Inaugural Maseeh Innovation Competition

Executive Summary SunUrban

Company / Team Information

- Company or Team Name: **SunUrban**
- Website (in development): *SunUrban*
- Industry / Sector: **Distributed Energy Resources (DER), Solar Infrastructure, Digital Energy-Management Portfolio services**
- Founded (Year): **2025**
- Headquarters / Location: **Austin, TX**

Leadership Team

Chief Executive Officer (CEO)

Name: **Kendall Baker**
Email: **bakerkendall@utexas.edu**

Kendall is an Energy and Earth Resources master's student at UT. Her current research focuses on the future of wind and solar energy in Texas, and her work is motivated by a commitment to the climate movement, decarbonization, clean energy deployment, and emissions reductions. Professionally, Kendall is a Graduate Teaching Assistant for the MIT-funded Startup Consultant Practicum at the Brumley Institute of Graduate Entrepreneurship. She is actively building experience at the intersection of business development, net-zero solutions, and sustainable innovation and is skilled at market research, commercialization, and stakeholder engagement and partnerships.

Chief Strategy Officer (CSO)

Name: **Aritro De**
Email: **aritro@utexas.edu**

Aritro is trained as an architect with a focus on energy efficiency and decarbonization in the built environment. He has experience in policy analysis, energy optimization, and indoor environment quality research through projects including USAID and GIZ India. He is currently pursuing an MS in Sustainable Design from UT. As CSO, he leads product strategy, techno-economic modeling, and overall system design for SunUrban's distributed microgrid network.

Chief Technology Officer (CTO)

Name: **Jaehwan Cha**
Email: **jaecha@utexas.edu**

Jaehwan is a Ph.D. student in the Department of Civil, Architectural, and Environmental Engineering at UT Austin, specializing in Building Energy and Environments. As a researcher at Fix Lab, he focuses on advanced HVAC systems, thermodynamic cycles, and energy simulation at both the component and whole-building levels. With expertise in thermal management and system optimization, he develops innovative engineering solutions to enhance energy efficiency and decarbonize the built environment. As CTO, he leads the technical strategy for system integration and performance modeling to ensure the reliability of sustainable energy solutions.

Technical Lead / Head of Engineering

Name: **Tejaswini "Tejoo" Kalikiri**
Email: **tejaswini.kalikiri@utexas.edu**

Tejoo is an Electrical and Computer Engineering student at UT Austin, specializing in Power and Renewable Energy Systems. At Fix Lab, she researches energy efficiency in large-scale computing systems by analyzing how computational workloads impact data-center cooling demands and exploring opportunities for load shifting. With experience in computational energy analysis, circuit design, and end-to-end electrical system design, including load studies, voltage-drop analysis, and solar power integration, Tejoo is passionate about building sustainable, reliable power systems.

Advisors or Key Partners

Potential Professional Partnerships: Dr. Walajabad S. Sampath at CSU has suggested connecting with contacts at First Solar and T1 to explore potential manufacturing partnerships. At this stage, we are prioritizing engagement with First Solar and T1Energy as our initial partners. At a further point, we plan to partner with BASE Power for leveraging battery services and grid arbitrage.

Academic Partnerships: Additionally, we hope to engage Dr. Javad Mohammadi and Dr. Andrew Fix as advisors on this project. Dr. Mohammadi holds a Ph.D. in Electrical and Computer Engineering and brings expertise in building energy systems and indoor environments, while Dr. Fix holds a Ph.D. in Mechanical Engineering with a focus on HVAC systems.

Energy Community: The founders of SunUrban are deeply embedded in the energy community at UT Austin and have strong connections to faculty and students focused on solar research, as well as to energy-transition–focused venture capital networks. As the startup gains traction, we plan to leverage these relationships to expand both the team and advisory network. For example, we are already in close contact with researchers working on perovskite and telluriumbased solar cells and plan to deepen these collaborations, as these technologies have been identified as promising options for implementation.

Technology Overview

The United States has **5,000+ square miles of parking lots**, most of them unshaded, heat-generating, and entirely disconnected from the grid in-terms of energy generation. Rooftop solar adoption is slowing (Wood Mackenzie, 2025), and OBBBA will phase out key rooftop credits after 2025, leaving millions of renters, small businesses, and campuses without accessible clean-energy pathways. Urban loads like retail districts, universities, and especially emerging data-center clusters are growing faster than local grid capacity. Heat-island effects and resilience failures create structural risks for cities.

SunUrban converts these parking lots into modular, grid-aware solar microgrids.

