

Chapter 2 – Resource Conservation

Resource conservation is central to green planning. Supplies of non-renewable resources have declined drastically in the past century. The systems and conditions that humans depend on every day, like the freedom to travel and clean air, depend on the wise use of these resources. Human beings are part of an intricate natural cycle requiring responsible stewardship. Communities and individuals have a responsibility to conserve resources for both current and future generations.

This section will focus on resource conservation in the energy, water use and solid waste arenas, and present a range of steps that can be taken to help conserve resources. For the most part, these steps are minor adaptations to the way all of us live our lives day-to-day. This section mainly addresses residential behavior, but schools and businesses are also targeted. At the end of this section concrete policy ideas and personal actions will be suggested. Finally, since several other chapters in this manual provide greater detail on ways to conserve natural resources, references to those chapters will be listed in the text where appropriate.

2.1 – Resource Use Among Individuals

Energy Use

Energy, as the force that makes things work, can be found in material objects (like wood, coal, or oil) or created from processes (like water currents, solar rays, or wind gusts). Once a unit of energy is used by humans, it typically adopts a more chaotic, entropic form that diminishes its subsequent value for useful work. The combustion of wood or coal, for example, creates dispersed gases that may be harmful to human health and the environment.

Energy sources are usually broken down into three broad categories. They include:

- **Fossil Fuels.** Fossil fuels include petroleum, coal and natural gas. Fossil fuels serve as the main sources of harmful gases. This means that energy use contributes to air pollution, water pollution and greenhouse gases that cause global warming.
- **Nuclear Energy.** Fissile radioactive materials are used to produce heat and, subsequently, electricity. Although nuclear energy does not produce harmful air pollutant emissions, radioactive nuclear waste, with issues of accidents and storage, can become problematic.
- **Renewable Resources.** Renewable resources are dispersed but abundant. More solar energy is created as long as the sun shines and more wind energy is created so long as the wind blows. Other forms of renewable resources include hydropower and geothermal energy

Energy Use in Highland Park. Highland Park falls in the range of average use for a municipality of its size. When calculated, the total energy used in the course of a year in Highland Park is an impressive number. Exhibit 2.1 shows the total non-transportation energy used in an eleven month period from September 2003 through August 2004, broken down by electricity (shown in kilowatt hours), natural gas (expressed in therms) and fuel oil. This total includes the residential, commercial, industrial and municipal sectors. It excludes transportation uses (addressed in Chapter 6). Broken into average day, this translates into 240,168 kWh of electricity, 34,710 therms of natural gas, and 4,560 gallons of fuel oil consumed on a daily basis for stationary uses in Highland

Park. Converting these values into British thermal unit (Btu) equivalents, it is possible to compare their relative influence on total stationary energy use in the Borough.

Exhibit 2.1 - TOTAL Annual Non-Transportation Energy Use in the Borough of Highland Park, by Number and Percentage 2003-2004			
	<i>Electricity (kWh)</i>	<i>Natural Gas (Therms)</i>	<i>Fuel Oil (gallons)</i>
Total:	80,456,286	11,628,077	1,527,791
Btu Equivalent:	2.74 x 10 ¹¹	1.16 x 10 ¹²	2.14 x 10 ¹¹
Percentage:	16.6 %	70.4%	13.0%

Source: PSE&G, U.S. Census, www.energyguide.com, Btu conversion factors from EIA 2004

As can be seen in Exhibit 2.2, the residential sector of Highland Park used almost 50 million kilowatt hours (kWh) of electricity and 3.5 millions therms of natural gas between September 2003 and August 2004. Annual fuel oil use in the Borough is approximately 1.5 million gallons. According to the U.S. Census, 13,999 people reside in Highland Park. On a per capita basis residents who use each type of fuel use

approximately 3,597 kWh of electricity per year, 399 therms of natural gas, or 511 gallons of fuel oil. In other words, the residential sector accounts for about 59 percent of total electricity use in the Borough and about 31 percent of total natural gas. In Btu equivalent, the residential sector accounts for 44.8 percent of total energy use.

Household energy use can be calculated based on the number of persons living in the house, the number and size of rooms, the type of fuel used for heating and cooling, and the types of appliances and lighting fixtures. In Highland Park, residents live in various housing arrangements, with about half of the population living in single-family homes (approximately 3,181 units). (Estimates arrived at by total residential acreage, average lot size, and counting housing units in the Highland Park Master Plan) Over 60 percent of housing in the Borough is rental, with several large garden apartment complexes. Over 50 percent of households have natural gas heating and slightly over a third use fuel oil for heating. Generally, about 72 percent of average home energy use is attributed to heating and cooling, water heating, refrigerators and clothes washers and dryers (Energy Star, 2004).

