2009-2011 INDIANA ENERGY MANAGEMENT PILOT

# West Lafayette Wastewater Treatment Plant

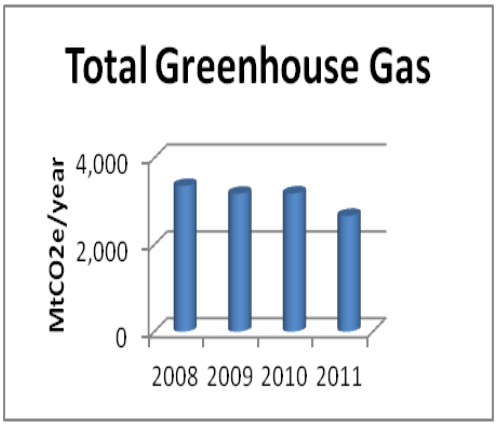
## Who we are

The West Lafayette Wastewater Treatment Plant (WWTP) is a 9 million gallon per day (MGD) activated sludge plant with four 415,000 gallon aeration basins equipped with fine bubble diffusers. The West Lafayette WWTP belongs to the EPA Green Power Partnership, a voluntary program that encourages "green power" as a way to reduce the environmental impact associated with energy use. "Green power" at West Lafayette comes from an innovative waste-to-energy treatment system that co-digests fats, oils and grease (FOG), food scraps, and sludge in anaerobic digesters and then uses the biogas generated to power microturbines. Electricity and heat generated by microturbines are used by the WWTP in a combined heat and power system that conserves energy.

### Electricity Usage

**2008: 4.771 mWh**
**2009: 4.396 mWh**
**2010: 4.328 mWh**
**2011: 3.641 mWh**

**Greenhouse gas (GHG) avoided:**
**691 metric tons carbon dioxide equivalent (2011 compared to 2008 baseline).***




## Project Success Story

Prior to a 2009 upgrade of the primary sludge withdrawal system, one blower was adequate to meet aeration needs. Either one 350 HP unit or one 250 HP unit was used. After the upgrade, however, it was often necessary to run two blowers simultaneously.

As with most WWTPs, blowers draw more energy than any equipment in the plant. Running two blowers, instead of one, was costing the WWTP money and electricity so it was vital to discover why aeration demand had increased and then to mitigate or eliminate this impact.

Operating and laboratory data showed that the removal efficiency of primary clarifiers had deteriorated since the 2009 upgrade of the sludge withdrawal system. Specifically, primary sludge was not being removed quickly enough by the new pumping system. As a result, primary effluent contained higher solids and biological loading which contributed to increased oxygen demand in the aeration tanks.

To correct the problem, the WWTP altered the automation program to increase the amount of sludge pumped from primary clarifiers. This greatly improved the removal efficiency of the primary clarifiers, and reduced the loading on the aeration basins. The reduced loading translated to a more balanced oxygen demand, allowing the WWTP to once again operate with one blower. Operating one blower, instead of two is estimated to save the WWTP $48,400 a year. There was no cost in implementing the change to primary sludge handling so an immediate payback was realized for these improvements.

Greenhouse gas emissions avoided are equivalent to

**Removing 135 vehicles from the road for a year**

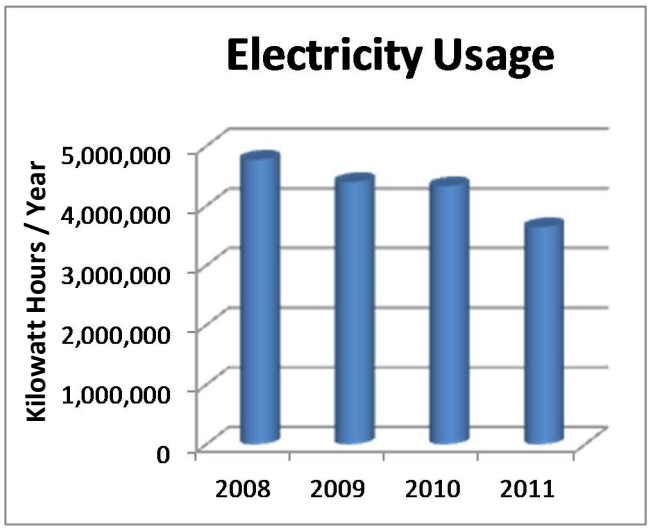
**Electricity for 86.2 homes for a year**

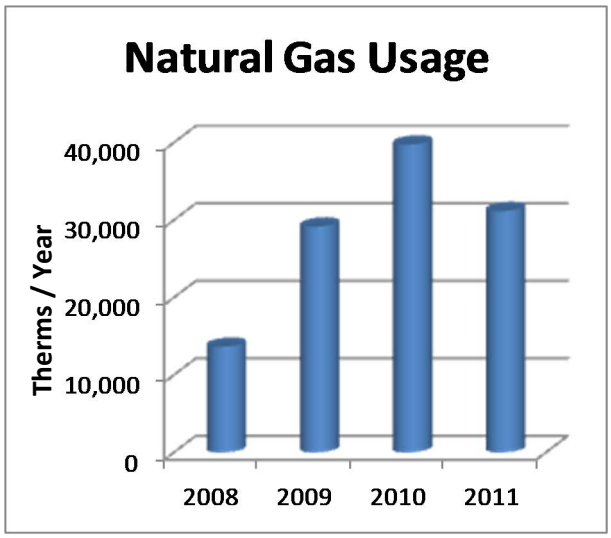
**3.8 Railcars of coal**

**1,607 Barrels of Oil**

Green House Gas Equivalencies calculated using USEPA calculator (http://www.epa.gov/cleanenergy/energy-resources/calculator.html

## Documented Results




## Key Improvements

| Process Targeted / Goal | Improvement and estimated saving | Annual Energy Saving, kWh | Implementation cost, $$ | Annual cost saving, $ | Simple payback, years |
|---|---|---|---|---|---|
| Primary Effluent BOD / Aeration Blower Demand | Reduce BOD loading to Aeration Basin, thereby reducing air demand. Run only one blower, instead of two.<br>$48,400 Estimated Annual Savings | (691,696 projected)*<br><br>So far, 324,819 kWh saved in 2011.* | $0 | ($48,400 projected)*<br><br>So far, $22,700 saved in 2011* | 0 |
| Wet Weather Building Chemical Room Exhaust Fans | Install VFD to reduce fan speed when building is not occupied.<br>$337 Estimated Annual Savings | 4821 kWh* | $3,900 | $337* | 11.5 |

*Above kWh & cost savings are calculations, based on equipment runtimes and the following conversion factor:
1 horsepower = 0.745699872 kW