Our system is simple: property owners host solar canopies at minimal upfront cost, and SunUrban sells them power under long-term Power Purchase Agreements (PPAs). As more sites (Phase 2) come online, they connect into a distributed microgrid fabric capable of supporting ERCOT through hybrid host-plus-grid revenue and eventually functioning as a Virtual Power Plant (VPP).

Unlike rooftop solar, SunUrban does not depend on roof condition, roof ownership, or complex permitting, allowing fast deployment and uniform performance. In addition, this business model avoids land acquisition and site preparation, as parking lots already provide flat, developed surfaces. This gives SunUrban a market advantage by reducing dependence on scarce land-development expertise and lengthy landowner negotiations.

Each installation would include:

- Solar canopy modules (100–500 kW blocks)
- Smart inverters, metering, and sensors for monitoring
- Optional battery storage for arbitrage and peak shaving
- Software control for aggregation and VPP dispatch
- Lightweight, thin-film solar panels
- Carport structures with simple, aesthetic designs (including roofing, columns, and beams)

This model shifts solar canopies from *one-off shade structures* into a **scalable urban energy system** that interacts with the grid in real time.

Solution and How SunUrban works

Phase 1 – Sell power to host (Behind-the-Meter PPA)	Phase 2 – Hybrid-Host and Grid Revenue	Phase 3 – Virtual Power Plants and Digital Data Services
No/low-cost installation for	Site sells surplus energy to	Post scaling, the canopies

property owners (long-term PPAs)	ERCOT – (Optimization models need to be developed)	function as a distributed microgrid (Urban)
Fixed rate of 8-10 ¢/kWh (Compared to Austin Energy rates -- Energy Charge: 5.84¢/kWh + Demand charge: 9.83$/kW) [Austin Energy, Link]	Battery arbitrage – possible partner with BASE Power ($40-80/MWh)	SunUrban Trades flexibility services in ERCOT
For ordinary case (20,000 kWh, 50kW): $1,168 + $491.5 = $1659.5 => 12.05 ¢/kWh		Digital layer and data services add additional ARR.

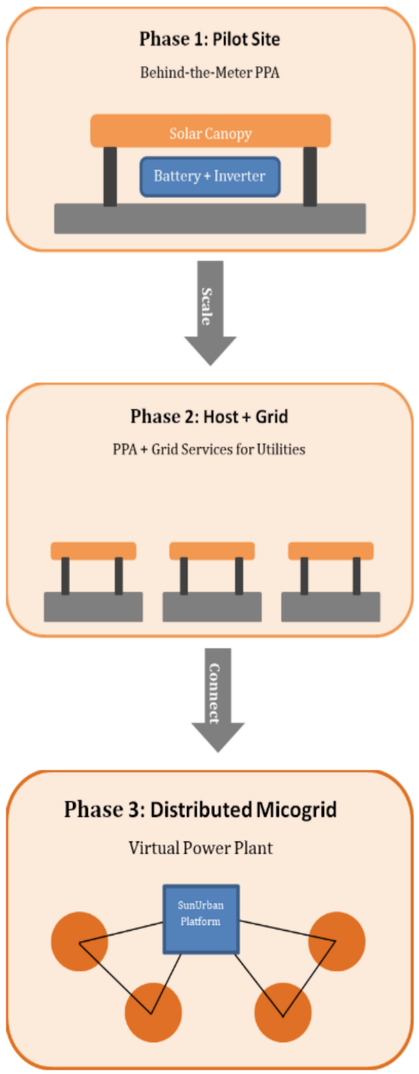

Figure 1: Flowchart showing the different phases of operations and how SunUrban works

Prototype example of the Energy Management Platform.

This image below is for a single site; however, it will be a centralized platform for the management and distribution of energy between all the coordinated canopies, hosts, and other beneficiaries.

Image Credits

Technical Validation (Power System Analysis)

We did a back of hand Power Systems Analysis that validates technical and financial viability across three sites in Austin (SunUrban, 2025): South Congress (550 kW), UT Campus (380 kW), and Austin Airport (800 kW).

Key metrics

- Solar Capacity: 1730 kW
- Battery power: 865 kW
- Battery energy: 433 kWh
- Optimized PPA rate: 7.54¢/kWh
- Annual revenue: $477k
- IRR: 7.8% (Phase 2/3 scaling increases IRR further)

Scenario Outcomes

Scenario 1: BTM PPA	Scenario 2: Hybrid PPA + Grid Sales
8,871 kWh/day generation	8,903 kWh/day generation
$951/day net revenue	$880/day net revenue

The hybrid case introduces grid sales and arbitrage while maintaining strong host economics.

