Project Summary for

Empowering Kids to Become Change Agents for Environmental Sustainability

Hispanic Austin Leadership

Environmental Sustainability Team – Class of 2014

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HISPANIC AUSTIN LEADERSHIP

Greater Austin Hispanic Chamber of Commerce

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Mission:

Establish educational math/science projects, in which high school and grade school students work together to learn about individual actions that have a great positive impact on the environment, take actions to reduce their electric energy consumption and create public service announcements to spur the community into action.

Vision:

1) Transform kids into change agents that promote environmental sustainability in their school, families and communities.
2) Empower individuals, families and communities to take actions that can have a large positive impact on the environment.

Executive Summary

In the midst of all the negative news about the effects of climate change and the failure by the community of nations to implement effective and coordinated measures to help address one of the most important challenges of our time, it seems ever more important to educate students with a positive message: "*You have the power!"*

- *Your knowledge and awareness about climate change and environmental sustainability is the key to solving the problem.*
- *Your activities (how much energy you consume, how much food and things you throw away) influence your surroundings and the world as a whole.*
- *Your individual actions, no matter how small, can make a big difference in your community AND the entire world.*

Our Unplugged project focused on this overarching message as we worked with over 100 fourth and fifth grade students at Williams Elementary School, where about 80% of the student population is from economically disadvantaged families. We partnered with Williams Elementary, Crockett High School and the City of Austin Office of Sustainability, educating students on energy, greenhouse gases, and climate change and taking simple individual actions to live sustainably.

Our team developed and implemented a program which provided over 10 hours of instructional activities to students. These activities involved:

1. Creating student public service announcements (*PSAs*).

2. Developing and implementing an education module for all Williams Elementary fifth graders on energy, energy consumption and global warming.

Our project contributed to Williams Elementary receiving the first place award in the Central Texas Green Schools Challenge organized by the US Green Building Council Central Texas Chapter and the National Wildlife Federation's Eco Schools USA Program. Additionally, Williams also received a Bronze Award through the National Wildlife Federation's Eco Schools USA Program. Beyond the prizes and perhaps more importantly, our project instilled knowledge, pride and leadership among the participating students.

As a result of the positive feedback received from teachers and students, we are currently optimizing the materials and organizing a train-the-trainers program with AISD in which any interested fourth or fifth grade teacher may utilize the curriculum and Kill-A-Watt devices to replicate the program in their respective classrooms.

With a total budget of less than $4,000, a purposely minimalist budget, Unplugged sought to demonstrate that low cost, grassroots efforts can have a significant impact in educating and empowering kids as change agents and providing them positive role models inspiring them to continue their education.

Project Rationale

We've been talking about climate change for decades. We know with certainty that our climate system is warming and that such changes present serious threats to humanity and earth's ecosystems. And we know with a high degree of certainty the principal cause in climate change is *man-made* Greenhouse Gas (GHG), namely CO2, methane, nitrous oxide and fluorinated gases. Nations and companies have paid lip service to the importance of reducing GHG emissions, have signed numerous agreements and established policies vowing to reduce them. And yet, in 2010 we globally emitted more anthropogenic GHG's than ever before. Moreover, in the 2000-2010 decade, anthropogenic GHG emissions were the highest in all of human history.[1] As a result, if we want to have a "likely chance" of limiting the increase in global mean temperature to 2 Degrees Celsius, we need to reduce GHG emissions by 40-70% below 2010 emissions by 2050 and to near zero by the end of the century.[2]

Texas and Austin cannot avoid the effects of climate change. We are seeing more extreme temperatures. We are experiencing one of the worst droughts on record. We have witnessed tragic wildfires. We have suffered severe flooding. And we see declines in crop yields. While we cannot affirm that climate change definitely caused any of these single events, we know this pattern of extreme weather events is consistent with the projections of climate change.[3]

Despite the consensus and urgency of the scientific community, important sectors of the public in the US and other countries still continue to question whether climate change is caused by human activities or do not recognize the urgency of the situation. In fact, a recent report which analyzes public perception about climate change found that:

- "only 42% of American adults said that 'most scientists think global warming is happening,"
- 33% said 'there is a lot of disagreement among scientists about whether or not global warming is happening,"
- 20% said they 'don't know enough to say," and

The Challenge of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) reports that warming of the climate system is "unequivocal." Additionally, "global emissions of greenhouse gases have risen to unprecedented levels despite a growing number of policies to reduce climate change."

Even if we stop CO2 emissions today, most aspects of climate change will persist for many centuries. Climate change poses serious challenges to our health, our economies and our ecosystems.

"The effects of climate change are already occurring on all continents and across the oceans." The world is not prepared for these risks.

If warming exceeds 2 to 3 C (3.6 to 5.4* F) the consequences of the negative impacts are likely to be much greater than the consequences of positive impacts.

