



# Energy Conservation Through Retro-Commissioning of Building 800

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# Dome-Tech Field Services



We specialize in “hands on” testing, evaluation and Retro-Cx of existing HVAC and utility systems.

We identify and solve problems, reduce energy expenses and improve indoor air quality.

We save companies significant money without requiring large capital outlays.

# Building 800 - Background



**MERCK**

<http://www.merck.com>

- **Multi-Science Building**
- **Constructed and occupied in 2000**
- **325,000 square feet**
- **Consists of R&D laboratories, support spaces and administrative offices**
- **Sixteen air handling units with VFD's**
- **Sixteen constant volume exhaust fans**
- **Three 200 HP chilled water pumps**
- **Three 100 HP preheat glycol pumps**
- **Three 25 HP reheat hot water pumps**

# Building 800 - Background

- **Operating costs in excess of \$2,400,000 annually prompted Retro-Commissioning**
- **The cost of Retro-Cx was 100% funded by the local utility (PSE&G) as part of a pilot incentive program**
- **Incentives for RCx in NJ have been eliminated, however many utilities throughout the country are still providing incentives for RCx (New York, Connecticut, California)**

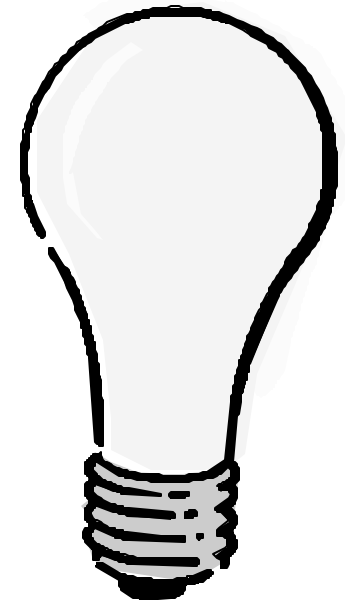
# Retro-Commissioning

**... a means of discovering and correcting HVAC/ utility system defects in existing systems so that the building will function as intended.**

**“Retro-commissioning is a rigorous and systematic process”**

# Why Should You Retro-Commission?

- **Excellent ROI (return on investment)**
- **Reduces energy costs/ budget**
- **Identified IAQ problems/ issues**
- **Verified/ validates environmental criteria**
- **Improved occupant comfort**
- **Reduced maintenance**
- **Increased system reliability**



# Retro-Commissioning Stages

- **Site orientation & documentation review**
- **Define the current design intent**
- **Trending/ datalogging**
- **Design/ installation reviews (DIRs)**
- **Functional checks (FCs)**
- **Performance Tests (PTs)**
- **Issues resolution**
- **Retro-Cx Report**

# Results of Building 800 RCx

- **Results were atypical for an RCx project:**
  - **In general, the building systems were operating as per design intent**
  - **Energy conservations designed into the building were being utilized properly**



# Results of Building 800 RCx

- **Identified ECO's**
  - **Chilled water pressure differential reset schedule - \$9,000 annually**
  - **Chilled water reset schedule - \$9,000 per 1°F reset**
  - **Night setback for air changes per hour - \$70,000 annually**
  - **Space temperature reset schedule - \$80,000 annually for a 3°F reset**

# Results of Building 800 RCx

- **Identified ECO's**
  - Chilled water bypass valve not operating as per SOP - \$1,600 annually
  - Change chilled water pump sequencing SOP - \$2,000 annually
  - Improperly sized flow meter - \$1,600 annually
- **Identified / Screened Capital Projects**
  - Exhaust Fan VFD's - \$56,000 annually
  - Heat Recovery System - \$32,000 annually
  - Both projects had paybacks of approx. 10 years.
  - Changes in utility costs and available rebates have prompted Merck to re-evaluate these items.

# Development of ECO – Space temperature reset schedule

- Original ECO – space temperature reset schedule - \$80,000 annually for a 3°F reset (reduce energy at reheat coils)
- Merck identified this as a prime opportunity for energy conservation as the labs encompass >250,000 sf of space and are served by 675,000 CFM conditioned air
- Engineering staff worked aggressively to not only see this ECO implemented, but improved upon it

# Development of ECO – Space temperature reset schedule

- **Engineering staff and scientific staff worked together to ensure there would be no impact to science or equipment**
- **Merck utilized light switches as control flags. If TOD > 8PM and < 6AM AND light switch is off, then offices go to unoccupied temperature set points**
  - **72°F to 64°F**
- **Occupants can override program by turning lights on. No involvement by building operations personnel.**

# Results of Implementation – Space temperature reset schedule

- **Total Energy Savings = 31,000 MMBTS's/yr and 1,724 tons/yr of CO2 emissions reduction**
- **Verified annual savings of \$230,000/yr**
- **Has since been adopted as a “best practice” by Merck.**

# Conclusion – Q&A

Specializing in hands-on field testing and evaluation of HVAC systems and site utilities, the Dome-Tech Group provides engineering services, energy consultation and project development and implementation. Our goal is to optimize building performance, reduce energy expenses while improving indoor environmental quality.

**Commissioning · Design Build Solutions**  
**Field Engineering · Facility Management Consulting**  
**Energy Engineering · Photovoltaic Systems**

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