Sustainable Baltimore ASAP: Assessment Study and Action Plan

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ABSTRACT

Sustainable Baltimore ASAP represents an Assessmenrt Study and Action Plan for Baltimore City. We cannot build solutions for tomorrow's sustainable world without assessing the problems we face today. The phrase ASAP also stresses the urgency of the current situation, not only of the environmental crises of global warming and resource depletion, but of the social, economical, and racial disparity in Baltimore. By comparing the statistical data of the United States, the State of Maryland, Baltimore City, and the African American population in Baltimore, the inequalities become apparent. Maryland is always above national averages for economic income, poverty rates, and education levels while Baltimore is consistently lower, and the selected population is even further below the city averages. A healthy dialogue on environmental issues must consider that in Baltimore, children are more likely to be victims of violent crime than graduate from high school. Sustainability and affordability, however, can go hand in hand. By creating action plans for conservation starting with one person, one family, one neighborhood, and eventually one city; the money saved can benefit public services with additional funds, individuals and families with increased monthly income, and the environment with resource preservation. The potential for "green collar" job creation is provided and the local economy is supported. Sustainable Baltimore ASAP also takes into account the expected population growth in the next thirty years and compares the future of continuing our current trends with one that implements the conservation strategies.

It Begins with One

Tomorrow's sustainable world begins with one individual, one family in one home, today. It then grows into one neighborhood, one city, one state, one country and eventually one earth. But before we can envision and create a plan for the future, our past and current actions need to be assessed - ASAP, Assessment Study and Action Plan. The phrase ASAP speaks not only to the urgency of our current natural environmental crises of resource depletion and global warming, but of the present social, economic, and racial inequalities in Baltimore City. So often the focus is only on the natural environment. We know we can build "green," but can we achieve true sustainability in a city with social-economic distressed neighborhoods. In his 1909 book, *An Introduction to City Planning: Democracy's Challenge to the American City,* Benjamin Marsh, said "no city is more beautiful than its most unsightly tenement. The back yard of a city and not its front lawn is the real criterion for its standards and its efficiency" (Corburn 2007). Sustainable Baltimore ASAP begins by assessing the total environment – the front and back yards - including the natural, physical and social factors within the city.

The Assessment Study

- **Physical environment.** Baltimore City was established in 1729, and is currently the largest city in the state of Maryland and a tourist destination. In 81 square miles of land, 651,154 people live in 271,314 homes (Census 2006, 2002b) in 200 neighborhoods (Live Baltimore 2006a). The majority of Baltimore homes were built before 1969 (86%), are 1-unit attached or rowhouses (52%) and use gas heating (66%). Sixteen percent of the housing stock or 42,481 homes are vacant compared to the U.S. average of 10% (Census 2002b). In general, homes account for 47% of buildings, which consume 48% of the total U.S. energy consumption (Architecture 2030 2006) and produce carbon dioxide comprising 85% of green house gases that cause global warming (EIA 2004).

- **Natural environment.** The natural environment is usually thought of when referring to sustainability. Baltimore has made strides in this area as the first EPA pilot for brownfields (EPA 2000a) and the first city in Maryland to set an urban tree canopy goal (DNR 2005). However, the Baltimore area is rated the eleventh most polluted city in terms of ozone air pollution (American Lung Association 2004) and its children have some of the highest asthma rates in the country (GSFC 2002). There are over 100 hazardous waste sites (BNIA 2000) and 5,300 acres of land may be contaminated (EPA 2000a). The harbor and the tidal waters of the Chesapeake Bay are also on the 'impaired water body' list of the Clean Water Act (USGS 2006).

- **Social environment.** Assessing the social environment includes studying education, poverty, income, etc. These statistics for Baltimore City are always much lower than the standard averages in the United States, although Maryland is usually at, or well above the national average. In 2006, Maryland was even declared the wealthiest state in the nation (Christie 2007). If you delve further into the population of Baltimore city and look at the selected population group of African Americans, the real problems of social inequality become apparent, as these statistics are even further below Baltimore City averages. African Americans comprise 64% of the total population and 89% of the student enrollment (Census 2002c). Table 1a compares statistics of the nation, the state, the city and the African American population in Baltimore. Table 1b compiles statistics focused on children, public schools and education, and violence.