Exhibit 2.2 – Energy Use in Highland Park by Sector (11-12 month period)										
Sector	Residential			Commercial		Industrial		Municipal Buildings and Schools		Street Lighting
Energy Type	<i>Electricity kWh</i>	<i>Natural Gas Therms</i>	<i>Fuel Oil gallons</i>	<i>Electricity kWh</i>	<i>Natural Gas Therms</i>	<i>Electricity kWh</i>	<i>Natural Gas Therms</i>	<i>Electricity kWh</i>	<i>Natural Gas Therms</i>	<i>Electricity kWh</i>
Total Amount	50,356,480	3,545,122	1,527,791	25,599,185	7,877,197	1,407,797	136,169	2,840,000	69,589	252,824
Per capita*	3,597	399	511	-	-	-	-			
Percentage of Borough Total	58.7%	30.7%	100%**	38.8%	68.2%	2.1%	1.2%			
Btu Equivalent Total	7.40 x 10 ¹¹			8.75 x 10 ¹¹		1.84 x 10 ¹⁰		1.75 x 10 ¹⁰		
Percentage of Total Energy Use:	44.8%			53.0%		1.12%		1.06%		

* - per capita numbers are based on the approximate number of households using the 3 types of fuel and the average household size of 2.37 persons as reported in the Highland Park Master Plan.

** - data do not exist on the use of fuel oil in sectors besides residential, therefore the figure of 100% accounted for by this sector may be understating the total use of fuel oil in Highland Park.

Sources: PSE&G; Highland Park Master Plan (for approximate quantities by residential unit type); U.S. Census (for total dwelling units and amount using fuel oil); www.energyguide.com for approximations of energy use based on fuel type, Spring 2004 Green Building Audit, EIA 2004 Btu conversion factors.

The commercial sector in Highland Park used almost 26 million kWh of electricity in 2003-2004 and 7.9 million therms of natural gas (Exhibit 2.2). This accounts for 39 percent of total electricity use and 68 percent of its natural gas use, and 53 percent of total Borough energy use in Btu equivalents. Energy estimation by type and unit of business is not easily quantified. A list of commercial establishments shows the wide variety of businesses, each with different energy needs (Exhibit 2.3). In general, energy used by a commercial business depends on the type of business, the amount of enclosed space, the number of employees and customers, the hours of operation, and the type of technology and appliances used.

Exhibit 2.3 - Number of Commercial Buildings in Highland Park	
Artist Studio/Gallery	4
Auto Sales/Service	26
Hair/Nail Salons	19
Banks	4
Restaurant/Food Service	26
Public/Institutional	11
Professional Office	46
Retail	53
Funeral Home	1
Fraternal Organizations	1

Source: Highland Park Master Plan, 2004

Also, regulations affect energy use. For example, some businesses must keep certain areas lit for the safety of the workers and customers. Industry in Highland Park comprises only a fraction of total annual energy use—2.1 percent of total electricity use and 1.2 percent of total natural gas use—and 1.12 percent of overall energy use in the Borough. Municipal buildings, schools, and street lighting also use energy (Exhibit 2.2), but also marginal in contrast to the residential and commercial sectors. *It is import to note that large apartment properties may be counted as commercial properties in energy tallies coming from the local utility.* This likely pushes the residential sector higher than the commercial sector in overall energy use in the Borough.

Water Use in Highland Park. Water is both a resource issue and a pollution issue. The resource component of water includes the amount of water consumed and the amount of water waste generated. The pollution component focuses on the volume and quality of the storm water generated and the quality of surface water and groundwater from which we draw our drinking water. This chapter focuses on the water consumption and waste. Chapter 3 will focus on the issues of pollution associated with storm water and groundwater.

The average American uses approximately 150 gallons of water per day (US EPA, 2003). This average includes water use for a number of sectors, including industrial, commercial, and municipal. The residential sector uses the most water, followed by industrial and commercial uses. Each community will have its own water use profile, depending on the number and size of the industrial and commercial uses within the municipality. Water consumption data should be obtained in order to establish a water profile that is specific for Highland Park.

