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# Proposed Sustainable Solutions For **Managing Solid Waste** in Beirut


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October 2016

# What Shape an Integrated **Solid Waste Solution**?




Time



Financial Resources



Waste Characteristics

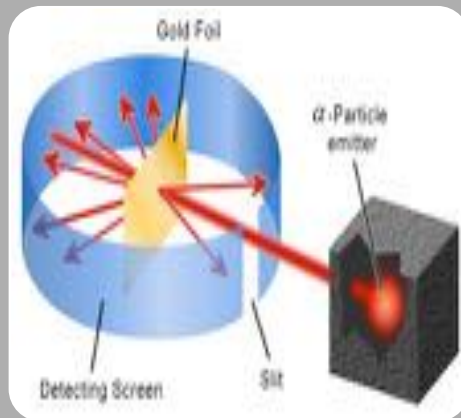


Space Availability

## What to Avoid?



R&D  
Pilot Projects



Non Commercial  
Technologies



All waste is source of  
income









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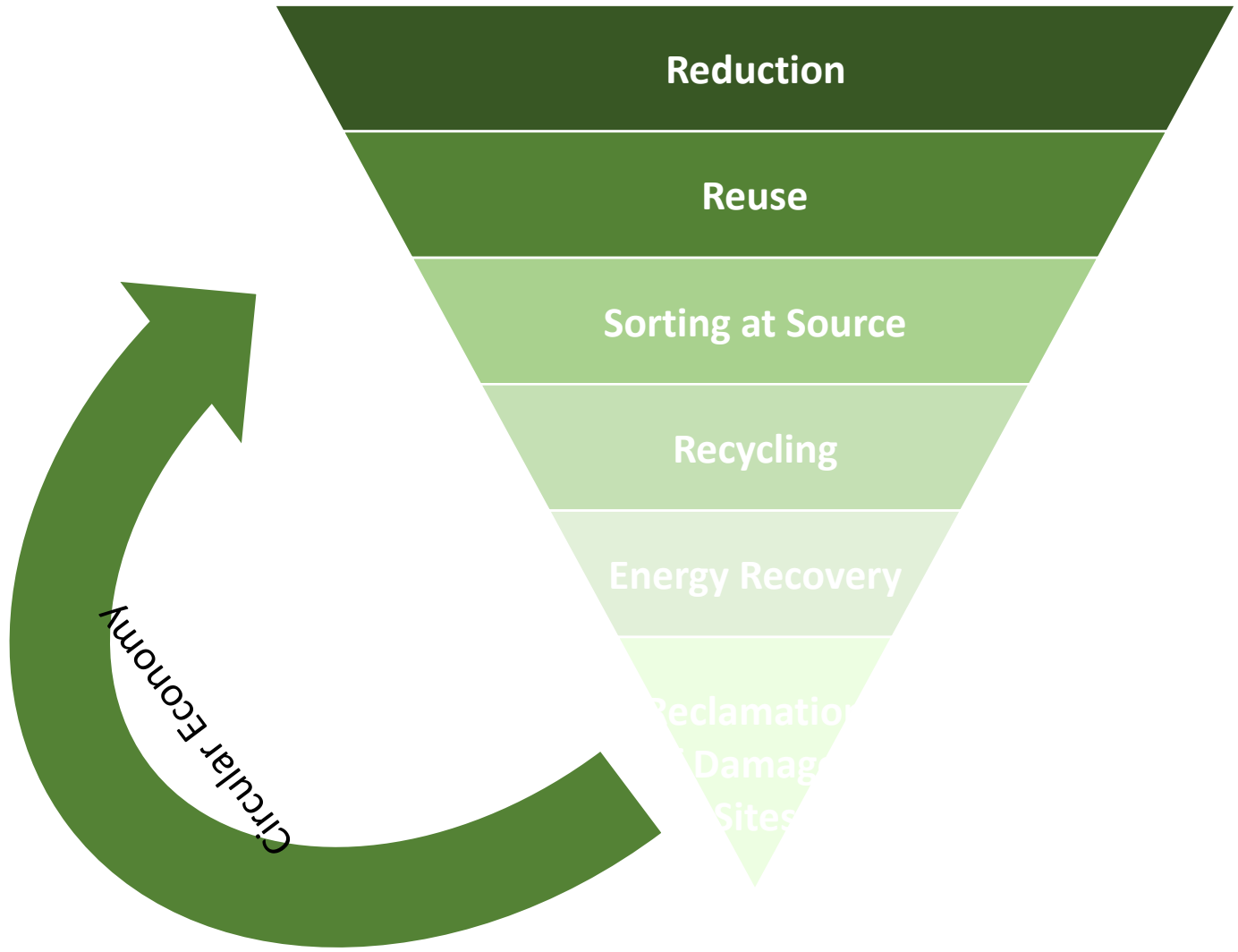
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# Beirut Waste: **Facts and Figures**

