

Undergraduate Thesis Prospectus

The Creation of a Human Powered Phone Charger

(technical research project in Mechanical Engineering)

Climate Change Skeptics in the United States

(STS research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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General research problem

How can we significantly slow climate change?

According to the National Oceanic and Atmospheric Administration (NOAA), nine of the ten warmest years on record have occurred since 2005 (Dahlman & Lindsey, 2019). The average temperature of the Earth is steadily rising outside the patterns of natural, cyclical climate changes. These are human caused changes, accelerated by rising energy consumption; Maibach et al. (2014) states that “97% or more of climate scientists are convinced that human-caused climate change is happening.” Our society will need to make drastic cultural and technological changes to avoid a climate catastrophe. Already, our society is working towards solutions: we are researching and developing cleaner energy sources, we are mandating environmental regulations, and we are encouraging individuals to minimize their carbon footprint. Despite these efforts, the fight to preserve the Earth remains an uphill battle; political and cultural barriers persist. Understanding the intersection of culture, corporate and government politics, and technology is the first step towards developing better ways to slow climate change.

The creation of a human powered phone charger

How can human motion be used to charge a smartphone?

This research team includes Rojeen Kamali, Alex Nazon, Grant Kim, and Maria Contreas. Dr. Michael Momot of the MAE department is our capstone advisor. We will develop a phone charger that will be strapped on an arm or leg or attached to a water bottle to generate electricity. Similar to a shake flashlight, the swinging motion of the appendage will move a magnet in and out of a coil to produce electricity and charge a battery. Human motion serves as a

clean, renewable energy source. Ellabban et al. (2014) estimates that renewable energy sources have the potential to “provide over 3000 times the current global energy needs”; this doesn’t even include the potential of human powered devices! However, this great energy potential can be unlocked only by modern technology and innovation.

Currently, there exists a similar human powered charger, the nPower PEG. This device is over 10 inches long; due to its size, it cannot be strapped comfortably on an arm or leg (REI, n.d.). The product is no longer available to purchase but, based on product reviews, it costs about \$200 (Lasky, 2012), making it prohibitively expensive; it provides clean energy that is accessible only to wealthy tech enthusiasts. Our team aims to make a comfortable, versatile, and affordable device that can accomplish this same goal. We will model our system using SolidWorks and use Faraday’s and Lenz’s laws to characterize the magnetic flux produced. We will prototype our device using 3D printers and purchased parts and we will test the current and charge produced using an oscilloscope. At the end of the project, we will have a cost effective device that allows the user to charge their phone as they walk. This will open the door to affordable, clean, easily accessible energy.

Climate Change Skeptics in the United States

How do climate change skeptics try to earn credibility?

With the increasingly apparent effects of global warming comes growing pressure for measures to reduce CO₂ emissions. However, these proposed changes have pushed climate change skeptics to fight back. The multifaceted, high-stakes nature of climate change leaves room for rejection or denial; as Connor & Higginbotham (2013) explain: “Climate change

presents particular problems of acceptance because of its insidious, long term nature, often distant effects, the numerous and powerful special interests involved, and the necessity for short term actions to solve problems that will only become evident in the longer term.” To find an all-encompassing solution to the climate crisis, it is imperative that we understand why skeptics take their stance and how they garner credibility to gain support.

Hatzisavvidou (2019) explains how Sarah Palin has promoted climate denialism by tying it into the support of free markets, social conservatism, and environmental anti-regulation, all of which find favor among many conservatives. This method gains deniers credibility. Nakajima (2001) explains that companies use public relations (PR) and advertising to craft an environmentally conscious public image while taking no actual action to reduce environmental impacts. She provides an overview of PR abuses, but the effectiveness and scope of this method within any one participant group needs clarification.

Climate change skepticism includes claims that climate change is not occurring as well as acknowledgments of climate change but with denial of humans’ role in it. The American Petroleum Institute’s (API) position on climate change protects the oil and natural gas industry. API claims stricter pollution regulations harm the economy. It hired Blue Advertising to publicize the benefits of oil and natural gas, equating the industry with economic growth (Blue Advertising, n.d) (fig. 1).

American Petroleum Institute

Buffeted by a challenging public opinion environment, the U.S. oil and natural gas industry hired Blue to create an education campaign unprecedented in the industry's history. This campaign, recipient of Telly, Communicator, SABRE and MarCom Awards, focused on showcasing both the benefits oil and natural gas bring to all facets of American life as well as the industry's innovation and technological prowess.

