Planning for Energy Metering

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Check your Worldview First !!
Do you want to . . .

- **Promulgate irrational regs?**
- **Prance around net, gross, viable, and all other "Types" of savings?**
- **Piddle with "Persistence?"**
- **Agonize over "Takeback?"**
- **Specify savings precision and reliability requirements?**

- **OR do you want to just start reducing TOTAL energy use for your agency or organization?**
- **Or just save energy relative to a baseline?**

“Worldview” should affect approach

- **TOTAL fossil-based energy use reduction (FEUR), and not “Gross” or “Net” or EUI could be the target (EUI can be an indicator, BUT EUI ➔ Total Energy over Total area)**
- **Baseline adjustments could be watched and handled by the entity wanting to make reductions, if FEUR is the goal — BUT better methods needed**
- **Specification for procurement could be easier, although different issues**
- **More flexibility for providers would be needed**

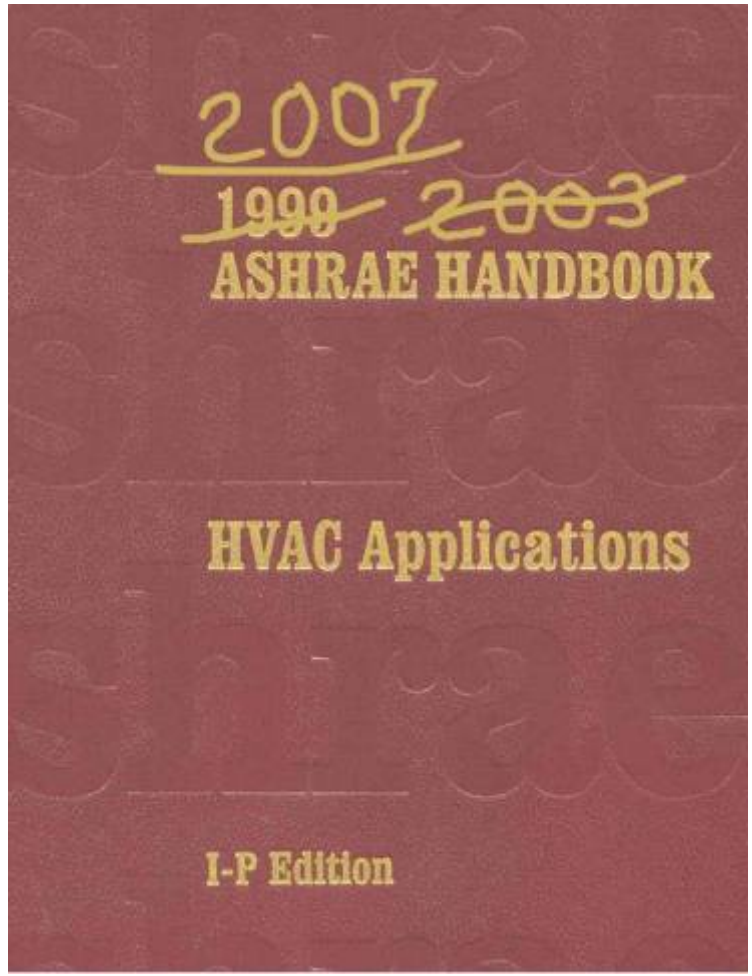
ASHRAE had new energy metering chapter debut in 1991

