Risk Sharing in Waste Management Projects

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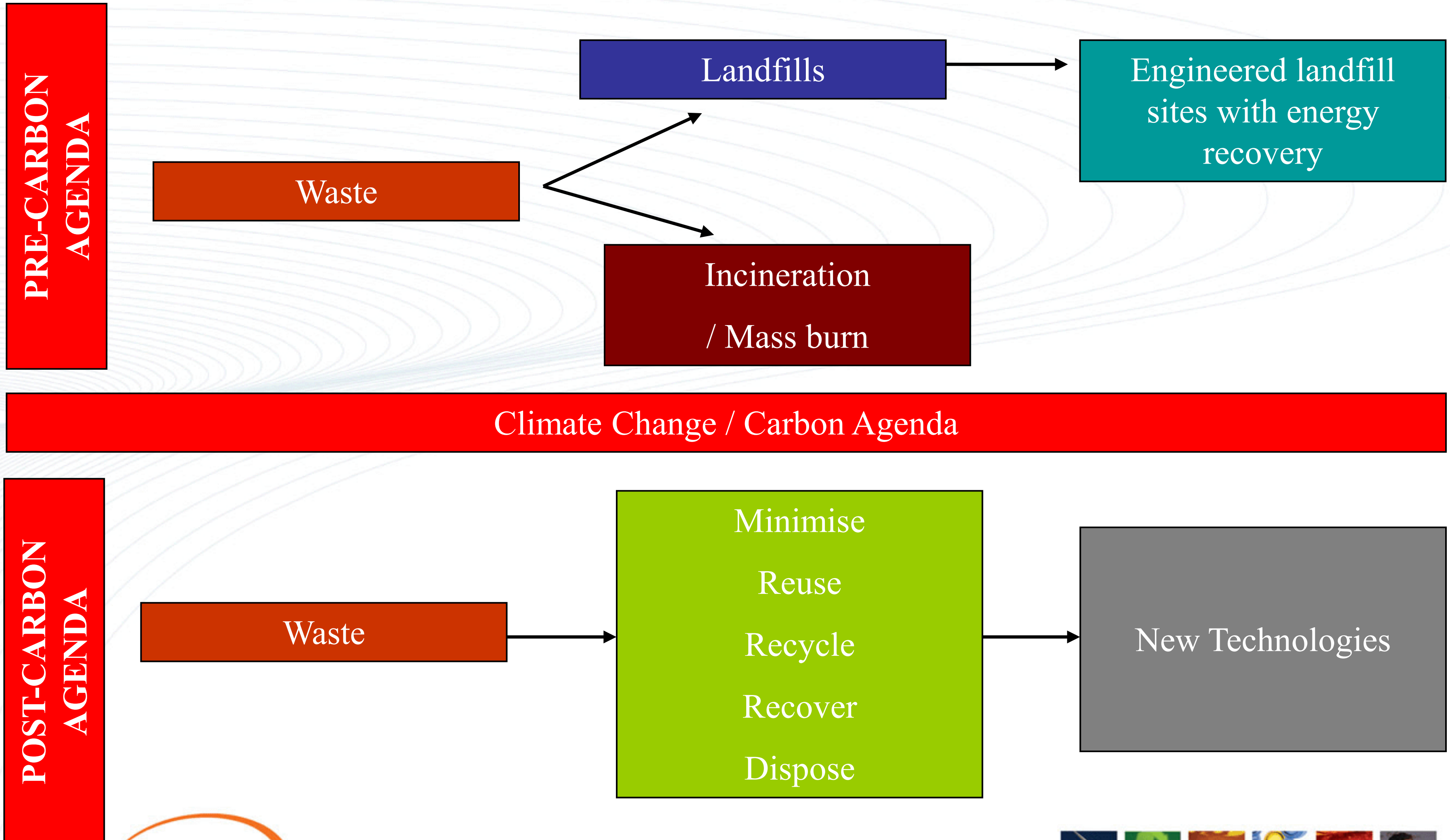
Objective

- To demonstrate how risk and uncertainty analysis can be applied to enhance the risk sharing in integrated waste management projects.

