Energy Assessment of the Tri Co-Operatives

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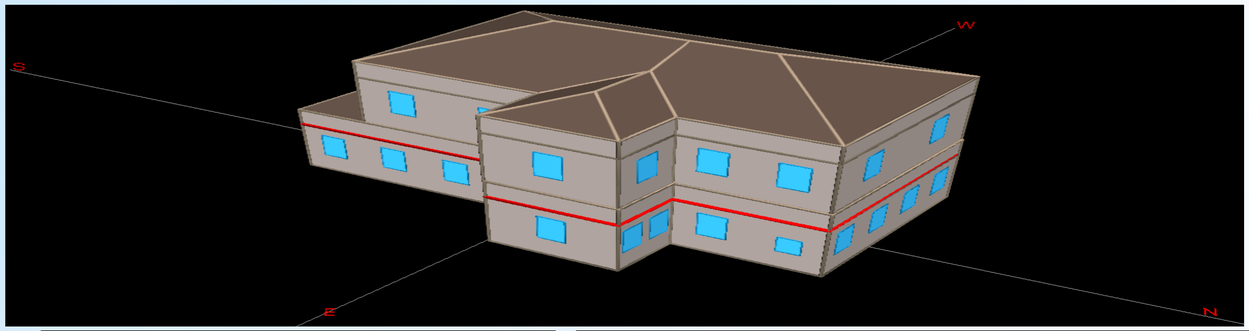
Client: Ben Pearl, SCHA / Customers: Tri Co-Op Residents

Purpose

The team was tasked with performing an energy assessment of the Tri Co-Operatives, specifically the Davis Student Co-Op. Solar Community Housing Association (SCHA) is in talks to manage a 20 year lease of the property and are interested in what energy saving opportunities are available. The team created a model using eQuest and validated the accuracy via current utility data. By simulating the effects of numerous potential improvements, the team will present Ben with a list of recommendations and possible funding sources to explore further.



Recommendations

- Plug loads
  - Power strip management
- Lighting
  - Fluorescent (25-35%)
  - LED (35-50%)
- Windows/Doors
  - Repair and weatherize
  - Blinds and curtains
- Hot water heating
  - Insulating pipes
  - Turning thermostat down to 120 °C
- HVAC
  - Cleaning furnace
  - Repairing and maintaining duct work
- Insulation
  - Blown cellulose

Methods

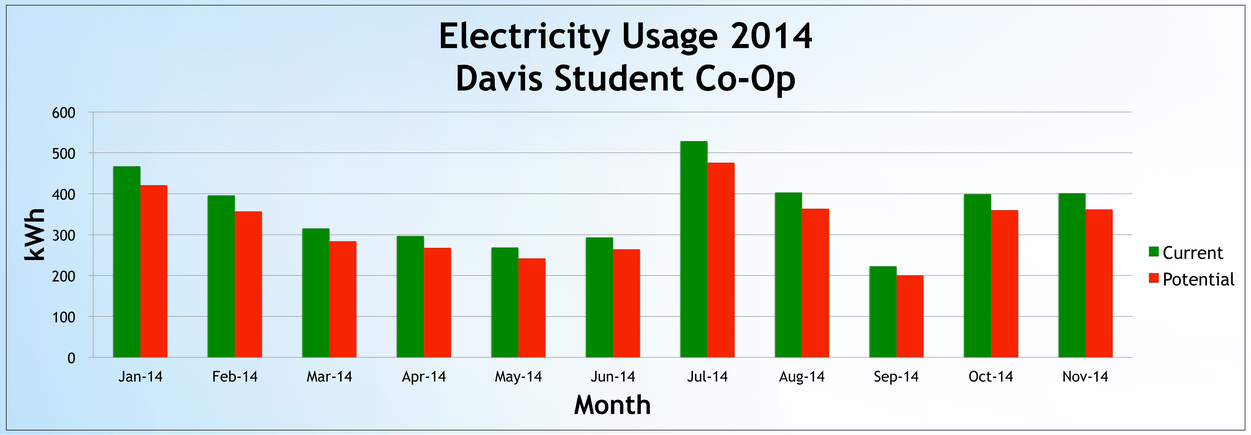
- Background research and case studies
- Customer and client discussions
  - Informal survey
- Detailed walkthrough
  - Measurements
- Architectural plans and utility data
- eQuest modeling
  - Model validation
  - Simulated implementation
- Energy Conservation Measures (ECMs)
- Funding sources

Results

- Numerous low-cost, low-difficulty options
- Resident behavior/knowledge
- Decreasing by 10% per month saves over 400 kWh/year

Funding Sources

- Energy Upgrade California / PG&E Rebates
- The Residential HERO PACE Program
- Other Utility Rebates
- Various Department of Energy Grants



Conclusion

The eQuest model was able to represent the Davis Student Co-Op and offer an opportunity to simulate multiple improvements. The energy and cost savings of these virtual retrofits are able to be approximated to the physical house due to utility validation. Basic recommendations are offered, such as plug load management and weatherization, that can easily reduce energy use by 10-15%. This reduction would save over 400 kWh/year of electricity. The funding sources outlined can help alleviate the initial costs of these projects. Additionally, large scale improvements should also be discussed. If this model is proved to be highly accurate, a large investment can be simulated that would significantly change the energy footprint of the Tri Co-Ops. More expansive funding sources are available for such implementations, ranging from blown insulation to a thermal hot water system. However these improvements are outside the scope of this project.

Future Work

It should be noted that this is an iterative process and this model serves as a base to build off. Other programs are available that offer more detailed evaluations of the model and can more accurately predict energy use. Making a highly precise simulation allows energy improvements to more realistically represent the actual changes. The team recommends that a full set of architectural drawings be used to amend the model and assure it is as accurate as possible. Furthermore, it is crucial to validate expected outputs from the actual implementation of improvements. The model should be checked against the observed energy profile whenever a change is incorporated. Future work can be extended to the other houses once a working understanding of the DSC has been reached.

Image Sources:
http://schadavis.org http://housing.ucdavis.edu/housing/tri_cooperatives.asp
http://www.ci.tulare.ca.us/ https://www.sce.com/

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