Solid Waste Management Practices in the Caribbean and the Potential for Reducing Landfill and Ocean Disposal of Waste by Employing Waste to Energy Technologies.

Interim report covering the Leeward Islands and southern Bahamas

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I. Summary

Solid Waste Management is a critical part of finding sustainable solutions that will enable us to maintain a reasonable quality of life into the future. We cannot continue to consume the vast amount of resources we have in the past, nor pollute the ground, air and ocean with them. Inspired by a firsthand immersion in the "Pacific Garbage Patch" the Caribbean Plastic Project was established to find out how plastic is entering the ocean and second to determine the feasibility of operating a mobile plastic to energy system that could travel from island to island converting stockpiled plastic and perhaps other waste to energy or fuel.

A few generalizations can be made at this point. All of the Solid Waste Management departments are underfunded. Some do not even have the funds to buy a chipper or own their own bulldozer. That said, every manager I met was both dedicated and skilled at their task. Many were highly educated and came from higher paying occupations. Part of the funding issue is the result of governments not prioritizing solid waste management.

We did not see any evidence of plastic that had been deposited in a trash can ending up in the ocean with the possible exception of a few plastic bags being blown from trucks and from the landfills or dumps. Plastic in the oceans is coming from litter thrown on the

ground, on the beach or off of boats. We saw tremendous amounts of litter on roadsides and in creeks and drainage canals.

All of the islands have issues with landfill capacity. All of the solid waste managers were interested in anything that would reduce the volume of material going to the landfill. None of them have funding that would pay for a waste to energy system. Any system would have to be built with outside capital and operated independently. It would offer its services to the island for a fee. However, that fee would be limited by the cost to the island for disposing of its waste in the present manner. With the exception of a few populous islands, that cost is quite low since the waste is dumped or burned often with no more expense than a rented bulldozer to consolidate or bury the material as needed.

II. Plastic in the Ocean

On our travels to date, it is clear that the plastic in the ocean and on the beaches does not originate from the island waste management systems no matter how inadequate they may be from other perspectives. What is picked up in the garbage trucks and hauled to the dump or landfill generally stays there. There may be a few plastic bags that blow out of the landfill and make it to the ocean, but the scrub and trees growing around most landfills seem to catch most of the stray bags. There may be some contamination of both subsurface water and ocean water from leachate in the unlined landfills but that is outside the scope of this investigation.

Littering is a problem in the islands. There is a campaign in every island to educate people about trash and littering, but roadsides are still dotted with plastic bottles and occasionally larger items. This is in spite of free or minimal fees for trash collection services. Most of the islands have some provision for disposing of larger items for free (appliances and automobiles). Many have daily street clean up services and in one case made a deliberate choice to pay for daily street clean up rather than put out bins for trash. It seems that private contractors hired to remove trash from hotels used the bins to avoid paying the small tipping fees charged by the landfill. The cost to the government of hauling the bins and cleaning up the overflow around them was greater than cleaning up the streets each morning.

Rain on the islands is occasionally heavy and every town we visited had concrete or rock walled creek beds that were littered with bottles and plastic bags ready to be washed to the ocean with the next good rain. Another local source of plastic in the ocean is beach littering. The organizations responsible for beach clean up on two of the islands estimated that roughly 80% of the litter they pick up is left by picnickers.

On the other hand, we visited beaches on the windward side of several islands and found a lot of litter consisting mostly of plastic bottles with some fishing floats and nets. One beach in particular on St Kitts provides an interesting example because the beach is monitored and cleaned on a regular basis by the St Kitts Turtle Monitoring Network. The debris on the beach when we visited on January 20 had accumulated since the last clean up on November 21.

Photo 1: Beach on East coast of St. Kitts Showing two months accumulation of debris.

