SUSTAINABLE WASTE MANAGEMENT:
The Forefront of Innovation 2018 EEC/WTERT Bi-Annual Conference

An Infrastructural Commons:

sustainable waste management & multiple-use facilities

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City University of New York
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shared resources
shared space

DEF: “land or resources belonging to or affecting the whole of a community”

urban infrastructural systems as a *commons*

integrated relationships: shared resources/shared space

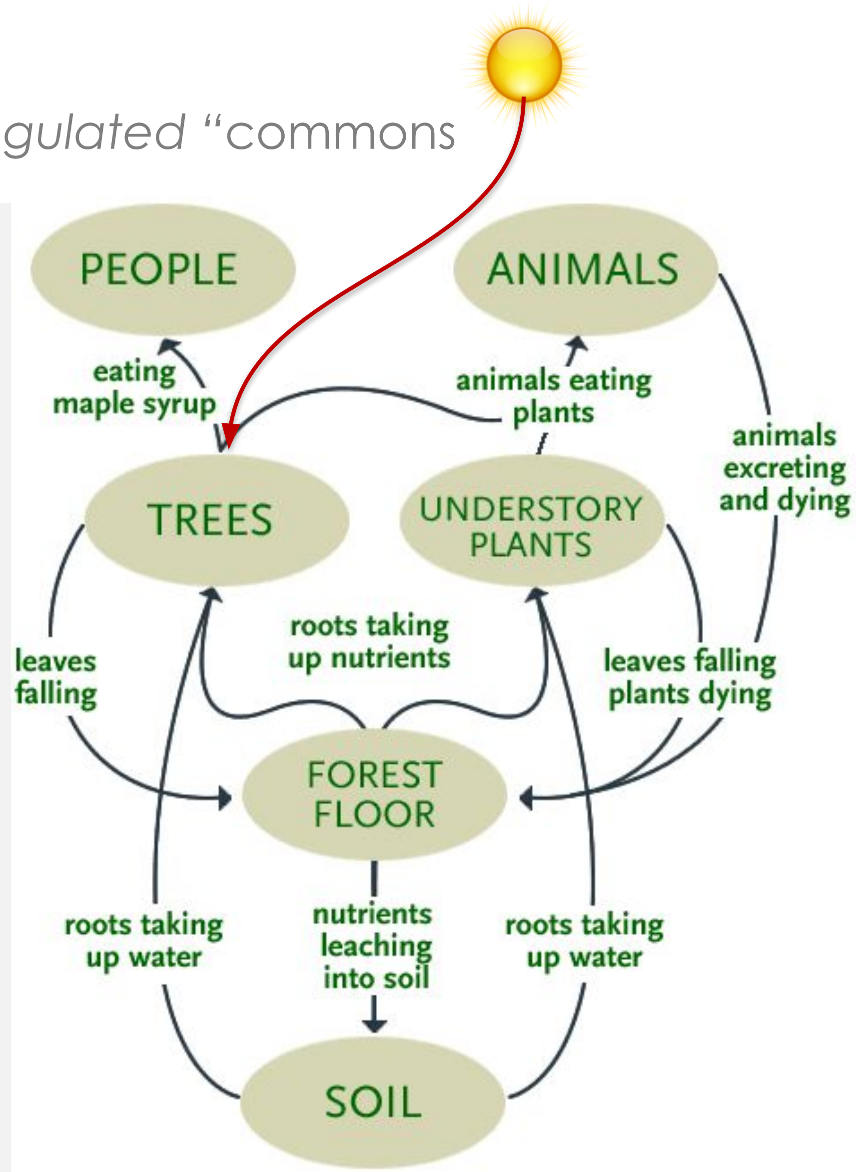
The Infrastructural Commons: a paradigm for waste management

a cooperative framework for shared residual resources and shared (public) use of infrastructural space

Nature's example

an integrated, shared, and self-regulated "commons

- A bounded network of interacting and co-located parts
- System of stocks and flows between producers, consumers, decomposers and nutrient reservoirs
- Resource (waste) cycling among components: energy, water, nutrients



