

Town of Nantucket 2019 Waste Summit

Waste Management Technologies

26 September 2019

Solid waste management/recycling facilities at 188 Madaket Road.

All managed under one Waste Services Agreement with Waste Options Nantucket, LLC

- Composting facility for compostables
 - Compostable fraction of mixed solid waste
 - Sludge (Surfside wastewater treatment plant)
 - Manure (local stables)
- Landfill for Composter residuals
- Materials recovery facility (MRF) for recyclables
- Transfer station for C&D waste
- Containers, bunkers and designated areas for everything else
 - Glass, NRNCs, scrap metal, bulky waste, ABC waste, leaves/yard/brush
 - Hard-to-manage items –batteries, CFLs, CRTs, e-waste, freon, HHW, tires, etc.



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<i>Final destinations</i>	<i>Materials</i>
Landfill	Composter residuals
Landfill site	Compost (from MSW, sludge and manure through the Composter) Mixed excavation waste Glass (crushed) Asphalt, brick and concrete (crushed)
Island off-site	Compost (from leaves/yard waste/brush) Mulch and soil products
Mainland	Everything else <ul style="list-style-type: none"> • Recyclables (other than glass and compostable paper) • C&D waste, bulky and hard-to-manage items, etc.

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The Waste Services Agreement expires in November 2025.
How should the Town manage MSW, sludge and manure going forward?

Continue
current
direction with
improvements

- Operate the Composter and improve compost quality by
- Composting targeted organic materials.
 - Recycling the recyclable materials.
 - Diverting non-compostable materials and contaminants.
 - Changing how materials are separated, set out and collected.

Change
direction

- End operation of the Composter in favor of
- Conventional waste management technologies; or
 - Emerging processing technology; or
 - Transfer MSW, sludge and manure to the Mainland.

Go backwards

Fill the landfill with materials that might be diverted

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Conventional waste management technologies: simply not feasible

Landfill disposal

- MSW disposal precluded by MassDEP waste bans, regulations, permits
- Very limited space in Cell 3 and on site generally after 2025



Mass-burn combustion/incineration (e.g., Covanta SEMASS off I-495)

- MassDEP moratorium since 1990 on permitting of new facilities
- Cost unacceptable at Nantucket's scale and seasonality
- Water use, local air/water quality and sole-source aquifer impacts



Mixed-waste processing facilities (e.g., Rochester Environmental Park)

- Cost unacceptable at Nantucket's scale and seasonality
- Success depends on mainland product markets
- Operational challenges in an island environment
- Water use, local air/water quality and sole-source aquifer impacts

