***25 Student Geniuses* Share What We Can Do Now to Help Reduce Energy Costs and Live More Sustainably**

Hope for Planet Earth*

25 Student Geniuses Share What We Can Do Now To Help Reduce Energy Costs and Live More Sustainably

Bonus #1

- Free One-Year Pass to National Green Museum
- Free Green Gifts and $1,000s in Discounts From Local and National Businesses

Bonus #2

- Your Name in a Green Exhibit for Your Community
- Purchase Just 12 Books to Display Info on Your Organization
- Purchase 33 Books to Display an Exhibit in National Green Museum and Have a Special Book Preface for Your School or Group

*Three Reasons for Book Title:

1. This book is giving Hope for Planet Earth by giving ideas to implement solutions.
2. Children are our Hope for Planet Earth.
3. Each student in the book was given a Hero of Planet Earth Award (HOPE Award).

Compiled and edited by
National Green Museum

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FIRST EDITION

National Green Museum

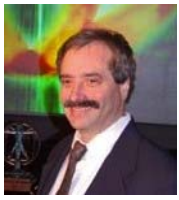
National Environmental Hall of Fame

The mission of the National Green Museum is to help every community create and implement their plan to "Go Green." You can help create or sponsor a green exhibit for your business, neighborhood, school or organization at no net cost through sales of this book.

Our goal is to create an exhibit for every community. Twelve books purchased by three individuals or organizations fund an exhibit in each community for one year. Sponsors receive their organization's name, information and photo in the exhibit.

Past Environmental Hall of Fame events included:

- **18 top environmentalists, including Art Linkletter, Mario Van Peebles and Van Jones** were inducted at the inaugural Environmental Hall of Fame Awards Ceremony in Los Angeles, June, 2008.
- **36 top environmentalists, including Pierce Brosnan, Keely Shaye Brosnan, Mayor Richard M. Daley, Sadhu Johnston, American Solar Energy Society (ASES) and American Wind Energy Association (AWEA)** were inducted in Chicago, November 2008.
- **Ed Begley, Jr.** was inducted into the National Environmental Hall of Fame on March 22, 2009 at the inaugural event for the National Green Museum's new location on Wells Street in Chicago.
- **Alderman Vi Daley (43rd Ward), Alderman Joe Moore (49th Ward) and his wife, environmentalist Barbara Moore,** were inducted at the National Green Museum Earth Day Celebration, April 22, 2009.
- **The first annual National Environmental Science Fair occurred on May 2, 2009. Honoree Alderman Manny Flores (1st Ward)** awarded 30 students who had displayed their environmental exhibits at the Museum of Science and Industry.
- **Alderman Gene Schulter (47th Ward)** was inducted on **May 26, 2009**. The students had a **book signing** during **World Environmental Week on June 6**.



Allen Rubin and Catherine Corbin, Co-Coordinators
Email: EnvironmentalFame@lisco.com | **Phone:** 641-451-5199
Website: EnvironmentalHallofFame.net

Message from the Mayor

Mayor Richard M. Daley, City of Chicago

My fellow Chicagoans,

It gives me great pleasure to present the Chicago Climate Action Plan, which describes the major effects climate change could have on our city and suggests ways all of us can work together to address those challenges.

Early on in my administration, I made a commitment to enhance our environment and make Chicago the most environmentally friendly city in the nation. When I became Mayor, "climate change" wasn't on the radar for most cities, states and nations – or even for most people.

But I believed then and believe even more deeply today that when you do such things as planting trees and creating open space, when you invest resources to remove pollution from the air and encourage the construction of buildings that are smart for the environment, then you enhance quality of life for all the residents of the city.

I'm proud of the example that Chicago has set in environmental leadership and that is being replicated by cities here and around the world. I believe our efforts demonstrate that embracing an environmentally friendly way of managing government can protect not only the environment, but our taxpayers as well. Chicago is recognized around the world as a leader in protecting our environment. I'm proud that we acted many years ago, in areas that many cities are just beginning to appreciate today.

The Chicago Climate Action Plan outlines a set of bold ideas that could help expand on our successes to slow the effects of climate change. What's clear is that this will require an enormous amount of hard work and cooperation. It will require the commitment of not only government but also of every individual and business in our city.

Each of us has a critical role to play in this effort.

As you will see when you read this report, some of things we need to do — such as investing in transportation infrastructure — require the involvement of the state and federal government. But other important steps are much simpler and within the reach of each individual. These are things such as driving less and walking more, using energy-efficient light bulbs or turning down the thermostat a few degrees in the winter. I thank the members of the Task Force for the leadership and guidance that led to this plan.

In Chicago we have long appreciated that cities are no longer the enemies of the natural environment; rather they're leading the way in preserving and

protecting it. Since I have been mayor, my goal has been to make Chicago a shining example of how a large city can live in harmony with its environment and as a result, be a better place for all its residents. I am confident that if we address the climate change challenge together, with creativity and boldness, then our city will continue to lead the world in designing a path to a more secure future.

Sincerely,

Mayor Richard M. Daley

Thank You.

Mayor Richard M. Daley would like to thank all of the City of Chicago's partners for their commitment to the Chicago Climate Action Plan. The overwhelming support and enthusiasm we received as this plan was developed reinforces Chicago's position as a world environmental leader.

A particular thank you goes to the members of the Task Force, and the co-chairs, Sadhu Johnston, Chief Environmental Officer of the City of Chicago, and Adele Simmons, Vice Chair, Chicago Metropolis 2020, President, Global Philanthropy Partnership and for their leadership. The Task Force and its advisors from business, academia, government and the civic community helped us to craft an inspirational and realistic Climate Action Plan.

He would also like to thank the funding organizations of this effort. The success of the Chicago Climate Action Plan and its contributing research is owed to the investment and faith of the Chicago Community Trust, the Nathan Cummings Foundation, the Lloyd A. Fry Foundation, the Grand Victoria Foundation, the Illinois Department of Commerce and Economic Opportunity, the Joyce Foundation and the Legacy Fund.

Website: ChicagoClimateAction.org

Mayor Richard M. Daley was inducted into the National Environmental Hall of Fame on November 20, 2008.

Please see EnvironmentalFame.com; click on **NOMINEES AND HONOREES 2008**

1st Ward Chicago—Alderman Manuel "Manny" Flores

Sustainability and GreenEconomyChicago.com

Sustainability Initiatives

Flores works on the Addison Industrial Corridor Redevelopment Project, a revitalization plan sponsored by the City of Chicago and the Metropolitan Agency for Planning to redevelop the under-utilized planned manufacturing district at the north end of the 1st Ward. Alderman Flores has been working closely with the planning team to realize his vision to create the city's first green manufacturing district in the Addison Industrial Corridor. The green manufacturing district will leverage retail opportunity and demand for manufacturing created by the nearby Green Exchange and provide jobs for the mixed-income workforce housed at Lathrop Homes. His vision combines a sustainable philosophy with a plan to bring competitive jobs to the ward and retain the neighborhoods socioeconomic diversity.

Flores also sponsors the development of the Green Exchange. He worked closely with Baum Development, LLC, the City of Chicago Zoning Committee, and private businesses to ensure the former factory was not converted into residential condominiums.

Flores has also been developing the Lathrop Homes LEED Neighborhood Development (ND) project with the Chicago Housing Authority (CHA) to create the nation's first ever LEED certified public housing project. Lathrop Homes is one of the oldest public housing projects in the city. Alderman Flores and CHA are working to develop affordable sustainable housing in a transit-oriented development. LEED ND is a sustainability certification in the experimental stages and Lathrop Homes could become the first development in the United States to receive the qualification.

Flores instituted the Building Green in the First Ward program in January of 2008. This program requires that all developers who receive a zoning change for new construction projects must participate in the Chicago Green Homes Program. Developers are required to achieve the maximum 3-star certification, ensuring that this new construction is an environmentally friendly, energy-efficient and high-quality project. This program will provide real benefits to developers, home buyers, and the environment.

1st Ward Service Office: 2058 N. Western Avenue, Chicago, IL 60647
Phone: (773) 278-0101 • Website: Flores1stWard.com

GreenEconomyChicago.com

Alderman Flores launched GreenEconomyChicago.com, a joint website and TV program, to bring everyday citizens into policymaking decisions concerning the development of a green economy in Chicago.

The website and program—a collaborative effort between Alderman Flores, Mike Bueltmann of Clear Content, and CN 100—features discussion and information pages that will be moderated by experts from academia, the private sector, and government. Moderators will translate these pages into steps individuals can take to promote economic development in Chicago based on sustainable practices and values.

GreenEconomyChicago.com seeks to tap into the groundswell of expertise and initiative occurring at the non-governmental level. The site utilizes a Web 2.0 approach to organizing and delivering information, allowing participants to directly provide input and feedback, and enhancing social networks directed at specific policymaking and implementation processes.

