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ILLINOIS DEPARTMENT OF COMMERCE & ECONOMIC OPPORTUNITY
DCEO

Defining the Baseline for Industrial Projects

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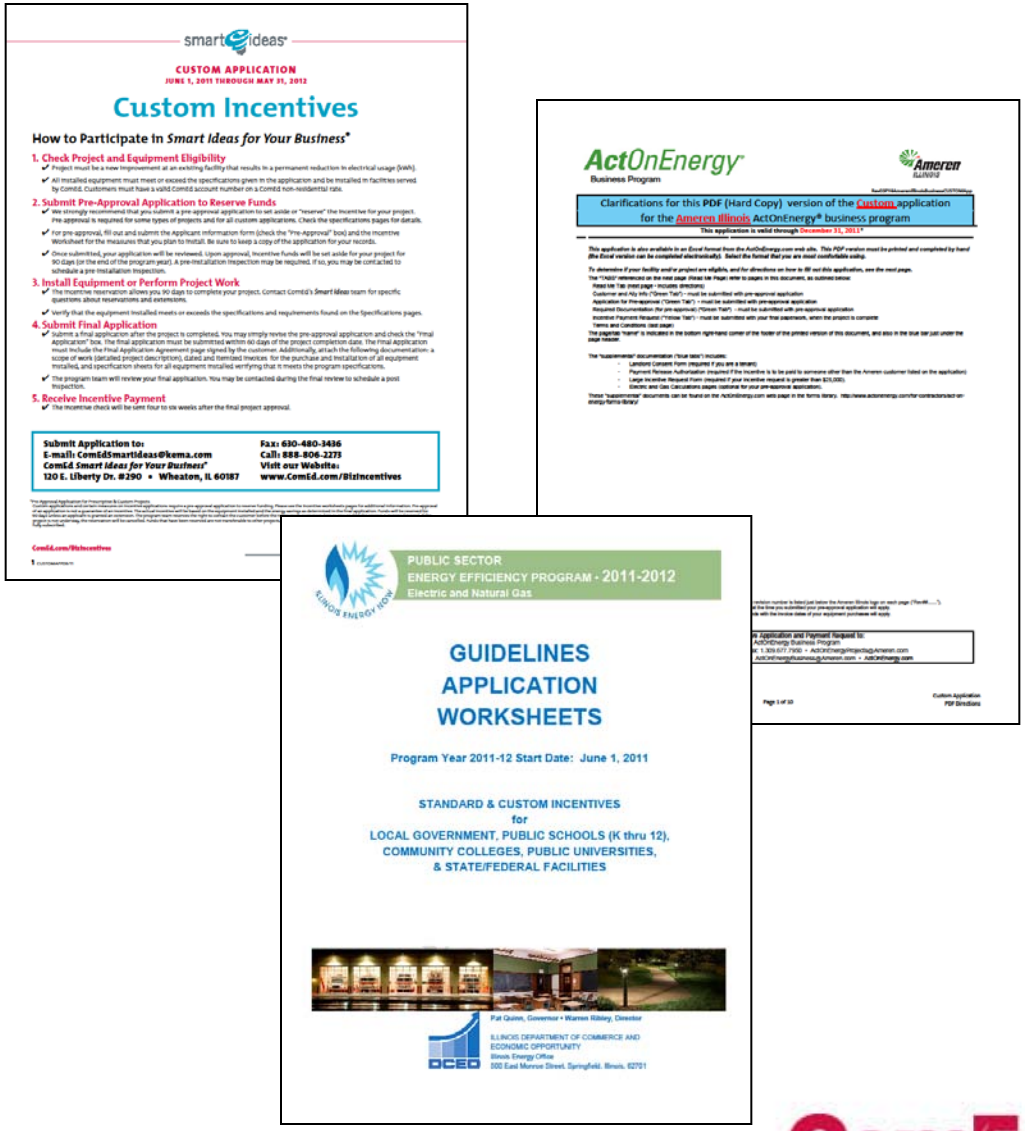
Agenda

