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Member of Liberty Mutual Group

Opportunities and Challenges Waste to Energy Industry

IMIA Conference, Istanbul September 2009

Mike Robertson

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Opportunities and Challenges Waste to Energy

- Industry Dynamics and Profile
- Key Process Features
- Risk Assessment
- Underwriting Considerations
- Case Studies
- Practical Conclusion

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Waste to Energy

Waste Management – Industry Definition

‘The waste industry involves the collection, processing and disposal of non hazardous residential, commercial, and industrial wastes, construction and demolition waste and land clearing debris for the proper mandated recovery of recyclable materials and the safe disposal or destruction of those materials.’

Source: Waste Business Journal - 2009

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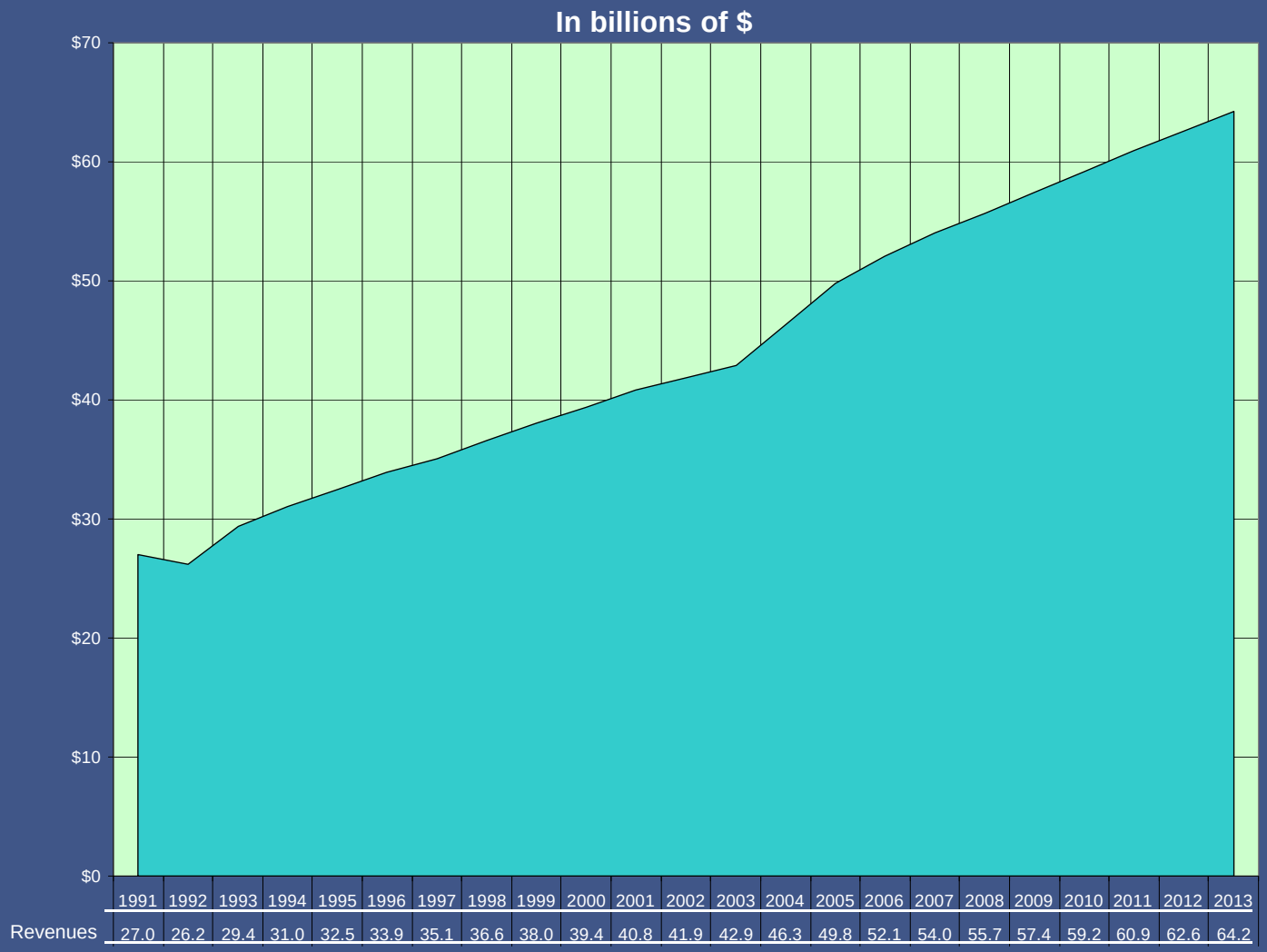
Industry Dynamics