Background – Evolution of Waste Sector



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Risk & Uncertainties Assessment Model Motivation

Waste Sector

Waste Management Companies

Local Authorities
MSW Management

Other sectors
C&I etc

Technology & Supplier

Funds

Finance / Insurance
e.g. Banks,
Equity investors

Other interested parties
e.g. Utility companies,
Construction companies

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Decision Making Issues

- Type of waste to be treated
- Required performance (e.g. recycling, landfill diversion)
- Technology
- Funding and affordability

Decision Making Criteria

- Performance (% recycled, % diverted from landfills)
- Net Cost / Unitary Charge [£/te]

- Contractual commitments are expected on both of the above criteria
- Good understanding of the risks and uncertainties associated with the integrated waste management project is essential to provide contractual commitments that are competitive and deliverable

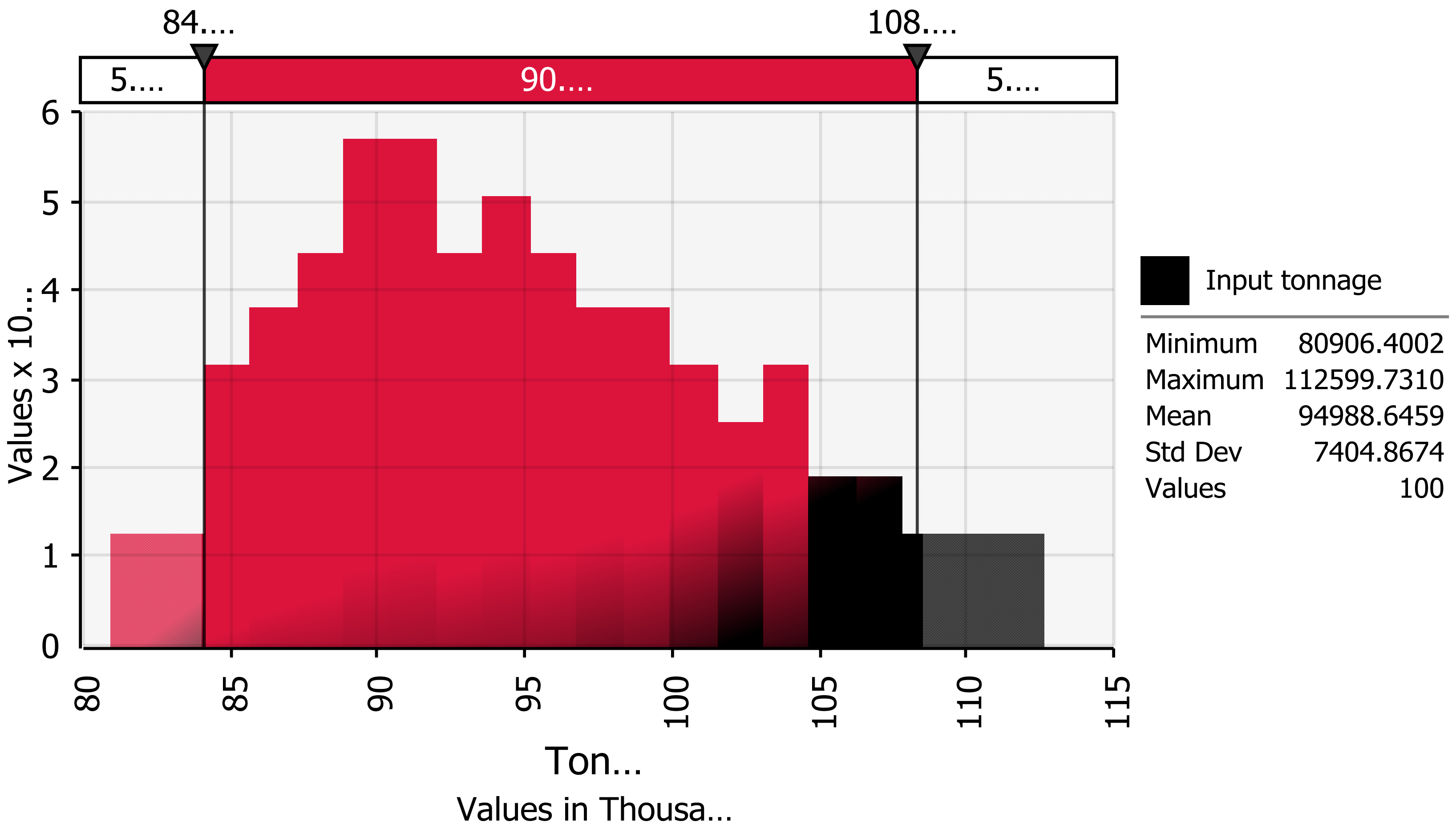
Solution – Risk and Uncertainty Assessment Model

