Business Case

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A Proposed Joint Venture Between

EMERGENT
WASTE SOLUTIONS

&

A Joint Venture Partner

For the Processing of Municipal Waste

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Introduction

This document describes a Waste to Energy (WtE) project that will process Municipal Solid Waste (MSW) with thermolysis technology and create energy, bio-coal, and bio-oil. The process is non-polluting and will reduce the amount of significant Greenhouse Gasses that otherwise result from decomposing MSW in landfills.

The document is not intended to be exhaustive; it forms a basis for the development of a comprehensive business case.

Included in this document:

1. A description of the project, including the processing stages.
2. An areas of responsibility statement that will make both parties fully aware of the tasks they are responsible for. A suggested ownership structure for the project will be presented in this section.
3. A sample Pro Forma financial forecast. The template summarizes revenue and expenses items associated with a WtE project based on ATS technology; however, the actual figures must be determined by the two parties in concert. The JV partner will be responsible for making the figures accurate for the local conditions and EWS will refine the revenue figures when the MSW Questionnaire has been completed and a letter of intent is in place.

Deonar – India (mountain in background is entirely garbage)

Project Definition

In summary, the project will redirect Municipal Solid Waste (MSW) from landfills to a thermolysis processing facility. Specifically, the project will use the Advanced Thermolysis System (ATS) from Emergent Waste Solutions Inc to transform the waste into bio-coal, oil, and methanol.

Waste will be collected at source in the same fashion as it currently is. The ATS facility does not require any changes to recycling practices; if recycling is in place it may continue, and the businesses that provide this service are not endangered.

The ATS facility will be process designed to accommodate waste receiving/inventory, pre-processing, thermolysis, post-processing, and inventory/shipping. Exact land and building requirements cannot be determined before waste volume, composition, moisture content, delivery schedule and shipping options are known.

The main steps in preparing the waste for introduction to the thermolysis reactors are screening/separation (removal of metal, glass, concrete, rocks, and PCVs), shredding, size reduction, classification, drying and densification (pelleting). This initial process creates what are called Refuse Derived Fuel Pellets (RDFs). It is important that the MSW be blended before being made into RDFs, as this will give the pellets a more consistent chemical composition, thereby allowing the ATS process to uniformly penetrate the pellets and complete thermalization.

The created RDFs are introduced to the ATS reactors where they are subjected to a high temperature in the absence of oxygen. Without air the RDFs do not ignite, but rather break down at the molecular level, removing volatiles, and oil. The ATS technology is a world leader in the totality of this breakdown and is able to keep the elements from recombining, which would contaminate each of the elements and reduce their value.

The bio-coal produced may replace coal in energy production in export markets. When combusted to create power it creates fewer particulate emissions and emits less GHGs than does mined coal. The thermolysis process brings the BTU value of the RDFs from ~6,000 to ~27,000. Bio-coal is less expensive to transport than the RDFs (or wood pellets) given the reduction in weight and the hydrophobic nature of the bio-coal pellets.

The plant building will be outfitted with solar arrays and the energy produced will be used to electrically heat the ATS reactors. Syngas produced by the process, which is predominantly H2, CO, CO2 may be combusted, along with the bio-oil produced, to create steam for energy generation by way of a steam turbine. Alternatively, EWS can, by way of a technology cooperation agreement with Hago Energetics, create methanol from the syngas.

EWS will specify the technology and suppliers for the sorting, blending, drying, pelleting, and post-processing stages, as well as for the generation of electricity.

Power Purchase agreements (PPAs), Tipping Fees, and bio-coal exports will form the basis for the business case, as they are longer-term and secured either by government or reputable private operators.

