Table 2-2. BNL Pollution Prevention, Waste Reduction, and Recycling Programs.

Waste Description	Type of Project	Pounds Reduced, Reused, Recycled or Conserved in 2008	Waste Type	Potential Costs for Treatment & Disposal	Cost of Recycle, Prevention	Estimated Cost Savings	Project Description Details *
Recycling containers	Recycling	600	Industrial waste	3000	$3,253	$0.00	Purchased 34 sets of recycling containers to increase recycling rates in conference rooms.
Timer switches*	Energy conservation	N/A	Greenhouse gas	N/A	$3,415	$5,386	Installation of motion detector and IR lighting in in labs in Bldg 535
Water timers	Water conservation	80,000	Potable water	N/A	$580	$164	Water timers allow the taps to be shut off after a specific amount of time running or a specified number of gallons is released, saving water and energy required to run the still.
Motion sensors for labs*	Energy conservation	N/A	Greenhouse gas	N/A	$4,320	$5,817	Installation of motion detector lighting in common areas of Buildings 490 and 463.
“Bio Circle Cleaner” parts washer	Substitution	640	Hazardous waste	$10,000	$4,461	$10,000	Eliminates the need for toxic solvents, chemical storage, and disposal associated with the cleaning of vacuum parts.
Aerosol can disposal system	Recycling	528	Hazardous waste	$12,000	$0	$12,000	Empty aerosol cans are recycled as scrap, rather then sent to the Waste Management Division as hazardous waste. Eight units (F&O=5; CA=1; NSLS=1; BES =1) each handle 66 lbs of hazardous waste.
Portable closed-head drum mixer	Neutralization	1,600	Hazardous waste	$9,720	$0	$9,720	The National Synchrotron Light Source (NSLS) bought a closed drum mixer to neutralize Rydlyme, used to descale cooling pipes.
Formaldetox	Source reduction	8	Non-hazardous waste (neutralized approx 1 gallon)	$25	$0	$25	Neutralizes nonhazardous para-formaldehyde, chlorix, bleach, and rat blood.
HPLC solvent recycler	Reuse	110	Hazardous waste	$2,500	$0	$6,755	Allows reuse of approximately 50 liters of solvent and saves approximately 50 labor hours.
Propane cylinder de-valver	Recycling	75	Hazardous waste	$7,500	$0	$7,500	The Collider Accelerator Division bought a propane cylinder de-valver to avoid sending cylinders to a disposal vendor at $75 each; they are now recycled as scrap.
Fluorescently-labeled oligonucleotides	Waste minimization	3,144	Radiological waste (396 ft^3); Mixed waste (35 gallons); Hazardous Waste (108 gallons)	$67,600	$0	$67,600	This project was cost-shared with Biology. The process avoids the use of radioactivity, thus avoiding radiological waste generation. This process won a 2008 DOE P2 Star Award.
Electronic recycling	Recycling	106,545	E-waste	N/A	$2,300	N/A	The Laboratory has partnered with a government-based e-waste recycler (UNICOR) which guarantees that its e-waste is recycled in the most environmentally friendly manor. BNL pays shipping fees to the recycling facility.
Building demolition recycling	Recycling	7,200,000	Industrial waste	$327,600	$32,000	$295,600	On-site demolition products (steel and concrete) are segregated, recycled, and reused.
System One parts cleaner	Substitution	640	Hazardous waste	$10,000	$0	$10,000	Plant Engineering bought a System One parts washer to re-distill dirty solvent, eliminating the need for a vendor, such as Safety Kleen. Removed grit and sludge are mixed with the waste oil.
Photon-counting spectro-fluorimeter	Substitution	54	Mixed waste (2 ft^3)	$29,792	$0	$79,792	Eliminated the need for radioactive assays and their radioactive waste. Savings include 1,000 work-hours and savings on material costs.
Replacement of mercury utility devices	Substitution	40	Mercury	$2,350	$4,000	$2,350	Approximately 48 lbs of mercury-containing devices were removed from utility devices during 2008. Savings are based on the cost of one mercury spill and cleanup.
Animal bedding conveying system	Composting	84,000	Low-level Radiological Waste	$841,428	$0	$841,428	Animal bedding material is no longer sent to sanitary landfill. It is now conveyed to a dumpster that is emptied or composted at the stump dump.
Plant Engineering grounds vehicle wash system *	Waste minimization	8,000	Oils/grease to soils	$16,000	$3,000	$13,000	This multi-year, multi-department project was completed in 2007 and eliminates the potential of oil and grease being released to soil.

