

Emerging Waste Management Technology Project Development Checklist

To assist your evaluation of opportunities to utilize emerging waste management technologies or to use existing technologies in new applications as part of your overall environmental services offering, here are a set of questions to consider. We recommend sharing this with your public works department, any other agency responsible for solid waste management and any third party solid waste experts you engage.

1) Technology – describe the technology and what it is designed to do.

- a) What is it?
 - i) Is this a “proven technology”? (i.e. has it been in commercial operation for minimum of two years using typical municipal waste and no regulatory issues with emissions)
 - ii) Where has the system been in operation?
- b) What are the benefits?
 - i) Energy production, waste diversion?
 - ii) Is the process designed to generate excess energy or does it require a net energy input?

2) Feedstock – describe the type of material and amount needed (MSW, C&D etc.). As the project becomes developed, more detailed questions should include the following:

- a) What are the specifications for incoming material to be processed (feedstock) a) At a minimum, preprocessed specifications should establish:
 - i) Moisture levels
 - ii) Particle size
 - iii) Physical and chemical contamination limits
 - iv) Prohibitives.
- b) What is considered unacceptable?
- c) How will upstream supply changes (ex: flexible packaging, bottle light-weighting), waste industry changes (ex: Organics diversion, other process technology implementations), demographic changes (population up/down, average age, recycling habits, etc.) impact the long-term availability of the desired feedstock?
- d) Do you have any existing long-term waste supply agreements in place?
- e) Are there any local regulations that restrict the ability of the community to commit the necessary waste quantities or qualifying feedstock? (i.e. Flow Control)

3) Preprocessing – describe modifications needs to incoming waste material.

- a) What preprocessing is required? Describe the preprocessing required from the point of the waste disposal to entry into the main conversion process.

- b) For the required preprocessing, what is the estimated operations and maintenance cost, including but not limited to power, labor, media replacements, overhauls, etc.
- c) What is the staffing level and plan?
- d) Who will be responsible for preprocessing and how are they incentivized to produce the quantity and quality of preprocessed input material the process requires?
- e) What are typical contaminants in the feed?
- f) How will the preprocessing system account for the low quantity of “other” items whose characteristics may impede operations of proposed Waste Conversion processes (engine blocks, bowling balls, VHS tapes, ropes, CFL lightbulbs, household hazardous waste etc.)
- g) Will the preprocessing stages be operating at full-scale prior to bringing the conversion process online?
- h) Are there alternate markets to which the preprocessing material can be marketed to in the event that the regular process is delayed?

4) Process – describe the process.

- a) Please provide:
 - i) Process Flow Diagram
 - ii) Mass Balance (basis clearly defined: dry/wet, raw/preprocessed)
 - iii) Energy Balance – describe anticipated energy use and energy production
 - iv) Air emissions, describe the anticipated volume of emissions and the anticipated quality
 - v) Water balance - for water discharges describe the nature of the discharge in terms of biological and chemical characteristics
- b) For the process, what is the estimated operations and maintenance cost, including but not limited to power, labor, parts, maintenance, media replacements, overhauls, etc?
- c) What is the staffing level and plan?
- d) Technology readiness/ reference projects: Are they running on comparable feedstocks under comparable market conditions? This is particularly important if all the reference projects are located outside of the US and Canada
- e) Technology guarantee – is solid and from credit-worthy entity?
- f) Given that feedstock availability, technology and markets evolve over time, how would the selection of the process fit in this evolving landscape? In other words, why should one select the process now rather than wait for alternative and improved processes that may (or may not) be developed in the future?
- g) How does the process mitigate odors?
- h) What differentiates the process from other processes in the same space?
- i) Is there a facility similar to the one proposed in commercial-scale operation in North America? Please provide contacts and describe relationships.

5) Outputs – Describe the products and by-products that result from the process.

- a) Is there currently an outlet market for selling the product produced? If the markets do not yet exist, who is responsible for establishing them? What is the impact to the project if the markets do not materialize?
- b) Describe the markets for products. What prices can be anticipated over the life of project? What evidence can be provided to support the proposed product value?
- c) Does the process produce any byproducts requiring disposal? Are or could any be considered hazardous waste?
- d) Who will be responsible for disposing of non-processible waste and/or non-salable products?
- e) Will the vendor guarantee recovery rates for the processed waste?
- f) What and how much are the air and water emissions of concern?
- g) What products are produced and is the project reliant on revenue from their sale to cover all or a portion of the operating and capital expenses? To what extent?
- h) Is there an existing market for the product(s)?
- i) What byproducts and waste streams will the operation generate? How, if at all, will they be handled in our area?

6) Project – Describe the location, land area and impacts on the waste stream and movement of materials.

- a) Where will the project be located? Has property been acquired or are there existing land leases in place?
- b) How much area is required for the project and all related support operations and traffic?
- c) Who is responsible for acquiring the property, the approvals to use it, and for the costs of site selection and development?
- d) What is the backup plan for the waste supply if the project gets delayed, cannot process the amount of material expected or the project fails?
- e) What role does this project play in the longer-term goals (recycling rate, diversion rate, GHG reduction, etc.)?
- f) Has the impact to other municipal/other government assets as a result of the selected Conversion Technology been fully evaluated? (i.e. Refuse collection fleet, Municipally-owned WWTP for co-digestion, etc.)
- g) Have current opportunities to improve the existing system (i.e. SS Recycling vs MWPF) been maximized?

7) Financial – Describe capital and operational costs and responsibilities and term assumed for the project.

- a) Capital Expenditures:
 - i) What are the estimated capital costs associated with the project?
 - ii) How much contingency is on the project, including all preprocessing steps?

- iii) What are the additional development needs and expenses of the project such as new or improved roads and additional utility or wastewater services? Are they factored into the project capital costs? If not, who will be responsible?
- b) Revenue sources; fraction fixed vs variable?
- c) What is the minimum annual tonnage of the desired on-spec feedstock required to build the facility? To keep a fully-construction facility running?
- d) Who will invest (debt and equity) in the project, including project development expenses?
- e) Role of State/Federal Environmental Attributes, Grants, low-cost loans, etc.?
- f) What taxes/fees will the project be subject to (Host fees, Environmental Fees, Landfill Taxes, etc.)?
- g) Commodity prices – what exposure do you and the project partners have to changes in commodity prices?
- h) Does project account for a realistic construction and startup time that may stretch over several years?
- i) Has there been an objective analysis done (eg., switching to CNG trucks regardless whether an AD+CNG fueling station is constructed)?
- j) Does the financial analysis include the impact on both waste collections and waste processing?
- k) What resources are needed from our agency/municipality and from other local partners to make the effort successful? What portion of the total funding and feedstock are required do we represent?
- l) What are the region's tip fees?

8) Regulatory – describe the permits required to move forward with the project.

- a) What are the regulatory requirements for the project/technology?
- b) What permits are required, what is the timeline, cost and likelihood to get them?
- c) Are there any Environmental Justice concerns associated with the project?
- d) Does the project align with likely future regulations (ex: micro-contaminants in compost)?
- e) Have state and federal regulatory requirements been evaluated for this project in this location? Provide a synopsis.
- f) What state agencies have jurisdiction? Have they been contacted? If so, please provide the name(s), titles, and contact information of the individuals and a synopsis of the interaction.
- g) Do the current regulations allow this technology? Or will they need to be changed?