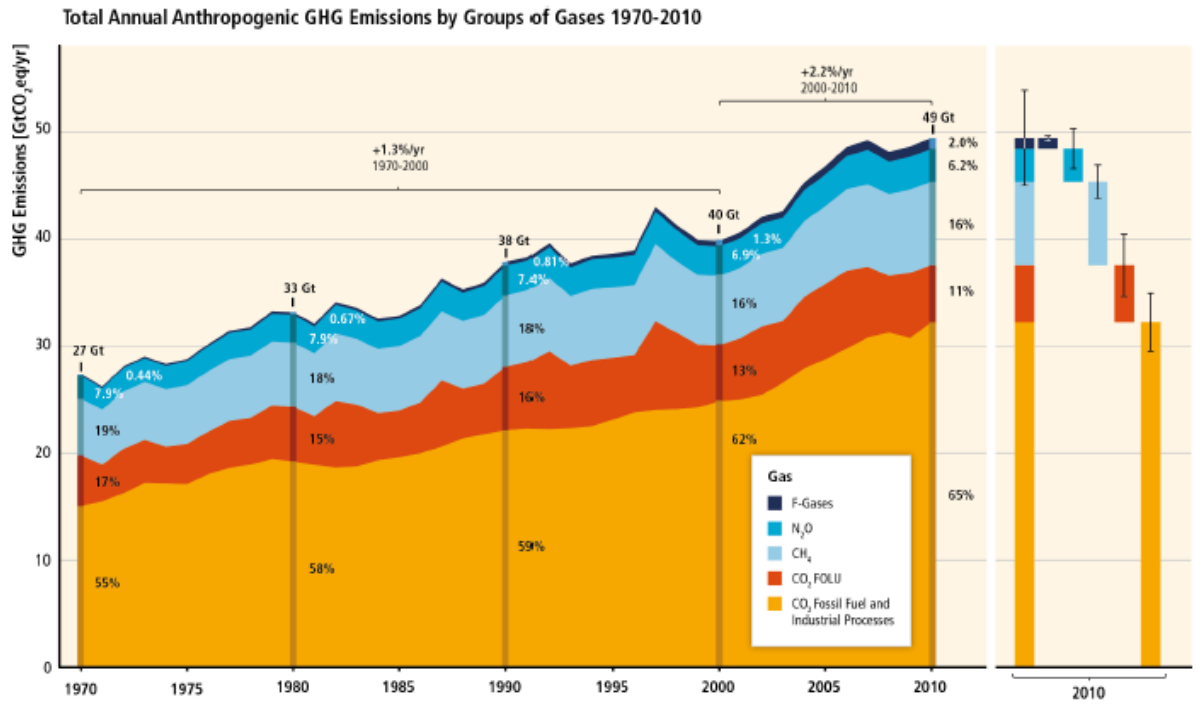
Negative impacts include:

- Rise in sea level
- Reduction in access to freshwater
- More extreme weather: more heat waves / more drought / intense rains in other places
- Increase in acidity of ocean water, putting at risk marine life
- Ecosystems on land will be affected and will be disturbed: migration of animals, plants, bacteria and viruses
- Human health and mortality rates will be affected

[1] Climate Change 2014: Mitigation of Climate Change. Intergovernmental Panel on Climate Change.
[2] IPCC: Greenhouse gas emissions accelerate despite reduction efforts.
[3] Climate Action Report. City of Austin, Office of Sustainability, 2010-2011.

- 6% said “most scientists think global warming is not happening.”[4]

In all, these findings indicate that about 59% of the American public are NOT aware that there is overwhelming scientific consensus about the existence of climate change and that it is principally caused by our greenhouse gas emissions.



Indeed, it is difficult to garner social support to aggressively tackle the threat of climate change when people do not believe or understand that climate change is happening, that it will have serious harmful consequences, and that it is a solvable problem.

In this context, we decided to focus on reaching young students at the fourth-fifth grade level for various reasons:

- They approach the issue without any preconceived ideology and are already learning the basics about climate change in their science curriculum;
- They are willing to modify or adapt their individual behavior;
- They can serve as change agents within their respective families.

[4] “Climate scientists need to set the record straight: There is a scientific consensus that human-caused climate change is happening,” Earth’s Future, April 4, 2014.

Why Williams Elementary? Williams was the right match for various reasons. There was a positive reception from the School Principal Joan Bertino and various teachers that participated in the program. Also, the school had just initiated an eco-schools project, which allowed us to contribute to the efforts which were being implemented to measure and reduce its carbon footprint. Finally, we thought it was important to collaborate with economically disadvantaged students: about 80% of Williams' students qualify for free- or reduced-lunch. Its student population is 73.9% Hispanic, 14.3% White and 6.8% African American.[5]

Unplugged addresses 4 key concepts:

1) The production of electricity represents the largest source of greenhouse gas emissions in the US (33% of all greenhouse gas emissions). About 68% of our electricity comes from burning fossil fuels: coal (37%), natural gas (30%), and petroleum (1%).[6]
2) In fact, on average, the electricity we use in each of our houses in the US during 1 year produces over 16,000 lbs of CO2 in 1 year (7.270 metric tons of CO2 per home).[7]
3) Energy efficiency is an easy and cost effective way to combat climate change, clean the air we breathe, and reduce energy costs for consumers.[8]
4) It is essential to convey the message that individual actions have an important impact on the environment.

[5] http://www.austinisd.org/sites/default/files/dept/cda/docs/post2013/2012-2013/227901166_5.pdf
[6] U.S. Energy Information Administration (2011). *Electricity Explained - Basics*.
[7] US Environmental Protection Agency.
[8] http://energy.gov/science-innovation/energy-efficiency.

Project Description

Unplugged implemented a program which provided over 10 hours of instructional activities to students.

These activities involved:

1. **Developing and implementing an education module for all Williams Elementary fifth graders on energy, energy consumption and global warming.** The module included one presentation to the entire fifth grade class on energy, carbon emissions, climate change, and individual actions to save energy. In follow up sessions, we taught all fifth grade students how to measure the amount and cost of electrical energy used by appliances/devices. Students took home and used Kill-A-Watt devices to complete an exercise measuring the amount of electrical energy consumed by appliances/devices of their choice and calculate the cost of powering the device. This lesson plan aimed to demonstrate the link between greenhouse gases generated by the electricity consumed in each home and the importance of energy conservation.