1. Waste generation: 600 tons per day (according to CDR)
2. The range of MSW constituents can be described as follows (% by weight):

 <b>Organics</b> (including food waste)	<b>40 – 50%</b>
 <b>Plastics</b>	<b>11 – 24%</b>
 <b>Paper, cardboard</b>	<b>16 – 20%</b>
 <b>Glass</b>	<b>4 – 5%</b>
 <b>Metal</b>	<b>2 – 5%</b>
 <b>Others</b>	<b>6 – 11%</b>
3. The moisture content of the MSW is between 55 and 65%. The NCV of MSW is in the range of 7 and 8 MJ/kg (7.6 Mj/kg according to Ramboll study).
4. Land is precious

# Basis of the Proposed Solution



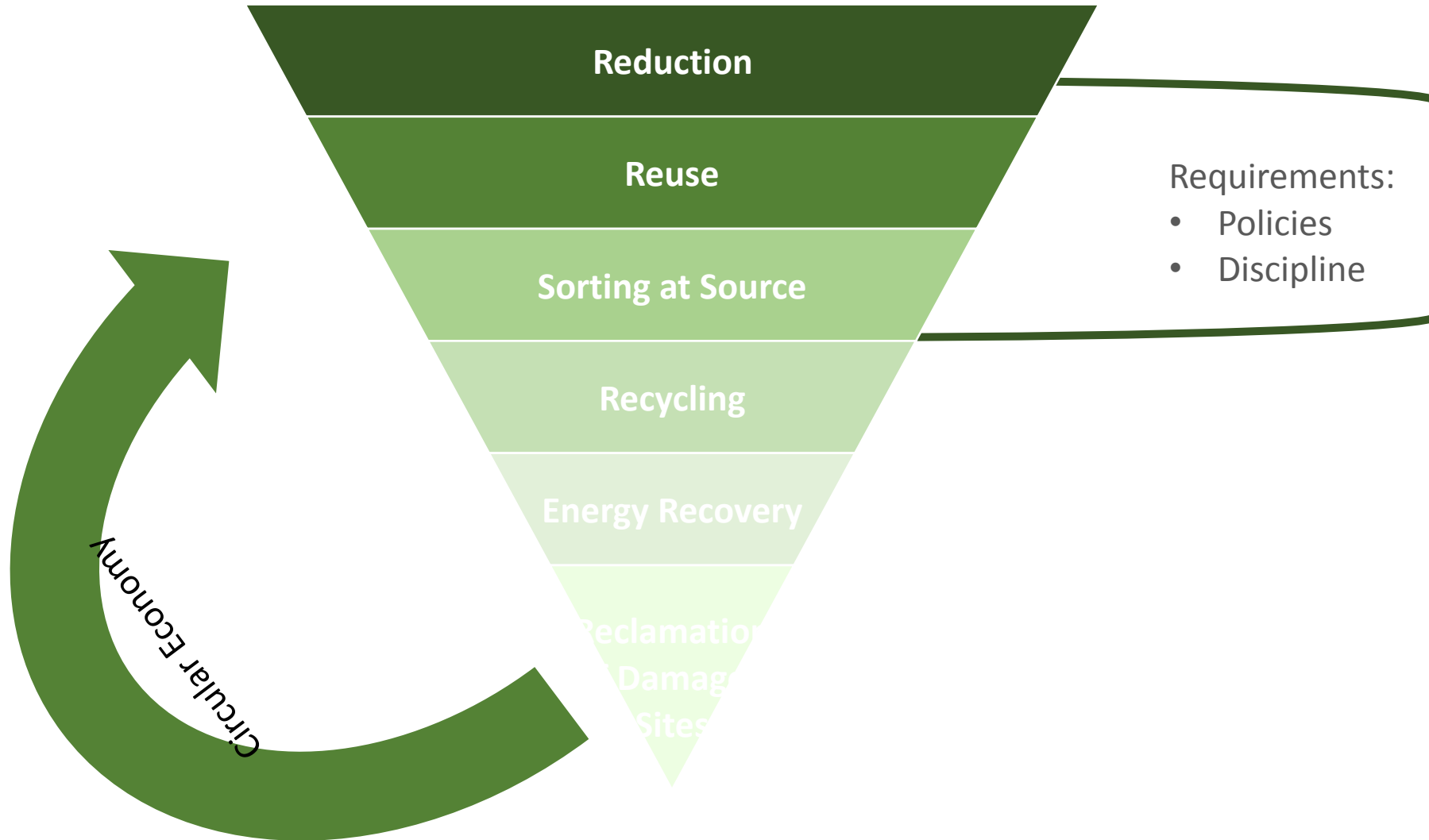
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**Most Favorable**