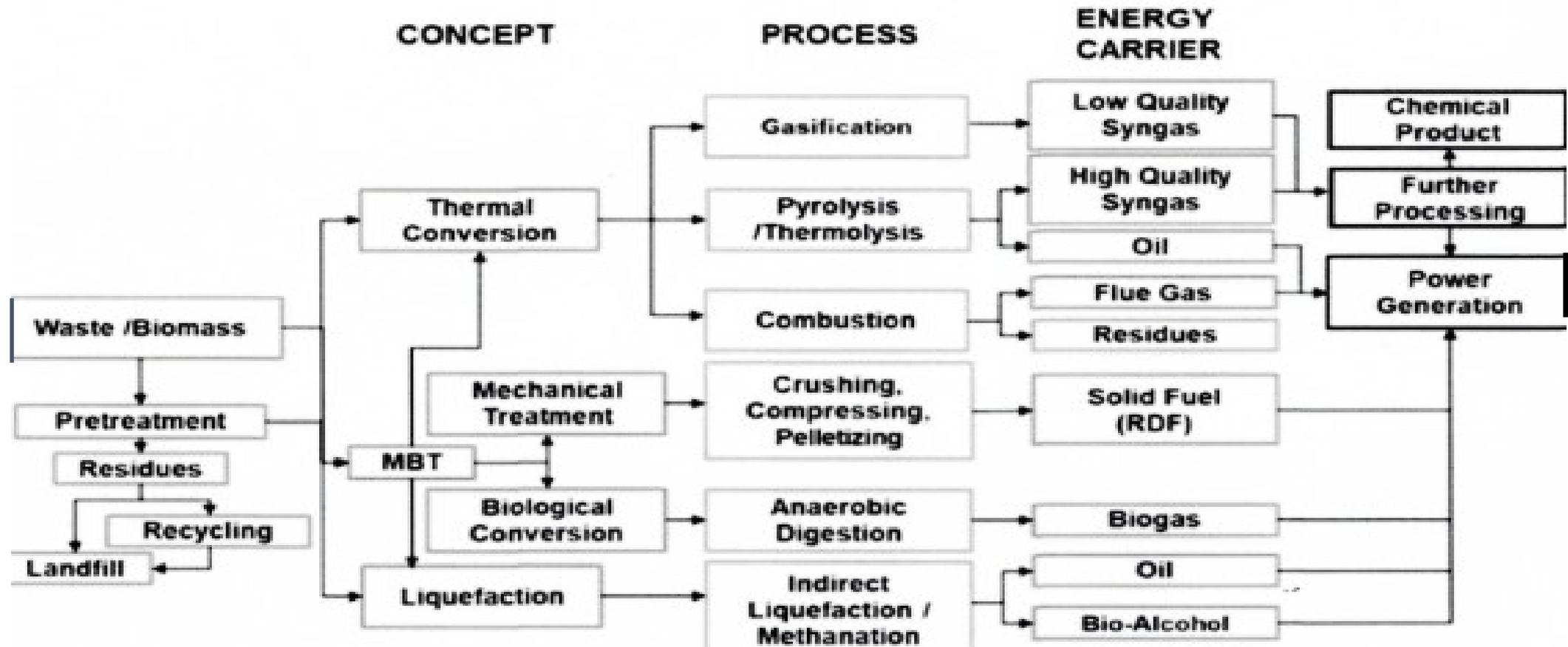


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MSW Processing Technologies: overview of opportunities