- Apply risk and uncertainty assessment principles and methodologies to decision making in waste management sector
- An overview of a decision support model which can assess risks and uncertainties of integrated waste management projects is presented here

Model Overview

- Process Input
  - Waste categories:
    - Segregated dry recyclables
    - Segregated organic waste
    - Residual waste
  - Tonnage
  - Composition
  - CV (calorific value)
  - Biological content
  - Growth rate

Model Overview – Example Input for Tonnage



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Model Overview

- Treatment Technology
  - Technologies;
    - In-vessel composting
    - 2x variants of MBT
    - Anaerobic digestion
    - EfW CHP
    - ATT
    - MHT
  - Physical & thermal mass balance matrices

Model Overview

❑ Performance

- Recycling and composting
  (tonnages & percentiles)
- Biodegradable diversion
  (tonnages & percentiles)
- Municipal waste to landfill
  (tonnages & percentiles)
- Calorific value of waste at various stages of the process

❑ Cost

- Collection costs
- Transfer costs
- Treatment costs

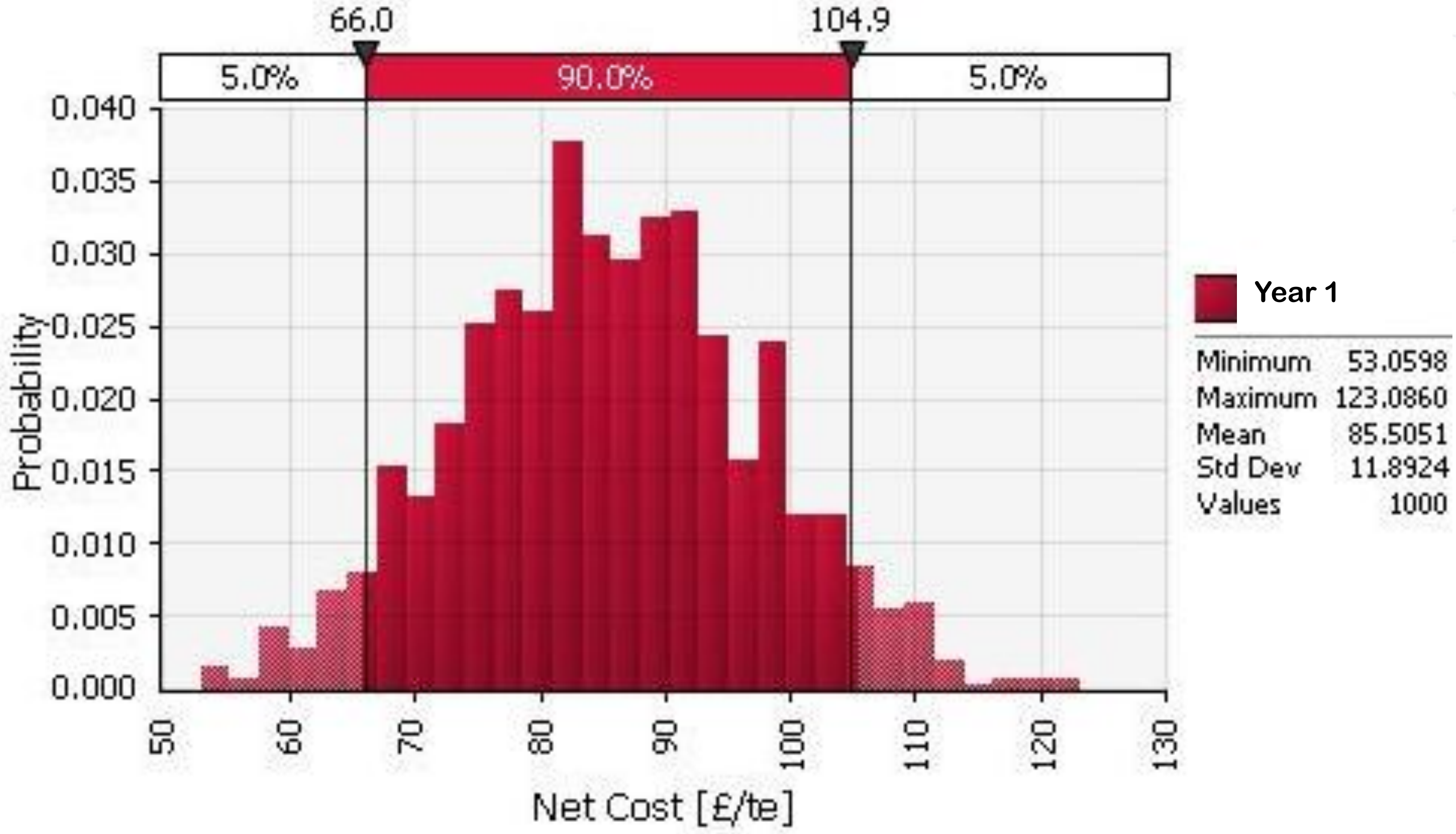
  (Capex, Financing costs, Opex)
- Product prices / gate fees
- Landfill Tax variability
- LATS trading
- Net treatment costs

