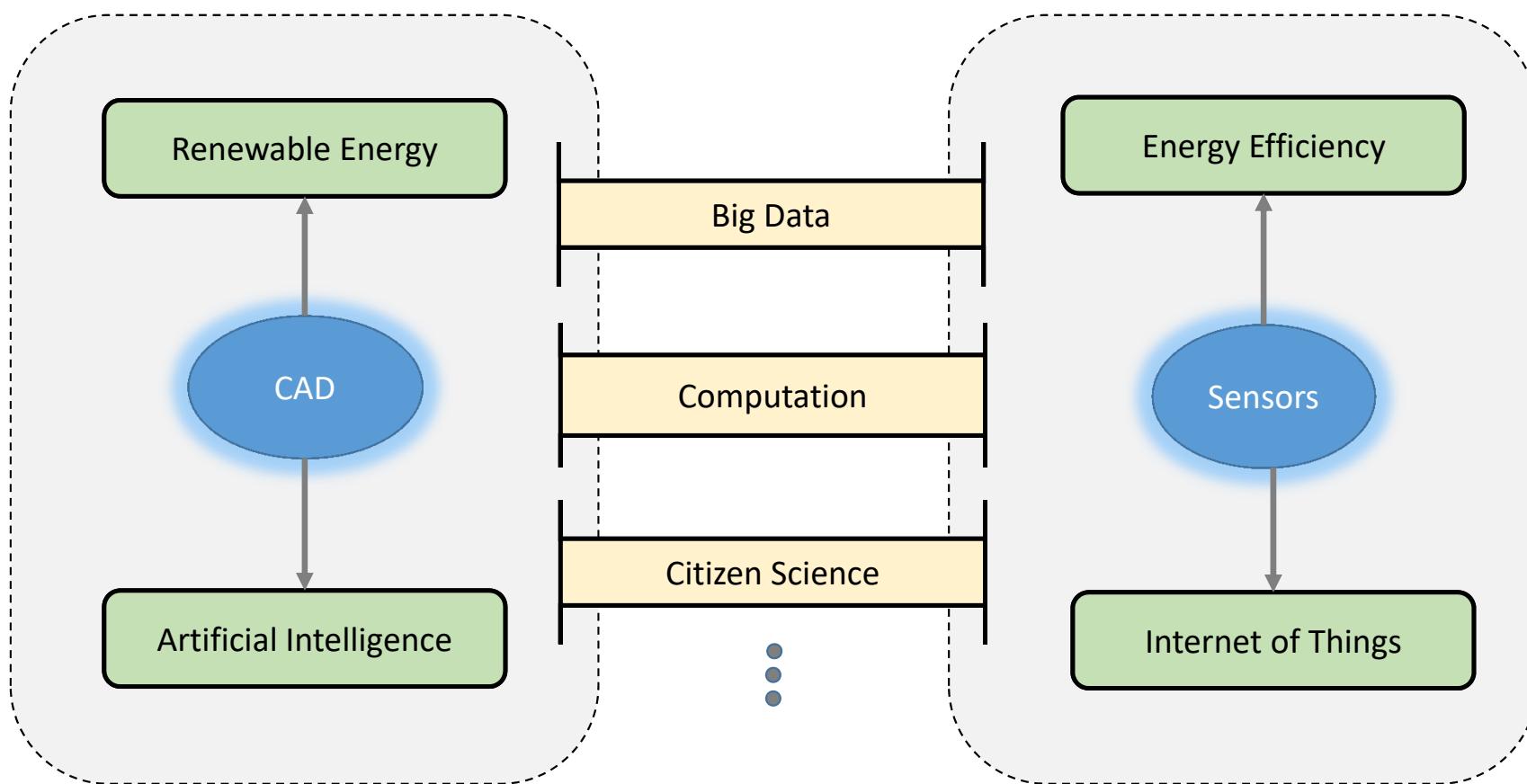


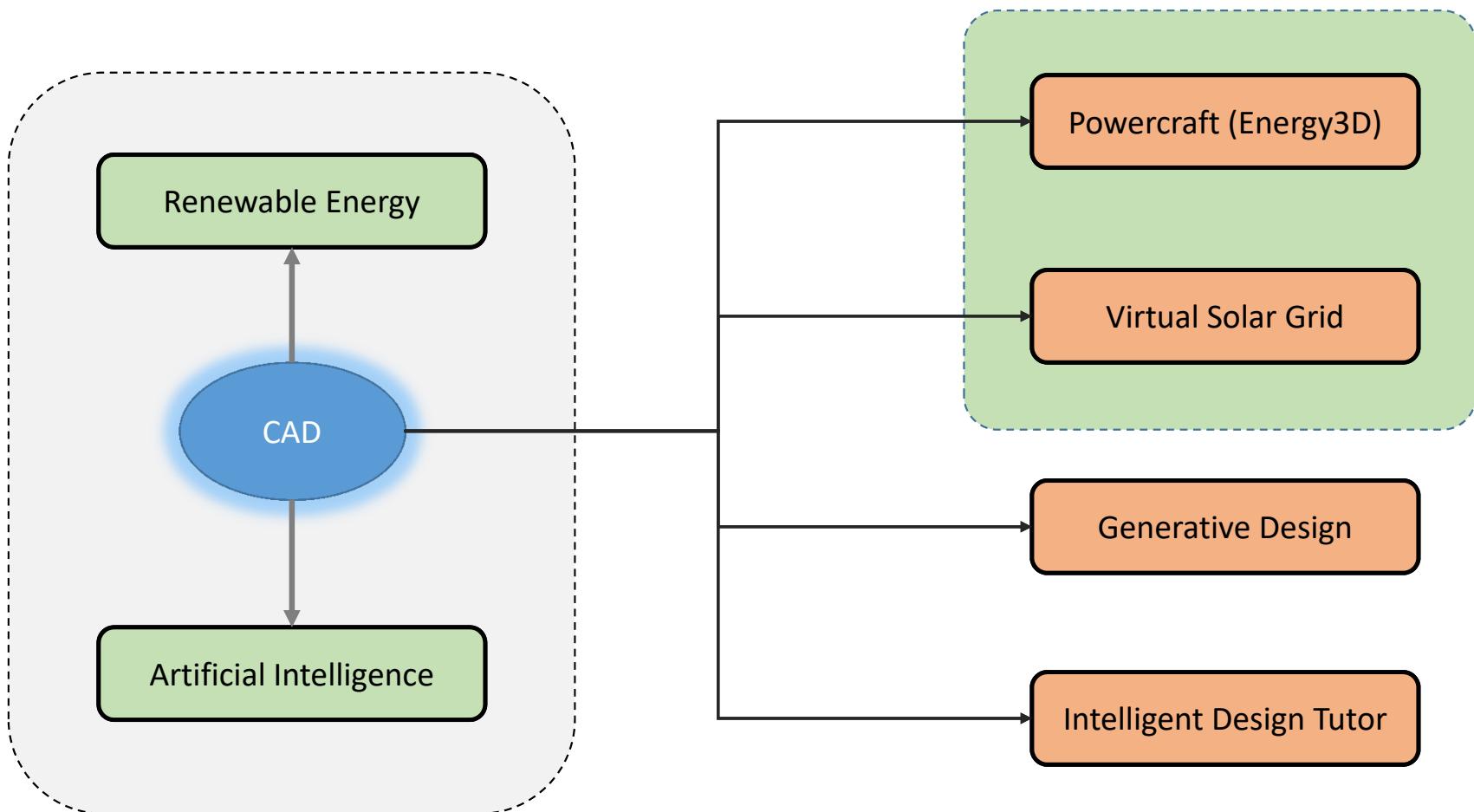
The Engineering Computational Laboratory

Charles Xie

Four Focus Areas of Research and Development at the Intersection of Engineering and Education



The CAD Frontier



Solar Work (Powercraft + Virtual Solar Grid)

The screenshot illustrates the Solar Work architecture. It features a central map of the world with various solar energy projects marked by yellow diamond icons. Two orange boxes represent the system's components: 'Powercraft (Energy3D)' at the top and 'Virtual Solar Grid' at the bottom. Arrows indicate a bidirectional connection between these components and the 'Google Maps' layer. A callout box on the right side provides a detailed description of Powercraft.

A Minecraft-like CAD modeling and simulation tool that turns engineering into design and construction games in the context of renewable energy and on the canvas of Google Maps.

A global network of solar energy systems that supports international collaboration to investigate a big question: Can humanity be realistically powered by 100% renewable energy in 2050 (32 years from now)?

Front end: Powercraft (Energy3D) and Google Maps.

Back end: Virtual Solar Grid.

Powercraft (Energy3D) Data:

- 479 projects posted as of 3/27/2018
- Output: 17,718 GWh/yr, Mix: 71% CSP, 29% PV (0.089% of global electricity consumption)
- 2095.4 GWh
- Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
- Total: 68891 MWh
- Modeled world hourly outputs on Jul, 1st
- Hour (GMT): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24

Virtual Solar Grid Data:

- Model output: 93,936 MWh/yr
- Tower Type: CSP
- Location: Tucson, Arizona, United States
- Plant: Sundt Generating Station
- Type: CSP
- Model output: 9,354 MWh/yr
- Location: Sanlúcar la Mayor, Seville, Spain
- Plant: Planta Solar 2D
- Type: CSP

