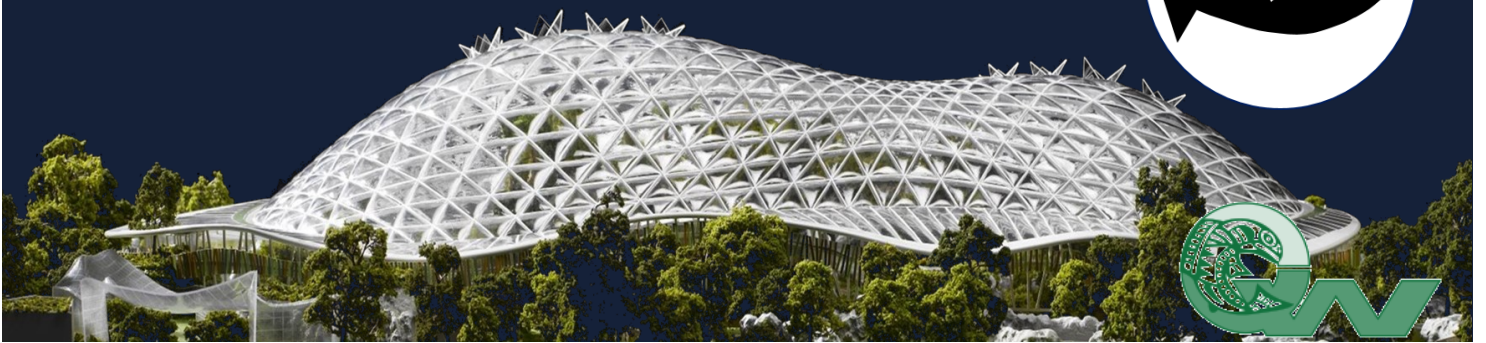


Sustainable Smart City Waste Management

**Cradle to Cradle designed ecosystem
for urban sustainability**



Situation Overview

Zero Waste Objective: Miami-Dade

On January 25, 2025 Mayor Levine Cava provided a Second Update on Directive No. 241676 to the Honorable Chairman Anthony Rodriguez and Members of the Board of County Commissioners of Miami-Dade who have mandated Mayor and Staff develop a broad strategy for Zero Waste management.

In her update, Mayor Levine Cava states there are no easy solutions when it comes to waste management. As Mayor, she notes: The underlying goal is to provide quality services to Miami-Dade residents in a financially and environmentally responsible and efficient way. Of utmost importance is the protection of the ratepayers.

Mayor Levine Cava also states that closure of North Dade Landfill and South Dade Landfill would represent on going annual revenue losses in the order of \$50 million, plus a closure cost of \$48 million. Reference was also made to the need to replace the RRF Facility at an estimated cost in excess of \$1 billion involving a 10 year procurement cycle.

This proposal outlines a pathway that avoids these losses and could be operational within 18 months of starting construction. Existing landfill life may be extended by 95 times, and we are able to recover landfill space now used, including closed landfill space. This proposal generates significant net surplus (profit) and reduces environmental impacts. We employ the use of a well established modular technology referred to as being 'mature' by Stantec, a major international consultancy. This well proven technology is combined with other

proven advanced farming and food preservation systems that utilize thermal energy left over after producing firm electrical power. The overall plant efficiency thereby goes from 23% (typical of standard Waste-to-Energy or WTE plants) to 75% efficiency. This efficiency gain combines to give the proposed plant an IRR of 15% prior to adjusting for avoided landfill costs and landfill space recovery this proposal represents.

This proposal reverses a major looming cost centre to a net positive revenue generator for the ratepayers, and significantly enhances net zero waste management objectives of Miami-Dade. We refer to this integrated technology package as the PEACE Bio-Dome. Summary financial performance information is provided below, together with a cost comparison to standard WTE costs as stated by HDR in their reports to Miami-Dade.

PEACE Bio-Domes, by **Quiet Water Resource Recovery Inc.** provide un-paralleled flexibility due to the modular design. Modularity means they may be expanded, contracted or moved to alternate locations providing maximum flexibility to the County in the years to come.