Most of the plastic was weathered and in some cases covered with growth indicating that it had been in the ocean for some time and did not originate locally. In attempting to identify the source of the plastic I was able to read labels on a few of the bottles. About a third were French and a half English with a few Spanish and an occasional one from another region, a water bottle from Singapore for instance. Based on the prevailing current which flows from the Southeast, it is reasonable to conclude that much of the trash on the beaches in the Leeward Islands comes from the islands farther south, and even the coast of Venezuela. The remainder either originates in Europe or from ships. It is difficult to quantify any of this. The only criterion I have is the amount of deterioration shown on the bottle and the amount of growth on it. Based on that, I would guess that much of the debris had been in the water less than 3 months. It should also be noted that most of the debris had not been crushed or damaged as would be the case if it had been processed with a compactor truck or put in a landfill, or processed through a compactor on a ship.

It should be mentioned here that it is illegal to dump any plastic overboard at sea. In the past cruise ships were blamed fairly or unfairly for much of the floating waste. My impression on this trip is that most of them obey the law.

I discussed the issue with several sailors coming from farther south. They concurred that littering is the primary source of oceanic plastic. On the other hand one couple mentioned that they had witnessed the employees of a high end hotel take trash including a bin of spent aerosol cans out to sea in a launch and dump it less than two miles offshore. Venezuela was also mentioned as a source of trash especially among the fishermen who throw all their trash overboard including motor oil containers. In fact we found a number of gallon motor oil bottles with Spanish markings on the beach in Nevis.

Assuming that most of the plastic enters the ocean by littering or casual dumping by individuals, what is to be done? With the notable exception of Antigua and St Barts, recycling is almost nonexistent in the Caribbean, but the lack of a recycling program cannot be blamed for all the debris. In fact on some of the islands that did have an effective recycling program, littering was just as severe as on ones that did not. Every island we visited had an active educational program to deal with the litter. In time that will have some effect. One representative of the local beach cleanup program said they felt educating the children was the only effective way of dealing with littering. The adults were accustomed to discarding trash wherever most convenient and changing the habit was difficult.

Many mentioned the need for financial incentives to reduce litter. Since each island has control of all goods landing on its shores, it would be possible to establish a fee for each item that will end up as trash. A deposit of 10 to 15 cents per bottle could eliminate most of the litter. If the fee was imposed by the government at the time of import, the government could make a profit since not all containers would be returned to redeem the deposit. For instance, the Oregon bottle bill with a deposit of only five cents reduced the portion of roadside litter that was bottles from 40% to 6% with a return rate varying between 80% and 94%. Even with such high return rates, the annual revenue generated from non returns is over $12 million[i]. St. Kitts and Antigua have bottling plants on them which only switched to plastic bottles in the last 2 years, so the habit of saving bottles and returning them for credit is well established historically and could be revived.

To make such a system work, however, there would need to be a method for disposing of the returned plastic bottles. Recycling would be the most sustainable solution, but if that is not practical, the waste to fuel system would be a good interim solution.

III. Trawl Data

Four trawls were made between islands. A manta trawl with a 500 micron mesh was used. The opening was 60 cm wide and 15 cm deep. The trawls were all made at between two and three knots for periods between 30 minutes and 45 minutes. Two of the trawls collected measurable amounts of plastic. Trawl #4 made north of the Dominican Republic captured 10 plastic fragments with a total weight of less than 2 grams. It was made in the vicinity of large agglomerations of Sargassum weed and as a result a lot of weed was picked up. It appears that the same currents that concentrate the weed also concentrate the plastic, and may give some of the particles a means of staying afloat after their initial buoyancy is lost. For example several large plastic objects and bottles were spotted riding on the top of the weed mats. Also taken in the same trawl were several fragments of white plastic such as used in grocery bags. Though these were brittle, they indicate that the plastic had not been exposed to the sun for an extended period of time or the pieces would not have been identifiable. The data indicates that while degraded plastic fragments are almost ubiquitous, the concentrations are far less than other researchers have found in the center of the gyres.[ii]

IV. Recycling and Waste to Energy

Reducing litter does not solve the problem of how to recycle the plastic, but it would keep it out of the ocean. The concept of turning the plastic into diesel fuel is appealing, especially on an island with no local market for recycled plastic. All of the managers expressed an interest in such a technology if it was affordable. One problem with the use of pyrolysis is that the bulk of plastic on the islands is PET bottles. Most of the technologies currently available do not accommodate PET efficiently. One of the most versatile systems is only able to convert roughly 60% of PET to fuel and the rest settles out of the system as sludge. New technologies are being developed and may solve this problem. On the other hand, PET is easily recycled and if there was an effective way of removing PET from the waste stream it could be recycled.