2. **Creating student public service announcements (*PSAs*).** Students created their own video public service announcements delivering messages about how to save energy. To develop this project component, we worked with Ms. Cristina Peña's Green Class (composed of 14 fourth and fifth grade students), Crockett High School student media/AVID adviser, Rich Campanaro, and four Crockett High School students. The program was purposely designed to establish positive mentorship relationships between elementary and high school students, to create interest in journalism/media production, and to enhance cooperation between Crockett High School and its feeder school Williams Elementary. We are now working to publish the videos in various media, including: Austin Independent School District (AISD) website and channel, City of Austin Channel and KLRU.

Building Partnerships

We were afforded the opportunity to create some amazing partnerships which enabled us to successfully implement our project. The following individuals were our key partners.

- Joan Bertino – Ms. Bertino graciously welcomed us into her school to partner with the Green Class and work with the fifth grade students to participate in our curriculum presentation and Kill-A-Watt exercise. Her amazing leadership and support allowed our team to effectively execute our program and share our “Unplugged” message.
- Cristina Peña – Ms. Peña is the Green Class leader and change agent who embraced the Environmental Sustainability team and partnered to empower students to be environmental change leaders. Ms. Peña’s passion and dedication to environmental sustainability provided us the opportunity to work with her Green Class. Ms. Peña served as a key partner by encouraging her students to collectively participate in the curriculum and PSA project and effectively communicated our “Unplugged” message.
- Rich Campanaro – Rich enthusiastically donated his time after school to script, film and edit three public service announcements (PSAs) empowering students to change environmentally destructive habits. His charisma motivated fourth grade students to think about and write ways they can reduce energy waste with the goal of protecting the environment.
- Mary Priddy – Mary acted as a mentor during the discovery and assessment phase of our project. Mary provided our team with 118 Kill-A-Watt devices used to measure energy consumption. Her generous contribution allowed our team to successfully implement the curriculum phase of our project, measuring and teaching students the importance of energy conservation.

Actions and Events

Our Concept

Our goal in this project was to raise awareness around environmental sustainability in the community by targeting fourth and fifth grade students at Williams Elementary, a Title 1 school in the Austin Independent School District. We created an environmental sustainability curriculum to complement what the students were learning in science, focusing on global warming, the greenhouse effect, and energy consumption and reducing their carbon footprint. As a follow-up to the curriculum, we taught the students how to measure the electricity used by certain devices/appliances using a Kill-A-Watt device. We developed an exercise that further taught the students how to calculate the cost of powering the selected device/appliance. This exercise encouraged the students to consider ways they could conserve energy at home which would result in lower electric bills for the household. Additionally, we worked with the Green Class at Williams Elementary to create public service announcements (PSAs) by partnering with Rich Campanaro and four Crockett High School students. The PSAs promote environmental sustainability by focusing on energy conservation. We believe that working with these students has empowered them to become environmental champions at home making an impact on their family and community.

Project Delivery

Our project involved working with the Green Class on the PSAs as well as presenting our curriculum to the entire fifth grade class.

PSAs – Session # 1

Our team, Rich and four Crockett High School students spent some time getting to know the Green Class by playing an ice breaker game. We also discussed the importance of energy conservation and Rich introduced the concept of a PSA with an example. Rich then had the kids play a game of "barnyard chaos" as a way to break them up into teams. Each team was responsible for coming up with ideas for the PSAs at the next session.

PSAs – Session # 2

We worked with the Green Class students in preparing concepts and storyboards for the PSAs. The kids came up with ideas, themes and dialogue for videos communicating the following messages.

- "Turn off the Lights"

- "Beware Energy Vampires"

- "Energy Conservation is No Game"

The kids had enough time during this session to film the first PSA which highlighted energy conservation by encouraging everyone to turn off the lights when leaving a room.

PSAs – Session # 3

The final two PSAs were filmed at this session. The students used props, make-up and costumes during filming. They also enlisted the help of their art teacher for make-up and costumes, and filmed in various settings throughout the school (i.e., computer lab, teacher's lounge, classroom, etc.).

Environmental Sustainability Curriculum Presentation

Designed by our team, the Green Class and fifth graders participated in a presentation about global warming that drilled down to the carbon footprint and described an energy-use monitoring tool, known as a Kill-A-Watt (KAW). The results of two audits performed at Williams Elementary by the Green Class were shared with the students:

1. Energy audit of energy use in classrooms and throughout the school
2. Consumption and waste audit of the cafeteria and selected classrooms

The presentation concluded with encouraging the kids to consider individual actions they could take at home to promote environmental sustainability and energy conservation. During the presentation, the students were engaged and eagerly asked questions.

Kill-A-Watt Exercise – Session # 1

Following up on the curriculum presentation, we visited each fifth grade class to discuss how electricity is measured and introduced a Kill-A-Watt meter, and how to safely use it with electronic devices/appliances. We also distributed and explained the KAW exercise. This exercise prompted the students to use their math skills to calculate the electricity consumption of a device/appliance at home and the monthly cost of using the selected device.

Kill-A-Watt Exercise – Session # 2

During this brief session, we returned to each fifth grade class to discuss the results of the KAW exercises. The kids learned that instead of spending their time inside using their selected devices, they would save money and energy by playing outside. Each of the 100 students who participated in the exercise and returned the KAW device received an Unplugged T-shirt which was co-branded with their school logo as a reward for their participation and to promote the Unplugged message.

