

The background of the slide features a large, faint watermark of the Rutgers University seal. The seal is circular with a sunburst design in the center and the text "RUTGERS UNIVERSITY" around the perimeter. The entire slide has a solid red background.

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New Jersey Agricultural
Experiment Station

Food Waste Recycling Opportunities for Municipalities

Priscilla Hayes, Solid Waste Resource Renewal
Group

Solid Waste Resource Renewal Group (SWRRG) at Rutgers New Jersey Agricultural Experiment Station

- SWRRG, begun in 1997 in response to stakeholder requests for assistance with New Jersey's solid waste issues, is a non-governmental organization hosted by Rutgers NJAES.
- SWRRG works to find solutions for managing and reducing our solid waste to preserve natural resources so that our children and their children will not face shortages which will threaten their quality of life.
- One of our initial major constituent-driven project areas, and now our primary focus, is food and organics waste recycling. SWRRG has become a recognized state and national expert in the field, working in New Jersey to bring together necessary elements of a model successful food waste recycling program.

Creating a New Local Industry

- Food waste can be used to make fuel, energy, soil amendments or fertilizers
- All of these can be used as substitutes for products made from oil
- As oil gets scarcer and more costly, using food waste will keep the cost of living down

Statewide Food Waste Initiative

- SWRRG is working to bring together the following identified necessary elements for a local industry using food waste:
 - Successful companies using economically and environmentally sound technologies for converting food waste/other organic wastes to bioproducts.
 - Haulers who will make the commitment to food waste collection routes.
 - Investors/members of the financial community who will support food waste recycling companies.
 - Generators who will commit to sending waste to food waste recycling facilities.
 - Governmental entities which will provide incentive programs and collaborations with both recyclers and generators to encourage both the development of a recycling industry and to encourage investors to invest in such an industry.
 - Governmental entities which will work with each other and internally, within each entity, to coordinate and streamline permits and regulations for food waste recycling operations.
 - An educated and active community of stakeholders from all the subcommunities.

Food Waste Recycling, A Part of Sustainability

- Environment: reduces methane production—72 times more potent than carbon dioxide
- Economy:
 - Saves money for waste generators
 - New industry creating sustainable substitutes for petroleum based products
- Equity: intergenerational equity—we conserve resources rather than stealing from our children
- LEED makes recycling a prerequisite to all certification levels

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ASSESSMENT OF BIOMASS ENERGY POTENTIAL IN NEW JERSEY



Prepared for: The New Jersey Board of Public Utilities

July 2007

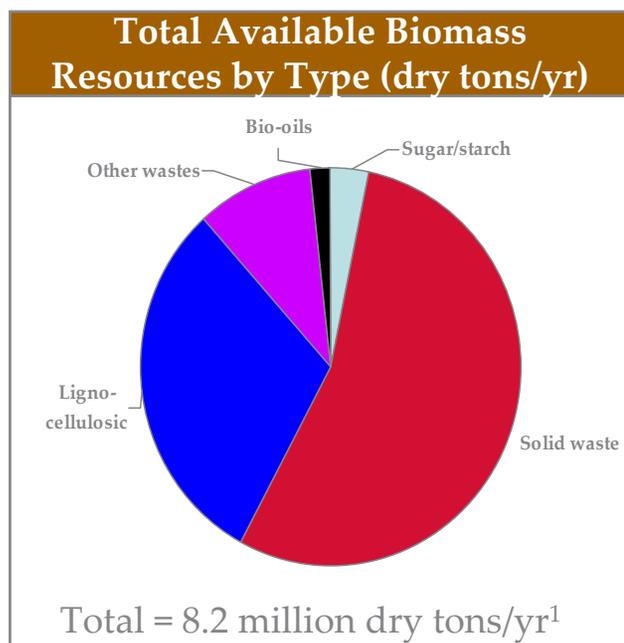
Prepared by: The New Jersey Agricultural Experiment Station