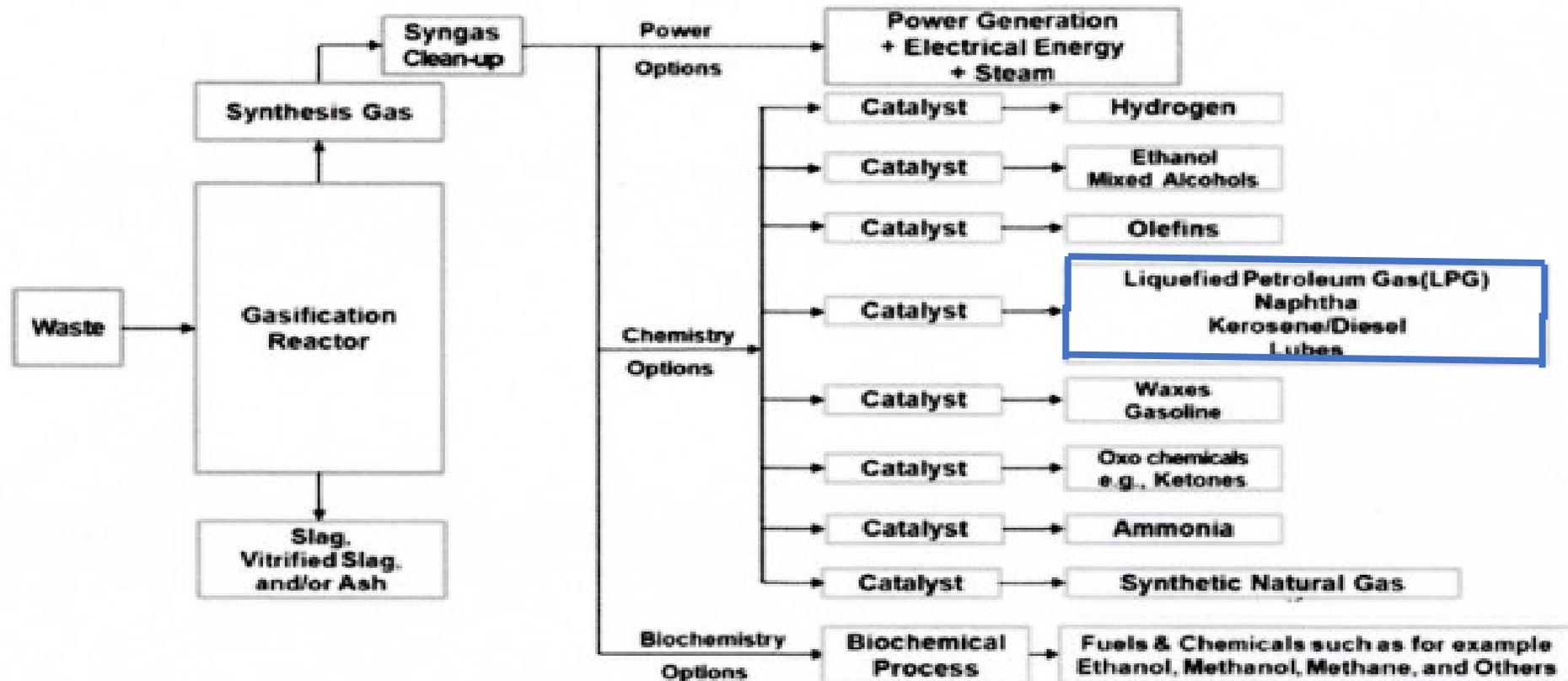


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MSW Gasification Technologies: product opportunities



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Emerging processing technologies to replace the Composter

Technologies

- Modular gasification of MSW
- Small-scale pyrolysis of organics, which might include:
 - Food waste, sludge, manure, leaves, grass, brush, clean wood
- Small-scale pyrolysis of plastics and rubber