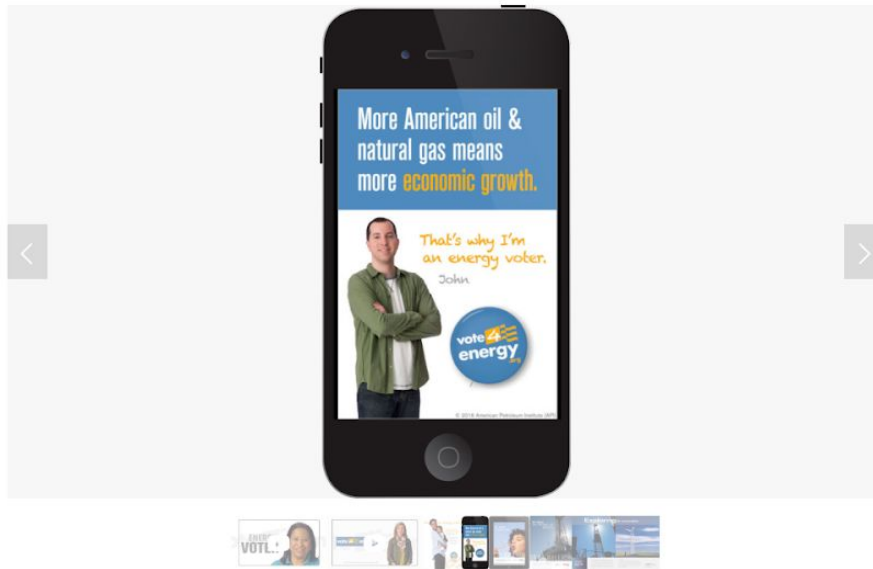


Figure 1. Ad made for API by Blue Advertising (Blue Advertising, n.d)

Koch Industries opposes regulations of carbon and fossil fuels and finances Americans for Prosperity (AFP) and the American Legislative Exchange Council (ALEC) to support free markets with little regulation. ALEC states that “a great deal of scientific uncertainty surrounds [climate] changes, and the cost of regulation to inhibit such changes may lead to great economic dislocation” (ALEC, 2017). On the Obama-era fuel efficiency standards, AFP stresses higher “costs for consumers” (AFP, 2018).

The Heartland Institute (HI) argues “Rationing access to energy and forcing a transition to alternatives to fossil fuels would reduce the quality of life of billions of people around the

world...and cause the premature death of millions of people” (Heartland Institute, n.d.). It paints climate change “alarmists” in a negative light, alleging they use fear to control people. To support its view, HI attacks scientific studies, saying they contain “bad data” (Burnett, 2019). This is confirmed by Cann and Raymond (2018), who found that 74.1% of HI’s climate articles attack the scientific basis of climate change to support its perspective.

The Cornwall Alliance (CA) opposes climate action on religious grounds. CA claims it informs “the public and policy makers about Biblical earth stewardship” and aids in “economic development for the poor (through private property rights, entrepreneurship, free trade, limited government, the rule of law, and access to abundant, affordable, reliable energy” (CA, n.d.). It describes the current environmental movement as “overwhelmingly anti-Christian,” and claims its “science and economics are often poorly done” (CA, n.d.). It explains environmentalist views like global warming as radical falsehoods that environmentalists masquerade as science. CA labels environmentalist views as distortions based on “faulty computer climate models” and “imaginary forecasts” (Jayaraj, 2019).

Some climate skeptics see climate change and environmental policies as schemes to gain political power. This participant group will be referred to as the political skeptics. In his opinion article, Kurt Schlichter (2019) describes climate science as “a package of self-serving lies buttressing the transnational liberal elite’s preferred narrative.” Ensuing comments on his article claim that “liberalism is fear mongering” and cite previous climate crises: “What about the hole in the ozone layer!!! Another liberal hoax fail!!!” commenter Sam Smith says. This is supported by Antonio & Brulle (2011) who observed that many Republican congress members shared views with their base “who see climate change and regulation of energy consumption to be a

left-wing anti capitalist conspiracy.” Although this perspective is not the focus of the organization, CA also contends that “settled science” is a term used by the left to ostracize those who think differently. “When it comes to any cause or agenda item that the left is pushing, science is called upon as the arbiter of ‘truth’” (Dyke, 2019).

Other skeptics equate climate change warnings with the boy who cried wolf. They have heard the same doomsday story over and over again and have seen nothing happen; this participant group will be referred to as false alarmers. In *Religion Unplugged*, Jillian Cheney tries to explain why most Evangelicals do not accept climate change. Curt B.’s comment on Cheney’s analysis perfectly expresses the concerns of false alarmers:

Has the author considered [that] many don’t buy into it because...we don’t see it happening? None of the computer models have come true, arctic and antarctic ice recedes, then reforms, sea levels rise, then lower, temperature[s] rise, then drop...

At this point, why in the world would we believe "experts" who have been caught manipulating data and literally flying in private jets to collect environmental awards

Remember when salt was bad for you, how about the idea of "healthy" high carbohydrate snacks? These ideas were brought to us by "experts" as well, and now we're dying of obesity related conditions by the millions, thanks to nutrition "experts". So forgive us in fly-over country if we don't buy into climate change when the only answer/solution presented to us is a massive increase in the power of government, no thank you. (Cheney, 2019)

Curt B.’s distrust of scientists and experts is echoed in many of the other comments on this article and similar articles. An opinion article from the Institute for Energy Research (IER) also expresses disbelief in climate change due to frequently falsified predictions (Bradley, 2018) and the same perspectives can be found in Ralph B. Alexander’s book, *Global Warming False Alarm*.

I will analyze the six participant groups introduced above to examine what methods they use to gain support and credibility among the public, politicians, and other organizations.

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