So an optimal solution would involve separation of trash to convert some to energy and recycle other components. It should be obvious that the more sustainable solution is to reuse or at least recycle as much material as possible. The most efficient use of resources would be achieved by using refillable bottles. Failing that the plastic from which the bottles are made would be reused to make new bottles and cycled multiple times. Unfortunately, very little of the PET and HDPE that is recycled ends up being reused to make new bottles. Instead it is used to make fabric, substitutes for wood decking and other products that are not recycled further. Because plastic does not get reused multiple times, the choice to convert it to fuel, which in effect is also a second and final use, is not as environmentally

distasteful as it would be if plastic could be molded back into bottles multiple times. Still this should be seen as an interim solution since it would not be sustainable in the long term.

Other aspects of the project,

At each stop there was a lot of interest in any system that would decrease the load on the landfills which in every case were either nearing capacity or already beyond designed capacity. Most of the islands do not have funding to purchase waste-to-energy equipment themselves and would require some outside assistance to make more than minimal payments toward a trash conversion system. If a mobile system can be built it would need to be operated by an independent contractor offering turnkey services to the island and delivering a finished product.

There are several issues to be considered.

PET. The largest component of plastic waste consists of water and drink bottles which are made of PET. If they were to be separated it would take time to establish an effective recycling program on the island; even then there will be some PET in the waste stream.

Car tires. If there was a way to convert them, it would be highly desirable. Every island we visited had problems with tires and listed them among the top items to be removed from the waste stream. Interim solutions do not seem to be working. Nevis purchased a tire bailer with the promise of sending the tires to Guadeloupe to be ground and used in road construction, but once the bailer was acquired, the market disappeared. St. Thomas is in the process of bailing one million tires to be sent to Miami. In addition to the nuisance of tire handling, tires pose a health threat in the tropics as an excellent ground for breeding mosquitoes. Because the tires provide multilevel pockets of water, the piles have to be sprayed regularly with heavy doses of insecticide creating additional environmental hazards. Clearly we need to learn to make tires that can be recycled.

Dump on St. Kitts: Mostly plastic and cardboard

Cardboard too is a valuable material if it can be bailed and move to a market efficiently. As with PET plastic converting it to energy is a less sustainable option.

Removing PET, HDPE and cardboard from the waste stream could reduce the volume of household trash by 60% or more.

Compost. There is little or no agriculture on most of the islands, but there is interest in reestablishing at least some small scale gardening/farming enterprises. Many of the NGOs and some of the solid waste managers expressed an interest in establishing a composting operation to supply nutrients to rebuild the poor and depleted tropical soils. This could be best done best on a house by house basis, but there may be an application for municipal composting to deal with the food waste from resorts, restaurants and even cruise ships. Composting would remove another problematic element from the waste stream. What would remain would be a mixture of paper, plastic packaging, bottles, cans and a mix of unsorted items tossed into municipal garbage cans on the city streets.

Conversion of waste to fuel

The waste stream in most of the smaller islands is relatively small, especially if some of the recycling measures were put in place. Only the islands with relatively high population densities can utilize a waste-to-energy plant large enough to be cost effective. St. Thomas is installing a plant linked to its power generation system that will supply a significant portion of its electrical power from waste. Tortola in the BVI has a 40 ton/day incinerator in place and is installing a 100ton/day unit, but there is no provision for utilizing the waste heat. For the sake of comparison the plant on St. Barth consumes 35 tons/day and supplies 1/3 of the water used on the island through thermal desalinization process.