Table 1a. Social-Economic Comparison

	United States of America	State of Maryland	City of Baltimore	African Americans in Baltimore
Poverty (% of families)	9%	9%	18%	82% of the 18%
Median Family Income	$50,046	$54,302	$35,438	$30,190
Median Household Income	$41,994	$52,868	$30,078	$26,202
Homes - Owner Occupied	66%	68%	50%	44%
High School Education	80%	84%	68%	24% of boys
Higher Education	24%	31%	19%	10%

All data (Census 2000a, 2000b, 2000c) except African American High School Education (Ewing 2005).

Table 1b. Social-Economic Statistics

	Children
Teen Pregnancy	21.5% of all births; (only 8.2% in Baltimore County) (Teen Pregnancy 2006).
Children in Poverty	38.3% of the families below poverty level have children under eighteen. 48.5% of the families have children under five (Census 2002b).
Caregivers	52.2% of grandparents bear primary responsible for grandchildren (Census 2002b).
Crime	Children were involved in twenty murders and sixty non-fatal shootings in 2005 and all of the children were African American (Baltimore State Attorney's Office 2006).
	Pubic Schools and Education
Student Teacher Ratio	31:1; (only 9:1 in Baltimore private schools (Schools K-12 2006).
Absenteeism	51% of tenth graders are absent twenty or more days out of the school year (BNIA 2000).
High School Graduation	For every 100 students that graduate from high school, 79 drop out (DHR 2005). 32% have less than a twelfth grade education (Census 2002b).
Adult Literacy	20% of adults read below a fifth grade level (GHCC 2003).
	Violence and Crime
Safety	Second most dangerous city in the U.S. with a population over 500,000 (Morgan Quitno 2006).
Murder Rate	5.48 times the national average (CityRating.com 2002). Average of five murders a week in 2005 (Ditkoff 2006).
Victim Profile	Of the 269 victims, 97% shot to death, 43% between the ages of eighteen and twenty-nine, and 80% African American men.
Incarceration and Probation	Over 50% of African American men between the ages of twenty and thirty are in jail or on probation (Ditkoff 2006).

- **Total environment assessment summary.** These statistics give an alarming glimpse into the "back yard" of Baltimore and do not even touch upon other social issues such as homelessness, healthcare, unemployment and drug abuse. When the total environment is assessed, concerns such as a deteriorating educational system, poverty and violence cannot be ignored. If children are more likely to be victims of violent crime or be incarcerated then to graduate from high school, the natural environment issues of melting icecaps and water quality are moot. Families in Baltimore are choosing between heating and eating, not carbon footprint offset options.

  Sustainability is about the distribution of resources on a global scale and speaks directly to issues of equality, peace, and justice. If everyone continued to increase their current rates of consumption, there would simply not be enough resources or planet to go around. Efficiency and conservation actions make resources more accessible to all, for today and tomorrow. These strategies improve the quality of life with healthier places (cleaner air and water), preserve resources and can make living more affordable. The ASAP Action Plans compares a scenario that implements conservation measures with a future that continues our current trends.

The Action Plan

- **Population Growth.** To successfully compare these two alternative scenarios of the future, the Action Plan must take into account expected population growth. This study predicts that Baltimore City can accommodate 30% of the growth projected in the Central Maryland Region over the next 30 years, an estimate of 409,469 additional households (Frece 2006). Although this 30% growth means an additional 122,841 households and

294,818 people, the total population of 945,972 would still be slightly less than what it was in 1950 (Live Baltimore 2006b). To accommodate this growth, the 42,481 vacant homes can be rehabilitated and occupied to offset additional new homes needed. By encouraging this infill, existing houses and infrastructure are utilized and new development and sprawl is reduced. For the first time in 2008, 50% of the world's population will live in urban areas and this number could be 75% by 2030 (UNFPA 2007); further stressing the importance of cities coping with increasing populations and decreasing resources. The world's future will depend on making our urban areas sustainable.

- **The ASAP Tables.** The Assessment Study and Action Plan focuses on energy, water, and waste -what one individual consumes or produces in his/her home; and transportation that residents use to get to and from the home, which accounts for 27% of the total U.S. energy consumption (Architecture 2030 2006). A typical ASAP chart is shown in Table 2. The Assessment Study on the left, (the current rate of consumption of one person, one family, one neighborhood, and one city over one day, one year, and thirty years), is compared to the Action Plan on the right, with its reduced rate of consumption of the same subjects over the same time periods. The Action Plan conservation strategies assume a 20% reduction for the existing population and 40% for future households. The proposed population growth is taken into account in the cells of 30 years and one city. The Assessment Study also assumes a 20% increased consumption rate for the additional population based on the increasing trends of the last 30 years, where as the existing population is assumed to remain at the current rate of consumption. The difference between the two scenarios after 30 years is summarized at the bottom of the chart.

