This project is developing a photovoltaic (PV) power system to supply solar energy for air monitoring equipment to be deployed near hydraulic fracturing sites in the Eagle Ford Shale area. When this renewable energy source is harnessed correctly, stand-alone monitoring systems can be implemented to run for days and weeks with only the sun as the power source.

The use of this renewable energy technology is advantageous when deploying air monitoring equipment at remote locations typical of most hydraulic fracturing sites. Our design will implement a small PV module that will charge a battery, which in turn will supply power to a 12v, 1.2 amp photoionization detector (PID) that will run 24 hours a day near a well site. Our design will also power a wireless modem with the same electrical specifications that will relay the data from the PID sensor to a database or cell phone. We designed our system to function for day and night with the ability to maintain power for one day with low solar radiation. Our design is dynamic in that it can easily be applied to many other applications that require electricity at low levels in rural locations.

1) Design a stand alone system that could power a small air sampling devise and modem.
2) Make the system portable and resistant to harsh environmental conditions typical of hydraulic fracturing sites.

When designing an off grid solar application it is necessary to start with the draw of power that is required. In this instance we are powering a piece of air monitoring equipment that draws 1.2 amps a 12 volts, for a power requirement 14.4 Watts (W = VI). We also have a wireless modem that transmits the data that has the same power specifications, making the total power requirement 28.8 Watts.

- 345.6 Watts x 2 devices x 1 day of autonomy/(0.85 efficiency x 0.8 depth of discharge x 12 V) = 84.7 Amp-hrs.
- We are using 17 amp-hr batteries.
- Dividing our total number of amp-hrs by 17 to find how many batteries we need gives 84.7/17 = 5 batteries required.

Our team has tested the unit and it has performed better than expected. We have not yet had the opportunity to give a true field test that includes leaving the unit in the field for days. However, the preliminary tests we have done have been successful.

Our team is planning to deploy this system at more locations and add a wireless modem to transmit air quality monitoring data to a database. This project can be implemented at different field sites with similar needs for remote monitoring power. We are also working on developing a tool forを選�i the system requirements.

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