If the waste to energy system is to be self sustaining, the capital cost will have to come from third party sources. It is unlikely that much capital can be raised from the island governments themselves. Once it is operational, many island governments intimated that there would be some funds available due to the reduction in landfill requirements on the island. How much this might be is questionable since the present cost of landfill operations on most islands is small. The question then is how much of the cost can be derived from the sale of recycled materials and fuel. Fuel on the islands is high, but not out of line with fuel on the mainland. There are refineries in the Caribbean on St. Croix, Trinidad to name just two, so transportation costs are higher only because the fuel needs to be transported in small vessels capable of docking in the small and often shallow harbors.

Logistics

The location of the dump site varies from island to island. In some cases it is near a commercial port and transportation to a barge mounted converter would be efficient. In other cases the landfill is located on a more remote section of island, either inland, or on the windward side with little option for building a dock. On these islands, it will be

necessary, either to construct a transfer station near the existing harbor, or truck the recyclable materials some distance from the dump to the barge. Distances however are relative since most of the islands included in this study are on the order of 10 to 15 miles long.

Turks and Caicos and the Bahamas pose another problem in the shallow depth of the harbors and in some cases the lack of docking facility that would allow a truck to be driven to a barge. To make the system work under such conditions would require some processing on land to reduce the volume so the material can be palletized and transported by forklift truck to the barge or even a smaller cargo vessel plying the local area.

A Sampling of Islands

Antigua

Part a: Models Worth Emulating

Population	**85,632**[iii]		
Area	443 km^2		
Gross Domestic Product per person (U.S. $)	$18,100[iii]		
Recycling or Separation	Voluntary no pick up		
Domestic Solid Waste/year	100,000 tonne total	273mtn/day	3.19kg/capita/day
Recycled HDPE (shipped in 2009)	18.49 met. tonne[iv]	50.6kg/day	0.59g/cap/day
Recycled PET (shipped in 2009)	37.64 met. tonne[iv]	103kg/day	1.2g/cap/day
Total PET & HDPE collection in 2009	165,000lb	452lb/day	0.0052lb/cap/day (2.4g/cap/day)

Antigua is a hilly island with a higher population than most of the other islands visited. The standard of living is also higher which correlates with higher per capita waste. Antigua

built a sanitary landfill which became operational in 1998. Antigua is one of two islands we visited with a viable recycling operation. Antigua Barbuda Waste Recycling Company began late in 2005 and has been expanding each year. In 2009 165,000 pounds of PET and HDPE were collected which was estimated by ABWREC to be 20% of the potential recovery. Most of the material is collected through school programs. It is a remarkable achievement given the limited drop off locations and no collection service. One of the successes is finding markets for the material at a price that supports the cost of shipping. One key is hand sorting of the material which insures the purity of the material. In addition because the bottles never get into the waste stream they are free of external contamination.

Hand sorting table at recycling center. Sorted bottles in cages behind

ABWREC is now recycling other materials as this list of exports in 2009 demonstrates.[ii]

No. Of Containers	Date	Quantity	Material	Country Exported To
1	08TH May, 2009	25.15 metric tonnes	Lead Acid batteries	Trinidad
2	16th June, 2009	19.21 metric tonnes	PET Plastics	China
3	22nd June, 2009	18.43 metric tonnes	PET Plastics	China
4	13th July, 2009	10.03 metric tonnes	Aluminum cans	South Korea
5	08th October, 2009	18.49 metric tonnes	HDPE Plastics	India
6	16th November, 2009	18.25 metric tonnes	Scrap Metals	Hong Kong
7	30th November, 2009	24.27 metric tonnes	Lead Acid batteries	Thailand

St. Barthelemy (St. Barts)

Population (2009)	7,448[v]		
Area	21km^2		
Gross Domestic Product per person(est. 2009)	$12,200 U.S.[v]		
Domestic solid waste	11,388 tonne/y[vi]	31tonne/day	4.9kg/cap/d
Toxic waste from scrubber shipped to France	40 tonne/y[vi]		

Each island has its own success story. Each is able to collect the trash generated and deposit it at a site that can hold it and keep it off the streets and out of the ocean. Beyond that, Antigua and St. Barts stand out. St. Barts has both a recycling program and a waste to energy system that is successful. All household trash is sorted at the point of origin into two categories, containers – including bottles, aluminum cans and steel cans- and everything else. This is further separated at the Solid Waste Facility into steel, aluminum, glass and plastic. Plastic is sent to Guadeloupe, metals to off island manufacturers, glass is

Photo 2: Incinerator core, St. Barts

Photo 3: Glass, plastic and metals are separated

crushed and mixed with sand to make cement products.