Green Class Celebration

Following the work completed by the Green Class and our team, a pizza party was held in the school library on March 26, 2014, to celebrate the students' efforts. Parents were also invited to attend and participate in the celebration. Pizza and cupcakes were provided, along with certificates of completion. Gift cards and door prizes were also awarded to celebrate completion of the project.

Project Continuity

As a result of the positive feedback received from teachers and students, we are currently optimizing the materials and organizing a train-the-trainers program with AISD in which any interested fourth or fifth grade teacher may utilize the curriculum and Kill-A-Watt devices to replicate the program in their respective classrooms. In this system, interested teachers could "check out" approximately 50 Kill-A-Watt devices to run the exercises with their students.

Additionally, to promote project continuity and, more important, the persistence of the Unplugged message, we are also seeking to feature the public service announcements and project materials through various media, including:

- AISD website and television channel
- Williams Elementary School website
- City of Austin television channel and website
- KLRU television channel and/or website
- Univision.

Project Impact

The key impact was providing new knowledge around electrical energy waste and as a result changing the behavior of students by reducing their energy consumption in the school, at home and in their communities. It also provided us the opportunity to establish a partnership, form relationships, and work with fourth and fifth grade students at Williams Elementary.

Our Measurable Impact

The work completed by the Green Class students at Williams Elementary, together with the work by our HAL team, qualified Williams Elementary for the Bronze Award. "Williams Elementary (first place winner) made a measurable difference in the school's waste consumption and effectively involved the community, including outreach to the Hispanic Chamber of Commerce, Crockett High School, and Keep Austin Beautiful." [9] The eco-team which granted the Bronze Award to Williams Elementary was so impressed with the accomplishments that they shared it with the Eco-Schools in Austin and Houston. The PSAs helped Williams achieve the Bronze Award. The Kill-A-Watt exercise will help Williams Elementary achieve the Silver Award next year. This will make Williams Elementary the first Eco-School in Austin to earn the Silver Award.

Our team partnered with Linda Medina of Austin Independent School District to prepare a press release which was presented to the Austin school board on March 31. The press release highlighted the accomplishments of Williams Elementary as an Eco-School, as well as their partnership with the HAL team. The press release also announced that Williams had qualified for the Bronze Award.

The PSAs helped build a mentorship relationship between the elementary and high school students by working together to develop and create this production. In the long term, it will actively engage students, parents and teachers in discussions and participation to reduce energy waste and promote other environmentally sustainable behaviors.

The videos were televised to the students at Williams Elementary during an assembly. The messages were well-received and the students were excited to see their peers in the videos. The PSAs, together with the curriculum, helped the kids understand the importance of reducing electrical energy waste and become environmental champions, making an impact at school, at home and in the community.

Having the PSAs air on public television and websites, such as YouTube, we promote the idea of energy conservation to the masses. They create awareness and remind everyone that a simple action, such as turning off the lights when exiting a room, can have a profound positive impact on the Earth.

[9] Central Texas Green Schools Challenge, press release April 15

Student Testimonials

Daisy – 4th Grader

Daisy is part of the Green Classroom. She has really enjoyed being a part of this program where she has learned more about recycling, and making a positive impact in her school and community. She really enjoyed learning about energy conservation where she was able to implement energy saving tips for her family.

Daisy says that "learning about vampire energy was interesting because there are so many appliances that we leave plugged in and waste energy when we're not around." The Green Classroom has made an impact on her view on things around her and is living a greener life.

Remi – 4th Grader

Remi has been part of the Green Classroom since its inception in 2013. His passion for the after school program has taught him about waste audits, electricity audits, and environmental change. His favorite part of the program was working with the Hispanic Austin Leadership team in creating Public Service Announcements about how everyone can be an environmental change leader.

Remi's efforts in the program also helped with conserving energy at home. He and his family have implemented programs with his family on reducing electricity costs and water usage.

Avery – 4th Grader

Avery has been part of the Green Classroom since the beginning of the school year. She has learned from being in the after-school program how to make a valuable difference in the environment by recycling and reducing electricity consumption and water usage. She has also made an impact in her school by teaching younger children how to properly recycle.

Avery also participated in a school-wide waste reduction audit to help younger students properly recycle their food at lunch and collect it for their school's compost. She is passionate about making a difference and hopes to continue to learn through her school's program on green initiatives.

Team Structure

TEAM MEMBER	ROLE	RESPONSIBILITIES
Mariano Conde de Frankenberg	*Project Manager & Analyst*	• Provided vision for activities and led team participating in all activities • Organized meetings with prospective partners • Helped prepare presentations, curriculum and exercises
Irma Martinez	*Curriculum Manager*	• Wrote and managed curriculum • Assisted with the partnership of Williams Elementary • Provided direction through organization of team meetings • Helped with Green Class participation at Williams Elementary
Cynthia Acosta Valdez	*Project Administrator*	• Wrote and managed curriculum • Organized and compiled team data • Coordinated disbursement of Kill-A-Watts to students
Lorraine Montes	*Finance Officer*	• Managed all financial expenses of the project • Provided direction through organization of team meetings • Supported all activities with Williams Elementary • Prepared curriculum PowerPoint presentation • Prepared final project binder
Crystal Flores-Crouch	*Marketing and Communications*	• Secured Austin ISD board meeting discussion • School liaison to Austin ISD communications team • Conducted participant interviews • Managed all marketing and communications • Assisted with preparation of curriculum presentation • Secured Press Releases on event information • Coordinated participant kickoff and graduation events
Manuel Arellano	*Analyst/Research/ At Large*	• Secured key partnerships • Managed development of project logo • Served as student liaison for PSA project • Coordinated and secured vendor for program t-shirts • Secured Crockett High School participation for PSA • Oversaw data and research for Kill-A-Watt exercise

Financial Summary

The expenses incurred during the project provided for 101 elementary school students to learn about global warming, the greenhouse effect, and energy consumption and reduced their carbon footprint. Each student that participated in the program received a co-branded T-shirt. In addition to the curriculum presentation and Kill-A-Watt exercise, the Green Class students created three public service announcements and were rewarded with a celebration for their hard work and dedication as they continue to work toward elevating Williams Elementary to the next level. The total cost for the project was $3,554.60.

