Oak View Microgrid

Huntington Beach, CA

California Energy Commission (EPC-17-045)

ADVANCED POWER & ENERGY PROGRAM
UNIVERSITY of CALIFORNIA · IRVINE

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

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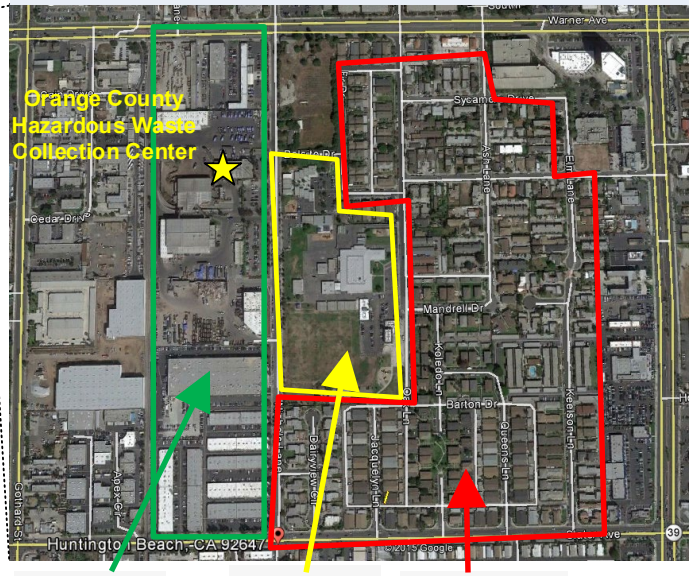
Southern California Gas Company®

November 16, 2020

Oak View Microgrid Award

- **GOAL: To design and thoroughly analyze a microgrid for the Oak View community that will improve the environmental performance and resiliency of the local electric infrastructure**