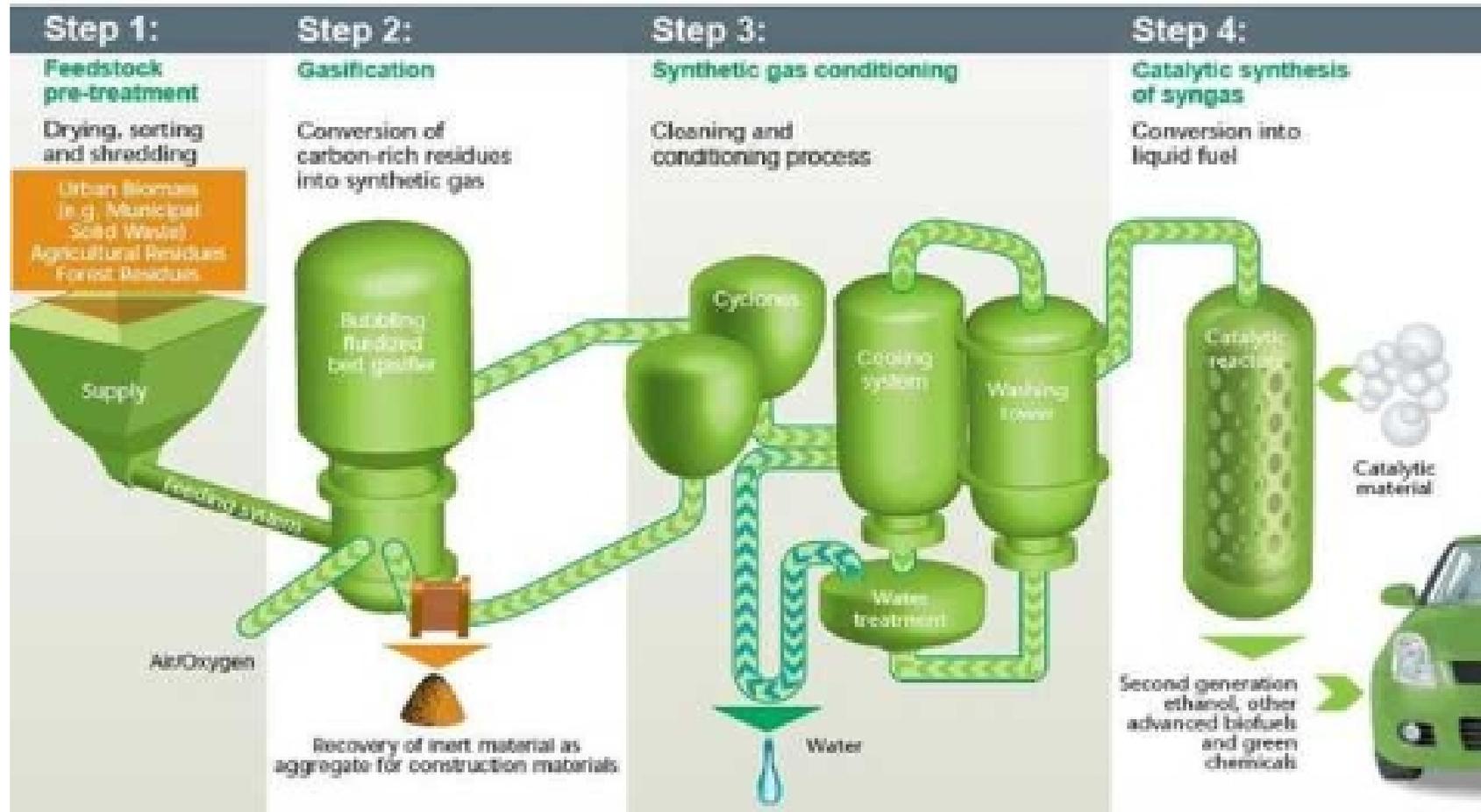
Products

- Liquid fuels (synthetic marine diesel or home heating oil from syngas)
- Electricity (from syngas)
- Biochar and carbon black
- Bio-fertilizer
- Aggregate (from slag)

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Modular gasification and combustion

Convert organics to synthetic gas (syngas)

Use syngas to make electricity/heat or liquid fuels (e.g., marine diesel)