The remaining trash which includes some metals, plastics, household waste, tires, and tree trimmings is chopped into pieces about 2 feet long and is then fed into an incinerator. The combustion chamber is a nearly horizontal cylinder mounted so that it can rotate on its longitudinal axis which keeps the trash agitated and moving slowly down the cylinder. Heat from the exhaust is channeled through a boiler and produces steam at 130 C. The steam is used to heat water in the desalination plant. The plant processes 1,300 kilograms/ hour and produces 1,350m^3 of fresh water per day, which is 1/3 of the drinking water required for the island. It was the only waste-to-energy system on the islands we visited and appeared to be well run and emitted no visible smoke. The use of the heat to desalinate water seems like an obvious solution to the need for fresh water on an island with no native source of energy.

The downside of the operation is the cost of shipping and processing the toxic material collected by the scrubber. Pollution control systems account for 40% of the budget. In the case of St. Barts it is shipped back to France and processed or disposed of there.

One potential issue that came to light in St. Barts is the lack of information on the downstream treatment of its exported materials. The Solid Waste Management staff did not know what happens to the toxic materials that are sent to France or for that matter the plastic that is sent to Guadeloupe. It is not clear if the mixture of plastic that is bailed and sent to Guadeloupe can be effectively separated by hand or machine, cleaned up and used for other products.

