

*Atlantic County Utilities Authority:
Building Renewable,
Sustainable and
Carbon-free Operations*

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ABSTRACT

The Atlantic County Utilities Authority (ACUA) has two divisions, Solid Waste and Wastewater, and holds as its mission to be an environmental leader responsible for enhancing the quality of life for its residents through the protection of waters and lands from pollution by providing responsible waste management services.

ACUA's mission is accomplished via the use of new technologies, innovations and employee ideas. These technologies include the use of sustainable landfill technologies and waste diversion strategies. Wastewater, the most energy intensive of the two divisions, now derives the majority of its energy from on-site renewable sources. ACUA was also the first New Jersey organization to join the Chicago Climate Exchange (CCX). CCX is the world's first and North America's only legally binding, voluntary greenhouse gas (GHG) emission registry, reduction and trading system.

Additionally, ACUA is developing several projects. At Wastewater, two beneficial reuse projects are underway: a Category I in Smithville, NJ and a Category IV for Marina Energy in Atlantic City, NJ. Both projects are anticipated to be operational by 2010 and process a combined 155 million gallons of water per year. At the Environmental Park, there are two exciting projects anticipated for development in 2009: a compressed natural gas (CNG) station and a landfill solar project.

ACUA OPERATIONS

Wastewater Division

As the world's first wind powered wastewater treatment plant, ACUA is on the cutting edge. Operating 365 days around the clock, Wastewater is home to a 40 million gallon per day activated sludge treatment plant with 20 regional pumping stations serving 14 member municipalities in Atlantic County. There are: 24 mixers at 100 horsepower each; effluent pumping to the ocean at 1,250 horsepower; and dewatering centrifuges at 1,000 horsepower.

The Jersey-Atlantic Wind Farm (JAWS) is a 7.5 megawatt system that became operational in December 2005 and has performed above expectations. The wastewater treatment plant is also powered by a 500 kW solar photovoltaic (PV) system.

Total energy use at the plant is 2.5 megawatts with energy costs that, prior to these renewable initiatives, represented about 16-percent of the ACUA Wastewater operating budget. The Wastewater facilities now receive approximately 62-percent of their total electricity from renewable energy generated on-site. The JAWS long-term, discounted power purchase agreement alone saved ACUA ratepayers over \$664,000 in 2008.

Figure 1 is a clear testament to the viability of renewable energy as both a financial and environmental success with implementation of the right business model.

Solid Waste Division

The Atlantic County Utilities Authority Environmental Park and Landfill is a unique and progressive complex that provides solid waste and recycling services for the 270,000 residents and over 5,000 businesses in the greater Atlantic City area.

The ACUA landfill serves southeastern New Jersey including Atlantic City. This landfill is highly buffered from surrounding land uses and is located within the Howard F. Haneman Environmental Park (Figure 2), situated in Egg Harbor Township, Atlantic County, New Jersey. In addition to the landfill, the Environmental Park also includes a transfer station, scale house, recycling center, maintenance center, administrative offices, greenhouse, composting site, hiking trails, observation deck, picnic areas, amphitheater, and playground. All of the energy required by the Environmental Park operations is generated by the landfill gas-to-energy initiative.