Unplugged Project Expenses		
Expenses	**Description**	**Cost**
AJL Advertising Specialties	118 T-shirts and logo	$706.10
Tickets	Leadership Symposium (3 guests)	$50.00
Program Celebration	Pizzas, cupcakes, raffle prizes, etc.	$229.05
	Total	$985.15

In-kind Services and Donations	**Furnished By**	**Total**
118 Kill-A-Watt devices	City of Austin Office of Sustainability	$1,819.45
PSA Production	Rich Campanaro - Crockett High	$400.00
Printing Services	New York Life	$100.00
Celebration Giveaways	New York Life, Bank of America, Seton	$250.00
	Total	$2,569.45

Total Expenses, In-kind Services and Donations	**$3,554.60**

Acknowledgements

A special thanks to the Williams Elementary School teachers who helped the Unplugged team accomplish our goal by providing their invaluable expertise and guidance: Heriberto Arellano, 3rd Grade Dual Language Teacher; Elise Koonce, Art Teacher; Josephine Valenzuela, 5th Grade Teacher; Leah Baker, Special Education Teacher; and Niki Estrada, Teacher Aide.

AJL Advertising Specialties

AJL provided co-branded t-shirts at a deep discount as well as designed the Unplugged logo. Program t-shirts were given to 101 elementary students and other participants for participation.

Environmental Stewardship Advisory Committee (ESAC)

ESAC serves as an advisory body to the Austin ISD Superintendent, who is responsible for administrative decisions and for providing administrative recommendations to the Board for approval. ESAC will help provide continuity of the program by housing and distributing our project to AISD schools interested in implementing to classrooms.

References

[1] Climate Change 2014: Mitigation of Climate Change. Intergovernmental Panel on Climate Change.

[2] IPCC: Greenhouse gas emissions accelerate despite reduction efforts.

[3] Climate Action Report. City of Austin, Office of Sustainability, 2010-2011.

[4] "Climate scientists need to set the record straight: There is a scientific consensus that human-caused climate change is happening," Earth's Future, April 4, 2014.

[5] U.S. Energy Information Administration (2011). *Electricity Explained - Basics*.

[6] US Environmental Protection Agency.

[7] http://energy.gov/science-innovation/energy-efficiency.

[8] Central Texas Green Schools Challenge, press release April 15

[9] http://www.austinisd.org/sites/default/files/dept/cda/docs/post2013/2012-2013/227901166_5.pdf

http://www.nwf.org/Eco-Schools-USA.aspx

Curriculum was adapted from the Bay Area Quality Management District, "Protect Your Climate"

Source:
http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Climate%20Protection%20Program/protectyourclimate.ashx

http://www.buzzle.com/articles/the-carbon-cycle-steps.html

http://www.epa.gov/climatestudents/basics/today/greenhouse-effect.html

https://www.youtube.com/watch?v=VYMjSule0Bw

http://www.epa.gov/airtrends/aqtrnd95/images/image19b.gif

National Energy Education Development Project (Public Domain)

Energy Kids – U.S. Energy Information Administration

http://www.eia.gov/kids/energy.cfm?page=1

http://www.eia.gov/kids/energy.cfm?page=about_sources_of_energy-basics

http://www.eia.gov/kids/energy.cfm?page=electricity_in_the_united_states-basics#electricity_environment-basics

Appendix

Empowering Kids to Become Change Agents for Environmental Sustainability

- Partner Biographies
- Project Materials

Partner Biographies

Williams Elementary is 1 of 33 Eco-Schools in Travis County, which includes 20 elementary, 7 middle, and 6 high schools, participating in the *National Wildlife Federation*® ECO-SCHOOLS USA - Turning K-12 Schools Green.

Through school-based action teams of students, administrators, educators and community volunteers, the Eco-Schools USA program brings together effective "green" management of school grounds, facilities and curriculum. This international initiative not only helps schools reduce their carbon footprint, but it inspires kids to be good stewards for the environment and take action in their school community.

How Did Williams Elementary Become an Eco-School?

Through school-based action teams of students, administrators, educators and community volunteers, Eco-Schools combines effective "green" management of the school grounds, facilities and the curriculum.

Schools that are certified in the program undergo a thorough application process and succeed in organizing and implementing a comprehensive assessment of their school. The Eco-Schools USA program is made up of seven steps, incorporating a variety of environmental pathways.

Once a school has registered and implemented these seven steps, it can apply for an Eco-Schools award. There are three levels of the award system. The first two levels are the Bronze and Silver awards which are self-assessed. The top level is the Green Flag award, which must be assessed by an Eco-Schools USA assessor and renewed every two years. A school is considered to be a permanent Eco-School once it has gained its fourth Green Flag.

