



Pacific Northwest
NATIONAL LABORATORY

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Large Commercial Buildings: Re-tuning for Efficiency

Building Personality

- ▶ Buildings start as children
 - Designed (parents)
 - By engineers with best guess information
 - For some weather conditions
 - Inside load conditions
 - For a specific number of occupants
 - For a specific solar gain and orientation
 - Built with (childhood years)
 - Low bid
 - Tight schedules
 - Limited inspections
 - Poor commissioning



- ▶ Buildings grow to be teenagers
 - Usage, constant change (teenage years)
 - Weather impacts
 - Staff loading changes
 - Electrical computer loading changes
 - Equipment malfunctions that are not repaired
 - Design flaws that are not repaired
 - Cubical and wall reconfigurations without moving diffusers
 - Poor maintenance on equipment
 - ◆ Dampers
 - ◆ Controls
 - ◆ Valves
 - ◆ Air and water balance

- ▶ Buildings grow to be adults
 - Current conditions (adulthood)
 - High energy cost
 - High complaints
 - Small number of zones driving large systems
 - Poor operations based on complaint response instead of the bigger picture
 - Still poor maintenance

Building Personality (cont.)

- ▶ Like children, you need to get to know your building
- ▶ What is its personality
 - How does it act or respond to changing internal conditions?
 - How does it responded to weather changes?
 - What is its balance point, when no heating and no cooling are required?
- ▶ It takes time and history to actually learn a facility
 - Need for operational history data
 - Need for complaint history

Building Personality (cont.)

- ▶ A psychologist will analyze a patient to learn a personality and then suggest changes in behavior or environment to help change that personality for a more acceptable response to their environment (happier person)
- ▶ Personality tuning is the process of learning a facility and then gently modifying its control parameters and sequence of operations to achieve more desirable results (happier building with less energy usage and lower customer complaints)





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Environmental Sciences Division

QUESTIONS?

www.pnnl.gov/buildingretuning