



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Kyle A. Douglas</b>	<b>Project Number</b>  31159
<b>Project Title</b> <b>Biofuel: A Home Run for the Environment</b>	
<b>Objectives/Goals</b> To determine if the biowaste from a sports stadium can produce enough energy to power the entire stadium. <b>Abstract</b> <b>Methods/Materials</b> Switch grass and sugar were controls for the experiment. Testing was performed on Bermuda grass and wild grass. 400 grams of each grass was chopped finely and hydrolyzed using Cellulase. The grass mixtures were fermented using yeast. A sugar mixture was also fermented. A hydrometer measured the specific gravity throughout fermentation. The mixtures were filtered to remove any residue leaving only ethyl alcohol. A still was built using a pressure cooker, copper tubing, a coffee can, ice and a collection bowl. The liquid was heated while ensuring the temperature of the mixture was kept below 200°F. The alcohol vaporized, went through the tubing, and was collected in a bowl. The volume of the collected alcohol was measured and recorded. <b>Results</b> 20 mL of 100% alcohol was collected from the Bermuda grass. 110 mL was collected from the Switch grass. Bermuda grass was only 30% as effective at producing alcohol as Switch grass. <b>Conclusions/Discussion</b> Petco Park's electricity consumption and waste production were determined. A San Diego Waste Study Report provided the percentage and type of biowaste. Energy conversion charts supplied the kilowatt-hours of electricity that ethanol can produce. The results from the experiment showed that 69% of the electricity consumption during a sporting event could be provided by the biowaste produced during the event.	
<b>Summary Statement</b> The project measured the amount of alcohol produced from grass clippings to determine if a sports stadium could use its own biowaste to provide the stadium's power.	
<b>Help Received</b> Jillian Blatti helped with research and hydrolysis. Kaitlin Rosichan helped by obtaining additional Switch grass and with distillation. Parents helped with materials and fermentation.	