INVESTMENT GRADE ENERGY AUDIT

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OUTLINE

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- Investment Grade Audits, Requirements and Expectations
- Some Cases
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- Perceived Causes of Problems
- Some Conclusions

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Energy Audit

The objective of an energy audit is to identify economical energy/cost saving measures that do not adversely affect the quality of work/product and the environmental consequences of the equipment and processes.

Why May an Energy Audit Be Needed?

- Energy Cost Savings
  - Procurement
  - Rate Schedule/Billing
  - Operation
- Apparent Energy Waste
- CO_2 Emissions Reduction
- Compliance

“STAY COMPETETIVE”

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Types of Audits

- Walk-Through Audits
- Investment Grade Audits – Feasibility Studies
  - Targeted Audits
  - Comprehensive Audits

Who Performs the Audit?

- The Utility Man (often free)
- Vendors (often free)
- Government Sponsored Organizations (e.g. IAC, often free)
- Energy Consultants (at a cost that may be paid by utilities and/or governments)
- ESCOs (often free at the first sight!)

Investment Grade Audit

Investment grade audit is a technical and economic analysis of potential energy saving projects in a facility that:

- Provides information on current energy-consuming equipment operations
- Identifies technically and economically feasible energy efficiency improvements for existing equipment, and
- Provides the customer with sufficient information to judge the technical and economic feasibility of the recommended projects.

Investment Grade Audit, Requirements and Expectations

It Is Expected that an Investment Grade Audit,

- Include Realistic Assumptions on the Conservative Side
- Complete and Self Sufficient
- Clear Guide to Implementation
- Serve As a Roadmap to Energy Efficiency Retrofit Work
- No More Detailed Energy Consumption Analysis Should Be Needed to Design and Construct the Measures.

Investment Grade Audit, Requirements and Expectations (cont.)

To satisfy the expectations, an investment grade audit must clearly and consistently address:

- The operating hours per department (and equipment in the case of major energy users)
- Nominal ratings/capacities of major energy consuming equipment
- Energy rate/cost per unit of energy usage for different types of energy (electricity, natural gas, etc.) preferably per meter
- In the case of electricity the electrical demand cost and its basis

Investment Grade Audit, Requirements and Expectations (cont.)

- Analysis of at least one year (as the base year) of energy consumption by type of energy/fuel
- Energy balance of the plant per type of fuel, preferably per meter (in the case of comprehensive audits)
- Analysis of major energy efficiency measures identified, to include:
  - Source of energy saving
  - Amount and type of energy saved
  - Cost savings
  - Detailed implementation cost and a pay-back analysis
  - Major assumptions made in the analysis

Investment Grade Audit, Requirements and Expectations (cont.)

- In the case of computer simulation, a clear and succinct input/output for the software, and reasoning behind the savings needs to be included.
- Identification of the retrofit or control scheme/technology, and inclusion of cut sheets of the proposed equipment
- Clear identification of the measures that may have potential in similar facilities that do not exist or are not economical in the audited facility

Cases – State Buildings in California

10 comprehensive investment grade audits of various state buildings were reviewed for the state, and major problems were identified that could easily be avoided if some of the basic issues discussed here were observed.

The Buildings Included:

- 8 Office Buildings
- 1 Prison
- 1 Vocational School

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Cases – Problems Encountered

- Lack of consistency in energy cost, demand cost, operating hours of various area of the facilities
- often the basis for the considered demand cost is not clear
- Lack of energy balance, which often results in overestimation of the cost savings
- Lack of a clear description of the energy rate schedules, annual energy analysis - the customer was not provided with a clear picture of how they are charged for energy
- Lack of equipment inventory and their ratings

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Cases – Problems Encountered (cont.)

- Lack of clear description and identification of retrofit schemes
- Overestimation of savings due to lack of consistency
- Lack of consideration of the latest retrofit technology
- Lack of Identification of the measures that may exist in similar facilities but do not exist in the surveyed facility

Perceived Causes of Problems

- Lack of expertise of people who do the surveys, and more importantly those who prepare the report
- Lack of basic knowledge of the fundamental engineering principles. Energy efficiency work is multi-disciplinary, which necessitates a strong knowledge of fundamentals of mechanical and electrical engineering.
- Lack of training in application of sophisticated simulation software such as DOE-2 and its various derivatives

Perceived Causes of Problems (cont.)