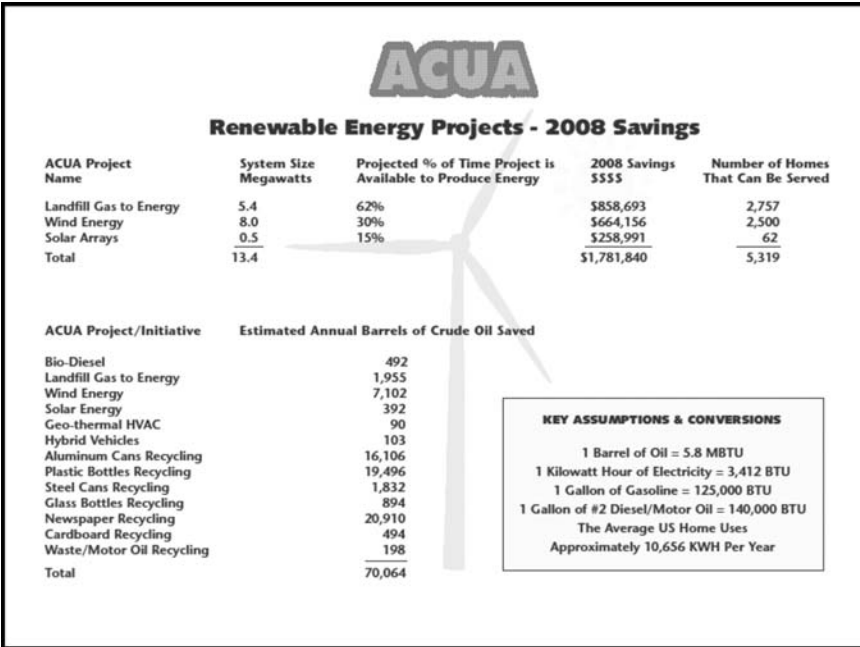


Figure 1. ACUA Renewable Energy Projects.



Figure 2. Howard F. Haneman Environmental Park.

WASTEWATER INITIATIVES

ACUA Cost Benefit—JAWS

As mentioned, energy costs at the wastewater plant were reduced by almost \$664,000 in 2008 as a result of JAWS. The discounted power purchase agreement enables the purchase of electricity for a flat rate of 7.95 cents/kWh over 20 years. This is important because grid electricity with transportation is more than 13.5 cents/kWh. The savings is primarily attributed to energy transmission costs. Wind energy has no transmission cost, amounting to a savings of approximately 3.5 cents/kilowatt while energy purchased from the grid includes this cost. On top of the electric savings realized, ACUA receives \$15,000 annually in rental income for the property on which the turbines stand.

The New Jersey Board of Public Utilities (NJ BPU) Clean Energy Incentive funded \$1.7 million, which represented 14% of the \$12.5 million total project cost. Project developer, Community Energy also applied for a \$1.92 million customer supply grant through Atlantic City Electric. The remaining costs were funded by equity investors and/or debt financing. Bottom line, ACUA viewed JAWS as a cost effective and environmentally responsible way to serve our ratepayers and stabilize our electricity costs over the long term.

ACUA'S Solar Portfolio

The solar electric (PV) project, unlike JAWS and other ACUA renewable projects, is wholly owned, operated and maintained by the ACUA. The design and build contract was awarded in April 2005 to World Water & Power Corporation and The Conti Group. The \$3.25 million project was funded by a \$1.9 million customer on-site renewable energy (CORE) rebate from the board of public utilities and a low-interest loan from the New Jersey Environmental Infrastructure Trust Program.

It is a 500 kilowatt (DC) system with 2,700 electric modules or panels installed at five locations at the ACUA wastewater treatment facility. The five locations, each known as a solar array, include two ground-mounted and two roof-mounted arrays, and a parking lot canopy array. The PV system does not produce enough electricity to allow grid supply or net metering, so each array provides solar generated electricity directly to the plant's electrical system.

The project was constructed in two phases. The first phase included the installation of the two roof-mounted arrays, the canopy array over

the employee parking lot, and a small ground-mount array for a total output of 280 kilowatt (DC). The second phase of the project began late 2005 and included a 220 kilowatt (DC) ground-mount array. The project was completed and fully operational by June 2006.

An average 660,000 kilowatt-hours (kWh) of electricity annually is produced by the solar arrays, which enable the ACUA to save more than an average of \$150,000 per year. These savings are comprised of avoided electricity costs and proceeds from the solar renewable energy credits (SRECs). SRECs are marketable environmental attributes that can be used to satisfy renewable portfolio standards (RPS) implemented by some states. The ACUA sold its first group of 135 SRECs for \$32,000 in June 2006. The ACUA entered into a two-year contract to sell SRECs, generated from June 1, 2006, through May 31, 2008, for \$220 per REC or an estimated \$145,000 per year. RECs for the energy year ending May 31, 2009 will be sold for \$640 per REC, or approximately \$415,000 revenue to the ACUA.