GreenEconomyChicago.com aims to open the policymaking process to Chicagoans by serving as a forum to discuss and develop ideas about building a green economy. This is more than planting a tree. This is supporting and creating sustainable jobs in the emerging green economy.

Here's how it works:

- You submit an idea that could help build support for Chicago's transition to a green economy. Maybe a targeted tax incentive or a change in zoning priorities to help spur new green business and manufacturing. Maybe a monthly lecture series from leading 'green' thinkers. The ideas are endless.
- Your peers comment on the idea. As the idea is refined and generates enthusiasm, it becomes a priority project.
- We help you build momentum around priority projects by creating a broader platform to raise awareness—public events, City Council committee hearings, social-networking opportunities.
- As support builds, we will help push the idea into new policies and initiatives.

From idea to policy, GreenEconomyChicago.com is a platform for citizen-driven policymaking and civic engagement.

BPA-Free Kids Ordinance

Chicago is the first US city to ban the sale of products containing bisphenol A (BPA), a chemical used in many plastics. The Chicago City Council adopted an ordinance proposed by Flores and Alderman Edward Burke to ban the sale of baby bottles and cups manufactured with BPA.

Alderman Manny Flores was inducted into the
Chicago First Ward Environmental Hall of Fame on May 2, 2009

25th Ward Chicago—Alderman Daniel "Danny" Solis

On the Issues—Environment

I believe creating a clean environment for our children is one of the top priorities for urban legislators. During my ten years as Alderman, we have managed to increase green space by more than ten acres in the 25th Ward.

We have used a large amount of the money in the Pilsen TIF (tax increment financing) to clean up the polluted portion of the industrial corridor, particularly the area contaminated during the Silver Shovel Scandal in the 1990's. We have removed over 846,360 cubic yards of waste and still have on-going projects to continue cleaning our land.

I have worked with Midwest Generation to install $30 million low-nox burners and invest in a $1 million beautification plan.

I have worked with community groups, the city and state departments of environment, and the governor's office to insure Midwest Generation agrees to make its coal burning plant green by 2015 or the site will be shut down.

We have invested over $170,000 in more than 52 community gardens. I am currently working with one of my community advisory boards, the Pilsen Planning Committee, on an ambitious green space project to be named the Pilsen Paseo.

And we have invested over $14 Million in our parks which provide green space for recreational use.

About Alderman Danny Solis

Danny Solis was appointed alderman in 1996 by Mayor Richard M. Daley.

As alderman, Solis has focused on job creation and physical improvements in the 25th ward. A few examples of physical improvement in the 25th Ward, or Lower West Side, are an expanded National Museum of Mexican Art, the Ping Tom Memorial Park, an improved and award winning rehabilitation of the Archer Court Senior housing development, and continued infrastructure improvements throughout the ward. Solis also encouraged and negotiated with the International Produce Market and American Linen Company to stay and/or locate in the 25th Wards Planned Manufacturing District (PMD) which has brought and continues to bring jobs and capital to the community.

Throughout his career as alderman, Solis has been an ally of Mayor Daley. Appointed President Pro Tempore of the City Council in 2001, he oversees council proceedings in the mayor's absence.

Solis serves on seven committees: Budget and Government Operations; Committees, Rules and Ethics; Finance; Education; Health; Human Relations; and Police and Fire.

Ward 25 Boundaries

Ward Office Information
2439 S. Oakley Ave.
Chicago, IL 60608
Phone: 773.523.4100

City Hall Office Information
121 N. LaSalle St., Room 203
Chicago, IL 60608
Phone: 312.744.6845

Website: www.dannysolis.org

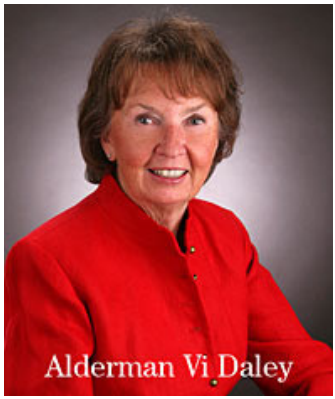
The **National Museum of Mexican Art** is a museum which features Mexican, Latino, and Chicano art and culture. The museum was founded in 1982 by Carlos Tortolero, is located in the neighborhood of Pilsen in Chicago, Illinois, in Harrison Park and opened on March 27, 1987. The museum is the only Latino museum accredited by the American Association of Museums. The mission of the museum is to display Mexican culture as one sin fronteras (without borders).

Ping Tom Memorial Park: a 12-acre public urban park in Chicago near Chinatown located at 19th St. and South Branch of Chicago River. It is owned and operated by Chicago Park District.

The park is unique because it has many Chinese accents, including a riverfront pavilion and bamboo gardens. The park is a popular destination, especially when the Chinatown Chamber of Commerce organizes a dragon boat race. In 2008, the Chicago Water Taxi added weekend service to the park.

Alderman Danny Solis was inducted into the Chicago 25th Ward Environmental Hall of Fame World Environment Week, June 6, 2009

43rd Ward Chicago—Alderman Vi Daley



About Vi Daley

Vi Daley was first elected 43rd Ward Alderman in 1999. She has been an active Lincoln Park resident for over forty years. She served as Chief of Staff to former Alderman Charles Bernardini and as Executive Director at Friends of Lincoln Park.

Reflecting the concerns of Lincoln Park residents, Alderman Daley serves as the Vice Chair of the Zoning Committee and the Historical Landmark Preservation Committee. Ald. Daley was the sponsor of legislation to protect victims of excavation damage. She introduced legislation to create height limits for mid-sized residential buildings and for business and commercial buildings, ensuring continuity on residential and arterial streets. Daley also wrote the legislation that limits the number of branch banks on pedestrian-oriented commercial streets. She continues to promote the preservation of unique buildings throughout the 43rd Ward.

Alderman Daley has worked to bring extensive capital improvements to the 43rd Ward. Armitage, Halsted, Lincoln, Fullerton and Clark have all been recipients of improved lighting and landscaping. Her efforts have resulted in pedestrian friendly streets, especially in commercial areas. Pedestrian level lights and traffic signal modernization are just a few of the additional safety measures provided for residents, their guests and for shoppers and shopkeepers in the evening hours.

Alderman Daley is a tireless negotiator, working with neighbors and developers to ensure controlled development in this extremely dense ward. Daley strongly supports public/private partnerships, such as a remodeled kitchen for the 55th Engine Company firehouse on Halsted. Alderman Daley created the Lincoln Park Community Art Initiative to bring large-scale contemporary sculptures to the area and a children's bike fest to promote safe summer activities. Her annual bingo party for local senior citizens is a much-anticipated event.

43rd Ward Office: 735 W. Wrightwood, Chicago, IL 60614
Phone: 773-327-9111 • Website: Chicago43rd.org

Alderman Daley and her husband, Vince, have two adult daughters, Kathleen and Colleen.

Alderman Vi Daley serves on the following City Council Committees:

- Budget and Government Operations
- Economic, Capital and Technology Development
- Finance
- Historical Landmark Preservation, Vice-Chair
- Parks and Recreation
- Special Events and Cultural Affairs
- Zoning, Vice-Chair

City/Ward Services

Recycling

The 43rd Ward is still using the Blue Bag program for recycling. Residents with City of Chicago garbage pick-up are encouraged to use blue bags (one for paper, one for lawn waste and another for cans, glass and plastic). Blue bags are available for purchase at most large grocery stores, hardware stores and pharmacies. Occasionally, free blue bags are available at the Alderman's office.

Blue carts are expected in the 43rd Ward in 2009. Alderman Daley is reviewing the possibility of coordinating a ward-wide pick-up recycling program to hire between the time that blue bags are phased out and the blue carts arrive. A private recycling firm will charge a per household fee for this service.

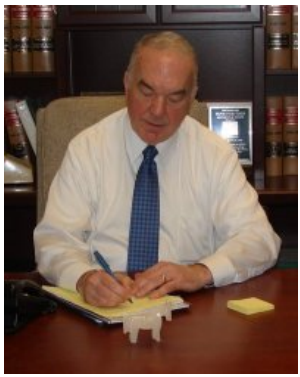
Tree Planting

Any resident seeking a new parkway tree should call our office; all requests are handled in the order in which they are received. Forestry will investigate the proposed planting site. Before planting can begin you will be asked to call and confirm the request. The Street Tree Planting Program is divided into two seasons, spring and fall planting seasons. The exact timing of each season varies based on weather and ground temperatures. Certain species may not be available for planting at the time of your request but every effort will be made to satisfy your request.

Alderman Vi Daley was inducted into the Chicago 43rd Ward Environmental Hall of Fame on Earth Day, April 22, 2009

47th Ward Chicago—Alderman Eugene C. Schulter

Greening of Ravenswood



Alderman Schulter created a 501(c)3 called the Greening of Ravenswood over 15 years ago.