The Williams Elementary Eco-Action Team 2014 (Green Class)

The eco-action team at Williams Elementary was composed of a diverse group of teachers, students, and community volunteers:

1. Cristina Pena, 4th grade teacher
2. Fourth and fifth grade students
3. Community volunteers:
    - Erik Blackburn, Program Coordinator, CLEAResult
    - Pamela Abee-Taulli, Environmental Planner, LEED Green Associate, Watershed Protection
    - Rich Campanaro, Student Media/AVID Adviser – Crockett High School
    - Greater Austin Hispanic Chamber of Commerce HAL Environmental Sustainability Team – Unplugged

Joan Bertino – Principal

Ms. Bertino has been a bilingual educator for over 20 years and has been at Williams Elementary for the last five years. She is very passionate about making a difference on the environment and making sure that Williams Elementary students can make a considerable difference in their carbon footprint as they are our future leaders.

Cristina Pena – 4th Grade Bilingual Teacher

Ms. Peña has been an educator at Williams Elementary for over five years. She leads the Green Class efforts in making sure her students are empowered to be environmental change leaders and impact the people around them. She is leading her students to a greener lifestyle and teaching them how to impact those around them. Her efforts, together with the Green Class, have made this an extremely successful year for the school.

Mary Priddy – Program Coordinator, City of Austin Office of Sustainability

Mary helps educate students at all levels on topics related to environmental sustainability and climate change. She is passionate about teaching and inspiring young people to “go green” and adopt earth-friendly habits with their families, schools and neighbors. Mary also participates in the Austin Energy Regional Science Festival, presents at Career Days, talks to environmental clubs, and speaks at Earth Day and other environmental events.

Rich Campanaro – Student Media/AVID Adviser, Crockett High

Rich earned his bachelor's in journalism from Texas Tech. He began his teaching career as an elementary school special education aid before developing the student media program at Eastside Memorial. This is his first full year as the student media adviser at Crockett High School. He is passionate about inspiring young adults to reach for goals they never thought possible.

Project Materials

Environmental Sustainability

5th Grade Curriculum – Williams Elementary School

PRESENTED BY:
MARIANO CONDE

MARCH 7, 2014

2

People and our world

World Population:

7+ billion people

U.S. Population:

317+ million people

3

Our activities impact the earth and our lives

4

You have the power!

• Your knowledge and awareness about these issues is the key to begin solving the problem.

• Your activities (how much energy you consume, how much food and things you throw away) influence your surroundings and also the entire world

• Your small individual actions can make a big difference in your community AND the entire world.

5

So what is energy?

• Without energy, there's no universe, there's no life

• **Energy Is the Ability to Do Work**

• **Something "works" when it exerts force on something else. When we work, we transfer energy.**

Can you name different types of energy?

Energy CANNOT be created. Energy CANNOT be destroyed. It CAN be transformed into another sort of energy. Energy has always existed in one form or another.

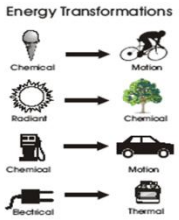
6

What is Energy?

Remember: Energy is the ability to do work

Energy comes in different forms:

- Heat (Thermal) Energy
- Light (Radiant) Energy
- Motion (Kinetic) Energy
- Electrical Energy
- Chemical Energy
- Nuclear Energy
- Gravitational Energy



Source: National Energy Education Development Project (Public Domain)

7

Why is energy important?

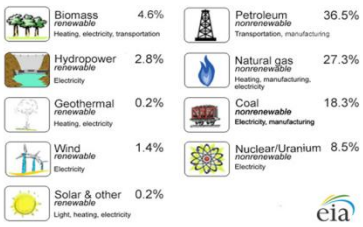
- Some types of energy pollute more than others.
- What sources of energy do you think pollute more?
  - Gas for your car
  - Coal
  - Sun power
  - Wind power
- We can run out of some sources of energy
  - Renewable energy vs. Nonrenewable energy
- Do we use energy well or do we waste it?

8

Sources of Energy

Renewable and nonrenewable energy can be converted into electricity. Most of our energy comes from nonrenewable energy.

U.S. energy consumption by source, 2012



Source: http://www.eia.gov/kids/energy.cfm?page=about_sources_of_energy-basics

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Sources of Energy

Renewable vs. Nonrenewable Energy.

Nonrenewable	Renewable
• Nonrenewable energy sources come out of the ground as liquids, gases and solids. • Fossil fuels: o Coal o Petroleum o Natural gas o Propane • Uranium • Cannot be recreated • Produce greenhouse gases	• Renewable energy is generated from natural resources which cannot be exhausted and is constantly renewed. • Biomass (plants, municipal solid waste, biogas, landfill gas) • Hydropower (water) • Geothermal • Wind • Solar • Naturally replenished • Low environmental impact

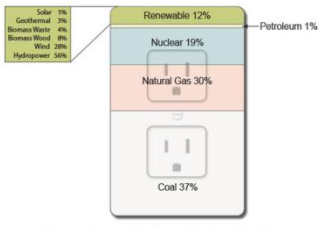
10

We already feel some consequences…

11

Sources of Electricity in the U.S.

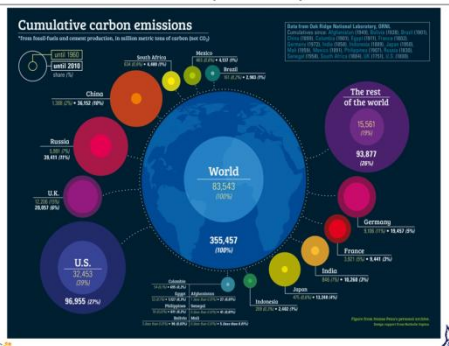
Sources of U.S. Electricity Generation, 2012



Source: U.S. Energy Information Administration, *Electric Power Monthly* (March 2013). Percentages based on Table 1.1 and 1.1a; preliminary data for 2012.

