

Worldwide Issues

As this world is not perfect, people all around the world have been impacted by problems caused by the auto industry that are waiting to haunt us today. Gas prices are rising higher and higher every year as resources slowly deplete. Shipping fuels consumes a lot of energy and causes disasters such as oil spills. On April 20, 2010, The Deepwater Horizon Oil Spill occurred. This event affected animals and plants through chemical toxicity and physical smothering, caused 11 deaths and 17 injuries, caused coastal industries to lose businesses, and killed many marine organisms.

The average American already spends \$368.09 on gas each month which will accumulate to a yearly expense of \$4,417.08. Time is a valuable pillar to our essence of life. Most Americans approximately spend 5 minutes at the gas station to fuel their cars. Assuming that the average American goes to the gas station 50 times a year, then the average American spends at least 4 hours and 10 minutes each year fueling their car. Not to mention that electric cars take much longer to charge.

Global warming is increasingly causing wildfires in the west coast which has led to a total number of 3,362 deaths in 2015. In 2017, wildfires have burned more than 9.2 million acres. These wildfires made towns and cities dangerous to breathe in, made many families and wild animals to flee their homes, and contributed to the destruction of the planet's woodlands on a dramatic scale. The rise of global warming is increasing the rise of storm surges which are the dangerously high floods caused by a storm pushing water onshore. In addition to Hurricane María, José, and Irma, we are expected to have much more hurricanes in the future with global warming on the rise. Reports have also told us that we are going to expect more droughts and heatwaves to attack in the near future. Sea level is estimated to rise between 1-4 feet by the year 2100 because of global warming. The Atlantic Ocean is expected to essentially become ice-free in the summer around mid century (2500). With worldwide demands rising for petroleum, ecological impacts of petroleum extractions will dramatically increase. Vehicle's are America's biggest air quality compromisers, producing about 1/3 of all of America's air pollution. Concerning health, the smog, carbon dioxide, and other toxins emitted by vehicles are especially troubling because they leave tailpipe exhaust at street level, which is where pedestrians breathe in the polluted air into their lungs.

Just as plants cannot just rely on water to survive, us humans cannot continue to rely on fuel to power our vehicles. Gases emitted from car engines has proven to be too dangerous and gasoline is quickly running out, which will lead to a surge of higher gas prices.

With the new industry of electric cars out, many car companies such as; Tesla, Lexus, BMW, Mercedes-Benz, Volkswagen Group, General Motors, and many more are competing with each other. As electric car prices are already high enough, car companies are competing to reach the highest mileage and best quality, which will require electric cars to become more expensive. This means that in the future, many people will want to experience the pleasure of driving electric cars, but will be discouraged by the high prices, and in result the movement to an eco-friendly car industry will be deterred. Sooner or later, gasoline for our cars will run out and we will all have to resort to electric cars or public transportation whether we like it or not. There are approximately 350 million Americans in the United States. Out of those 350 million Americans, only about 332.5 million Americans drive cars. Out of those 332.5 million Americans, only about 1 million Americans drive pure electric cars. So when the time comes when gasoline is no longer available and electric cars are too expensive for the common man, the car industry will face a major depression and 331.5 million Americans will experience many financial issues. Note this is all hypothetical.

Also, according to studies in the United Kingdom, fossil fuels, such as; gasoline, oil, and coal are predicted to run out around 2080. Today's electric cars are a great way to enter into an eco-friendly car industry, but they are too expensive, take much longer to charge than normal car, and makes the average person spend an average of \$540 annually to charge their car. Solar energy from the sun could be a possible source of energy for cars, but the sun is only out shining for so long. Scientists and meteorologists claim that the shortest day ever recorded was for 9 hours and 32 minutes, and that after every solstice winter, our days will continue to get shorter. We must also note that the sun is not always shining completely, with clouds blocking the sunlight.

Pros

With my car established in the world, we will be able to slow down or stop these chaotic issues that may arise. We will be able to influence the movement towards an eco-friendly car industry, allow fossil fuels to last a couple more years later than expected, reduce the likelihood of oil shipping disasters, prevent needless deaths and injuries, prevent coastal industries to lose

business, protect animals and marine organisms from toxicity, slow down the growth of global warming, reduce the number of wildfire occurrences, reduce the number of wildfire deaths and destruction, deter the number of droughts, heat waves, and hurricanes, expected to happen, reduce the rising of sea levels, allow more time for the Arctic Ocean to stay frozen, expel tailpipe exhausts at street level, and prevent a depression in the car industry.