Historical and Projected Growth of the Waste Management Industry



	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Revenues	27.0	26.2	29.4	31.0	32.5	33.9	35.1	36.6	38.0	39.4	40.8	41.9	42.9	46.3	49.8	52.1	54.0	55.7	57.4	59.2	60.9	62.6	64.2

Source: Waste Business Journal

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Industry Dynamics
Government Directives

Stern Report 2006

- Decarbonise the Power sector by 60%
- Reduce CO^2 emissions by 80% of current levels

EU Waste Framework Directive (2008)

- All EU countries must recycle 50% of household waste and 70% of construction waste by 2020

EU Package on Climate Change (2008)

- 20% cut in Green House Gas emissions by 2020

UK Climate Change Act (2008)

- World's first long term legally binding framework to tackle climate change
- Reduce Green House Emissions by at least 50% by 2050

US Stimulus Bill (2009)

- $63bn for renewables and energy efficiency
- $18bn for environmental infrastructure

Obama Commitments (2009)

- Renewables: 10% by 2012, 25% by 2025
- Reduce Green House Gas emissions by 2050
- Create 5 million jobs by investing $150bn over next 10 years

Source: IFSL Impax Environmental Leaders Fund: March 2009

Waste to Energy
Industry Profile

Purpose:

- Primarily to reduce the volume of landfill required.
- Secondary product is derived from waste heat in conjunction with a steam turbine generator:

  …..the process of creating energy in the form of electricity or district heating from the incineration of waste sources.

