Energy Efficient Design Fundamentals

1. **Introduction, Paradigms & Why Comfort (2-hrs)**

2. **Design Strategies for better Energy Efficiency:**
   - **A. Airside Strategies: (4-5 hrs)**
     1) VAV
     2) Low Humidity Strategies
   - **B. Chiller Strategies: (3-4 hrs)**
     1) Condenser Water: Flow Rate & Entering Temperature
     2) Evaporator Water: Flow Rate & Leaving Temperature
     3) Single Chillers vs. Multiple Chillers
     4) Technology Diversification
     5) Free Cooling
     6) Chiller Life Expectancy
     7) Air Cooled vs. Water Cooled
   - **C. System Control Strategies: (4-5 hrs)**
     1) Ventilation Optimization
     2) Duct Pressure Optimization
     3) Chiller-Tower Optimization
     4) Variable Flow Pump Pressure Optimization
     5) Airside Economizer Control
   - **D. Energy Recovery (4-5 hrs)**
     1) Air to Air Energy Recovery
        a. Applications
        b. Technologies
        c. Integrating into Systems
     2) Waterside Heat Recovery
        a. Historical Perspective
        b. Reasons to Use
        c. Feasibility
        d. Analysis Tools
        e. Common Uses
        f. Comparison of Options
        g. Control Methods
   - **E. Variable Refrigerant Flow: (4-5 hrs)**
     1) Application:
        a. How it works
        b. Strengths & Limitations

Purpose: The majority of buildings designed over the past several decades have HVAC mechanical systems optimized using rules of thumbs that were optimal in 1937. On average, these buildings could be using 10%-30% less HVAC energy if the designers were more aware of powerful paradigm shifts that have taken place since the 1980's. Any design engineer who attends this course will be given a number of effective strategies that will dramatically improve their very next design. Any technician will learn dozens of ways to improve the overall efficiency of their existing systems.