



Knowledge to Go Places

INDUSTRIAL ENERGY EFFICIENCY

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IAC Program Summary

- **Sponsored by the U.S. Department of Energy Office of Industrial Technologies to assist small and medium-size manufacturers**
- **CSU is one of 26 IACs located at various universities and colleges in U.S.**
- **IAC was originally started as the Energy Analysis and Diagnostic Center - 1976**



CSU IAC Program Summary

- Colorado State University IAC started in April 1984
- 591 plants have been served at the CSU IAC in CO, WY, NE, NM, UT, NV, SD, ND, MT
- Service is free to qualifying manufacturers



Client Selection Criteria

- **Plant Must Be a Manufacturer**
 - **Standard Industrial Classification (SIC) Must Be Within SIC 2000 and 3999**



Client Selection Criteria

- ~~Additional Criteria - Must Meet Any Three~~
 - ~~Spend \$100,000 - \$2.0 Million Annually in Total Energy Bills~~
 - ~~Less Than \$100 Million Annual Gross Sales~~
 - ~~Less Than 500 Employees~~
 - ~~No In-house Professional Expertise~~
- Allowances for Previous Clients - Up to 5 Per Year
- Allowances for Exceptions - Up to 3 Per Year



CSU Industrial Assessment

Reasons for Not Participating?

- **Too busy!**
- **Perceived as student class project**
- **Worried about compliance and confidentiality**
- **No perceived value for free service**
- **Not necessary - already doing/not needed**
- **Prior poor experiences w/other programs**
- **Government/taxpayer issues**



Confidentiality and Compliance

- The CSU IAC Is **NOT** Affiliated With the U.S. Environmental Protection Agency
- The CSU IAC Is **NOT** Affiliated With the Colorado DPHE or Wyoming DEQ
- The Assessment Report Does **NOT** Include the Name of the Plant
- Plant Personnel Are Encouraged **NOT** to Discuss Any Operations That Are Proprietary



Confidentiality and Compliance

- **U.S. DOE Requires Information About:**
 - **Types and Sizes of Manufacturers Being Served**
 - **Types of Opportunities Recommended at Each Plant**
- **The Most Sensitive Data Are Annual Sales and Annual Production**
- **Data Are Included in a Database Maintained by Rutgers University and Is Available at <http://oipea-www.rutgers.edu>.**



Site Visit

- A one-day plant visit is scheduled at the manufacturer's convenience
- A team of CSU faculty, graduate students and undergraduate students tour the plant
- Follow production flows from raw materials to finished products



Site Visit - Goals

- **Identify the Most Significant Energy Usage and Waste Streams**
- **Take Measurements and Talk to Plant Personnel**
- **Gather Documentation to Estimate Energy Usage of Specific Equipment/operations**
- **Quantify the Volumes of Waste Generated and Associated Waste Management Costs**



Site Visit - AR Idea Generation

- Identify/estimate major **ENERGY** streams and concerns
 - i.e., Lighting, Compressors, HVAC
 - Peak Demand
 - Electricity vs. Gas
 - Most concerned with streams that plant can do something about
 - Also concerned about things we can and have recommended that work



Site Visit - AR Idea Generation

- Identify/estimate major **WASTE** streams and concerns
 - i.e., waste water, trash, haz waste, air
 - Costs vs. volumes
 - Nuisance waste streams
 - Most concerned with streams that plant can do something about
 - Also concerned about things we can and have recommended that work



Site Visit - AR Idea Generation

- Identify/estimate major **PRODUCTION** concerns
 - Mostly based on Theory of Constraints
 - There may not be any concerns
 - Usually needs more investigation
 - Most concerned with products/processes that plant can do something about
 - Also concerned about things we can and have recommended that work



Site Visit - Plant Personnel Time

- **Plant Personnel Typically Spend About 1/2 of the Day With the Assessment Team**
 - **About 2 Hours on the Plant Tour**
 - **About 2 Hours Answering Questions**
 - **About 1/2 Hour Meeting With the IAC Team at the End of the Day to Review Preliminary Findings.**



Typical Measurements

- Temperatures
- Flow rates (air and water)
- Motor RPMs, temperatures, dimensions, operation
- Boiler operation
- Air compressor temperatures, dimensions, operation
- Datalogging



Assessment Timeline

- **Preliminary Information - by mail, phone, or fax - 1/2 day**
- **Plant Visit - one day**
- **Assessment Report - 4-8 weeks**
- **Implementation Survey - by phone and fax; 6-12 months after report published**



Energy Baseline

- **Baseline previous year or two**
- **Use actual utility bills**
- **Contact your customer rep for rate structure**
- **For electricity, track kWh, kW, and costs**
- **For gas, track ccf/MMBtu/therms and cost**
- **Use baseline to determine what's important**



On-Line Resources - Materials

- See CSU IAC home page for links
 - <http://www.engr.colostate.edu/IAC>
- CSU IAC Sample Report (pdf format)
- CSU IAC Energy Conservation Recommendations
- CSU IAC/WMAC Pollution Prevention Recommendations
- CSU IAC Site Data Collection Sheets
- OIPEA Self-Assessment Workbook
- CSU IAC Pollution Prevention Handbook
- Rutgers-OIT Industrial Productivity Training Manual
- Rutgers-OIT Modern Industrial Assessments: A Training Manual Version 2.0



DOE Resources - Software

- See CSU IAC home page for links
 - <http://www.engr.colostate.edu/IAC>
- DOE MotorMaster+ 4.0 Efficient Motor Software
- NAIMA 3M Plus Insulation Selection Software
- DOE Pumping System Assessment Tool (PSAT)
- DOE Fan System Assessment Tool (FSAT)
- DOE Steam System Assessment Tool (SSAT)
- DOE Steam System Assessment Tool (SSAT)
- DOE Process Heat Assessment System Tool (PHAST)
- DOE AirMaster+ Software



DOE Resources - Software

- See CSU IAC home page for links
 - <http://www.engr.colostate.edu/IAC>
- DOE NREL Energy-10 Building Design Software
- DOE Combined Heat and Power Tool
- DOE Chilled Water System Assessment Tool



DOE BestPractices

- **BestPractices helps you identify opportunities to save substantial amounts of energy in industrial manufacturing plants.**
 - **Informational resources and tools**
 - **Technical Assistance**
 - **Demonstrated emerging technologies**



DOE BestPractices

- **BestPractices teams with industrial companies**
 - **Hands-on energy assessments**
 - **Training in energy management practices**



CSU Industrial Assessment Center

IT'S A WIN-WIN-WIN-WIN-WIN-WIN-WIN

- Win for students
- Win for clients
- Win for referring partners
- Win for CSU
- Win for DOE
- Win for the U.S. taxpayer
- Win for our founder – Dr. C. Byron Winn!