Examples: Architectural Design



Examples: Architectural Design



Examples: Architectural Design



Examples: Architectural Design



Examples: Architectural Design



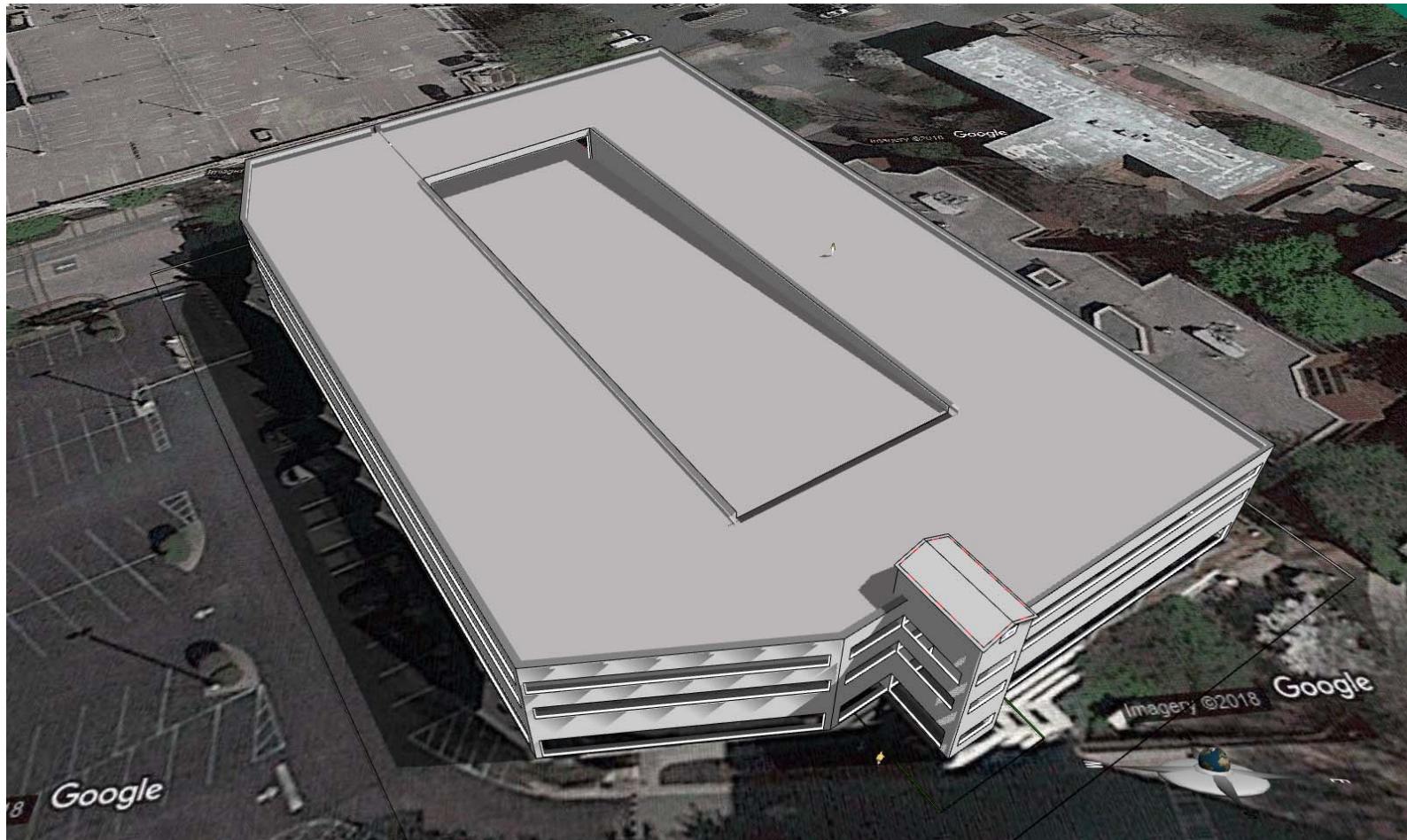
Examples: Solarize Your Home (Braintree, MA)



Examples: Solarize a Public Building (Fitchburg Police Department, MA)



Examples: Solarize a Parking Garage (Spelman College, GA)