Oak View Community, City of Huntington Beach



Business Park

School / Library

Residential Multifamily

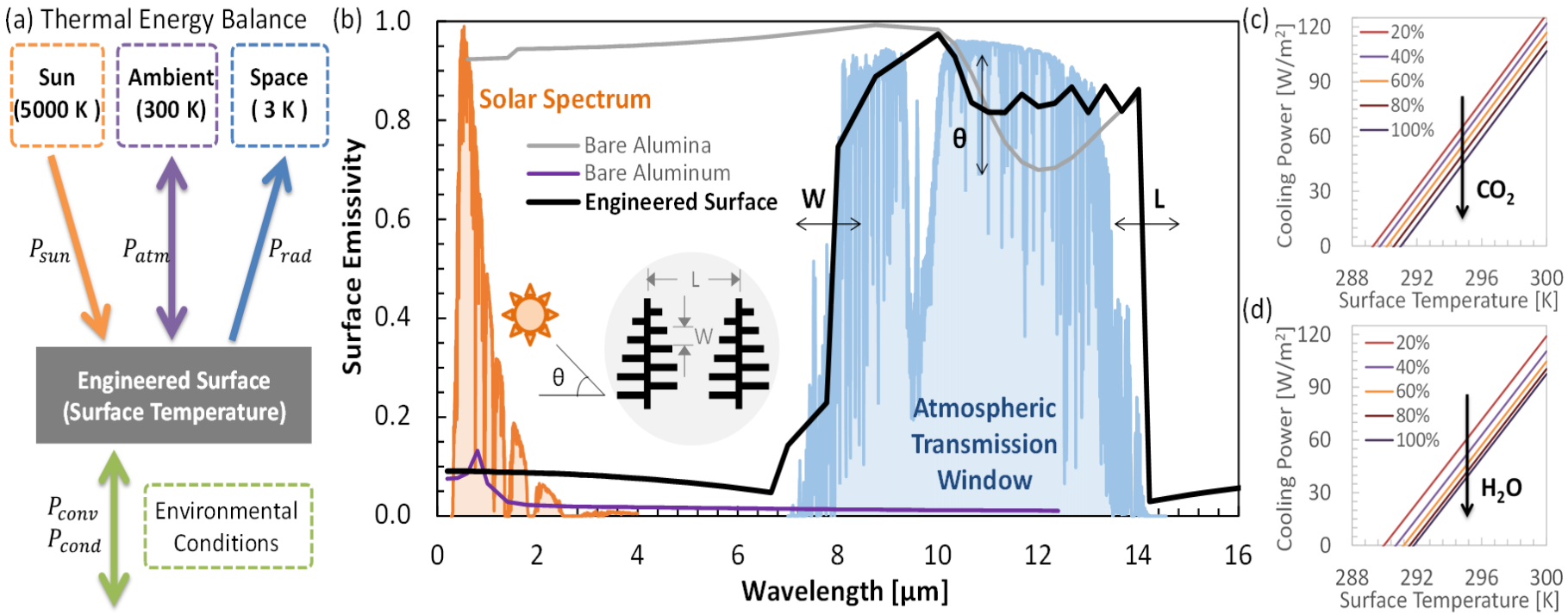
Oak View by the Numbers

- Average household size is 6 occupants.
- A dense, 1-square-mile neighborhood with a population over 10,000.
- The crime rate is 200% that of Orange County.
- 70% of those 25 or older lack a high school diploma or GED.
- 97% of students qualify for free or reduced-price lunch.
- Only 48% of those 16 and over are employed.
- Per capita income in Oak View is $16,700 vs. $31,400 for Orange County.
- Facilities: 1 primary school, 1 library, 1 community youth center, 1 small park and 2-3 community-based non-profits

Project Technical Tasks

- **Task 2 Capture big data associated with the community**
  - Building energy demand; address security issues with personal data; infrastructure classification
- **Task 3 Adapt Microgrid Design Tools for UES Application**
  - Integrate URBANopt with REopt and grid modeling; determine technologies for consideration; enable tools to calculate environmental benefits
- **Task 4: Carry out case studies on Urban Energy Scenarios (UES)**
  - Consider technology combinations for improving urban AQ, reduced GHG, and increased grid reliability; quantify economic & environmental impacts
- **Task 5: Assess Air Quality**
  - Develop appropriate boundary conditions for AQ modeling; predict regional AQ; predict indoor AQ
- **Task 6: Propose set of optimal UES for the proposed master microgrid design**
  - Based on case studies and AQ results; propose current and future UES designs

