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## Envision Charlotte Building Retuning Training

### Overview

The Pacific Northwest National Laboratory (PNNL) has developed a process known as Building Re-Tuning (BRT). BRT is a structured process for investigating building/HVAC system operations to identify and correct common faults that lead to energy waste. Re-tuning instructional materials have been developed for two general categories of buildings: (1) large buildings with building automation systems (BASs) and (2) small- to medium-sized buildings without BASs

This document provides an overview of the two flavors of BRT. Typically, courses are offered in a classroom environment with some opportunity for students to participate in projects in their home facility. Based on our conversations to date, UNCC is willing to tweak as desired to focus on specific modules, or to use a particular building or buildings as examples.

Please note that the small building re-tuning is meant to be performed in one to one and half days, and the large building retuning is meant to be a two-day offering. As indicated previously, all could be modified as desired.

### Small Building Re-Tuning

#### *Purpose & Intended Audience*

The purpose of this course is to help building operations staff to learn how to operate buildings more efficiently, reduce operating cost, and provide energy savings. The knowledge and skills learned through the training will be highly valued by organizations and companies seeking to improve the performance of their buildings. The intended audience includes onsite employees responsible for day-to-day building operations and off-site contractors hired to improve building energy efficiency.

#### *Learning Goals and Objectives*

The lesson goals and associated objectives for each lesson summarized below:

- Module 1: Understand the purpose of small building re-tuning, definition of building re-tuning and what to expect from the re-tuning training class
- Module 2: Understand that re-tuning is the process of learning a building and then making incremental adjustments to achieve more desirable results:
  - Learn through examples that re-tuning works
  - Understand the importance of learning a building's "personality"
  - Understand that it takes time to learn a building's personality





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- Module 3: Understand the information needed
    - Purpose of collecting initial building information
    - Kinds of information needed
  - Module 4: Investigation Phase: Building Walk-Down
    - Purpose of a building walk-down
    - List the different systems and components that need to be focused on
  - Module 5: Investigation Phase: Building Envelope
    - What to focus on when reviewing windows and doors
    - What to focus on when reviewing walls and roofs
  - Module 6: Investigation Phase: HVAC Systems and Controls
    - What to focus on when reviewing packaged equipment
    - What to focus on when reviewing thermostat controls
    - Using the senses (visual, audio, feel, smell) to detect problems
  - Module 7: Investigation Phase: Lighting Systems and Controls
    - What to focus on when reviewing interior and exterior lighting
  - Module 8: Investigation Phase: Hot Water Systems and Controls
    - What to focus on when reviewing domestic and heating hot water systems
  - Module 9: Investigation Phase: Office Equipment
  - Module 10: Investigation Phase: Indoor Environmental Quality
  - Module 11: Investigation Phase: Air Distribution Systems
  - Module 12: Implementation Phase: Building Envelope
    - What to focus on when improving doors, windows, walls and roofs
  - Module 13: Implementation Phase: HVAC Systems and Controls
    - What to focus on when improving HVAC RTUs and controls
  - Module 14: Implementation Phase: Indoor Condition
    - What to focus on that may be impacting indoor conditions
    - What to focus on when improving indoor conditions
  - Module 15: Implementation Phase: Lighting Systems and Controls
    - What to focus on when improving lighting and controls
  - Module 16: Implementation Phase: Hot Water Systems and Controls
    - What to focus on when improving hot water systems and controls
  - Module 17: Implementation Phase: Air Distribution Systems
    - What to focus on when improving air distribution systems
  - Module 18: Meter Data Profile Analysis
    - How to analyze building meter data (if available)
  - Module 19: Documentation Phase and Calculated Savings
    - How to document the measures implemented and calculate savings

The time for classroom instruction for each module ranges from 10 minutes for some of the shorter (i.e. Module 1) to an hour for more detailed modules (i.e. Module 6 – HVAC). Note that the modules focus on three areas:





- Understanding the process of retuning
- Understanding your systems and what to look for in terms of operations
- Understanding what measures are effective for each given system

## Large Building Re-Tuning

### *Purpose & Intended Audience*

The purpose of this course is to help building operations staff to learn how to operate buildings more efficiently, reduce operating cost and provide energy savings. The knowledge and skills learned through the training will be highly valued by organizations and companies seeking to improve the performance of their buildings. The focus is on large (>100,000 sq. ft.) buildings with a BAS. The concepts in general are applicable to all operations staff, even if the building does not feature a BAS. The course teaches an approach to understanding the systems in the building, and learners are expected to obtain the skills needed to be able to perform appropriate building walk-throughs.

### *Learning Goals and Objectives*

The course can be broken into two 9 different modules:

- Module 1: Understand the purpose of re-tuning, definition of building re-tuning and what to expect from the re-tuning training class.
- Module 2: Understand that re-tuning is the process of learning about a building and then making incremental adjustments to achieve more desirable results.
- Module 3: Understand the information needed.
- Module 4: Learn how to re-tune air-handling units (AHUs)
- Module 5: Understand economizer operations
- Module 6: Understand terminal units
- Module 7: Understand central plants
- Module 8: Conduct a thorough building “walk down”
- Module 9: Retune the building based on specific findings

The course has been offered in various flavors. The full course has typically been offered over a 15-hour block, and has been offered through several university programs. Trainings can be performed over a several week period, or in a targeted two-day workshop format.

One attractive feature of the more spread out course is that participants launch a project in their own facility. The project is built up in steps through weekly assignments and submitted at the fifth (final) class session. The goal of the project is to initiate a BRT process in your facility. Ideally,





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a project will include data acquisition trend logging, graphical presentation, and diagnostic interpretation. It is recognized that the class is short and not all projects will be able to accomplish this full scope.



The Center for Sustainably Integrated Buildings and Sites  
Part of the Energy Production & Infrastructure Center (EPIC) at UNC Charlotte