Convert inert fraction to bottom ash and metals

Synthetic diesel production is common in Europe and Asia, new to USA



BOS™ Batch Waste Gasification System in Húsavík



Emission control system at BOS™ plant in Húsavík



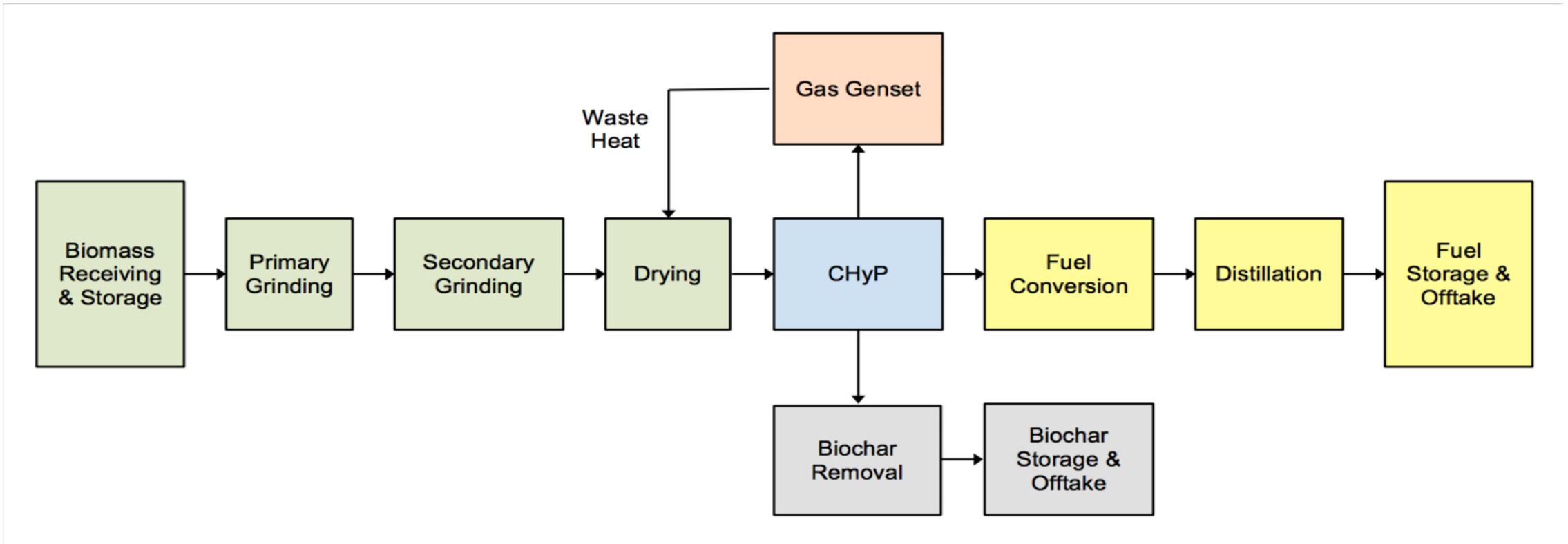
Húsavík church and harbour

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Small-scale pyrolysis of organic materials

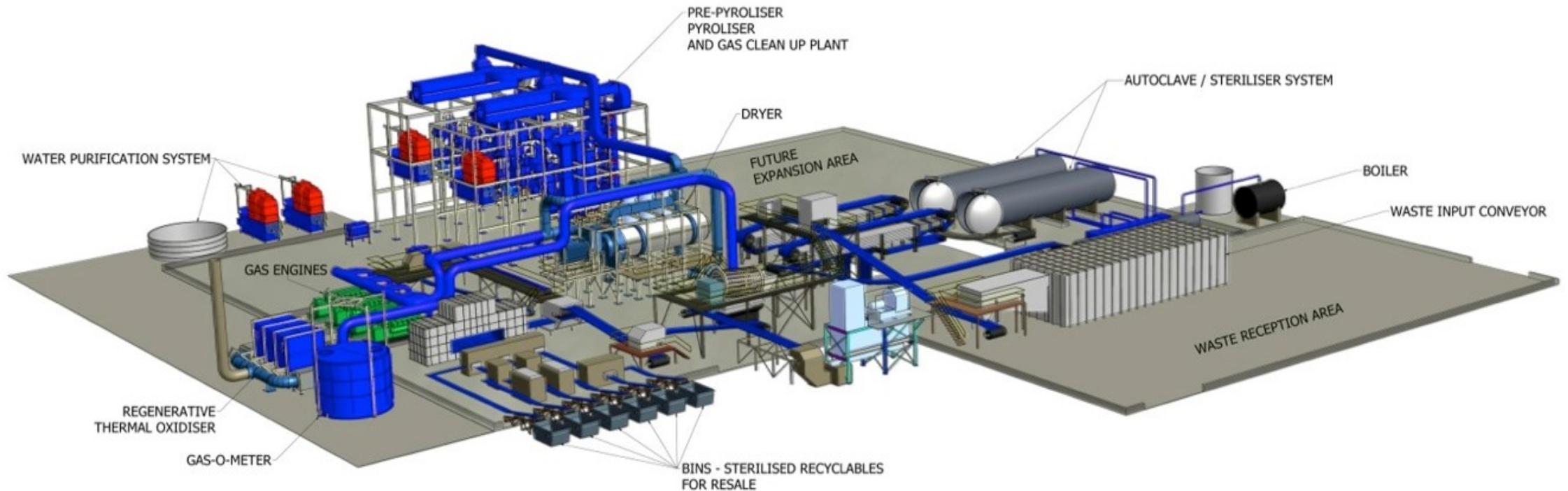


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Small-scale pyrolysis of organic materials