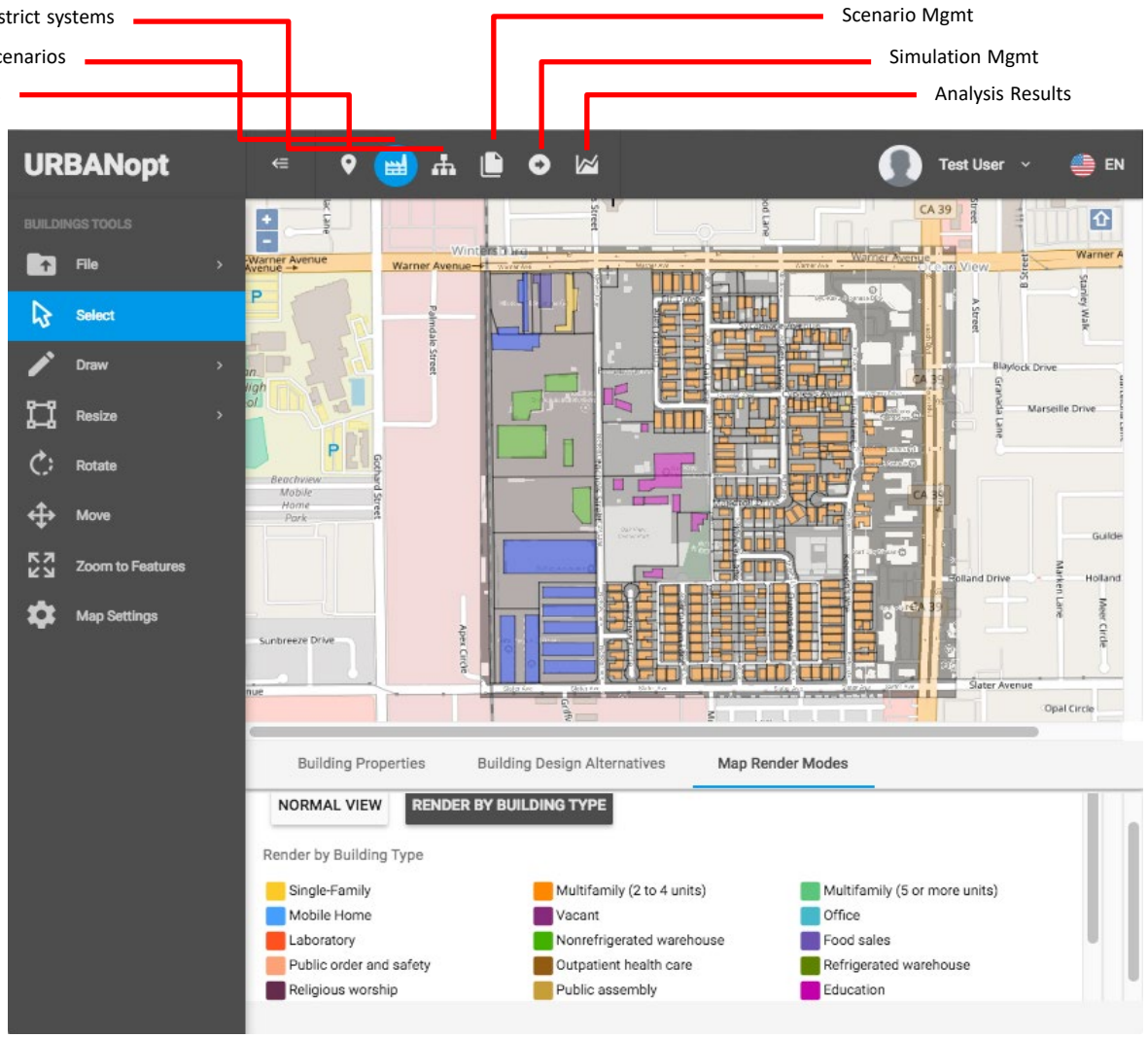
Objectives Baseline: Novel EE Retrofits



- (a) Energy transfer at engineering surface
- (b) Emissivity of engineered surface
- (c)/(d) Surface performance dependence on ambient conditions