forest eco-system cycling

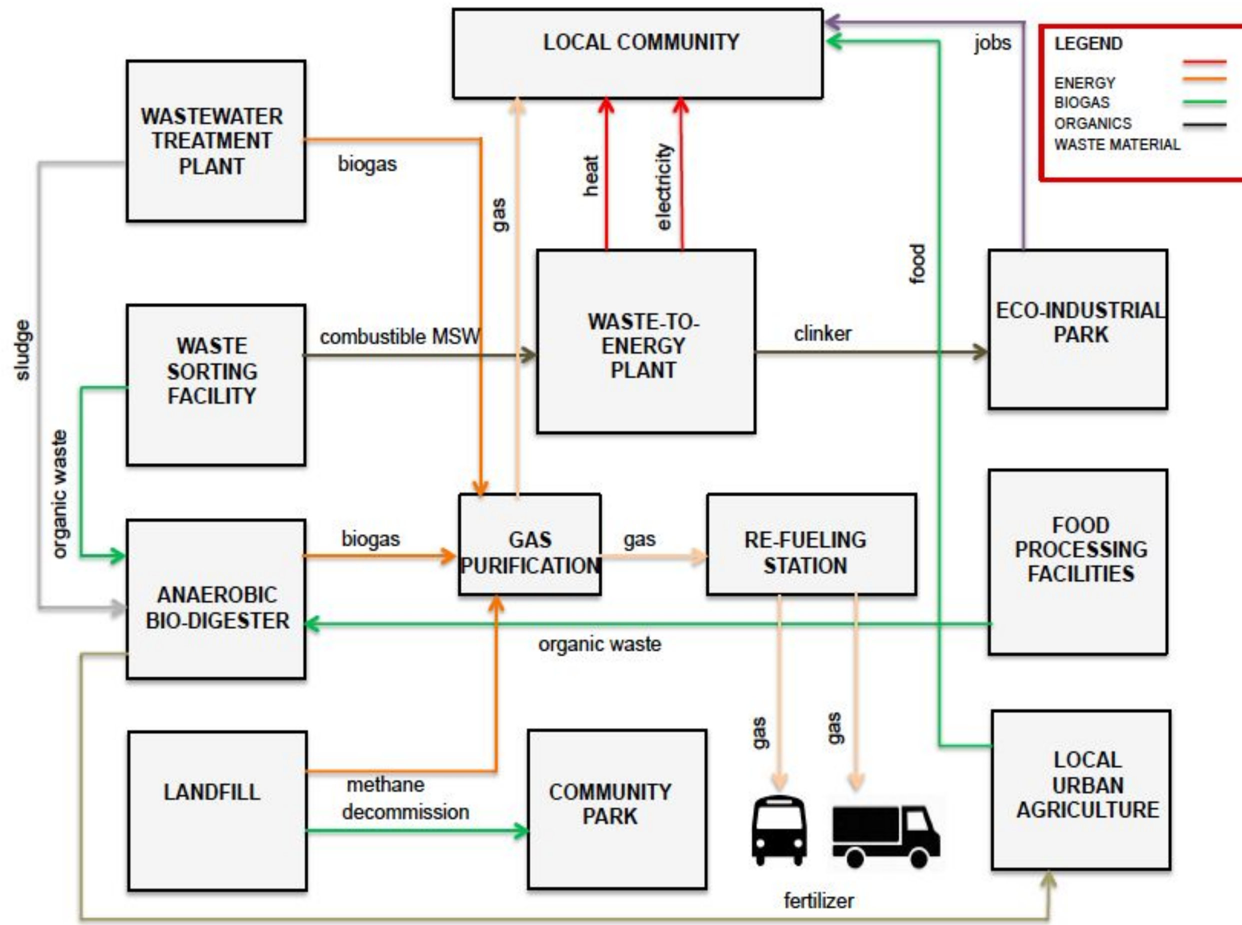
integrated and colocated urban systems

Promote beneficial exchanges across multiple sectors to:

- *reduce collective system costs*
- *improve performance*
- *reduce environmental and social impacts.*