Exhibit 2.4 - Water Use Distribution in the U.S., per person per day, 2004	
Sectors	gallons/day
Residential (57%)	85.5
Industrial (13%)	19.5
Commercial (15%)	22.5
Public (14%)	21
Unaccounted (1%)	1.5

(US EPA: *How we use these waters in these United States 2003*)

Exhibit 2.5 - MCUA processed wastewater associated with Highland Park (thousands of gallons)	
First Quarter	238,897
Second Quarter	201,888
Third Quarter	146,119
Fourth Quarter	211,393

Source: Middlesex County Utility Authority

The overwhelming majority of residential water-use, about 93 percent, serves indoor purposes. Within the home, most water-use includes toilet flushing, bathing and cleaning. On the other hand, outdoor water use includes gardening activities, car washing and swimming pools.

If the average person's water use data were applied to the 13,999 residents of the Borough of Highland Park, then the Borough's water use would amount to approximately 2.1 million gallons of water a day and over 768 million gallons of water a year. As mentioned above, water use in Highland Park does not only involve the residential sector. Commercial,

Exhibit 2.6 – Average Household Indoor Water Use	
Bathing	33%
Toilet Flushing	41%
Kitchen Uses	5%
Cleaning	21%

(US EPA: *How we use these waters in these United States 2003*)

industrial and governmental sectors also consume water. Water consumption data on these municipal actors have not yet been collected. However, analyzing relative water use by sector will be important in determining where our efforts should be directed towards water conservation.

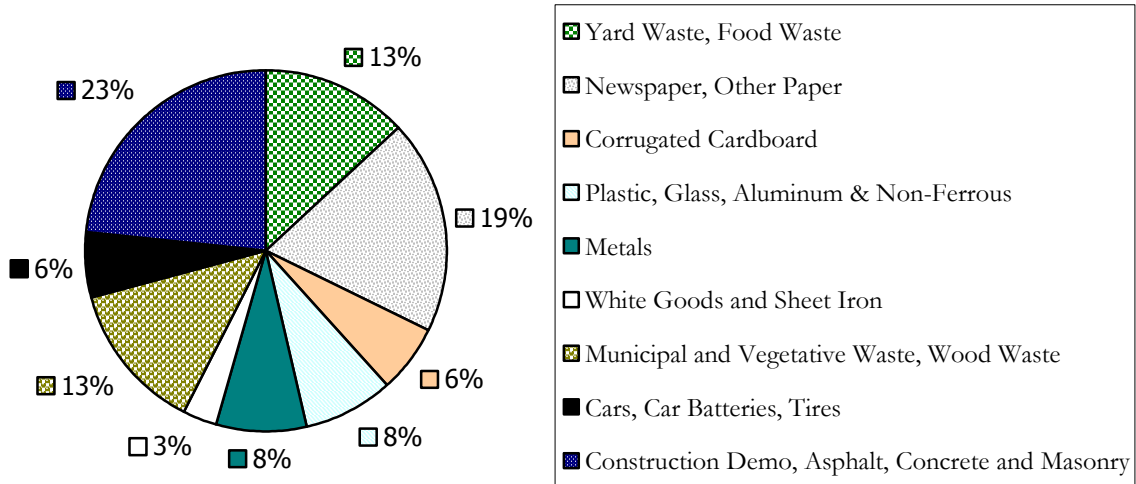
Wastewater is defined as water used for washing, flushing or the processing of manufacturing materials. Most water consumed in Highland Park will end up as wastewater. The sewer infrastructure within the Borough, organized in a feeder and collector system, terminates in a single main that leads to the Middlesex County Utility Authority (MCUA)

facility for processing. In 2003, MCUA processed 798 million gallons of wastewater from Highland Park.

Solid Waste Production and Disposal. The term municipal solid waste (MSW) generally refers to the durable goods, non-durable goods, containers and packaging, food wastes, yard trimmings and miscellaneous inorganic wastes generated by the residents, businesses and institutions within a municipality. A close look at the composition of our

trash in New Jersey (Exhibit 2.7) reveals that much of what gets disposed could be diverted through a process of reusing, recycling or composting, rather than sending it to a landfill.

Exhibit 2.7 - Waste Composition in New Jersey



According to figures by the Middlesex County Division of Solid Waste Management, Highland Park generated over 13 million pounds (6,594 tons) of municipal solid waste in the year of 2002. Highland Park has decreased the amount of solid waste generated by 7 percent over the last ten years. This downward trend is accompanied by the excellent news that Highland Park has steadily increased its rate of recycling during the same period (Exhibit 2.8).