Outline of Referenced Study

- Identification of the most sensitive parameters governing the net treatment cost of MBT and EfW facilities
  - Define probability distributions for net treatment costs [£/te]
  - Regression mapped value analysis of net treatment costs [£/te]
  - Analysis and comparison of sensitivity parameters

Results

Probability Distribution for the Net Cost [£/te] of Mechanical Biological Treatment Facilities producing Refuse Derived Fuel



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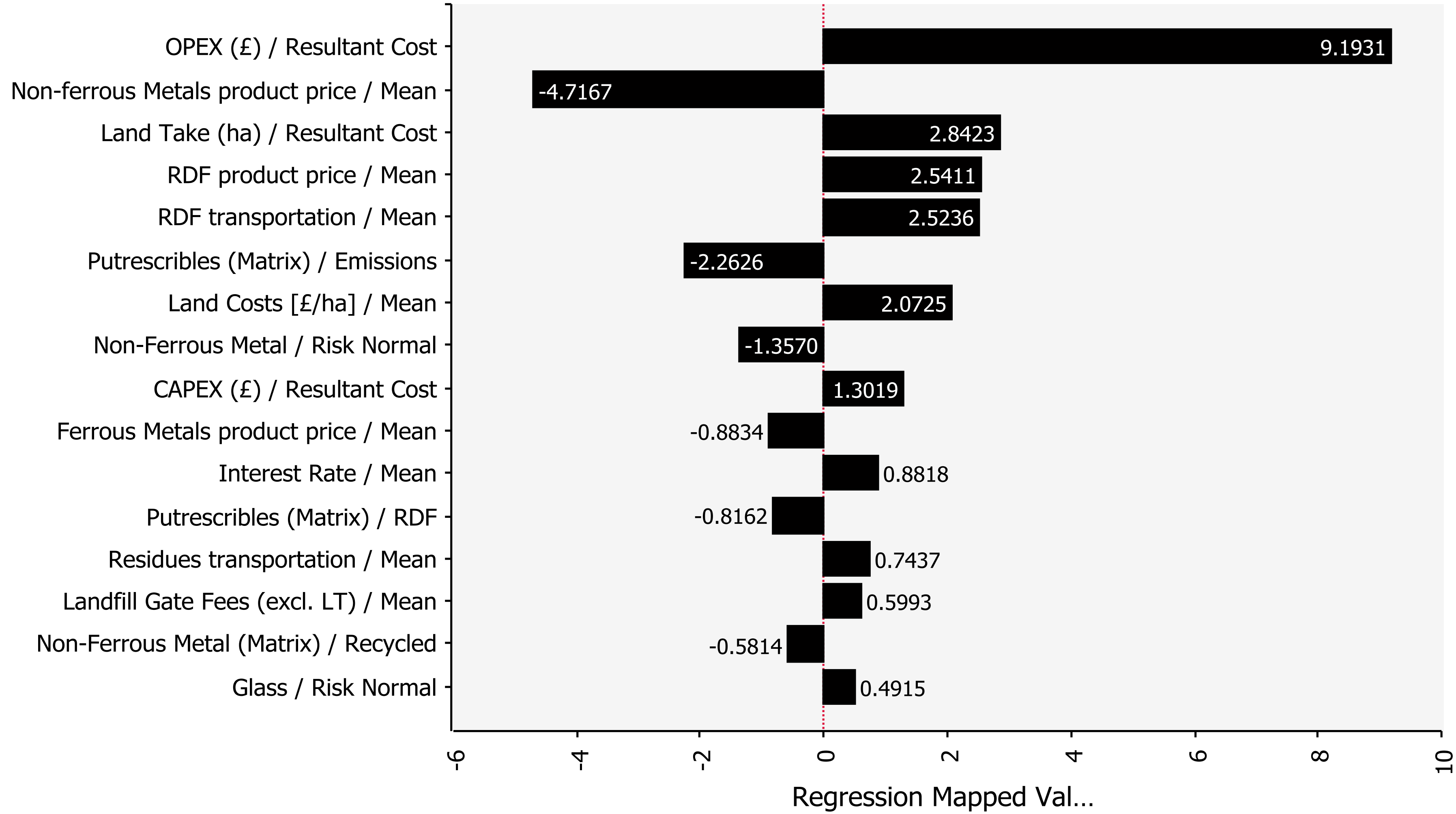
Results

Regression Mapped Values Tornado Graph for the Net Treatment Cost [£/te] of Mechanical Biological Treatment Facilities producing Refuse Derived Fuel



