



Smeal Undergraduate Sustainability Case Competition Charge Sheet

A Changing Climate

As the world's population continues to grow, so do our emissions of harmful greenhouse gases that exacerbate the climate crisis. The main driver of the crisis is human's consumption of energy—electricity for our devices and fuel for our cars—which is primarily generated from fossil fuels. Humans need energy to meet their needs for food, shelter, mobility, education, etc. However, our use of energy is changing the climate, and this is not just an environmental crisis, but a human one. Poor countries and communities are much less likely to contribute to climate change and more likely to be negatively impacted by it.

The COVID-19 pandemic revealed health disparities in communities of color, especially among Native American, Latinx, and African American communities where individuals are 1.2 - 1.4 times more likely to be hospitalized or pass away from COVID-19 (CDC Racial Data Tracker). Such racial and economic disparities are seen with respect to weather events made more frequent and extreme by climate change. As just one example, in 2020 the New York Times publicized research showing neighborhoods that once faced the discriminatory practice of “redlining” now see worse climate impacts: temperatures 6 – 12 degrees hotter than other neighborhoods (NY Times, 8/24/20).

Clearly, innovative solutions are needed that address these intertwined social and environmental outcomes of our current energy economy. One such solution is to develop, or invest in the development of, more clean energy sources. Clean energy technology such as solar power produces electricity with a much smaller carbon footprint than fossil fuels. However, the deployment of clean energy is best when it combats climate change and economic disparities at the same time. That is the question at the center of this case: how can business address climate change while simultaneously providing economic benefits to low-income communities?

Community Solar: Fighting Climate Change with Climate Justice

One promising approach is *community solar*. Community solar is an approach to solar development that allows people and entities otherwise unable to build their own solar system to work together to develop a larger and more cost-efficient solar project. Then they can use the energy provided to power their homes, businesses, and schools. Savings off one's utility bill for community solar subscribers can vary from just a few percentage points up to 15 percent.

According to GreenTech Media, in the United States, forty states are home to at least one community solar project and 19 states and Washington, D.C. have a formal community solar program. At the end of 2019, there were around 2 gigawatts of U.S. community solar projects, a small but not insignificant slice of the 76-gigawatt fleet of domestic solar power. In fact, Penn State research suggests community solar projects could produce \$1.8 billion in economic activity for Pennsylvania during the construction phase and \$88 million annually during their operating life. The Penn State report (linked in “Resources” below)

states that solar developers are already planning 235 community solar projects in 48 of Pennsylvania's 67 counties with total generating capacity of 1,033 megawatts. Given the solar resource and average household energy consumption in Pennsylvania, that's enough solar-generated electricity for over 124,000 homes. As a point of comparison, Rob Cooper, Senior Director of Energy and Engineering at Penn State, states that the University Park campus uses the same amount of heating and electrical energy as 30,000 homes (see Mr. Cooper's full presentation in the "Resources" below).

Penn State and Community Solar

Penn State University has a significant impact on the climate and has invested millions to reduce greenhouse gas emissions over the years. Across all campuses, the university emits over 400,000 metric tons of carbon dioxide equivalent (MTCDE) each year. According to Penn State's Office of Physical Plant, Penn State has reduced these emissions by 32% since 2005 thanks to targeted investments in efficiency and cleaner energy sources such as the 70 MW solar project developed with Lightsource BP in Franklin County which will provide 25% of Penn State's state-wide electricity consumption.

Penn State is considering partnering with local communities to help grow the community solar market in a way that reduces Penn State's greenhouse gas emissions while also broadening access to clean energy and increasing the local economic benefits.

Your Consulting Team's Project

Your consulting team has been asked by Sara Thorndike, Penn State's Vice President of Finance & Business, and Paul Shrivastava, the Chief Sustainability Officer, to propose that Penn State invest in a community solar project. Your proposal must consist of an investment case, specific and compelling community benefits, and measurable reductions in greenhouse gas emissions.

Your team can select a specific Penn State campus for your proposal or a project that involves multiple campuses.