NJAES Report 2007-1

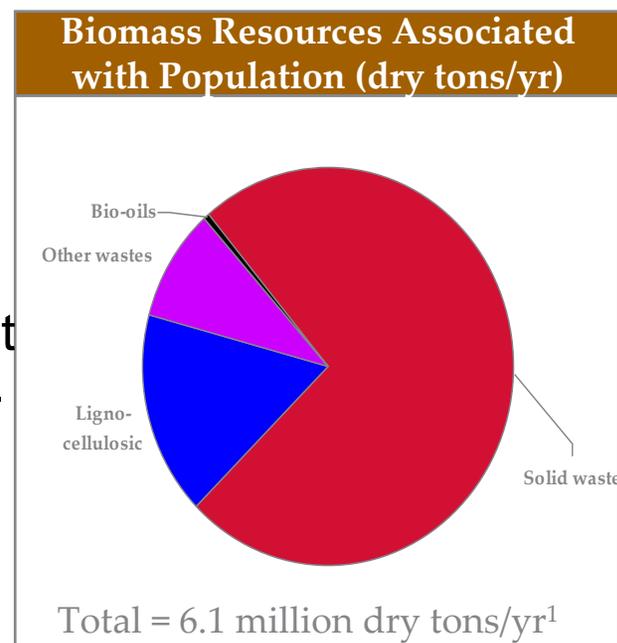
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Executive
Summary

Almost 75% of NJ's biomass resource is produced directly by the state's population, much of it in the form of municipal solid waste.

