

**A brief recap of auditing.**

**Why the traditional audit is not longer good enough.**

**The critical elements of the Investment Grade Audit (IGA) that really make the difference.**

**Why the IGA is fundamental to risk management.**

# **INVESTMENT GRADE AUDITS**

**Shirley J. Hansen, Ph.D.**

**Kiona International**

## **In the beginning ...**

### **Started in France over 100 years ago**

- 1962**     **The Survey [prices to low to make it viable]**
- 1970's**   **Convincing Congress that engineers could predict energy savings**  
**Saving Schoolhouse Energy project**
- 1977**     **Regulations – CPA**
- 1978**     **Regulations for a traditional energy audit**
- 1981**     **Revised regulations**
- 1980-90** **CGC expanded its work: 20 countries;**  
**29,000 employees doing PC**

# **INVESTMENT GRADE AUDITS**

**Kiona International**

**Our surveys kept looking for  
equipment/modifications that  
would save energy. [period]**

**Gradually we began to recognize that  
was not enough.**

**INVESTMENT GRADE AUDITS**

**Kiona International**

## **The Wake-Up Call**

**Texas A&M University study: off  
an AVERAGE of 25%**

**Achieved savings ranged from 5.5% to  
414% of predicted savings!**

**INVESTMENT GRADE AUDITS**

**Kiona International**

**Table 5: Summary of Measured Savings to Estimated Savings for 1993**

| SITE # | NAME   | SQFT    | 1993 ANN. UTIL. \$ | EST \$ SAVE | MEAS \$ SAVE | MEAS/EST % | MEAS \$/SQFT | EST \$/SQFT | ANN UTIL\$/SQFT | MEAS \$/ANN UTIL \$ |
|--------|--------|---------|--------------------|-------------|--------------|------------|--------------|-------------|-----------------|---------------------|
| 1      | ZEC    | 324,000 | \$584,972          | \$411,066   | \$165,520    | 40.3%      | \$0.51       | \$1.27      | \$1.81          | 28.3%               |
| 100    | EDU    | 251,161 | \$261,276          | \$161,956   | \$249,209    | 153.9%     | \$0.99       | \$0.64      | \$1.04          | 95.4%               |
| 101    | UTC    | 152,690 | \$139,782          | \$118,179   | \$143,980    | 121.8%     | \$0.94       | \$0.77      | \$0.92          | 103.0%              |
| 102    | PCL    | 483,895 | \$649,474          | \$373,621   | \$709,271    | 189.8%     | \$1.47       | \$0.77      | \$1.34          | 109.2%              |
| 103    | GAR    | 54,069  | \$41,738           | \$10,485    | \$35,090     | 334.7%     | \$0.65       | \$0.19      | \$0.77          | 84.1%               |
| 104    | GEA    | 61,000  | \$57,784           | \$26,367    | \$46,476     | 176.3%     | \$0.76       | \$0.43      | \$0.95          | 80.4%               |
| 105    | WAG    | 57,600  | \$84,482           | \$20,400    | \$30,496     | 149.5%     | \$0.53       | \$0.35      | \$1.47          | 36.1%               |
| 106    | WEL    | 439,540 | \$1,111,240        | \$303,435   | \$95,522     | 31.5%      | \$0.22       | \$0.69      | \$2.53          | 8.6%                |
| 107    | BUR    | 103,441 | \$105,296          | \$42,049    | \$90,034     | 214.1%     | \$0.87       | \$0.41      | \$1.02          | 85.5%               |
| 108    | NUR    | 94,815  | \$114,741          | \$41,235    | \$59,573     | 144.5%     | \$0.63       | \$0.43      | \$1.21          | 51.9%               |
| 109    | RAS    | 56,849  | \$54,048           | \$5,768     | \$4,404      | 76.4%      | \$0.08       | \$0.10      | \$0.95          | 8.1%                |
| 109    | WIN    | 109,000 | \$188,269          | \$44,881    | \$177,447    | 395.4%     | \$1.63       | \$0.41      | \$1.73          | 94.3%               |
| 110    | PAI    | 128,409 | \$278,985          | \$65,955    | \$83,333     | 126.3%     | \$0.65       | \$0.51      | \$2.17          | 29.9%               |
| 110    | WCH    | 48,905  | \$64,197           | \$15,682    | \$69,189     | 441.2%     | \$1.41       | \$0.32      | \$1.31          | 107.8%              |
| 112    | BUS    | 149,900 | \$147,743          | \$83,960    | \$33,991     | 40.5%      | \$0.23       | \$0.56      | \$0.99          | 23.0%               |
| 113    | FNA    | 223,000 | \$239,569          | \$109,334   | \$48,903     | 44.7%      | \$0.22       | \$0.49      | \$1.07          | 20.4%               |
| 120    | MED    | 887,187 | \$3,677,292        | \$664,589   | \$82,416     | 12.4%      | \$0.09       | \$0.75      | \$4.14          | 2.2%                |
| 126    | SHS(1) | 210,500 | \$52,342           | \$33,094    | \$43,339     | 131.0%     | \$0.21       | \$0.16      | \$0.25          | 82.8%               |
| 127    | VHS(1) | 257,000 | \$76,440           | \$12,754    | \$38,281     | 300.1%     | \$0.15       | \$0.05      | \$0.30          | 50.1%               |
| 128    | SIM    | 62,400  | \$55,064           | \$17,240    | \$7,691      | 44.6%      | \$0.12       | \$0.28      | \$0.88          | 14.0%               |
| 149    | MCC(2) | 90,100  | \$47,229           | \$27,069    | \$19,660     | 72.6%      | \$0.22       | \$0.30      | \$0.52          | 41.6%               |
| 151    | NHS    | 202,615 | \$171,504          | \$83,416    | \$31,649     | 37.9%      | \$0.16       | \$0.41      | \$0.85          | 18.5%               |
| 165    | UNV    | 123,450 | \$77,532           | \$81,077    | \$25,998     | 32.1%      | \$0.21       | \$0.66      | \$0.63          | 33.5%               |
| 300    | SPII   | 233,738 | \$473,094          | \$330,984   | \$18,283     | 5.5%       | \$0.08       | \$1.42      | \$2.02          | 3.9%                |
|        | AVG    | 200,219 | \$364,754          | \$128,525   | \$96,240     | 74.9%      | \$0.48       | \$0.64      | \$1.82          | 26.4%               |