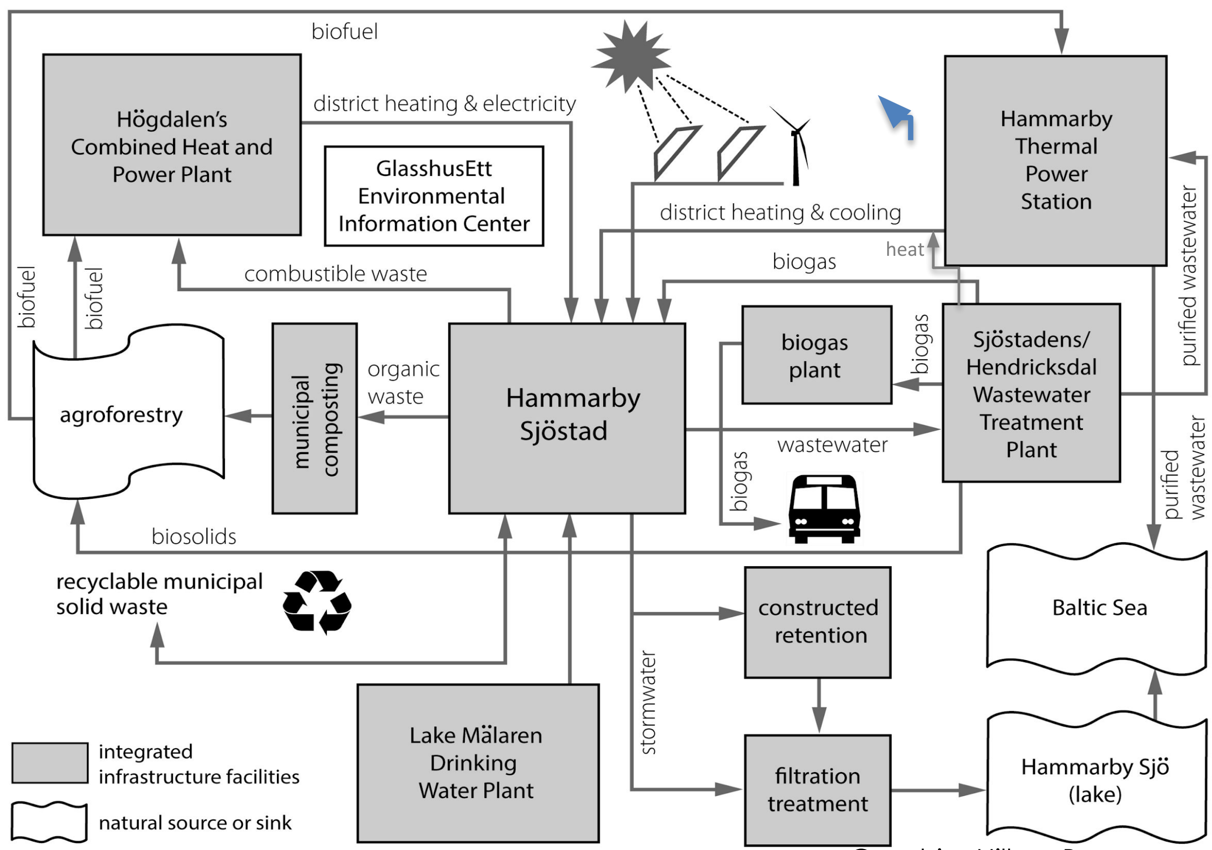
Foster synergies by:

- *proactive co-location*
- *capitalizing on adjacent or nearby land-uses, natural systems or resources*



Graphic: H. Brown

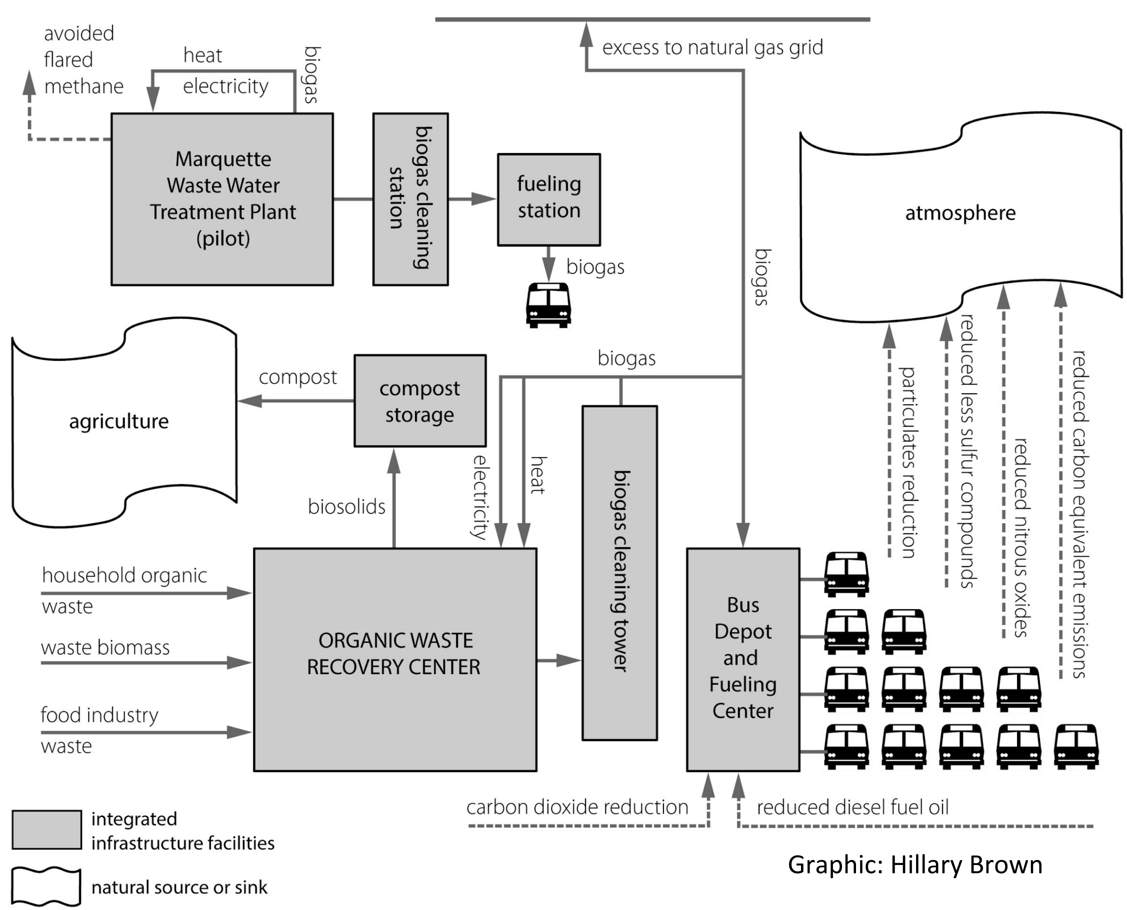
Infrastructural Commons: closed-loop cycling of energy and matter *Hammarby Sjöstad, Stockholm, Sweden*