Table 1 provides a concise picture of both the financial and environmental benefits of the solar electric project at the ACUA.

Table 1. Basic Financials Statement

Solar System Financial Statement - Basic 2008	
	<u>Total</u>
Energy Production (kWh)	665,737
Avoided Electric Expense	\$ 90,179.54
REC Revenue	<u>\$ 338,415.68</u>
Revenue/Savings	\$ 428,595.22
Debt Service (monthly equivalent)	<u>\$ 145,000.00</u>
Net Savings to ACUA	<u>\$ 283,595.22</u>
Savings/(Cost) per kilowatt	<u>\$ 0.426</u>
# RECs produced (energy produced/1,000)	665.7
RECs for the energy year ending May 31, 2009 will be sold for \$640 per REC	

SOLID WASTE INITIATIVES

The 365-acre Environmental Park is appropriately located in an industrial area. Just seven miles from Atlantic City, it is easily accessible as a result of major traffic improvements that were put in place by the ACUA. The site is naturally buffered on all sides by woodlands.

Elements that make ACUA's Solid Waste facilities extraordinary include:

- A 5.4 MW landfill gas-to-energy (LFG) system.
- The Environmental Park is a model of energy efficiency. In addition to the LFG system, the park includes a geothermal office building.
- An impressive fleet of 106 trucks and pieces of equipment that are fueled by biodiesel, the largest fleet to do so in New Jersey. The ACUA also owns six hybrids and remains committed to only purchasing alternative fuel vehicles. In addition, 23 municipal vehicles and 4 Atlantic County vehicles use biodiesel and fill-up at the ACUA.
- An integrated recycling program that was put in place in 1988 to provide for the recycling of commingled materials, fiber, green waste, tires, oil, paint, concrete, and brick. Curbside recycling went single stream effective January 1, 2009 and is provided to 19 municipalities on a contractual basis by the ACUA.

Overviews of two initiatives, landfill gas-to-energy and ACUA's membership on the Chicago Climate Exchange (CCX), are provided in the next two sections.

Landfill Gas to Energy Overview

This ACUA landfill gas-to-energy project, Figure 3, was fully funded by a third party, AC Landfill Energy, LLC, a joint venture of DCO Energy and South Jersey Industries. Methane gas produced by the landfill powers a total of 5.4-MW engine generators; a 1.6-MW Caterpillar® generator installed in 2006, and two 1.9-MW Caterpillar® generators installed in 2007.

The 1.6-MW generator powers the entire Environmental Park with



Figure 3. ACUA Landfill Gas to Energy Project

excess energy sold to the PJM grid. The excess energy from two 1.9-MW generators is sold to The Borgata Casino Spa & Hotel and the PJM grid.

The LFG project cost totaled approximately \$3 million and was funded via: a \$513,200 incentive from the New Jersey Board of Public Utilities (NJ BPU), a \$375,000 New Jersey Department of Environmental Protection (NJ DEP) grant, and a \$2 million New Jersey Economic Development Authority (NJ EDA) low interest loan. The cumulative energy savings realized by the ACUA from this project from January 2006 through December 2008 totals more than \$2.2 million.

The ACUA estimates a reduction in electric costs and revenues of over \$1,000,000/yr for 2009. The ACUA anticipates that the market value of electricity will increase because of an increase in the amount of renewable energy required in the renewable portfolio standards (RPS) set by the NJ BPU. The savings are as follows: rental income of \$210,000; avoided electricity costs of \$180,000; 20% revenue share of \$560,000; and credit for LFG Flare of \$51,500. ACUA also anticipates receiving approximately \$250,000 in revenue from the Chicago Climate Exchange (CCX). CCX will be discussed in more detail in the next section. Benefits realized with the second generator include 20% of the gross revenues associated with the generator during the year when a production tax credit (PTC) is available.