**Least Favorable**

# Basis of the Proposed Solution



# Europe: Facts and Figures

	Municipal waste generated,	Total municipal waste treated,	Municipal waste treated, %		
	kg per person	kg per person	Recycled & composted	Landfilled	Incinerated
EU28	492	480	42	34	24
Belgium	456	456	57	1	42
Bulgaria	460	433	27	73	0
Czech Republic	308	308	24	57	20
Denmark	668	668	45	3	52
Germany	611	610	65	0	35
Estonia	279	220	40	44	16
Ireland	570	570	45	39	16
Greece	503	493	18	82	0
Spain	464	464	27	63	10
France	504	504	39	20	33
Croatia	391	381	16	85	0
Italy	529	523	38	41	20
Cyprus	663	663	21	79	0
Latvia	301	301	16	84	0
Lithuania	469	458	21	79	1
Luxembourg	662	662	47	18	36
Hungary	402	402	26	65	9
Malta	589	559	13	87	0
Netherlands	661	661	60	2	49
Austria	552	528	62	3	35
Poland	314	249	25	75	1
Portugal	453	453	27	54	20
Romania	389	313	1	99	0
Slovenia	362	301	47	51	2
Slovakia	324	313	13	77	10
Finland	506	506	34	33	34
Sweden	462	462	47	1	52
United Kingdom	472	465	46	37	17