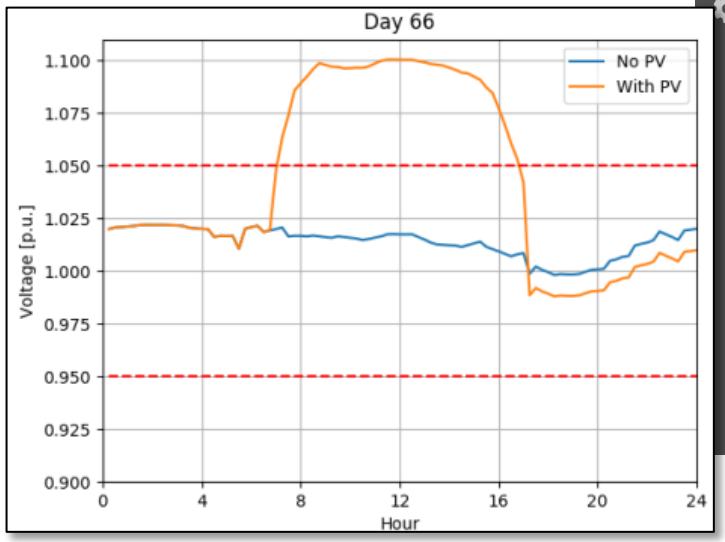
Objectives Baseline: URBANopt

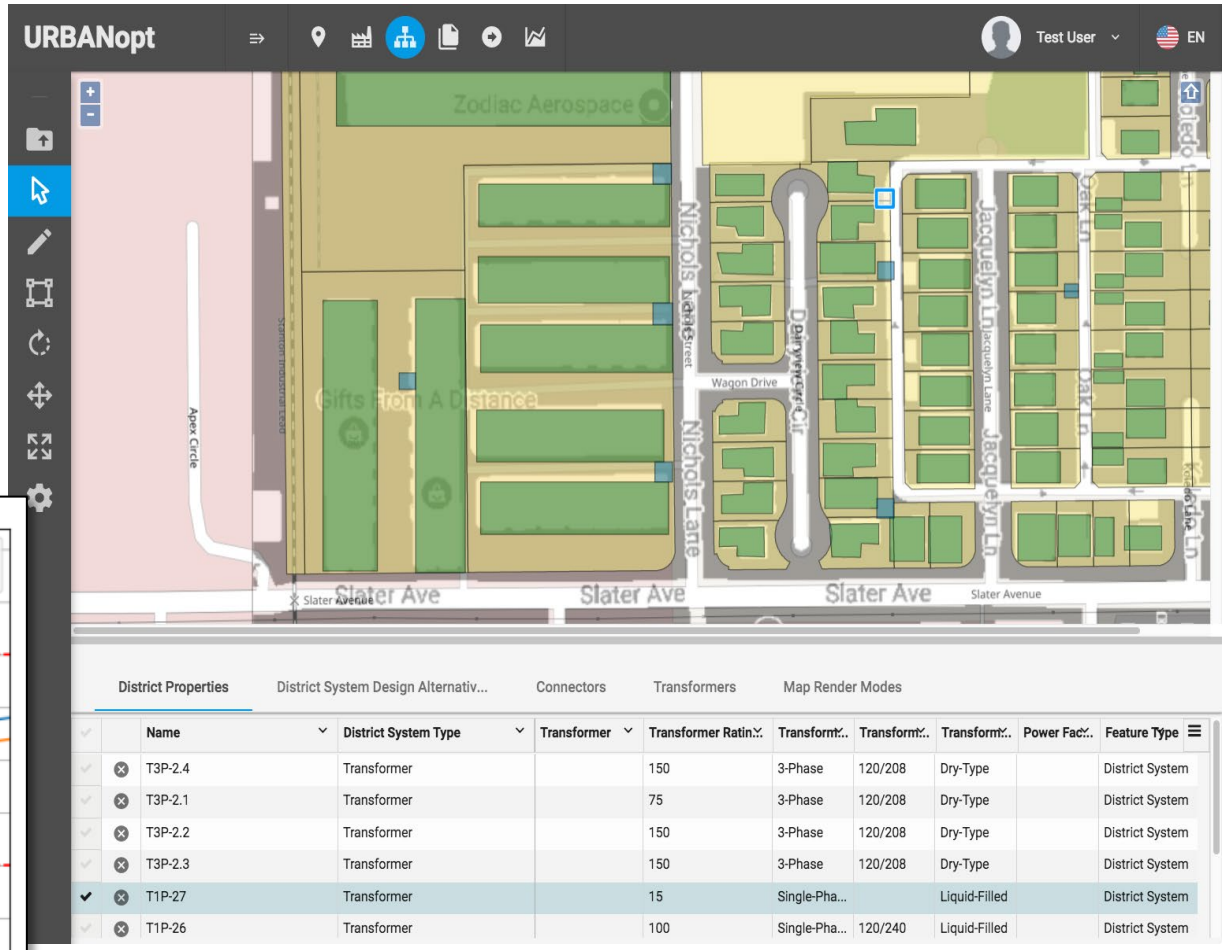
- **Computational framework**
  - Powered by DOE's OpenStudio and EnergyPlus