- ✓ Problem summary
- ✓ Project examples
- ✓ Recommendation



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Problem Summary

- ✓ The energy savings baseline is not easily determined for most industrial equipment
  - Energy use is a function of production volumes, schedules and product mix
  - Equipment is specialized and unique to the process
  - Industrial customers have staff who are skilled at maintaining process equipment indefinitely
  - Industry standards for equipment efficiency do not exist for most process equipment (e.g., air compressors)

Problem Summary

✓ Evaluators lack a consistent method to establish the baseline, but generally use one of two approaches:

- **Useful life of existing equipment**
  - Problem: With regular maintenance and life-extending strategies, industrial equipment can be used many years past its useful life
  - Inability to offer Custom incentives to replace equipment past its useful life results in inefficient equipment being used until it fails

Workers rewind an industrial motor

- **Metered data**
  - Problem: Changes in production skew data, making an "apples-to-apples" comparison difficult
  - For a metered data analysis to be effective, the implementation team and evaluation team must conduct their analyses over the same time period

Problem Summary (cont.)

- ✓ Lack of a defined approach to establishing the baseline hampers the program's ability to accurately estimate a project's energy savings
- ✓ Evaluators' estimates of energy savings from industrial retrofits have been highly variable, with kWh substantially reduced or eliminated in some cases and increased in others
- ✓ If the program relies on evaluator feedback on baseline conditions, opportunities to reduce energy use in the industrial sector will be lost
  - Inability to count on predictable energy savings from industrial retrofits makes the program less likely to incentivize such projects
- ✓ Industrial customers are frustrated and unhappy when energy efficiency incentives cannot be used because their equipment is too old

Project Example #1 (ComEd)

Facility type: Manufacturing/heavy industry

Project type: Replace induction furnaces

Ex Ante kWh savings: **2,549,903**

Ex Post kWh savings: **0**

Utility Baseline Assumption: Existing Equipment

Evaluator Baseline Assumption: Induction furnace available in the market today

Summary

- ✓ Implementation team's Custom analysis assume existing equipment was the appropriate baseline because the customer stated that, without the incentive, he would continue to use the furnaces beyond their effective useful life (EUL) and beyond their remaining useful life (RUL).

- ✓ The evaluator's Final Site Report stated the EUL for this type of equipment is 20 years and that, according to the customer, the equipment is 35 years old. The evaluator stated the RUL was two or three years and concluded the old furnaces were not a viable option for the baseline.

Project Example #1 (cont.)

- ✓ The Final Site Report stated a modern furnace currently available on the market was the appropriate baseline and that the efficiencies of the furnaces installed and the baseline were comparable—thus, no savings were realized.

Conclusion

- ✓ Metered data (pre- and post-) and subsequent implementation team analysis demonstrated energy savings at the customer site, but the program was not able to claim these savings.

Project Example #2 (ComEd)

Facility type: Automotive Manufacturing

Project type: Replace two compressors

Customer kWh savings: **921,000**

Ex Post kWh savings: **204,859**

Utility Baseline Assumption: Equipment Available in Market Today

Evaluator Baseline Assumption: Equipment Available in Market Today

Summary

- ✓ Working with a Trade Ally, customer requested an incentive of $70,000, based on estimated savings of 921,000 kWh from replacing 19 year old equipment.
- ✓ Utility rejected the existing equipment as baseline and established a baseline based on what the customer could purchase today, resulting in an incentive of $14,000.

Conclusion

- ✓ Customer was angry and disappointed with the reduced incentive. He stated he does not plan to participate in our programs again and will not return our phone calls.

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Project Example #3 (ComEd)

Facility type: Manufacturing/Heavy Industry

Project type: Replace 300 HP water-cooled motor with 300 HP air-cooled motor

Customer kWh savings: **524,000** (assuming existing equipment)

Ex post kWh savings: **3,800**

Utility Baseline Assumption: 94.1 % motor efficiency

Evaluator Baseline Assumption: Not evaluated

Summary

- ✓ Customer requested an incentive of $37,000 based on estimated savings of 524,000 kWh, calculating savings using the existing motor as baseline.
- ✓ Utility rejected existing equipment as baseline and established a baseline based on what the customer could purchase today, resulting in an incentive of $264.