Table 2. ASAP Table Explanation

ASSESSMENT STUDY				ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	**= you today**	x 365 days	x 30 years	x 30 years	x 365 days	**= you *w/ 20% reduction***	**one person**
one family	x 2.4 family size	x 365 days	x 30 years	x 30 years	x 365 days	x 2.4 family size	**one family**
one 'hood	x 5418 'hood size	x 365 days	x 30 years	x 30 years	x 365 days	x 5418 'hood size	**one 'hood**
one city	x 651,154 existing population	x 365 days	x 30 yrs + (294,818 pop increase x one person ***w/ 20% increase*** x 365 x 15 yrs)	x 30 yrs + (294,818 pop increase x one person ***w/ 40% reduction*** x 365 x 15 yrs)	x 365 days	x 651,154 existing population	**one city**
the difference?							
amount				**saved over 30 years in the city**			

Baltimore City's average household size is 2.4 persons, the population of one neighborhood is 5,418, and the total population is 651,154 (Census 2002b).

- **Water.** The Assessment Study and the Action Plan results for water are shown in "gallons consumed" in Table 3a and in "dollars spent" in Table 3b. The typical person uses 80-100 gallons of water per day (USGS 2005). The Action Plan strategies are based on the LEED, Leadership in Energy and Environmental Design, Water Efficiency Calculator (USGBC 2008). The 20% reduction for existing homes involves installing a low flow shower head (1.8 gpm) and aerators to faucets - bathroom (0.5 gpm) and kitchen (1.8 gpm). The 40% reduction for new homes includes the above measures with the addition of ultra low flow toilets (1.1 gal/flush).

Table 3a. Water, Gallons Consumed (gal)

ASSESSMENT STUDY				ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	90	32,850	985,500	788,400	26,280	72	**one person**
one family	216	78,840	2,365,200	1,892,160	63,072	173	**one family**
one 'hood	487,620	177,981,300	5,339,439,000	4,271,551,200	142,385,040	390,096	**one 'hood**
one city	58,603,860	21,390,408,900	816,038,150,400	600,532,755,300	17,112,327,120	46,883,088	**one city**
the difference?							
215,505,395,100 **gallons of water saved over 30 years in the city**							
enough for							
50.5 neighborhoods to have water for 30 years **or 93,698 additional Baltimore Aquariums**							

The National Aquarium in Baltimore holds 2.3 million gallons of water (2004).

Table 3b. Water, Dollars Spent ($)

ASSESSMENT STUDY				ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	$0.56	$205.81	$6,174.16	$4,939.33	$164.64	$0.45	**one person**
one family	$1.35	$493.93	$14,817.98	$11,854.38	$395.15	$1.08	**one family**
one 'hood	$3,055	$1,115,053	$33,451,585	$26,761,268	$892,042	$2,444	**one 'hood**
one city	$367,153	$134,010,912	$5,112,479,012	$3,762,337,712	$107,208,729	$293,723	**one city**
the difference?							
$1,350,141,300 **saved over 30 years in the city.**							
enough for							
$99 - $114 **avg. savings a year for each of the 394,155 families.**							

The cost of water in Baltimore in 2006 was $.048 per Cu Ft or $0.006265 per gallon.

- **Waste.** The Assessment Study and the Action Plan results for waste are shown in "pounds produced" in Table 4a and in "pounds of carbon dioxide emitted" in Table 4b. The typical American generates 4.5 pounds of waste per day (Clean Air Council 2008) and the waste from a household of 2 produces 2,020 lbs of carbon dioxide a year. Recycling all materials able to be recycled (newspaper, glass, plastic, aluminum, and steel cans) reduces carbon dioxide emissions by 42% or 845 lbs per household per year (EPA 2006). This is the assumed Action Plan recycling strategy for new homes. The 20% reduction for existing houses involves recycling half of all materials able to be recycled.

