Cerritos College Campus
Quick Facts

- Founded in 1955
- 18,000+ students (FTES)
- 135 acres
- 41 buildings, 1 million gsf
- $560 million for modernization and new construction
- $115 million operating budget
- $2.1 million annual cost of energy
Green Cerritos College Environmental Stewardship

Sustainability Initiatives

- Board Policy 3580 – Environmental Sustainability
- Cerritos College Sustainability Plan
- Greenhouse Gas Reductions
- Energy Savings
- Water Conservation
- Green Education
- USGBC’s LEED standard for projects above $5 million
- CCC/IOU Partnership first-of-a-kind Integrated Energy Master Plan
Project Approach

- Create a comprehensive plan of holistic energy solutions
- Align with present state and future condition of campus
- Dual integration: intra-campus and with California’s guiding energy policies
- Real – world solutions using a wide spectrum of applications
- A strategic roadmap for other institutions
Challenges

- Facilities master plan – IEMP overlay
- One meter – over 40 major buildings
- One gas meter
- Sub meters do not isolate the different load cooling load, lighting loads, plug loads and heating.
- Data gathered over 3 years to be effective
- Installation of permanent sub meter very expensive and time consuming
- Electric circuits will need to be modified
- Temporary meters when installed are for a few months only
What do we know

- Facilities master plan and phasing
- Spatial mapping – window, walls, footprint, etc
- Age of each building – Codes determine performance and construction
- Climate files – cooling and heating loads
- Light fixtures – lighting consumption
- Types of mechanical systems – central plant, roof top packaged system, VRF systems, etc
- Energy Upgrades will effect IEMP
Data Analytics

• Regression methods in predicting the accuracy of software.
• ASHRAE recommendation of consumption in sq ft
• CBECs method for consumption
• Utility Data for electricity gas and water
• Utility bill alignment – 15 minute data for 3 years
• Calibration
Methodology

Data Collection
Factor selection
Regression
Results Analysis
Tool Development
Verification

Workflow

Input
EUI (BEopt)
$P_0$

Architecture Features
$A_0, A_1, A_2, \ldots$

Data Base
Regression
Predict Tool

Output
EUI
HEED
eQuest
IES-VE
IES-Ware
EnergyPro
DesignBuilder

Tools

BEopt - Shortcut
DesignBuilder
EnergyPro 6
eQUEST 3-65
HEED
IESVE 2014
Minitab 17
Fitted Regression Model----Stepwise

- Total
- Heating
- Cooling

Response: EUI (HEED), EUI(eQuest), etc.
Predictor: EUI (BEopt), A1-A9, B1- B3
Stepwise: $\alpha = 0.15$
Existing Energy Consumption By Building
The charts provide a visualization of energy consumption and provide a quick comparison to show that there is an immediate need for energy efficiency measures that fall into the category of large consumers that are not slated for either demolition nor major renovation as these have the largest impact on savings for the college.
Existing Energy Consumption By Building
Comparison of Cerritos College EUI, CBECS and Goal EUI
Green House Gas Emissions

Cerritos College GHG emissions in 2013

- Mobile emissions (scope 1): 67 metric tonnes
- Stationary emissions (scope 1): 2026 metric tonnes
- Indirect emissions (scope 2): 3837 metric tonnes
- Total emissions (scope 1 & 2): 5930 metric tonnes

Metric tonnes Carbon Dioxide equivalent
Conclusion

• Road map: An integrated energy masterplan overlay to facilities masterplan.
• Bench marking the entire campus
• Manage energy costs, short term, medium and long term
• Capturing funding opportunities: utility rebates, Prop 39, bond funds
• Reduction in operational costs