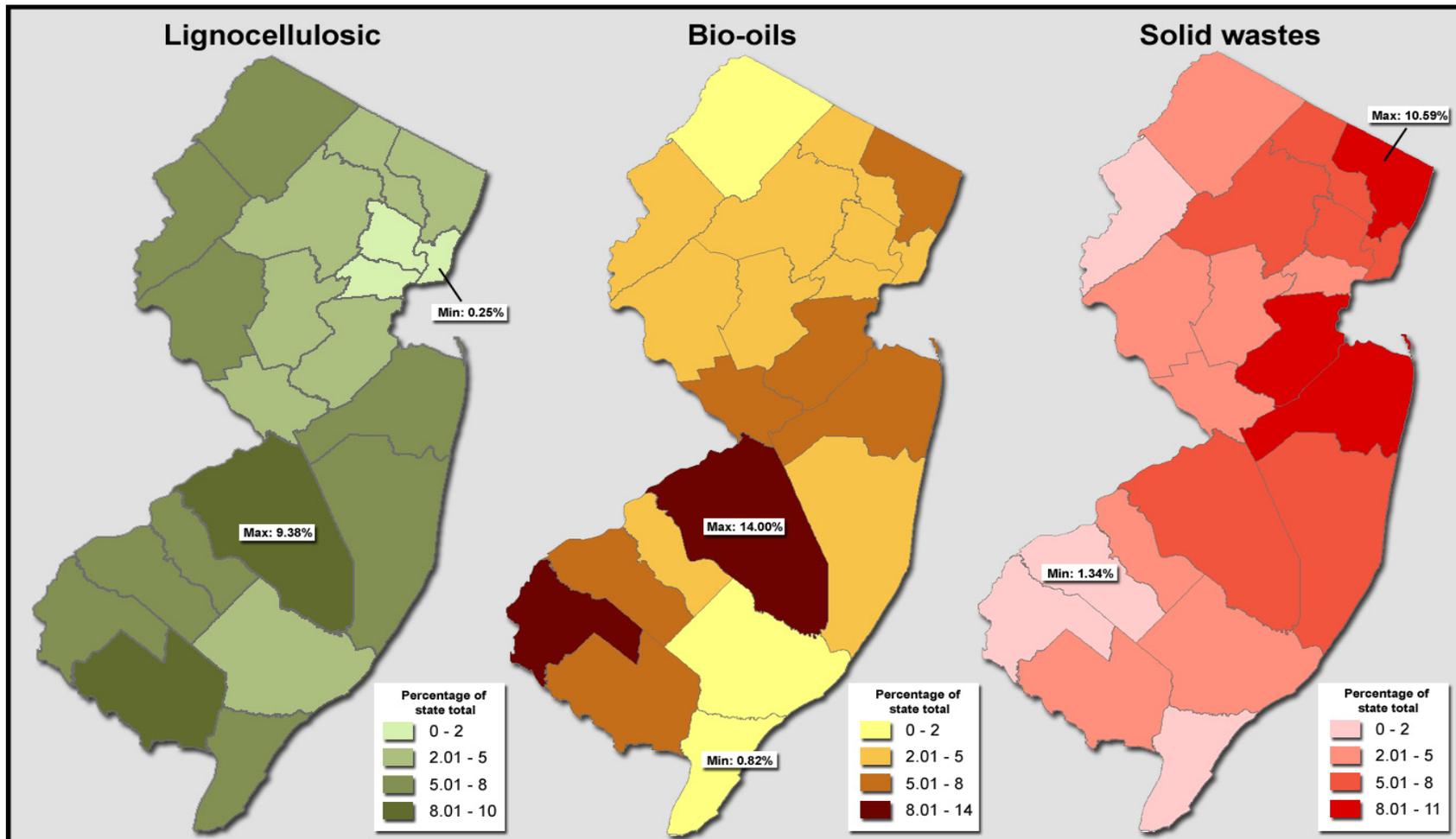


The chart on the left shows NJ's total biomass. The chart on the right shows just the population-related biomass waste stream.



1. This total includes biogas and landfill gas quantities converted to dry ton equivalents on an energy basis. Note that these are gross quantities, not taking into account differences in heat content per ton.

Biomass Resources by Feedstock Category 2007



Web Address for Bioebenergy Report

- For more information on the Bioenergy Report and Bioenergy Calculator, it is available on-line at:
njaes.rutgers.edu/bioenergy

Food and Organic Waste to Target

- Prep waste: vegetative waste, bread, eggshells—historically compostable materials
- Plate waste
- Meats, fish, other seafood, dairy products
- “Other paper”
- Yard waste: grass clippings, leaves, yard trimmings
- Manures
- Fats, oils, greases (more detail below)

Fats, Oils, and Greases

1. Yellow Grease – Directly from fryers and baking, low water content and some solids
 - Recycle to renderers
 - Biodiesel
 - Direct use in heaters
 - Anaerobic Digestion (at low levels)
2. Brown Grease – Often collected in grease trap, high water content, high solids content, sewer pipe clogger, and *smelly*
 - Co-fire in solid fuel boilers/incinerators
 - Anaerobic Digestion (at low levels)

What Do We Want to See Done with Food Waste?

- Traditionally it has been composted. We will continue to do this in enclosed or covered systems (Peninsula Compost and AgChoice). Sodexo is doing this onsite with a professor at Montclair State.
- In Summer 2008, an advanced composting system called Converted Organics will open in Woodbridge, making organic fertilizers for homes, golf courses and farms.
- TerraCycle uses already created compost to make liquid plant food.

What Do We Want to See Done with Food Waste? Part 2

- Trenton Fuel Works will use a chemical process to make vehicle fuel or cellulosic biodiesel.
- Fuel Bio is moving from making biodiesel from grown (virgin) biomass to two forms of waste oil, chicken fat and waste vegetable oil.
- We want to attract some anaerobic digesters into the state to make truck fuel or gas to heat and power buildings. We are particularly working with Kompogas, which has an emphasis on digesters sized to serve one or more municipalities, providing fuel for e.g. municipal fleets.
- We are also working with a new company, Lifecycle Renewables, on a facility sized generator which would utilize filtered waste vegetable oil.