12

Our carbon emissions increased by 4X in 50 years



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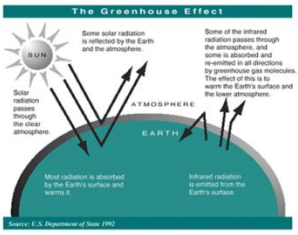
Greenhouse Effect

- The Earth's atmosphere, a layer of gases and microscopic dust surrounding the planet, acts like a greenhouse in keeping the Earth warm enough to support life.
- Similar to the glass panes in a greenhouse, gases in the atmosphere let sunlight pass through and warm the Earth's surface, and limit the amount of heat that escapes back into space.
- A greenhouse is like a car with the windows rolled up.



Source: http://www.epa.gov/airtrends/aqtrnd95/images/image19b.gif

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Greenhouse Effect

Greenhouse Effect Video

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Climate and Weather

Weather

- Weather is driven by heat, the rotation of the Earth, and variations in the Earth's surface. Heat from the sun warms the Earth's land and oceans, which in turn heat the air above their surface.

Climate

- Climate describes weather patterns in an area over a long period of time, 30 years or more.
- Earth's climate has changed over the planet's five billion year history through different ice ages and warming periods. However, these climate changes occurred over periods of thousands of years.

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Climate and Weather

The Climate Change Connection

- The Earth's average temperature has increased by one degree Fahrenheit over the past 100 years.
- Scientists have recorded an overall global warming trend, with the most rapid warming occurring over the last twenty years.
- The warming of the atmosphere is currently affecting, and will continue to affect, weather conditions around the planet.

What weather changes have you noticed in Austin?

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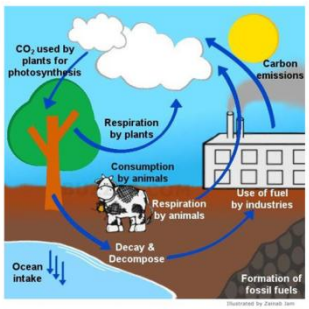
Carbon Cycle

- Carbon is a key element in all living matter, found in people, animals, soil, and oceans.
- People are emitting carbon dioxide into the air faster than the planet is absorbing it.
- The surplus of carbon dioxide in the atmosphere is escalating the planet's greenhouse effect, leading to global warming and climate change.
- Conserving energy, choosing environmentally friendly products, and driving less are all actions that reduce greenhouse gas emissions, helping to protect our environment, air quality, and climate.



Source: http://www.buzzle.com/articles/the-carbon-cycle-steps.html

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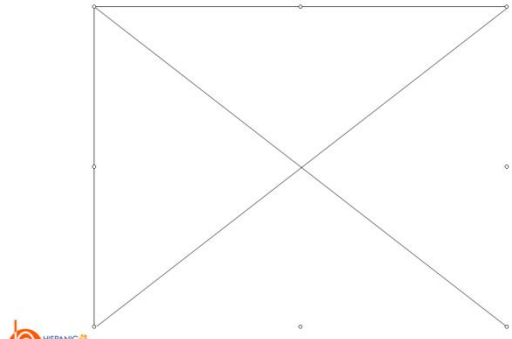
We emit a bunch of CO2 and many other GHGs



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Consequences:

If warming exceeds 2 to 3 C (3.6 to 5.4* F) the consequences of the negative impacts are likely to be much greater than the consequences of positive impacts:

- Rise in sea level
- Reduction in access to freshwater
- More extreme weather: more heat waves / more drought / intense rains in other places
- Increase in acidity of ocean water, putting at risk marine life
- Ecosystems on land will be affected and will be disturbed: migration of animals, plants, bacteria and viruses
- Human health and mortality rates will be affected

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Carbon Footprint

- Carbon footprint – the amount of greenhouse gases such as carbon dioxide that are emitted into the atmosphere each year by a person, a household, a building, a school, or a company.
- The gases trap heat within the atmosphere which is said to have a serious impact on the global climate by raising global temperatures.

How can you reduce your carbon footprint at school?

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Steps you can take!

1. **Be a leader**: Serve as an active environmental leader in your house and school. Make sure everyone in your house and school understands how they can help to reduce energy and resource costs. Now is your turn to be the boss!
2. **Recycle & Compost:** Recycle paper, cardboard, aluminum and metals, plastics and glass! You can also compost a lot of food waste (not meat!). Also, reduce your waste: if you will not eat something, don't put it in your tray!
3. **Water:** Use less water! Turn off the faucet while you brush your teeth. Take quick showers. Do not put the faucet on high when you wash your hands or wash dishes. Install aerators for your faucets and low flow showerheads for your showers. Install low flow toilets.
4. **Drive less:** If you can carpool, do so. If you can walk or ride your bike, it's a lot more fun than driving and it keeps you in great shape.
5. **Lighting & Appliances:** Turn lights and appliances off when you don't need them. Swap out all your lighting with energy efficient LED lighting. LED's can save you up to 85% on your energy costs when compared to older incandescent technology. Buy electronics and appliances that are ENERGY STAR compliant. Keeping your computer and your entertainment systems on all month can cost you $20.

22

Steps you can take!

