Phoenix NYC
Waste-to Energy for NYC

WTERT Biennial Conference
October, 2024

Phoenix NYC – Goal Today

- Present the "preliminary cubed" (prelim^3) concept, explain why it makes sense in 15 minutes or less.
- Inspire involvement – "force of one" to force of many.

Convert the "ridiculous" to "this is actually a good idea."

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Phoenix NYC – Presentation Overview

- What is Phoenix NYC –
- Why does Phoenix NYC make sense?
- Can it be built – prelim^3 concepts
- Keystone Issues – design, environmental, business/financial

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What is Phoenix NYC

The best infrastructure opportunity for NYC

- 10,000 ton/day WTE facility – 10 miles from any backyard
- 300 MW power capacity
- Recover the value, reduce emissions, environmental impact of 3.25 million tons/year
- Convert $425 million into investment for long term lower cost and capacity security
- Provide NYC with secure, renewable and sustainable waste disposal capacity
- Infrastructure with "payback"

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Phoenix NYC - Where

Offshore platform 10 miles from any shore



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What is Phoenix NYC

- 300 MW of power - approx $100 million in Zone J NYISO power cost
- Power injected into the MTA traction system – direct benefit to New Yorkers.
- Recovered metals - $100 million annually recovered to NYC (ref 3)
- Capacity security!!

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NYC DASNY – the "Numbers"

- 10,000 tons/day DASNY export – 75% to landfills. 3.25 -3.5 million tons per year (same as 2004)
- Average distance – 300 miles, as far as 1200. 1.5 million ton-miles/year (train)
- $477 million for waste export in 2024 DASNY budget

This has no return on investment – landfilling the $$ with the MSW.

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NYC Disposal – the "Good"

$800 million invested in MSW handling in NYC to address equite and environmental injustice.

- 4 Marine Transfer Stations and rail transfer yard
- Barges/rail transport replaced trucks, numerous smaller transfer facilities in neghborhoods
- SEALED CONTAINERS – critical improvement

Equity and environmental justice gains stop at the barge-train transfer station.

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Marine Transfer Stations and Barges



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NYC Disposal – Where it goes.



This is not solving the problem – its just moving it

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NYC Disposal – Locally Better

Barge, sealed containers, and train transport were significant gains for NYC MSW management.

Equity and environmental justice gains in NYC are at the expense of remote communities where the landfills are located.

Moving the inequity/injustice is neither equitable or just.

Phoenix NYC leverages the $800 million invested into a better solution that fully addresses these concerns for the remote communities.

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Phoenix NYC – NYC Benefits

- 3.25 million tons of CO_2e per year for NYC
  - (at 1 ton per ton WTE vs Landfill)
- NYC LL97 equivalent – 12.6 billion kWh or 687 million therms of natural gas offset
- 20 years – 73 million tons processed, lower net disposal cost than current
- $200 million in offset MTA power cost and recovered metals per year
- 25-30 year payback (prelim[3])

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Preliminary Projections
(super prelim^3)

Financed Cost	$5,000,000,000			Annual Recovered Metal	$100,000,000	3%	Current $/ton	$125
Interest rate	5%	guess		MTA Subway Taction Offset	$100,000,000	3%		3%
Year	Tons Processed	Debt Service	Recoverd Metal $	MTA Traction Offset	Op Cost (50% of current disposal)	Annual Phoenix Net	Net $/ton	
0								
1	3,650,000	($401,212,936)	$100,000,000	$100,000,000	($228,125,000)	($429,337,936)	($118)	
2	3,650,000	($401,212,936)	$103,000,000	$103,000,000	($234,968,750)	($430,181,686)	($118)	
3	3,650,000	($401,212,936)	$106,090,000	$106,090,000	($242,017,813)	($431,050,748)	($118)	
4	3,650,000	($401,212,936)	$109,272,700	$109,272,700	($249,278,347)	($431,945,883)	($118)	
5	3,650,000	($401,212,936)	$112,550,881	$112,550,881	($256,756,697)	($432,867,871)	($119)	
6	3,650,000	($401,212,936)	$115,927,407	$115,927,407	($264,459,398)	($433,817,519)	($119)	
7	3,650,000	($401,212,936)	$119,405,230	$119,405,230	($272,393,180)	($434,795,657)	($119)	
8	3,650,000	($401,212,936)	$122,987,387	$122,987,387	($280,564,976)	($435,803,138)	($119)	
9	3,650,000	($401,212,936)	$126,677,008	$126,677,008	($288,981,925)	($436,840,844)	($120)	
17	3,650,000	($401,212,936)	$160,470,644	$160,470,644	($366,073,656)	($446,345,305)	($122)	
18	3,650,000	($401,212,936)	$165,284,763	$165,284,763	($377,055,866)	($447,699,276)	($123)	
19	3,650,000	($401,212,936)	$170,243,306	$170,243,306	($388,367,542)	($449,093,866)	($123)	
20	3,650,000	($401,212,936)	$175,350,605	$175,350,605	($400,018,568)	($450,530,294)	($123)	
21	3,650,000	$0	$180,611,123	$180,611,123	($412,019,125)	($50,796,878)	($14)	
22	3,650,000	$0	$186,029,457	$186,029,457	($424,379,699)	($52,320,785)	($14)	
23	3,650,000	$0	$191,610,341	$191,610,341	($437,111,090)	($53,890,408)	($15)	
24	3,650,000	$0	$197,358,651	$197,358,651	($450,224,423)	($55,507,121)	($15)	
25	3,650,000	$0	$203,279,411	$203,279,411	($463,731,156)	($57,172,334)	($16)	
	91,250,000	(8,024,258,719)	3,645,926,432	3,645,926,432	(8,317,269,673)	(9,049,675,528)	($99)	