PEACE Bio-Domes do not generate a waste ash; a key element in achieving 'zero waste' status. In addition, PEACE Bio-Domes may be used to profitably recover valuable land covered with waste from prior generations, taking 'zero waste' to a new level.



Situation Overview - Miami-Dade County

Zero waste management goals ultimately should seek to enact policy and develop systems whereby MSW is significantly reduced or eliminated at source. As manufacturing technologies adapt to a reuse or zero waste mentality, significant reduction in MSW volumes is expected. Therefore, a commitment to extremely large centralized WTE or RFF plant is essentially an admission that zero waste is not achievable.

In the alternative vision proposed here; existing land, currently permitted for waste management (landfills), would be the home to a series of modularly expandable PEACE Bio-Domes. As Zero Waste initiatives are successfully implemented and less waste is generated at source, these facilities could switch focus to landfill mining and waste processing thereby recovering valuable land for development.

PEACE Bio-Domes represent an aesthetically pleasing waste management approach. Recovered landfill space and lands nearby would be more likely to attract development interest when buyers know that the benefits of the PEACE Bio-dome to them are lower household costs for cooling / hot water / heat and fresh food. Offsetting energy use with this lost resource (landfilled waste) is a positive step towards sustainability beyond that currently envisioned by the Zero-Waste plan.

Modular homes, built in Florida with recycled steel, are available through PEACE for deployment should a master planned self sustainable

development be adopted. Such a development would be food and energy self-sufficient. Each home would be designed with permaculture elements. All waste, both sewage and solid wastes would be safely eliminated or repurposed, leading to true sustainability. PEACE provides Master Planning services through our NY office.

Food security for large urban areas like Miami-Dade should play a role in every decision. The great State of Florida will remain independent so long as the needs of the ratepayers are met in a sustainable fashion.

PEACE Bio-Domes represent a significant advantage to standard WTE systems. For instance, PEACE converts green organic waste to produce fish feed needed to raise antibiotic free shrimp and fish. The remainder makes excellent compost or RDF if there is no market for compost. All benefit from utilizing excess energy captured after making firm electrical power for sale 24/7.

This proposal is a pathway to zero-new-landfill space requirements no matter how large the County grows. Moreover, this proposal states that each closed or soon to close landfill, currently permitted for waste management could be transformed to one that never fills up, and becomes a self-sufficient community or development zone.

In summary this proposal outlines a new paradigm for municipal solid waste management.



Three Pillars to make Miami-Dade (Miami) the Smartest City

The current leadership of Florida, together with the extraordinary efforts of Mayor Levine Cava, will be seen through the lens of history as the fulcrum point administrations that made Miami-Dade County home to practical Smart City practices.

Miami-Dade is attracting record numbers of people who wish to live out their lives knowing there is smart leadership making wise critical decisions that will lead to fiscal and environmental sustainability. Landfills were first utilized as a waste management strategy 5,000 years ago by the Egyptians and Persians. We are smarter now than they were.



Typical pillars of a smart city model *

I. City infrastructure and services

- **Built environment**
- Transport, mobility and **logistics**
- Water and wastewater management
- **Solid waste management**
- **Energy**
- Telecommunications
- **Health**
- Education and skills
- **Economic Development**

II. Institutional enablers

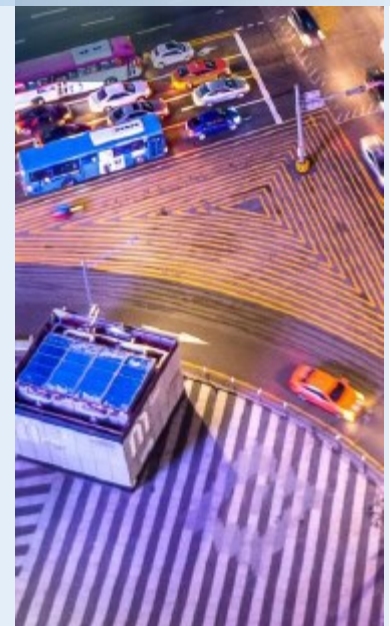
- Policy, legislation and regulation
- Leadership and governance
- City-wide planning (spatial, strategic / economic, smart city, etc.)
- Business model and financing
- **Innovation - seeing landfills as a resource**
- Citizen engagement / participation
- Sustainability and resilience