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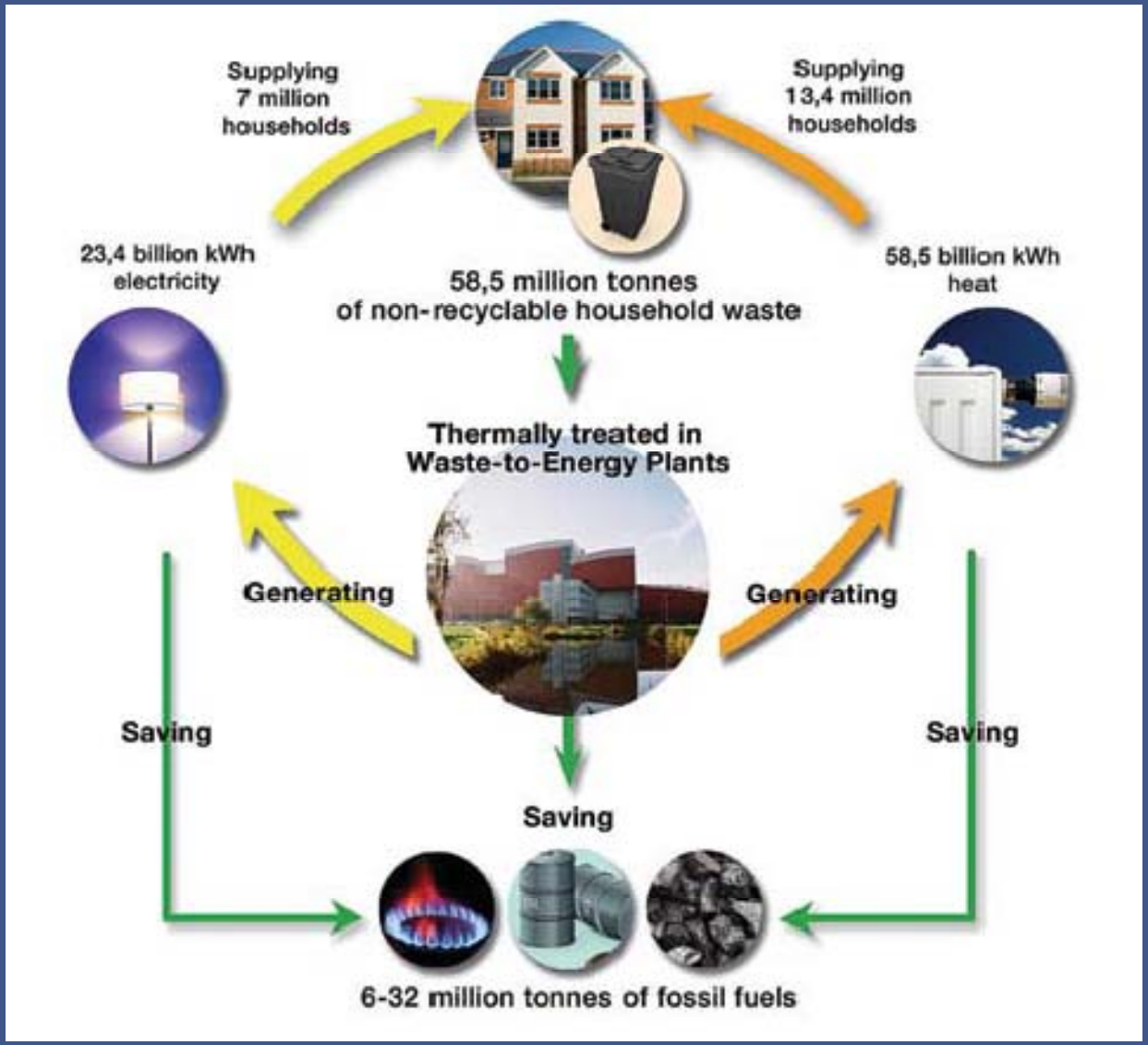
Waste to Energy

Industry Supply and Demand Considerations



Source: Confederation of European Waste-to-Energy Plants

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Waste to Energy
Process Features

Common Processes:

- Mass Burn-Municipal Solid Waste
- Refused Derived Fuel

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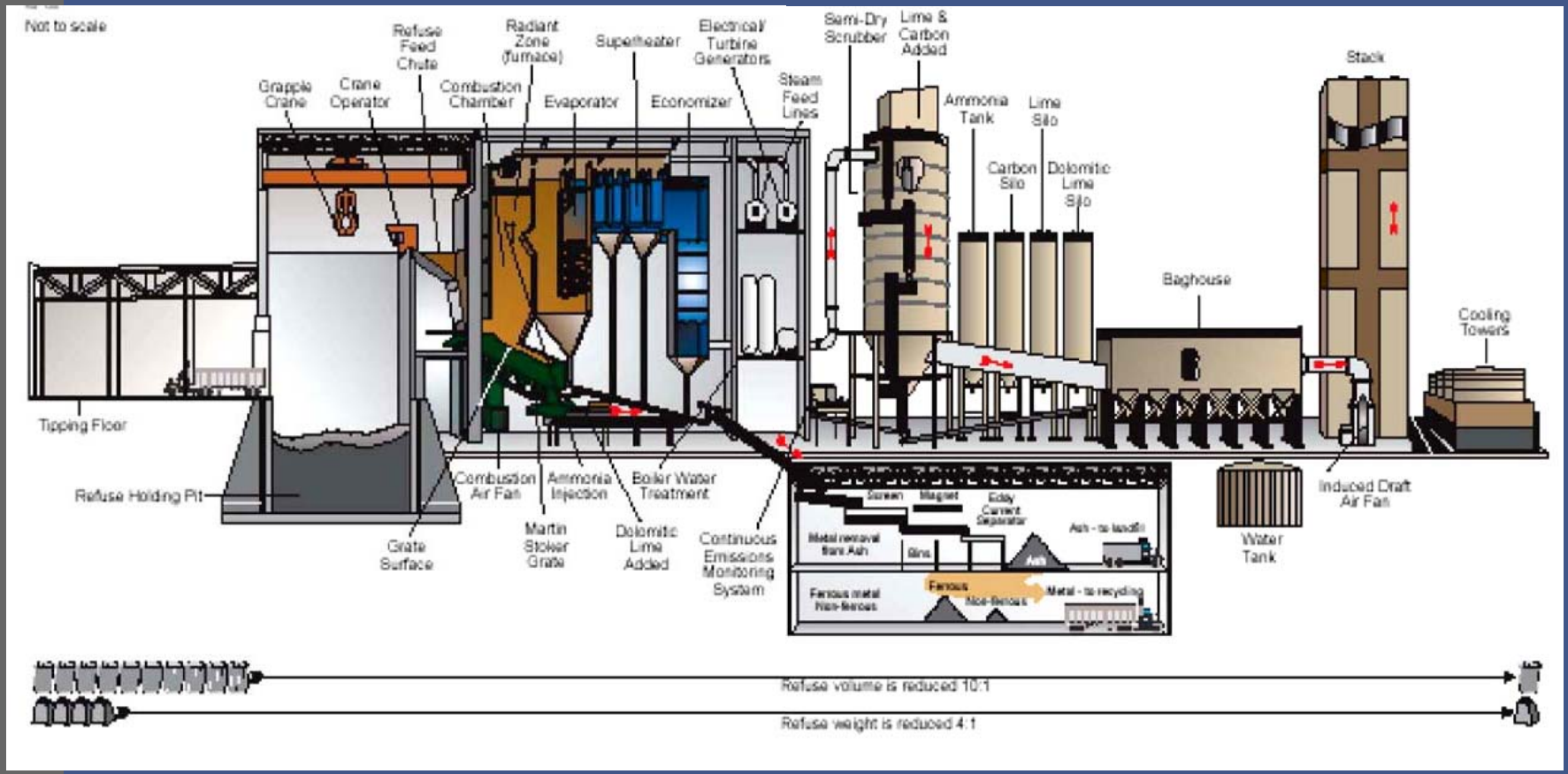
Waste to Energy