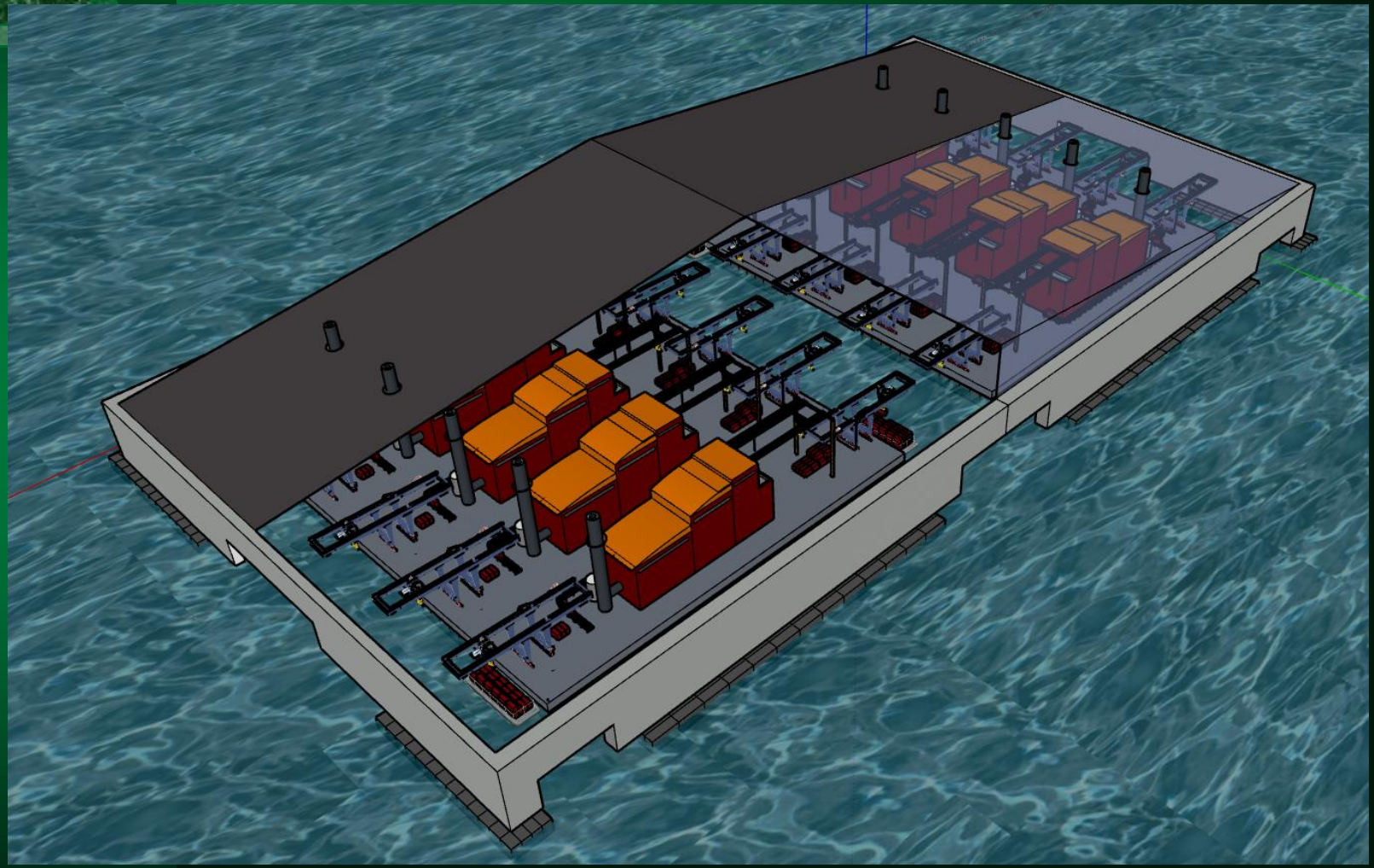
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Building Phoenix NYC (prelim^{3})