Table 4a. Waste, Pounds Produced (lbs)

ASSESSMENT STUDY				ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	4.5	1,643	49,275	39,420	1,314	3.6	**one person**
one family	17.6	6,424	192,720	94,608	3,154	9	**one family**
one 'hood	24,381	8,899,065	266,971,950	213,577,560	7,119,252	19,505	**one 'hood**
one city	2,930,193	1,069,520,445	40,801,907,520	30,026,637,765	855,616,356	2,344,154	**one city**
the difference?							
10,775,269,755 **lbs of waste diverted over 30 years in the city.**							
enough to fill							
7.5 **Raven Stadiums**							

Raven Stadium's volume is assumed to be similar to Giants Stadium at 64,500,000 cu. ft. (Ballparks 2006).

Table 4b. Waste, Pounds of Carbon Dioxide Emitted (lbs)

ASSESSMENT STUDY				ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	2.8	1,010	30,300	24,240	808	2.2	**one person**
one family	6.6	2,424	72,720	58,176	1,939	5	**one family**
one 'hood	14,992	5,472,180	164,165,400	131,332,320	4,377,744	11,994	**one 'hood**
one city	1,801,823	657,665,540	25,089,757,440	18,463,868,580	526,132,432	1,441,459	**one city**
the difference?							
6,625,888,860 **lbs of CO2 diverted over 30 years in the city**							
equivalent to planting							
4,601,312 **trees a year for the next 30 years.**							

A tree is assumed to absorb 48 lbs of carbon dioxide each year (Parks and People 2006).

- **Transportation.** The Assessment Study and the Action Plan results for transportation are shown in "miles traveled" in Table 5a and in "dollars spent" in Table 5b. The average household travels 21,252 miles per year (NHTS 2001) and 0.92 lbs of carbon dioxide is emitted per mile (EPA 2000b). Only 19% of Baltimore residents use public transportation and 56% drive alone (Census 2002b). The 20% reduction in miles traveled is equal to carpooling or taking mass transit one day a week based on the average 30 mile roundtrip commute (RITA 2003). Two days a week meets the 40% reduction as well as using a car that achieves 28 mpg, a 40% increase in fuel efficiency over the standard 20.2 mpg (EPA 2007).

Table 5a. Transportation, Miles Traveled (mi)

ASSESSMENT STUDY				ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	24.3	8,855	265,650	212,520	7,084	19.4	**one person**
one family	58.2	21,252	637,560	510,048	17,002	47	**one family**
one 'hood	131,442	47,976,390	1,439,291,700	1,151,433,360	38,381,112	105,154	**one 'hood**
one city	15,797,174	5,765,968,670	219,970,101,120	161,878,768,590	4,612,774,936	12,637,740	**one city**
the difference?							
58,091,332,530 **miles not driven over 30 years in the city**							
equivalent to							
53,444,025,928 lbs of CO2 diverted **or 37,113,907 trees planted a year for 30 years**							

Table 5b. Transportation, Dollars Spent ($)

ASSESSMENT STUDY				ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	$3.60	$1,315	$39,453	$31,562	$1,052	$2.88	**one person**
one family	$8.65	$3,156	$94,687	$75,750	$2,525	$6.92	**one family**
one 'hood	$19,521	$7,125,206	$213,756,193	$171,004,954	$5,700,165	$15,617	**one 'hood**
one city	$2,346,115	$856,331,981	$32,668,826,899	$24,041,401,276	$685,065,585	$1,876,892	**one city**
the difference?							
$8,627,425,623 **saved over 30 years in the city.**							
enough for							
$631 - $730 **avg. savings a year for each of the 394,155 families.**							

$3.00 is the assumed average price of gas.

- **Energy.** The Assessment Study and the Action Plan results for Energy are shown in "kilowatt hours consumed" in Table 6a, and in "dollars spent" in Table 6b. The average household monthly energy consumption is 7,680 CF of gas or 900 kWh of electricity (EPA 2006). The 20% energy reduction strategies in existing homes include turning the hot water heater to "medium" and improving the air sealing rating from "poor" to "better than average." The 40% energy reduction strategies for new homes include energy efficient construction, double pane windows and a "very good" rating for air sealing (BGE 2006). The new home construction includes energy efficient envelope (insulation, windows and doors), energy efficient appliances and lighting, and energy efficient systems (heating, cooling and water heating).