Process Features – Mass Burn



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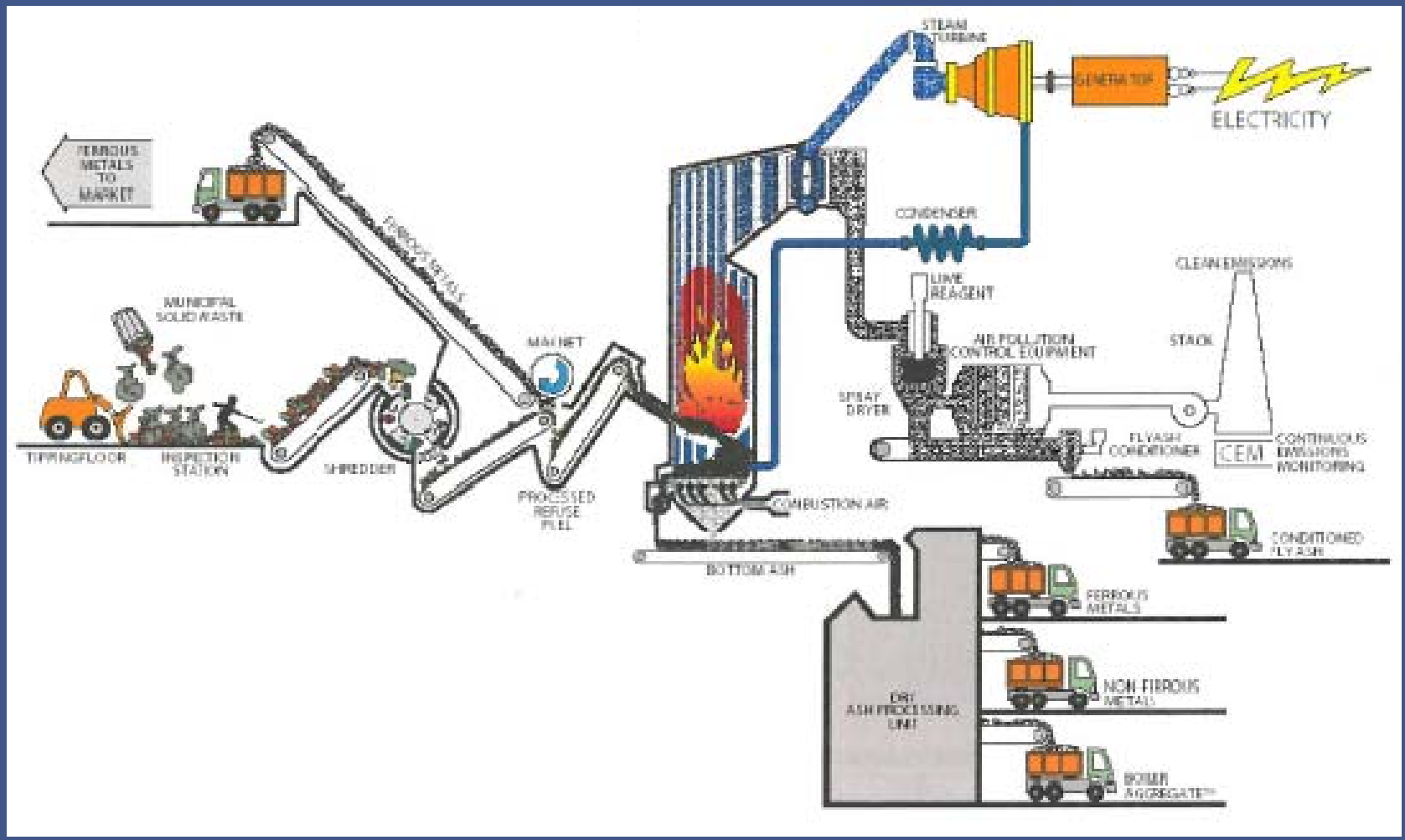
Process Features – Refuse Derived Fuel



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Industry Profile – Key Process Peculiarities

Mass Burn

- Mass Burn allows introduction of Municipal Solid Waste directly to the incinerator
- Mass Burn has limited shredders and smaller tipping floor
- Mass Burn feeding the air combustion system requires little odour control ductwork

Refused Derived Fuel

- RDF includes process shredding of Municipal Solid Waste prior to delivery to the incinerator
- RDF requires multiple shredders, handling conveyors and large tipping area
- RDF incorporates extensive odour control ductwork on tipping, shredding and conveyors

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Industry Profile

Advantages

- Fully integrated process- ‘front end’ recycling with Energy (Power) recovery
- Waste processed at half the calorific value of leading fossil fuel-coal.
- Flexibility: co-fired with other fuels in a variety of different boiler designs
- ‘Proven’, available technology at an ‘object’ level
- Sophisticated pollution control systems continuing to evolve

Disadvantages

- High capital cost requiring continuous utilisation and availability
- Significant relative power consumption and operational and maintenance expense
- Mature installations experience process inefficiencies-reliability, corrosion
- Increasing risk factors associated with ‘integration’ processes
- Negative public perception towards stack omissions

Waste to Energy
Specific Inherent Hazard

- Wide diversity in terms of mix of ‘fuel’ (waste)
- Metal and flammable explosion risk materials in waste
- Spontaneous combustion of waste occurring within the refuse holding pit
- Deep seated fires in waste bunker
- Loss of fan suction within combustion process can lead to fire spreading back up the refuse chute.
- Deterioration of machinery, equipment and pipe work from dust and corrosive environment

