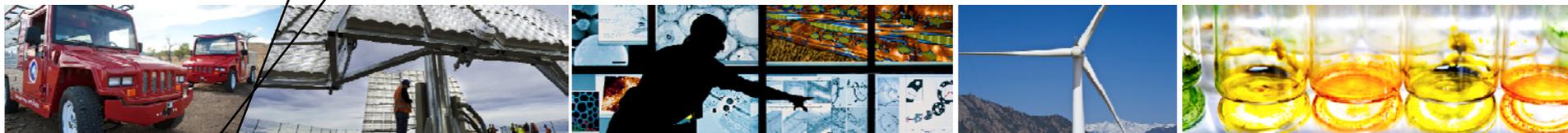




BEopt Multifamily Modeling Capabilities for ZNE and iDSM in California



CSI RD&D Program - Coordination and IOU Outreach
Meeting for Solicitation #4 and #5 Grants

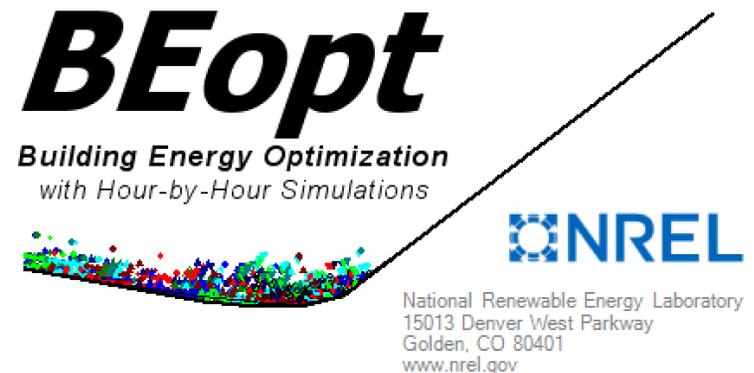
Eric Wilson, National Renewable Energy Laboratory
David Springer, Davis Energy Group

June 26, 2014



Project Summary

Develop **multifamily residential modeling capabilities** for use in California, to facilitate integration of distributed solar power into the grid in order to maximize its value to California ratepayers



Project Information

National Renewable Energy Laboratory (sub)

- Lead modeling / software development

Davis Energy Group (prime)

- Project management
- Model development / engineering support
- Software testing and evaluation

Budget: \$188k (\$99k from CSI RD&D #5)

Project Need

- 32% of California housing stock (4 million homes) ...and growing—multifamily surpassed single-family new construction in 2012.¹
- California policy goals:
 - AB 758
 - Statewide policy goals on ZNE new construction
 - 33% renewable portfolio standard by 2020
 - Climate goals (24,200 GWh of EE by 2020)
 - Potential for longer term clean energy goals (2030 and 2050)

¹ California Department of Finance. 2012 Population Report Press Release.

http://www.dof.ca.gov/research/demographic/reports/estimates/e-1/documents/E-1_2013_Press_Release.pdf

Project Need

Existing tools for multifamily:

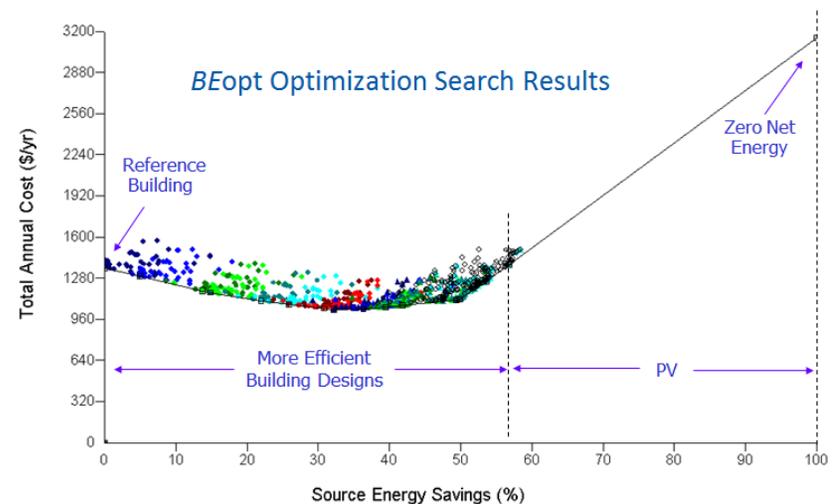
- **Focused on rating/audits (not design/optimization)**
 - REM/Rate
 - EnergyGauge USA
 - TREAT
 - MulTEA
- **Large effort required (40+ hours of modeling/building)²**
 - eQUEST
 - EnergyPlus

² Green Builder Magazine. "Optimizing Multifamily Buildings." August 2013.

http://www.greenbuildermag.com/GBM/media/pdfs/Optimizing_Multifamily_Buildings.pdf

Project Background

- **BEopt™** (Building Energy Optimization Tool) (<https://beopt.nrel.gov>)
 - Developed by NREL with U.S. DOE funding
 - Uses EnergyPlus or DOE-2 simulation engines
- **CSI RD&D Solicitation 1 project by NREL, DEG and E3**, provided a **California version** with the following features:
 - Existing home analysis
 - Detailed cost database
 - Detailed utility tariffs
 - Utility cost effectiveness tests
 - Demand response options
 - TDV calculations
 - Efficiency (whole-house) incentives
 - Solar incentives
 - Net energy metering alternatives