Figures 4 and 5 show energy production and savings realized by renewable energy sources at the ACUA. Between January 2006 and De-

cember 2008, the ACUA used over 47 million kWh of renewable energy and saved \$4,265,830 in energy costs.

More important than the financial benefits realized by the ACUA are the long-term environmental benefits realized by our community.

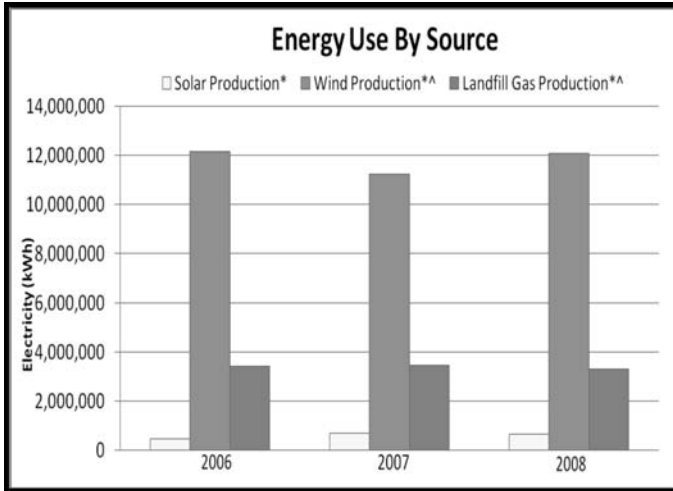


Figure 4. Energy Use by Source.

*energy in kWh

^ accounts only for energy used by ACUA

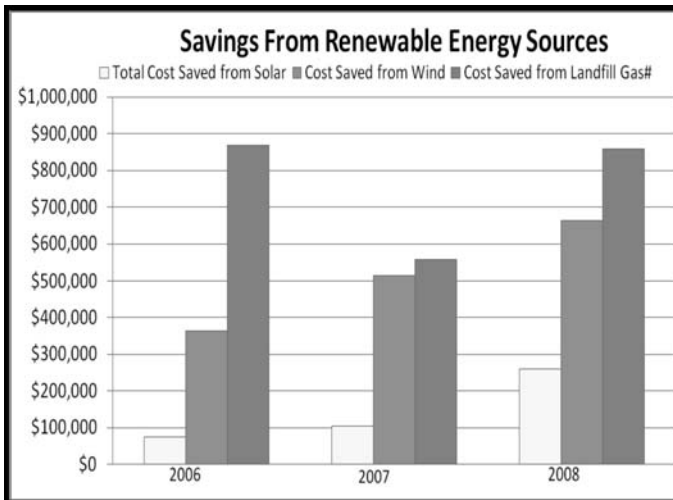


Figure 5. Savings from Renewable Energy Sources.

Note: savings from grid price and revenue from extra energy generated.

Landfill gas is approximately 50% methane, a potent greenhouse gas. Landfill gas is also a source of smog and odor problems. By capturing and using landfill gas, air pollution is reduced and an otherwise wasted source of energy is used. The generators use approximately 1,700 cubic feet per minute of landfill gas which generates enough kWh to power 3,434 homes for one year; generates the energy equivalent of 25,083 barrels of oil; yields the same reduction in greenhouse gases as removing 45,410 cars from the road for one year; and has the same greenhouse gas impact as planting 64,718 acres of trees.

Chicago Climate Exchange Overview

The ACUA was the first organization in New Jersey to join the Chicago Climate Exchange (CCX). This system is called a cap and trade system and is the world's first, and North America's only legally binding, voluntary GHG registry, reduction and trading system for all six greenhouse gases.