Part b: The Middle Path

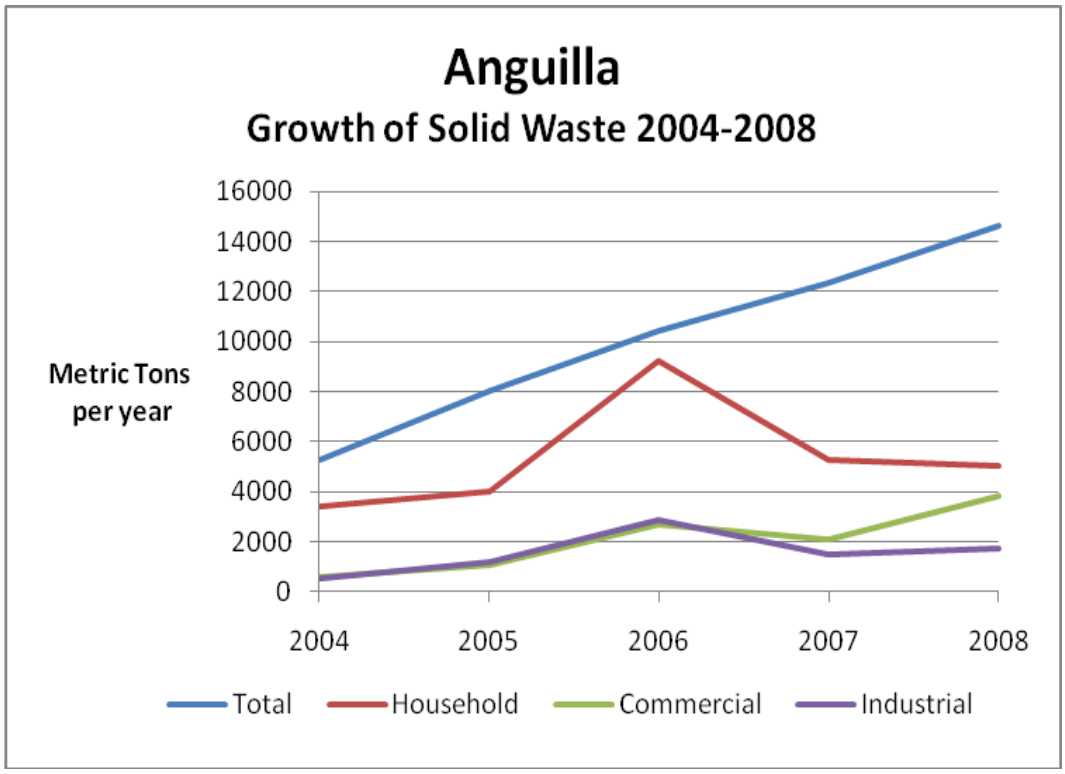
Anguilla

Population	**14,436**[vii]		
Area	91km^2		
Gross Domestic Product per person(est 2009)	$12,200[vii] U.S.		
Household solid waste 2008	5,038tonne^3[viii]	13.8 tonne/day	0.96kg/cap/day
Green solid waste 2008	4,001 tonne[viii]	11 tonne/d	0.76kg/cap/day
Commercial solid waste 2008	3,852tonne[viii]	10.5tonne/d	0.73kg/cap/day
Industrial solid waste 2008	1,764tonne[viii]	4.8tonne/d	0.33kg/cap/day
Total waste stream 2008	14,655 tonne	40.1tonne/d	2.8kg/cap/day

Note on data: The table is derived from figures published by the Anguillan government, but since the dump is open and there is no scale, the figures are estimates based truckload volume.

Anguilla is a low sandy island with relatively large population. The dump is open, but well ordered. Cover material is obtained by crushing the limestone (marl) to make coarse gravel resulting in cover material that allows water to flow through easily. The dump is unlined, and while there is some separation of green waste, scrap metal, oil and medical waste, everything ends in the dump. There is some use of groundwater on the island and apparently there is little or no testing to see if the leachate from the dump is affecting the groundwater.

The following graph illustrates another problem faced by all of the islands. The amount of material taken to the dump has increased by just under 300% in the 5 years for which the data is published. This is in part due to the increase in affluence, the increase in tourism, and the increased use of plastic. The local bottling companies on all of the islands have switched from reusable glass bottles to plastic in the last 4 years increasing the plastic content of the landfill significantly as well as the problem of litter both in the ocean and on land. The peak in 2006 may in part be caused by tropical storm Chris which crossed the island in August. The greatest percentage increase occurred in commercial trash and is a reflection of the increase in tourism, hotels restaurants and shops.



From Anguilla Government
http://gov.ai/statistics/ENVIR_CLIMATE_TAB_10.htm

Anguilla dump after covering with crushed marl. Note the coarse cover and difficulty covering plastic with the rock.

Road cut though Anguilla dump. Most of what survives is plastic.

Everything goes into the dump including oil, car batteries and even some medical waste.

The Oil Pit

Litter is a major problem on the island in spite of an active educational program. Much of the litter consists of scattered drink bottles, but there are piles along the roadside.

Illegal roadside dump

The Anguilla dump is filling and the government is interested in alternatives. The dump is located on the windward side of the island, so docking is not practical. There is a commercial pier about 3 miles away in Road Bay that can accommodate a draft of at least 8 feet. Trucking that short distance should not be a problem.

As with most of the islands, it appears that the best way to solve the litter issue would be to charge a deposit on all containers. It would be far easier to pass a deposit bill if there was some means of dealing with the plastic once it was collected and separated.

Part c: Islands that Have Not Dealt With Trash Effectively

Tortola - British Virgin Islands

Population (of all BVI)	**24,491 (2009)[ix]**	**Est. 19,000 Tortola**	
Area (Tortola)	21.5 Sq mi		
Gross Domestic Product per person	$38,500[ix]		
Municipal Waste per year (Tortola)	36,500 tons[x] 33,112 metric tons	100 tons/day	5.2lb/cap/day 2.4kg/cap/day
Method of disposal	Incineration + open burning		
Recycling or Separation	none		

The British Virgin Islands are some of the most prosperous in the Caribbean. The income is based almost entirely on tourism which in conjunction with the higher level of prosperity contributes to a high per capita generation of trash. Despite the relatively high standard of living, the government has not allocated the necessary resources to manage solid waste. I visited the dump/burn sites on Tortola, Virgin Gorda and Jost Van Dyke. On each island the dumps were open with no fencing to exclude animals, and on the smaller islands all of the trash was burned in low temperature open fires. On Tortola about half the trash is incinerated and the rest burned in the open.