Exhibit 2.8 - Highland Park's Municipal Solid Waste 1993- 2002 (tons)			
	Waste	Recycled	% Recycled
1993	7,090	2,921	29%
1994	7,318	2,870	29%
1995	6,737	2,467	27%
1996	7,786	3,101	28%
1997	7,352	3,272	31%
1998	6,203	2,927	32%
1999	6,184	2,592	30%
2000	6,319	2,795	31%
2001	6,376	3,094	33%
2002	6,594	3,198	33%

Source: Middlesex County Division of Solid Waste Management, 2004

These data do not include the 24 private trash collection sites located at different spots along Raritan Avenue, which also feeds into the Middlesex County Landfill. Including these sites in municipal calculations would raise the total amount of waste collected. Although the municipality does not pay directly for the disposal of waste by private haulers, the increase in quantity of waste going to the landfill may end up affecting the Borough if the contract fee structure for waste removal is altered to reflect the quantity increase.

Highland Park paid \$316,512 in 2002 to dispose of its waste. This reflects the current contract rate for the handling of municipal solid waste at the Middlesex County Landfill at \$48/ton. Assuming this contract rate remains the same, a ten percent reduction of municipal solid waste generation in Highland Park would represent a cost savings to the town of over \$31 thousand dollars a year.

2.2 – Implications of Resource Use

The continuing use of even currently abundant resources, coupled to the steady decline in the quantity and quality of scarcer resources, affects not only the quality of life for future generations, but also the quality of life today. This section describes some of the effects of using energy and water and in creating solid waste.

Effects of Energy Use

Two main effects of energy use include:

- Depleted natural resources
- Harmful emissions from the combustion of fossil fuels

Depleted Natural Resources. Deforestation, depleted petroleum reserves, overseas sources of petroleum and natural gas and complex mining of coal reserves are all issues related to the quantity of energy we use. The United States contains coal reserves to last over 200 years, but the domestic petroleum reserves peaked in the early 1970s and have been falling ever since (EIA, Figure 5.1, 2004). Imported petroleum contributes almost 60 percent of all oil and gas used in this country (EIA, Figure 5.7, 2004). Most of the known oil reserves are located in the Middle East. The vast majority of that imported oil goes for transportation uses. Sources of natural gas exist in North America. However, there will be increased use of natural gas in future years. Ninety percent of new power plants in the U.S. use natural gas (Roberts, 2004), and the United States will have to look to Russia, Indonesia and other areas of the world with large quantities of natural gas.

Harmful Emissions. Personal energy use translates into a huge amount of annual CO₂ emissions. Exhibit 2.9 shows the annual emissions of different pollutants for the residential sector. Exhibit 2.10 shows how these emissions could break down by typical daily activities. Emissions have of course increased as energy use has increased over time.

Exhibit 2.9 - Emissions from Highland Park's Stationary Energy Use (11-12 months) (1 MWh = 1000 kWh)							
Residential							
	<i>MWh</i>	<i>per capita MWh</i>	<i>Therms</i>	<i>per capita Therms</i>	<i>Fuel Oil (gallons)</i>	<i>per capita gallons</i>	
Totals:	50,356	3,597	3,545,112	399	1,527,791	511	
CO ₂ (lbs.)	76,541,850	5,467,440	41,506,171	4,671	36,700,678	12,273	
NOx (lbs.)	140,998	10,072	53,177	5.99	30,556	10.2	
CO (lbs.)	50,356	3,597	8,508	0.96	7,639	2.6	
SO ₂ (lbs.)	327,317	23,381	213	0.02	10,847	3.6	
Mercury (mg)	100,713	7,194	-	-	-	-	
PM ₁₀ (lbs.)	-	-	659	0.07	5,042	1.69	
VOC (lbs.)	-	-	1,911	0.2	519	0.17	
Commercial		Industrial		Municipal and Public Schools		Street Lighting	
	<i>Electricity MWh</i>	<i>Natural Gas Therms</i>	<i>Electricity MWh</i>	<i>Natural Gas Therms</i>	<i>Electricity MWh</i>	<i>Natural Gas Therms</i>	<i>Electricity MWh</i>
Totals:	25,599	7,877,197	1,408	136,169	2,840	69,589	253
CO ₂ (lbs.)	38,910,761	92,226,222	2,139,851	1,594,267	4,316,800	814,748	384,292
NOx (lbs.)	71,678	118,158	3,942	2,043	7,952	1,044	708
CO (lbs.)	25,599	18,905	1,408	327	2,840	167	253
SO ₂ (lbs.)	166,395	473	9,151	8.2	18,460	4.2	1,643
Mercury (mg)	51,198	-	2,816	-	5,680	-	506
PM ₁₀ (lbs.)	-	1,465	-	25.3	-	12.9	-
VOC (lbs.)	-	4,246	-	73.4	-	37.5	-