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Technical Risk Assessment

- Financial evaluation of contract parties and business plan review

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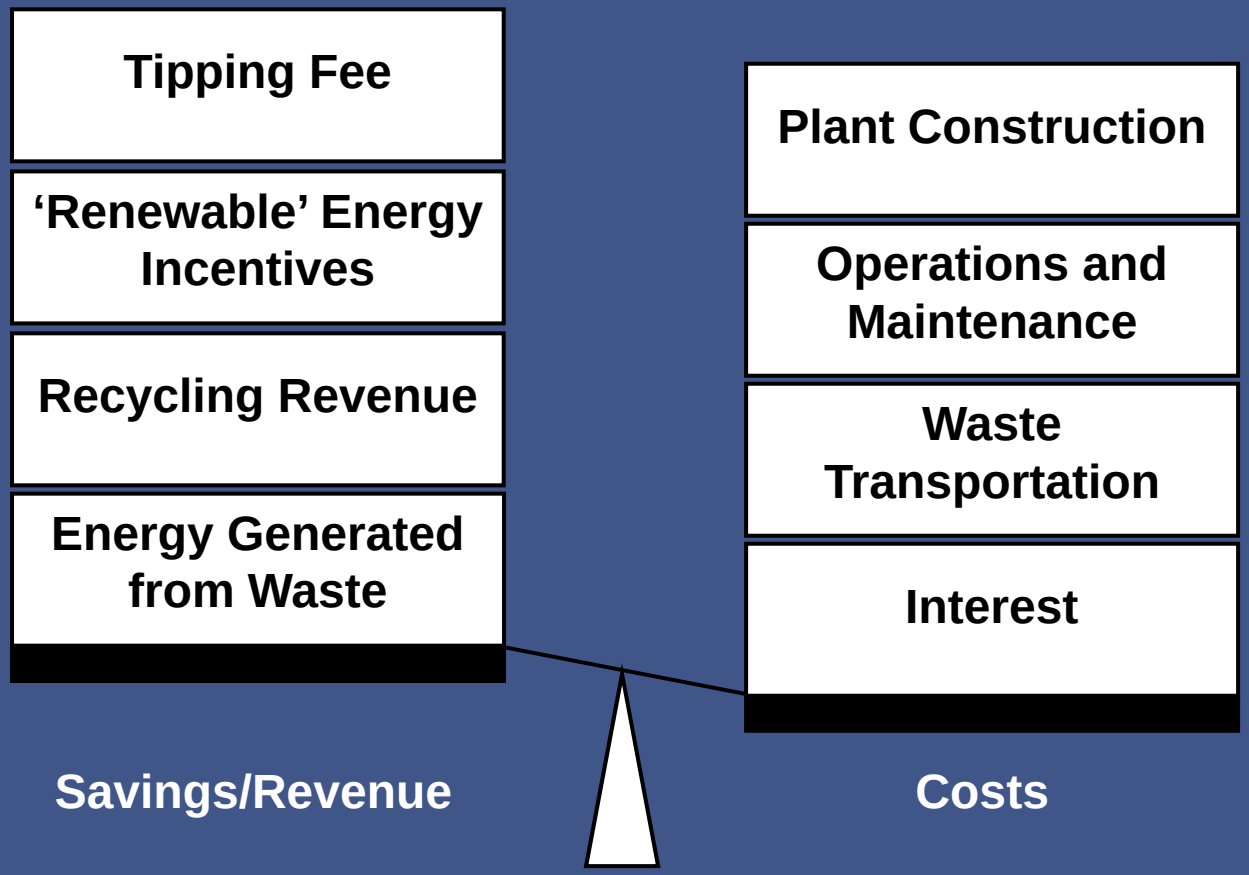
Financial Factors – The Feasibility of Waste-to-Energy Facilities



Source: Naval Facilities Engineering Service Center, California

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Waste to Energy
Technical Risk Assessment