Americans who drive my car will also benefit by not paying for gas or electricity, saving \$500-\$4000 yearly, save about 4 hours of time every year, helping keep the environment a cleaner place, not falling into future financial crises, experience using an electric car in an affordable and enjoyable manner, and paying to replace inexpensive batteries.

Cons

Though my concept is not perfect, it does present progression, but with progression comes with faults that must be overcome. Some cons of my concept are that a driver cannot leave their car for too long, the installation of the wind turbines will require car owners to take frequent trips to the car shop, not have tons of room in the car, and will have to replace the car battery often.

List of Acknowledgements

Julianne Corroto

Chemistry Teacher

Cristo Rey Columbus High School

Eva Sullivan

Physics Teacher

Cristo Rey Columbus High School

Regan Donoughe

Rotational Analysis

IGS

Elhadj Bah

Student

Columbus Community State College

Elizabeth Lugivelle

Community Investment
IGS

Mark Gordon

Engineer
IGS

Jerald Brevick

Professor and Director
Otterbein University

James M. Sonnet

Managing Partner
Redwood Innovation Partners, LLC

Bibliography

#PopTheHood: A Dipstick's Guide to How Cars Work. (n.d.). Retrieved from <http://acprocold.com/blog/car-tipstricks/popthehood-dipsticks-guide-cars-work/>

Aerodynamics of Wind Turbines. WINDPOWER.org,
xn--drmsttre-64ad.dk/wp-content/wind/miller/windpower%20web/en/tour/wtrb/drag.htm.

Amadeo, Kimberly. "BP Gulf Oil Spill: Facts, Economic Impact."
Www.thebalance.com, The Balance, 17 Jan. 2018,
www.thebalance.com/bp-gulf-oil-spill-facts-economic-impact-3306212.

Animation: How a Wind Turbine Works." Department of Energy, Energy.Gov,
www.energy.gov/eere/wind/animation-how-wind-turbine-works.

Atlantis Wind Turbines." Wwww.atlantissolar.com, Atlantis Solar, 2015, www.atlantissolar.com/turbine_50kw.html.

Ayre, James. "How Do The Chevy Bolt & Chevy Spark EV Battery Packs Compare To One Another?" CleanTechnica, Sustainable Enterprises Media, Inc, 3 Sept. 2016,

cleantechnica.com/2016/09/03/chevy-bolt-chevy-spark-ev-battery-packs-compare-one-another/.

Barber, David. "The Four Forces That Influence Wind Speed & Wind Direction."

Sciencing, Sciencing, 9 Jan. 2018,
bizfluent.com/list-7651707-four-wind-speed-wind-direction.html.

Berkley , Stu. "A Sedan or a Coupe? What's The Difference?" [Www.middletonhonda.com](http://www.middletonhonda.com),
Middleton Honda, 26 Oct. 2015,
www.middletonhonda.com/sedan-or-a-coupe-whats-the-difference/.

Blevins, Robert D. 2003. Applied Fluid Dynamics Handbook. Krieger Publishing Co.
Bloomfield, Nikki. "We're Sorry Gizmodo, But Mini Wind-Turbines Won't Power Your Electric Car For Free." Transport Evolved, Patreon , 9 Jan. 2014,
transportevolved.com/2014/01/09/were-sorry-gizmodo-but-mini-wind-turbines-wont-power-your-electric-car-for-free/.

Brain, Marshall. "How Horsepower Works." HowStuffWorks, HowStuffWorks, 1 Apr. 2000,
auto.howstuffworks.com/horsepower.htm.

Brain, Marshall. "How Horsepower Works." HowStuffWorks, HowStuffWorks, 1 Apr. 2000,
auto.howstuffworks.com/horsepower1.htm.

Brain, Marshall. "How Horsepower Works." HowStuffWorks, HowStuffWorks, 1 Apr. 2000,
auto.howstuffworks.com/horsepower2.htm.

Bubear, Ryan. "12 of The Most Aerodynamic Cars in Production Right Now." [Www.motorburn.com](http://www.motorburn.com), Motorburn, 15 Jan. 2014, motorburn.com/2014/01/12-of-the-most-aerodynamic-cars-in-production-right-now/.

Chevrolet Pressroom - United States - Spark EV." Media.gm.com, Chevrolet, 2016,
media.chevrolet.com/media/us/en/chevrolet/vehicles/spark-ev/2016.tab1.html.