- **Deployed at http://urbanopt.net and https://github.com/NREL/OpenStudio/releases/tag/v2.5.1**
- **Can be integrated with EnergyPlus and Open Studio measures**



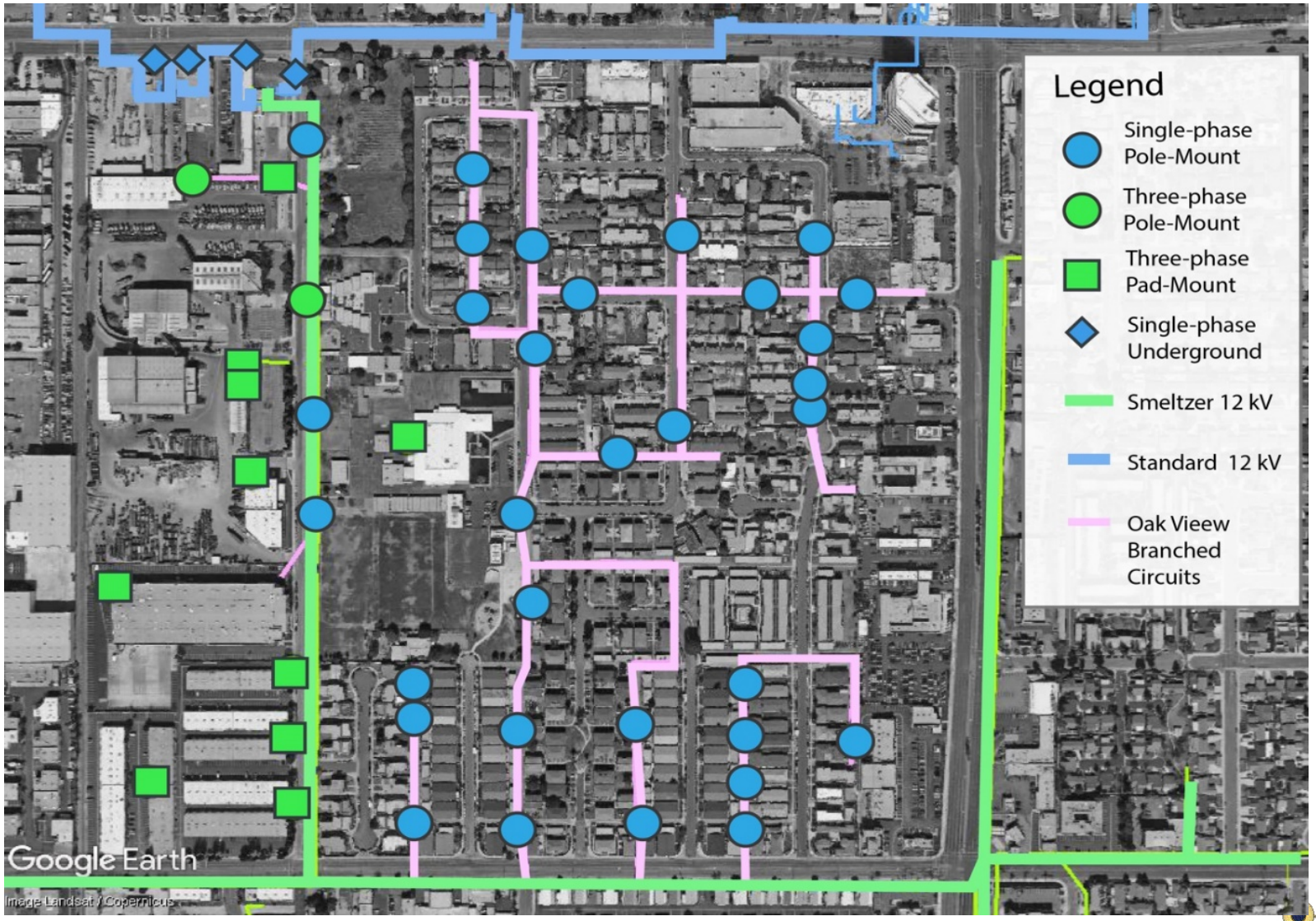
URBANopt: Considering Transformer Loading

