

PSU: GO GREEN OR GO HOME

Addressing Environmental Issues at Penn State



The awareness for our environment over time has led to 10,000 recycling plants by 1964, National Earth Day beginning in 1970, and state laws requiring items such as plastic bags and electronics to be recycled.

Penn State has also been taking steps toward a less harmful environment. In 2014, Penn State committed to closing the loop on solid waste and implemented numerous recycling bins and trash cans all over campus with directions about what items should be placed in which bin. Penn State continued its progress by diverting 62% of all of the waste on campus from the landfills. Other examples of environmentally friendly efforts include the CATA Buses that run on natural gas, Green-to-Go containers in the dining halls, and automatic lights that turn off after periods of inactivity.

Although each of these programs has had a positive impact on our environment, there is still a long way to go to save our planet. According to Duke University, the average person produces 4.3 pounds of waste each day. If that number is multiplied by 46,000 (the number of students on campus), our campus alone is responsible for almost 200,000 pounds of waste each day.

It is our responsibility to learn how we can reduce that number. Our goal is to improve awareness, activity, and communication about climate change and helping the environment. A few questions to keep in mind as the deliberation begins are: What is Penn State's role in addressing climate change? What are the main issues we need to focus on? How can we optimize these efforts as students? Can we make a bigger impact as a campus?

Image sources:

Figure 1: http://www.ucsusa.org/global_warming/science_and_impacts/science/each-countrys-share-of-co2.html#.WKWx-WeM3cs

Figure 2: <https://www.epa.gov/climate-indicators/climate-change-indicators-coastal-flooding>

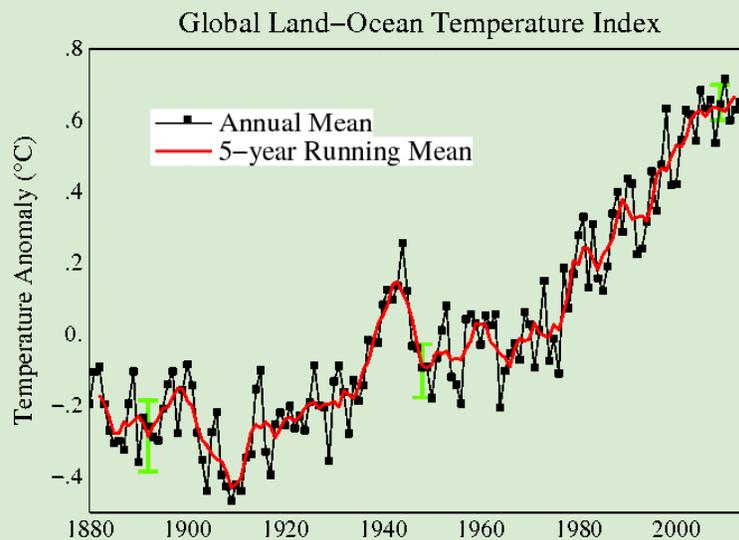
Figure 3: <http://www.bbc.com/news/science-environment-38652746>

Approach 1: Is Climate Change Real?

By Kristin Sarsfield and Katie Nields

The issue of climate change is something that's highly debated. So much so that it's even considered a political issue. The controversy of climate change mainly stems from human involvement in the environment. Do humans play a role in climate change, or is it a naturally occurring event? Is global warming even real? What's the evidence that supports it? All of these are questions that are necessary to ask in order to determine what actions should be taken to help the environment.

To begin, climate change is defined as a change in global or regional climate patterns. Global warming, more specifically, addresses the ongoing rise in the temperature near the earth's surface. Over the past century, the earth's average temperature has risen by 1.7°F. It's expected to rise another 0.5 to 8.6°F over the next hundred years. Climate change is something that has been observed on our planet for a while; the controversy comes into play when we look at the cause of global warming.



