

Training Energy Engineers The Industrial Assessment Center (IAC) Project

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Annual Meeting of
Chartered Association of Energy Engineers

November 7, 2018

Energy Engineering

Energy engineering or **energy systems engineering** is a broad field of [engineering](#) dealing with [energy efficiency](#), [energy services](#), [facility management](#), plant engineering, [environmental compliance](#) and [alternative energy](#) technologies. Energy engineering is one of the more recent engineering disciplines to emerge. (Wikipedia)

Through the IAC Program

We train energy engineers with basic background and knowledge for:

- Energy and water efficiency
- Energy services
- Facility and plant energy management
- Environmental compliance
- Alternative energy technologies

IAC Mission and Objectives

- Training energy engineers - Workforce development
- Assist small to medium-sized manufacturers become more energy efficient and productive

Historical Context

- IAC was established in 1976 after the Oil Embargo through a proposal by William Kirsch to the Department of Commerce as “Energy Analysis and Diagnostic Center” and then transferred to newly established DOE .
- Title of the Program changed in early 1990s.
- Although the core service of IAC has been energy efficiency, depending on the government priorities, because of the geographic spread and involvement with industrial establishment, IAC has become involved with industrial waste minimization, productivity improvement, cyber security, etc.
- DOE taps into the IAC program for many other initiatives and projects

IAC Organization and Operation

- There are 28 Centers across the country, all in universities with accredited engineering programs
- The centers are managed by Center for Advanced Energy Systems at Rutgers University on behalf of DOE
- The annual budget for each Center is about \$250,000
- There is about 20% matching fund by the participating university
- Each center serves about 20 plants per year

Industrial Assessment Centers 2017-2021

[HTTPS://IAC.UNIVERSITY](https://iac.university)



U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

TURABO

Industrial Assessment Center

San Francisco State University

- SFSU IAC was established in 1992
- As of October 2018 we have served 533 manufacturers and wastewater plants in Northern and Central California, Nevada, Arizona and Hawaii
- We have graduated over 175 energy engineers who mostly work in energy efficiency industry.
- We have developed a solid curriculum in energy related courses supporting and based on IAC experience.
- We have established an Master of Science in Energy Systems supporting and based on IAC experience

IAC Products

- Training Energy Engineers through:
 - Application of engineering fundamentals
 - Familiarity with energy systems and equipment
 - Learning about the state of the art energy systems and equipment
 - Learning about business of utilities
 - Learning about project cost estimation
 - Extensive self learning
 - Oral and written communication
 - Integrating their knowledge through project work

All our graduates find employment before or immediately after graduation!

IAC Products

- Assessment reports for the industrial plants on:
 - Energy efficiency and conservation
 - Water efficiency and conservation
 - Waste minimization

On average over 60% of our recommendations are implemented!

Crystal Creamery – Modesto, CA

Plant Information

- Products: Milk powder, Butter, Frozen cream, Milk and Dairy mixes, Sour Cream, Cottage cheese, Ice Cream
- Number of Employees: 385
- Annual Gross Sales: \$500 Million
- Annual Production: 565 Million Pounds
- Total Sq. Ft: 532,000
- Distribution: Global

Crystal Creamery – Modesto, CA

Facility Energy and Water Consumption and Costs

• Annual Electrical Consumption	47,700,000 kWh
– Grid Purchase:	46,000,000 kWh
– On-site Generation (1.1 MW PV):	1,700,000 kWh
• Average Maximum Demand	6,600 kW
• Annual Electrical Costs	\$4,800,000
• Annual Natural Gas Consumption	282,000 MMBtu
• Annual Natural Gas Costs	\$1,970,000
• Annual Water Consumption	238 Million Gallons
• Annual Water and Sewer Costs	\$1,530,000

Recommended Measures

1. Repair Steam Leaks and Steam Traps
2. Repair Air Leaks
3. Floating Head Control on Ammonia Compressors
4. Move Ammonia with Mechanical Pumps Instead of Compressed Ammonia
5. Install VFDs on Glycol Pumps
6. Heat Recovery from Boiler's Blowdown
7. Improve Boilers' Thermal Insulation
8. Reduce Air Compressor Discharge Pressure
9. Install VFDs on Captive Loop Cooling Tower Pumps
10. Install VFDs on Captive Loop Cooling Tower Fans
11. Sequence Air Compressors' Operation
12. Sequence Ammonia Compressors' Operation
13. Replace Low Efficiency Lighting LEDs
14. O₂ Trim Control and Combustion Air VFD Control of Boilers
15. VFD Control on Evaporator Fan Motors
16. Lighting Controls
17. Recycle Fresh Water From Various Areas

Implementation

	Recommended	Implemented
Energy Conservation Measures	16	8
Water Conservation Measures	1	1
Electrical Energy Savings	11%	8%
Natural Gas Savings	5%	5%
Water Savings	11%	11%
Cost Saving	\$665,000	354,000
Simple Payback	Immediate – 3.6	Immediate – 2.7

Some General Conclusions

- Overall IAC model has been very successful in serving the US industry for over 40 years!
- It has proven to be a highly effective experience in training energy engineers in energy related subjects and technologies.
- It connects the academics with the manufacturing industry, where the transfer of information becomes very valuable.

Thank you, it is our pleasure to host you at SFSU, we hope you engage with our School of Engineering!