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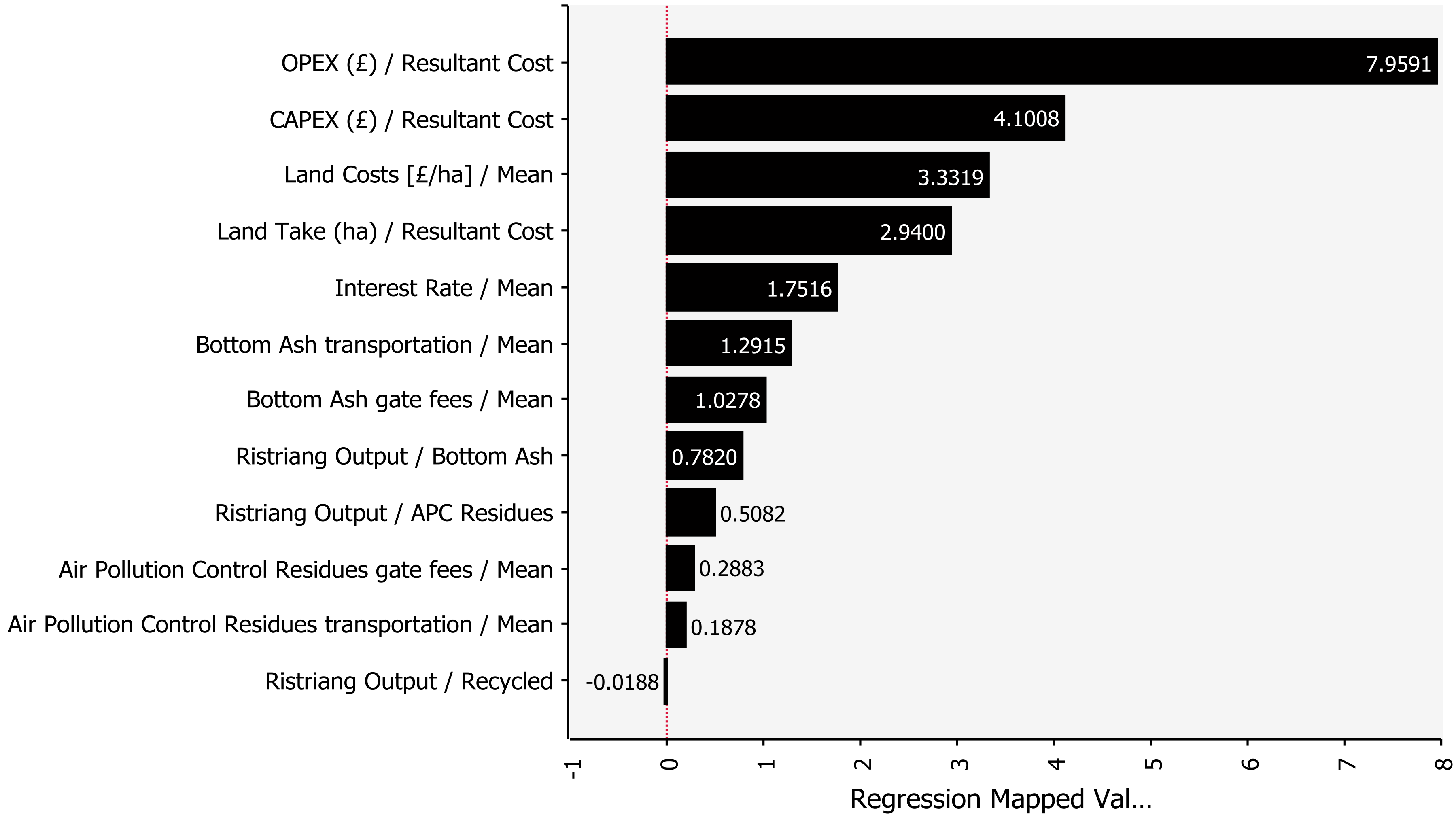
Results

Regression Mapped Values Tornado Graph for Net Treatment Cost [£/te] of Energy from Waste Facilities



