How Smart Green Cities Turn Waste into a Resource

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Image: American Society of Interior Designers

Big problems call for smart solutions. By 2050, the world population is expected to grow from 7.2 billion to 9.6 billion and it is estimated that 66% of all people will live in cities (up from 54% today). Looking at these numbers, it's easy to understand how climate change can be considered the most important challenge of our time. Faced with a future of rapid urbanization, increased resource scarcity, and rising temperatures from greenhouse gas emissions, we are being forced to consider how urban environments will be designed to support the needs of our offspring while sustaining the planet.

Smart Green Cities:

The concept of the 'smart green' city has emerged in response to concerns about urban population growth and climate change. Smart green cities use technology to improve the efficiency and performance of urban services. They are designed to create the smallest possible ecological footprint while boosting quality of life. At the heart of the smart green city concept lies the Internet of Things, a network of devices embedded with electronics, software and sensors that can collect data, allowing the city to adapt to changes and optimize its use of resources.

Beyond intelligent infrastructure, **the ideal smart green city attempts to produce a closed-loop system with zero emissions and zero waste.** This means residents consume only what energy, water, and food inputs are necessary, recycling whatever waste is produced, and minimizing outputs of greenhouse gases (Co_2, methane), air pollution and water pollution.

Addressing Waste:

Above all else, **innovative waste management systems will be essential to the success of smart green cities.** Currently, most of the things we produce follow an unsustainable cradle to grave life cycle, which not only pollutes our environment but fails to recognize waste as a valuable resource. In order for a smart green city to use resources in a way that results in both cost and energy savings and minimal contributions to climate change, it must **follow a cradle to cradle cycle where all materials that are produced are utilized to the fullest extent possible.** With the right technology, just about everything we throw away has the potential to be composted, recycled or converted through waste-to-energy processes into energy, biofuel, or biochar.

Regreen machines are designed with zero waste in mind. Because our systems are scalable and can turn any type of waste into a variety of end-products (animal food, fuel pellets, fertilizer, etc.), they appeal to smart green city developers, like Zeons, who are building the first generation of fully sustainable urban communities.

Zeons Sustainable Micro-Townships:

Zeons is a strategic venture capital firm created by Los Angeles-based real estate developer, Garson Silvers and Houston-based entrepreneur, Naved Jafry that invests in ecologically- and economically-responsible development projects. The company is currently creating what they

refer to as a "sustainable micro-township" in India. Located near Mumbai in Karjat, this city will join a handful of planned smart green cities around the world that are modeling the future of sustainable urban living.

Regreen + Zeons=A Model for the Future:

Zeons believes Regreen technologies provide an essential solution to the problem of urban waste management, particularly in a developing country like India, where the population is growing quickly and people are migrating en masse from rural areas to cities in search of a better life. Currently, Indian cities generate more than 68.6 million tons of solid waste every year (188,500 tons per day!) and there are no efficient systems in place to handle the mess. In light of this and other issues that will arise as a result of the country's rapidly urbanizing population, Prime Minister Narendra Modi has laid out an ambitious plan for India's government to build 100 "smart cities". But private developers like Zeons aren't waiting for this to happen. Instead, they are laying the foundation now for a model of "smart city" which transcends the shallow focus on wired infrastructure as an end-goal. This model is rooted in principles of sustainability. As an example, instead of using smart sensors to automate trash collection, this "green" approach finds ways to eliminate the need for trash collection altogether with the help of clean technologies.

Here's a picture of how this vision will play out in Karjat using Regreen technologies:

For every residence, Zeons is working to create a closed-loop system. This means that everything which comes into a home will either be used in the home or turned into something else that can be reused in the home or community. On apartment buildings in Karjat*, networks of rooftop gardens and window planter gardens will be designed to help harvest rainwater and feed residents. Instead of going in the trash, excess food scraps and other organic materials that residents discard will be quickly converted into soil amendments or liquid fertilizer by a Regreen Organic Waste Recycling Processor and used to nourish these gardens. Normally, this conversion process is highly labor-intensive and time consuming. It typically takes 3 months to create compost from food waste and during this time, greenhouse gases are emitted from decaying food! With Regreen technologies, Karjat can create odor- and bacteria-free soil products in 23 minutes, cutting these financial and environmental costs out of the picture. Residents will be able to see their food follow a direct and efficient cycle from garden to fork and back again.

But Regreen machines can do so much more than just expedite the process of returning unused organic materials to the earth. In its work to create a community that is capable of being completely fossil fuel-free, Zeons plans to use Regreen systems to help recover energy from waste. Besides generating energy from wind turbines and solar panels, Karjat will be able to create fuel pellets from both organic and non-organic waste using the Regreen Total Waste Processor. This machine—which can handle mixed waste—produces pellets that can be used for powering boilers, hot water heaters, and air conditioning systems. Imagine living in an apartment building where your trash is used to heat your shower! This is the future

that Silvers and Jafry envision: one in which **consumers can contribute to their own energy needs.**

Waste-to-Energy:

Zeons is also looking to pair Regreen machines with waste-to-energy technologies like anaerobic digesters, gasifiers, and pyrolysis systems that take the waste conversion process one step further by producing biogas, biofuel, and biochar. Regreen shredders, liquid presses, and pelletizers will provide all the pre-processing required for Karjat's waste-to-energy systems to efficiently create these products. The ability to efficiently create energy from waste and do so in a decentralized manner will allow smart green micro cities like Karjat to function "off the grid" and profit from selling excess power to the grids of other cities. Their residents will be able to trap the gases released by decomposing organic waste and convert them into biogas for cooking or electricity generation. Transportation will be powered by biofuels like biodiesel or synthetic crude oils made from non-organic materials (plastics, tires, etc.) that would normally be sent to landfills. Finally, landscaping debris and other green waste will be turned into a charcoal called biochar and used as a soil amendment on nearby farms.

Decentralized waste processing and energy production minimizes municipal costs and puts more money in the pockets of city residents, raising everyone's standard of living. Placing Regreen machines in each housing complex would result in little to no trash hauling costs and few (if any) utility costs for residents. The cost savings from this combined with the revenue generated from converted waste by-products and renewable energy production will **create a community that benefits economically from being "smart" about its resources.** As Mr. Silvers sees it, "former trash dumps become sources of energy to light the way of common man, fuel our transportation, nourish our fields and ourselves with mineral-rich organic foods, all [while] being motivated by financial gains to clean and power our environment".

Smart green cities offer answers to our biggest problems by turning them into solutions. Karjat proves this by treating waste as a resource and employing new technologies to benefit the people, planet, and profit margins of the future.

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*Phase 1 of Karjat will open in 2016. The city's total capacity will be 2,500.

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[Researched and written by Alyssa Gunter-Davis, Marketing Associate, Regreen. Regreen manufactures various machines to convert waste (food, organic, medical, and dirty municipal waste) into valuable odorless and germ-free products that can be further pelletized for fuel, or used to create animal feed, fertilizer, or soil amendments. These patented and patent-pending machines are available for purchase or lease. The manufacturer is willing to place machines and share the tipping fees and revenue from pellets etc. Please contact Robin@Regreenus.com for details].