Every year Alderman Schulter, along with local chambers of commerce and industrial councils, organizes an event that raises over $10,000 for greening initiatives throughout the ward.

Anything from planting flower bulbs to raising funds for LEED Certified lighting for Giddings Plaza in the heart of Lincoln Square, Alderman Schulter uses the Greening funds as a resource to beautify the community.

Please visit the Greening of Ravenswood website to learn more about the work of this organization.

City Achievements

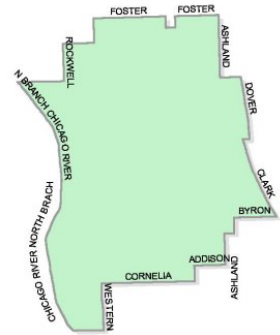
Alderman Gene Schulter with Greening of Ravenswood Committee

- Spearheaded most recent license reform effort to simplify business licensing policies and procedures. In conjunction with the Mayor's Office, has studied each of the major licensing categories and made recommendations for change that makes sense for Chicago businesses.
- Recognized in 1993 by Chicago Tribune for his leadership in reducing number of license fee categories to 200 from 500 and adjusting the fees to more accurately reflect the city's cost of inspection and certification.
- Was responsible for legislation that guaranteed equitable city-wide cable service and included minority set-asides.
- Provided leadership as Chair of the Committee on Landmarks for passage of the first comprehensive landmark ordinance designed to protect and preserve Chicago's historical buildings, sites structures and works of art.
- Was instrumental in achieving greater community control of the parks through the creation of local Park Advisory Councils. Led the drive to rehabilitate more than 500 playgrounds throughout the City of Chicago.
- Sponsored the City's Landscape Ordinance, which requires the incorporation of landscape plans and planting of trees as part of every new residential, commercial or industrial development.

Lincoln Square is in the 47th Ward

Ward Achievements

- Helped found the Sulzer Regional Library, the City's busiest library and helped re-establish Sunday service hours at Chicago Libraries
- Was instrumental in developing the City's first senior citizen center, the Northeast Region Levy Center
- Helped establish new Police and Court facilities at Belmont and Western
- Enhanced fire protection by creating the fire station at Damen and Grace
- Worked to create a new field house at Chase Park and advocated for substantial improvements at Welles Park and Paul Revere Park
- Has fostered commercial revitalization in the successful Lincoln Square Mall
- Has created new jobs and retained skilled, high-paying jobs through the development and support of the Ravenswood Industrial Corridor
- Created the Greening of Ravenswood Committee to beautify the 47th Ward



47th Ward Boundaries

- Invited and cultivated Old Town School of Folk Music's move into Ward
- Advocated for and sponsored capital and operational improvements at each of the 47th Ward's public schools, including new additions at McPherson and Chappell elementary schools
- Led the fight against negligent and delinquent landlords in the Ward, often monitoring court proceedings on behalf of tenants and community groups
- Established the City's first School Campus at Lake View High School
- Has been a thoughtful leader in ensuring of the City's most stable and safe neighborhoods

47th Ward Office

4237 N. Lincoln Avenue • Chicago, IL 60618 • Phone: 773-348-8400

Email: ward47@cityofchicago.org • Website: Ward47.com

Alderman Gene Schulter was inducted into the Chicago 47th Ward Environmental Hall of Fame on May 26, 2009

49th Ward Chicago—Alderman Joe Moore

Alderman Joe Moore's 49th Ward Green Corps

Alderman Joe Moore and his wife Barbara Moore launched the 49th Ward Green Corps in 2007 in hopes of building a far more sustainable and livable community.

Chicago's 49th Ward is one of the most ethnically and economically diverse communities in our nation and has two other key strengths that Joe and Barbara wanted to draw upon.

The 49th Ward, which comprises most of the Rogers Park community along with parts of West Ridge and Edgewater, has historically been a community that believes in and fosters grassroots activism. It is also a community that many environmental scientists and other experts choose to call home.

The mission of the 49th Ward Green Corps is to bring together and empower local citizens interested in effecting positive environmental change through local action and to put additional muscle behind those actions by engaging local environmental experts and making use of the government and community resources that the Alderman and 49th Ward Service Office can bring to bear.

Through their efforts and with cooperation of the City of Chicago's Conservation Corps (C3) program, local residents have organized and led public awareness events, educational workshops, service projects, and hands–on trainings. They are working in cooperation with other local organizations to bring a green European style farmers market to the Glenwood Avenue Arts District in 2010.

In 2009 Joe and Barbara Moore launched a new socially interactive website to allow neighbors to meet virtually and form online ecoteams as a means of encouraging even greater public involvement.

To find out how you can get involved or support the efforts of the 49th Ward Green Corps, please contact BarbaraMoore@Ward49.com.

2009 Green Workshop Series

In 2008, Alderman Joe Moore and the 49th Ward Green Corp hosted a series of popular workshops. The workshop series returns this year with a focus on water, one of our most essential natural resources, and of vital concern to our lakefront community. This workshop series will show you ways to conserve water, use rain water as a resource, safeguard Lake Michigan water quality, keep storm water and sewage out of your basement, and green our community.

Put your passions into practice!

Meet Neighbors Who Share Your Interests

49thWardGreenCorps.org

Alderman Joe Moore's GREEN CORPS 49th Ward

Alderman Joe Moore and Barbara Moore were inducted into the Rogers Park Environmental Hall of Fame on Earth Day, April 22, 2009

Students in this book participated in the first annual National Environmental Science Fair.

Each student participant was inducted into the National Environmental Hall of Fame.

Awards were given to the students by Alderman Manny Flores, Chicago's First Ward, on May 2, 2009, at the National Green Museum, 1640 N. Wells Street.

Alderman Danny Solis honored the students from the first annual National Environmental Science Fair at their book signing event held June 6, 2009.

Bonus #1

Free One-Year Pass to National Green Museum:

Free Green Gifts and $1,000s in Discounts from Over 100 Local and National Businesses

The following green companies have expressed interest in offering members of the National Green Museum a discount or coupon on certain products. Please check with them for details. More businesses will be added soon. Please see our website for details.

2 Point Perspective
AirHound
Baabaashop.com
BioBizz
Bright Endeavors
Chico Bag
Consolidated Printing Company
Crownley Engineering Group
Earth Presents
Eco Promotional Products
EcoGeek Living
Eco-Kids
EcoMinders
Essentia
Fair Indigo
Global Sisters
Green 3
GreenSpace Today
Jute and Jack Fruit
Lake Side Cafe
LuSa Organics
Mountains of the Moon
Olive Owl Organics
Organic College
Paragon Mechanical
Second Rain
Stainless Cups
Syracuse Cultural Workers
Terrazo and Marble Supply
Tuwa

AA Service Company
Angel Wind Energy
Biltmore Insulated Concrete
Blissful Home
Chicago Solar Corporation
Community Green Energy
Core Sales
Earth Paints
Earth Thermal
Eco-Friendly Glass Art
EcoHome Chicago
Ecological Products Company
Ecozini.com
EZing
Foods Alive
Gray's HVAC Service
Green and Save
GreenSwitch
Lake Oliver
Light Gives Heat
Monthly Aspectarian
Novelle International
On Time Promotions
Organic Garden Company
Plant It Water
Sparkle Queen
Studio ACB
Taylor
Tru Sweets
Uncle Dan's Wholesale Sweeteners

Allen Rubin and Catherine Corbin, Co-Coordinators
Email: EnvironmentalFame@lisco.com | **Phone** 641-451-5199
Website: EnvironmentalHallofFame.net

Bonus #2

Your Name in a Green Exhibit for Your Community

Purchase Just 12 Books to Display Info on Your Organization

Purchase 33 Books to Display an Exhibit in National Green Museum And Have a Special Book Preface for Your School or Group

For just $12 you can:

1) Help create an exhibit to help your community go green (your name is included in the exhibit)
2) Receive a one-year pass to the National Green Museum and Environmental Hall of Fame
3) Receive 1000's of dollars in discounts from over 100 Chicago area businesses
4) Receive a book on how to reduce energy costs and live more sustainably by local student geniuses.