Graphic: Hillary Brown

Energy from wastewater & waste (organic)

Lille Métropole Organic Waste Recovery and Transfer Center, Lille, France

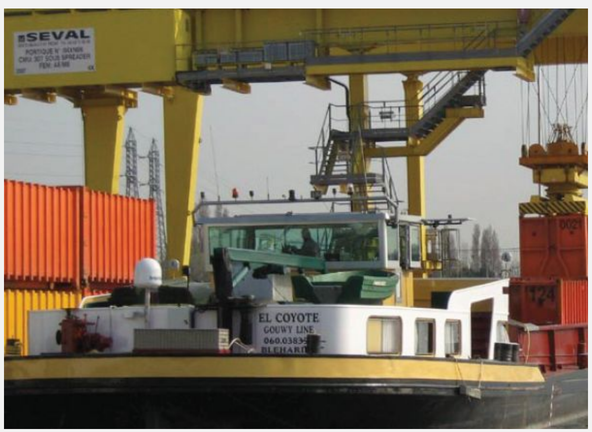


Graphic: Hillary Brown

Biogas from organic waste and wastewater + bus depot

Lille Métropole Organic Waste Recovery Center and Transfer Center, Lille, France

- Combined centralized refueling and overnight bus depot, reducing mileage traveled
- Reduced CO_2 using barges for waste transport
- Incorporated visitors center



Lille Metropole Urban Community

shared infrastructural space

urban systems as “commons”

shared use of infrastructural space - 4 water treatment plant examples




Co-locating WTE + Ecorium ("museum of garbage") + public park *Naka Waste-to- Energy Plant Hiroshima, Japan*