- Recently added transformer nodes
- Will be used for load aggregation
- Critical for identifying days when transformers are overloaded

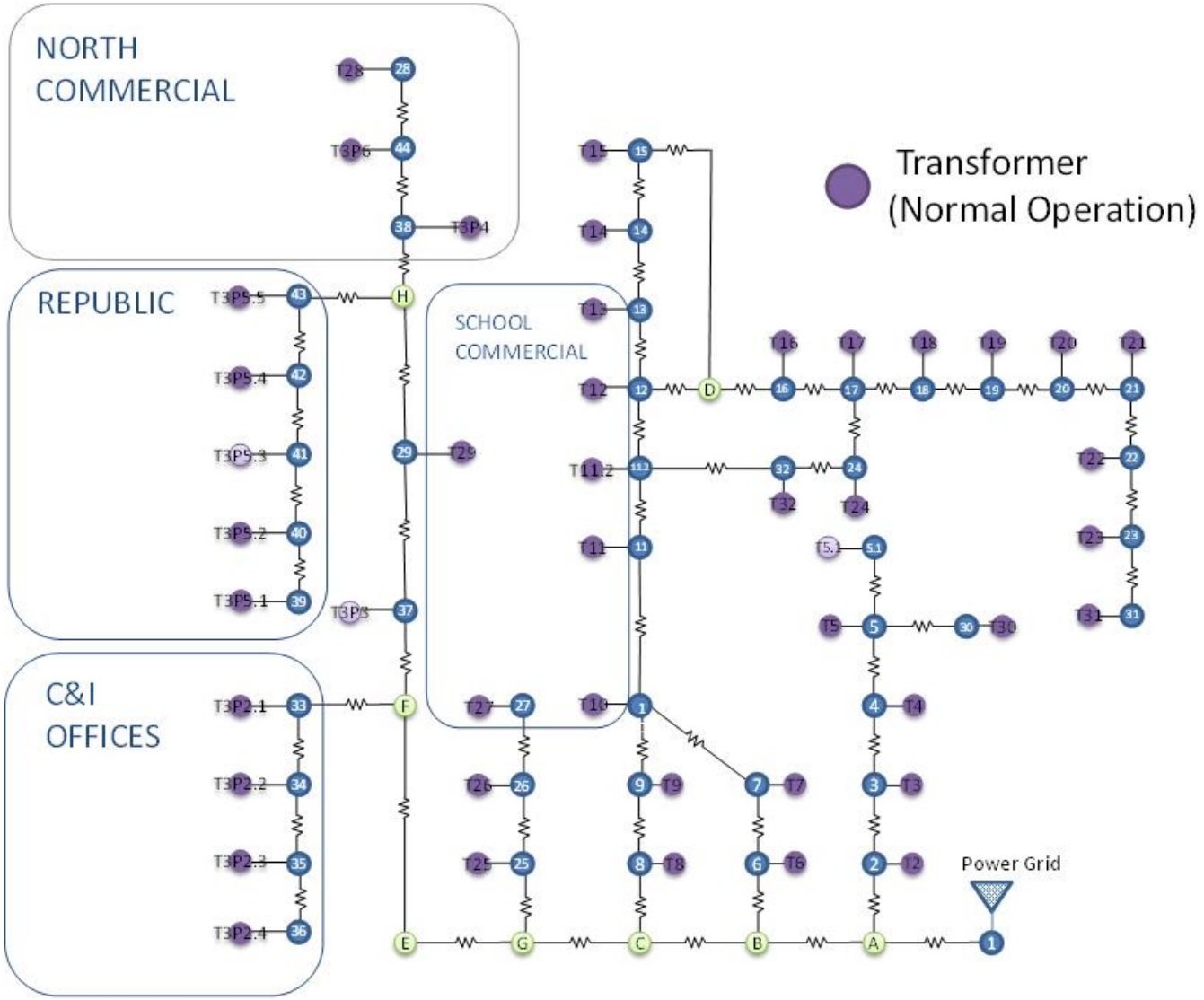




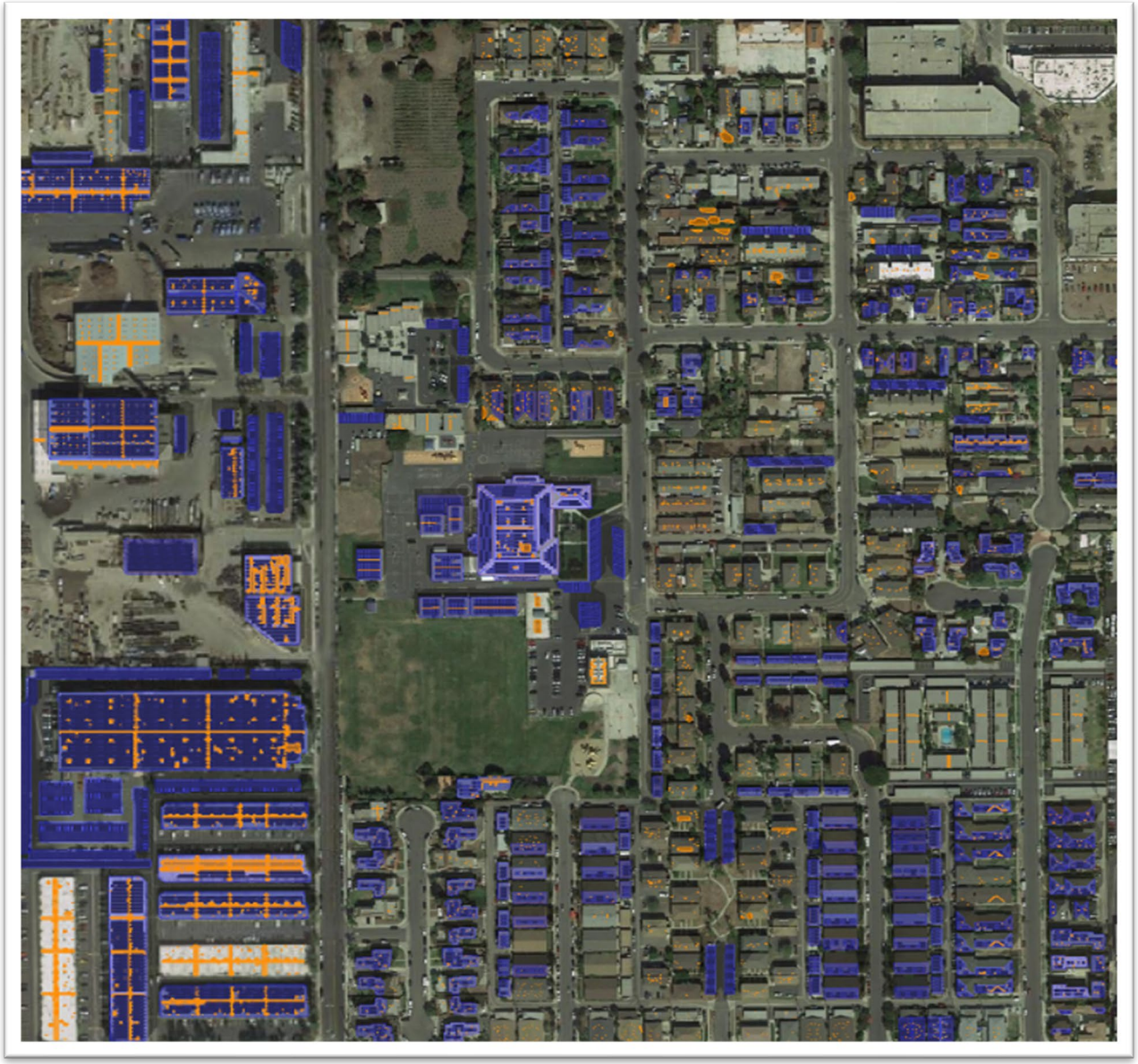
Objectives Baseline: Oak View Grid Modeling