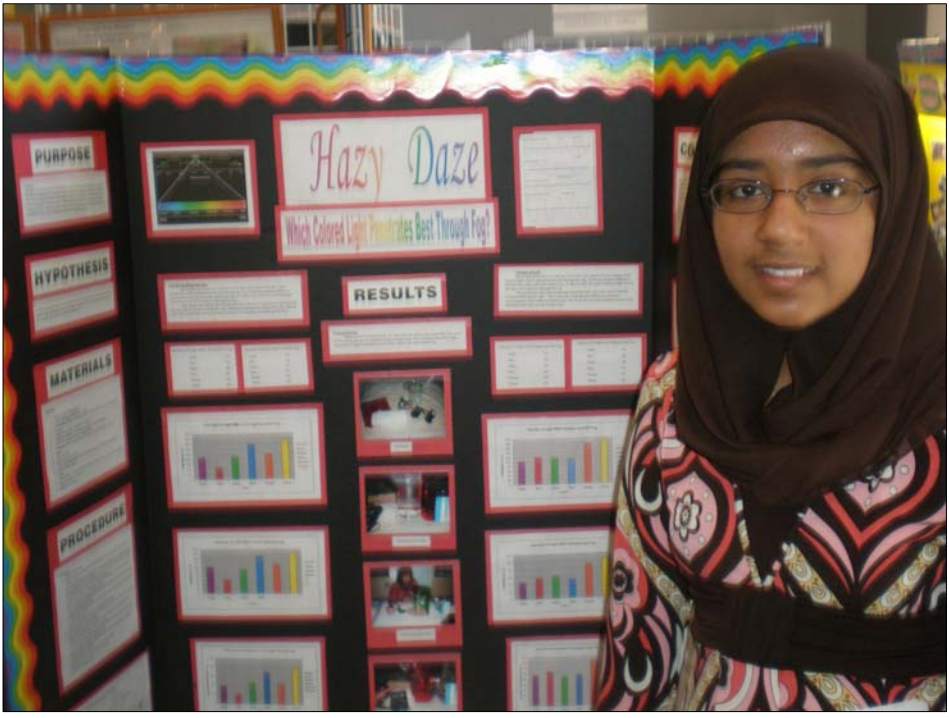
For $144 (receive 12 books you can sell and receive your money back) you can receive your photo and organization information on an exhibit in the **National Green Museum**.

How You Can Create or Sponsor an Exhibit for Your Community
To Support Its Efforts to "Go Green"
(At no net cost!)

- Commit to selling 12-33 books of ***Hope for Planet Earth: 25 Student Geniuses Share What We Can Do Now to Reduce Energy Costs and Live More Sustainably***.
- Twelve books will fund your community's exhibit for 3 months; thirty-three books fund your exhibit for one year!
- You will also be able to place your own introduction or preface in the book indicating how your organization or community is "going green."

Allen Rubin and Catherine Corbin, Co-Coordinators
Email: EnvironmentalFame@lisco.com | **Phone** 641-451-5199
Website: EnvironmentalHallofFame.net

Contents



"As you can see, global warming is a serious and important issue that can affect all living organisms alike. But if significant action is taken immediately, we can prevent our well-loved planet from being lost."

Ameena Khan

Grade 7, Thomas A Edison Regional Gifted Center ES

Project Essay

Hazy Daze

When I first became aware that our class was responsible for completing a science fair project I began searching for ideas. I tried to search for problems that we faced in our everyday lives. Luckily, not to long after I began browsing for topics I found the experiment that I had decided to do. The purpose of this project was to find out which colored light would penetrate the best through fog. In my opinion, this topic was relevant to many people and seemed interesting. This was because fog is a large hazard to many drivers and it decreases their visibility, which can cause accidents, and result in severe injuries.

To conduct the experiment I gathered two different types of lights, I used a Halogen Bulb Search Light and an L.E.D. light, or Light Emitting Diode. The reason two lights were being tested was to prove or disprove the same colored light would penetrate the best through fog. In the experiment I also used the following items: cellophane paper, this was used to change the color of the lights, a light meter, this measured the intensity or the light, boiling water, a bag of ice cubes, a glass cylinder, and a thermometer.

Before I began my experiment, my hypothesis was that if different colored lights were tested on there penetration through fog, the yellow colored light would penetrate the best because of two main reasons. First, it appeared to be the brightest to the human eye, and second, it seems to be the color of the midday sun.

To begin my experiment, I put the water to boil and set up my experiment. The setup had three main sections. The first was the section that was emitting the light, the second was the fog that would penetrate the light, and the last was the section hat received and recorded the intensity of the light. Once the setup was complete, I tested the intensity of each light without any fog. This would be used to compare to the penetration of each colored light with the fog. Once these recordings were taken, I poured the water that was now boiling into the glass cylinder that was placed between the light and the light meter. Next, I covered the cylinder with a lid and placed the bag of ice upon it. As the water in the cylinder began to evaporate, the difference in temperature, of the ice and water, created fog in the center of cylinder. After the fog was created, we shone the light through the fog and recorded the intensity.

There were many factors I had to consider while conducting the experiment. First of all, I had to ensure that the distance between the light source and the light meter remained the same through every testing. This was because, the farther away a light the dimmer it becomes; it would have affected our results. Secondly, I had to make sure that all lights, except for the light that was being tested, were closed so they did not change our results. Also, the amount and temperature of the water and ice cubes

had to stay consistent for each light. This would help ensure that the fog that was being made was the same for every test.

When graphing the intensities, I made three different graphs for each light. The first graph was the intensity of each different color, for each light, without any fog. The second was the intensity for each color, for each light, with the fog. And the final graph was the difference between the two previous graphs, which was the actual amount of penetration.

When studding the final graph for each light, I found that the yellow colored light had the highest penetration through the fog for both of the lights tested. But when comparing the amount of penetration of the yellow Halogen Bulb Search Light and the yellow L.E.D. light, the L.E.D. light had a grater penetration. The L.E.D light is also more environmentally friendly. This is because L.E.D. lights have a semi-conductor base with two sides, an electron efficient and electron deficient side. When the semi-conductor base is heated, the electrons from the electron rich side move on the electron deficient side, and the movement crates energy which we see as light. When the electrons cool they return to the electron rich side. This method helps 'reuse' the energy and electrons and it also makes the L.E.D. lights last longer. The Halogen Bulb Search Lights has tungsten filament sealed into a compact, transparent envelope filled with inert gas and halogen, such as iodine and bromine. These bulbs operate when the filament gets hot and the halogen gas combines with the tungsten atoms as they begin to evaporate and finally are re-deposited on the filament.

Over all, the yellow colored light does have the highest penetration proving my hypothesis correct.

A Halogen bulb has tungsten filament sealed into a compact, transparent envelope filled with inert gas and halogen, such as iodine and bromine. These bulbs operate when the filament gets hot and the halogen gas combines with the tungsten atoms as they begin to evaporate and finally are re deposited on the filament.

Sustainability Essay

Global warming is a term we hear everyday, on the news, in books, and from people around us. But how many of us really know what it is? Global warming is when the average warming temperature of the Earth's surface, atmosphere, and water increases. It is causes by excess pollution which releases a surplus amount of greenhouse gasses, such as methane, CFC, ozone, and CO2 into the atmosphere, disrupting the balance of the air around us. These gases warm the atmosphere in order to make Earth more comfortable for humans to live. In fact, without greenhouse gasses, our planet would be too cold to support living organisms. But the excess amount of these gasses causes the planet to become warmer and warmer leading it to have a significant affect on everyone.

First and foremost, global warming can cause ice caps to melt which in turn would raise the water level of oceans, lakes, and rivers. This can cause flooding in coastal areas, which then cause loss of valuable land for humans, plants, and animals.

Secondly, the warming of the Earth also suggest that the temperatures of the bodies of water on our planet to increase, making the water less comfortable for all marine life. Some may even die or become extinct. The same situation can be seen of land. If the temperatures continue to rise, the air would also become warmer making it harder for certain plants to grow and animals to live. Some of these plants may be major food crops and some of the animals may go extinct. If any animal or plant becomes extinct, before humans can research its benefits or hazards, we may never know if there was something in that plant or animal that could help us cure diseases such as cancer or help us in other everyday problems that we face.

We can prevent these horrid events from taking place with simple actions. To begin, we should plant more and cut down fewer trees, flowers, and other plants. Plants release oxygen, which human and animals breathe in, and inhale carbon dioxide, which animals and humans exhale. This help keep the balance of oxygen and carbon dioxide in our atmosphere. If we continue to cut down more plants at the rapid speed that we persist, the amount of carbon dioxide in the air will continue to increase. In fact, CO2 is responsible of 60% of our greenhouse gasses. Also, without plant we would not receive oxygen to live.

Another way to reduce the amount of CO2 is by reducing the amount of fossil fuel. Fossil fuels are non recyclable energy sources. We can decrease our use fossil fuels by taking easy actions such as driving less, turning off lights when they are not necessary, and turning down the heating and conditioning. Also, people should use environmental appliances through out their day. We can add to this by having environmental friendly architecture as well. This would include green rooms in which the lights work as motion detectors, and ceilings and flooring made of recycled material.

As you can see, global warming is a serious and important issue that can affect all living organisms alike. But if significant action is taken immediately we can prevent our well loved planet from being lost.

"Ways we can reduce is very simple and not complex. Wash your clothes in warm or cold water... Clean and replace filters regularly; use energy efficient fluorescent light bulbs; to reduce air leaks in windows and doors put calk and weather strip around them. Also, ask a utility company for a home energy audit to find poorly insulated spots in your home. Reduce air pollution by walking, carpool, or bus... Finally, recycle everything you can to reduce waste."