One possible explanation for global warming is human causation. Humans definitely play a role in the environment when it comes to things such as landfills and cutting down trees, but do they play a role in advancing global warming? NASA has done a fair amount of research on how Earth's temperatures and water levels have changed over the past century, offering some incredibly powerful statistics. For example, carbon dioxide levels have risen from 378.21 parts per

million in 2005 to 405.25 parts per million at the end of 2016. Such rising CO₂ levels are not a natural phenomenon, as they are mainly due to burning fossil fuels. Burning fossil fuels releases substances into the atmosphere called greenhouses gases. Some of the most abundant greenhouse gases include carbon dioxide and nitrous oxide, and a buildup of these gases promotes the trapping of heat in Earth's atmosphere, thus raising the temperature on Earth. Today, this is known as global warming, which is including climate change. This evidence is most popularly used to support the human-linked cause for climate change.

The changes in amounts of greenhouse gases, and therefore Earth's average temperature, have occurred so drastically over a short period of time that they are not comparable to any other points in history when humans were on Earth. Not only has this caused a rise in Earth's temperature but also a 13.3% decrease in arctic sea ice per decade since 1980, as well as 3.4 mm increase per year in sea level due to melting ice at the poles. Looking back further in time reveals that there have been changes in temperature on Earth that have been unlike anything humans have ever experienced.

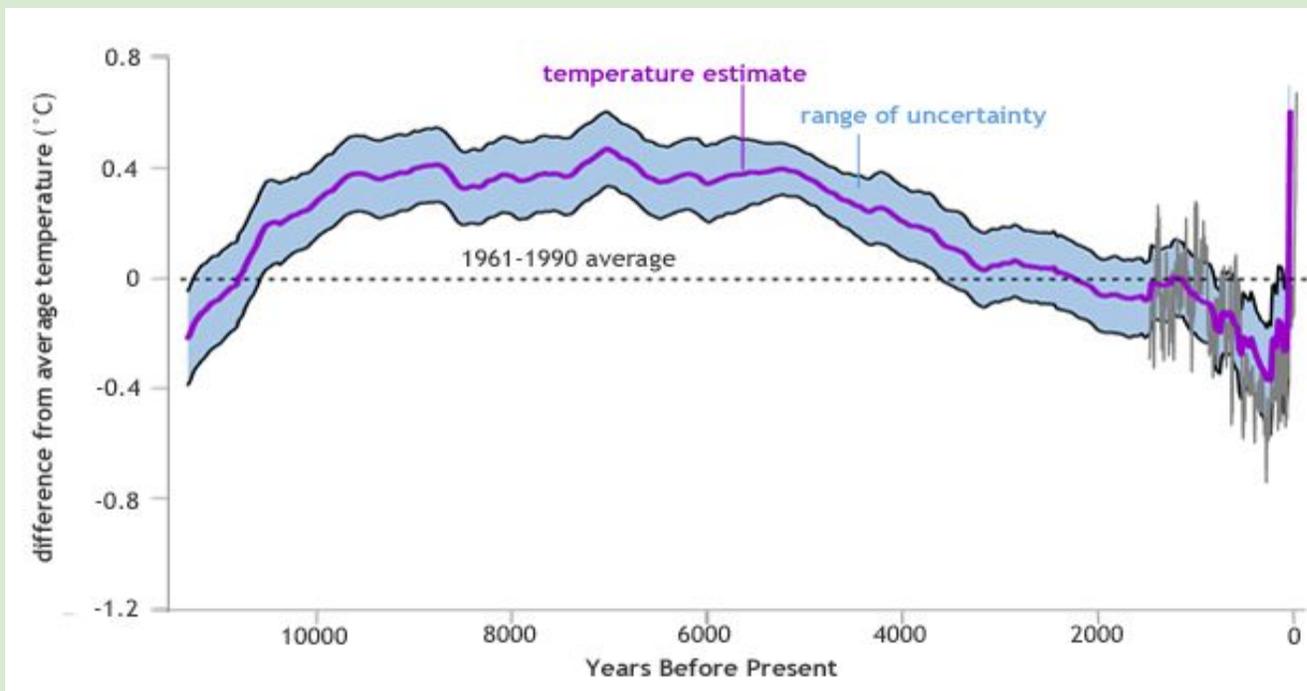


Figure 5 - Courtesy of Shaun A. Marcott

The National Oceanic and Atmospheric Administration offers more information regarding the temperature changes in the past 10,000 years. Global temperature was very steady from about 7550 BC-3550 BC, then dropped consistently until 1850 AD to approximately 0.6°C below the average temperature. Since that point, there has been unprecedented global temperature

increase as discussed by NASA. The most significant part from this perspective is seeing that global average temperature rose from one of its coldest points in thousands of years up to being warmer than 75% of this history, all in a mere 10 years. One would have to refer to times greater than 100,000 years ago in order to find temperature changes similar to the ones experienced today. Earth has always warmed and cooled, but the addition of warming greenhouse gases from human activity has added an entirely new point of analysis in addition to other natural factors that could contribute to this change.