Amounts of Food Waste

- Most of what a supermarket generates
- San Francisco shows that it is about 38% of school waste—but East Brunswick shows it is about 90% of the waste left over after you take out paper and bottles and cans
- Princeton Restaurant Waste Audit showed about three fifths of a pound of waste per guest per meal
- Los Angeles found that 75 to 80% of a restaurant's waste was food waste and things like food soiled paper which could be recycled
- For restaurants, food waste recycling offers the opportunity to send the heaviest and wettest and most odorous parts of the waste stream to options which will be cheaper than disposal

Opportunity to Choose Containers



Generators are Crucial to the New Industry

- New Jersey will have facilities requiring substantial financial investment
- A significant amount of the return on investment must come from the per ton fees which generators pay to the recyclers
- To induce generators to sign on, they must be presented with both lower per ton tipping costs, and hauling costs which are either lower than or equal to current hauling costs.
- Offering generators the lower costs they need in order to sign on requires development of compact hauling routes (unless the generator has enough volume of waste to sustain a route by itself), assistance in choosing containers for various waste streams and collection frequencies thereof, assistance in effective hauling contract management.
- Municipal support to generators and facilities can make the difference.

Northampton Massachusetts had Multiple Small Restaurants/Eateries/Food Stores

- Northampton used municipal sites to construct joint waste and recycling sheds for neighboring businesses, including both food waste generating and other businesses
- This was beneficial to both generators and haulers
 - Generators were assured ample space for all kinds of recyclables
 - They got the benefit of a lower price, because of the single pick up from a shared facility
 - Haulers did not have to go from business to business, but could pick everything up at a single site

Shared Recycling Shed



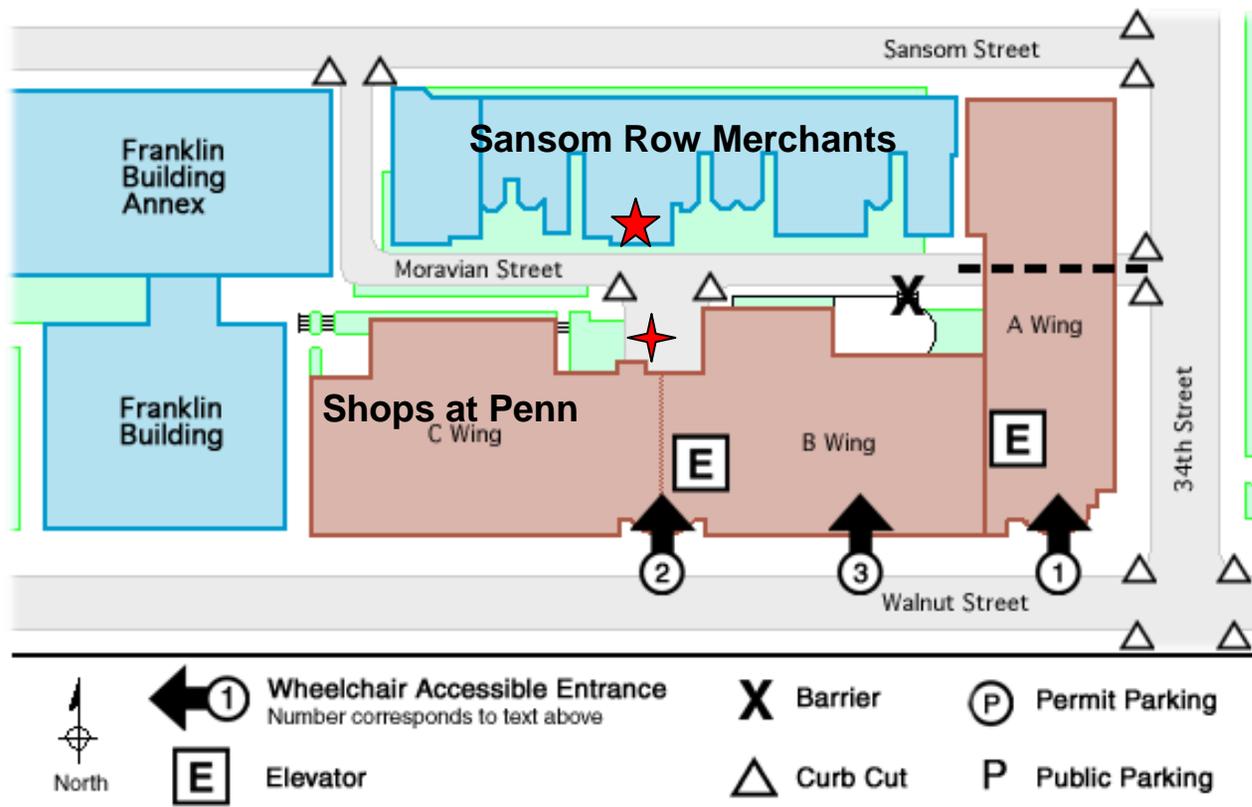
Power to Use Waste as a Resource Equals Satisfaction