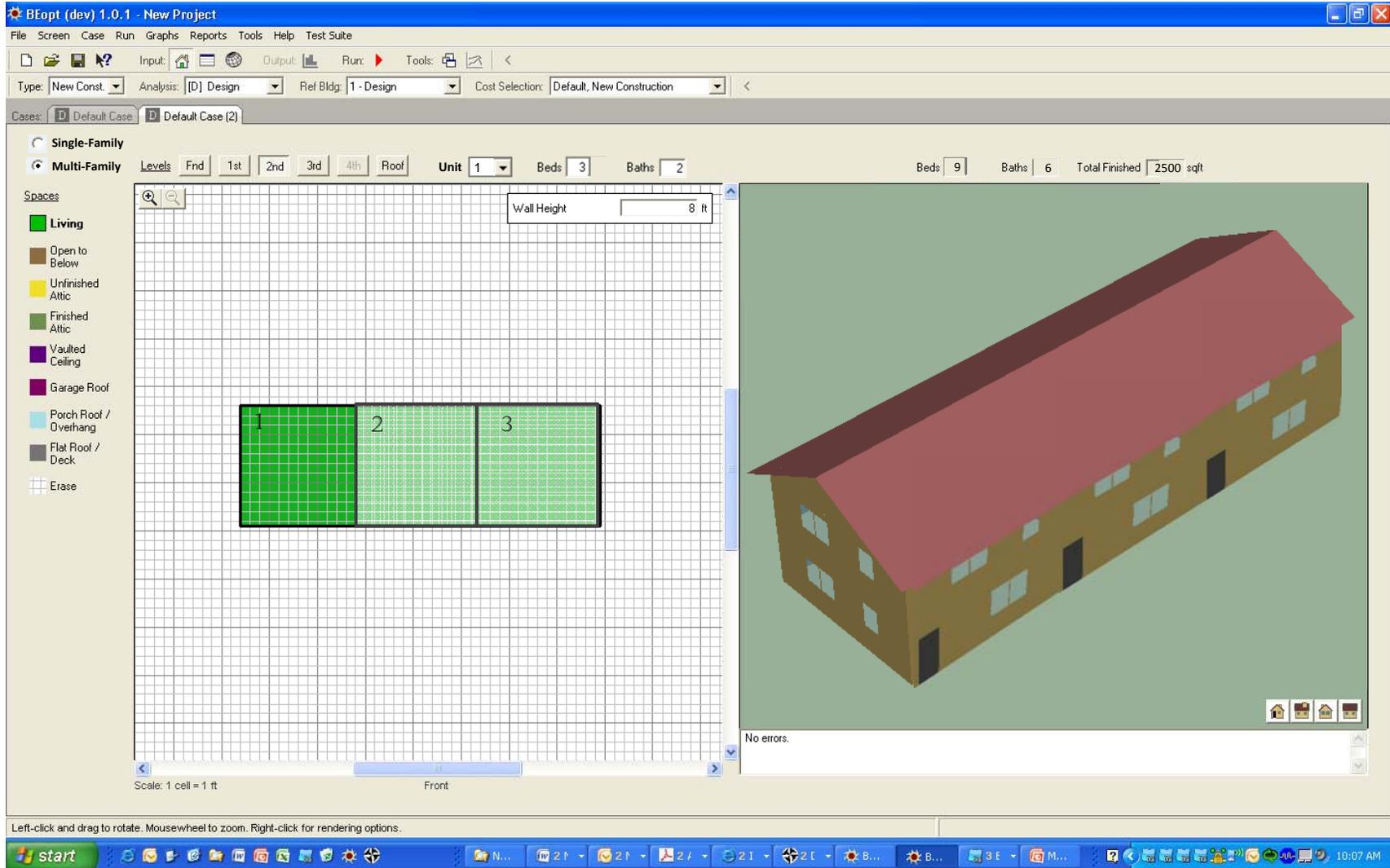
- This project extends these capabilities to multifamily buildings.

Project Scope

- **Focus is on low-rise (≤ 3 stories)**
 - Likely also applicable for walk-up 4–5 story buildings
- **Multifamily occupancy patterns**
- **Both *individual* and *central* DHW and space heating systems**
- **Optimization of whole-building at once**
- **Does not include:**
 - Common areas
 - Central ventilation systems

Project Scope

Interface mockup



Project Scope

\$12k cost-share from DOE Building America project
(DEG, TRC Solutions, and Sun Light & Power)

- Field monitoring of two multifamily buildings with central solar water heating
- Detailed TRNSYS modeling
- Develop recirculation control strategies that reduce losses by 15%
- Useful for BEopt/EnergyPlus model validation

\$77k cost-share from DOE/NREL Annual Operating Plan funds specifically for multifamily implementation

Conclusion

Brings BEopt's existing modeling and optimization capabilities to multifamily buildings



Enables analysts to find the least cost combination of *energy efficiency and renewables*



Supports integrated DSM (iDSM) and Zero Net Energy (ZNE) in California residential buildings.

Please send us your suggestions for BEopt-Multifamily:

beopt.nrel.gov/contact

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