currently

CHAPTER 40

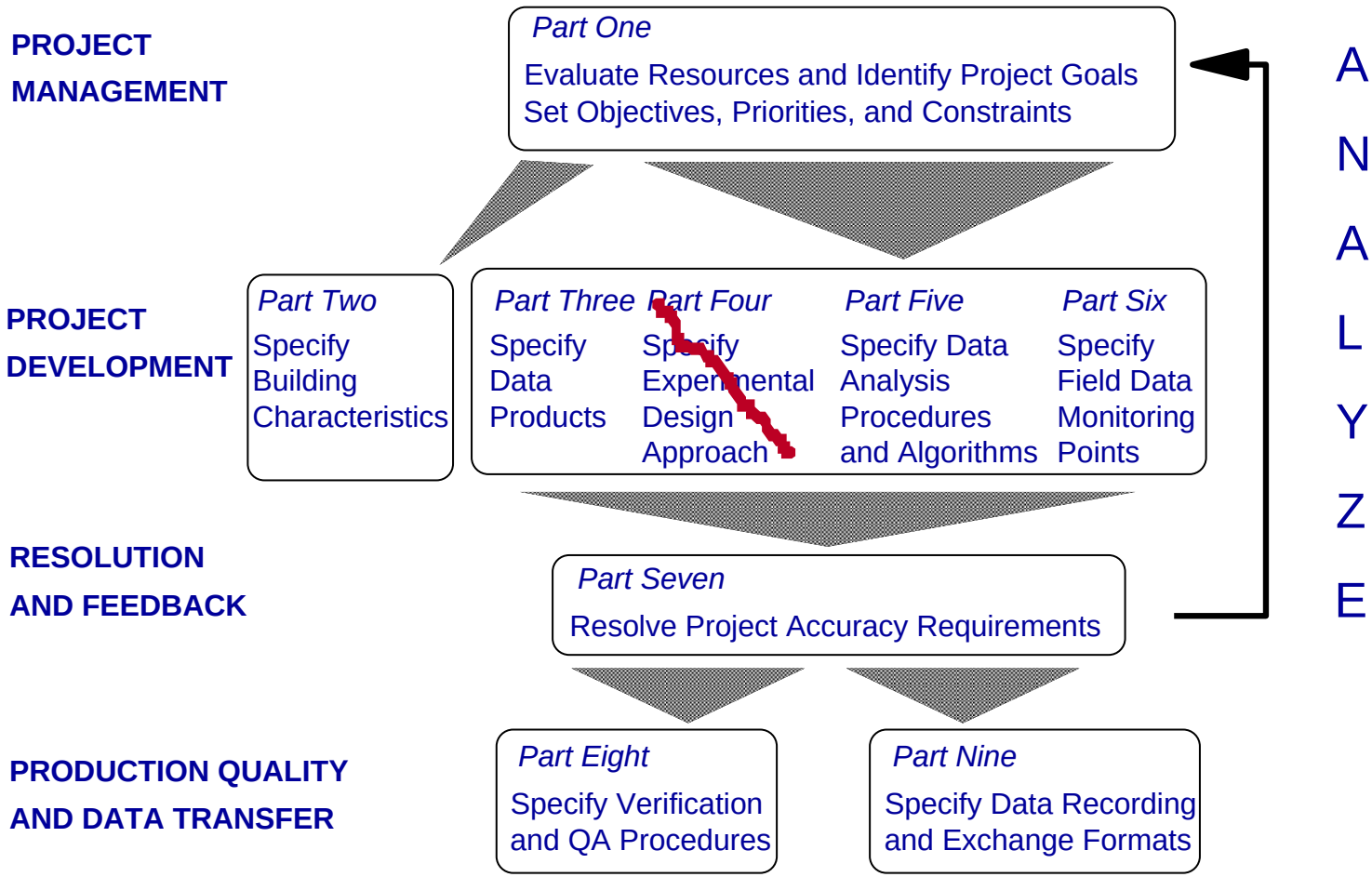
BUILDING ENERGY MONITORING

- *Reasons for Energy Monitoring*
- *Protocols for Retrofit Performance Monitoring*
- *Common Monitoring Issues*
- *Stepwise Process for Project Design and Implementation*



Chapter 40, Figure 1

Methodology for Designing Energy Monitoring Projects



From 2007 ASHRAE *Handbook*

- Monitoring projects can be **uninstrumented** (i.e., no additional instrumentation beyond the utility meter [whole-building meter]) or **instrumented** ([whole-building] data supplemented by additional sources, such as an installed instrumentation package, portable data loggers, or building automation system).
- Uninstrumented approaches are generally simpler and less costly
- Instrumented field monitoring projects generally involve data acquisition systems (DASs), which typically comprise various sensors and data-recording devices (e.g., data loggers) or a suitably equipped building automation system
- Projects may involve a single building or hundreds of buildings and may be carried out over periods ranging from weeks to years