- 2000ft x 2000 ft platform (400,000 sq ft)
- 10 WTE processing "trains" (based on B&W from recent MSW projects)
- Container handling cranes for each WTE train
- Shell covering the whole thing – weather and other concerns
- Platform "lift" - prelim^{3} – 250,000 to 500,000 tons

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Building Phoenix NYC (prelim^{3})



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Building Phoenix NYC (prelim^{3})

- 10 WTE processing "trains" (based on B&W from recent MSW projects)
- Container handling cranes for each WTE train
- Shell covering the whole thing – weather and other concerns. Or pod modular coverings. Prelim^{3}

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Building Phoenix NYC (prelim^{3})

Platform "lift" - prelim^{3} – 250,000 to 500,000 tons.
How do you get something this big to float?

- Steel hulls – catamaran or trimaran configuration
- Phoenix originally conceived as part of an offshore LNG platform.

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Large Steel Platforms/Ships

- Pioneering Spirit – 1200 foot catamaran
- Prelude – 166 ft FLNG





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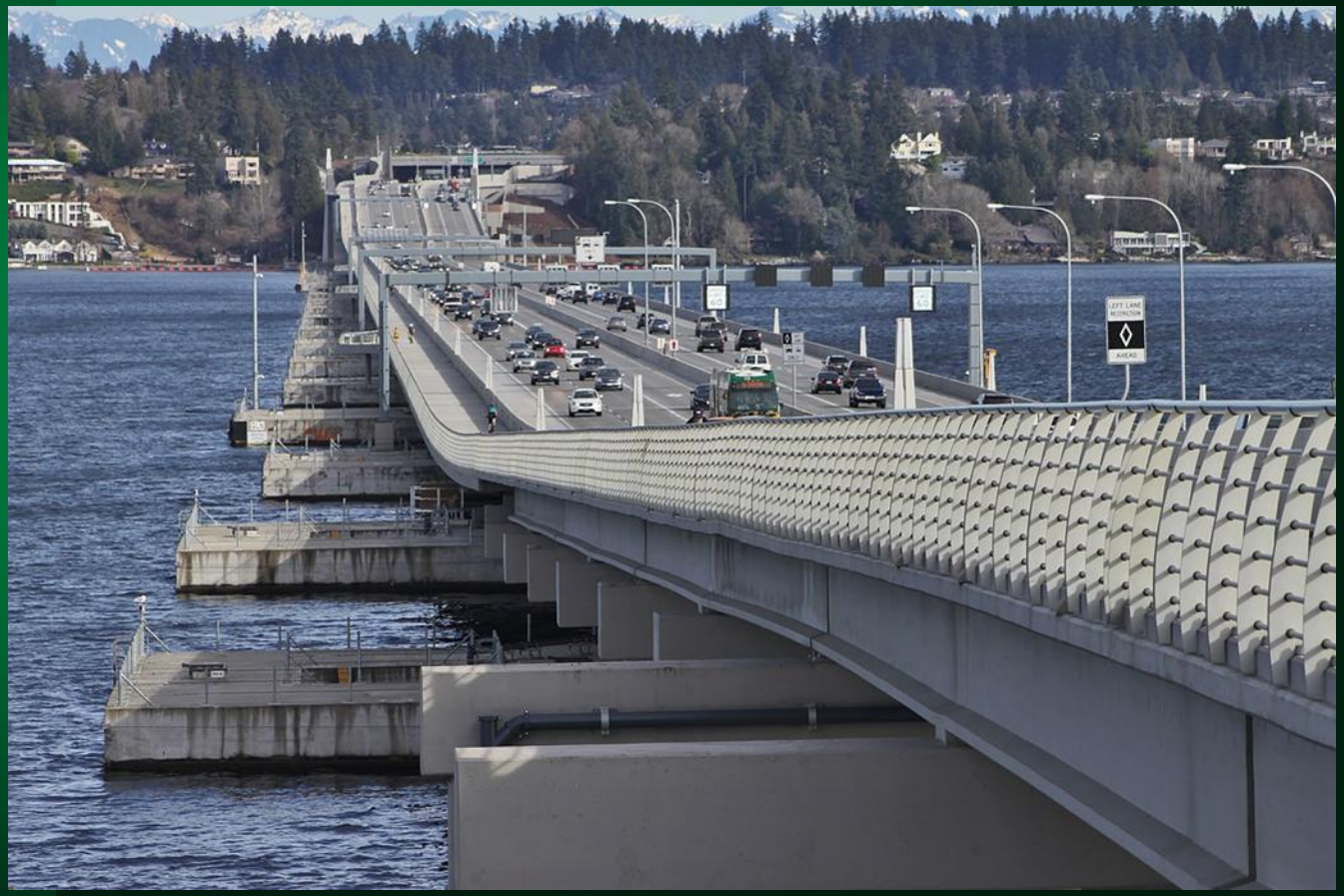
Building Phoenix NYC (prelim^{3})