Andrea Sanders

Grade 11, Gage Park High School

Project Essay

Does Water Quality Affect *Elodea* Plants?

Purpose

The surroundings have a great effect on the health and growth of plants. A few of these factors are pollution of the water, the history of the water, and the people around it. The purpose of my project is to observe the condition of the chloroplast submerged in different water qualities.

Procedure

First, collect water from three river sites, Bubbly Creek, Lawrence Fisheries, and Tinley Creek, and complete the habitat survey. Complete water qualities tests. Next, submerge healthy Elodea plants in each water sample for seven days. Place some of the Elodea in the distilled water that will be the control. Mount one Elodea leaf on slide to analyze. Observe the Elodea using a 100-x microscope. Take photos through eyepiece, were subject to spectral analysis, and recorded.

Conclusion

In conclusion, the hypothesis was both supported and disapproved. My hypothesis supported by proving the chloroplast did decrease in the Lawrence Fishery Chicago River, South Branch. It was disapproved because the chloroplast increased in Bubbly Creek and Tinley Creek.

Sustainability Essay

Definition/ History

Global warming is the increase in the average temperature of the Earth's near-surface air and oceans since the mid-twentieth century and its projected continuation. This rise results from the "greenhouse effect," in which gases such as carbon dioxide trap heat within the earth's atmosphere. The climbing temperatures could cause catastrophic climate change.

A French mathematician named Jean Baptiste Joseph Fourier in 1824 introduced the first theory of global warming. He discovered that the Earth's temperature was slowly increasing Fourier argued that the earth's atmosphere traps solar radiation and reflects it back toward earth. In the late 19th century, Fourier's theory was labeled the "greenhouse effect" when Nobel Laureate Svante Arrhenius coined the term to explain how carbon dioxide traps heat in the Earth's atmosphere. Arrhenius believed that the greenhouse effect was responsible for the onset of the ice ages. By the 1960s, many scientists dismissed this theory in favor of the hypothesis of Serbian geophysicist, Milutin Milankovitch, relating climate change to the orbital changes of the earth.

In 1896, Scientist Svante Arrhenius publicly predicted that increasing carbon dioxide levels within our atmosphere would raise the temperature of the planet. He

hypothesized that humankind would benefit from the additional warmth. Other scientists also thought of a different view of global warming during the twentieth century. In 1957 geophysicist, Roger Revelle and geologist Hans Seuss wrote a paper, which advanced the theory that burning fossil fuels had contributed to global warming. That same year, American scientist David Keeling started monitoring and documenting an annual rise in carbon dioxide levels. In 1982, Revelle warned that global warming could melt the earth's glaciers and subsequently raise sea levels dangerously. In 1988, NASA scientist James Hansen testified before Congress and declared his near certainty that based on computer models and temperature measurements, "...the greenhouse effect has been detected, and it is changing our climate now."

Affects of global warming on the human body and wildlife

Global warming just doesn't affect the Earth but the people and wildlife that are on it. Global warming can cause intense heat waves in warmer spots of the world. It may also trigger natural disasters, including floods, hurricanes and droughts. The increase of precipitation and temperatures in certain areas could produce more mosquitoes which carry diseases such as the Nile West. Greater heat may also increase the production of ground-level ozone, a pollutant which can damage the lungs.

When global warming triggers natural disasters it produces mores ways to sicken people. For example, floods encourage the growth of fungi, and droughts, which promote whiteflies, locusts and rodents, have an impact on agricultural production.

Nature

Animals are affected daily because of global warming. For example, Polar bears who live in the South Pole cannot survive without ice! With out ice they will not have a home, will not be able to find other polar bears therefore reproducing rates will decrease. The penguins will die off because if the ice is melting that means its getting warmer and arctic animals need cold to survive not heat.

Reduce

Ways we can reduce is very simple and not complex. Such as washing your clothes in warm or cold, never hot uses up too much energy. Clean and replace filters regularly, use energy efficient fluorescent light bulbs, to reduce air leaks in windows and doors, put calk and weather strip around them. Also, ask a utility company for a home energy audit to find poorly insulated spots in your home. Reduce air pollution by walking, carpool, or bus this can reduce global warming. Finally, recycle everything you can to reduce waste.

"The domed homes may also help with the problem of global warming. Earth is the only place known where humans can live, and it is being destroyed because of pollution and bad decisions.

All of this can be avoided if we take advantage of our knowledge and science and create alternative ways of energy.

For example we could stop using fossil fuel and use solar energy. Science can make it possible; all we have to do is take advantage of it. Together we can make a better tomorrow."

Brandon Durr

Grade 9, King College Prep High School

Project & Sustainability Essays Combined

The United States of America and the entire world has found itself in a situation that requires all of its inhabitants to find innovative practices that will allow our world to continue to thrive and prosper. The ways we have polluted our environment and severely damaged our natural resources has created a global condition that if not checked and altered, could result in catastrophic proportions for future generations. When people speak of global warming, many young people think this topic applies to some far away place, but in actuality our earth's atmosphere needs as much help as we can afford.

My project's goal was to reduce the cost of energy bills so everyday people can afford their homes. Many people in America are losing their home because they cannot afford upkeep of the home.

My theory is if you change the house's physical structure, it can be made more cost efficient. The basic design of the average home in America is the suspended ceiling. Just about every home in the United States is built in this manner, even my home.

I hypothesized that if you change the shape of the ceiling of the home, less energy will be used to heat the house. When heat travels it rises to the top, fills the top, and starts to fall back down to the bottom. This form of heat flow is called convection. However, heat also moves in a circular motion.

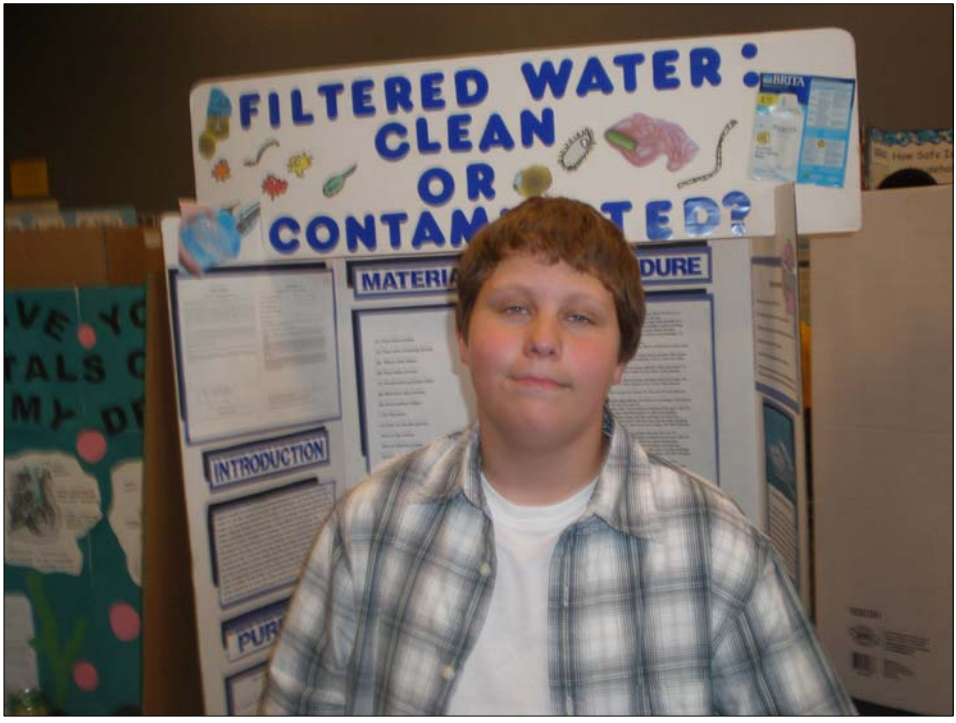
The suspended ceiling does not flow with the natural flow of the heat. The corners of the suspended ceiling are called dead zones. Since heat travels up and in a circular motion, it will take a longer time for the heat to fill the entire top. This means more energy will be used and more money will be spent.

I believe if you replace the suspended ceiling with a ceiling that works with the heat flow, it will take less time to fill the home and will be more cost efficient. I hypothesized that the domed ceiling will work better with the heat flow.

A dome has no dead zones because it has virtually no points. The dome also works with the natural flow of heat. In a dome home there will also be more volume at the top. The domed homes may also help with the problem of global warming. Earth is the only place known where humans can live, and it is being destroyed because of pollution and bad decisions.

The power plants and energy providers cause pollution and destroy the ozone layer, the force surrounding earth that keeps out the deadly heat from the sun. As the ozone layer gets weaker, Earth will become hotter and humans will most likely cease to exist.

All of this can be avoided if we take advantage of our knowledge and science and create alternative ways of energy. For example we could stop using fossil fuel and use solar energy. Science can make it possible; all we have to do is take advantage of it. Together we can make a better tomorrow.