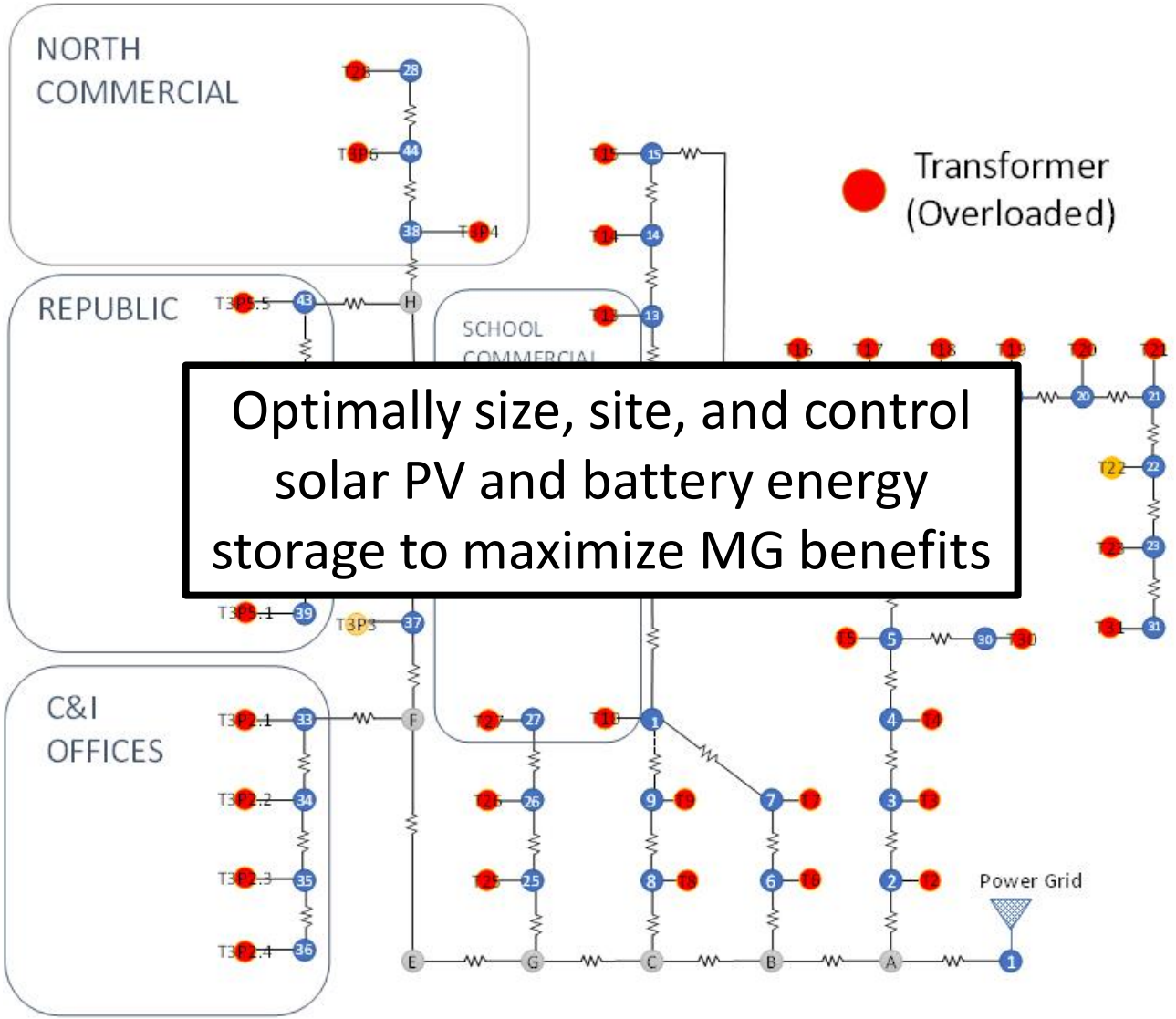
Oak View Grid Model: No PV



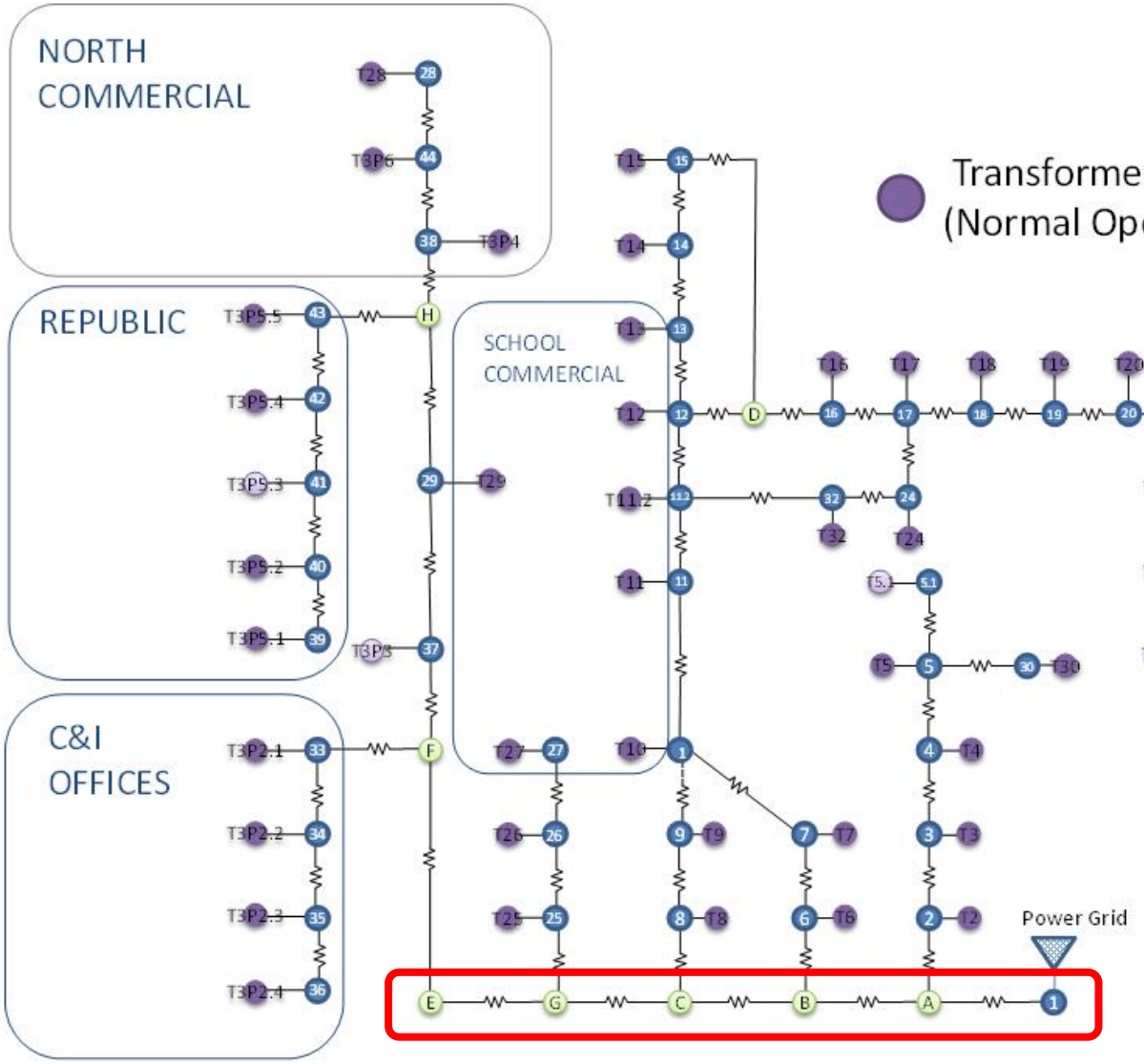
Oak View Maximum PV



Oak View Grid Model: Max PV



Oak View Grid Model: Microgrid Technology



Switching Equipment

At Nodes

- Storage
- Sensors
- Communication
- Load Mgmt

THANK YOU!

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