

Project Goals

The goal is to install anaerobic digestion plants in the rural communities of Chimborazo, Ecuador. Their purpose will be to convert the animal and plant waste into methane, which will be used to run generators and produce electricity.

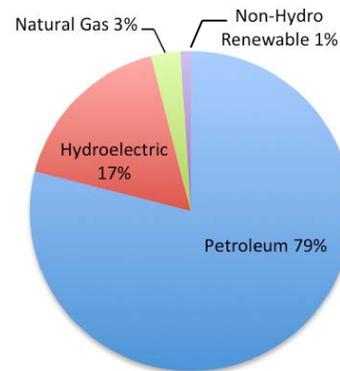


Figure 1. Total primary energy consumption in Ecuador, by type (2013)

Background

- A vast majority of Ecuador's electrical energy comes from oil; the government is trying to reduce its dependence
- Burning of fossil fuels leads to pollution and climate change
- The province of Chimborazo is mostly agrarian, and produces a large amount of manure^[1]
- Through our contact with locals we determined that communities will be accepting of the government's clean energy initiative



Figure 2. Geographical location of Chimborazo^[5]

Implementation Process

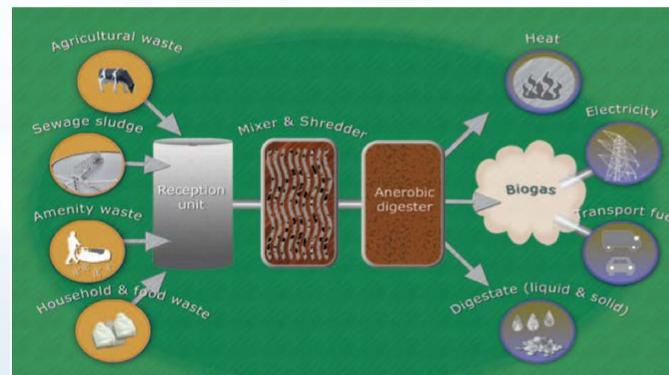


Figure 3. Intake, processing, and output of a biogas plant^[2]

1. Analyze livestock distribution in order to determine the locations that have a high enough animal density for a system to be economical
2. Host informative group sessions in each area identified, describing the systems' function as well as what is expected from the farmers
3. Obtain consent from the farmers
4. Work with an external company to install the systems
5. Educate and hire locals to operate the systems
6. Connect biogas plants to the local farms
7. Monitor for five years in order to address any major issues and determine project success

Benefits of Methane

- Can provide up to 46% of the total energy in Chimborazo^[3]
- Makes electricity more accessible to rural citizens
- Reduces Ecuador's greenhouse emissions by consuming methane that is already present
- Enables more educational opportunities for poor families



Figure 4. An on farm biogas system similar to what our team plans to install in Chimborazo^[4]

Measurements of success

- For this project to be considered a success, by the year 2020, 40% of the energy in Chimborazo should be supplied by livestock methane alone
- 87% of all farmers in the region should contribute to the production process
- 97% of those who benefit from the system should report satisfaction with its operation
- The maintenance is done entirely by locals

References

- [1] Administration, E. (2013). Energy profile of Ecuador. Retrieved from <http://www.eoearth.org/view/article/152492>
- [2] Anaerobic Digestion. (2009, October 1). Retrieved November 16, 2015, from <http://www.farmingfutures.org.uk/resources/factsheets/17-anaerobic-digestion>
- [3] Kaparaju, P., & Rintala, J. (2011). Mitigation of greenhouse gas emissions by adopting anaerobic digestion technology on dairy, sow and pig farms in Finland. *Renewable Energy*, 36(1), 31-41. doi:10.1016
- [4] An anaerobic digestion plant. (2014, July 26). Retrieved December 2, 2015, from <http://www.ordnancesurvey.co.uk/education-research/>
- [5] File:EC-chimborazo-map.PNG. (2006, November 4). Retrieved December 6, 2015, from <https://commons.wikimedia.org/wiki/File:EC-chimborazo-map.PNG>