Source: PSE&G, www.cleanerandgreener.org, PJM average emissions, NJ Clean Energy Program Report June 2004, oil data approximated from www.energyguide.com

Exhibit 2.10 - Annual CO₂ Emissions for One Average American	
1 Average American	Annual CO₂ Emissions (lbs./year)
<i>Using Natural Gas Heat</i>	
Drives 225 miles per week 22 miles per gallon	13,280
\$40 of electricity per month	9,840
\$25 of natural gas per month	5,558
25% of possible recycling is recycled	2,400
Total:	<u>31,078</u>
<i>Using Fuel Oil Heat</i>	
Drives 225 miles per week 22 miles per gallon	13,280
\$40 of electricity per month	9,840
\$25 of fuel oil per month	7,265
25% of possible recycling is recycled	2,400
Total:	<u>32,785</u>

Source: EPA CO₂ Calculator 2004, behavior estimates based on averages for a 2 person household provided by the EPA.

In addition to residential energy use, commercial and industrial sites contribute greatly to this country's carbon emissions. For example, 18 percent of total carbon dioxide emitted in the U.S comes from commercial sources, while 33 percent comes from industrial sources (Energy Star, 2004). In Highland Park, the commercial sector uses a significant amount of energy, while the minimal presence of industry contributes little to total carbon emissions count (Exhibit 2.9).

Air pollutant emissions harm plants, animals and other life forms. According to the U.S. EPA, Middlesex County ranked among the dirtiest 10 percent of all counties nationwide for air quality in 1999. This means that county residents face an increased cancer risk that is estimated at 100 times the level set by the federal Clean Air Act (Energy Star, 2004). Most emissions are generated outside of Highland Park's boundaries, and fully 94 percent of harmful emissions were attributed to automobile use. The remainder is generated by stationary sources that depend ultimately on personal energy use. In Chapter 3 there will be more information on the harmful effects of poor air quality, while Chapter 6 will focus on the transportation sector.

Effects of Water Use

Every gallon of water conveyed to the Middlesex County Utility Authority (MCUA) as waste costs Highland Park. Water use and waste costs are borne primarily by the citizens of the Borough, both directly for water used and indirectly for wastewater processing. Additional costs include the infrastructure investments made by the municipality in order to maintain and expand potable water supplies to residences and businesses. Thus, the effects of excessive water use are multi-faceted. Increases in water use impact the transmission and

distribution systems, while increases water demand negatively affect the quantity and quality of groundwater, including potential salt-water intrusion and increases in arsenic and pesticides (US EPA, 2003).

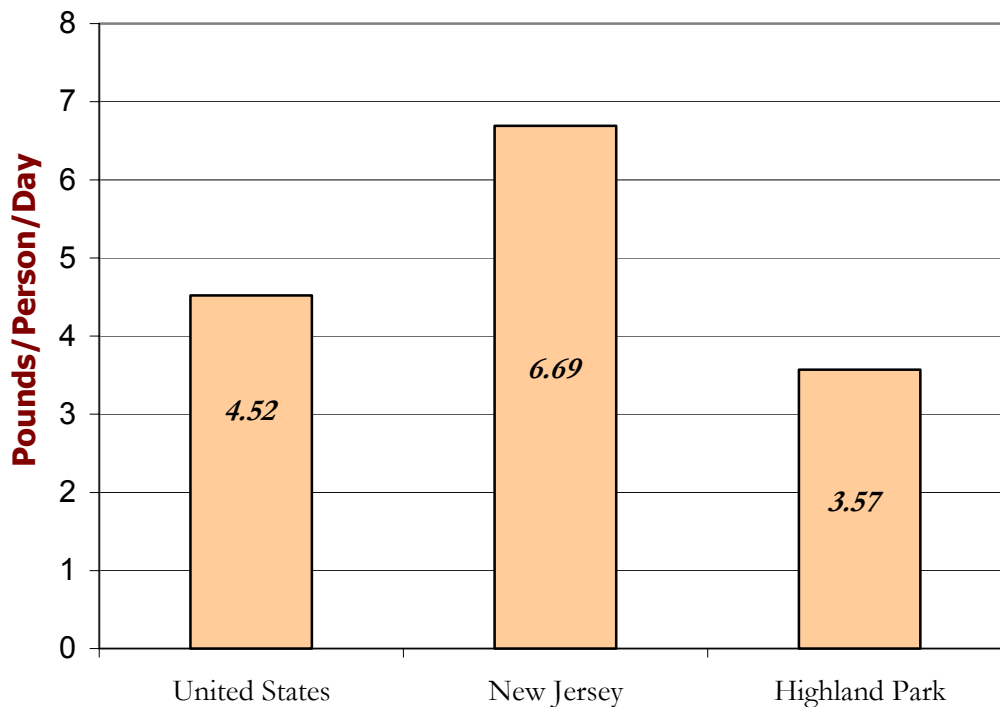
Highland Park receives its water, classified as Class II Ground Water, from the Delaware and Raritan Canal and the Round and Spruce Run Reservoir Systems in the Highlands. These water sources have a finite amount of water that can be used by Highland Park and other municipalities. As New Jersey's population grows, human demand on water resources will increase. According to the Raritan Basin Watershed Management Project (RBWMP, 2001), the demand for water in the region may reach the limit of its supply by the year 2040. Therefore, water conservation will be a critical component of ensuring a sustainable supply of water for Highland Park in the 21st Century.