Source: Eurostat



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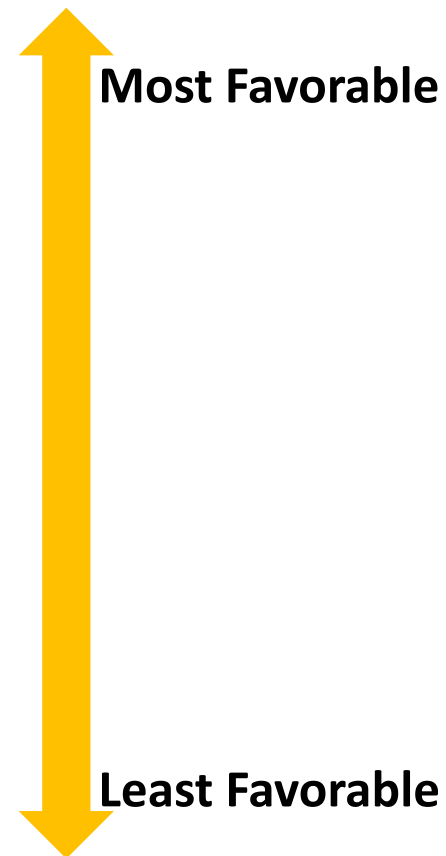
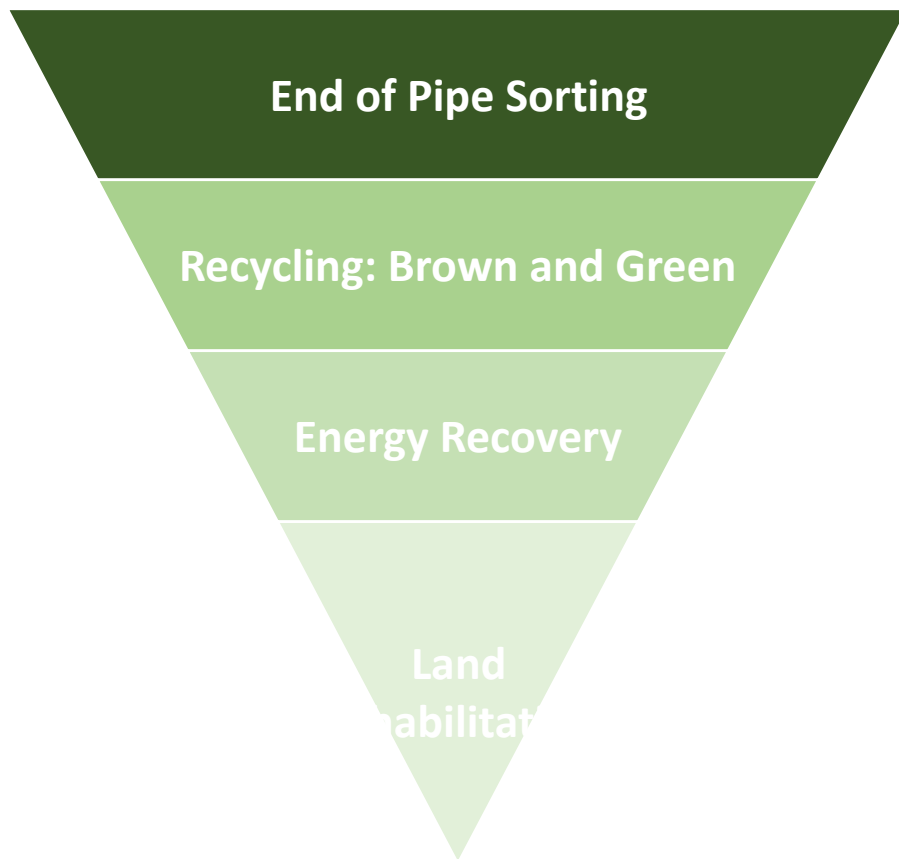
# Sorting at Source: **Facts and Figures**



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# Basis of the **Proposed Solution**