- Steel hulls – may not be available domestically in US
- Need 40 year or longer life expectancy – cant put Phoenix into drydock
- Storm and wave stresses and design
- Vulnerable to attack? Security is a big concern with such a critical resource.

Better solution already in use in Seattle that addresses all these concerns

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Evergreen Point Floating Bridge



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Building Phoenix NYC (prelim^3)

Evergreen Point Bridge floats on concrete pontoons – 360 ft x 75ft – 10,000 tons float capacity each

- Cast in drydock built for project – all domestic materials and labor
- Phoenix NYC - prelim^3 200ft x 75 ft - approx. 190 pontoons. 700,000 tons of lift capacity
- Redundancy, maintainability, replaceability
- Old bridge pontoons were 60 years old – they were fine just needed a bigger bridge.

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Phoenix – Other Main Techs

- WTE incinerators, emissions controls – Babcock and Wilcox systems from Shenzhen and West Palm Beach 2
- steam turbines/generators
- Barge handling and containers – maximize automation and "production line"
- Barge and container tech – RFID, drone escort, emergency response equipment and procedures
- Ash handling – processing

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Keystone Issues/Questions I

A few of the many (100's – 1000's)

Design criteria and goals – initial list

- Exact location
- Basic size, structure, flotation and anchoring
- Personnel on platform – lodging, food services, recreation
- Cat 5+ hurricane/storm surge resilience or higher
- Space on platform – must be used at highest optimization
- State of the art barge and container handling – highly automated
- State of the art emissions controls
- Preprocessing – RDF/SRF on shore to reduce volume to platform and maximize efficiency and materials recovery

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Keystone Issues/Questions II

Environmental –

- No release of waste to marine environment
- Rescue plans for barges and containers
- Processing/beneficial use and disposal of bottom and fly ash.
- Impact on marine environment – precedent in other larger platform projects
- Waste water containment and disposal/treatment

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Keystone Issues/Questions III

Business/Financial

- Public/private structure
- Current disposal contracts affected
- Financing/funding – great infrastructure funding project
- Interconnection into MTA system – where and what is needed
- Beneficial use for ash produced

Regulatory/permits – local, state,federal, FERC, EPA, marine.....this is going to be a very long list. All has to be identified and handled – Impact studies alone will be very long and extensive.

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Whats Next?

- Presentations and discussions with key stake holders – NYC, NYSERDA, NYPA, MTA, Con Ed
- Detailed development funding and team – in depth development to validate feasibility and answer key design questions.
- Project funding mechanisms and structures – public/private models with a key requirement being NYC owns and controls Phoenix
- Develop and provide answers to the myriad stakeholders who will have a say in Phoenix and the NYC community at large
- Initial design team

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Thankyou for your time
Leave Inspired!

"Impossible is not a fact. It's an opinion."