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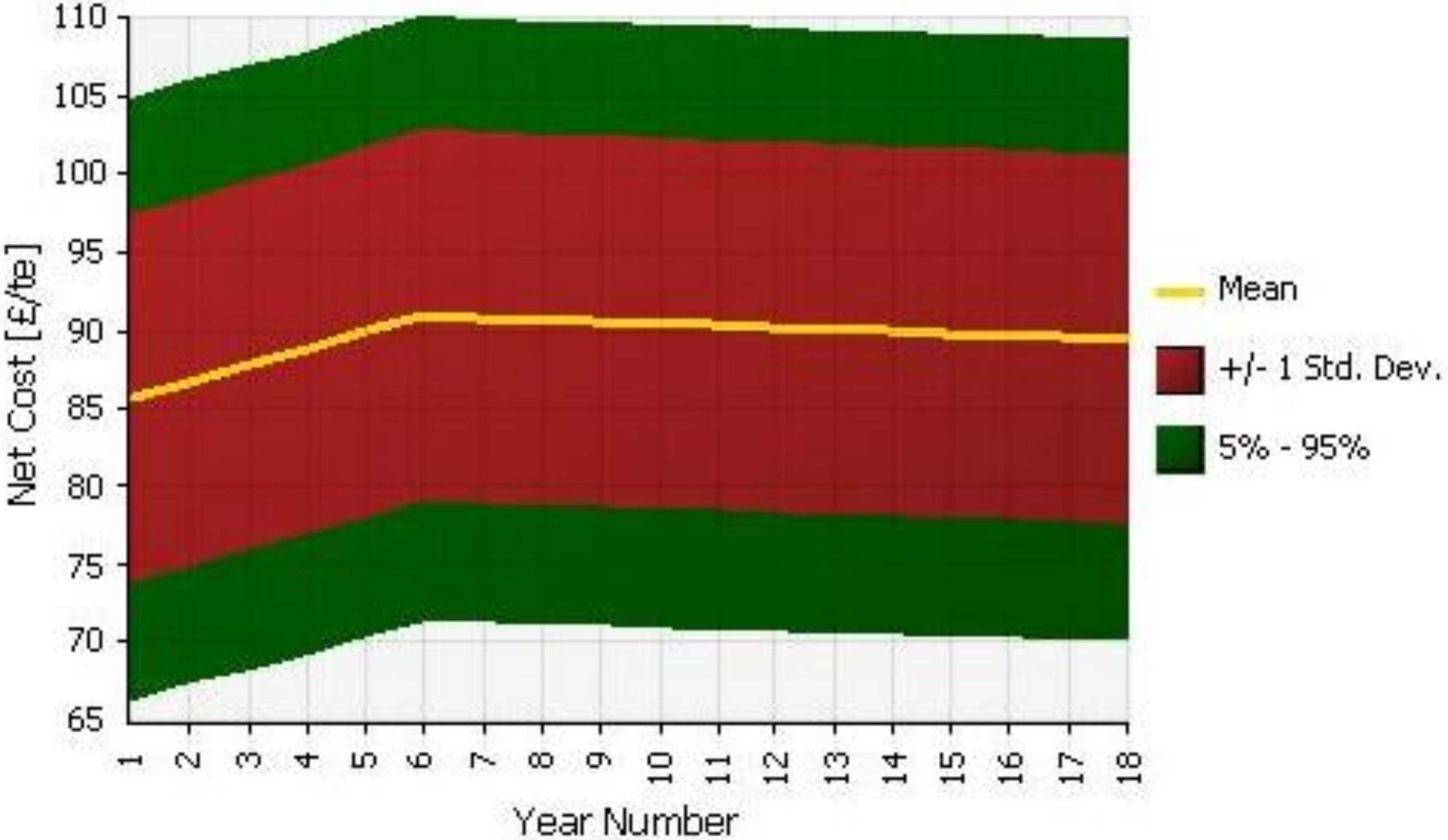
Sensitivities Comparison

- MBT
  - Opex
  - Non-Fe metals values
  - Land requirements
  - RDF / SRF values
  - RDF / SRF transportation

- EfW
  - Opex
  - Capex
  - Land price
  - Land requirements
  - Financing rates

Temporal Projection for Mechanical Biological Treatment Facilities producing Refuse Derived Fuel, Years 1 to 18 Net Treatment Cost [£/te]



