VIRTELLUS
ENERGY SOLUTIONS

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CASE STUDY

GLOBAL EQUIPMENT MANUFACTURER

Client Background:

The client manufactures an array of equipment for use by residential and commercial customers across 100+ world-wide manufacturing facilities. The client launched a corporate sustainability pilot program to audit and implement resource conservation measures across select business unit facilities. Virtellus was engaged to audit seven (7) facilities and implement projects where appropriate.

The sites were selected for the pilot program based upon a cross-section of business units and geographic locations. The combined annual energy/utility spend for the pilot sites is $14 million.

Energy/Utility Audit Process:

The Virtellus team of energy professionals conducted comprehensive site visits and corresponding energy/utility savings assessments. Site audits were completed in North & South America and Europe. The following were evaluated to identify potential savings opportunities:

- Energy/utility tariffs and available energy efficiency incentives/rebates
- Plant layout, function and operating characteristics
- Review of all production processes
- Compressed air systems
- Process heating systems (steam, hot water, other)
- Process cooling systems (chillers, cooling towers, other)
- Exhaust, ventilation and make-up air systems
- On-site water & waste water treatment
- Electric motors & drives
- Power factor & demand control
- HVAC equipment & systems
- Lighting

Potential energy/utility savings opportunities were identified. The details provided for each measure included (i) scope of work, (ii) capital cost, (iii) energy, utility and operating savings (iv) CO_2 reduction potential and (v) project payback period.

Audit Findings:

The energy audits identified an array of Energy Conservation Measures (ECMs) across the sites:

- Energy Conservation Measures = 79
- Total Estimated Capital Cost = $5.7 million
- Estimated Annual Savings = $1.82 million
- CO_2 Reductions = 12,220 tons

Highlights of the findings include:

- **Compressed Air System**
  - Air leak detection, tagging and repairs
  - Automation system to optimize sequence of operation of air compressors
  - Pressure flow controller to match air supply and demand
  - Addition of air storage receivers
  - Modify air header to allow for lower operating pressures in production areas
  - Engineered high efficiency nozzles for parts movement by air blowing

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- **Process Cooling**
  - Install VFDs on cooling tower fans and circulation pumps
  - Add temperature reset controls to cooling towers
  - Decommission chiller used for process cooling and use existing cooling tower water
  - Redesign process cooling water system to use chillers less and rely more on cooling towers for heat rejection
- **Process Heating**
  - Burner calibration program for all furnaces & boilers
  - Cold standby of boiler (one of three in plant)
  - Install recuperative type burners in heat-treating furnaces to pre-heat combustion air
  - Optimize efficiency of endothermic gas generators
  - Automatic isolation of intermittent steam loads
- **Exhaust/Ventilation**
  - Install VFDs and controls on the exhaust & make-up air system to slow down or turn off fans during low production or unoccupied periods
  - Add fan speed controls to match demand
  - Reduce the airflow of the exhaust system in various production areas
  - Install automated controls that will turn off fans during shutdown or unoccupied periods
  - Operate existing swamp coolers as make-up air units
- **Power Factor Correction**
  - Install PFC equipment to increase the power factor
- **Renewable Energy**
  - Installation of Brise Soleil with solar photocells
- **Building Envelop**
  - Install insulation on exterior walls and roof
- **HVAC**
  - Retro-commission non-process air handlers
  - Automated control of relief air fans
  - Automatic chiller controls
  - VFDs on chilled water pumps
  - Chilled Water Supply (CHWS) temperature resets
  - Replace the existing gas-fired cast iron sectional boilers with high-efficiency condensing boilers
  - Replace convective heaters in the production area with infrared radiant heating
  - Provide spot cooling of personnel workstations in lieu of area cooling in manufacturing area
  - Install programmable thermostats on packaged HVAC systems
- **Lighting**
  - Fluorescent T12 to T8 lamp/ballast conversion
  - Fluorescent T8 to T5 lamp/ballast conversion
  - Install low power electronic ballasts

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Project Implementation:

The client stakeholders evaluated the identified ECMs on their individual merits. Several sites engaged Virtellus to provide turn-key project implementation services for targeted ECMs. Other sites self-implemented specific ECMs. Work completed to date has delivered the following results:

Performed by	Capital Cost	Annual Savings	CO2 (tons)	Payback (yrs)
Virtellus	$ 1,040,000	$ 438,000	2,799	2.4
Client	$ 689,000	$ 245,000	1,773	2.8
	$ 1,729,000	**$ 683,000**	**4,572**	**2.5**

Additional energy savings based projects have been approved and work is underway:

To Be Performed by	Capital Cost	Annual Savings	CO2 (tons)	Payback (yrs)
Client	$ 2,100,000	$ 705,000	4535	2.98

In addition to the energy savings-based projects underway, Virtellus is providing a turn-key HVAC replacement project at one of the facilities:

To Be Performed by	Capital Cost
Virtellus	$ 1,500,000

Client Benefits:

The client has received verifiable annual energy/utility and operating savings of $683,000, along with annual CO2 emissions reductions of 4,572 tons.