"To help me be more aware of how I can help the environment, I came up with my own plan—the THINK plan.

Try it and see what a difference you can make.

Brian Pacholski

Grade 8, Dore Elementary School

Project Essay

Filtered Water: Clean or Contaminated?

Water is a necessary, natural resource. Many people consider water to be the earth's greatest natural treasure. As an important fluid, water is needed to hydrate every part of the body from the skin to the brain. Human beings cannot live without it. Water sends nutrients to the brain, controls body temperature, helps digest food, keeps skin healthy, cushions bones, transports nutrients, and removes toxins.

For Chicagoans, Lake Michigan is the main source of drinking water. The water from the lake is not clean though. It is contaminated and must be cleaned before it can be sent through the pipes and delivered to homes for drinking. The Jardine Water Purification Plant near Navy Pier uses several methods to treat contaminated water to make it drinkable and safe.

Companies such as Brita claim to make tap water healthier and safer to drink. Is there any truth to this claim? Does Brita's carbon filtration system actually make the water healthier or does the filter, which is continuously submersed in water, cause bacteria build up in the pitcher?

I hypothesized that carbon filtered water, which is continuously in direct contact with a carbon filter and remains stagnant in a pitcher, will contain more bacteria than common tap water.

To prove my hypothesis, I performed an experiment and these are the procedures I used:

1) Sterilized (6) test tubes.
2) Labeled each test tube T1, T2, T3, F1, F2, F3.
3) Used a graduated cylinder and poured 9 ml's of distilled water into each test tube.
4) Used a pipette and added 1 ml of tap water into test tube labeled T1.
5) Took 1 ml of solution from T1 and added it to T2.
6) Took 1 ml of solution from T2 and added it to T3.
7) Followed the same procedures for test tubes F1, F2, and F3 using filtered water.
8) Labeled (6) agar nutrient plates the same as test tubes T and F.
9) Transferred 1 ml of solution from each test tube and placed on the partner agar plates.
10) Covered, taped, and placed all plates in a warm, dark area.
11) Did not disturb for 3 days. After 3 days, observed and recorded the results.

The results confirmed my hypothesis. The Brita filtered water, even after a 3rd dilution, contained more bacteria than tap water.

Although there were acceptable bacteria levels in both the tap and filtered water, the question to ask is "why did the samples of filtered water contain more bacteria than the samples of tap water?" Is it possible that the carbon filter creates more bacteria because it is constantly submersed in water?

There is clear evidence of higher levels of bacteria growth in water samples taken from the Brita water filtration pitcher and these results should cause the consumer to think twice before purchasing a carbon filtered water purifier. The City of Chicago provides clean, safe, refreshing drinking water. Save your money and fill your glass straight from the tap!

Sustainability Essay

"Save the Planet"; "Go Green"; "Stop Global Warming"; Conserve Energy"; "Reduce, Reuse, Recycle"; "Stop Waste"; "Green with Envy"; "Why Waste a Cool Planet?"… Most of us are familiar with these energy conservation slogans. We hear and see them on a daily basis. They are shown on TV and the internet. We read about it in the paper, hear it on the radio and see it on billboards.

Saving the planet has become a topic that people talk about. We as human beings are focused on this issue and have made it a priority in our lives. The problems of global warming and conserving energy and the environment are a concern of ordinary people, politicians, and famous celebrities.

President Obama and Vice President Biden have developed the New Energy for America plan. Pierce Brosnan is committed to cleaning up the air and water. Sting wants to help save the rainforests in South America. Leonardo DiCaprio made a movie called *11th Hour*, which focuses on environmental issues. Former Vice President Al Gore tackles the global warming issue in his documentary, *An Inconvenient Truth*.

We are told to shut off the faucet when brushing our teeth, recycle, use organic materials, support locally grown food, drive less, bike more, turn off the lights and electronic devices, go hybrid, use fluorescent lights!!

WOW!! Does all this information confuse you?

To help save our planet, all it takes is cooperation and awareness of our actions. It is the little things that make a difference. Realizing that each of us is part of the energy and global warming solution just makes things alot easier.

To help me be more aware of how I can help the environment, I came up with my own plan—the **THINK** plan.

Try it and see what a difference you can make.

T Try to do at least one thing a day to help the environment. Leaving the room? Turn off the light! Finished with your drink? Put the bottle in a recycling container.

H Have a place in your house for things that should be recycled: paper, plastic, cans, batteries, cardboard, ink cartridges, and glass. Check the internet for a list of things that can be recycled.

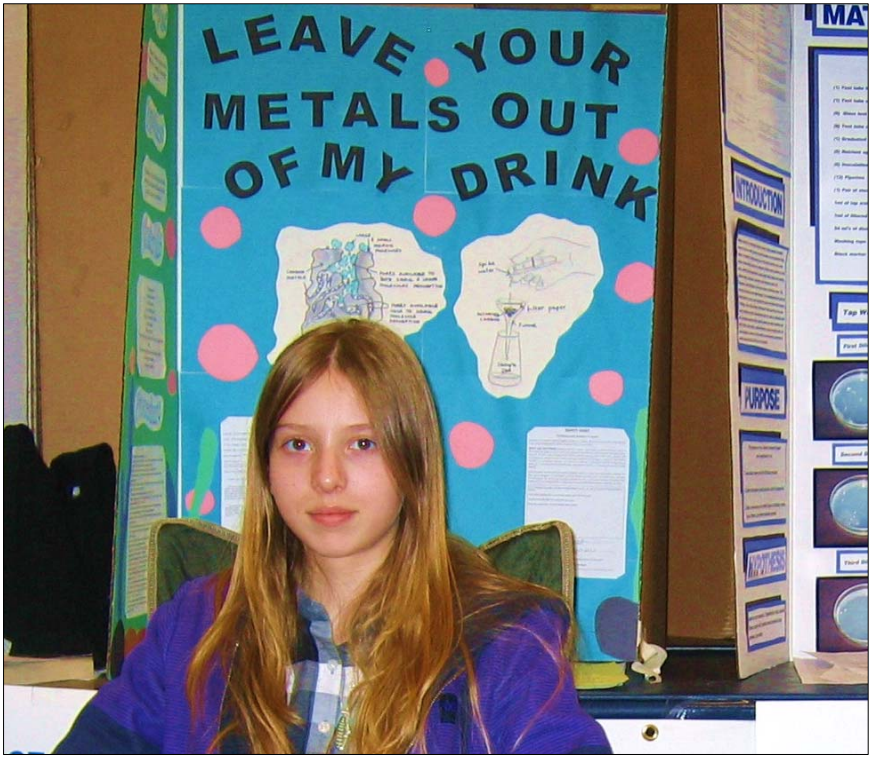
I Include your friends, family, and neighbors in your plan to help save the planet.

N Never get discouraged! It's going to take a lot of work to make our planet a better place to live, but with everyone's help, we can accomplish this goal together.

K Knowledge is the key. If you know what's good for the environment, then do it! Don't be a follower—be a leader.

BE A TEAM PLAYER! DON'T BE SELFISH!

DO YOUR PART TO MAKE THE WORLD A BETTER PLACE!



"We must find new fuels for existing technologies and machines ... By getting new hydrocarbons made from plants that are renewable, we will be able to fuel the current world into a cleaner, greener, safer future."

Brigette Dzialek

Grade 8, Peck Elementary School

Project Essay

Leave Your Metals Out of My Drink

From the beginning of time, humans had to know how to find fresh water. Most of their lifetime was dedicated to finding sufficient amounts of food, good shelter and fresh water. In today's world we do not even think about survival the way our ancestors did. We already have fresh water on demand, stored food everywhere, and, of course, shelter. Because more and more people are born these days, free access to uncontaminated water is getting harder. Some people even predict that in the future, water will be the most valuable asset on our planet.

How can we get healthy and good tasting water from the tap without the smell and taste of chlorine and other minerals? The answer is purification. That is why people have been seeking ways to improve the taste and smell of drinking water since as early as 4000 B.C.

Ancient Sanskrit and Greek writings recommended water treatment methods such as filtering through charcoal, exposing to sunlight, boiling, and straining. By the early 1800s, slow sand filtration was beginning to be used regularly in Europe, mainly to improve water's taste and odor.

Today, even spring water filtered by soil and rock layers naturally, considered "safe" a hundred years ago, has to be carefully checked for impurities. On our planet, 1.1 billion people lack access to a good and pure water supply. Annually, we have 4 billion cases of diarrheal disease and 1.8 million people die from this disease. Simple procedures such as boiling, chlorination, filtering, solar disinfections, and storing water in safe containers could save lives.

My purpose is to determine if activated carbon loses its ability to filter out copper and lead after many uses. What I think might happen is if spiked water is filtered through activated carbon, then the filtration efficiency of the activated carbon will diminish.