“... the current melting of ice in Greenland is already causing the tilt to change at a rate of approximately 2.6 centimeters each year.”

- Astrobiology Magazine

What’s highly debated is the possibility that global warming is caused by other, naturally occurring factors. Many scientists acknowledge that the sun plays a role in climate change. Natural fluctuations in the amount of sun energy that reaches the earth can and do occur. Another possibility includes looking into the earth’s orbit. The Earth’s orbital tilt varies between 22 and 25 degrees roughly every 41,000 years. This orbital change could have huge impacts on the climate of earth. Astrobiology Magazine stated that “scientists from NASA’s Jet Propulsion Laboratory say that the current melting of ice in Greenland is already causing the tilt to change at a rate of approximately 2.6 centimeters each year . . . [and that] this change could increase in the years ahead.”

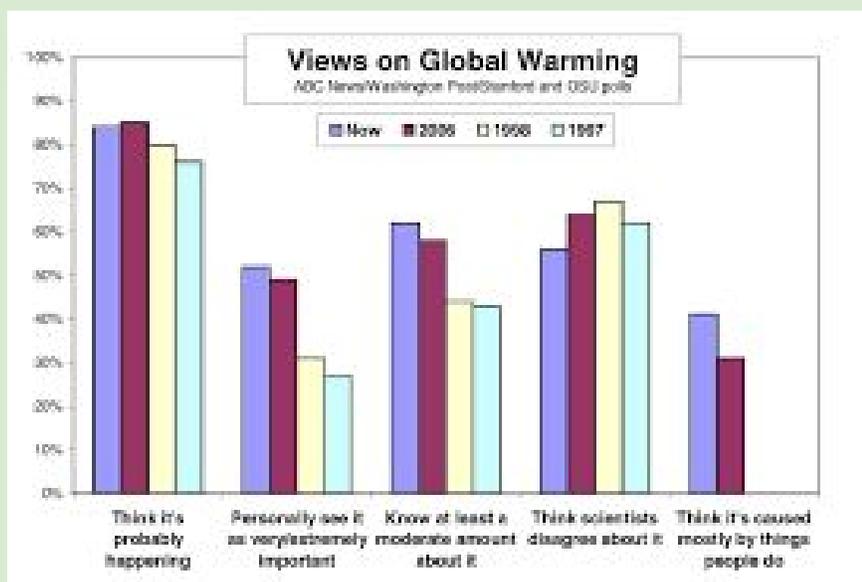


Figure 6 - Courtesy of the Stanford Political Psychology Research Group

While both speculations are possibilities, what's important to note is that scientists do not generally see the issue as a debate. The general view in the scientific community is that climate change is not something to do with opinions, rather scientific research. Opinions come into play when deciding how to deal with the issue. More currently speaking, climate change is an issue now more than ever. With the inauguration of President Trump, all mentions of global warming were taken down from the white house's website. The new administration also plans to change Obama's climate change policies. So the question is, what should the government do? Does something need to be done, how can the government intervene and help the environment?

With the mention of government comes the possibility of enacting certain efforts to reduce carbon footprints and perhaps slow down the process of global warming. If limitations and restrictions were put into place by the government, would this have a large enough impact to affect the process of global warming? If so, what types of policies would work best and why? If not, why not? If people of Earth continue to behave the same way they do now relating to the environment, what will the planet look like in 100 years? These are many unanswered questions, as they are just now beginning to be tackled by society as more and more people learn about climate change and want to make a difference.