**NOTE:**

- (1) The savings at these sites include electric demand savings which are not reflected in the 1993 annual energy costs.
- (2) The savings at this site includes electric demand savings. This site also consumes natural gas which is not reflected in the 1993 annual energy costs.

**Facilities and process are part of your clients  
investment portfolio**

**An energy audit should inform the client how to  
enhance that portfolio through energy efficiency**

**Would you invest in an audit that may be off 94.5%?  
Or 414%?**

That is not an "investment grade" energy audit!

**INVESTMENT GRADE AUDITS**

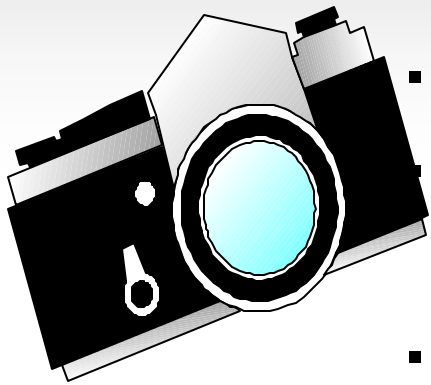
**Kiona International**



# INVESTMENT GRADE AUDITS

**Kiona International**

## The Traditional Energy Audit

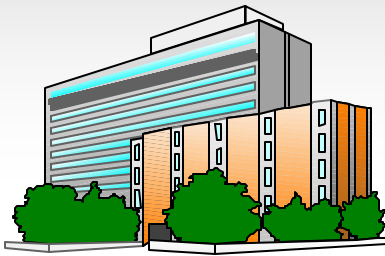


- ... is a snap shot
- ... assumes all conditions will stay the same
- ... pretends paybacks are the same in varying conditions
- ... ignores the human element
- ... is just not good enough anymore

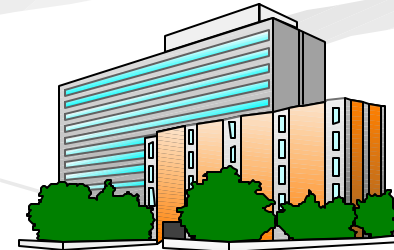
**INVESTMENT GRADE AUDITS**



**Is the payback for a given measure always the same . . . even in two similar facilities?**



*How do we gauge the difference?*



**INVESTMENT GRADE AUDITS**

**Kiona International**

**The IGA goes beyond science  
and becomes an art.**



**subjective judgment on the  
people factors**



**assess the people impact on  
paybacks**



**how great is the uncertainty; risks**



**other mitigating strategies; cost**

**INVESTMENT GRADE AUDITS**

**Kiona International**

# Key factors to weigh...

- . management's *real* commitment to energy efficiency
- . occupant behavior
- . operations and maintenance (O&M) manpower, skills, training needs
- . equipment constraints due to O&M limitations
- . conditions of energy-related mechanical equipment
- . budget allocations for repairs and replacement
- . attitude of O&M to energy program

# INVESTMENT GRADE AUDITS

**Kiona International**

# **ADDING IN THE FINANCIAL COMPONENT**

**Convert issues and human  
factors to "price tags"**

**Add in actual cost of money and  
net present value**

**Adding financial aspects is what  
puts "investment" in the IGA**

# **INVESTMENT GRADE AUDITS**

**Kiona International**

*Determining factor:*

# *Predictive Consistency*

**The savings from a quality IGA should fall  
within  $\pm 10\%$  of predictions.**

# INVESTMENT GRADE AUDITS

**Kiona International**

**Need more information?**

**Fall of 2003, the Association of Energy  
Engineers will publish**

***The Investment Grade Energy Audit:  
Making Smart Energy Decisions***

**By**

**Shirley J. Hansen, Ph.D. and**

**James W. Brown, P.E.**

**INVESTMENT GRADE AUDITS**

**Kiona International**

**Any questions?**

**Comments?**

**Thoughts?**

**INVESTMENT GRADE AUDITS**

**Kiona International**