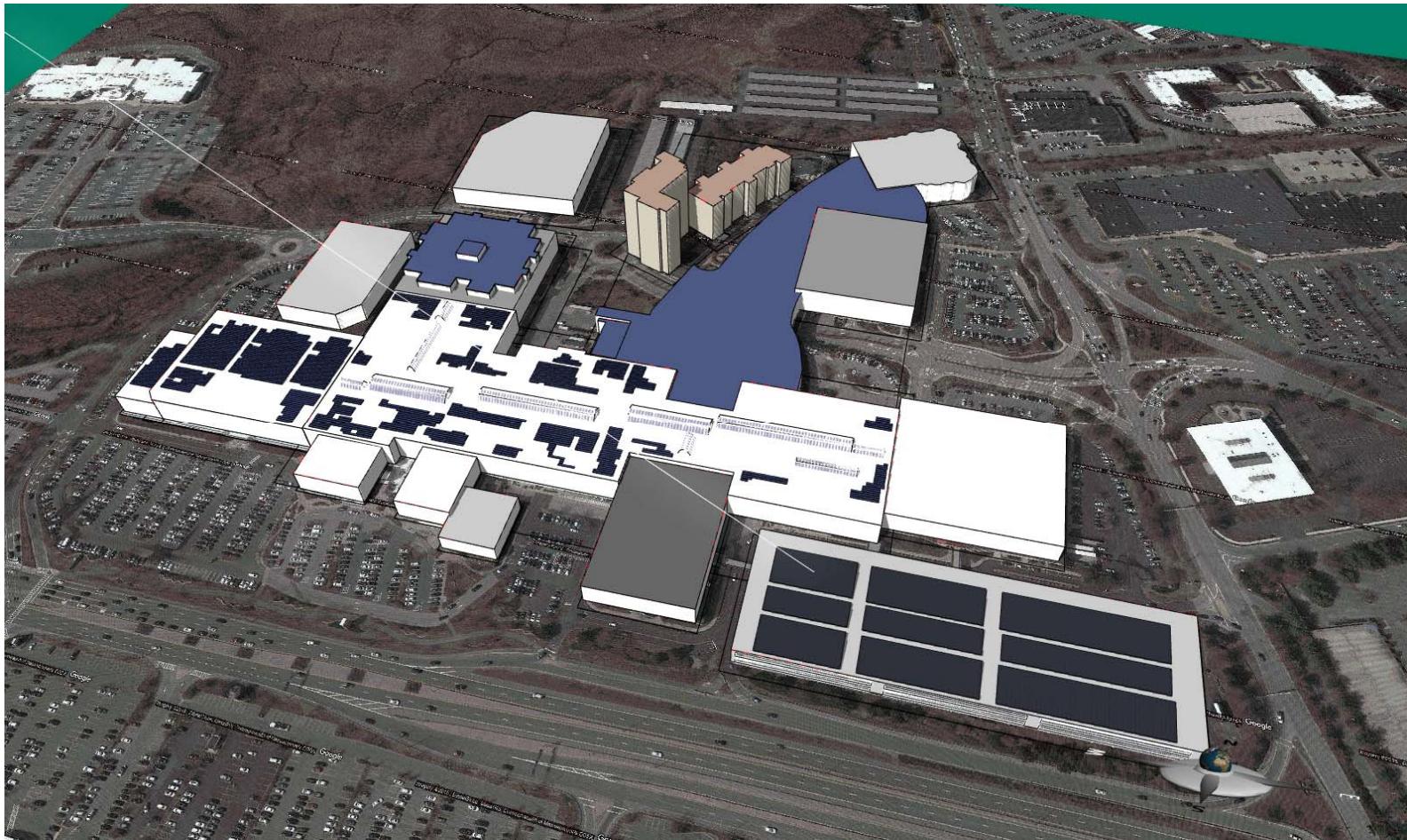
Examples: Solarize Your School (Malden Catholic High School, MA)



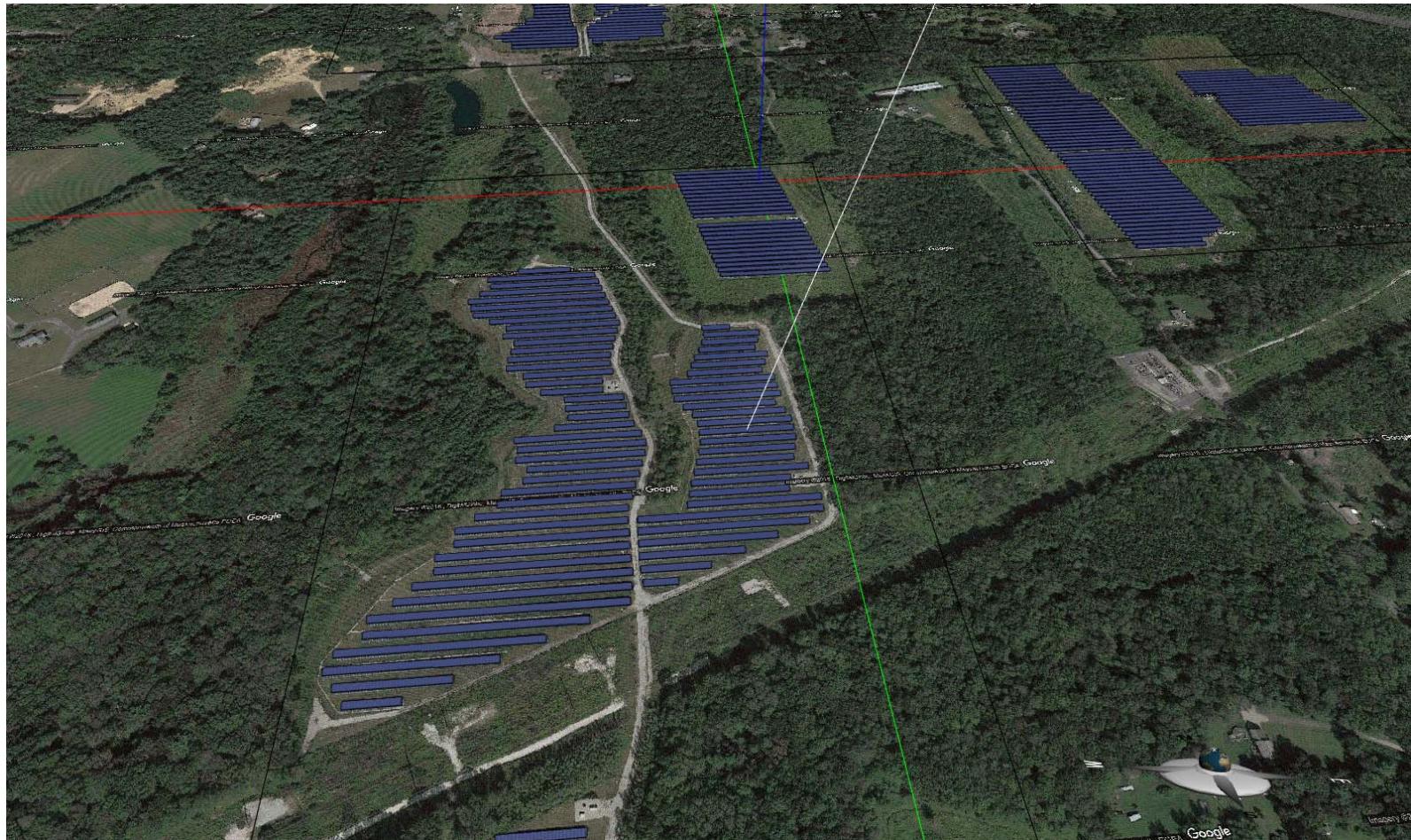
Examples: Solarize Your School (Acton-Boxborough High School, MA)