ISOMETRIC VIEW



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Small-scale pyrolysis of organic materials

Convert plastics to synthetic gas (syngas)

Use syngas to make electricity/heat or liquid fuels (e.g., marine diesel)

Convert inert fraction to bottom ash and metals

Challenges

- Feedstock separation and pre-treatment needs
- Some products (biochar, pellets, slag) have no markets on Nantucket
- Designed for biomass (wood, yard waste) vs. source-separated MSW
- Technology transfer and commercialization issues in Island environment

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Small-scale pyrolysis of plastics into synthetic diesel fuel (China)

Feedstock



Reactor



Refinery



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Small-scale pyrolysis of plastics

Convert plastics to synthetic gas (syngas)

Use syngas to make electricity/heat or liquid fuels (e.g., marine diesel)

Convert inert fraction to bottom ash and metals

Large facilities in IN, NY, OR; smaller facility coming on-line in Nova Scotia

Challenges

- Scale: likely not enough plastic to support a facility
- Plastic feedstock separation and quality
- Technology transfer and commercialization issues
- Operations in an island environment

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Emerging processing technologies: every facility has challenges and trade-offs

- Acceptance. Costs, and environmental and nuisance impacts, must be acceptable locally
- Stage of development. Technology transfer and commercialization issues.
- Scale. On Nantucket, capital-intensive facilities will have high per-unit costs.
- Seasonality. Facilities must meet peak summer needs and off-peak winter needs.
- Product sales. Products must have local value. Biochar, pellets and slag do not.
- Residuals management. Residuals must be manageable at the landfill or otherwise.
- Reliability. Facilities operations must be reliable in an island environment.
- Compatibility. New facilities must work with existing systems to meet all needs.
- Law. New facilities must comply with applicable laws, regulations, policies and rules.

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Emerging technologies assessment: Investigate the opportunities