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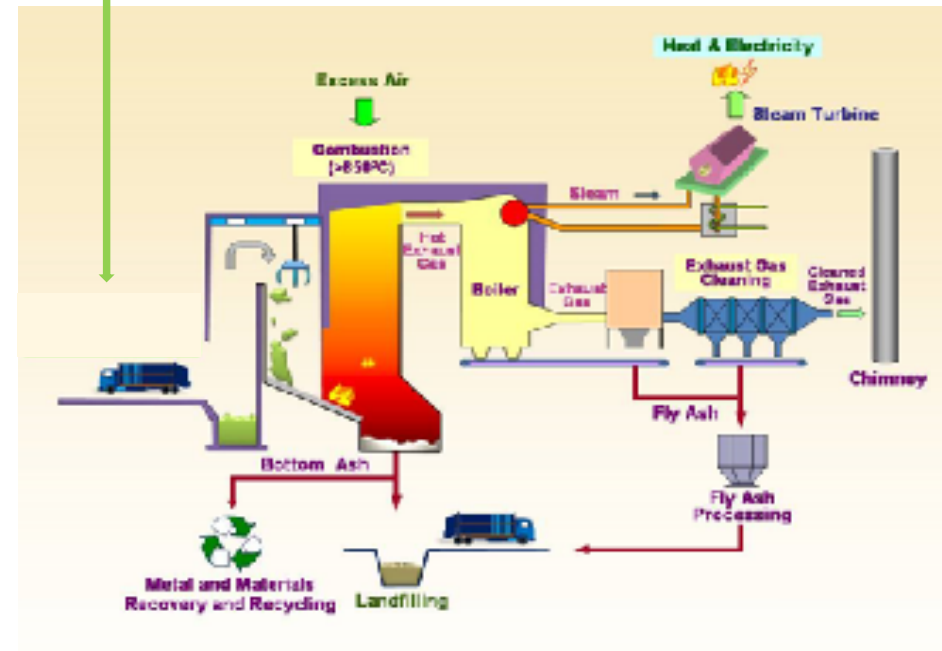
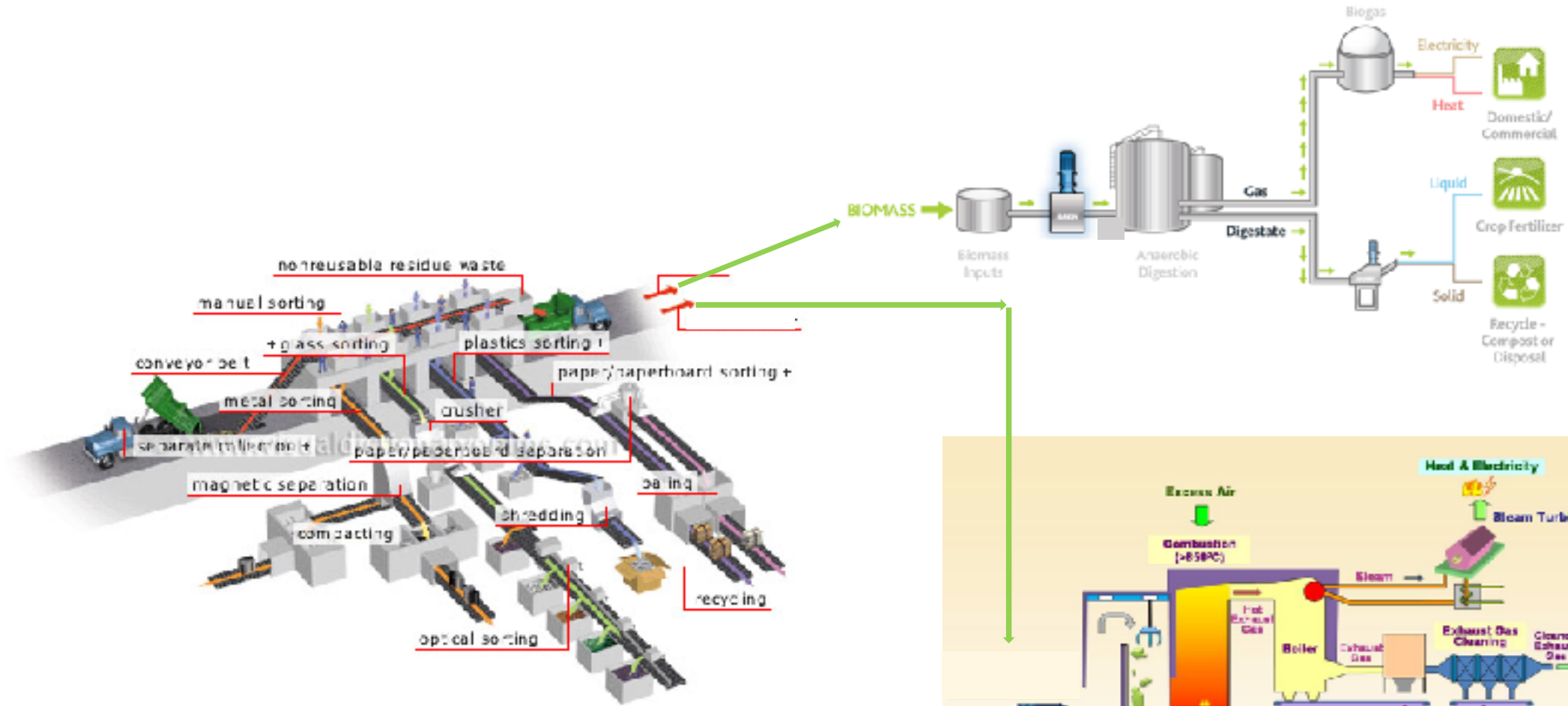
# The Proposed Process

## SW Stream

- Sorting at Source
- Reducing Waste Generation
- End of Pipe Sorting
- Recycling
- Green Recycling: MBT
- Total Destruction
- Re-using bottom ash
- (Asphalting – concrete blocks)