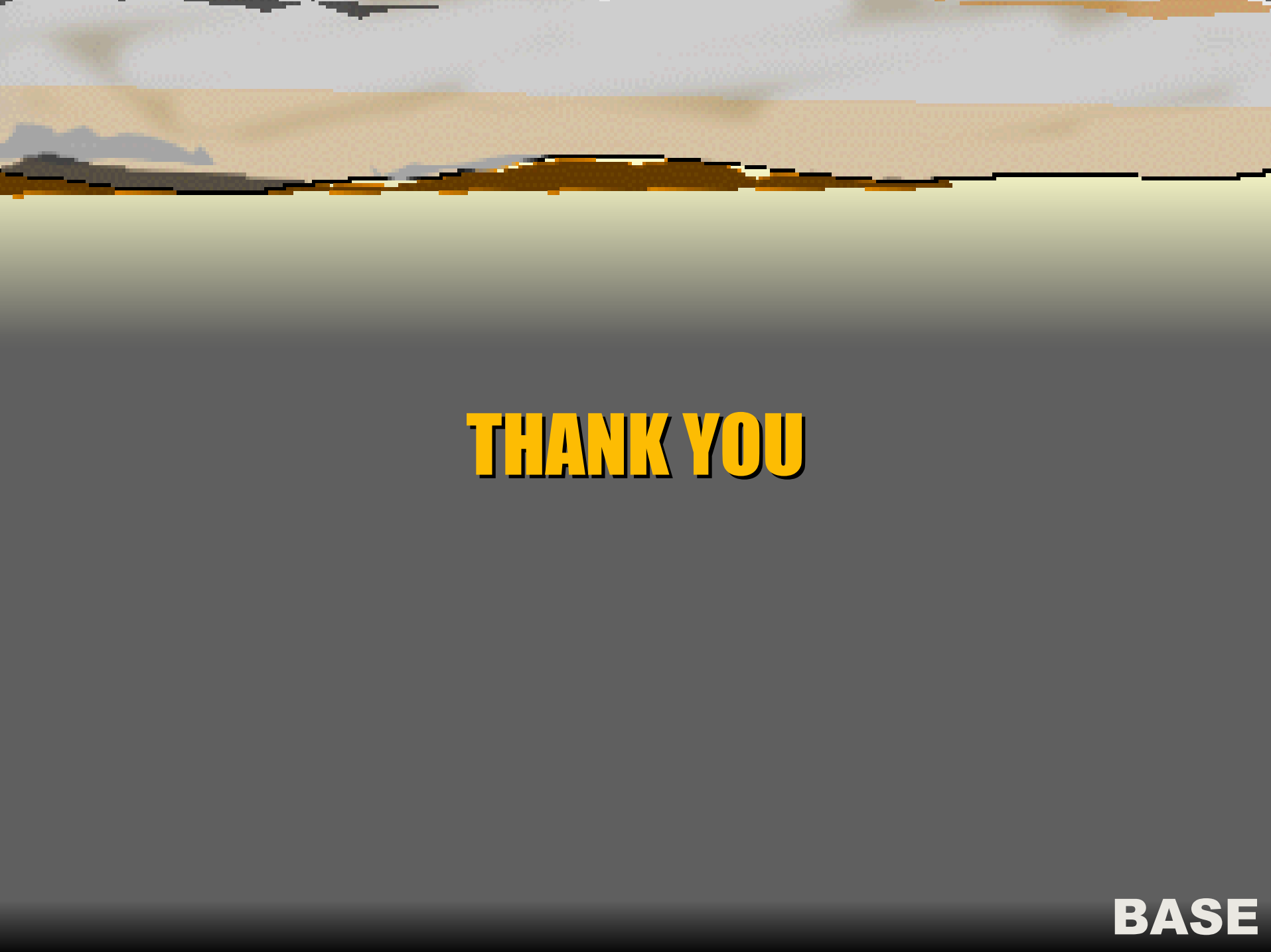
- Conflict of interest – Often the firm that conducts the survey and prepares the audit report, is the same or affiliated with the firm that will do the engineering design and implementation (such as full energy service companies).

Some Conclusions

- CEC (2000), “Guide to Preparing Feasibility Studies of Energy Efficiency Projects” provides a comprehensive guide for reporting investment grade audits of various types of facilities.
- The results from review of investment grade audit of ten institutional facilities performed by seven ESCOs and engineering consulting firms show major deficiencies in their process and reporting, suggesting that closer adherence to the guidelines will significantly improve the works, and result in more realistic evaluation of the economics of the projects.

Some Conclusions (cont.)

- In addition to the economics of the suggested measures, an investment grade energy audit should clearly define what the change/ improvement is, and where it will take place, so that a designer would have specific knowledge for completing the design and specifications.
- An investment grade audit should include sufficient information so that the analysis could be repeated by another expert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