



Twinning Project IL/11

Implementation and Strengthening the Environmental Framework for
IPPC, Resource Efficiency and Eco-Management in Israel



Residual Waste as a Resource

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Jerusalem Workshop
13th September 2016
Activity 3.6





Introduction

- Best Practice
 - Assume 50% recycling
- EU Waste Framework Directive
- Strategic Planning
- Procurement, construction and contract duration
- Waste Growth





Waste Arisings

District	Population	%	Municipal Waste Generation (T)	Waste Recycling @ 20% (T)	Residual Waste (T)
North	1,358,000	16.37	883,980	176,796	707,184
Haifa	966,700	11.65	629,100	125,820	503,280
Center	2,024,500	24.40	1,317,600	263,520	1,054,080
Tel Aviv	1,350,000	16.27	878,580	175,716	702,864
Jerusalem	1,034,200	12.47	673,380	134,676	538,704
South	1,192,300	14.37	775,980	155,196	620,784
West Bank	370,700	4.47	241,380	48,276	193,104
Total	8,296,400	100.00	5,400,000	1,080,000	4,320,000





Current Situation in Israel

- Little or no waste energy recovery
- Landfill costs 170 ILS
- UK landfill is 500 ILS
- Levy is 108 ILS vs. UK 430 ILS
- Market conditions





Energy Recovery Options

- Refuse Derived Fuels
- Dedicated energy-from-waste facilities
- Export





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Refuse Derived Fuel





RDF Capacity

- Cement industry
- Power generation
- For discussion





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Waste to Energy





Benefits of Modern WtE

- Environmental
 - Air quality
 - Groundwater
 - Odour, dust, litter
- Energy
- Visual
- Education





WtE Air Emissions

- BAT air cleaning
 - Ammonia injection for NO_x
 - Lime or bicarbonate for SO₂ and HCl
 - Carbon for heavy metals
 - Filtration for fly ash and solids
 - CO, VOCs, dioxins etc. by process temperature control
- Retrofit to industrial applications for RDF
- Health impacts likely to be non-detectable





Capacity and Site Locations

- Tel Aviv and Center 1.1 mTPA (3k T/d)
- North and Haifa 760 kTPA (2k T/d)
- Jerusalem and South 720 kTPA (2k T/d)
- West Bank 120kTPA (320 T/d)

Average WtE Parameters (UK Environment Agency)

Treatment Capacity T/day	Capital Costs in million ILS	Area (Dunams)
60	75	10
1600	375	50





Site Selection Criteria

- Phase 1 high-level assessment
 - Site Size
 - Flood Risk
 - Planning Policy / designations within the site
 - NIMBY and PR advice





Site Selection Criteria

- Phase 2 detailed assessment

	Criteria	Proposed Weightings
1	Environmental Impact - Noise	7.0
2	Environmental Impact – Odour + Air Quality	8.0
3	Environmental Impact – Dust + Litter	7.0
4	Environmental Impact - Soils	6.0
5	Site Condition	7.0
6	Proximity to Development	10.5
7	Waste Arisings proximity	10.5
8	Visual Impact	7.0
9	Traffic Impact and Accessibility	10.5
10	Flora and Fauna	8.0
11	Architectural + Archeological Heritage	6.0
12	Water Resources	6.5
13	Construction Impacts	6.0
	Total Weighting	100





Site Selection Criteria

- Phase 3 costs assessment
 - Cost of acquisition of the site
 - Cost of hauling waste to the site
 - Cost of electrical connection to the site





Transfer and Transport

- Existing network of TFSs?
- Locations
 - Route optimisation
 - Proximity to centres of population
- Road
 - Direct Haul
 - 40m³ bulk transport
- Rail





Ash Disposal

- Incinerator Bottom Ash (IBA) is the ash that is left over after waste is burnt in an incinerator. Municipal energy from waste plants that use incineration burn a wide range of municipal wastes and therefore the term 'ash' is slightly misleading because it is not all powdery but contains glass, brick, rubble, sand, grit, metal, stone, concrete, ceramics and fused clinker as well as combusted products such as ash and slag.
- IBA is different from Air Pollution Control (APC) residue, which is the by-product of cleaning up flue gases from the combustion process and is a mixture of fly ash, and the reagents (mainly lime) used in the flue gas treatment. APC residues are classified as hazardous waste and account for approximately 2% by weight of the waste inputs.
- IBA produced from a typical municipal incinerator represents about 15-30% of the input waste





Ash Disposal

- Approximately 1 million tonnes of IBA are produced in England and Wales each year. In 2011, 86% of IBA produced was reused.
- IBA can be recycled in a number of construction applications to replace primary aggregates extracted from quarries as follows:
 - Bulk fill (often sub-base for roads)
 - [Asphalt](#)
 - [Cement](#) bound materials
 - Lightweight blocks
 - Pavement [concrete](#)
- Fly ash normally comprises only a small proportion of the total volume of residue from a WtE facility; the quantity ranges from 5 to 20 percent of the total ash.





Finances

- Capital investment
- Revenue costs
- Procurement costs
- Landfill Levy
- Cleanliness Fund
- Incineration Levy
- Transfer
- Transport
- Ash disposal





Surety of Supply

- An absolute imperative in the delivery of strategic waste infrastructure is that the operator is certainty of daily waste supply tonnages.
- MoEP staff have indicated that only a few municipalities have the financial stability to deliver on this requirement. Section 5 of this report describes how Best Practice in the development and operation of statutory Waste Management Groups can provide the required assurance (with central government and statutory support) to enable this type of plant to be procured and to operate for the duration of the associated contract.





Timescales and Procurement

- Decision, procurement and construction 10 years
- Operational phase 25 years
- Procurement options for 3 EfW plants
 - Parallel procurements, where all 3 sites enter the process simultaneously
 - Procurement in series, where one sites is selected to go to market first, with the others to follow in order and
 - Staggered procurement, where one plant commences competition and the others follow before the first is complete.





Recommendations

- Israel to consider the implementation of a ban on the landfilling of untreated controlled wastes
- A detailed site selection process should be undertaken to define specific sites for WtE across the country
- In the interim, Israel should consider the option to produce RDF and utilise this in local industry or export for energy recovery
- Route optimisation software should be utilised to define the most suitable waste transfer locations
- Statutory municipal groupings should be developed to deliver (inter alia) a secure waste delivery capacity for infrastructure operation
- Utilise the National Infrastructure Committee to deliver the agreed waste treatment plants