Muhammed Ali

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Sources:

1. Duren, R.M., Thorpe, A.K., Foster, K.T. et al. California's methane super-emitters. Nature 575, 180–184 (2019). https://doi.org/10.1038/s41586-019-1720-3
2. Beneficial Use of MSW Combustor Ash – presentation by Frank J. Roethel, PHD, Waste Reduction and Management Institute, School of Marine and Atmospheric Sciences, SBU Sept 2020 –
3. Scientific Truth About Waste-To-Energy, Marco J. Castaldi, PH.D.
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Shenzhen Energy Ring – China "going big" on WTE

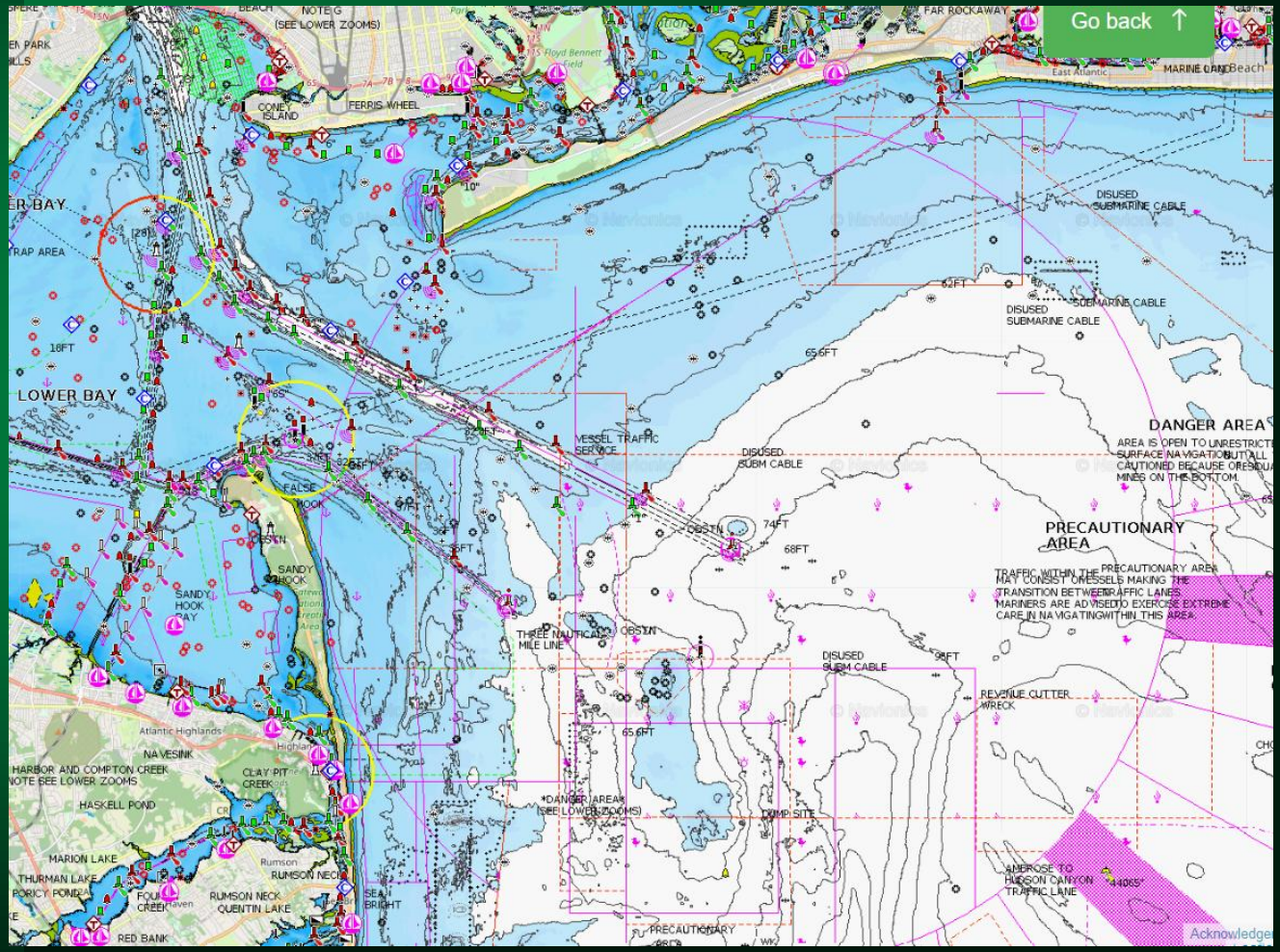
- 5,500 Tons per Day – largest in the world
- 300 WTE in operation – 26% growth per year for the last 5 years





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Phoenix NYC – Where?



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NYC Disposal – the "bad"





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