Coley, David. Energy and Climate Change. Chichester: John Wiley & Sons Ltd, 2008.
d turbine power curves., www.wind-power-program.com/turbine_characteristics.htm.

Convert newtons to pounds - Conversion of Measurement Units." Convert units,
www.convertunits.com/from/newtons/to/pounds.

Coriolis Effect." Factors Affecting Wind, 25 Mar. 2003,
www.csun.edu/~psk17793/ES9CP/ES9%20factors_affecting_wind.htm.

Elliott, Debbie. "5 Years After BP Oil Spill, Effects Linger And Recovery Is Slow." NPR, NPR, 20 Apr. 2015,
www.npr.org/2015/04/20/400374744/5-years-after-bp-oil-spill-effects-linger-and-recovery-is-slow

Eoltec Scirocco (Weole) Wind Turbine." Solacity , Solacity Inc., 19 Oct. 2017,
www.solacity.com/eoltec-scirocco-weole-wind-turbine/.

Factors Affecting Wind." Wwww.csun.edu, CSUN, 25 Mar. 2003,
www.csun.edu/~psk17793/ES9CP/ES9%20factors_affecting_wind.htm.

Friedl, Sarah. "Factors That Affect Wind: Pressure Gradient Forces, Coriolis Effect & Friction." Study.com, Study.com,
study.com/academy/lesson/factors-that-affect-wind-pressure-gradient-forces-coriolis-effect-friction.html.

Geuss, Megan. "There are more than 2 million electric vehicles on the road around the world." Ars Technica, 12 June 2017,
arstechnica.com/cars/2017/06/there-are-more-than-2-million-electric-vehicles-on-the-road-around-the-world/.

Global Warming and Hurricanes." GFDL - Geophysical Fluid Dynamics Laboratory,
www.gfdl.noaa.gov/global-warming-and-hurricanes/.

Gore, Al. "The End of Fossil Fuels." Ecotricity, Ecotricity, 2018,
www.ecotricity.co.uk/our-green-energy/energy-independence/the-end-of-fossil-fuels.

Graff, Frank. " How Much Wind Does a Wind Turbine Need?" Science.unctv.org, UNCTV,
science.unctv.org/content/how-much-wind-does-wind-turbine-need.

Hall, Greg. "Do You Know The Factors That Make Fast Cars Fast?" Singapore Travel Guide, Street Directory,
www.streetdirectory.com/travel_guide/59289/performance_cars/do_you_know_the_factors_that_make_fast_cars_fast.html.

Hall, Nancy. "The Drag Equation." Nasa.gov, NASA, 5 May 2015, [www.grc.nasa.gov/ www/k-12/airplane/drageq.html](http://www.grc.nasa.gov/www/k-12/airplane/drageq.html).

Hall, Nancy. "Velocity Effects on Aerodynamic Forces." Wwww.nasa.gov, NASA, 5 May 2015,
www.grc.nasa.gov/www/k-12/airplane/vel.html.

Highest Recorded Temperature." Guinness World Records, Guinness World Records , 13 Sept. 2012, www.guinnessworldrecords.com/world-records/highest-recorded-temperature.

How Do Wind Turbines Survive Severe Storms?" Energy.gov, Office of Energy Efficiency & Renewable Resources, www.energy.gov/eere/articles/how-do-wind-turbines-survive-severe-storms.

How Do Wind Turbines Work?" Department of Energy, Energy.Gov, www.energy.gov/eere/wind/how-do-wind-turbines-work.

How do you calculate the force of air resistance?" How Things Fly, howthingsfly.si.edu/ask-an-explainer/how-do-you-calculate-force-air-resistance.

How to Calculate Air Density." Fly Me to the Moon, Brisbane Hot Air Balloon, 14 Feb. 2017, www.brisbanehotairballooning.com.au/calculate-air-density/.

How To Calculate Power Output of wind." Windpower Engineering & Development, 26 Jan. 2010, www.windpowerengineering.com/construction/calculate-wind-power-output/.

How to convert horsepower to watts." How to convert horsepower (Hp) to watts, www.rapidtables.com/convert/power/how-hp-to-watt.html.

"Lift propelled versus drag resistance wind turbines." Windchallenge, 25 Jan. 2017, windchallenge.com/2017/01/25/lift-versus-drag-wind-turbine/.