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Organic solvents	Substitution	678	Hazardous waste	$1,694	$0	$26,000	A Microwave Peptide Synthesizer, in Life Sciences, significantly reduces the hazardous wastes generated and saves ~1,000 work-hours/year (reflected in cost savings).
Organic solvents	Purification/ reuse	44	Hazardous waste	$110	$0	$3,510	The primary savings of the BES solvent purification system are in not purchasing new solvent and labor savings from not running the stills.
Cooling water	Reuse	63,400	Deionized water	$0	$0	$7,925	A closed-cycle water recycling system for the Building 480 melt spinner saved 7,925 gallons of ultra-pure water and extends the life expectancy of equipment worth $100,000.
Mercury utility devices	Substitution	37	Mercury	$2,300	$0	$2,300	Plant Engineering replaced mercury-containing utility devices with mercury-free equipment in 2007. Savings are based on the cost of one mercury spill and cleanup.
Radioactive emissions	Emission reduction	0	Radioactive emissions	$0	$0	$0	A shroud was installed over the 16-inch diameter shaft in the Hot Cell of the Brookhaven Linac Isotope Producer, isolating cooling water from the rapidly moving air of the exhaust system and allowing radiological decay within the water system. Slowing the diffusion into the hot cell air will effectively reduce gaseous emissions into the exhaust stack, as these radionuclides have very short half lives. The shroud/ enclosure has been instrumental in reducing short-lived radioactive gaseous emissions. Beyond the environmental benefits associated with the project and due to the efficiency of the enclosure in reducing emissions, the facility has been able to stay below the emissions level that would require additional regulatory burdens.
Radioactive waste generated through wet chemistry	Waste minimization	30	Mixed waste/ Liquid radioactive waste	$17,600	$0	$22,500	The use of a Kinetic Phosphorescence Analyzer (KPA) system for uranium analysis eliminated mixed waste generation in a chemistry lab, reduced 90 percent of the volume of liquid waste, 90 percent of radioactive material handled, minimized exposure to uranium by Laboratory personnel, and decreased labor costs by 75 percent.
Radioactive waste from labeled chemicals	Waste minimization/ volume reduction	0	Solid radioactive waste	$2,168	$0	$2,168	A vial crusher for glass vials, pipettes, and other glassware reduces the volume of rad waste.
Radioactive and mixed wastes from radio-labeled chemicals	Waste minimization	112	Mixed waste	$27,690	$0	$27,690	Use of a microplate scintillation counter generates less mixed waste.
Electrophoretic Mini-Gels	Microscale chemical use	2,200	Hazardous waste - lab pack	$11,500	$0	$11,500	Minimizing silver waste from silver-staining electrophoretic mini-gels saves waste disposal costs and lowers material purchase costs ($6,000).
Film and other radioisotopic imaging	Substitution	300	Hazardous waste/ Industrial waste	$5,468	$0	$5,468	Replacement of film-based autoradiography and other radioisotopic imaging with a Phosphor Imager reduced waste generation by 200 lbs of hazardous waste and 100 lbs of industrial waste. Additional projected savings are in annual supply costs and labor reduction.
Lead acid batteries	Recycled	7,440	Universal waste	$30,132	$0	$30,132	Avoids hazardous waste disposal costs for approximately 40 lbs of lead per battery.

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Ion exchange wastewater	Source reduction	1250	Hazardous and sanitary wastewater	$3,125	$0	$3,125	Prefilters, added to the deionization system, polish makeup water entering the ion exchange system. This extends the useful life of the ion exchange resins, requiring less frequent regeneration. The regeneration process generates hazardous and sanitary waste.
Short half-life waste	Decay in storage	490	Radioactive waste	$16,389	$0	$16,389	Short half-life isotopes, particularly iodine-125 and phosphorus-32, are often used in life sciences experiments. In 2007, wastes from these operations (21.5 ft^3 and 133 lbs of liquid) were managed in accordance with BNL decay-in-storage requirements, rendering the wastes eligible for volumetric release.
Cooling Tower chemicals	Source reduction	9,563	Industrial waste	$22,500	$0	$22,500	Ozone water treatment units were installed on cooling towers at SEM, the National Space Radiation Laboratory, and the Relativistic Heavy Ion Collider Research Facility for biological control of cooling water. These systems eliminate the need for water treatment chemicals (typically toxic biocides), save labor, and reduce analytical costs for monitoring cooling tower blowdown.
Blasocut machining coolant	Recycled/ Reused	26,720	Industrial waste	$71,154	$0	$76,754	Central Shops Division operates a recycling system that reclaims Blasocut machining coolant and supplies it Laboratory-wide. In 2008, 3,340 gal (26,720 lb) of Blasocut lubricant were recycled. Recycling involves aeration, centrifuge, and filtration. This avoids cost of disposal as industrial waste and an avoided cost of buying seven drums of concentrate ($800/drum) and 67 empty drums for shipping ($50/drum).
Used motor oil	Energy recovery	12,000	Industrial waste	$31,860	$0	$31,860	Used motor oil from the motor pool and the on-site gas station is given to Strebel's Laundry Service to fire their boilers. In 2008, they collected 1,500 gallons of oil at no charge to BNL, which avoided the costs for disposal and 30 shipping drums ($50/drum).
Office paper	Recycled	301,180	Industrial waste	$15,963	$0	$15,963	Cost avoidance based on $106/ton for disposal as trash.
Cardboard	Recycled	294,220	Industrial waste	$15,594	$0	$15,594	Cost avoidance based on $106/ton for disposal as trash.
Metals	Recycled	920,610	Industrial waste	$48,792	$0	$140,853	Cost avoidance based on $106/ton for disposal as trash, plus $150/ton revenue.
Bottles/cans	Recycled	39,140	Industrial waste	$2,074	$0	$2,074	Cost avoidance based on $106/ton for disposal as trash.
Construction debris	Recycled	604,760	Industrial waste	$13,607	$0	$13,607	Cost avoidance based on $45/ton difference for disposal as trash
	TOTALS	9,688,918		$1,666,235	$41,300	$1,823,682	

* Cost savings of projects funded by the BNL Pollution Prevention Council will be tracked for 3 years.