Next steps

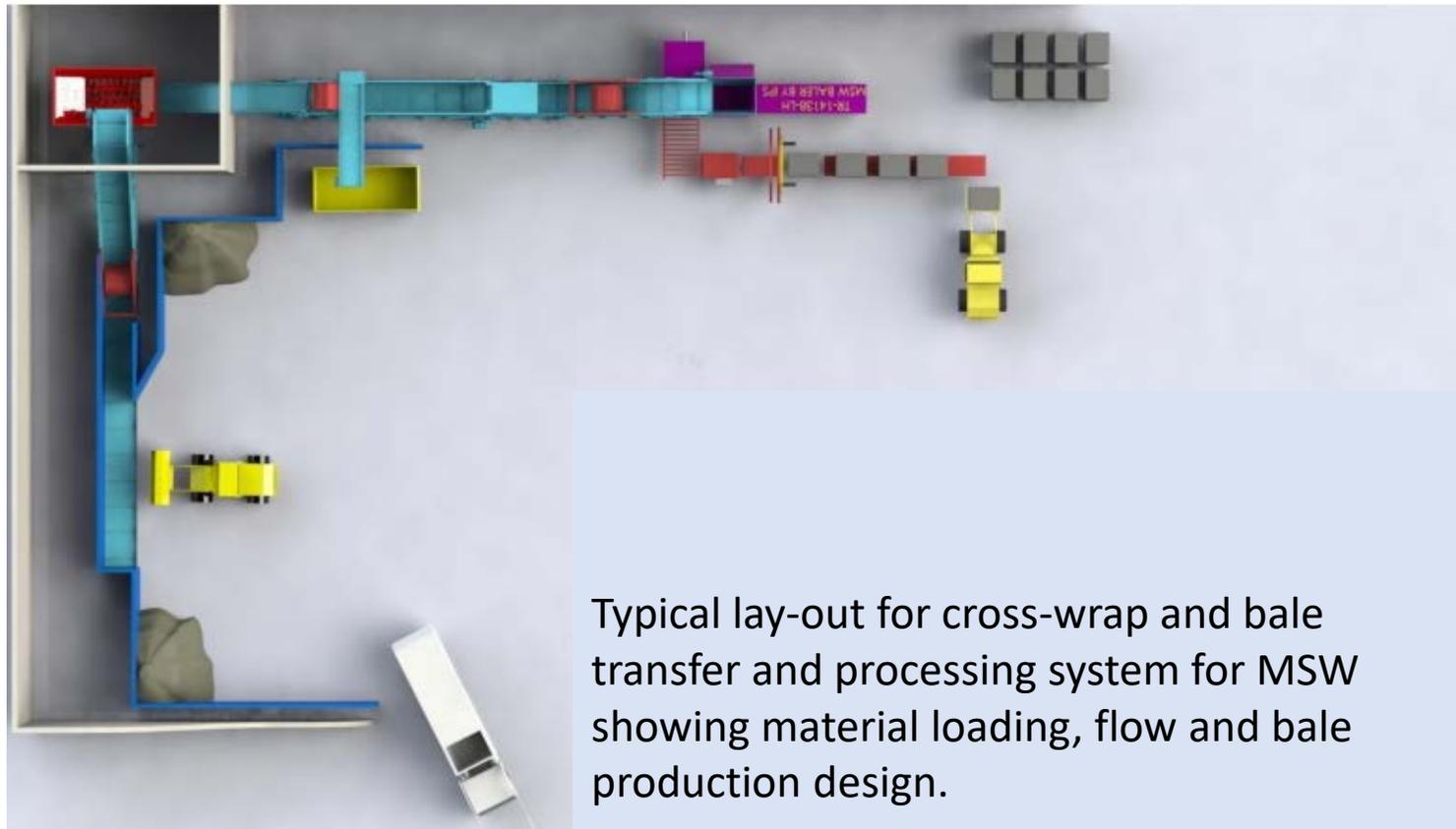
- Public vendor/technology qualification process
- Rigorous and realistic evaluation
- Business/policy decisions on how to integrate existing and new systems
- Act soon – 2025 is nearly here

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Transfer to the Mainland: not as easy as it seems



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Transfer to the Mainland: not as easy as it seems

	Step	Comments
1	Aggregate; transfer for travel; deliver to the dock	Use existing Composter or build/buy a transfer station Use 110-cy trailers or containers
2	Ship to the Mainland by commercial ferry, barge, or new dedicated system	Avoid odors during queuing, loading, passage and unloading, even when ferry is cancelled and in bad weather. Likely requires baling and wrapping.
3	Offload and deliver to a facility that will take bales	Huge capacity shortfall in southeastern New England. Disposal market driven by long-haul trucking or rail
4	Sign a contract Pay tip fees	Long-term contracts not available or advisable Tip fees are rising – significant market cost risks

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Transfer to the Mainland: not as easy as it seems



K&K MSW transfer and processing facility, St. Croix, USVI



- Marathon wide box baler with
- Cross Wrap direct with out ties
- Production of RDF in UK

Cross-wrapped bales exiting to storage conveyor

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Transfer to the Mainland: not as easy as it seems



Wrapped bales at the St. Croix facility.



Wrapped bales on barge from U.K. to mainland Europe

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Transfer to the Mainland: not as easy as it seems

Costs include:

- Equipment for odor management (baler/wrap at \$1.5M)
- Building or buying a transfer station
- Mainland disposal at market tip fees (> \$90 per ton)

All-in cost expected to exceed \$200 per ton