Setting Goals and Achieving Aggressing Energy Savings

Paul A. Torcellini, Ph.D., PE
Group Manager, Commercial Buildings
November 30, 2010
### Report Documentation Page

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<td>National Renewable Energy Laboratory, 1617 Cole Blvd, Golden, CO, 80401</td>
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<td>8. PERFORMING ORGANIZATION REPORT NUMBER</td>
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<td>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</td>
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<tr>
<td>12. DISTRIBUTION/AVAILABILITY STATEMENT</td>
<td>Approved for public release; distribution unlimited</td>
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Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std Z39-18
KEYNOTE ADDRESS

SETTING GOALS AND ACHIEVING AGGRESSIVE ENERGY SAVINGS

DR. PAUL TORCELLINI
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO  80401
(303) 384-7528
paul.torcellini@nrel.gov

The potential for aggressive energy savings is achievable today. This discussion will look at setting and following through with goals working within financial constraints. We will also explore how new technologies help push the envelope for energy savings including better information flows and technologies. The key is putting the pieces together and aligning the technologies and the decision makers.
Buildings use 70% of electricity

- Lights 28%
- Water Heat 13%
- Heating 32%
- Cooling 10%
- Refrigeration 9%
- Ventilation 7%
- Cooking 5%
- Wash 5%
- Electronics 5%
- Computers 1%
- Other 4%

Source: 2004 Buildings Energy Databook with SEDS distributed to all end-uses
Commercial Sector Energy Use is Growing at 1.6% per year
Growth is faster than energy efficiency measures
Remember the overall vision—reduce the impact of buildings.

Today’s building’s designs mortgage the energy future of this country.
Many Pieces

So many ways to assemble the pieces

Design is about making decisions – need motivation to make the right decisions

And having a suite of technologies
Setting Goals

Measurable goals are better

From bad to good…

– I want a green building
– Design a LEED <rating> building
– Design a building to use 30% less energy than ASHRAE 90.1-2004
– Design a building to use less than 30,000 BTU/sqft
– Design a [NET] ZERO ENERGY BUILDING

Influencing purchasing decision—the owner
The Path to a Low Energy Building

Typical 90.1 Compliant Building

Source Energy Savings (%)

Total Annual Costs ($/year)

- cash flow
- Lease Costs (or Finance Costs)
- utility bills
The Path to a Low Energy Building

![Graph showing total annual costs vs. source energy savings. The graph includes lines for cash flow, lease costs (or finance costs), and utility bills. Points 1 and 2 are marked on the graph.]
The Path to a Low Energy Building
The Path to a Low Energy Building

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<th>Source Energy Savings (%)</th>
<th>Total Annual Costs ($/year)</th>
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<td>cash flow</td>
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<td>Lease Costs (or Finance Costs)</td>
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<td>utility bills</td>
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1. 0% 2. 100% 3. 100% 4. 0%
Optimization Curve

- Starting Point
- Cost Neutral Point
- Maximum Energy Savings
- Minimum Cost Point
- ZEB Not Possible

~3,000 Simulations
Great Potential in Commercial Buildings

What we've proven we can do
Low Energy Buildings

Where we are today
90 (1020) Existing commercial buildings
(2003 CBECs)

Where we would be if all buildings were built to current code
70.7 (803) New buildings base scenario
(Standard 90.1-2004)

Where we could be with current technologies
40.3 (458) Max Tech energy efficient scenario
(Griffith et al. 2007)

Add renewables and we’re almost to net-zero
12.2 (139) Max Tech energy efficient scenario w/PV
NREL Research Support Facility
Project Goals

- LEED™ Platinum
- 800 Staff Capacity
- 25 kBTU/sf/yr
- Zero-Energy Building

Includes:
Data Center
How Good is 25 kBtu/ft²?
The Section

PV System

Natural Ventilation

Thermal Mass

Transpired Collectors

Daylighting

Thermal Bridging

(60-ft)

Enhanced Envelope

Radiant Cooling

Radiant Heating

Workplace

UFAD

Electrical lighting

Outdoor Air Pre-cool

•800 Staff Capacity
Tell Your Stories…

DOE’s Building’s Database
www.commercialbuildings.energy.gov

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<th>Picture</th>
<th>Name</th>
<th>Owner</th>
<th>Location</th>
<th>Building Type</th>
<th>Floor Area (ft²)</th>
<th>Annual Purchased Energy (kWh/ft²)</th>
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Aldo Leopold Legacy Center
Oberlin College Lewis Center
Questions?

www.nrel.gov/rsf
www.commercialbuildings.energy.gov