Effect of Solid Waste Production and Disposal

Garbage that Americans dispose either gets recycled, incinerated or dumped in a landfill. According to the U.S. Environmental Protection Agency, for the nation as a whole 30 percent of trash is recycled, 15 percent is burned and 56 percent is dumped in landfills. (EPA, 2004) Although recycling is often the preferred option, all three disposal methods have associated problems. First, recycling can be a highly energy intensive endeavor, involving the melting and reforming of materials into useful objects. Second, garbage incineration can create electricity at the same time as reducing the volume of waste that must be deposited in a landfill -- to 90 percent in volume and 70 percent in weight (EPA, 2004). Unfortunately, harmful emissions, such as dioxins, can result when burning solid waste. Finally, dumping consumes space, disrupting natural landscapes and endangering groundwater supplies. Over 8,000 landfill sites existed in the United States in 1988. By 2001, this number dropped to fewer than 1,900. Despite the decline, however, overall capacity has not decreased, meaning that today's landfills are much larger in total area (EPA, 2004). In New Jersey, an increasing proportion of the state's garbage gets shipped out of state. Between 1985 and 2000, the percentage going across borders (primarily to Pennsylvania) increased from 7 percent to 15 percent (NJDEP, 2003).

Any garbage not diverted by reusing, recycling or composting in Highland Park goes to the Middlesex County Landfill. By 2015 the Middlesex County Landfill will reach its maximum capacity of 20 million cubic yards, covering 300 acres at 165 feet above sea level. The county will have either find a new site for a landfill, open an incinerator, transport our trash elsewhere, or develop other means of dealing with increasing levels of trash. None of these costly options are particularly attractive or desirable for the municipality and region. Reducing the amount of solid waste collected may be a good place to start prolonging the life of the current county facility. The good news is that the average resident of Highland Park generates far less garbage than that of the average resident of New Jersey, and less than the national average as well (Exhibit 2.11).

Exhibit 2.11 - Daily Solid Waste Production 2004



Adapted from EPA 2004, NJ DEP 2004, MCDSWM

This issue of space is compounded by the fact that funds for recycling in the state of New Jersey will no longer be available as of January 1, 2005. The elimination of available funding has led many municipal leaders to consider establishing their own recycling efforts in order to remain in compliance with the New Jersey Statewide Mandatory Source Separation and Recycling Act (N.J.S.A 13:1E-99.11 et seq.), which established a target of diverting 50 percent of municipal solid waste through recycling.

This cost associated with recycling should not be taken lightly. Highland Park generated 3,198 tons of recycled materials in 2002. Before 2004, Highland Park and 17 other towns in Middlesex County had individual contracts with the Middlesex County Improvement Authority for the curbside collection of recyclable materials. The contract cost of recycling was \$3.49 per household per month, which reflects significant subsidization that evaporated as of January 1, 2005. As a result, Highland Park is assuming responsibility for its own curbside recycling program. Assuming that Highland Park continues to recycle 30 percent of the total municipal solid waste and the cost were to remain constant ($\$3.49 \times 6,071$ households \times 12 months), we can assume a yearly cost of roughly \$254,000, or \$79.50 per ton, as compared with \$48 per ton for depositing waste at the landfill. Furthermore, without subsidization, the total cost of recycling in Highland Park could increase significantly. Given the high costs associated with waste disposal and recycling, the importance of reducing consumption cannot be underestimated.