Project Example #3 (cont.)

- ✓ The customer expressed concern regarding the basis for calculating payback for the *Smart Ideas* Custom Application Incentive Program and requested an individual site evaluation to determine the remaining useful life of the 300 HP motor under consideration for replacement.
- ✓ The customer stated that this equipment was in good to excellent working condition and would have another 10 years or more useful life. Without the incentive, they would not replace the motor.
- ✓ The customer also stated the requested incentive would help them achieve the required internal payback to make the project viable.

Conclusion

- ✓ The project is currently on "hold" while we attempt to develop a solution that is acceptable to the customer, utility, evaluation team and SAG.

Project Example #4 (Ameren)

Facility type: Manufacturing/heavy industry

Project type: Replace compressed air and nitrogen systems

Ex Ante kWh savings: **1,042,265**

Ex Post kWh savings: **473,640**

Utility Baseline Assumption: Existing Equipment/Metered Data

Evaluator Baseline Assumption: Existing Equipment Specs

Evaluator Post-Installation Assumption: Metered data

Summary

- ✓ Implementation team's custom analysis assumed existing equipment performance supplemented with metered pre-retrofit data. As the savings estimates were prepared prior to new equipment installation, the savings estimates used the new equipment specifications and assumed that the new equipment would be meeting similar nitrogen and compressed air loads.

Project Example #4 (cont.)

- ✓ The evaluator used existing equipment specifications and assumed that the existing equipment met similar nitrogen and compressed air loads determined in post-retrofit data collection to establish baseline usage. Then, post-installation metered data were used to determine usage after the new equipment was installed.

- ✓ However, due to production changes, the plant had increased nitrogen and compressed air loads following the new equipment installation. And it appears that the evaluator's analysis did not account for the change in loading which resulted in decreased apparent project savings.

Conclusion

- ✓ Metered data (pre- and post-) would demonstrate energy savings at the customer site. However, production differences pre- and post-retrofit need to be properly accounted for to determine appropriate levels of savings. Relying on post-installation metered data only and not adjusting for production differences can unfairly influence project savings.

Project Example #5 (DCEO)

Facility type: Waste Water Treatment Plant

Project type: Replace aeration blower system

Ex Ante kWh savings: **490,122**

Ex Post kWh savings: **204,035**

DCEO Baseline Assumption: Existing Equipment/Metered Data

Evaluator Baseline Assumption: New Equipment

Evaluator Post-Installation Assumption: Metered data compared to new equipment

Summary

- ✓ Custom analysis assumed a baseline of existing equipment with energy use based on metered pre-retrofit data. The energy savings estimates used the new equipment specifications and assumed that, on average, one aeration blower operating at 100% would meet the required load. Post-installation metered data showed that energy savings were actually 25% greater than estimated.

Project Example #5 (cont.)

- ✓ The evaluator rejected the baseline calculation, stating that the EUL of this type of equipment is 15 years and that, according to the customer, the equipment is 25 years old. The evaluator calculated a baseline based on two new 75 hp blowers operating without any flow controls or sequencing control. Then, post installation metered data were used to determine usage after the new equipment was installed. The net result was a NTG ratio of 42%.

Conclusion

- ✓ DCEO's experience with many of its public sector clients, and in particular water treatment plants, is that the large energy-using equipment is nearly always maintained far past its theoretical useful life.
  - Blowers on water plants are typically 30 years old or more.
  - Despite efforts of building engineers to get replacement equipment into the budget, such equipment is replaced on a regular schedule.
  - DCEO incentives enable such equipment to survive the budget process.
  - EUL should not be used in a Municipal setting. Baselines should reflect that existing equipment will be used for at least several more years.

Recommendations

- ✓ Obtain consensus on whether the issue of how the industrial project baseline is determined should be addressed
- ✓ If there is consensus that it this is an issue that should be addressed, convene a team of evaluators, program implementers and SAG representatives to propose a solution