Waste to Energy

Collection

Sorting

Emulsifying

Drying

Pelleting (RDF)

Torrefaction

Bio-Coal

Turbines

Electrical Grid

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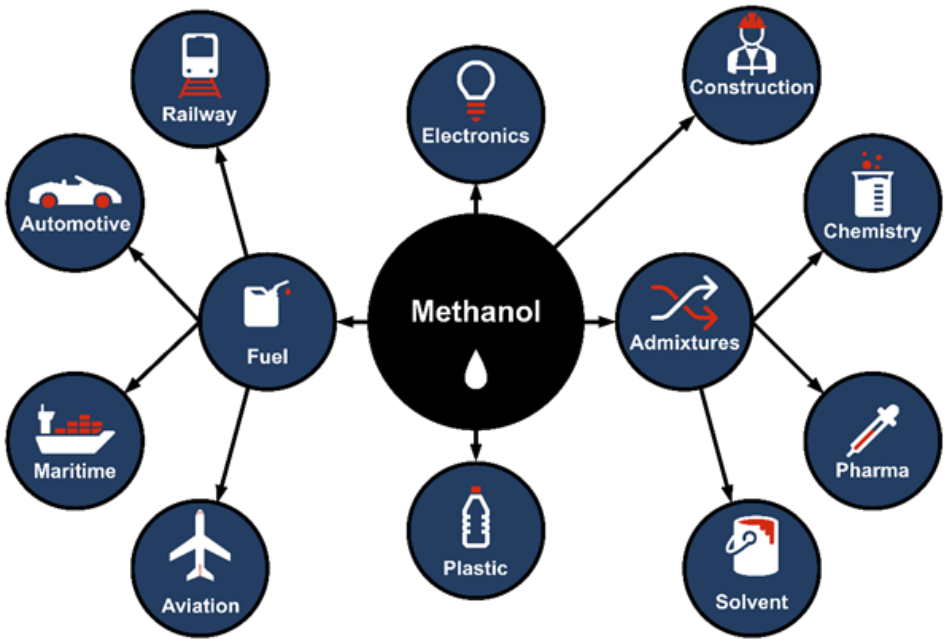
Methanol — the simplest alcohol (CH3OH) — is a clear liquid chemical used in thousands of everyday products, including plastics, paints, cosmetics, and fuels. Methanol is also an energy resource used in the marine, automotive, and electricity sectors and an emerging renewable energy resource.



Methanol (CH3OH) is water-soluble and readily biodegradable, comprising four parts hydrogen, one part oxygen, and one part carbon, and is the simplest member of a group of organic chemicals called alcohols. Methanol is a clean-burning, biodegradable fuel. Increasingly, methanol's environmental and economic advantages make it an attractive alternative fuel for powering vehicles and ships, cooking food, and heating homes.

Typically, methanol is produced with natural gas. However, with increasing interest in sustainability, methanol has proven versatile in its production pathways. More projects are utilizing renewable feedstocks such as agricultural waste, Municipal Solid Waste (MSW), sewage, renewable electricity, and captured CO2.

Methanol production with renewable feedstocks significantly reduces greenhouse gas intensity and contributes to the energy transition in end-user markets. As a building block for many downstream chemicals, sustainably produced methanol facilitates the growth of the green chemicals sector. Sustainably produced methanol is also being utilized as an alternative drop-in fuel in shipping, road transport, and power generation to lower overall emissions and impact on the environment.

Through a technology cooperation agreement with Hago Energetics EWS can participate in this rapidly growing fuel market through the conversion of biogas created in the processing of waste material by thermolysis.

Areas of Responsibility

THE JV PARTNER WILL BE RESPONSIBLE FOR:

- Government relations
  - Guarantees of permits and licenses from appropriate government ministries if any are required
  - Securing arrangements with municipalities and regional districts for the supply of MSW
  - Assisting EWS in negotiating a tipping fee for MSW (where possible)
- Completing the MSW Questionnaire (attached)
- Adapting the pro forma financials for the local costs of personnel, materials, supplies, and services
- Working closely with EWS in negotiating a Power Purchase Agreement (PPA) with domestic power providers, for as many years as possible
  - Helping to ensuring that grid tie-in is not an obstacle
- Human relations
  - Finding and hiring suitable employees (EWS to train)
- Assist EWS in getting MOUs in place with major subtrades required for completion of the project
- Assist EWS in selecting local accounting and legal firms to represent the project

EWS & JV PARTNER WILL BE JOINTLY RESPONSIBLE FOR:

- Completing the following elements of the business case:
  - Infrastructure details
    - Strategic location
    - Building layout and costs
    - Security arrangements

EWS WILL BE RESPONSIBLE FOR:

- Creating the final version of the Pro forma statements showing debt repayment and ROI
  - Specifying and costing ancillary equipment
    - Pre-processing:
      - Sorting, drying, mixing, and pelleting equipment
      - Conveyance systems
    - Post-processing:
      - Sizing, pelleting, and packaging equipment
      - Conveyance systems
    - Specifying and sourcing electricity generation:
      - Infrastructure between system elements
      - Turbines and supporting equipment
      - Grid tie-in
- Marketing of Bio-Coal
  - Securing letters of Intent, or actual offtake agreements
    - In local markets wherever possible

- Presenting the business case to potential financiers and helping to secure funding for the project
    - How well the two parties complete the elements in this section will determine if funding can be secured, and at what cost

Suggested Ownership Structure

The business model for EWS is based on Joint Ventures. EWS provides the technology and the operational knowledge base and assists with securing the financing. The JV Partner contributions, including financing are required to make the project viable. Taking all these things in balance, we feel that a 50%/50% ownership structure is fair. EWS recognizes that the financing is not without risk and therefore is open to seeing a disproportionate amount of net profits accrue to the JV partner until the investment is returned.

Sample Pro Forma for an ATS1000

Municipal Solid Waste (MSW) - ATS1000				
Manufactured Product	**% of Output**	**Annual Output**	**Price Per Tonne**	**Revenue**
Bio-Oil	8%	871	$400	$348,480
Bio-Coal	70%	7,623	$1,000	$7,623,000
Tipping Fee			$100	$5,445,000
Methane	8%	-	-	-
Methanol	14%	1,546	$365	$564,429
Total Revenue	100%			**$13,980,909**
Approx. Operational Expenses				$5,743,252
Royalty				$699,045
Net Income (before taxes)				**$7,538,611**
Notes: •Based on 10,890 Tonnes Per Year (330 Operating Days Per Year) •All figures are shown in US Dollars				

Please note that the ATS is modular and expandable, and as such there is no limit to the volumes that can be processed.

Addendums

A - Questionnaire for Municipal Waste Processing with ATS Technology

Feedstock

- What % of each type of waste material is in the mix
    - E.g.

MSW Component	Percentage of Overall Mix
Leftover / food scraps	64
Paper	**5**
Carton	4.5
Plastic	10
Tire	7.9
Animal residues	1
Glass	4.8
Metal	1.4
Ash, soil etc.	1.4

- What is the overall moisture content of the material
- How many tonnes per day of waste is delivered to the site
- Are there any toxic materials we should be made aware of

Facility

- Is an adequate facility already in place
    - 930 square meters (10,000 square feet)
    - 8-meter ceiling height (25 feet)
    - 6-meter bay door height to allow assembly machines to work
    - Loading dock
    - Water and drainage onsite
    - Is power available, or will the project have to generate its own power
- Is the zoning adequate
    - How much time is required to apply for and receive proper zoning
- How long will it take to secure proper municipal and environmental permits
- What is the proximity to the waste materials
- What is the proximity to shipping
    - Rail / Highway / Shipyards
- If the building is not in place how long will it take for building permits to be issued
- How much area is around building for feedstock processing and finished goods handling
- Who will be responsible for site security

Sorting facility

- Is the pre-processing for moisture extraction and particle sizing already in place
- Is there adequate land and building to house the sorting and pre-processing equipment

Labour

- Is there an adequate supply of workers close to the project site
- Are the workers adept at processing and manufacturing work
- What is the average salary (or hourly rate) for good workers
- Are medical facilities close by in the unlikely event of worker injuries

Future Developments

- What is the projected growth in waste material over the next ten years
- Will additional waste material be brought in from other jurisdictions
- Does the project location and existing facility (if in place) allow for growth

Please note that other questions will arise as the project design is advanced, however the answers to the questions in this document will allow for an initial project scope to be created.