III. Digital transformation

- Data management and analytics
- Connectivity
- Interoperability and standards
- Security and privacy
- Urban platforms
- Disruptive technologies
- **Data center cooling with low grade energy from PEACE**

* PEACE Bio-Domes directly address those items in Bold type

PEACE Bio-Dome projects positively contribute across all three pillars. Of particular note is the way in which each complex assists the overall county in meeting waste management, energy, health, education and economic development goals while reducing traffic and improving power grid stability by providing a decentralized approach. Institutional enablers and staff regularly comment on the multiple ways our integrated complex (the PEACE Bio-Dome) holistically complements the goals and objectives they are seeking to facilitate.



PEACE Bio-Domes: a smart choice

Bio-Domes: a center for new community development.

Bio-Dome designs may be geared primarily towards high yield advance agriculture and aquaculture, or may be integrated with a more complex development model that includes a public market place and / or a hotel and convention development. In all cases the Bio-Dome is a source of both electrical power and district energy for cooling, heat and hot water. Moreover, the treatment of waste water may be integrated into the process design so that new developments do not add burden to existing sewage treatment plants.



Mobility:

Grow fish and prawns with feed from green waste. Fish waste grows pesticide free vegetables year round eliminates the need to transport food from far a-field to meet urban demands. Each Bio-Dome is a farmers market.

Safety and Security:

Uninterruptable food security from bio-secure non-GMO, pesticide free urban locations at scale meets critical planning needs.

Living and Health:

Modern urban farms reduce long chain food supply lines. Traditional farming practices consume high volumes of water and, typically, non-renewable nutrients. Fresh harvested urban food delivered same day ensures highest nutritional value.

Economy:

Bio-Dome attributes:

- Urban employment
- Eco-Tourism
- Entertainment
- Food products
- Fine dining
- Firm energy at discount



Energy:

Zero waste is the ultimate goal. Dumping waste, wasting it in a landfill is the last, worst, least enlightened solution; yet one used by the vast majority of urban civilizations (to use the word, in this context, loosely).

Bio-Dome complexes utilize chemical reactions to transform waste from a problem to reformed materials, recovered resources and continual (always available) biogenic energy.

Circular designs employed in PEACE Bio-Dome complexes use waste from one process as an input for the next. (e.g. fish waste is used as fertilizer for living lettuce and herbs.)

Education:

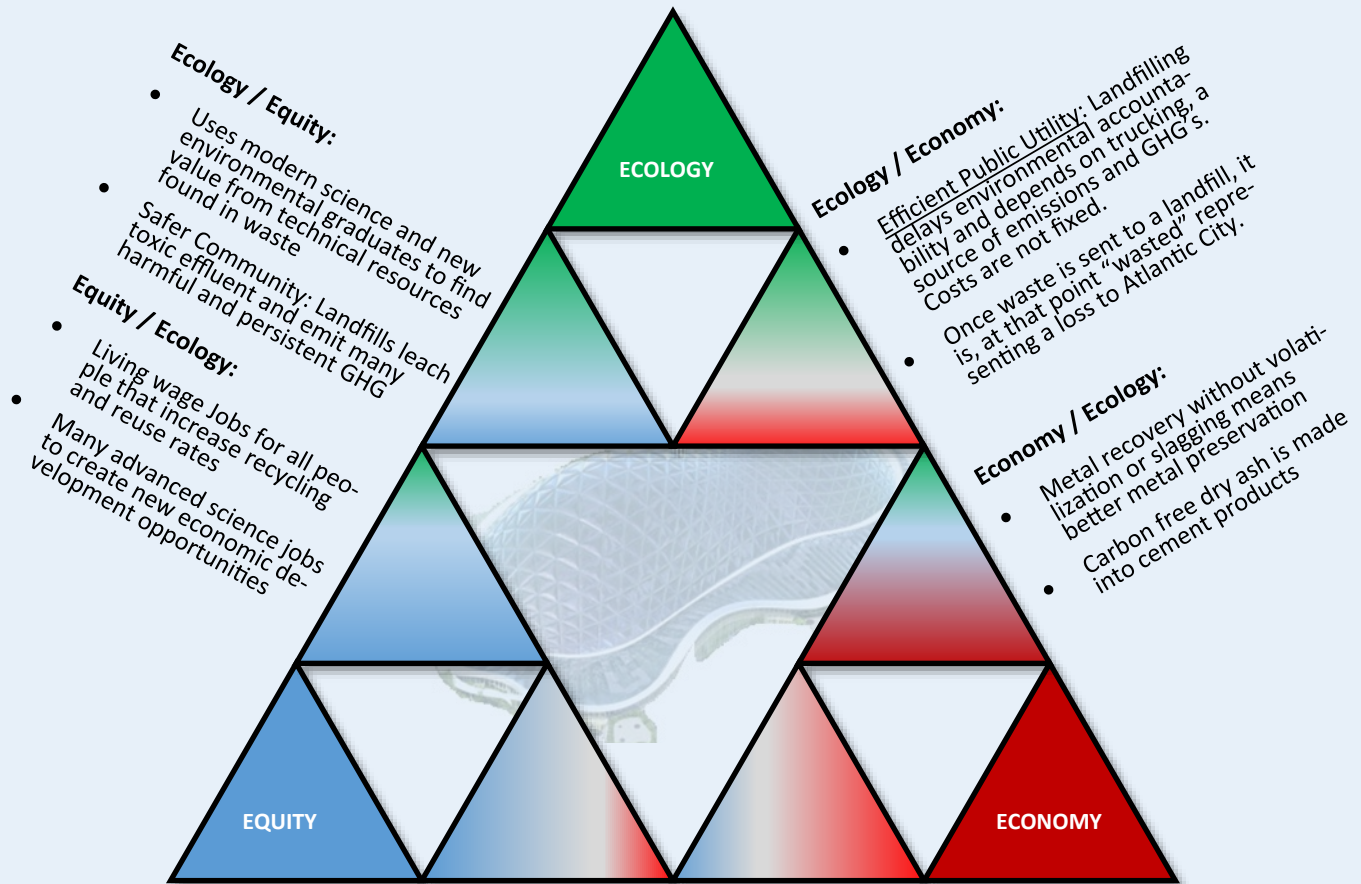
Intensive learning through advance information delivery systems that include entertainment and competitive elements are the vanguard for cross cultural impact. Bio-Dome focus is trained on environmental stewardship, using the understanding of circular design principals employed in the design of each PEACE complex to inspire vision for future projects locally and abroad.



Triple Bottom Line Analysis of the PEACE Bio-Dome Complex for Miami-Dade County based on one system processing 700 ton/day

Minimum calculated Total Equivalent Emissions Reduced utilizing US EPA Calculator for PEACE Bio-Dome Complex diverting 500 ton/day MSW from landfill

Total Equivalent Emissions Reduced [Total = Direct + Avoided]		
MMTCO ₂ E/yr million metric tons of carbon dioxide equivalents per year	tons CH ₄ /yr tons of methane per year	tons CO ₂ /yr tons of carbon dioxide per year
0.5677	22,411	65,464
Equivalent to any one of the following annual benefits:		
<u>Environmental Benefits</u>		
• Carbon sequestered by ___ acres of U.S. forests in one year:		737,226
• CO ₂ emissions from ___ railcars' worth of coal burned:		3,122
• CO ₂ emissions from ___ gallons of gasoline consumed:		63,875,745



Equity

- Tri-party advisory panel made up of community members, City representatives and Management Team
- Best annual art award using recycled metal
- Flag stones donated to charity for fundraising
- Food bank donations

Equity / Economy

- Organic fresh food production / green jobs
- Specialized nutraceutical products to reduce sickness at "no-name" prices

Economy / Equity

- New jobs in Green Sciences Sectors
- Advancement opportunities and training / advanced education based on merit

Economy

- Increased (decentralized) power supply to City on a continual basis to mitigate black-outs / economic losses
- Reduced waste management costs that stabilize far into the future
- Permeant employment at living wage or better rates in Green Energy, Food and Environmental job sectors

Miami-Dade County, Florida

SITUATION:

Miami-Dade County is seeking a comprehensive solution for Municipal Solid Waste (MSW). Currently the daily tonnage of MSW is 4,000 tons per day that had been processed in a Waste-to-Energy plant owned by Miami-Dade that is now permanently shut down.