6. **Thermostat:** Set your thermostat to 78 (or higher) in the summer months and 68 (or lower) in the winter months.
7. **Windows:** During summer shade your windows using dark curtains or screens to block the heat of the sun. During winter, keep your windows unshaded so your home can absorb the heat of the sun. Make sure your windows make a tight seal when they close and there are no leaks around the frame.
8. **Seal your home:** Make sure your home is sealed properly from the outside air. You can seal the windows with caulking and the doors with weather stripping at the bottom. Even if you have to hire someone to do this, you will save more than the cost of the contractor.
9. **Hot water heater:** Insulate your hot water heater to prevent the outside temperature from cooling the water in the heater. Set the heater temperature to 120. See how low you can go without sacrificing your quality of life.
10. **Use less water!** Turn off the faucet while you brush your teeth. Take quick showers. Do not put the faucet on high when you wash your hands or wash dishes. Install aerators for your faucets and low flow showerheads for your showers. Install low flow toilets.

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Steps you can take at school!

1. Use the lights less, when possible
   - Turning off one-third of the lights will reduce emissions by 33%.
   - Turn off lights when the classroom is empty- during lunch, planning periods, etc.
   - Assign one student the job of turning off the lights each day.
2. Thermostat:
   - If the classroom has an adjustable thermostat:
   - Turn down the heat. For every degree you turn down the heat, you could reduce you CO2 up to 500 lbs./yr
3. Help with recycling and compost efforts

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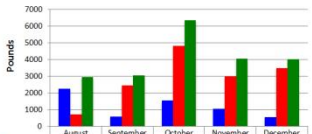
Recycling and Compost

- This chart shows the amount of recycling and compost (in pounds) your school has accumulated this school year.
- Through your efforts you have prevented 20,310 pounds of waste from going in our landfills.
- This makes a huge impact on our environment!
- GREAT JOB!!

2013 Williams Elementary School Recycling and Compost



	August	September	October	November	December
Recycling	2240	580	1520	1040	520
Compost	700	2450	4800	2980	3480
Combined	2940	3030	6320	4020	4000

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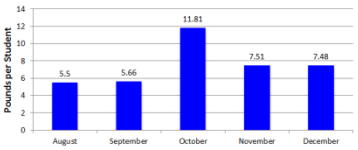
Recycling and Compost

- This chart shows the amount of recycling and compost (in pounds) each student has accumulated this school year.
- On average, each of you has saved this much waste from going in the landfills which reduces your carbon footprint.
- THAT'S AWESOME!!

2013 Williams Elementary School Recycling and Compost



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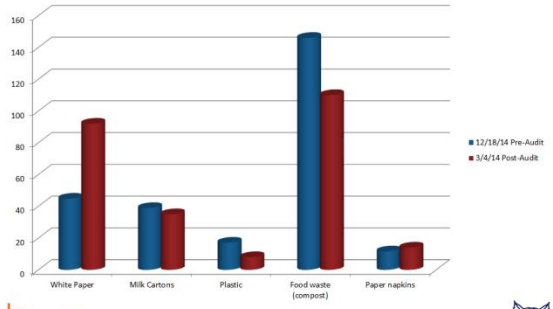
Results of action right here at Williams!



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Make an Impact at Home

STOP

THINK

What can you do at home to reduce your carbon footprint?

GREEN

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Measuring Energy Consumption

Name: _____ Teacher: _____

INSTRUCTIONS:

When performing this exercise, make sure you take safety precautions.
DO NOT handle electronic devices if you, the device or the floor is wet.
DO NOT handle electronic devices that have peeled/exposed cables.

1. Select ONE of the following electronic devices or appliances at home.
   - Game console
   - TV
   - Computer
   - If your TV or computer is plugged in with several other devices to a surge protector, you can measure the consumption of all the devices together.
   - Experiment! Feel free to select any other device that you use regularly. (Be sure to check with your parents first.)

What device(s) did you select? _____

_____

2. TURN OFF / SHUT DOWN device or appliance and unplug from the wall.
3. Plug electronics or appliance into Kill-A-Watt. (Want to measure the consumption of various devices connected to a surge protector? Simply plug the surge protector to the Kill-A-Watt.)
4. Plug Kill-A-Watt into outlet.
5. Turn ON and RUN the devices (or the surge protector).
6. Press PINK button until CLOCK appears, flashing KWH Time.
7. Keep the device running and plugged in to the Kill-A-Watt for about 4 hours. How much time has gone by? Check the Kill-A-Watt and write down how long it has been measuring. (You may have to press the PINK button for the time to appear.)

   _____:_____
   Hours: minutes
8. Press the PINK button until METER appears.
9. Read and write down the number of kilowatt hours (kWh) used.

_____ Example: 5
The kWh measurement shows how much electricity the device has used during the time you measured it.

Let's assume this is how much electricity this device uses each day.

10. Multiply the daily kWh measurement above by 30 to estimate the device's monthly usage of electricity (average of 30 days each month).

Example:
5 (daily kWh use)
x 30
150 (monthly kWh use)

_____ (daily kWh use)
x 30
_____ (monthly kWh use)

11. Multiply the monthly usage above by 0.10 (each kWh costs $0.10)

Example:
150(monthly kWh use)
x 0.10
15.00 (monthly cost)

_____ (monthly kWh use)
x 0.10
_____ (monthly cost)

The result you get in step 11 is the total amount of money it costs to provide electricity for the device in one month.

If you use the device more hours daily, you will need more electricity and more money. If you use the device less hours daily, you will need less electricity and you can save money.

Think of all the devices (lamps, electronics, appliances, air conditioning, fans) that are plugged in at your home. Is there any way to reduce the electricity consumption of the device you tested or others?

_____

_____