By joining CCX, the ACUA has committed to cut its greenhouse gas (GHG) emissions by a minimum of 6% by 2010. This means ACUA is required to reduce GHG emissions by a minimum of 1.2% every year. The ACUA reports annual emissions data to CCX that is then verified by a third party. For the most recent verified year, ACUA reduced GHG emissions by 16%. If reduction goals are met, the ACUA sells GHG credits to other members. Members of CCX who fall short of reduction goals are required to buy credits.

The ability to reduce greenhouse gas emissions stems from a variety of initiatives that the ACUA has implemented including biodiesel fuel and a significant energy efficiency improvement at its wastewater treatment facility. In addition, the ACUA will be able to participate in the CCX's offset market because it has been voluntarily collecting and destroying methane gas generated at its landfill. Figure 6 provides a snapshot of how ACUA will meet the CCX goals.

CONCLUSION

The ACUA holds itself accountable to live up to its role as an environmental leader. Environmental benefits will always be the primary objective of any new initiative undertaken by the ACUA, however, the financial aspects to these initiatives cannot be ignored. As demonstrated

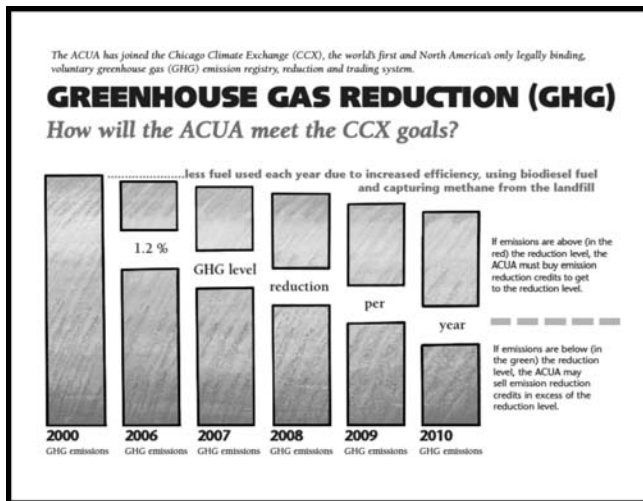


Figure 6. ACUA Greenhouse Gas Reduction.

in this article, being a responsible leader means implementing viable business models that enable a project to come to fruition and eventually sustain itself, benefiting both the entity and the environment. The environmental successes ACUA has worked hard to achieve have been a result of remaining steadfast to our mission while employing sound business practice.

In closing, the technologies and strategies as described in this article, while representing the cutting edge of today, only scratch the surface of what the Atlantic County Utilities Authority will strive towards as we continue building renewable, sustainable and carbon free operations.

References

All information contained in this report was taken from internal ACUA documents and files.

ABOUT THE AUTHOR

Richard S. Dovey is President of the Atlantic County Utilities Authority (ACUA), a position he has held since 1990. While Mr. Dovey has served as president, ACUA wastewater and solid waste operations have been nationally recognized for excellence in innovation, efficiency, and



Figure 7. The Jersey-Atlantic Wind Farm.

environmental stewardship. Mr. Dovey has been a strong proponent of renewable energy. A leader in the New Jersey environmental infrastructure and utility community, Mr. Dovey has served as chairman of the New Jersey Solid Waste Advisory Council and on the Board of Trustees of the New Jersey Association of Environmental Authorities (AEA). Prior to joining the ACUA, he was department head of Regional Planning and Development for Atlantic County Government for eight years, and manager of the Rutland County, Vermont, Solid Waste District for two years. Mr. Dovey is active in numerous community organizations. He is chairman of the Egg Harbor City Industrial Commission, Vice President of the Egg Harbor City Board of Education, and past chairman and current board member of the Community Food Bank of New Jersey, Southern Branch. Mr. Dovey is a supervisor of the Cape Atlantic Soil Conservation District, and a member of the following Chambers of Commerce: Egg Harbor City and Greater Atlantic City. Mr. Dovey may be contacted at rdovey@acua.com.