



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Christie S. Mathews	Project Number J1022
Project Title Future Fuel	
Abstract Objectives/Goals In 2008 alone the US used 23% of the world's oil consumption i.e., more than 7.14 billion barrels of petroleum. This number grows drastically each year. The world's oil wells are running dry. Not only is petroleum nonrenewable, it is also hazardous to the environment. Prolonged exposure to gasoline is hazardous to health and spills can cause much biological loss. We need an alternative fuel source which is renewable and safe for the environment. The purpose of my project was to see if a biofuel such as ethanol has the potential to sustain the world with a renewable and environmentally safe fuel. I tested gasoline and ethanol for the energy content and the particulate matter emitted when the fuel was burned. I had hypothesized that gasoline would have a higher energy content than ethanol, but ethanol would produce far less particulate matter than gasoline.	
Results Ethanol overall had more calories per gram than gasoline while emitting far less particulate matter than gasoline. Ethanol produced an average of 741.55 calories per gram, while gasoline produced an average of 512.87 calories per gram of energy. The average mass of the particulate emission of ethanol was 1.28725 micrograms of particles per cubic centimeter while the particulate emission of gasoline was 635,667 micrograms of particles per cubic centimeter. My control group which was normal air had an average mass of 0.85063 micrograms of particles per cubic centimeter.	
Conclusions/Discussion The mass growing and selling of corn for ethanol could cause economic and pollution problems. One possible answer to this problem is something called cellulosic ethanol. Cellulosic ethanol is made from nonfood sources such as wood chips, switch grass, and cornstalks. If the ethanol industry develops into a large enough producer then cellulosic ethanol could be a real low cost solution in the ethanol versus gasoline debate. More research needs to be conducted to find new and cheaper sources of ethanol.	
Summary Statement Can ethanol replace gasoline as the fuel of the Future?	
Help Received Used lab equipment at University of California, Riverside under supervision of Dr. Paul Ziemann, Professor of Air Pollution.	