Table 6a. Energy, Kilowatt Hours Consumed (kWh)

	ASSESSMENT STUDY			ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	15	5,400	162,000	129,600	4,320	12	**one person**
one family	36	12,960	388,800	311,040	10,368	28	**one family**
one 'hood	80,157	29,257,200	877,716,000	702,172,800	23,405,760	64,125	**one 'hood**
one city	9,633,511	3,516,231,600	134,143,257,600	98,717,713,200	2,812,985,280	7,706,809	**one city**
the difference over 30 years for the city?							
32,425,544,400 kWh of energy saved or 48,532,995,828 lbs of CO2 diverted							
enough for							
50.5 neighborhoods to have power for 30 years or 33,703,469 trees a year for 30 years							

The average emission factor is 1.37 lbs of carbon dioxide per kWh (EPA 2006).

Table 6b. Energy, Dollars Spent ($)

	ASSESSMENT STUDY			ACTION PLAN			
	one day	**one year**	**30 years**	**30 years**	**one year**	**one day**	
one person	$1.21	$442	$13,250	$10,600	$353	$0.97	**one person**
one family	$2.90	$1,060	$31,799	$25,439	$848	$2.32	**one family**
one 'hood	$6,556	$2,392,860	$71,785,791	$57,428,633	$1,914,288	$5,245	**one 'hood**
one city	$787,896	$287,582,164	$10,971,179,578	$8,073,829,266	$230,065,731	$630,317	**one city**
the difference?							
$2,897,350,312 saved over 30 years in the city.							
enough for							
$212-$245 avg. savings a year for each of the 394,155 families.							

The cost of electricity in Baltimore in 2006 was $0.11 per kWh.

- **ASAP Cumulative Results.** As shown in the tables above, conserving water and energy and reducing miles traveled equals money in the pocket of the resident, preservation of natural resources, and reductions of both carbon dioxide emissions and foreign fossil fuel dependencies. The individual results for water, waste, transportation and energy are combined for cumulative totals in the city for "environmental savings" in Table 7a; "carbon dioxide reductions" in Table 7b; and "financial savings" in Table 7c. It becomes very clear that one person making one small step can grow into a collective action with significant results.

Table 7a. Total Environmental Savings in the City (units at bottom of chart)

	WATER		WASTE		TRANSPORT		ENERGY	
	TODAY	ASAP: reduce 20%	TODAY	ASAP: reduce 20%	TODAY	ASAP: reduce 20%	TODAY	ASAP: reduce 20%
one person	88	70	4.4	3.5	24	19	15	12
one family	210	168	18	8	58	47	36	28
one 'hood	474,075	379,260	23,839	19,071	131,442	105,154	80,157	64,125
one city	56,975,975	45,580,780	2,865,078	2,292,062	15,797,174	12,637,740	9,633,511	7,706,809
	SAVINGS IN ONE DAY IN THE CITY							
	11,395,195		573,016		3,159,435		1,926,702	
	SAVINGS OVER 30 YEARS IN THE CITY							
	209,519,134,125		10,535,819,316		58,091,332,530		35,425,544,400	
	gallons of water		lbs of waste		miles driven		kWh of energy	

Table 7b. Total Carbon Dioxide Reductions in the City (lbs of CO2)

	WASTE		TRANSPORT		ENERGY		
	TODAY	ASAP: reduce 20%	TODAY	ASAP: reduce 20%	TODAY	ASAP: reduce 20%	
one person	2.77	2.21	22	18	20	16	
one family	6.64	5.31	54	43	49	39	
one 'hood	14,992	11,994	120,927	96,741	109,815	87,852	
one city	1,801,823	1,441,459	14,533,400	11,626,720	13,197,910	10,558,328	
	SAVINGS IN ONE DAY IN THE CITY						TOTAL lbs CO2
	360,365		2,906,680		2,639,582		5,906,627
	SAVINGS OVER 30 YEARS IN THE CITY						TOTAL lbs CO2
	6,625,888,860		53,444,025,928		48,532,995,828		108,602,910,616

Table 7c. Total Financial Savings in the City ($)

	WATER		TRANSPORT		ENERGY	
	TODAY	ASAP: reduce 20%	TODAY	ASAP: reduce 20%	TODAY	ASAP: reduce 20%
one person	$0.56	$0.45	$3.60	$2.88	$1.21	$0.97
one family	$1.35	$1.08	$8.65	$6.92	$2.90	$2.32
one 'hood	$3,055	$2,444	$19,521	$15,617	$6,556	$5,245
one city	$367,153	$293,723	$2,346,115	$1,876,892	$787,896	$630,317