Moravian Court, Philadelphia

- In Philadelphia, University of Penn owns buildings with restaurants and other businesses.
- Used joint property to house waste containers and two food waste composters. Compost goes to a local garden, from which one of the restaurants buys produce.
- Asked the contractors to bid on each business separately and also on the whole group—this allowed Penn to calculate how to charge each of the different businesses under the joint contract.

Shops at Penn/Sansom Row Merchants



★ = White Dog Cafe

★ = Recycling/Compost Facility

Waste Disposal: Untouchable Vert-I-Pack Compactor



- Developed for use in the alleys of Chicago
- Ratio, loose to compacted: four dumpsters to one

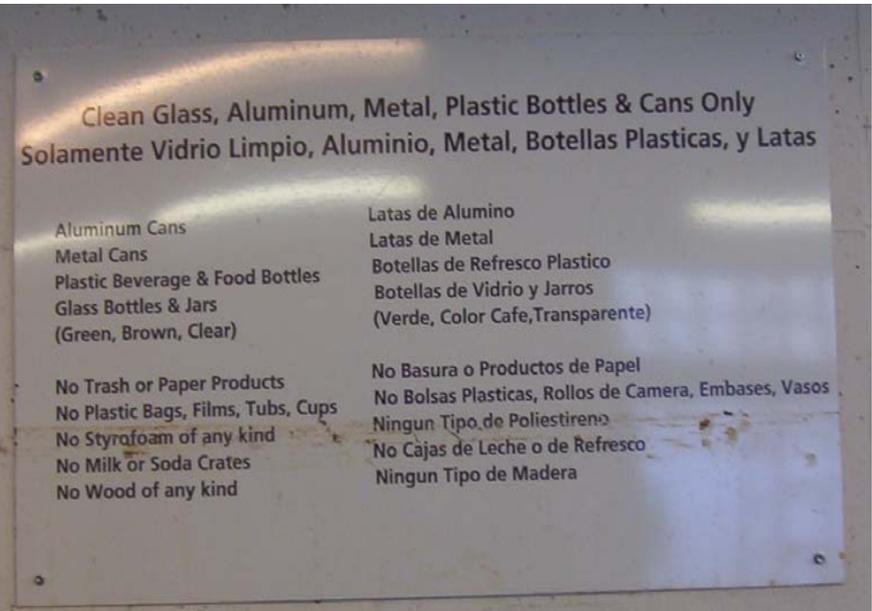
Waste Fryer Oil Enclosure



Waste Fryer Oil Collection System



Commingled Recyclables: Dumpsters



Mixed Paper: Dumpsters



Earth Tub In-Vessel Composting System



Natural Gas—Cleaner Energy than Diesel Fuel

- INFORM, Inc., found that natural gas trucks are significantly cleaner and quieter than comparable diesel vehicles
 - Particulate matter alone can be reduced 67 to 94 % by shifting to natural gas vehicles
 - Nitrogen oxides and non-methane hydrocarbons can be reduced from 32 to 73 % and from 69 to 83 % respectively

Hamilton Township Model

- Hamilton had already begun a green initiative
- Biodiesel at B20 is used in all municipal diesel vehicles, including school board vehicles, fire engines, and trucks
- Bought a GMC Sierra which could run on gas or compressed natural gas (CNG); bought 3 or 4 police CNG only vehicles at the state auction. Entered a fueling agreement with the NJ Department of Transportation, which has a local fueling station.
- Hamilton has 16 vehicles in the fleet that are capable of running on E85. That number should increase to over 30 by the end of 2008. They are upgrading our 30 year old fuel dispensing system at Public Works to be able to store E85. This effort should be completed sometime in 2008. They will be the first town in the state to provide E85 to its fleet.