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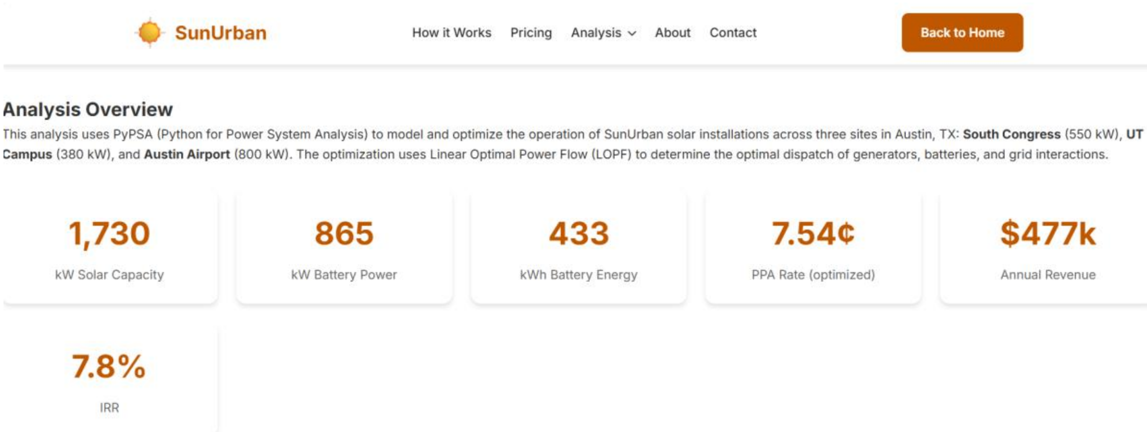
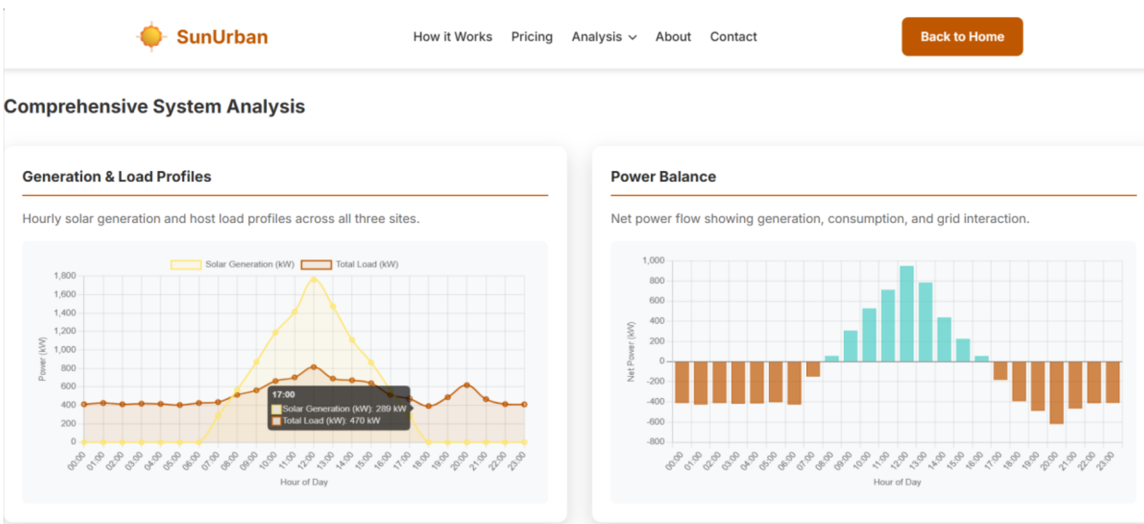
Key Insights

- Batteries optimally charge during low-price hours and discharge during peaks
- Self-consumption ratio ~60–65%
- Grid independence ~40–45%
- Surplus power enhances VPP potential
- Optimization reduces system cost and stabilizes returns

