District Use Case: Florida A&M University

<u>Version and Release Date:</u> 1.0, September 12, 2022

<u>Note:</u> This Progress Deliverable phase will challenge student teams to model solar systems only. The battery and microgrid aspects of this challenge will be introduced in the Final Deliverable phase, beginning January 2023.

This document contains a description, data, and reference links for the Solar District Cup 2022–2023 district use case of Florida A&M University. Data not available in this document can be found in the data room at the following website:

Website: https://pfs.nrel.gov
Username: xxxxxxx
Password: xxxxxxx

Reference files for this use case are numbered in the data room and are referred to in this description as "ref." followed by the number.

District Description and Energy Goals

Florida A&M University (FAMU) is a historically Black public university with its main campus in Tallahassee, Florida. The university was founded in 1887 and became a land-grant institution in 1891. Today, FAMU consists of 11 schools and colleges and a Division of Graduate Studies and Continuing Education, and enrolls nearly 10,000 students a year. As of 2022, FAMU has been the highest-ranked historically Black college and university (HBCU) for three consecutive years. FAMU's campus (Figure 1) sits on more than 420 acres within Tallahassee and includes facilities ranging from academic and research centers to office space, residence halls, gymnasiums, urban farming plots, and outdoor recreation.

Figure 1: View of the FAMU campus.

In 2013, FAMU became a signatory to the American College and University Presidents' Climate Commitment, now the [Presidents' Climate Leadership Commitments](), setting a goal of reaching climate neutrality by 2050.

To help implement its sustainability goals, FAMU's School of the Environment has a Sustainability Institute that promotes student engagement. The School of the Environment also promotes circular-based economies and strategies to address the interconnected issues of sustainable energy procurement, access to safe water, and food security. The School hosts a biennial international summit on the EnergyWaterFoodNexus, as a new science enterprise addressing these vexing global issues.

USE CASE DESCRIPTION

Student teams are challenged with designing solar systems (and storage systems, later in the Final Deliverable phase) within the challenge boundary (Figure 2) of FAMU's campus.

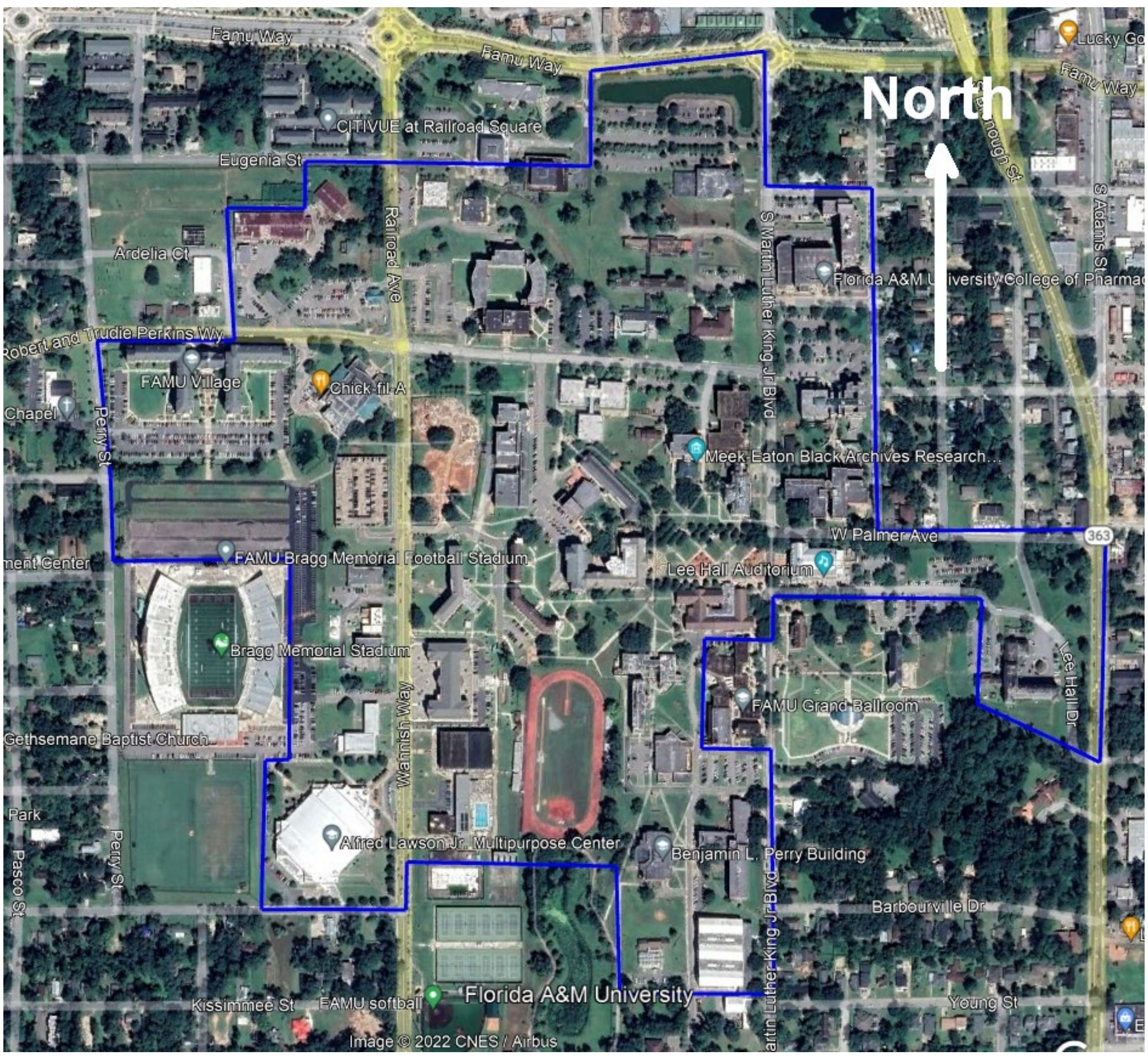

Figure 2: FAMU use case boundary [ref. 1] (Google Earth satellite imagery, November 2021).