The reason copper and lead data were chosen is because water pipes are most often made from these substances. The results came out surprising. The efficiency diminishes, but also it did so quite quickly. In the control, all the test results were close to the average of 0.1mg/L. This is expected, because no activated carbon was used, just the filter paper. During the experiment, the filter paper did not remove any metals from the spiked water; it only prevented the activated carbon from getting into the sample jars.

After the first trial, 0.043 mg/L of lead and 0.055 mg/L of copper was remaining. The activated carbon removed almost half of the metal contaminants. In trials 2 and 3, similar results occurred. The average amount remaining for all three trials after the

first use was 0.042 mg/L of lead and 0.054 mg/L of copper. This means that the trials were consistent with each other.

After 5 uses, the activated carbon became weaker. There was an average of 0.081mg/L of lead and 0.082 mg/L of copper remaining in the sample after purification.

As the experiment progressed, the activated carbon lost its reactivity, because it became saturated with the metals. I believe that the carbon's filtration ability is weakened by the amounts of water that pass through it. The concentration of metals present affect the activated carbon as they attach to the carbon and reduce the surface area impurities can attach to.

Sustainability Essay

The industrial revolution has redefined human civilization. It brought change to our sleeping schedules and the geographical spread of humans. It created the massive metropolises, such as this great city that we live in called Chicago. It has revolutionized the way we build things and how our economies are based. However, even due to all these great things that were brought by this revolution, there are some negative things that came into being when the engines of change were in full effect. The biggest one of concern now is Climate Change and how it can affect future generations.

As nations were industrializing during the late 19th and early 20th centuries they consumed great amounts of fossil fuels and used chemicals whose impact on the environment was not known yet. CFCs were released into the atmosphere, and they cause great damage to the ozone layer allowing UV rays to come through the atmosphere.

Hydrocarbons such as coal and petroleum were burned in great amounts, and they released great amounts of greenhouse gases. These greenhouse gases raise the average temperature of earth and can make increase the speed of climate change. That is why we must take action as fast as possible to reduce emission, but at the same time allow technology to advance.

The quickest way to help deal with this problem we have is to tackle the two main sources of greenhouse gases; transportation that runs on fossil fuels and the production of electricity.

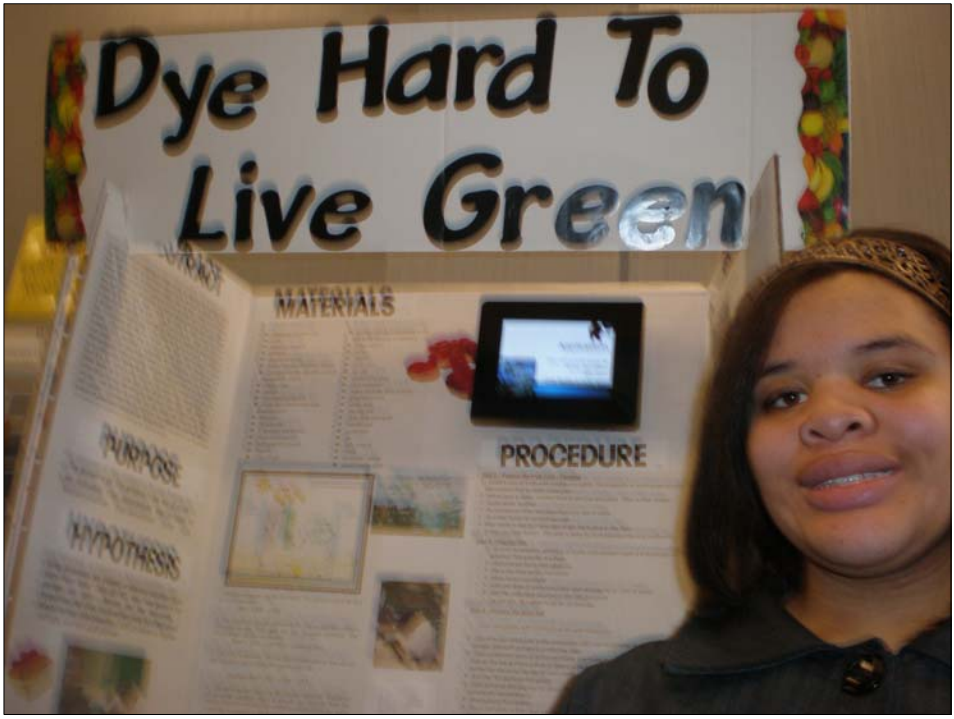
The solution to the electric problem is solar and wind energy. Solar panels are getting more advanced and efficient every year. By making solar panels less expensive we can implement more of them for increasing the supply to meet demand. The sun is a limit-less source of energy, and all free things should be harvested if it is possible to harvest it safely. Large solar cell farms can be placed in the middle of the desert or other inhabitable lands to produce electricity. Another

way solar energy can be produced is solar cell lined roofs that are in the county or even in the city and pump electricity back into the grid.

The next major source of pollution is the transportation industry. It is a vital industry for economies and any type of major change that will halt the flow of goods will be very hard to accept. Most cars or trucks run on internal combustion engines which have been fine-tuned for almost 100 years to get maximum efficiency out of them. If gasoline could be reproduced from plants in a renewable manner that would be a very good solution until a cleaner source of energy can be found and widely applied.

Electricity would be a very strong contender if it were possible to go long distances on it and if the source of the electricity would be clean like solar or wind generated electricity. Bio-diesel is the first step in achieving clean transportation and making the transition to clean fuels possible in reality not only on paper.

We must find new fuels for existing technologies and machines because it will be impossible to just bring in a totally new technology and force everyone to change over to it. By getting new hydrocarbons made from plants that are renewable, we will be able to fuel the current world into a cleaner, greener, safer future.



"For the 2009 Future City Competition, my best friend Kalene and I researched ways on building a sustainable community. We discovered that a Vertical Farm (VF) designed with a living machine would be a perfect solution to issues surrounding global warming."

Dekonti Davies

Grade 8, Kenwood Academy High School

Project Essay

Dye Hard to Live Green

There are two types of solar cells that take energy from the sun: the photovoltaic solar cell and the nanocrystalline Dye-Sensitized Solar Cell (DSSC). Photovoltaic is the first generation of solar cells (Fruit to Aid the Sun's Work). This cell is made with an expensive material called crystalline silicon, and they are found on the rooftops of homes and buildings (Berries, Oranges… Solar?).

DSCC is the third generation of solar cells. DSSC are a green technology that is easy to manufacture and inexpensive to produce. Michael Gratzel and Brian O'Regan, at the Swiss Federal Institute of Technology in 1991, created the dye-sensitized solar cell (Dye-Sensitized Solar Cell (DSSC)–Gratzel). This cell is also known as the Gratzel Cell.

Unlike a silicon solar cell that absorbs light in the semiconductor layer, DSSC adsorbs light in the dye molecules. Fruit dyes convert energy from the sun into energy we can use. A single layer of dye absorbs light. The dye is absorbed by titanium oxide that is painted on a conductive transparent glass. The titanium oxides are tiny crystals between 10 and 50 billionths of a meter. Because of their size, they are called nanocrystalline (Smestad, 158).

DSSC are sensitive to indirect light, and they can generate electricity on cloudy days and under indoor light conditions (Energy Service Bulletin—Dye-Sensitized Solar Cell). They are a photochemical solar cell that biomimics the photosynthesis process; they mimic the way plants convert sunlight into energy. The dye in DSSC is like chlorophyll because they absorb light and produce a flow of electrons. Electron transfer is the base for the photosynthesis process and DSSC process (Harper, 105). See figure below.

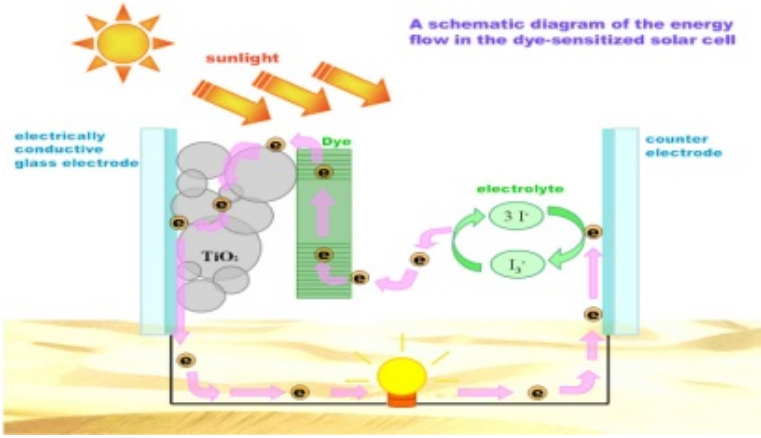
DSSC resembles a sandwich. The cell is made of tin dioxide (SnO_2) coated glass, titanium dioxide nanoparticles, dye from fruits, iodine electrolytes, and counter electrodes. The movement of electrons from one substance to another substance is the foundation for the dye-sensitized solar cell (Braz).