Thorndike is concerned about any project that would cause the university to raise tuition in order to pay for it. Shrivastava is equally concerned about ensuring the project make financial sense for the university while extending access to clean energy for low-income communities and delivering real reductions in greenhouse gas emissions.

Your team has one week to develop your proposal.

Project requirements:

- *Financial feasibility*: proof that the project will have a desirable payback period and return on investment for the university and/or other investors and subscribers
- *Social impact*: proof that solar energy is being provided to communities that otherwise wouldn't have access (# of people; # of households)
- *Environmental impact*: tell us the measured avoided greenhouse gas emissions (# metric tons of CO2 avoided)
- *Project planning and implementation*: recommended steps for implementation including how diverse voices will be engaged throughout the process
- *Risks and mitigation*: identified project risks and your teams recommendations to mitigate those risks

In developing your proposal, we strongly recommend your team makes full use of the "Curated and Highly Recommended Resources for Competing Teams" on the last page of this document.

Round 1 Deliverables:

1. **Executive Summary** (no more than a page in length 12 pt. Times New Roman font, single-spaced with normal margins) **Due 12:00 PM EST Friday, March 19th** **Late submissions will not be reviewed.**
2. **PowerPoint for a 15-Minute Presentation, your team also must submit a PDF version of the Powerpoint:**
 - The review process is anonymous; DO NOT include team member names or photos in the Executive Summary or in the PowerPoint
 - The PowerPoint is the version your team will use to present if chosen as a finalist and the PDF version is to take into effect any potential transitions or animations, and to share with the judges (again, IF your team is chosen as a finalist)
 - Intro Slide: Contains Team Name (not team member names, just the overall team name)
 - There is no required number of slides; it is up to your team to determine the appropriate number of slides for a 15-minute presentation
 - Slide Page Numbers
 - Appendix (additional data, graphs, analysis, etc.)
 - Strongly recommend your team makes full use of the "Curated and Highly Recommended Resources for Competing Teams" on the last page

Submissions are made here: <https://php.smeal.psu.edu/sustainability/uge-case/view>

Round 2 Deliverables (if your team is chosen as a finalist):

1. **15 Minute Presentation** (Expectation is Every Group Member Must Present)
2. **Prepared for 15 Minutes of Q&A with Judges**

If you have questions, please contact us at smealsustainability@psu.edu.

Curated and Highly Recommended Resources for Competing Teams

Penn State Energy and Climate

Video: “Penn State Energy Use and Greenhouse Gas Reduction Efforts” A Presentation by Rob Cooper, Senior Director, Energy and Engineering <https://youtu.be/K8WRnO4yehg>

Penn State Energy Use and Investments in Efficiency and Clean Energy

<https://sustainability.psu.edu/campus-efforts/operations/>

Greenhouse Gas Emissions at Penn State – charts, graphs and data

<https://sustainability.psu.edu/campus-efforts/climate-action/our-footprint/>

A List of Climate Initiatives at Penn State – from student activism to teaching to research

<https://sustainability.psu.edu/campus-efforts/climate-action/initiatives/>

Community Solar

Penn State Research “Potential Economic Impact of Community Solar in Pennsylvania”

https://03b6d275-ec98-4872-923e-592df4b19126.filesusr.com/ugd/678dcb_2bef0068ce3d4c91ae465b3c99098ca9.pdf

Solar Basics and Industry Data

Solar Energy Industry Association – industry and market data, maps, and more

<https://www.seia.org/>

PV Watts Solar Calculator from the National Renewable Energy Lab

<https://pvwatts.nrel.gov/index.php>

Community Solar Basics, Data and Case Studies

Community Solar Database: <https://data.nrel.gov/submissions/95>

EnergySage: <https://www.energysage.com/solar/community-solar/community-solar-power-explained/>

Coalition for Community Solar Access: <http://www.communitysolaraccess.org/>

Institute for Local Self-Reliance: <https://ilsr.org/national-community-solar-programs-tracker/>

Podcast episode: CleanTechnica “Democratizing Energy & Community Solar Investment”
<https://cleantechnica.com/2020/09/11/democratizing-energy-community-solar-investment/>