Irfan, Umair. "How much did climate change affect California's wildfires? Depends on where you are." Vox, Vox, 12 Dec. 2017, www.vox.com/energy-and-environment/2017/12/12/16762120/los-angeles-california-fire-climate-change.

Kampf, Peter. "Where Can The Highest Air Density Be Found On Earth?" Stack Exchange, Aviation, 9 Aug. 2016, aviation.stackexchange.com/questions/30621/where-can-the-highest-air-density-be-found-on-earth.

Kellogg, Ryan. "What Will The Gas Price Be 5 Or 10 Years From Now? We Have No Idea. What Does That Mean For Transportation Policy?" The Energy Collective, Energy Post Productions, 12 Jan. 2017, www.theenergycollective.com/epicuchicago/2396075/what-will-the-gas-price-be-5-or-10-years-from-now-we-have-no-idea-what-does-that-mean-for-transportation-policy.

Khan, Amina. "Fires, droughts and hurricanes: What's the link between climate change and natural disasters?" Los Angeles Times, Los Angeles Times, 5 Dec. 2017, www.latimes.com/science/sciencenow/la-sci-sn-climate-change-natural-disasters-20170907-htmstory.html.

Laporte, John. "Topic: Car Drivers." Wwww.statista.com, Statista, 2017, www.statista.com/topics/1197/car-drivers/.

Layton, Julia. "10 Innovations in Wind Power." HowStuffWorks Science, HowStuffWorks, 8 Mar. 2018, [science.howstuffworks.com/environmental/energy/10-innovations-in-wind-power .htm](http://science.howstuffworks.com/environmental/energy/10-innovations-in-wind-power.htm).

Leitman, Seth, Bob, Brant. Build Your Own Electric Vehicle. New York City: The Philip Lief Group Inc., 2004.

Lima, Pedro. "Battery: Chevrolet Bolt EV vs Chevrolet Spark EV." Push EVs, 30 Aug. 2016, pushevs.com/2016/08/30/battery-chevrolet-bolt-ev-vs-chevrolet-spark-ev/.

Maestre, Luis. "What Do You Get For 1KWH?" Elektor Magazine, Elektor, 24 May 2010, www.elektormagazine.com/articles/what-do-you-get-for-1kwh

Meyers, C Bracken. "Centurion Energy." Energy Loss of a Wind Turbine, centurionenergy.net/energy-loss-of-a-wind-turbine.

Miessler, Daniel. "The Relationship Between Horsepower, Torque, and Acceleration." Daniel Miessler, 28 July 2007, danielmiessler.com/study/study/horsepower/.

Munson, Bruce R., Donald F. Young, and Theodore H. Okiishi. 1998. Fundamentals of Fluid Mechanics. John Wiley and Sons, Inc.

NASA, NASA, www.grc.nasa.gov/www/k-12/airplane/falling.html.

Natural Gas Prices Forecast: Long Term 2017 to 2030 | Data and Charts." Knoema, 24 Nov. 2017, knoema.com/ncszerf/natural-gas-prices-forecast-long-term-2017-to-2030-data-and-charts.

Ramon, Alex. "Running a Car on Wind Energy." AENews, Alternative Energy News, 8 Jan. 2010, www.alternative-energy-news.info/running-a-car-on-wind-energy/.

Rejcek, Peter. "How Many Electric Cars Are There in the USA?" Nanalyze, Nanalyze, 18 June 2017, www.nanalyze.com/2017/03/electric-cars-usa/.

Retseck, George. "Measure Wind Speed with Your Own Wind Meter." Scientific American, Bring Science Home, 10 Nov. 2011, www.scientificamerican.com/article/bring-science-home-wind-speed/.

Shaw, Ethan. "List Three Factors That Affect Wind Direction." Sciencing, Sciencing, 10 Apr 2017, sciencing.com/list-factors-affect-wind-direction-7420202.html.

Shelquist, Richard. "An Introduction to Air Density." Equations - Air Density and Density Altitude, Shelquist Engineering, 14 Jan. 2016, wahiduddin.net/calc/density_altitude.htm.

Simon, Christopher. *Alternative Energy*. Lanham: Rowman & Littlefield Publishers, Inc., 2007.

"Size of Wind Turbines." www.windpower.org, Danish Wind Industry Association, 29 July 2003, xn--drmsttre-64ad.dk/wp-content/wind/miller/windpower%20web/en/tour/wtrb/size.htm

Smith, Anthony. "How to Calculate Air Density." Sciencing, Leaf Group Education, 24 Apr. 2017, sciencing.com/calculate-air-density-5149935.html.