DIAGNOSTICS

- **Diagnostics efforts should be driven by short-term metering, not hardwired**
- **Diagnostics takes special expertise to support metering**
- **If you cannot pick out major building problems without instrumented metering, you need better expertise**
- **If you install metering because you might be able to diagnose problems, a lot of money is being wasted**
- **Half the time metering will not tell what the problem is anyway**

Most projects include:

- **Project planning (relative cost = 1)**
- **Site installation and calibration of data acquisition equipment (if required, relative cost = 5)**
- **Ongoing data collection and verification (relative cost = 5 to 30)**
- **Data analysis and reporting (relative cost = 5 to 20)**
- **NOTE: costs based on rational objectives**

ASTM Standard Guide on Developing Energy Monitoring Plans

Designation: E 1464 – 92 (Reapproved 2005)

Standard Guide for
Developing Energy Monitoring Protocols for Commercial and Institutional Buildings or Facilities

- **4.1 … Careful development of energy [measurement] projects can make a crucial difference in the value of project results relative to the expense.**

“In preparing for battle I have always found that plans are useless, but planning is indispensable.”

- Dwight D. Eisenhower

Circle around data results and objectives

before you jump into planning

Does anybody know?

What the data options are?

What to do with the data?

How to specify metering?

How to fill in holes or gaps?

OBJECTIVES?

- **Allocate energy costs to end users**
- **Evaluate energy performance of facilities**
- **Evaluate energy programs; demonstrate results**
- **Satisfy regulatory BS with minimal efforts**
- **Save energy, save money, save the environment**
- **Prove we can do a metering project**
- **Diagnose problems causing energy waste**

CONSTRAINTS

- **MONEY**
- **TIME**
- **PEOPLE, expertise**
- **Lack of priority, lack of interest**
- **Inability to procure expertise**
- **Energy system issues, like use of steam, no meters, . . .**
- **Tradeoffs on metering design issues**

Data Products?

1. **Measured energy and calculated emissions savings results for . . .**
2. **Documented energy performance ratings on specific buildings or facilities**
3. **Evaluation of an energy program by energy, cost, and demand units saved**
4. **Check off a box on a form somewhere**
5. **Find opportunities for savings in a set of buildings or facilities**
6. **. . .**

Data Analysis

- **Least understood but most critical step in obtaining results**
- **Beware of the "ELCAP Fallacy," good data more important than worrying about analysis — good results demand a reasonable level of analysis from the beginning**
- **If budget does not include analysis tasks, you are likely in for major disappointment**

Potential Metering Design Tradeoffs

- **Many buildings with more data vs few buildings with lots of data (maybe you already have the meters needed?)**
- **Factors needed to determine energy performance vs basic energy data for savings estimates**
- **Uncertainty over analysis methods vs number of data points needed**

Expertise that can be helpful

- Most important is someone who understands available tools and can help set objectives to maximize benefits and minimize costs
- If an **instrumented** approach is needed, find those who have produced good final results, and compare what they have produced to what you need
- Consider using expert help to evaluate procurement methods

Aphorisms

- **Simpler IS better in most cases**
- **You can’t measure what you can’t define**
- **Complicated metering is like hip surgery, only do it when really needed**
- **Only rational objectives are subject to planning, irrational ones are executed**
- **Keep the planning process fluid, to adapt to the battle at hand**

GOOD PLANNING

- **Define the energy situation using simpler methods before jumping into metering**
- **Metering should not be an end in itself**
- **In the end, simple answers are all that are used, so continuously look for ways to generate the simpler ones needed, including those based on metering results**
- **Remember that metering is a tool, not a result**