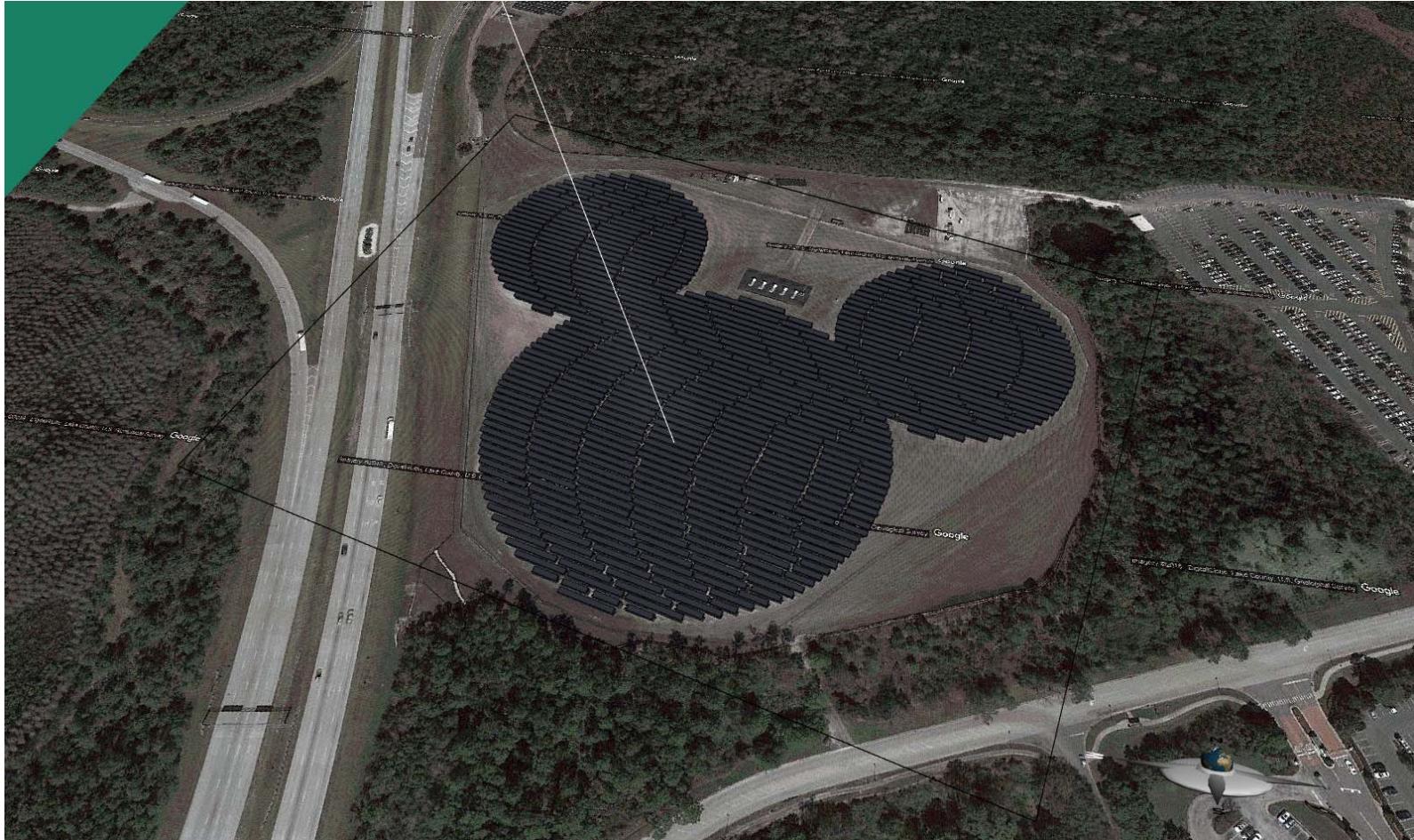
Examples: Solarize Your Stores (Natick Mall, MA)



