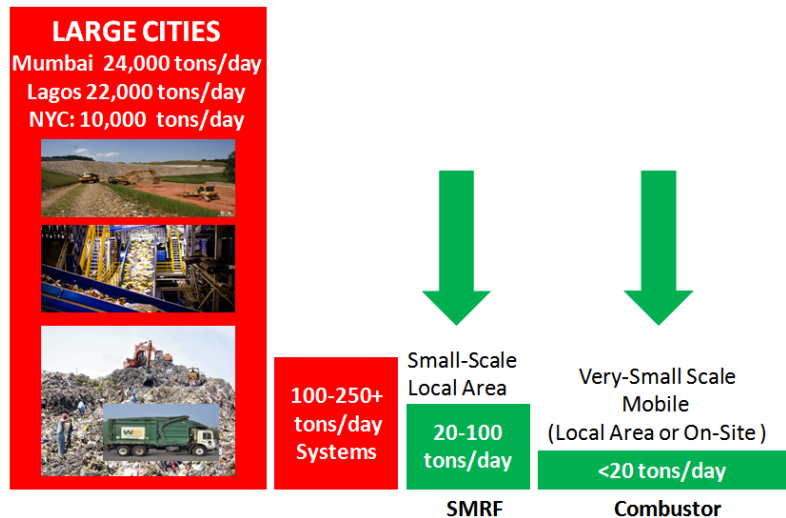


THE STARTER MATERIAL RECOVERY FACILITY (SMRF)

- A SUBSTITUTE FOR BUILDING EXPENSIVE LANDFILL SITES IN SMALL CITIES IN DEVELOPING COUNTRIES & ISLANDS
- A LOW-ENTRY COST WASTE PROCESSING, RECYCLING & DISPOSAL SOLUTION FOR SMALL CITIES & ISLANDS
- LONG-TERM POTENTIAL TO STOP OPEN BURNING & USE OF GARBAGE DUMPS IN DEVELOPING COUNTRIES & ISLANDS
- INTRODUCING OUR VERY-SMALL SCALE & MOBILE COMBUSTOR AS ANCHOR & ENABLER OF THE SMRF

Today, waste management in developing countries is challenging, even for large cities, as populations increase and “disposable” consumerism marches forward. For the most part, the largest cities are aggressively tackling their waste situation by incorporating expensive modern waste collection, recycling and disposal infrastructures, but even they have waste overflow problems.

For smaller cities it’s a different story. The vast majority do not even have minimal waste management systems as there is not as much waste and the modern waste infrastructure costs are too high. The result is a startling 40% of all municipal waste in the world is openly burned or sent to unsanitary garbage dumps.



Our Starter Material Recovery Facility (“SMRF”) is a game-changing solution offering these small cities a localized, scalable and systemic solution to process, recycle and dispose of its waste.

THE SMRF WILL DIRECTLY REDUCE THE AMOUNT OF OPEN BURNING AND WASTE SENT TO GARBAGE DUMPS IN DEVELOPING COUNTRIES & ISLANDS

- Our target will be secondary/tertiary cities – with populations below 200,000 – in developing countries and for island archipelagos. These places have growing populations, too much waste, and underwhelming/inefficient or no waste collection/landfill infrastructure in place.
- Local government should be formally involved, one way or the other, in implementing the SMRF within its jurisdiction. At best, local government is the customer and pays to have waste collected for its citizens by a waste management firm. At worst, they will be asked to provide land, permits and/or job creation/economic tax incentives for the SMRF, and are already working with a waste management firm in some minimal capacity.
- Each SMRF should be, ideally, championed by both a NGO & a local waste management firm. Both will be asked to participate in setting up and operating the SMRF.
- Each SMRF, at full capacity, can process, recycle and dispose up to 25,000 tons of waste per year, or roughly about 80-100 tons/day, assuming roughly 80% can either be composted or recycled.
- We anticipate initial waste collection by a waste management firm to be within small, controlled areas that become “Waste-Free” 365 days per year. Once full processing capacity reached, collection would expand into additional areas based on a community’s participation and acceptance. This approach will enable a local region to take “baby steps” in their waste collection, processing, and recycling efforts.
- Until this functioning SMRF, trash would normally not be composted or recycled at all. Informal recycling of “valuable” waste would occur, but otherwise, the majority of this waste would be sent to the local unsanitary dump, or openly burned.

WHAT IS A STARTER MRF (SMRF)?



Our Starter Material Recovery Facility (“SMRF”) is a centralized waste management facility that small cities use to process, compost, recycle and dispose of its waste

The Process: How It Works

[1] A local waste management firm has a waste collection program where teams of 3-4 people travel by truck to collect 2-3 tons per truck from local businesses and residents in a defined area. Community drop-off centers may also exist that pay residents for “valuable recyclables.” Plus, all area streets and roads are cleaned weekly, even if not included in specific routes.