2.3 – Recommendations

Reducing personal resource consumption is important, and options exist. They range from improvement projects, like increasing the energy and water efficiency of a home through retrofitting, to smaller, behavioral changes, like remembering to turn the lights off when leaving a room, turning the faucet off during teeth brushing, or diverting a higher percentage of solid waste through recycling, composting, reusing or reducing overall waste production. Being conscious of personal resource use and making small changes in your life contributes more than one would expect to resource conservation.

Energy Conservation and Efficiency Recommendations

New Jersey has several progressive policy options to help residents, businesses, and institutions conserve energy. Many of the main state programs are listed at the end of this chapter with links to more information and contacts. The available programs:

- Provide rebates for purchase of energy efficient appliances and fixtures
- Assisting lower income residences with upgrades and energy bill payment
- Offer incentive programs for business owners

Highland Park is already making progress on improving the use of renewable energy resources in the Borough by installing solar photovoltaic (PV) panels on the roof of Borough Hall. The school district is also exploring the possibility of installing PV panels in the impending reconstruction projects.

Currently, energy customers in New Jersey are allowed to select their energy provider from a list that includes only one green energy company – Green Mountain Energy™. Moreover, the state has implemented a Renewable Portfolio Standard (RPS), which currently requires the state's energy suppliers to have 4 percent of their total energy portfolio coming from renewable resources. While other states have established RPS programs, New Jersey serves as a model state for adoption and supportive program creation, such as the Renewable Energy Certificate (REC) and the Solar Renewable Energy Certificate (SREC) programs. These programs provide tradable certificates for every kilowatt of renewable energy generated, which can be exchanged for dollars that can be used to help the capital financing of the installation. The PV panels on Borough Hall, for example, will generate a SREC for the city, thus helping the cost and promoting renewable energy in the municipality. Anyone who installs a solar panel or other renewable energy generator will be eligible to receive a REC or a SREC based on the total generating capacity of the unit.

The state of New Jersey will likely soon implement an option for all energy consumers to pay a small premium each month (some other state programs, such as those in Alabama and Georgia suggest premiums of a few cents per kWh, or around \$5.00 to \$6.00 per month) for the purchase of green-generated energy. If given this easy-to-choose option, energy customers may more readily make this choice (NARUC, 2003).

Water Use Recommendations

As stated earlier, the largest portion of water used in Highland Park takes place in the home. Using the calculated annual water use in Highland Park of 768 million gallons, and by apportioning the total based on residential uses, Highland Park residents consume approximately 436.8 million gallons a year. Toilet flushing comprises 41 percent of the total residential use, or 166.5 million gallons, followed by 33 percent for bathing, or 134.1 million

gallons, and then 21 percent for cleaning purposes, or 85.3 million gallons. (Exhibit 2.12).

Exhibit 2.12 - Residential Water use in Highland Park (in millions of gallons)	
Water Use Type	gallons
<i>Indoor (93%)</i>	
Bathing (33%)	106.6
Toilet Flushing (41%)	132.5
Kitchen Uses (5%)	16.2
Cleaning (21%)	67.9
<i>Outdoor (7%)</i>	24.3

Water conservation can best be achieved in the residential sector. Conserving water in the bathroom, kitchen and laundry area can potentially reduce daily water consumption by about 30 percent or 52 gallons per person (US EPA, 2003). For example, the replacement of conventional toilets with the low-flush versions (1.6

gallons/flush) can result in a decrease in water consumption from approximately 225 gallons per day per for a household of 3 persons to 148 gallons, a savings of 34 percent. Another method to reduce water consumption can be replacing standard 4.5-gallon-per-minute showerheads with 2.5-gallon-per-minute heads, which cost less than \$5 each. With these transitions, a family of four can save approximately 20,000 gallons of water per year (EPA, 2003).

