



# PROJECT OPPORTUNITY

**2021-08**

## ***Technical and Economic Feasibility of a Bio-Digester at Allentown, PA***

### **Problem Statement**

One of the major problems facing our society is how to dispose human/animal waste. Allowing organic waste to degrade in anerobic environments such as landfills creates methane, a potent greenhouse gas that contributes to climate change, and is an explosion hazard if the landfill is not properly managed. One approach to reducing methane gas is to encase the organic waste in plastic or other material so as to prevent degradation. However, this approach results in unnecessarily using landfill space and fails to make use of the methane gas which can be beneficially used. A better approach is to capture the gas and use it as fuel.

Biodigesters enable this process and used extensively in Europe. While several entities have utilized biodigesters to power farms<sup>1</sup> and provide cooking and heating fuel<sup>2</sup>, the US has been slow to embrace biodigesters on a large scale. It may be that even though it is a renewable fueled generation technology, the economics of large-scale electricity generation are not compelling.

The goal of this project is to generate a biodigester for dog waste. We propose that a biodigester in a public dog park is an alternative solution that allows the waste to degrade and, by capturing the methane produced and burning it to generate electricity, helps to reduce energy use. The electricity produced could be used for lighting or other use at the dog park, or could feed into the power grid in the same way that small solar and other renewable energy projects do. The student(s) will develop a plan for building the digester, and develop the technical and economic reasons. They will present to the appropriate authorities as a proposal for funding the

### **Project Scope**

The student(s) will work with Professor Jennifer Swann and the Allentown department of Parks and Recreation to

- Find, collect, and organize the available information on the design, execution and assessment of biodigesters
- Survey the site in Allentown's dog park at Dixon Street.
- Create a design for an underground publicly accessible biodigester for dog waste

---

<sup>1</sup> <https://www.epa.gov/anaerobic-digestion/farm-digester-projects>

<sup>2</sup> <https://www.homebiogas.com/>



# PROJECT OPPORTUNITY

**2021-08**

## ***Technical and Economic Feasibility of a Bio-Digester at Allentown, PA***

- Develop a cost estimate to construct the biodigester and interconnections to the electric grid
- Assess the annual volume of methane gas generated and the electric energy produced
- Present the plan to the ESE Strategic Advisory Committee at the bi-annual meeting
- Propose the digester to the city

### Student Deliverables

- Student(s) will meet weekly with a renewable energy advisor to report on project progress.
- Student(s) will produce a mid-way report summarizing the literature review portion of this project.
- Student(s) will produce a final report documenting the economics of construction of the biodigester and annual electric energy output

### Project Advisors



**Jennifer Swann** is a professor of Biological Sciences who serves on the Allentown's environmental advisory board. While not an engineer she is an avid promoter of environmental issues including food waste and single use plastics. She worked with project development teams to create a functional above ground biodigester and hopes to recreate that success with this project.



**Tinku Khanwalkar** is an environmental attorney with over 35 years of experience, primarily as in-house counsel at PPL (a Fortune 500 power company headquartered in the Lehigh Valley). Tinku serves as Chair of the Allentown Environmental Advisory Council, is an active member of the Energy and Environment Committee of the Greater Lehigh Valley Chamber of Commerce, the Allentown Water and Sewer Compliance Oversight Review Board and the Citizens' Climate Lobby Lehigh Valley Chapter. Tinku is also active with Community Bike Works and is a Big Sister in the Big Brothers Big Sisters program. She has also been instrumental in bringing Wildlands Conservancy and Zoellner Arts Center together to provide STEAM programming to middle school students in Center City Allentown.