The campus is served by two university-owned substations, one at the north end of campus and one at the south end. The challenge boundary addresses part of the area served by the north substation.

Students should not try to develop PV systems on all the available space; rather, be selective, design a few systems, and provide the rationale for why you chose to prioritize certain locations over others. Your rationale may include optimization based on system cost, proximity to the load, or other factors. Within the constraints set by the master plan [ref. 5], student teams may design rooftop and parking canopy systems on any of the structures for which they decide the energy production quantity and value will yield beneficial economics. Energy consumption has been provided for loads where data is available. In some cases, the site of the load cannot host PV panels because of space constraints; in such cases, PV systems can be designed on nearby structures and wired to the loads. Ground-mount systems can also be designed for areas that will not be developed. There is also a permanent body of water at the northern end of the campus that is available for floating solar [ref. 1]. To estimate floating solar costs, we recommend students review NREL's Floating Photovoltaic System Cost Benchmark.

All systems designed by students must be interconnected to the buildings on which they are installed, except for ground-mount systems and those on parking garages, canopies, or bodies of water, which can be DC-wired to the nearest building. In the Final Deliverable phase of the competition, student teams will consider which of these systems to connect to a battery, and how to size the battery based on the available PV generation and dispatch strategy. However, for this Progress Deliverable phase, students will only be designing and modeling PV systems.

Student teams must calculate both a lease price and a cash purchase price for *each* of the systems they design within the challenge boundary. (Note that power purchase agreements are disallowed in Florida under prevailing regulations.) All panels with a common point of interconnection can be considered as one system. Guidance on lease price calculation can be found in the financial model training materials available on HeatSpring. Teams should ensure that all lease prices deliver a rate of return for investors that matches market expectations. When calculating a cash purchase price, teams must incorporate the value of the Investment Tax Credit (ITC) direct pay option, as described in the Inflation Reduction Act of 2022. For guidance on how to calculate a cash purchase price, see the training entitled "Using Aurora Solar Outputs To Complete the Financial Model" under the "Training" tab on HeroX (students must be logged in as a Solar District Cup competitor to access the training).

Several resources are available in the data room to assist students in their designs.

Campus Information

The FAMU campus consists exclusively of university-owned buildings. The campus master plan shows future development; solar systems should not be designed for those areas. The boundaries of the challenge area are indicated in the provided *kmz* file [ref. 1]. Within those boundaries, teams can determine the areas available for solar systems by using the following resources:

- Campus map [ref. 2]
- List of facilities to be analyzed [ref. 3]
- Map showing locations of facilities where 15-minute energy data has been provided [ref. 4]
- Campus Master Plan [ref. 5], especially the map on the 12th page of the PDF.

Utility Data

Kilowatt-hour (kWh) consumption data in 15-minute intervals and monthly peak demand are provided for 13 facilities [ref. 8]: 11 campus buildings plus two thermal facilities that are among the highest energy users:

- Allied Health
- Center for Access and Student Success (CASS) Building
- College of Pharmacy
- FAMU Towers
- Foote-Hilyer Administration Center
- Jones Hall
- Paige Building
- Perry Building
- Science Research Facility
- Student Services Center
- Ware-Rhaney
- Central Chilled Water Plant
- Central Boiler Plant.

FAMU buys 500,858 kWh monthly from the City of Tallahassee's Solar Farm [ref. 7], representing roughly 10% of the university's total consumption. The university receives electricity service under (1) the Commercial Curtailable General Service Demand and (2) the Solar rates listed in the City of Tallahassee Utility Rates table [ref. 6].

USE CASE PROFILE

Category	Data Files or Links
District Name	Florida A&M University
Short Name	FAMU
Location	Tallahassee, Florida
Maps and Master Plans	• Google Earth *kmz* file showing challenge area [ref. 1] • Campus map [ref. 2] • List of facilities for analysis [ref. 3] • Map showing locations of facilities where 15-minute energy data has been provided [ref. 4] • Campus Master Plan [ref. 5]—especially map on PDF page 12
Electricity Rates	• See "Commercial Curtailable General Service Demand" and "Solar" rates in the City of Tallahassee Utility Rates table [ref. 6] • City of Tallahassee solar farm service agreement [ref. 7]
State Renewable Energy Policies	Database of State Incentives for Renewable Energy (DSIRE) Florida Website: https://programs.dsireusa.org/system/program/fl
Roof Conditions	For the purposes of this competition, all teams shall assume that roofs are of sufficient condition and age and have sufficient structural capacity to support the installation of rooftop solar arrays. Teams should use the maps and aerial views available to assess the presence of obstructions or roof materials that may limit solar system installation.
Electric Load Profile Data	15-minute load data and monthly peak demand are provided for 11 buildings, plus a central chilled water plant and a central boiler plant. [ref. 8].
Meter Locations	Teams should use available resources to identify meters (i.e., the point of interconnection for the solar systems) on buildings where possible. If no point can be located, an assumption as to the location of the meter may be substituted.