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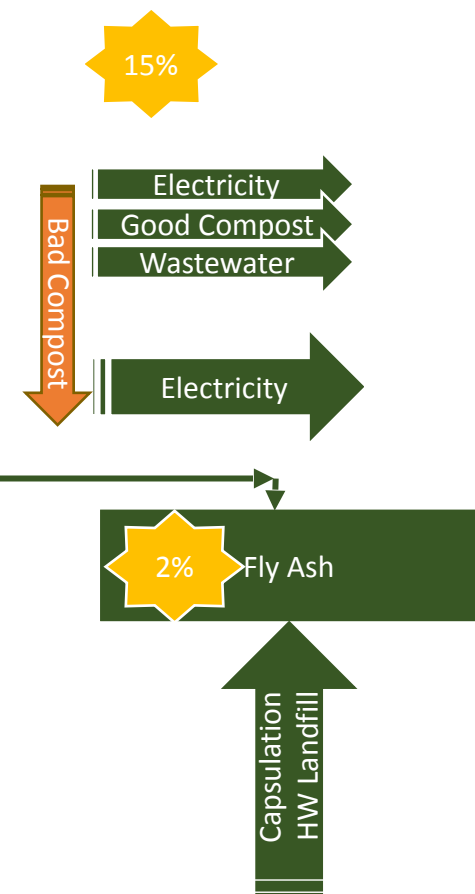


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# Potential Results of the Proposed Beirut Solid Waste Solution

SW Stream

- Sorting at Source
- Reducing Waste Generation
- End of pipe sorting
- Recycling
- Green Recycling: MBT
- Total Destruction
- Re-using bottom ash (Asphalting – concrete blocks)





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# Expression of Interest

- **Historical Contract Non-Performance**
  - History of Non-Performing Contracts
  - Failure to Sign Contract
  - Pending Litigation
- **Financial Situation**
  - Financial Performance
  - Average Annual Contract Turnover
- **Experience**
  - Management Contracting Experience
  - Mechanical Sorting Facilities
  - MBT Facilities
  - WtE Facilities



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# Minimum Experience **for Shortlisting**

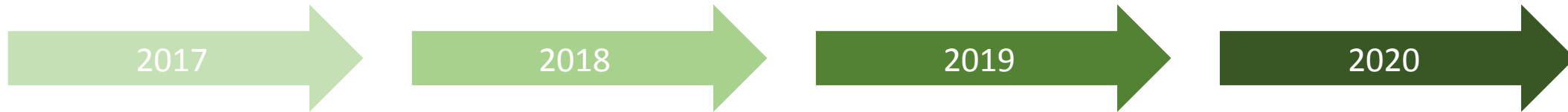
- Design and construction of at least 3 (three) mechanical sorting plants with the purpose of separation of recyclables, stones/minerals, organics and high calorific value waste each reference with a capacity of at least 30 tons/hr;
- Operation of at least 3 (three) mechanical sorting plants with the purpose of separation of recyclables, stones/minerals, organics and high calorific value waste each reference with a capacity of at least 30 tons/hr;
- Design and construction of at least 3 (three) Mechanical and Biological Treatment plants each with a capacity of at least 30 tons/hr
- Operation of at least 3 (three) Mechanical and Biological Treatment plants each with a capacity of at least 30 tons/hr;
- Design and construction of at least 3 (three) WtE (**total destruction**) reference plants each with combustion unit of a capacity of 500 tons/day minimum infeed (associated electrical generation capacity of no less than 60 MW of the three WtE plants in total);  
**(for the sake of this procurement all WtE references should include pollution control process line (especially flue gas) as an integral part of the overall process).**
- Operation of at least 3 (three) WtE (**total destruction**) reference plants each with combustion unit of a capacity of 500 tons/day minimum infeed (associated electrical generation capacity of no less than 60 MW of the three WtE plants in total);

**N.B.: Each of the above references should be built and operated according to the European Waste Incineration Directive (WID) and or US EPA norms or equivalent**

# Timing



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- January: Eol
- March: Tendering
- August: Contracting
- November: Design .....

➤ Construction.....

- June: Testing
- August: Debugging
- December: Commissioning



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