Image sources:

Figure 4: https://data.giss.nasa.gov/gistemp/graphs_v3/

Figure 5: <https://www.climate.gov/news-features/climate-qa/what%E2%80%99s-hottest-earth-has-been-%E2%80%9Clately%E2%80%9D>

Figure 6:

<http://climatepublicopinion.stanford.edu/sample-page/research/concern-soars-about-global-warming-as-worlds-top-environmental-threat/>

Approach 2: Where Do We Fall In?

By Alice Lin and Emily Yanoshak

Penn State is a very large university with an enormous student population. As a result, Penn State consumes great deal of energy and accumulates considerable amounts of waste each year. Because energy usage is the largest contributor to Penn State's emissions profile, Penn State's primary environmental focus is on the reduction of energy consumption through increased efficiency, conservation, and awareness around the university. Penn State is currently implementing a \$60 million five-year investment in energy efficiency and conservation initiatives. Through its comprehensive sustainability mission, Penn State aims to integrate sustainability into the University's research, teaching, outreach, and operations, which will prepare students, faculty, and staff to be sustainability leaders.

Currently, Penn State has pursued many initiatives and measures to work toward its sustainability goals. Basically every campus building has reusable water bottles filling stations to reduce the use of disposable plastic water bottles, while the dining halls have taken on the "Green2Go" program so students can get take out in washable, reusable plastic containers. In addition, Penn State Food Services donates leftover food to Meals on Wheels, CATA buses run on biodiesel fuel, and Penn State holds a Trash-to-Treasure sale at the end of every spring semester to recycle move-out waste. Perhaps Penn State's most notable program dedicated to reducing waste is the Möbius campaign. Möbius is Penn State's waste management system, which promotes environmentally friendly ways of getting rid of waste on campus. Instead of merely throwing away waste, the Möbius campaign prompts students, faculty, staff, and guests to sort out any recyclable material, such as metal, plastic, paper, compost, and glass, into various labeled containers around campus. As a result, Penn State currently diverts 56% of its solid waste, and with campus-wide composting and recycling, that percentage can reach up to 85%! Over the past decade, Penn State has reached many milestones in its move toward sustainability. Since 2005, Penn State has reduced its campus greenhouse gas emissions by 18% and it has set an ambitious new reduction goal of 35% by 2020. Penn State has also reduced its electrical usage



Figure 7: Courtesy of Treggirl

by about 7% since 2005, saving the university millions of dollars annually. Over 3,000 tons of food and landscaping waste are converted into 1,200 tons of compost, and 22,000 gallons of used-cooking oil are refined yearly into fuel for campus vehicles and pieces of equipment.