Hamilton—Going Beyond Municipal Vehicles

- Solid Waste Collection and Disposal Contract modified to require that clean fuel technologies be used on all collection vehicles (e.g. garbage trucks).
- Broke the 40 square mile town into three zones, and broke down items of service for each zone.
- Four haulers bid on the contract, each of them successful on one or more items/zones. All vendors will be using CNG in trucks.
- Central Jersey waste has the bulk of the services, including curbside residential recycling.
- All vendors have until July 1, 2009 to begin using the CNG trucks.
- Bid prices were not significantly higher; curbside recycling was only 6% more than the last contract.

Next Steps in Cleaner Truck Fuel

- Food waste can be converted to methane via an anaerobic digester; the methane can then be converted to liquid natural gas for use in trucks designed to run on that fuel
- Kompogas has a model which involves partnering with a municipality/group of municipalities as follows:
 - The parties agree on building an anaerobic digester
 - The municipality helps direct feedstock, especially food waste, to the facility
 - The municipality can enter into a contract for vehicle fuel from the digester
- Some municipalities or corporations have agreements to buy methane from landfills
 - EcoComplex had a pilot project which used methane, converted to natural gas, to power two garbage trucks—very convenient, since the vehicles refueled after they dumped their loads, and did not have to drive long distances for fuel.
 - Johnson and Johnson uses landfill gas for power at one of its facilities (not in New Jersey).

School Food Waste Recycling

- Joe Butrica of East Brunswick is completing planning of a food waste recycling route for all of the 11 schools in his municipality
- At schools which have a good rate of recycling for the traditional items (bottles and cans, office paper, cardboard), his waste audit showed that about 90% of the remaining waste was food waste from the cafeteria.
- This will allow him to get rid of all his 6 and 8 yard dumpsters and replace them with wheeled carts for all commodities.
- Minimal numbers of carts will be needed for trash; trash will go from three days a week pick up to one day a week.
- Food waste will be picked up either two or three times a week.
- Other recyclables will be picked up once a week.

School Food Waste Recycling, Continued

- Butrica is expecting major savings, since his total costs per ton of trash are currently \$114, and could go to \$120.
- Food waste will cost about \$62 per ton
- Cost may depend somewhat on how many times food waste is picked up per week

Seattle: Residential Collection of Food Waste

- Seattle supplies 96-gallon carts for mixing compostable yard waste, all food waste other than meat, fish, and dairy, and “food-soiled paper,” which includes paper towels/napkins, paper food wrap, uncoated paper plates and cups, shredded paper, paper bags, greasy pizza boxes.
- Meat/fish/dairy are excluded because the material will be composted outdoors; if the waste went to an energy plant, these items would most likely be acceptable.
- They maintain a website which includes suggestions for ways to store food scraps in the kitchen, and locations to get compostable bags.
- Extra yard waste only may be set out in extra containers; the homeowner pays for anything beyond one additional container. This would accommodate leaf season.

San Francisco: Mixed Residential and Commercial Collection of Food Waste

- More than 1800 San Francisco restaurants/food related businesses are sending food waste and yard trimmings to be composted
- In addition, homeowners are also recycling these materials
- In this program, more materials may be composted than in Seattle: includes meat, fish, bones, along with paper milk cartons and all paper plates, wooden crates and sawdust.
- SF provides green carts for collection; if the carts are lined to keep them clean, a compostable liner must be used.

Possible Funding for Supporting Recycling

- Bayshore Recycling pays voluntary, per-ton, host benefit fees to Woodbridge Township
- Converted Organics, new aerobic digestion facility at Bayshore, will pay such fees, also
- Woodbridge Township enacted a buy recycled ordinance which encourages use of recycled material such as that from Bayshore
- Costs of enacting such ordinances or other support to recycling businesses within municipality can be offset by the host benefit fees, rather than taxpayer money