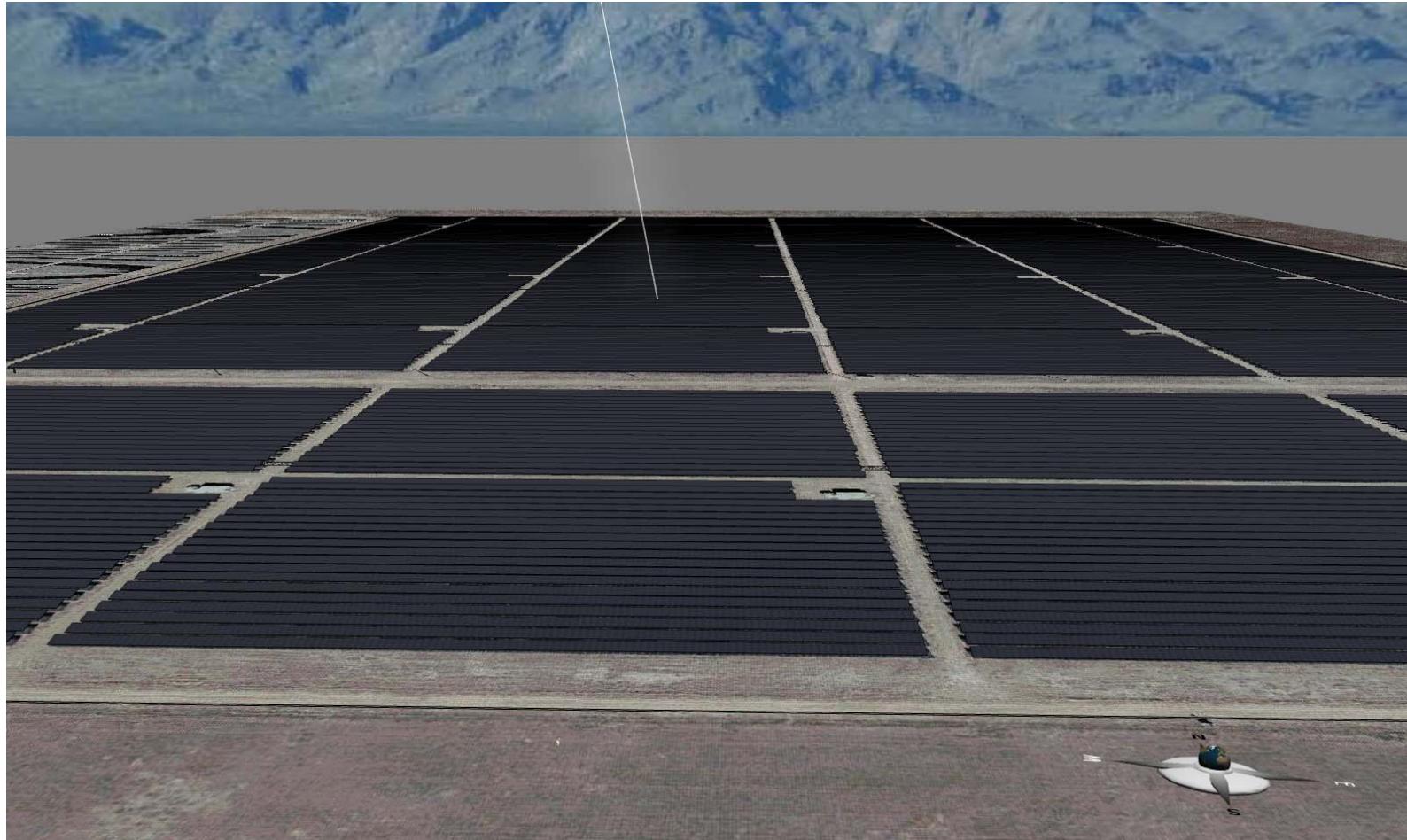
Examples: Ground-Mounted Solar Farms (Warren, MA)