- Financial evaluation of contract parties and business plan review
- Owner/Operator and Managing Contractor- structure, reporting, expertise
  - Elevate review of project management and power generation disciplines
- Plant design and workmanship considerations:
  - Integrity of main suppliers and vendors - QA/QC and establish details of reference plants
- Fire detection/protection at ‘exposed’ process stages

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Fire Detection and Prevention

- Fire detection/protection is well designed, in good condition and a sustainable maintenance and inspection programme in place to support
- Automatic sprinklers to protect:
  - –Specific localised fire protection on Shredders
  - –Conveyors carrying combustible material
  - –Bins, hoppers and feed chutes
  - –Boiler fuel systems
  - –Hydraulic systems
- Water cannon over MSW/RDF pits

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Underwriting Considerations

- Develop consistent approach to basis of Insurance Valuation
- Selective and prudent approach to the granting of ‘Defects’ cover
- Bespoke policy wording considerations to encourage sustaining ‘best practice’
- Tailor survey and inspection disciplines and ‘service plans’ to address critical recommendations
- Pro-active involvement in claims handling and post loss investigation

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Waste to Energy
Case Study 1

- Refuse Derived Fuel to Power facility
- Operational since 1989
- 850,000 tons municipal solid waste per annum
- Reduces solid waste by 60% for landfill
- Generates 62MW of power to state grid
- Cause: Fire in conveyor system

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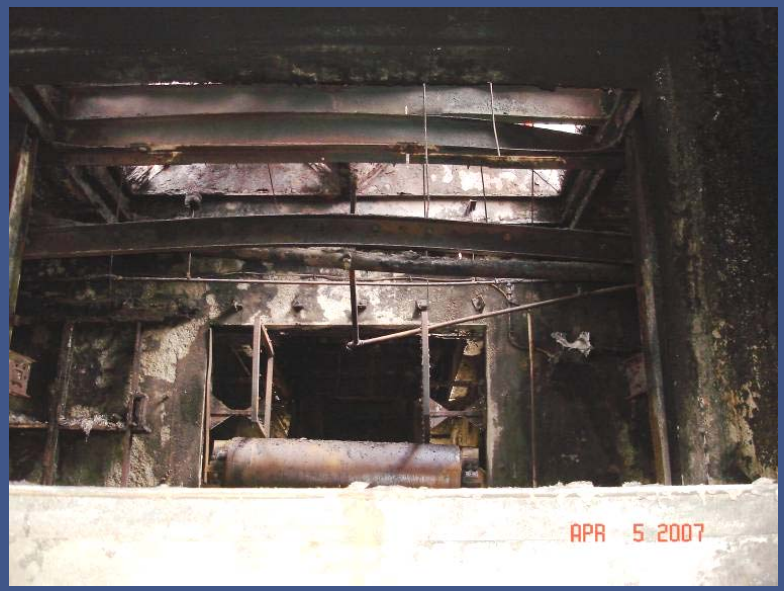
Fire in Conveyor System



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Waste to Energy
Case Study 2

- Refuse Derived Fuel to Power facility
- Operational since 1989
- 365,000 tons municipal solid waste per annum
- Generates 55MW of power to state grid
- Cause: Ingestion and fire in Shredder

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Fire in Shredder

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Waste to Energy
Case Study 3

- Refuse Derived Fuel to Power facility
- Operational end of 2008
- 500,000 tons municipal solid waste per annum
- Generates 44MW of power to state grid
- Cause: Explosion in Shredder section

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Explosion in Shredder

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Practical Conclusion

- Government incentives guarantee significant and sustainable global investment
- Greater financial analysis as part of ‘risk selection’ processes is actively encouraged
- Pro active risk assessment and involvement at design stages can reduce dominant ‘process’ risks
- Encourage ‘partnership’ approach to on-going risk management and improvement recommendations
- Enhance evolving risk assessment approaches given changing ‘industry dynamics’