Open burning on Tortola (left) and Virgin Gorda (below)

Tortola Dump site from the water ***New incinerator waiting to be hooked up.***

Tortola does have an incinerator with a 40 ton per day capacity. The incinerator was designed with to have a 10 year life span before significant maintenance was required. The plant has been in operation for 16 years with no major maintenance resulting in frequent breakdowns. It is also clear from the numbers that it can process less than half of the total

waste. A new 100 ton per day incinerator was ordered and completed in the United States in 2007, but because of funding and work delays was not shipped until 2009 and installation had not been completed as of February 2010. There was no sign of work being done on the plant.

Despite the location of the new plant in close proximity to the electrical power plant, there was no provision to generate power from the waste heat from the incinerator, nor was there provision for a scrubber to clean the toxins from burning plastic. The budgeting of the BVI government seems to place solid waste management near the bottom of the list. The staff that I talked to however was doing excellent work within the handicaps of inadequate funding.

One would think that waste oil would be relatively easy to re-refine and use again. All of the oil in the US Virgin islands is sent to the refinery in St. Croix, but no other island sent out their oil for reprocessing. Tortola burned 39,000 gallons of used motor oil in 2008. St. Barts incinerates their oil. Other islands have burned or dumped it in less acceptable ways. Nevis has a big tank and is still storing oil until they can find a way of getting rid of it. When I asked why they do not ship the oil to St. Croix or Trinidad, the answer was always that the complications of sending it across borders were too daunting. If that is true, the shipping of recyclable materials across borders is an issue that needs to be addressed. We certainly have no trouble shipping fuel internationally.

Turks and Caicos Islands

Providenciales

Population	22,500[xi]	T&C total 36,000	
Area	98km^2		
Gross Domestic Product per person	$17,112[xii]		
Municipal Waste	NA	NA	
Method of disposal	Open Dump		
Recycling or Separation	none		

Providenciales is the most developed island in the group and has 62% of the total population. In 1960 the population was 500 and there were no wheeled vehicles. Rapid development has left its scars, one of which is an open dumpsite that covers a large area with seemingly random piles of trash. When visited, there were 20 or 25 scavengers rummaging through the waste. Fires were burning in various places on the site. We were told they were set by the scavengers to burn the insulation from the salvaged wires. The combination of blowing dust and smoke made the air almost unbreathable.

Two studies have been done on Turks and Caicos starting back in 2001 devise waste disposal systems on the islands. Contracts have been signed, but as of February 2010 there is no evidence of work on the ground. The plan is for a large facility on Provo that will handle all of the waste from the island group. Recycling will be a priority and the remainder will be landfilled. There is evidently no plan for a waste to energy system.

[i] http://www.deq.state.or.us/lq/pubs/factsheets/sw/expandedbottlebill.pdf

[ii] See reports by Charles Moore, http://www.algalita.org/ report on this site or report on "Passive collection Systems" on this site.

[iii]CIA World Fact book, https://www.cia.gov/library/publications/the-world-factbook/geos/ac.html

[iv] Antigua Barbuda Waste Recycling Corp., http://www.abwrec.com/news/index.php

v CIA World Factbook, https://www.cia.gov/library/publications/the-world-factbook/geos/tb.html

[vi] Estimate based on daily capacity of incinerator and percentage use from conversation with J. Christophe Director of Solid Waste Management.

[vii] CIA World Factbook, https://www.cia.gov/library/publications/the-world-factbook/geos/av.html

[viii] Government of Anguilla, http://gov.ai/statistics/ENVIR_CLIMATE_TAB_10.htm

[ix] CIA World Factbook, https://www.cia.gov/library/publications/the-world-factbook/geos/vi.html

[x] Annual Report of Solid Waste Department of the Government of the British Virgin Islands, 2008 (unpublished)

[xi] Wikipedia, http://en.wikipedia.org/wiki/Turks_and_Caicos_Islands

[xii] Department of Economic Planning and Statistics, TCI, http://www.depstc.org/index.html