



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Russell K. Sobota	Project Number S0327
Project Title What Is the Difference in Power Output between a Gasoline and Hydrogen Fueled Internal Combustion Engine?	
Abstract Objectives/Goals Environmental concerns about global warming have increased the interest in internal combustion engines that can run on hydrogen instead of gasoline, because hydrogen combustion emits no carbon dioxide into the atmosphere. It is our objective to see if a hydrogen engine is a practical alternative to a gasoline fueled engine. As part of this goal, our immediate objective is to compare the power output of a hydrogen engine to a gasoline engine of the same type and size. Methods/Materials To obtain my data I used a small single cylinder four stroke engine. I modified the engine so that it would run on both gasoline and hydrogen. I constructed a dynamometer using a positive displacement hydraulic gear pump. The dynamometer was used to measure the maximum power output of the engine at different speeds for both gasoline and hydrogen. Materials included, a four stroke engine, gasoline/hydrogen carburetor, motor oil, gasoline, pressure regulator, hydrogen fuel tank, hydrogen fuel hose, dynamometer, heat exchanger, workbench, clamps, digital tachometer, white-out, and other miscellaneous tools. Results I recorded two sets of results. First I ran the engine on gasoline and recorded the maximum power output at several engine speed. Next I ran the engine on hydrogen and recorded the power out put for the same speeds. Results showed that the power output of hydrogen was about half as much as the power output of gasoline at any give RPM. I also discovered that it was difficult to start the engine on hydrogen alone so I had to start the engine using gasoline and switch to hydrogen. Conclusions/Discussion I was able to conclude that the power output of a gasoline-powered engine was higher than the same engine using hydrogen. The power output of hydrogen was about half of gasoline at the same engine speed. Hydrogen is better for our environment because it produces water vapor and no carbon dioxide. By analysis, I found that gasoline produces much more greenhouse gasses than hydrogen. Therefore gasoline produces a higher power output, but hydrogen has a more environmentally friendly exhaust. Also in order to have a practical hydrogen, I would have to figure out how to start it using only hydrogen.	
Summary Statement I compared the power output of a hydrogen fueled internal combustion engine to a gasoline engine to establish the practicality of using hydrogen as a fuel for transportation.	
Help Received My father helped me in procuring the equipment I needed. He demonstrated the use of certain machine tools to me. He ensured that I was using hydrogen safely.	