Images Courtesy Kensaku Nishida, Ken Mabuchi

Energy-from-waste + visitors center + recreational facility

Amager Bakke EFW plant, Copenhagen, Denmark

SWA Waste-to-Energy Facility + visitors center + water recycling facility

Solid Waste Authority, Palm Beach County, Florida

Images © Michael Singer Studio, photo: David Stansbury

Solid Waste Treatment Center + powerplant + environmental center

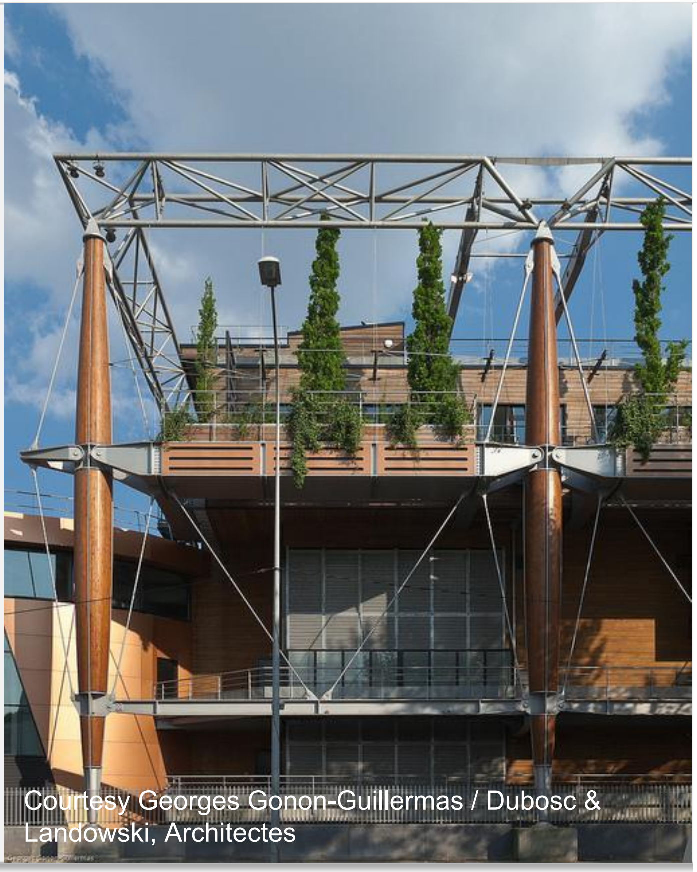
Landfill-to-Resource Recovery Center Belo Horizonte, Brazil

Recovery and regenerative processes from multiple sectors

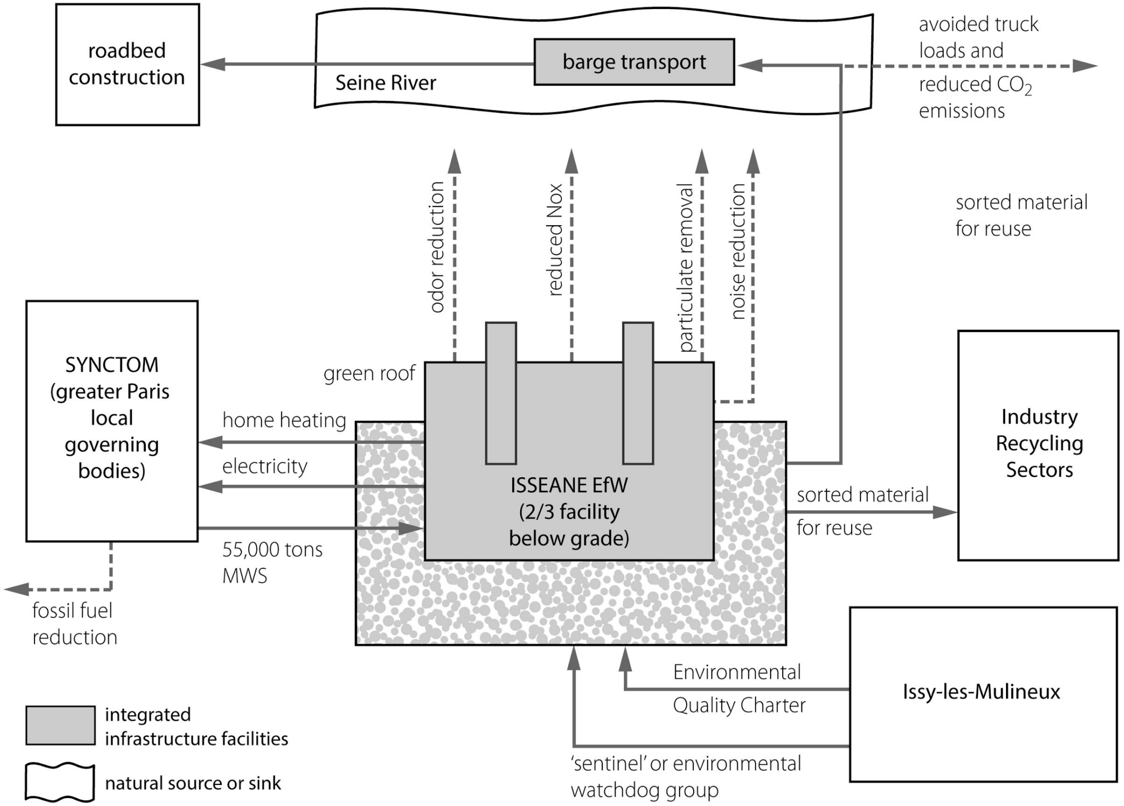
- Landfill methane recovery feeds 4.5 MW capacity power plant
- Colocated facilities include:
  - Composting plant
  - Construction waste recycling facility
  - "Seedling station"for trees and plants to sequester CO_2
  - Hazardous medical waste plant
  - Recycling tire rubber
  - Environmental Center (144,000 visitors annually
- Reduced GHG emissions by 237,473 tCO^2e/ in single year
- Gets CER credits and % of electricity sold