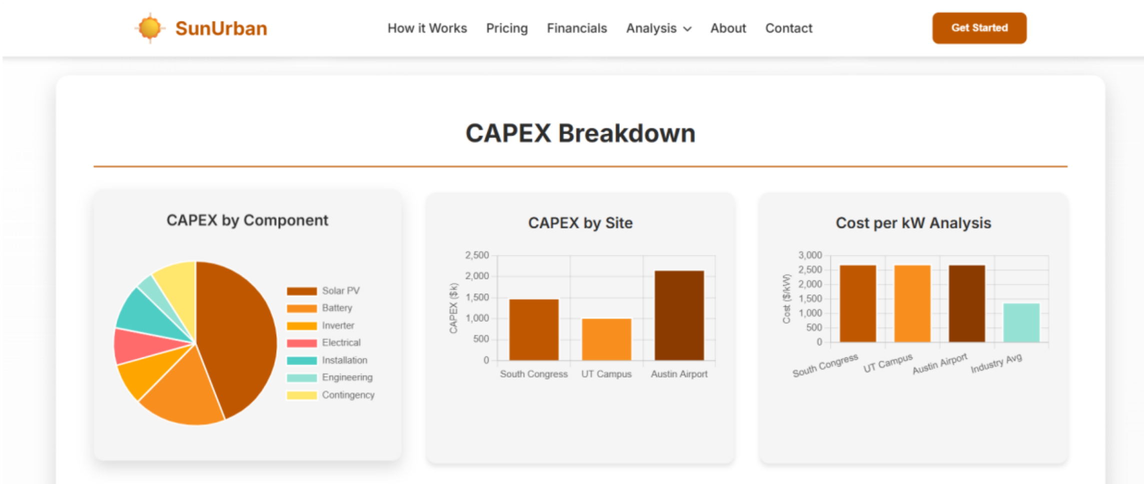
Some snapshots

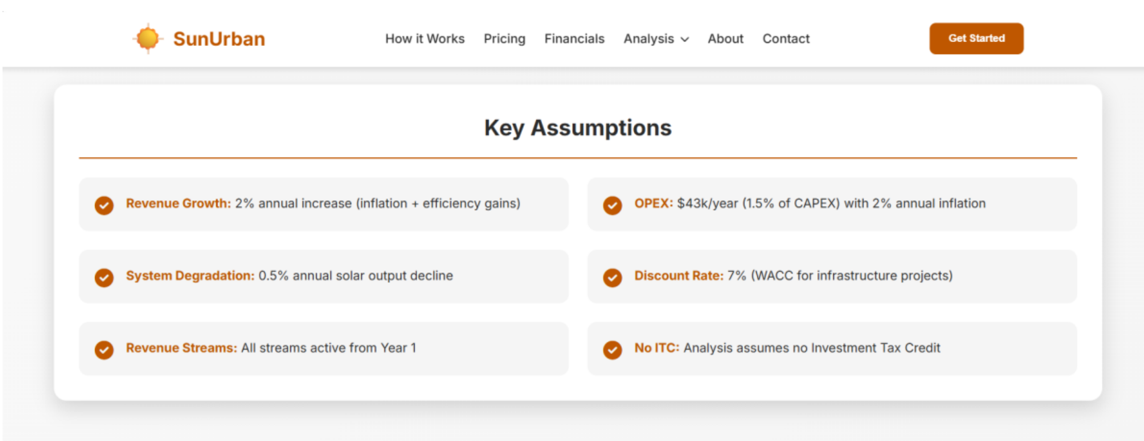
Power System Analysis





CAPEX Breakdown





Market Opportunity

1. **Massive Untapped Land — Parking Lots**

U.S. parking lots represent thousands of square miles of unused surface area and can host more than 500 GW of distributed solar with no new land acquisition or deforestation. Each acre can generate 447 MWh/year. (Mark Bolinger, 2022)

2. **Rooftop Solar Plateau & Policy Expiry**

OBBBA ends residential rooftop credits in 2025 which will eliminate clean-energy access for millions of households and renters. Parking lot solar bypasses this restriction entirely.

3. **Surging Urban Loads & Data Centers**

Data center demand is projected to reach 134 GW by 2030 which will strain urban grids (ERCOT, 2024). Over 100 GW in potential near load distributed generation has yet to be developed. This improves resilience and creates a multi-billion-dollar opportunity to transition away from existing diesel generators over the next decade. [EPA NEEPA, 2023]

4. **Heat Island & Resilience Crisis**

Unshaded parking can be 10–20°C hotter than surrounding zones, which raises cooling bills, worsens air quality, and puts stress on infrastructure and vehicles. Solar canopies directly address these problems (Prosper Uzoma, 2021 , Catalin Neacsu, 2009)

Market Sizes

- **Total Addressable Market:** A study cited by TIME estimates the U.S. has the technical potential for 422 GW of solar on parking lots.
    - Yield: **~1,350 kWh per kW per year** (US commercial solar average).
    - Total Energy Volume: **~570 Terawatt-hours (TWh) per year**.
    - Revenue Rate: **$0.14/kWh** (Average 2025 US commercial retail rate, captured via PPA savings or avoided cost).
    - Calculation: **570 billion kWh × $0.14 = $79.8 Billion/year**.
- **Serviceable Addressable Market (Texas): $2-3B (3%)** in immediately viable parking lots with grid access.
- **Digital-twin & data-layer revenue:** Pure profits, recurring, and scalable across sites

Each MW generates **$250–350k/year** through combined PPA, arbitrage, and ERCOT market participation (SunUrban, 2025).