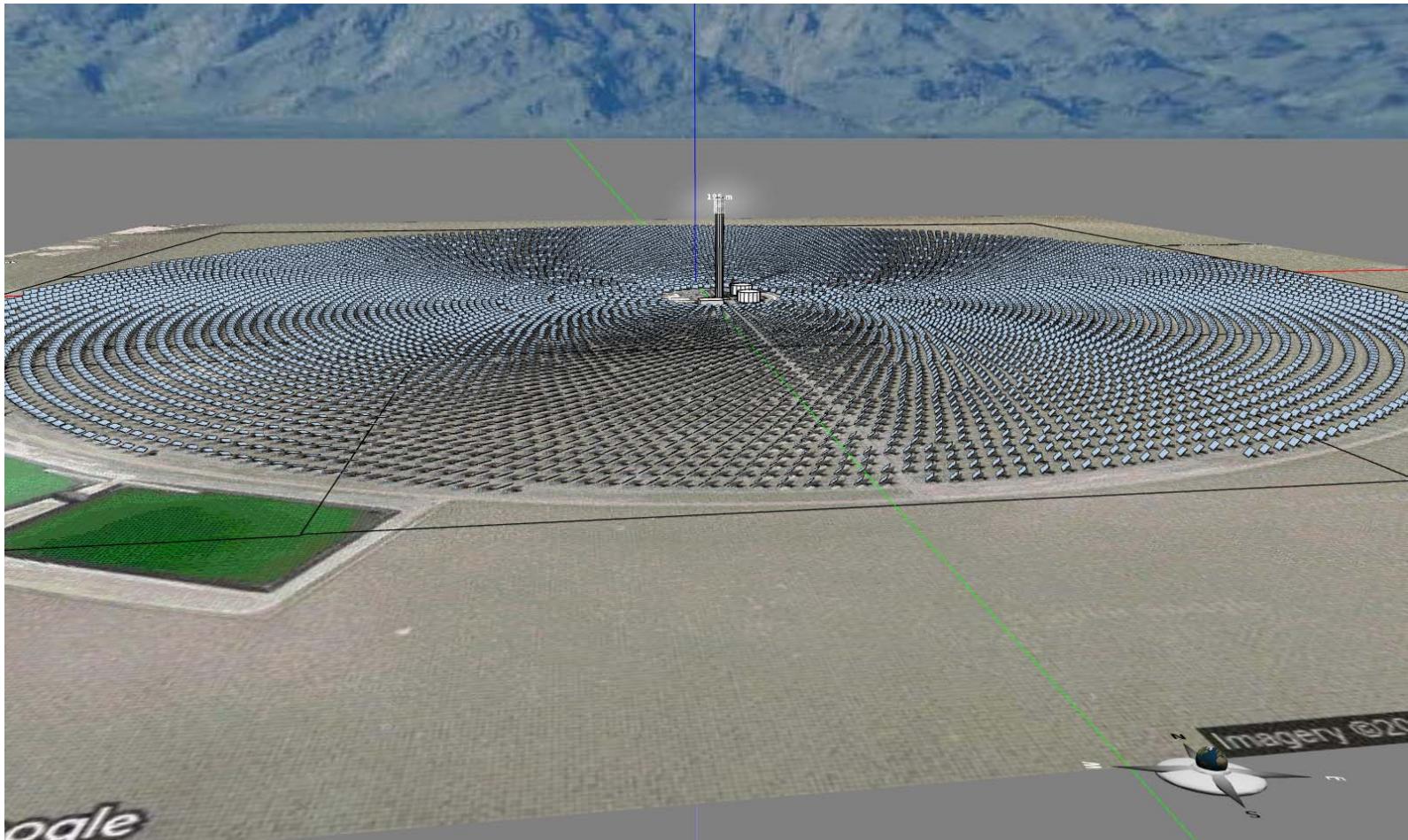
Examples: Advertisement-Integrated Photovoltaics (Orlando, FL)