	SAVINGS IN ONE DAY IN THE CITY			TOTAL $
	$73,431	$469,223	$157,579	$700,233
	SAVINGS OVER 30 YEARS IN THE CITY			TOTAL $
	$1,350,141,300	$8,627,425,623	$2,897,350,312	$12,874,917,235

Conclusion and Next Steps

As energy and fuel prices continue to rise, the amount of money saved by the residents will increase. From just one year ago, the price of gasoline increased 36% or $0.80 a gallon, which means families are paying $842 more this year than last for transportation alone. If the electricity cost increased by $0.02 per kWh, families would pay another $300 per year. Conservation measures pay for themselves and are less expensive than finding new supplies or building new infrastructures. The cost of not doing the actions is greater than doing them. It would take less than three months to pay off the cost of the 20% water conservation strategies for all 271,324 existing homes (based on an estimated cost of $20 for one low flow shower head and two faucet aerators). A phased citywide program could be arranged so the cost of the measure is paid for with the savings and the resident would never see the additional charge.

- **City Specific ASAP Actions.** The cumulative results achieved by these individual actions can then be applied to help remedy specific social-economic issues within the city. The money potentially saved over the next 30 years is enormous – almost 13 billion dollars (Table 7c). The amount of money potentially saved by conserving energy in one year alone is almost $58 million dollars (Table 6b) which is also the estimated deficit of the Baltimore City Public School System (Walaika 2004). A $0.50 charge per ton of cargo traveling through Baltimore's Port would yield $15 million dollars in one year (Port of Baltimore 2006) and could be used to further develop the Chesapeake Bay Environmental fund. A $2 increase in dumping fees at Baltimore's landfills would yield $949,000 a year based on the 400,000 tons of waste received every year and the city's 1300 ton daily estimates (DPW 2007) and could support recycling efforts in the city. The Northeast Maryland Waste Disposal Authority also estimates that we will run out of landfill space by 2011 (Kolodziejski 2002). The revenues created through the conservation Action Plans and "taxes" on non-conservation efforts can increase operating budgets for badly needed social services and fund initiatives to support "green collar" jobs.

- **The Green Collar Economy**. Sustainability has the potential to stimulate economic growth and create what is becoming known as a "green collar" economy. Education, stewardship training, and employment in weatherization and conservation fields can bring jobs back to Baltimore. From 1970 to 1990 the city lost over 50% of its manufacturing jobs (EPA 2000a). More jobs in Baltimore reduce vehicle miles traveled and travel time of its residents as 54.8% of Baltimore residents hold jobs outside of the city (DBED 2006) and the mean travel time to work for African Americans is 35 minutes while the U.S. average is 25 minutes (Census 2002c, 2002a).

  Green collar jobs are careers that support the ASAP strategies of conservation. In existing home rehabilitation they are repairs, retrofits, replacements and renovations including sealing air leaks, replacing windows, checking systems, increasing insulation, installing faucet aerators, and repairing water leaks. In new home construction, they are installing systems such as tankless water heaters, rainwater harvesting, solar hot water heating, and photovoltaic panels. Green collar jobs do more then benefit the natural environment - they lead to career paths, pay decent wages, support local economies and help to pull people out of poverty.

- **Conclusion.** This Assessment Study and Action Plan for Baltimore City is a first step that has the potential to develop into policy programs, educational initiatives, and consumer awareness efforts. The outcomes demonstrate that if every individual and family made a small change in their homes today, the results would accrue over time and when families join together into neighborhoods and neighborhoods into cities. The money saved benefits public services with additional funds, individuals and families with increased monthly income, and the environment benefits through resource preservation.

  Historically, Baltimore has shown great initiative towards physical, natural, and social environments and is a city of many firsts in the nation: first water company, street lights, public carrier railway, commercial electric car line, water taxi transportation, public library, and YMCA (BACVA 2006c). The future of Baltimore and a sustainable world depends on achieving environmental and social equity within our cities as soon as possible.

References

American Lung Association. 2004. "State of the Air: 2004." www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=50752. New York, N.Y.: American Lung Association.

