



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> <b>Luis A. Lujano</b>	<b>Project Number</b>          <b>36415</b>
<b>Project Title</b> <b>Comparing Generators</b>	
<p align="center"><b>Abstract</b></p> <p><b>Objectives/Goals</b>          By comparing two methods of generating electricity, the objective is to figure out which is the most efficient. As one method requires a shaking motion and the other requires a spinning motion, there are four designs that are being tested. Two designs are for the shaking method (Mark I and Mark II) and the other two are for the spinning (Mark I and Mark II). The mark II designs contain stronger magnets. Multiple formulas must also be used to gain results.</p> <p><b>Methods/Materials</b>          As the two methods are being compared, the shaking and spinning designs, in order to get accurate results, they will contain the same amount of copper wire, the same type of magnets and will be tested at a constant rate. There are also formulas and major components for this experiment that are essential. Some essential components are strong neodymium magnets, copper wire (32 AWG), a timer, a digital multi-meter, soldering tool and a scale. Once the designs are built, each design is tested multiple times and timed. Once the data is gained, the efficiency of the designs can be interpreted by using the formulas. Newton's second law is a major formula. By knowing how much force is being applied to receive one volt, that's what lets us know which method is more efficient.</p> <p><b>Results</b>          Once the shaking and spinning methods, all four designs, have been tested multiple times, the results are gained. For the shaking and spinning methods, mark I designs, the shaking method turned out to be more efficient than the spinning method because less force is being applied for one volt. The mark I, the shaking method, is best for a hand held generator. As for the Mark II designs, the spinning method turned out to be more efficient because weight also plays a huge role in generators.</p> <p><b>Conclusions/Discussion</b>          All the designs turned out to be successful. They were all tested multiple times, at a constant rate, for ten seconds each test. Although the shaking method produced more voltage, for every test, the spinning method is how almost every single generator is designed. It's easier to modify and because of it's mass, it turns out to be more efficient. The shaking method is best for a hand-held generator and the spinning method is best for bigger generators.</p>	
<p><b>Summary Statement</b>          For this experiment, two methods of generating electricity are being compared in order to figure out which design is more efficient.</p>	
<p><b>Help Received</b>          While I designed and purchased all the materials for my project, I had also received help from a physics teacher who taught me all the formulas needed in order to get my results.</p>	