Societal Impact

SunUrban aims to deliver more than clean energy. It transforms everyday urban spaces into public-benefit infrastructure and provides ancillary benefits that strengthen cities, protect people, and expand access to affordable power.

Mitigating Extreme Heat and Public Health Risks

A personal story that gave us the motivation -- *"A member on the team has personally witnessed the dangers of unshaded parking environments—a man suffered a heatstroke and collapsed in an unshaded H-E-B parking-lot during extreme summer heat."*

Extreme heat is the leading cause of weather-related deaths, and this trend is expected to significantly increase in the coming decades. (WHO, 2024) In addition, high temperatures aggravate the risk of heat-related illness, aggravate respiratory conditions, and contribute to higher stress and antisocial behavior.

Under direct sun, a parked car acts like a greenhouse— interior temperatures can spike to 131.5°F (+30.6°F above the outside air). (Prosper Uzoma, 2021) However, shaded parking effectively mitigates this heat, in this study maintaining the interior at 99°F which was only 5.4°F above the outside air. (Prosper Uzoma, 2021) Additionally, asphalt can increase by 36°F. (Cotrone, 2025) Providing shade can lower surrounding air temperatures by as much as 15 to 20 degrees °F. (Munier, 2024)

Emphasizing human factors like these is important, because they resonate with customers and can strengthen marketing campaigns for local and corporate businesses.

Creating Local, Skilled Jobs

Creating Local, Skilled Jobs SunUrban stimulates the local green economy by creating high-quality jobs in installation, electrical engineering, and system maintenance. By partnering with local vocational institutions, we support the transition of the workforce into the renewable energy sector which ensures that the economic benefits of clean energy infrastructure remain within the community.

Expanding Clean Energy Access and Reducing costs

Parking-lot solar removes the barriers that keep millions of renters, small business owners and institutions from adopting rooftop solar. SunUrban provides a no/low-cost entry point into the clean-energy transition, making renewable power available to buildings and communities that could never participate before. Offering fixed PPA rates that are 20-30% lower than the retail electricity rates, SunUrban lowers operational costs for commercial sites, campuses, and public facilities.

Lowering Carbon Emissions

By integrating battery storage, SunUrban discharges clean energy during peak demand hours (ERCOT peaks). This directly reduces the grid's reliance on inefficient natural gas peaker plants which are often the largest source of marginal carbon emissions.

Shading asphalt surfaces lowers local ambient temperatures by 10–20°C. This significantly reduces the air conditioning load for both parked vehicles (on startup) and adjacent buildings, lowering overall energy consumption and associated Scope 2 emissions.

By utilizing lightweight, thin-film solar panels, we significantly reduce the structural dead load. This enables a minimalist canopy design that minimizes the use of carbon-intensive steel, effectively lowering the project's overall embodied carbon.

Data-Layer

Every site collects shading, thermal, EV charging, footfall, uptime and power-flow data. This is a valuable digital layer for cities, retailers, fleet operators, and insurers to optimize building operations, mobility patterns, and energy planning.

Commercialization Plan

Go-To-Market Strategy

1. Begin with a pilot project at the University of Texas at Austin, which offers a relatively accessible entry point for student founders.
2. After validating the first pilot, expand to 3–5 additional installations with early adopters e.g., universities, retail centers, and climate-focused commercial institutions.
3. Demonstrate measurable savings, shading, and resilience benefits for customers.

4. Integrate a digital platform for monitoring, billing, and optimization.
5. Expand to multi-site projects across Austin (as a starting point), Houston, Dallas, and San Antonio.
6. Develop and deploy DER aggregation and VPP capabilities across ERCOT.
7. Gradually integrate new revenue streams, such as data monetization and other opportunities identified through deployment.

Financing Strategy

1. Cost sharing between the host site and SunUrban through power purchase agreements.
2. TX-PACE financing and municipal green bonds.
3. Grant funding from UT, NSF, ARPA-E, and potentially DARPA.
4. Strategic alignment with Austin Energy's ongoing investments in commercial solar.

Eventually Digital and Data Layer for Alternative Revenue

The installed canopy produces operational data	Recurring revenue streams from these
Shading maps	Urban analytics companies
Thermal and temperature data	Retail Operators
Footfall/parking data	Researchers
EV charging behavior	Fleet managers
Power Flow and Uptime	Insurance companies

Intellectual Property Status

- N/A (as of now)
  - IP planned for economic and financial models

Company Stage

☒ Concept / Ideation

☒ Prototype