



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Oliver Chen	Project Number S1104
Project Title Method for the Sequestration and Utilization of Atmospheric CO(2)	
Objectives/Goals My goal is to create a complete system of Carbon Dioxide Gas capture and conversion into usable substance, and the recycling of waste CO ₂ . By capturing atmospheric Carbon Dioxide and converting it to usable substances such as syngas, synthetic natural gas, Carbon Dioxide can be successfully be reused in a renewable fashion.	
Abstract Methods/Materials Methods: The first step was to capture CO ₂ from the atmosphere. After some research I found that Sodium Carbonate was a good contender for carbon sequestration, or the removal of carbon dioxide from the atmosphere, and also could be easily reused. Next, the Carbon Dioxide had to be broken down into a usable substance. To achieve this, I build a tesla coil to breakdown the CO ₂ into CO, or carbon monoxide. I then built a Hydrolysis reactor to create Hydrogen and Oxygen. This Hydrogen and Oxygen was then mixed with the newly created Carbon Monoxide. This mixture of gasses is known as Syngas, short for synthetic natural gas. This mixture can then be later refined in chemical processes and used as fuel.	
Results I found that Sodium Carbonate effectively captured CO ₂ from the atmosphere and could be easily reused. I found that corona discharge can be used to break down CO ₂ into CO and mixed with Hydrogen made from electrolysis to produce Syn-gas, synthetic natural gas for use as a fuel or creation of industrial chemicals.	
Conclusions/Discussion I found that the use of Sodium Carbonate is a viable way for the capture of atmospheric Carbon Dioxide. It is not only efficient, but also reusable. Also, I found that the most effective use of Sodium Carbonate would be in areas of high Carbon Dioxide concentrations. I concluded that the most effective method of converting Carbon Dioxide into useful substances would be through a high voltage corona discharge, as is present in a tesla coil. After much research, I concluded that a conversion from CO ₂ to CO could be utilized to create syngas. According to efficiency tests of my electrolysis reactor, the device was able to produce roughly one liter of synthetic natural gas per minute. Finally, I found that through research that this mixture of Carbon Monoxide and Hydrogen could be utilized in its present state or be refined into pure natural gas through chemical processes. Overall I believe that this method of Carbon Dioxide capture and conversion to synthetic natural gas is a viable solution to the growing problem of rising CO ₂ levels.	
Summary Statement To create a complete and efficient system to capture and recycle atmospheric CO ₂ into a useful product for use as a fuel or refinement into industrial chemicals.	
Help Received Chemistry Teacher, Mr. Jones, provided classroom space to conduct the experiment	