Energy-from-waste facility + community engagement

Isséane: Issy-les-Moulineaux, France



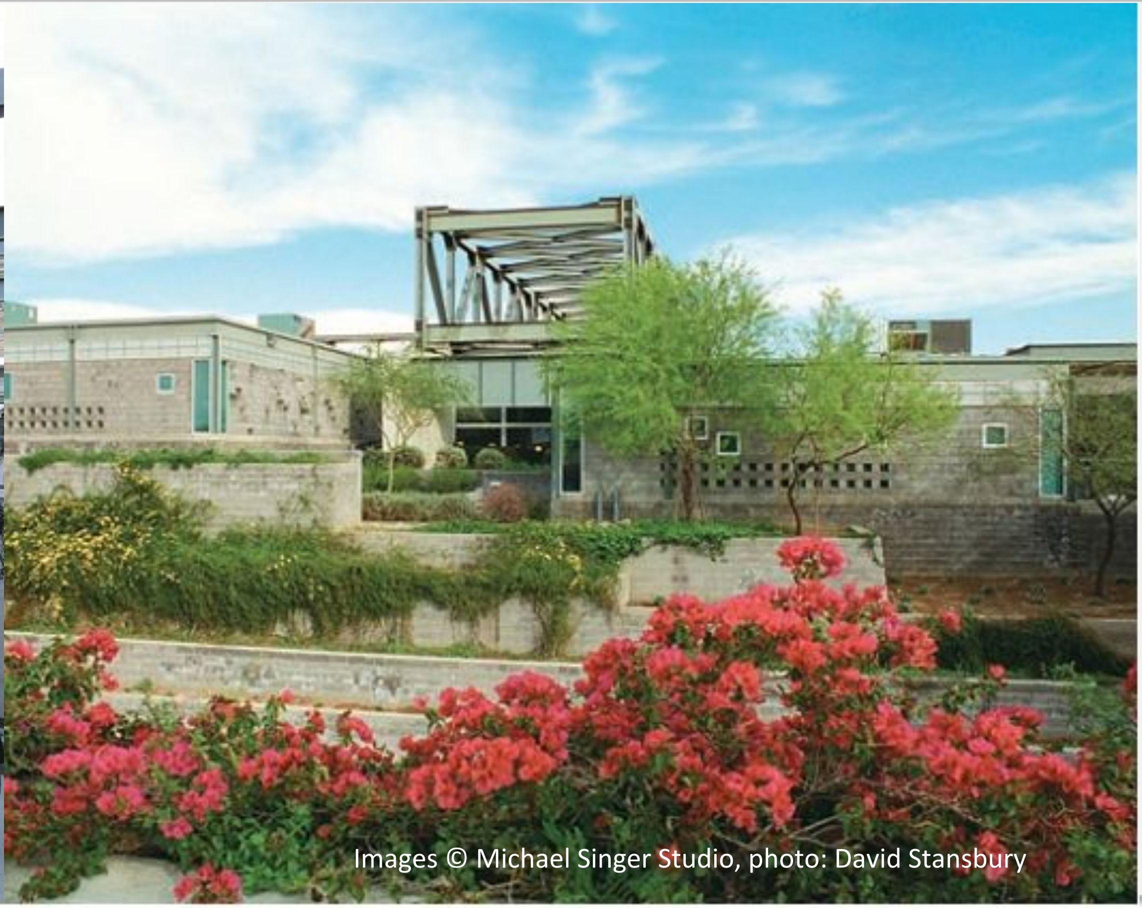
Courtesy Georges Gonon-Guillermas / Dubosc & Landowski, Architectes



Graphic: Hillary Brown

Waste transfer/ recycling center + community engagement

27th Avenue Waste Transfer Station/Recycling Center, Phoenix, Arizona



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Justification for infrastructural commons: integration and exchange and multiple use of space

Benefits/Cost savings

- (Colocation) Optimized land use $
- Synergistic cascading of waste energy, water, nutrients or other resources $
- Economies of scale $
- Eliminated redundancies in maintenance and operations $
- Reduced environmental impact/resource conservation
- Reduced construction disruption
- Community benefits
- Job creation and new tax revenue
- Increase resiliency

METRICS

SO Site optimization
ES Economies of scale
OS Operational savings
RC Resource Conservation
RE Reduced environmental impact
RD Reduced disruption
PA Public amenity /community benefit
EB Job creation/new revenue
RE Resiliency

