Short Performance Assessment: **HS-ESS3-4**

Grade Level: **High School**

Adapted from SNAP[1]

Title	**Moo Juice**		
Designed by		Course(s)	**High School**

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Performance Expectation	**HS-ESS3-4**: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. **Clarification Statement**: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean). **Assessment Boundary**: none

Science and Engineering Practice	**Designing Solutions** • Design or refine a solution to a complex real-world problem based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and trade off considerations.
Disciplinary Core Ideas	**ESS3.C: Human Impacts on Earth Systems** • Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. **ETS1.B: Developing Possible Solutions** • When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. (secondary)
Crosscutting Concept	**Stability and Change** • Feedback (negative or positive) can stabilize or destabilize a system.

Student Performance	1. Using scientific knowledge to generate the design solution 2. Describing criteria and constraints, including quantification when appropriate 3. Evaluating potential refinements

[1] The Short Performance Assessment (SPA) and the Assessment Rubric adapted from the Stanford NGSS Assessment Project http://snapgse.stanford.edu/

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Name_____



Turning waste into watts

by Ming Xu

https://dnr.mo.gov/magazine/2013-winter.pdf

Students will read the introduction paragraph, the Science section and the Future section of the Moo Juice article. Students will be given the "Typical Anaerobic Animal Waste Generator" diagram from the article.

1. Make a pro/con T-Chart evaluating positives and negatives of Anaerobic Digestion → Energy.

2. Consider the negatives and cons listed and offer a potential solution to refine the process.

3. What else can this process be applied to convert waste into energy to minimize human impact on the environment?

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Assessment Rubric* - Question 1				
	Emerging	Developing	Approaching Proficiency	Excelling
Description of performance				
Sample student responses				

Assessment Rubric* - Question 2				
	Emerging	Developing	Approaching Proficiency	Excelling
Description of performance				
Sample student responses				

Insert additional Assessment Rubrics (if needed) here.

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