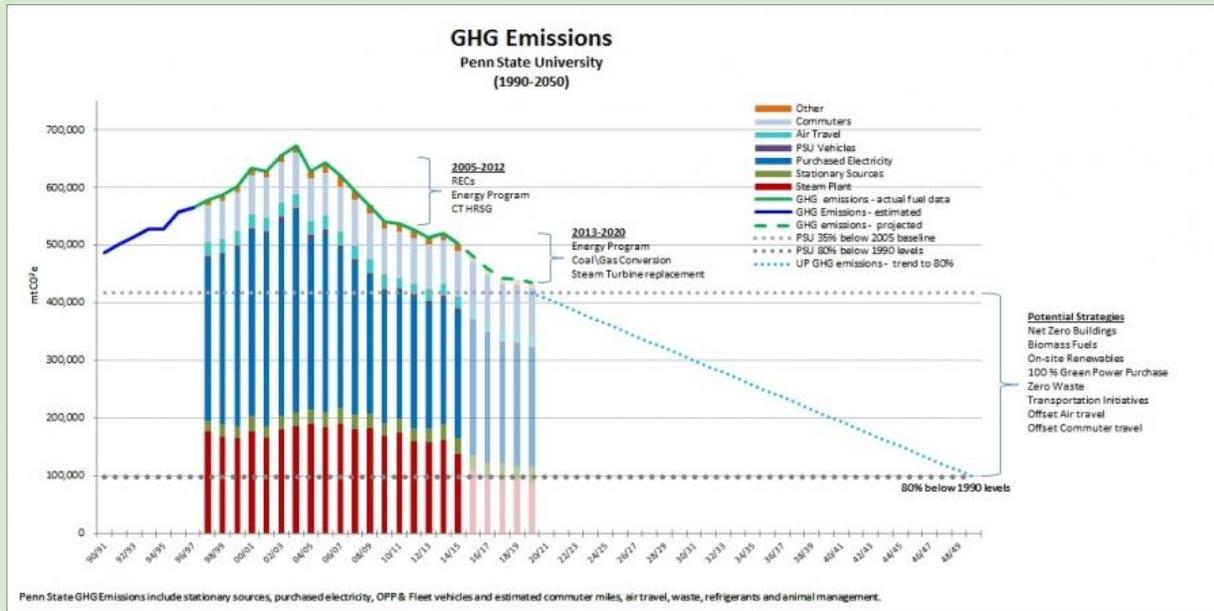


Figure 8: Courtesy of sustainability.psu.edu

Out of all the universities that earned the “gold ranking” for being eco-friendly, Penn State was listed as 30 out of 39.

- STARS

However, Penn State is not the only institution that has started implementing ways to be more environmentally friendly. There are many other colleges and universities across the United States that have jumped on the eco-friendly, sustainability bandwagon and taken measures to reduce their energy consumption and waste accumulation. To truly understand how “green” Penn State really is, we can compare Penn State to other universities. According to the Sustainability Tracking, Assessment & Rating System (STARS) Participants and Database, out of all the universities that earned the “gold ranking” for being eco-friendly, Penn State was listed as 30 out of 39. Why is that? While Penn State may have a great

waste management system and various other environmentally conscious initiatives, other universities have taken more innovative measures to reach their goals. For example, listed #1 on the STARS database is Colorado State University. Here, sustainability research is conducted in more than 90% of the departments. In addition to rooftop solar panels, Colorado State offers many research and volunteer opportunities for students relating to environmental concerns, as well as a Master’s of Greenhouse Gas Management and Accounting Program program for

graduate students. Colorado State has integrated sustainability into its academic programs, so its faculty and students are very familiar with and dedicated to the cause. Some more notable



Figure 9: Courtesy of The Atmosphere Conservancy

they are in use.

measures other universities are taking to become more “green” include serving organic food to students at Stanford University, and making every new building LEED (Leadership in Energy and Environmental Design) certified at the University of North Carolina - Chapel Hill. At George Mason University, students can work with endangered species in Smithsonian-Mason School of Conservation, and the school itself has electric car charging stations, solar thermal hot water, green roofs, and stormwater capture. In addition, Oregon State University has 22 exercise machines connected to the power grid to help provide the university with energy when

Clearly, there are many more ways Penn State can reduce its negative impact on the environment, as demonstrated by the countless efforts of other institutions around the nation. Penn State has undoubtedly made progress to become more sustainable and eco-friendly, but whether Penn State is doing enough to reach its goals and uphold its sustainability mission is ultimately up for debate.

Image sources:

Figure 7: <http://sites.psu.edu/treegirl/2015/04/24/58/>

Figure 8: <http://sustainability.psu.edu/energy-environment>

Figure 9: <http://www.atmosphereconservancy.org/projects/csu-complete/>

Approach 3: What's Next?

By Anthony Silva and Monica Mohler

Large universities such as Penn State can easily be viewed as small cities. With a total enrollment population of 99,000, Penn State's impact on the environment is impossible to ignore. Once the issue of climate change is established, methods for improvement stem from management, public participation, social responsibility, and the teaching of sustainability. How can we continue to progress? Where do we see the future of going green efforts? The work towards ending climate change will take many steps, dedication, and time to reach a higher goal.

PSU's numerous strategies for being sustainable and environmentally friendly can always be modified, based on effectiveness. Clubs and bulletins work on public awareness, which is the first step. The more people who comprehend the reality of climate change, the more work they will put into fighting it. But true motivation to make changes in a population the size of a small city has to come from somewhere.