PROPOSED SOLUTION:

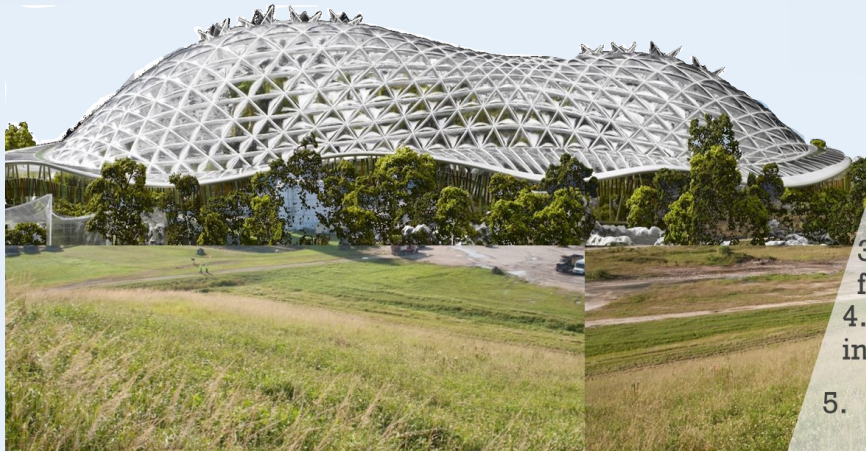
This document presents an economically viable model for comprehensive MSW management that aligns with those envisioned for Smart City Developments as articulated above and as has been envisioned by the City planners of Miami-Dade County referred to herein as the PEACE Bio-Dome. In the alternative, and in order to allow comparison to more traditional Waste-to-Energy plants such as the one previously owned and operated by the County of Miami-Dade to process 4000 t/d, a basic low-efficiency comparative is provided.

In all cases, this proposal recommends a decentralized management approach for all MSW (Types 1, 2, 3, 4 and 5) "as received", based on 500 ton/day thermal treatment plant with '200 ton/day green waste' processing sub-system. Numerous plants, able to be set up turn-key within 12 to 18 months of order, would be located at existing landfill sites, currently permitted for waste management and owned by Miami-Dade County. Each plant could be expanded or contracted by adding or re-locating modules in the event of demand changes. Each system could allow for landfill mining by processing waste mined out should the decision to recover valuable land owned by the County for repurposing to support advanced food production, data centres, new affordable housing etc. , be made and thereby achieve higher overall energy efficiency and further emission reductions.

Fully enclosed waste management centers support high-yield farming

The new generation of resource recovery centers utilize highly efficient bio-dome technology. Odors and dust are contained. No mountains of black ash remain. Efficiency rates of 70% or higher are standard when the energy released is used to power refrigeration systems and pump water for fish farming. The pleasing aesthetic look means the facility would be welcome in any new development.

PEACE Bio-DOME with
CORE 700 Ton/day MSW Processing



Using Circular Engineering

1. 70%+ efficient
2. Generate COLD
3. Grow Fish Food from green waste
4. Farm fish in tanks in the basement
5. Attractive building

Basis

PEACE BIO-DOME SYSTEM:

Within the Bio-Dome enclosure we place all the integrated systems required to repurpose 500 tons per day of waste thermally, plus source separated 'green waste'. Our ash from the thermal units is carbon free, so we manufacture concrete blocks for use in landscaping by utilizing the ash as a Portland Cement ingredient. We do not need an ash landfill.

Continuous power is delivered to the grid and thermal energy is used on site to pump water and produce COLD for the production of Ice and Cold Storage Space. Fish and shrimp feed are produced on site making the farm sustainable as it does not depend on wild-caught fish from the ocean to be the feed source. Fresh vegetables and salad ingredients are grown using fish and shrimp excrement and provide further GHG offsets.

The entire system is covered. All odors from MSW are contained within the building and eliminated by our process.