Σ= SO + ES + OS + RC + RE + RD + PA + EB+ RE

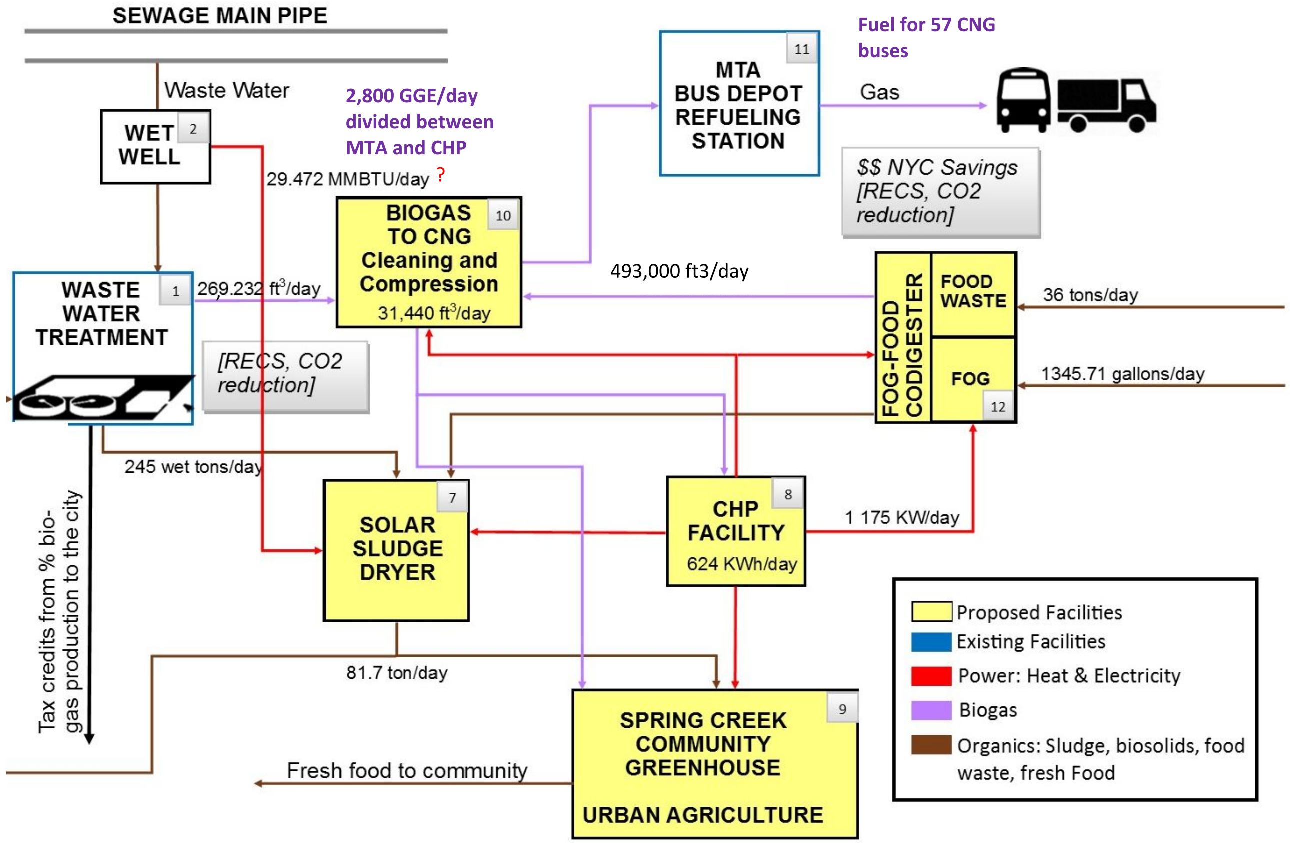
2016 study - infrastructural symbiosis

"Urban Infrastructure Commons, Spring Creek Cross-sector Synergies"

