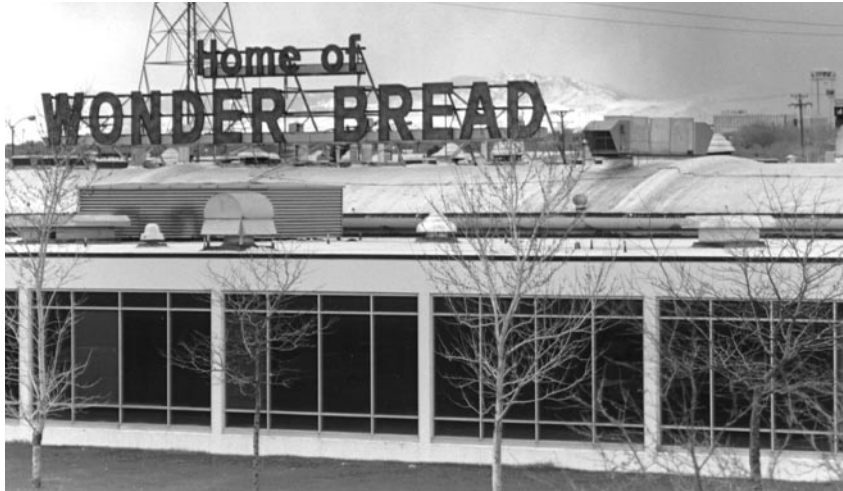


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# Commercial Energy Conservation



## HP Data Acquisition Application Note

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### Description

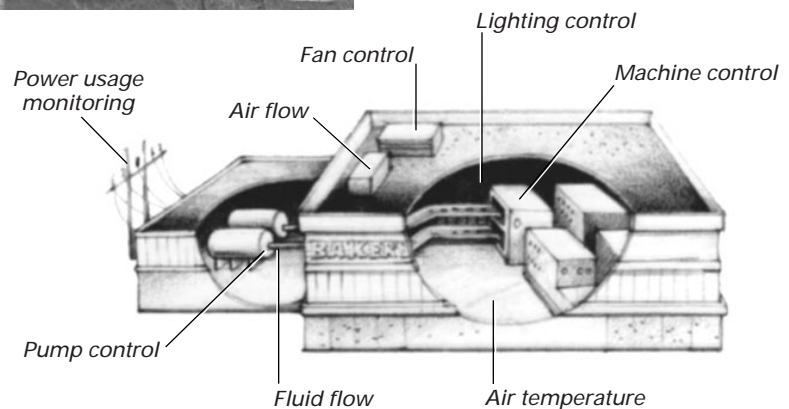
Energy conservation is a concern in any facility where people and machines exist together. By carefully routing warm or cool air emitted by machinery to other areas in the facility, heating and cooling costs can be reduced. By controlling ovens, dishwashers, heaters, air conditioners, furnaces, copiers, and other machinery, peak energy needs can be spread out to save on electricity, natural gas, and water.

### Problem

Companies concerned about saving energy are looking for easy-to-use, inexpensive equipment that can monitor temperatures, pressures, flows, and power consumption. This same equipment must then analyze the measurement data and issue control commands to equipment so that electricity, natural gas, and water are conserved.

### Solution

A VXibus data acquisition and control system from Hewlett-Packard is a cost-effective and easy-to-use solution that can accurately measure a variety of parameters, make decisions, and control those items that can reduce energy costs. Using a computer, a graphical programming software package, and a few peripherals, the system can also archive and document the amount of energy used by every piece of equipment and the amount of energy saved by having a data acquisition system in place. In many cases, the system can pay for itself in energy savings within six months.



### Applications

- Restaurants
- Laundromats
- Bakeries
- Shopping centers
- Department stores
- Office buildings
- Swimming pools
- Schools

### Departments

- Facilities engineering
- Maintenance
- Plant engineering

## Implementation

### Air temperature

Temperature measurements are made at various points both inside and outside a facility to determine which areas have warm or cool air that could be circulated to other areas. From this data, the most efficient combination of outside air, return air, heated air, and cooled air can be determined. Thermocouples and thermistors are the most popular types of transducers for this type of measurement.

### Air flow

Using flow meters (0-1 Vdc), the data acquisition system can monitor the amount of air flowing from one area of a facility to another such as between floors or between buildings in a large complex. Even outside wind speed and outside wind direction can be monitored to determine when and where exhaust gases should be vented from the facility.

### Fluid flow

Water flow and gas flow are frequently measured to determine the amounts being used by a particular piece of equipment. By regulating the flow of fluids throughout a facility, pumps can be used more efficiently. A variety of flow meters are available which can output voltage, current, or a pulse train with a frequency proportional to the flow.

### Power usage monitoring

Monitoring power lines with power transducers (mV outputs) can indicate the amount of power consumed by each piece of equipment. Scheduling this equipment so that only one machine turns on at a time can avoid peaks of power usage followed by periods of low usage. If a company is charged by peak power energy usage, costs can be reduced by load leveling in this manner.

### Machine control

Peak power usage can be reduced by turning off unnecessary equipment during peak power periods. Some machinery can be controlled with digital output modules and solenoids. Other equipment can be controlled directly with high voltage actuators.

### Fan, pump and lighting control

Exhaust fans, circulation fans, water pumps, and similar machinery can be used to move air and water throughout a facility. The use of pumps and fans can be controlled to reduce peak power demands and ensure that energy (in the form of hot or cold air) is moved to areas in the facility where it is needed most. Even the lights can be controlled to reduce energy costs by automatically turning them off when not needed.

## Key System Features

- VXIbus open architecture
- Data Acquisition and Control on a single programmable VXIbus card (E1419A)
- Graphical programming language (HP VEE)
- Flexibility with deterministic control
- Wide choice of inputs/outputs
- Built-in control algorithms
- Up to 32 user-written "C" code algorithms
- 65,000 reading FIFO buffer
- 500 reading Current Value Table (CVT)
- All algorithms can write to FIFO/CVT
- Data can be time-stamped

## Typical Configuration

Data Acquisition System	Qty
HP E1421B VXI 6-Slot Card Cage	1
HP E1406B VXI Slot 0 Command Module	1
HPE1419A Multifunction Measurement & Control Card	1-2
Analog input channels	10-60
Counters channels	2-10
Digital output channels	26-62
<b>Computer and Software</b>	
HP Vectra Series PC with HP 82341C HP-IB Interface Card	
HP VEE for Windows 95	
HP LaserJet or InkJet printer	