[2] All collected waste is transported to a centralized location, our waste processing, recycling & disposal center, our SMRF.

[3] A team, at the SMRF, separates out the organic waste for composting where it is later profitably sold as fertilizer.

[4] Next, this team filters out the valuable recyclable inorganic materials to sell, such as metals, bottles and cans.

As mentioned previously, similar MRFs in the developed world and in a small number of cities within the developing world, have demonstrated the compost/recycle rate to be about 70-80% of all collected waste! The remaining “valueless” inorganic non-recyclable waste is referred as “residuals” or “fluff.”

[5] Lastly, each SMRF contains a mobile, small-scale Frontline Waste System’s combustor unit. All remaining combustible residual waste is prepped and sent into the combustor for “clean” disposal (about 5000 tons per year). Any minimal leftover non-combustible waste is taken to the local garbage dump.

Important Note: A SMRF spurs recycling! Without the combustor’s ability to dispose waste within the SMRF, any nascent recycling activities, by and of itself, would most likely not be as robust in many locations. **Why? The combustor makes the waste “go away/disappear” in the mindset of people once the waste is picked up– they never see it again.** This is the same role, in many respects, that the modern landfill plays within the developed world. Currently, without the combustor as an option, the only choices for getting rid of the same waste are to openly burned the waste or send it to a nearby dump. **With continuous collecting, processing, recycling and disposal, the area will maintain its Waste-Free status!**

CLEAR VISUAL COMMUNITY BENEFITS DUE TO SMRFs

[1] Creating expanding “Waste-Free” local areas

As each SMRF transforms a collection area from “waste everywhere” to “Waste-Free,” we expect a hired waste management firm to expand its regular waste collection routes into new areas, in addition to regular cleanup of streets and roads. Over time, once waste collection capacity is reached in Area A, we would expect the waste firm to expand its geographic reach to adjacent local areas by adding a SMRF in each area (Areas B, C and D in this example to the right). People see the changes, come to expect this “Waste-Free” environment, and see the benefits of recycling, too! Plus, farmers receive cheaper fertilizer from composting.



[2] Creating electricity from waste exhaust heat from combustor (optional)

Our combustor can include a power generation module (or be retrofitted after the successful implementation of SMRF operations) that can produce a net 75 kW/hour of electricity that can be

used off-grid or sent into the grid. Continuous electricity best used to power a small community building that can be used for multiple purposes based on community involvement and input.

WHY SMRFs ARE AN IMPORTANT TOOL FOR SMALL-SCALE WASTE MANAGEMENT

- [1] **A SMRF replaces or delays the need to build a modern landfill facility within a local area**
 - Stringing together multiple SMRFs within a larger region will create large landfill-free areas
- [2] **Introduces recycling and positions recycling as a clear community reward/benefit**
 - Local residents see direct Waste-Free areas for their participation
 - Cheaper fertilizer will be available for local farmers from composted organic waste
- [3] **SMRF tipping fees, composting and recycling operations should be profitable**
 - Small tipping fees paid to take in waste from businesses and residents, as well as sale of fertilizer and valuable metals, cans and bottles should cover salaries and operating expenses of the SMRF itself
- [4] **SMRF creates a “just in time” approach to waste collection and recycling**
 - The 25,000 tons/year capacity is limited by the capacity of our combustor unit (approx. 5,000 tons). Once more waste is consistently collected and sent to the SMRF, given the mobility of our combustor and its small footprint, we can add an additional combustor to the SMRF, which would allow additional geographical-near Waste-Free areas to be added.
- [5] **Our system provides flexibility for governments, companies and NGO’s**
 - Often these organizations are very good at educating people about waste collection and recycling, but struggle to find cost-effective treatment options that compel people to participate. A SMRF creates the “what’s in it for me” required to rally people to participate
- [6] **SMRFs create jobs and economic value**
 - We estimate at full capacity (collecting and processing 50+ tons/day of waste per day) the collection, recycling and disposal process would require between 50-80 people
- [7] **Less open burning and less waste in garbage dumps should positively impact healthcare and deliver real humanitarian value**
 - With cleaner streets, cleaner air, and cleaner water, the short-term and long-term impact on the health of the population should not be underestimated
- [8] **A SMRF is THE low cost waste infrastructure alternative**
 - The cost to build modern waste infrastructure, including landfill, in these small cities would not be justified due to the small amount of waste. Plus, other waste systems, such as gasification and pyrolysis, are not cost/benefit effective and difficult to scale/operate
- [9] **The mobility of combustor allows a SMRF to be built in any location without “fixed” permanency – repurpose capital equipment at no-cost.**
 - If for any reason waste collection efforts fail within a community, the combustor and SMRF could be moved to another community if politically expedient and if the waste operator can’t be profitable otherwise. Allows capital equipment to be repurposed.