



2010

MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

A Program from The Foresight Project Inc; www.theforesightproject.org



Region I: Western Massachusetts

Alex Tierney: Taconic High School, Pittsfield

Climate Science: "*Strategic on-site (SOS) Tornado Alarm*"

About Me:

I hope to study meteorology and become a severe weather expert. I was terrified of Tornadoes when I was a little kid, but now I dream of chasing them. When I'm not watching the Weather Channel you can usually find me bowling; I have won many trophies for my performance on the lanes. I bowl for Taconic High Varsity as well as in a Saturday morning league. One year I was on the city, the county, and the State championship teams as well as being *bowler of the year* runner up. That was a pretty good season!

I am very proud of this, particularly since I had stroke when I was born, and doctors weren't sure if I would ever walk, talk or be in a regular classroom. Doctors have been telling me the things I shouldn't do all of my life, but I guess I don't give up that easily. I have limited use of my left hand, but am still interested in sports; I have played four sports including one-handed baseball. I have worked hard in school, and recently became a member of the High School Honors Society.

My Project:

For my Science Project I explored the possibility of developing an affordable, early warning, on-site Tornado alarm system. I wanted to see if the gust front winds could be used to trigger an early warning alarm to give people precious extra time to find shelter. Doplar radar has greatly increased the chance of survival in a tornado, but hundreds of people still die every year from these storms.

My initial design, based on a wind-belt generator invented by *Shawn Frayne* was ineffective because the belt vibration did not increase with wind speed. I decided to try to 'capture' the wind with a kite to trigger the alarm. This proved more effective.



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I attached a full sized kite to a frame; testing proved that it would consistently trigger at wind speeds of 31 mph. I was really excited to see it work for the first time.

I found that 41mph was the optimal wind speed to trigger the Tornado Alarm. I established the size of the kite as an independent variable and testing various smaller sizes proved that 7.5" x 10.5" was the size to trigger the alarm at the desired wind speed on a consistent and reliable basis.

I developed a third prototype that utilized two smaller kites, stretched in a perpendicular frame in order to trigger the alarm if a tornado approached from any direction, which also proved effective.

In general I found that my SOS Tornado Alarm proved to be a reliable, affordable (approximately \$33) solution to the design issues of size, direction and alarm consistency. The SOS Tornado Alarm captures the wind to support my hypothesis that using gust front wind to warn of an approaching tornado truly can work.

I am currently working on a fourth generation prototype; a vertical axis wind turbine that will be self-sustainable by generating electricity to trigger the Tornado alarm.