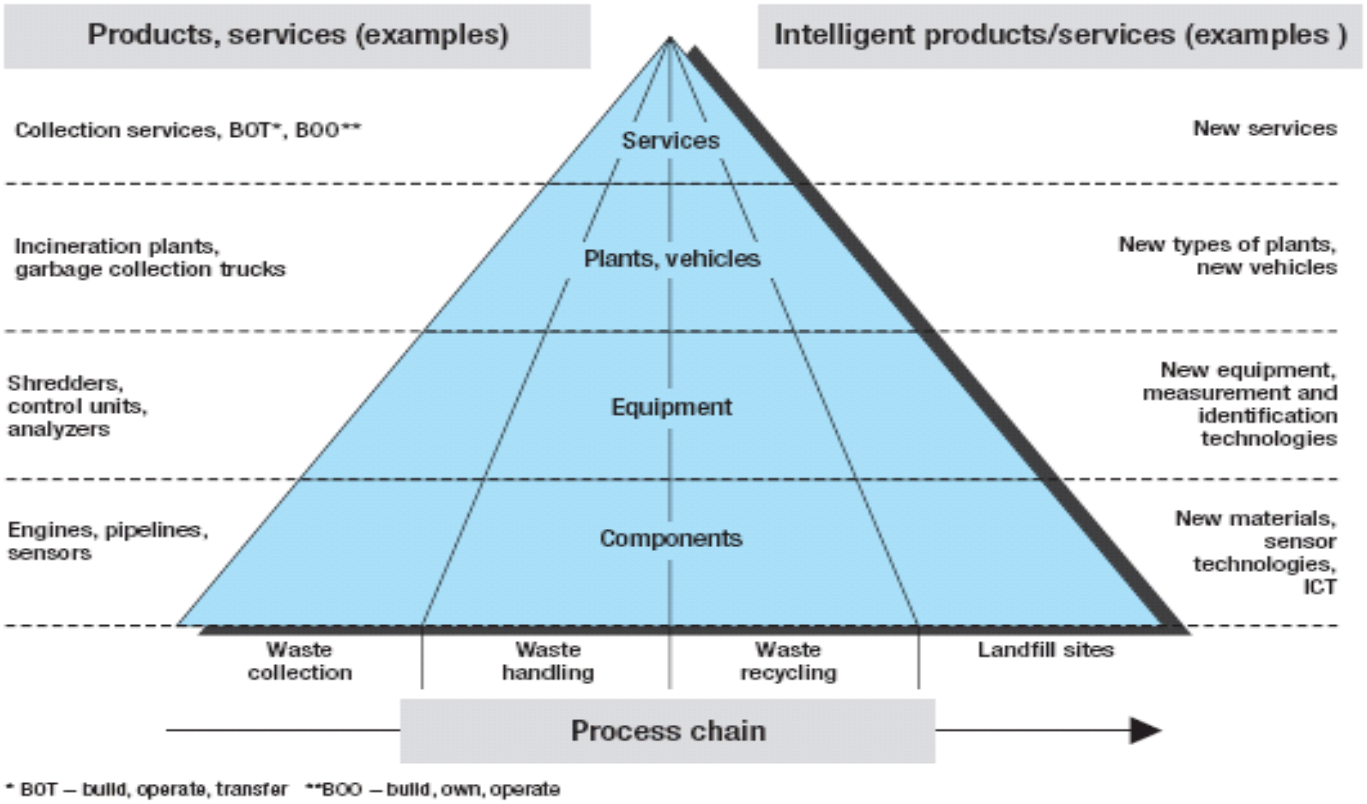
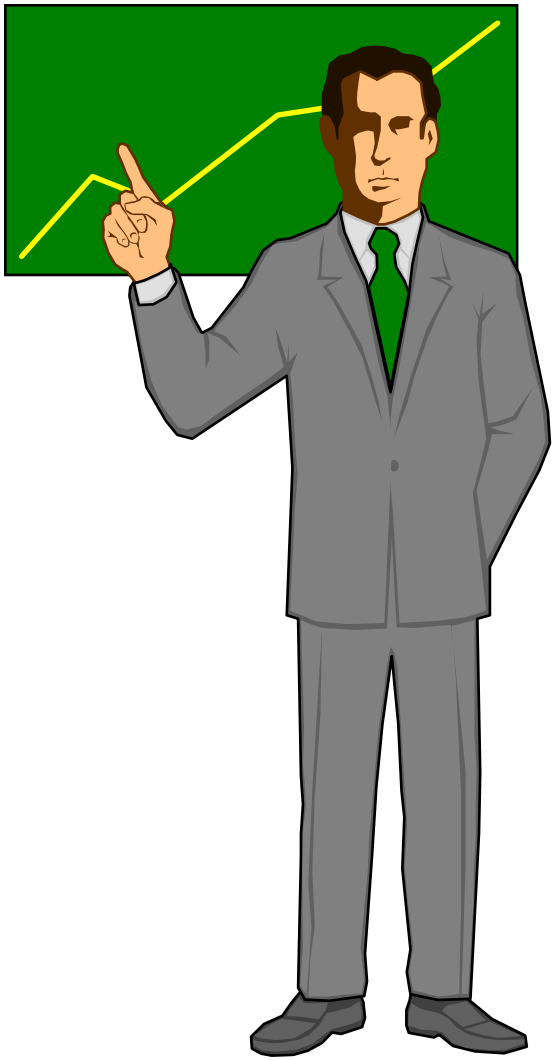


Figure 1.1. Waste treatment: Hierarchy and process chain.


SITA
SUEZ

Nordförbränning, Copenhagen, Denmark

Thank You



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