



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Grant T. McKechnie	Project Number J0213
Project Title Can Polymer Electrolyte Membrane Fuel Cells Power the World?	
Abstract Objectives/Goals The goal of this project was to find out which can run a fan for the most amount of time, hydrogen and oxygen that is stored in a small reservoir, versus hydrogen and oxygen that is stored in a larger reservoir. On top of that, I tested which was more efficient to produce hydrogen and oxygen, batteries or solar cells. Methods/Materials PEM fuel cell kit by horizon Batteries Solar panel Lamp Small Fan Water Results My results for small and large reservoirs were interesting. The large reservoir test was always at one point better than the small reservoir tests. This was because the small reservoir had a maximum that was dwarfed by the size of the large reservoir's max. The small reservoir peaked at 5 min charging time, and then went down hill. Conclusions/Discussion At the end of the day, I figured out that YES, the size of the hydrogen and oxygen reservoir affects how long a fuel cell can power a small fan. I also figured out that battery power was quicker in producing hydrogen and oxygen, but solar power ultimately is the way to go. Disposable battery power is bad for the environment. It comes from chemicals that are hard to recycle and that can kill plants and animals. Solar power, on the other hand, is great because it comes from the best and most renewable source, our sun. Solar power is also way better if we humans want to save our planet. I think that hydrogen fuel cell cars will be more efficient than electric cars. Especially when they can use solar power to produce hydrogen and oxygen to power the car. But for now the things you need for a hydrogen fuel cell system in a car are rechargeable batteries, solar panels, a big fuel cell, water and some hydrogen (you can get the oxygen from the air and the hydrogen from electrolysis) and there you have it, a zero emissions car that is efficient and good for the earth.	
Summary Statement My project was about which size hydrogen and oxygen reservoir could make a small fan run for a longer amount of time. On top of that, I tested whether battery power or solar power would be more efficient in producing hydrogen and oxygen.	
Help Received My dad helped me set up the hydrogen fuel cell kit.	