Architecture 2030. 2006. "The Building Sector." www.architecture2030.org/current_situation/building_sector.html. Sante Fe, N.Mex.: Architecture 2030.

Ballparks. 2006. "Present National Football League Stadiums." www.football.ballparks.com. n.p.: Ballparks.com.

[BACVA] Baltimore Area Convention and Visitors Association. 2006. "Baltimore Firsts." www.baltimore.org/visitors/v_bfirsts.html. Baltimore, Md.: BACVA.

Baltimore State's Attorney Office. 2006. "Authorities: Juvenile Killers Getting Younger, More Violent." www.stattorney.org/juvenile_article3.html. Baltimore, Md.: The WBALChannel.com

[BGE] Baltimore Gas and Electric. 2006. "Home Energy Calculator/" http://bge.apogee.net/homesuite/calcs/rescalc/default.aspx. Baltimore, Md.: BGE

[BNIA] Baltimore Neighborhood Indicators Alliance. 2000. "Community Statistical Area Profile." www.ubalt.edu/bnia/indicators/baltimorecity.pdf. Baltimore, Md.: University of Baltimore, The Jacob France Institute.

[Census] U.S. Census Bureau. 2002a. "Fact Sheet, Census 2000 Demographic Profile Highlights: Maryland." www.factfinder.census.gov. Washington, D.C.: U.S. Census Bureau.

--. 2002b. "Fact Sheet, Census 2000 Demographic Profile Highlights: Baltimore city, Maryland." www.factfinder.census.gov. Washington, D.C.: U.S. Census Bureau.

--. 2002c. "Fact Sheet, Census 2000 Demographic Profile Highlights: Baltimore city, Maryland, Selected Population Group: Black or African American alone." www.factfinder.census.gov. Washington, D.C.: U.S. Census Bureau.

--. 2006. "State and County Quick Facts, Baltimore City." http://quickfacts.census.gov/qfd/states/24/2404000.html. Washington, D.C.: U.S. Census Bureau.

Christie, L. 2007. "The richest (and poorest) places in the U.S." http://money.cnn.com/2007/08/28/real_estate/wealthiest_states/. New York, N.Y.: CNN, Cable News Network.

CityRating.Com. 2002. "Crime Statistics." www.cityrating.com/citycrime.asp?city=Baltimore&state=MD. n.p.: CityRating.com

Clean Air Council. 2008. "Waste Facts and Figures." www.cleanair.org/Waste/wasteFacts.html. Philadelphia, Pa.: Clean Air Council.

Corburn, J. 2007. "Reconnecting with our roots: American urban planning and public health in the twenty-first century." *Urban Affairs Review*. Thousand Oaks, Calif.: Sage Publication.

[DBED] Maryland Department of Business and Economic Development. 2006. "Transportation." http://researchtools.choosemaryland.org/comparison/resultsProcessSA.asp?FA=3&SAId=6. Baltimore, Md.: DBED.

[DHR] Maryland Department of Human Resources. 2005. "Baltimore City Snapshot 2005." www.dhr.state.md.us/pi/pdf/bcity.pdf. Baltimore, Md.: DHR.

[DNR] Maryland Department of Natural Resources. 2005. "Baltimore City To Set Urban Tree Canopy Goal To Improve Air, Water Quality." www.dnr.state.md.us/dnrnews/pressrelease2005/100505b.html. Annapolis, Md.: DNR.

[DPW] Baltimore Department of Public Works. 2007. "Bureau of Solid Waste Responsibilities and Services." www.baltimorecity.gov/government/dpw/waste.php. Baltimore, Md.: DPW

Ditkoff, A. 2006. "Murder by Numbers: A Look Behind The Sad Statistics Of Baltimore's 2005 Homicide Toll." *Baltimore City Paper.* January 18.

[EIA] Energy Information Administration, U.S. Department of Energy. 2004. "What are Green House Gases." www.eia.doe.gov/oiaf/1605/ggccebro/chapter1.html. Washington, D.C.: EIA.

[EPA] U.S. Environmental Protection Agency. 2000a. "Brownfield's Assessment Pilot Fact Sheet." http://epa.gov/brownfields/html-doc/baltimo2.htm. Washington, D.C.: EPA.

--. 2000b. "Emission Facts: Average Annual Emissions and Fuel Consumption for Passenger Cars." www.epa.gov/otaq/consumer/f00013.htm. Washington, D.C.: EPA.