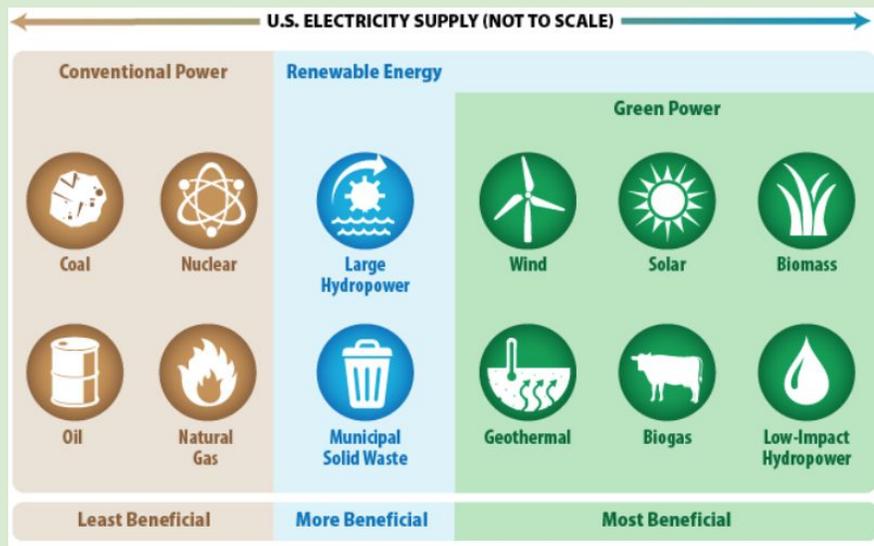


Figure 10: Courtesy of EPA.gov

When schools are exposed to their personal impact on the environment and presented with incentives to reduce their wastefulness, the effects are tangible. In a study at Oberlin college and sponsored by the EPA, dormitory water and electricity was monitored and displayed to students with a real-time web-based feedback system. This was presented to students as a competition in which the dorm to reduce their usage most would have some sort of prize. Over the two week period, the study showed that the monitored dorms reduced electricity usage by

32% and water usage by 3%, about \$5000 in savings for the school. Furthermore, according to a post-study survey, students agreed that despite the lack of incentive, they would continue to reduce their wastefulness. Therefore, showing students their personal impact interests motivates them to be more environmentally friendly.

Another form of involvement is the EPA's Green Power Partnership, which tracks collegiate athletic conferences. The colleges are evaluated on their "green power" usage. The EPA defines green power as electricity produced from solar, wind, geothermal, biogas, eligible biomass, and low-impact small hydroelectric sources. Universities report their green power usage and are then compared to other schools within their athletic conference. Competition such as this is attractive to students, especially those who follow athletics and already have strong rivalries. The 2015 winner was the Big 10, and an individual winner of University of Buffalo. Increasing the use of alternative energy increases sustainability and reduces the carbon footprint.



Figure 11: Courtesy of sustainability.psu.edu

When the issue of climate change is so significant, sometimes we must look beyond individual universities and at the bigger picture. The government's involvement in the future of climate change is one move towards progress. The EPA's funding and backing of research studies and competitions is crucial to its function, but the EPA generally take a hands-off approach in specifically regulating universities, occasional

finances for hazardous waste violations, air pollution, etc. Possible governmental mandates on schools to increase sustainability would allow for closer monitoring and coercion. Subsidies would also assist universities in making changes and managing their missions towards going green.

"Going Green" may be the motto of environmental changes not only because green is a universal indicator for nature, but also for money. Money is the number one tradeoff for environmental change. On the international scale, going green will cost up to \$76 trillion. On a smaller scale the money going into sustainability may go towards not only making the physical changes, but also for incentives towards going green and for employing those to keep track of

progress. For Penn State specifically, this may look like hiring more Eco-Reps, students hired to promote environmentally friendly practices among their classmates and across campus, or broadening their work spectrum. Nevertheless, protecting the environment can save money when broken down to usage costs, such as lowering costs of electricity when electricity is conserved.

Overall, efforts towards sustainability and fighting climate change must continue and expand. Lindsay Cole with the University of Victoria defines a sustainable campus community as “the one that acts upon its local and global responsibilities to protect and enhance the health and well-being of humans and ecosystems. It actively engages the knowledge of the university community to address the ecological and social challenges that we face now and in the future”.

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- Lindsay Cole

Image sources:

Figure 10: <https://www.epa.gov/greenpower/what-green-power>

Figure 11: <http://sustainability.psu.edu/eco-reps>

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