Further, households can also reduce their outdoor water use. Methods include:

- Planting native and/or drought tolerant vegetation
- Harvesting rainwater can reduce potable water use
- Avoiding the over-fertilization of lawns
- Refraining from hosing down driveways/sidewalks to clean leaves and other debris
- Using a commercial car wash that recycles water

Solid Waste Reduction and Source Diversion Recommendations

Parks and productive land uses are preferable to unsightly landfills. Waste incineration contributes to greenhouse gases. Even recycling, which makes used items productive again, is a highly energy intensive endeavor. Yet recycling is still on balance the preferred option to burying or burning waste. The community can spend less money on recycling efforts by simply reducing the amount of waste created in the first place. The U.S. Environmental Protection Agency promotes the waste management hierarchy:

1. Source Reduction (avoiding consumption or reusing items)
2. Recycling and Composting
3. Landfill or incinerator

The concept of source reduction involves a range of actions, such as purchasing items with less packaging. For example, the shopper can bring shopping bags or the coffee drinker a thermos. Source reduction is a fancy phrase for a simple concept -- if you do not need something, do not buy it. Not only do excessive packaging and shipping materials contribute to the waste generated, the by-products of manufacturing contribute considerably to the garbage that ends up in our landfills. The only way we can begin to significantly reduce our municipal solid waste loads, and the high costs associated with it, is to increase citizen awareness of the role played in waste generation as producers and consumers.

Moreover, 13 percent of the trash in New Jersey is made up of a combination of food scraps and yard waste. Composting converts organic materials into a valuable resource useful to the homeowner. The following recommendations are aimed at encouraging source reduction through education, composting and increased recycling.

2.4 – Useful Links

New Jersey has a number of incentive programs to help residences, businesses, and institutions become more energy efficient and sustainable. The following sections provide a brief description of the main incentive programs along with a list of resources and contact information for the programs.

Energy

The New Jersey Board of Public Utilities Office of Clean Energy and Clean Energy Program have several programs:

1. “Get with the Program” – Offers financial incentives in the form of rebates to consumers of energy (ratepayers) who choose to install renewable energy generators (wind or solar) in their homes, businesses, and institutional buildings.

Sample incentives:

For wind turbine systems up to 10 kW → \$5.00/watt or a maximum of 60% of total system cost for installation.

For solar photovoltaic panels up to 10 kW → \$5.50/watt or a maximum of 70% of total system cost for installation.

More information available at: http://www.njcep.com/html/2_incent.html

Online information and application forms are available at:

http://www.njcep.com/html/4_app_eforms.html

2. “COOL Advantage” (Residential Sector) – Offers rebates for the purchase of energy efficient air conditioners and heat pumps. Rebates require proof of certain types of equipment purchase as well as showing that they have been installed using proper techniques to maximize performance.

Sample incentive:

Central air conditioner unit with a Seasonal Energy Efficiency Ratio (SEER) of between 13 and 13.99, a minimum Energy Efficiency Ratio (EER) of 9, and a Heating Seasonal Performance Factor (HSPF) of 8 or higher along with proof of proper installation could receive a rebate of up to \$300.

More information available at:

http://www.njcleanenergy.com/html/1residential/1_cool_advantage.html

Information on appliances that meet the above guidelines provided by:

<http://www.energystar.gov/>

3. "WARM Advantage" (Residential Sector) – Offers rebates for the purchase of energy efficient natural gas heating systems and water heaters. Eligible systems must meet certain Energy Star guidelines and residents must purchase or be able to purchase natural gas from participating natural gas providers.

Sample incentive:

For a furnace or boiler meeting specific Energy Star requirement there is a rebate of up to \$300 per unit. For a hot water heater also meeting certain Energy Star requirements there is a rebate of up to \$50 per unit.

More information available at:

http://www.njcleanenergy.com/html/1residential/2_warm_advantage.html

Information on appliances that meet the specified guidelines of the program provided by:

<http://www.energystar.gov/>

Additional information on a range of energy programs that support businesses and institutions see the NJ Board of Public Utilities Office of Clean Energy home page at:

<http://www.bpu.state.nj.us/cleanEnergy/cleanEnergyProg.shtml>

Water

The links below help households determine their own water consumption and provide options for reducing their consumption.

Water Budget Calculator:

H2OUSE: <http://www.h2ouse.org/>

Water Conservation Information:

H2OUSE: <http://www.h2ouse.org/>

Rocky Mountain Institute: <http://www.rmi.org>

The American Water Works Association: <http://www.awwa.org/>

Solid Waste

The following link provides information for educators interested in conducting a trash audit for their classrooms. This exercise increases students' awareness of the role they play in the creation of solid waste.

http://www.resourcefulschools.org/docs/waste_audit.pdf

The following links provide examples of material resource exchange centers in various municipalities around the country. This information may be of value for community leaders and residents interested in forming a similar program in Highland Park.

<http://www.hvmaterialsexchange.com/about.html>

<http://www.deq.state.or.us/wmc/solwaste/factsheets/MaterialsExchanges.pdf>

http://www.swmcb.org/EPPG/3_1.asp

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