--. 2006. "Personal Emissions Calculator." www.epa.gov/climatechange/emissions/ind_calculator.html. Washington, D.C.: EPA.

--. 2007. *Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2007.* www.epa.gov/oms/fetrends.htm. Washington, D.C.: EPA.

Ewing. H. and R. Grady. 2005. "The Boys of Baraka." New York, N.Y.: Loki Films.

Frece, J. 2006. *Today's Vision, Tomorrow's Reality: Summary Report of the "Reality Check Plus" Growth Visioning Exercises*. Baltimore, Md.: Reality Check Plus. September 26.

[GHCC] Greater Homewood Community Corporation. 2003. "Adult Literacy and ESOL." www.greaterhomewood.org/education/AdultESOL/adultesol.htm. Baltimore, Md.: GHCC.

[GSFC] Goddard Space Flight Center, NASA. 2002. "Students Join Scientists in Search of Asthma Triggers." www.gsfc.nasa.gov/topstory/2002/20020614baltasthma.html. Greenbelt, Md.: GSFC.

Kolodziejski, J. and G. Winfield. Department of Public Works. 2002. "Ten Year Solid Waste Management Plan, Chapter 4." www.baltimorecity.gov/government/dpw/SW10yrPlan/SW10yrMgmtPlan4.pdf. Baltimore, Md.: City of Baltimore.

Live Baltimore Home Center. 2006a. "Neighborhoods." http://www.livebaltimore.com/nb/list/. Baltimore, Md.: Live Baltimore Home Center.

--. 2006b. "Baltimore City Population." http://www.livebaltimore.com/ID=3621/TYPE=1633/Census_Population_Chart.pdf. Baltimore, Md.: Live Baltimore Home Center.

Morgan Quitno Corporation. 2006. "13th Annual America's Safest (& Most Dangerous) Cities." www.morganquitno.com/cit07pop.htm#500,000+. Lawrence, Kans.: Morgan Quitno Press.

National Aquarium in Baltimore. 2004. "Behind the Scenes." http://www.aqua.org/downloads/pdf/BehindtheScenes.pdf. Baltimore, Md.: National Aquarium in Baltimore.

[NHTS] National Household Travel Survey. 2001. "Do More Vehicles Make More Miles?" http://nhts.ornl.gov/2001/presentations/vehicleMiles/index.shtml. Knoxville, Tenn.: Oak Ridge National Laboratory (ORNL).

Parks and People. 2006. "Benefits of Urban Trees." www.parksandpeople.org/publications/special_reports/Benefits_of_Urban_Trees.pdf Baltimore, Md.: Parks and People.

Port of Baltimore, 2006. "Port of Baltimore sets Cargo Records in 2006. www.mpa.state.md.us/news/press/2007/PortSetsCargoRecords.pdf Baltimore, Md.: Maryland Port Administration.

[RITA] Research and Innovative Technology Administration, 2003. "From Home to Work, the Average Commute is 26.4 minutes." www.bts.gov/publications/omnistats/volume_03_issue_04/html/entire.html. Washington, D.C.: U.S. Department of Transportation.

Schools K-12. 2006. "Baltimore Schools." www.schoolsk-12.com/Maryland/Baltimore/index.html. San Diego, Calif.: Tanner Williams Group, Inc.

[Teen Pregnancy] National Campaign to Prevent Teen and Unplanned Pregnancy. 2006. "County and City Birth Data." www.teenpregnancy.org/resources/data/countycitydata.asp. Washington, D.C.: National Campaign to Prevent Teen and Unplanned Pregnancy.

[UNFPA] United Nations Population Fund. 2007. "State of the World Population" www.unfpa.org/swp/2007/english/introduction.html. New York, N.Y.: UNFPA.

[USGS] U.S. Geological Survey, Department of Interior. 2005. Water Q&A: Water Use at Home." http://ga.water.usgs.gov/edu/qahome.html#HDR3. Reston, Va.: USGS.

--. 2006. "USGS Chesapeake Bay Activities, Water Quality and Quantity." http://chesapeake.usgs.gov/waterquality.html. Reston, Va.: USGS.

[USGBC] U.S. Green Building Council. 2008. "WEc3: Water Efficiency Template." *LEED-NC Rating System.* Washington, D.C.: USGBC

Walaika, H. 2004. "The Big Payback." *Baltimore City Paper.* April 14.