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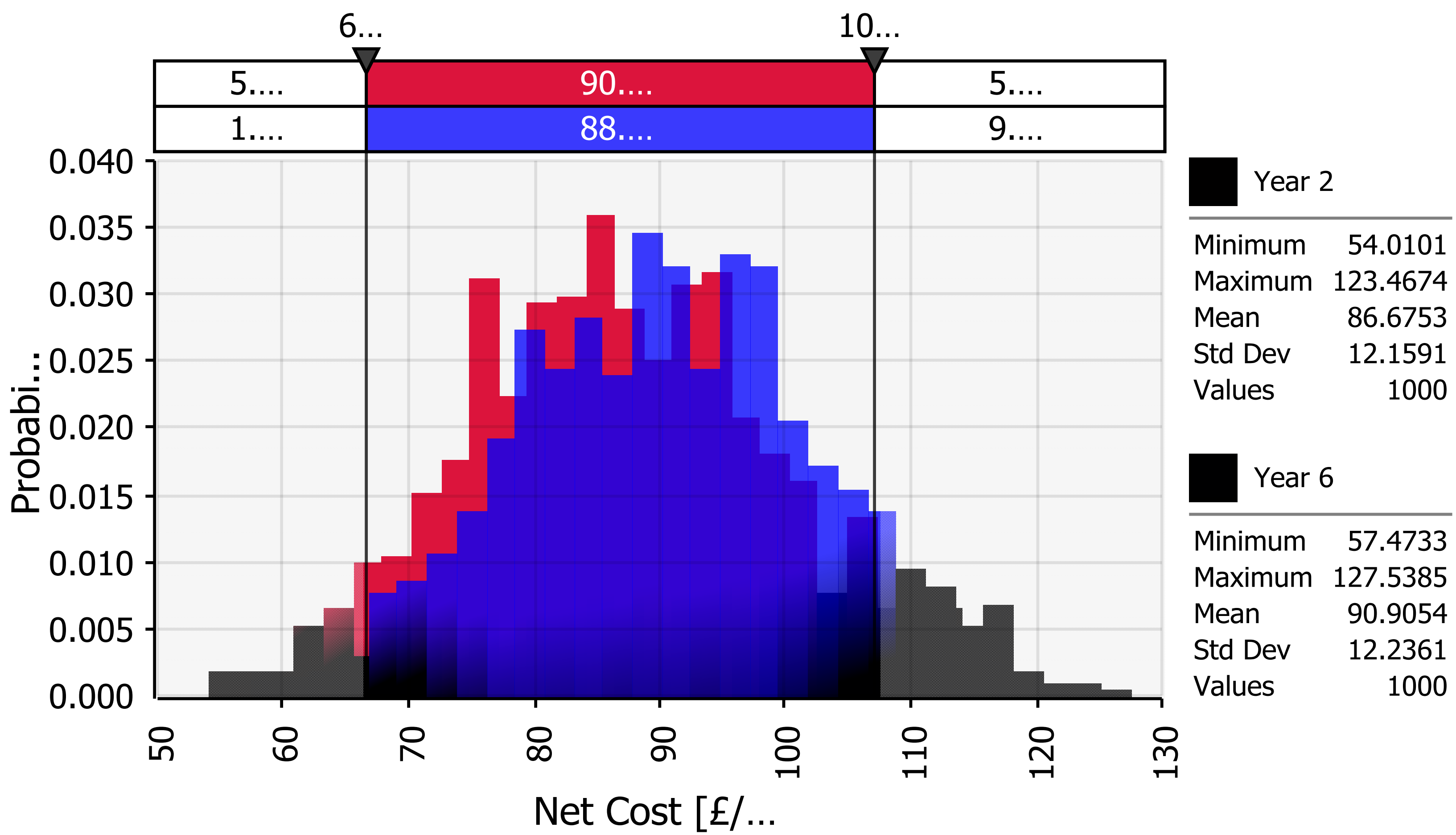
Probability Distribution Comparison of Year 2 & 6 Net Costs [£/te] for Mechanical Biological Treatment Facilities producing Refuse Derived Fuel



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Model Strengths

- Key Strengths
  - Its ability to deal with a range of values for each input parameter where relevant
  - It takes into consideration the physical and thermal mass balances of the inputs and outputs from the technology
  - It uses Monte Carlo simulations to report the most likely outcome or values for the parameters of interest
  - It identifies the most sensitive parameters or issues influencing the value of the outputs of interest; and
  - It informs the risk sharing process in integrated waste management projects.

Conclusions

- Project related risks and uncertainties have to be identified and allocated to partners/entities best placed to manage it

- Good understanding of risks and appropriate sharing of risks can lead to contractual commitments (performance and cost) that are competitive and deliverable

- Principles discussed in this presentation are transferable to other integrated waste management projects

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Other potential uses within our field

- Waste flow models
- Process flow models
- Technical feasibility assessments
- Market assessments
- Sustainability / carbon foot-print models

- Potential tie-in of existing ‘sister’ models from SLR’s Decision Tool Suite

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Challenges

- Good quality data
- Robustness of transformation matrices
- Knowledge of distribution patterns for parameters

- Provision of 'executable files', non-report based viewable outputs (preferably Excel based).

Thanks

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