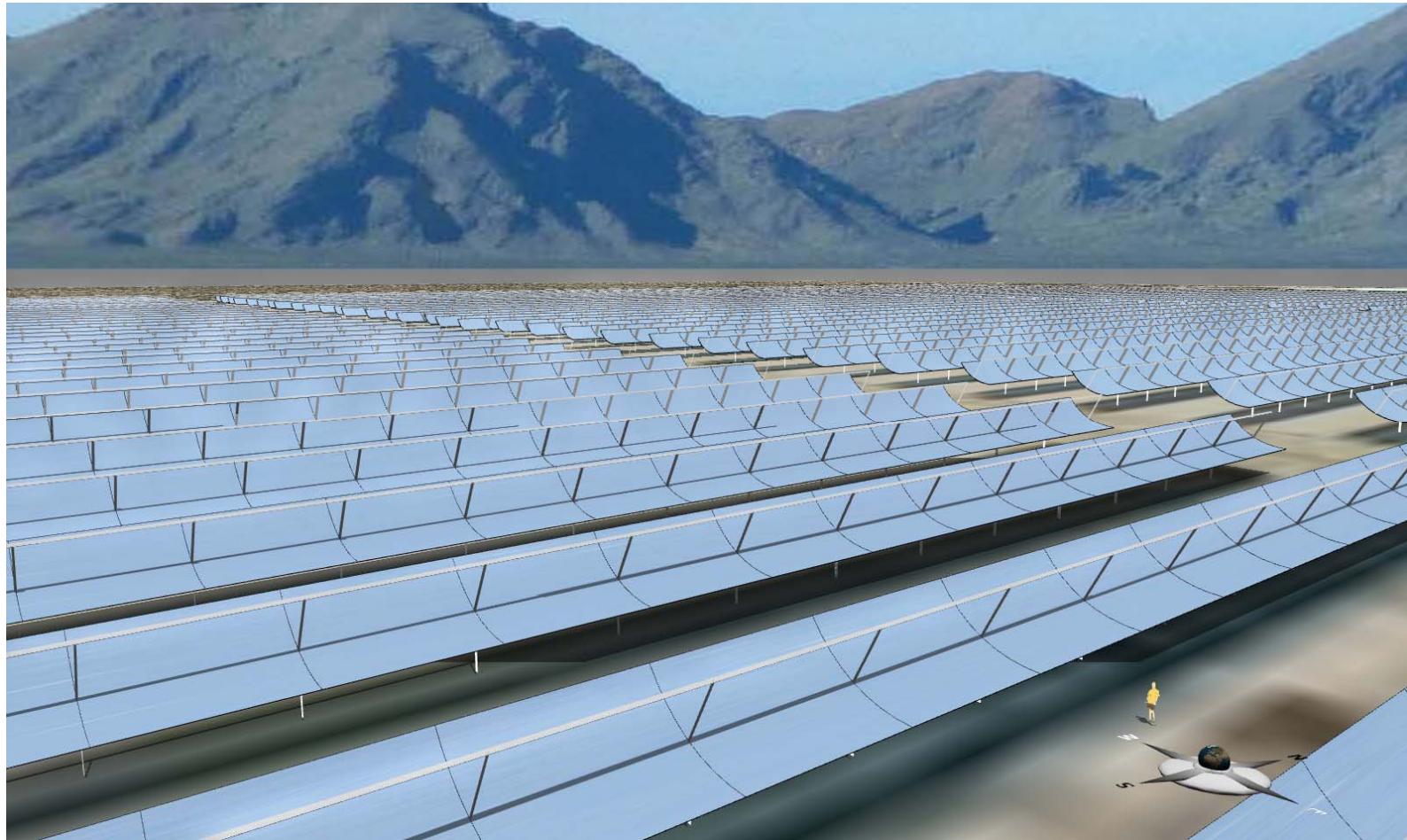
Examples: Topaz Solar Farm, California



Examples: Crescent Dunes Solar Tower, Nevada



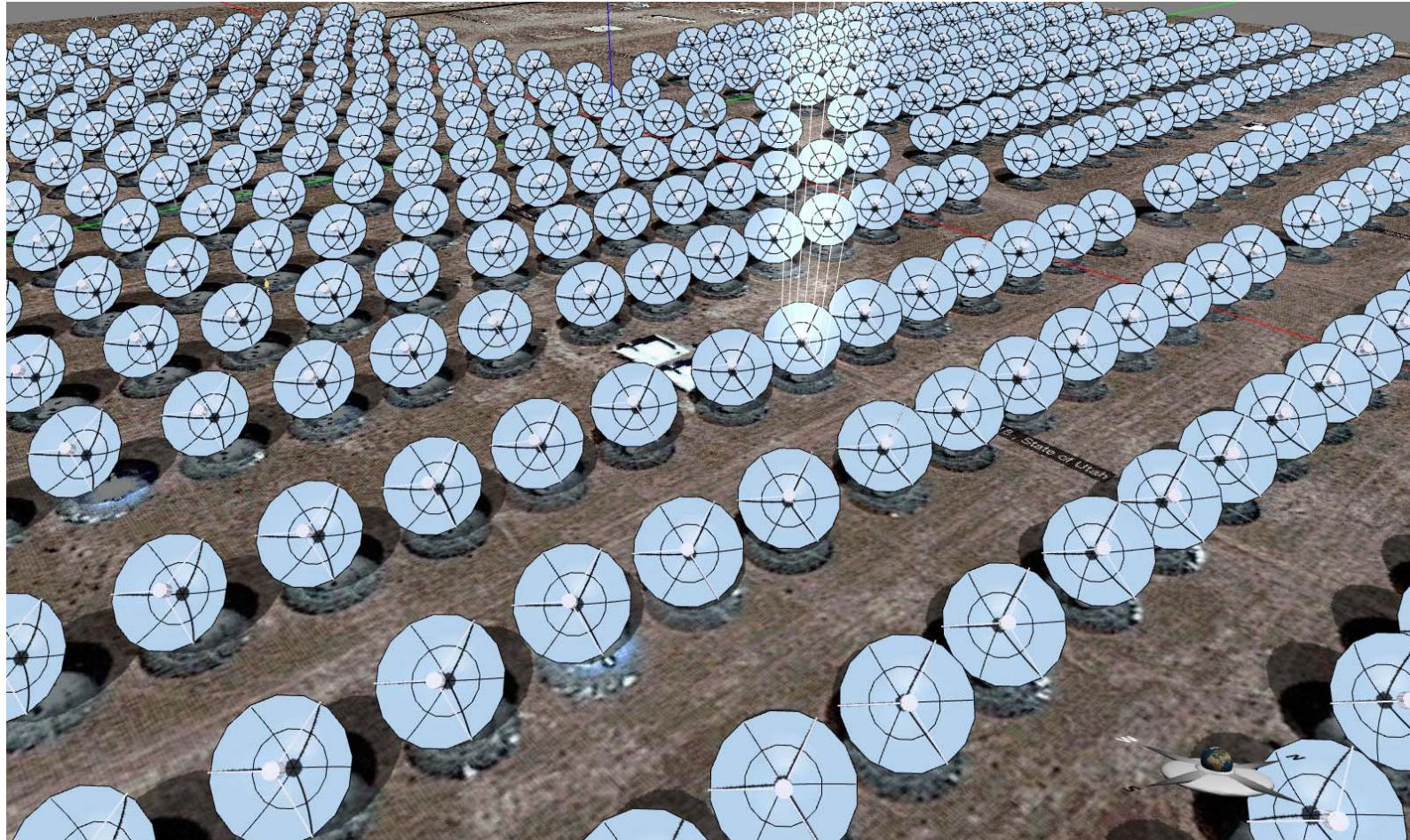
Examples: Solar Energy Generating Systems VIII, California



Examples: Puerto Errado Thermosolar Power Plant, Spain



Examples: Tooele Army Depot, UT



Thank you!