Jamaica Bay, New York

Closed-loop savings

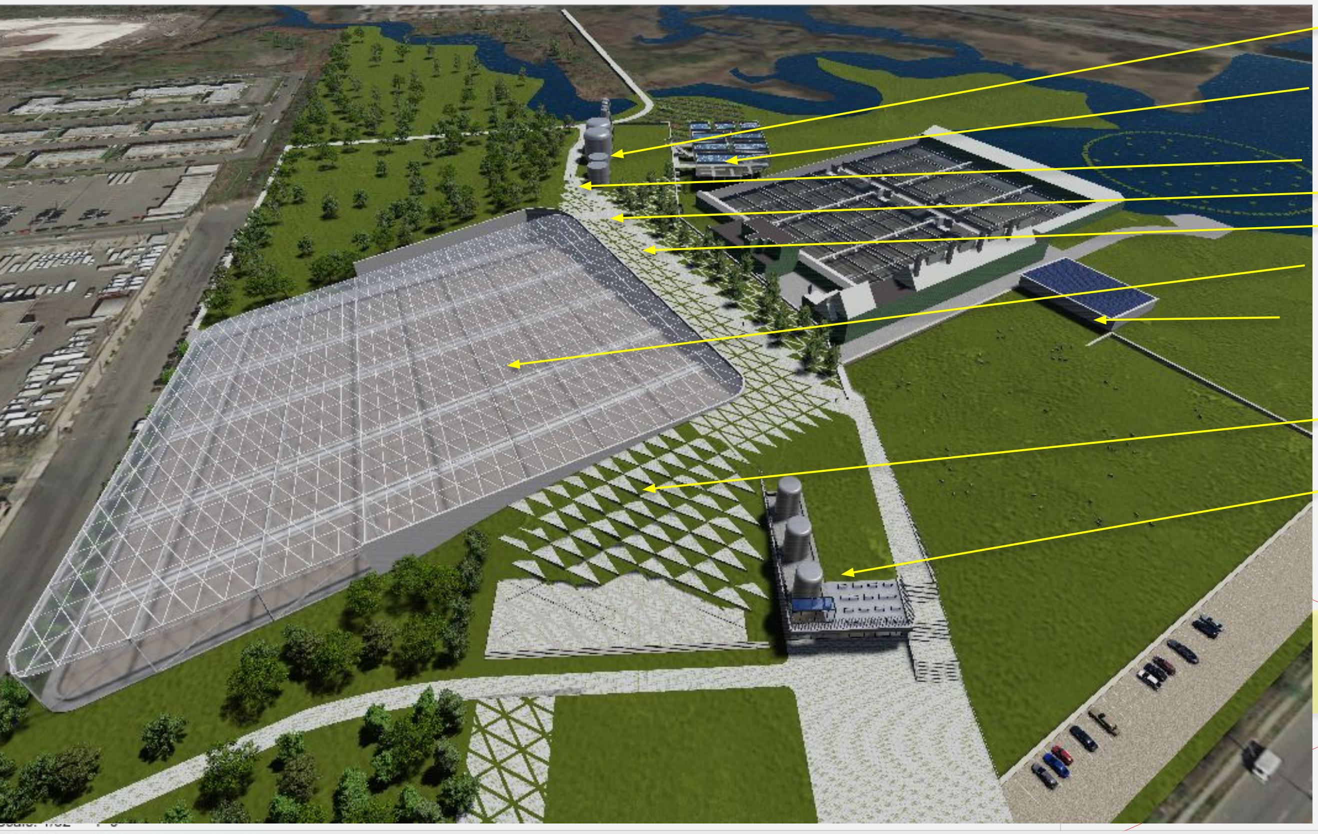
- Eliminate NYC sludge drying costs
- Beneficial use of biomethane
    - Electricity & heat production (CHP)
    - Renewable fuel for ½ MTA fleet
- Local food production

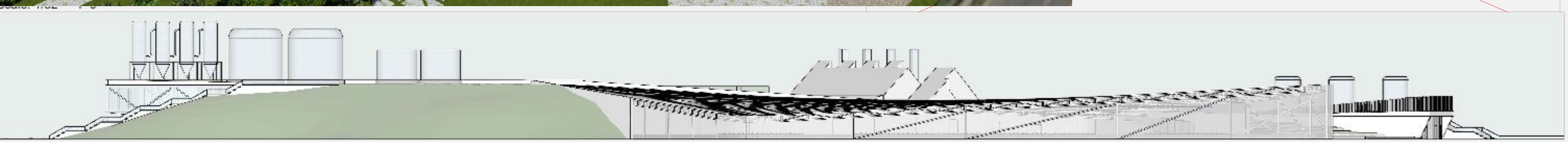


Graphic: Navarro, Yuen, Ingber

"Urban Infrastructure Commons, Spring Creek Cross-Sector Synergies"

Jamaica Bay, New York





NORTH ELEVATION
Scale: 1/32" = 1'-0"

Design: Marija Georgievska, with H. Brown

the infrastructural commons

- As planning paradigm, infrastructural commons presents great synergistic opportunities - **solves multiple problems with single integrated solutions**

- Requires commitment to to cooperate, **share space, waste**, and **work in reciprocal relationships with public or private sectors and other prospective users**

Thank you