



2009

## MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

A Program from The Foresight Project Inc; [www.theforesightproject.org](http://www.theforesightproject.org)



Region II, Central MA  
CleanTech, Honorable Mention:

Ashley Millette, Massachusetts  
Academy of Mathematics and  
Science, Worcester

*"Fueling the Future: Direct  
Methanol Fuel Cells"*

### ABOUT ME:

Ashley Millette was born on a sunny day in July. She grew up with her brother and sister in the town of Douglas, Massachusetts, where she lived until the age of 14. She then moved to Auburn, where she now resides. Shortly after, she began school at the Massachusetts Academy of Mathematics and Science where she is currently a junior. Although she enjoys all academics, she especially enjoys science and humanities. After completing high school, she hopes to attend college and major in environmental engineering. When not at school (or doing homework), Ashley enjoys doing many extracurricular activities. Her favorites are softball, field hockey, and horseback riding.

### MY PROJECT:

In our rapidly advancing society, scientists are always looking for new fuel sources. With recent advancements that have been made in the fuel cell industry, fuel cells have the potential to replace many current fuels and storage devices, including the battery. Although much attention has been paid to hydrogen fuel cells, liquid fuel cell energy sources are also possible; liquid is much more compact to transport and store than a gas, especially hydrogen, which is more than ten times lighter than oxygen.

The design for this project is an acrylic cube with a fuel cell on the sides (disregarding the top and bottom of the cube). Methanol (in three molar solution) is poured inside of the cube. The cube is able to be screwed shut to prevent spilling. A catalyst at the anode side of the fuel cell enables a chemical reaction to take place, combining the methanol with oxygen to produce energy, plus two molecules of water and one molecule of carbon dioxide ( $2 \text{CH}_3\text{OH} + 3 \text{O}_2 \Rightarrow 4 \text{H}_2\text{O} + 2 \text{CO}_2$ ). The cells were connected in a series to generate an electric current to power a device. While the result of the project was intended to be a charger run by fuel cells with enough electrical output to charge an iPod, the actual product was a device with an open circuit potential of approximately 1.3 volts and enough power to run something that would normally use one battery. Although this energy source does produce some carbon dioxide, it can be easily made from bio-materials, and produces water as a byproduct as well as carbon dioxide in a ratio of 2:1).