Springob, Christopher. "Is the Sun always up for exactly 12 hours at the equator? (Beginner)." Home - Curious About Astronomy? Ask an Astronomer, curious.astro.cornell.edu/about-us/161-our-solar-system/the-earth/day-night-cycle/195-is-the-sun-always-up-for-exactly-12-hours-at-the-equator-beginner.

Susan, Callery . "Global Climate Change: Effects." NASA, NASA, 27 Feb. 2018, climate.nasa.gov/effects/.

Tara. "5 Smart Uses for Wind-Powered Energy." Biofriendly Planet Magazine, Biofriendly Planet, 9 Aug. 2013, biofriendlyplanet.com/renewable-energy/5-smart-uses-for-wind-powered-energy/.

"The Best Electric Car - Model S Tesla." Tesla Motors, Tesla, www.tesla.com/models

"The Inside of a Wind Turbine." Department of Energy, Energy.Gov, www.energy.gov/eere/wind/inside-wind-turbine-0.

"The Rising Cost of Natural Hazards : Feature Articles." NASA, NASA, earthobservatory.nasa.gov/Features/RisingCost/rising_cost5.php.

"Turbines." Small Wind Turbines | Small Wind Generators | Community Wind Generators, Polaris, 2012, www.polarisamerica.com/turbines/.

Tverberg, Gail. "10 Reasons Why Natural Gas Is NOT The Solution To Our Energy Problems." Business Insider, Business Insider, 18 Feb. 2011, www.businessinsider.com/dont-count-on-natural-gas-to-solve-us-energy-problems-2011-2.

Urieli, Israel. "Engineering Thermodynamics." Specific Heat Capacities, Ohio University, www.ohio.edu/mechanical/thermo/property_tables/air/air_Cp_Cv.html.

U.S. fire deaths, fire death rates, and risk of dying in a fire." U.S. Fire Administration, 18 Dec. 2017, www.usfa.fema.gov/data/statistics/fire_death_rates.html.

U.S. Population (LIVE)." U.S. Population (2018) - Worldometers, www.worldometers.info/world-population/us-population/.

Weisenthal, Joe. "THE TRUTH ABOUT GAS: Here's How Much Of Your Life Every Year Just Goes To Filling Your Tank." Business Insider, Business Insider, 22 Feb. 2012, www.businessinsider.com/heres-how-long-you-have-to-work-to-just-to-fill-up-your-cars-gas-tank-2012-2.

What Factors Affect Wind Direction and Speed." Actforlibraries.org, Act For Libraries, www.actforlibraries.org/what-factors-affect-wind-direction-and-speed/.

Wild Winds: Turbulent Flow around Structures." Scientific American, Bring Science Home, 17 Sept. 2015, www.scientificamerican.com/article/wild-winds-turbulent-flow-around-structures/.

Wilson, Harvey. "Universal Gas Constant "R" Values in Many Units." Uconeer 3.4, Katmar, www.katmarsoftware.com/gconvals.htm.

Wind Energy Basics." Wind Energy Basics | NREL, National Renewable Energy Laboratory, www.nrel.gov/workingwithus/re-wind.html.

Wind Turbine Components." Www.Windpower.org, Danish Wind Industry Association, 10 May 2003, xn--drmsttre-64ad.dk/wp-content/wind/miller/windpower%20web/en/tour/wtrb/comp/index.htm.

Wind turbine power output variation with steady wind speed." Win "Your monthly gasoline bill: \$368." CNNMoney, Cable News Network, money.cnn.com/2011/05/05/news/economy/gas_prices_income_spending/index.htm.

Woodford, Chris . "Aerodynamics - Introduction to the science of air flow." Explain that Stuff, Www.explainthatstuff.com, 21 Nov. 2017, www.explainthatstuff.com/aerodynamics.html.

Woodford, Chris . "How Do Regenerative Brakes Work?" Explain that Stuff, Otis Elevator Company, 12 Oct. 2017, www.explainthatstuff.com/how-regenerative-brakes-work.html.

Woofenden, Ian. "Understanding Wind Speed." Understanding Wind Speed | Home Power Magazine, Home Power Inc., June 2011, www.homepower.com/articles/wind-power/design-installation/understanding-wind-speed.