Titanium dioxide (TiO_2) is a nanomaterial wide band gap semiconductor. TiO_2 has two responsibilities in the dye-sensitized solar cell. It separates the electron charges, and in addition to separating electrons, it holds large numbers of dye molecules. (Dye-Sensitized Solar Cell (DSC) – Gratzel).

1. Photons from the sun hit the DSSC. The photons cause the dye to loose electrons. **Dye + Light → Dye***
2. The exited dye mixes with the TiO_2. The excited dye releases electrons to the TiO_2 and the dye becomes oxidized. The oxidized dye has lost an electron. **Dye* + TiO_2 → e-(TiO_2) + oxidized Dye**

3. The TiO2 is porous. TiO2 is like a nanohighway that allows the electron to travel along the coated electrode. **Oxidized Dye + 3/2I- → Dye + 1/2 I-3**
4. The electron travels, it travels to the load. **1/2I-3 + e- (counterelectrode) →3/2I-**
5. Reoxidation allows the tri – iodide to give up an electron to iodide. **1/2I-3 + e-(TiO2) → 3/2I-**

The newly created electron replaces the electron lost to the TiO2. Reoxidation allows the tri–iodide to give up an electron to iodide (Emerging Uses of Nanotechnology in the Energy Industry).



Sustainability Essay

Reduce, Reuse, Recycle: The Most Important Solution(s) to Help Reduce Global Warming

One of the most important solutions to help reduce global warming is to reduce, reuse and recycle. If everyone were to do their part in reducing waste, we could limit the yearly amount of carbon dioxide that we produce. For the 2009 Future City Competition, my best friend Kalene and I researched ways on building a sustainable community. We discovered that a Vertical Farm (VF) designed with a living machine would be a perfect solution to issues surrounding global warming.

The Vertical Farm (VF) would be a 40–story pyramidal shaped residential, commercial and agricultural tower. This tower would feed 60,000 residents. The purpose of the VF is to grow food locally in a controlled environment. This tower would also reduce the need for cars that run on fossil fuels.

The water infrastructure located within the tower would be one of the most important components of the building. The sustainable water system in the tower would recycle water by capturing waste, purifying the water and returning it to the source where it is reused. In the Vertical Farm, water would be essential for cooking, cleaning, and aquaponic farming.

The Living Machine (LM) is a wastewater treatment system that mimics the natural wetland process. LM is designed to produce clean water and edible plants and fish. The LM is used to treat 200,000 gallons of wastewater per day. The waste management process is as follows:

- Water is sent to the appropriate storage tank
- Solids in the wastewater are allowed to settle
- Water flows through a biofilter to remove the odors
- Water is routed to appropriate tanks to remove pollutants

Step 1: Tank 1 operates as a pretreatment center. The cleansing stage is an anaerobic process (without oxygen). The solids in the wastewater are allowed to settle. Toilet wastewater is collected into tank 1 located in the subbasement.

Step 2: Water flows from tank 1 through a biofilter made to remove the odors.

Step 3: Pollutants such as nitrogen and ammonia are removed from the water. Oxygen is added by algae. A network of pipes located under the VF transports the wastewater to another station where the microorganisms will remove harmful pollutants and add nutrients to the water. Also, a wide variety of microorganisms assist in removing toxic chemicals, such as methane, from the wastewater.

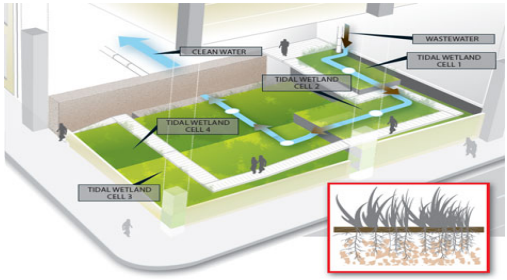
An ecosystem naturally removes toxins from the environment. Plankton are very important in the cleansing process; they feed on hard to remove micro particles.

$$Microorganisms \xrightarrow{\text{RemovedBy}} Plankton \xrightarrow{\text{RemovedBy}} Small\ Fish \xrightarrow{\text{RemovedBy}} Larger\ Fish$$

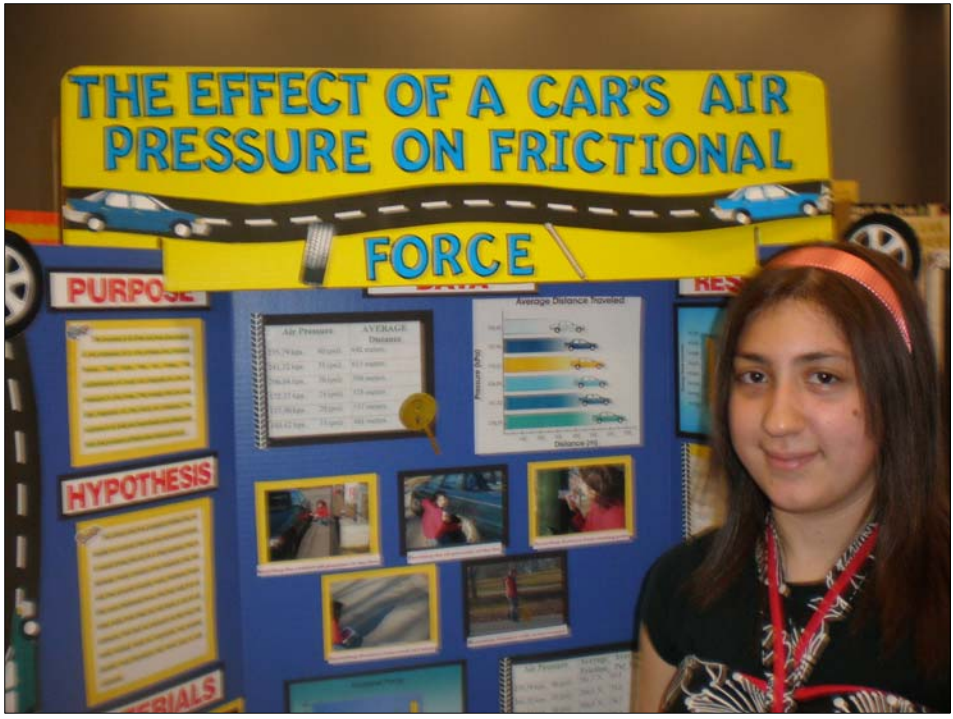
Rainwater would be reclaimed through an extensive system of channels, and the ground runoff would be collected by underground drainage pipes. Gravel and bark filters remove sediment and odors before this water can be used for irrigation and used to operate the toilets. Smart toilets would be computerized and they could decide the appropriate amount of water to use in waste removal.

Drinking water would also be reclaimed from moisture within the air. The building would be equipped with an evapotranspiration recovery system. The evapotranspiration system dehumidifies the air which makes residents feel cooler than the actual temperature.

The Vertical Farm, designed by Mithum
Does not require water from municipalities



The Living Machine



"Remember, people make pollution … If we all contribute to helping the world, people would not make pollution, there would be no global warming, and everyone would be happy. Don't be greedy, be green!"

Denisse Marquez

Grade 9, Chicago High School for Agricultural Sciences

Project Essay

The Effect of Tire's Air Pressure on Friction

When you see a car moving what makes it move? The tires are the agents that help the vehicle move while the ground actually supplies the force that moves the car due to Newton's third law of action and reaction. This is because of the laws of motion studied in the science of physics. The air pressure in the tires affects the controlling of the car. What about the energy used? Yes, the air pressure in your car's ties affects how much energy your car uses. This experiment will tell how the air pressure affects the motion of a car.

The purpose of this project is to find out how the amount of air pressure in a tire affects the frictional force the tire has. When driving a car, what keeps the car from actually moving is the ground. The purpose is to prove the hypothesis of frictional force being greater in a lower air pressured tire. The lower tire pressure makes the car harder to control. Due to the increased friction it would bring the car to a stop quicker. This is because more contact area between the tire and the ground causes more frictional force. The more frictional force, the less safe it is to drive with tires that do not have a lot of air pressure. The less air pressure in the tire, the more energy used to overcome the greater friction and therefore the more gas it will consume.

In order to complete this project, there are some steps that need to be performed. The first step was to get the materials gathered. Then, set the car's tire pressure to 40 pounds per square inch (psi) or as metric equivalent as a kilopascal (kpa). Next, set the car to go at 30 miles per hour (mi/hr). Once at 30 mi/hr, put the car on neutral. Wait until the car comes to a halt by itself. Measure the distance in meters from start to finish. Continue the same steps with the different air pressures of 35,30,25,20, and 15 psi. Finally, calculate the frictional force between the tires.

In conclusion, the hypothesis for this project was correct. The tire pressure that created more friction and stopped the fastest was the tire with 15 psi. When it comes to picking the air pressure of your car's tires, you should not have it too low or too high. The less air in the tire the more friction it has and therefore the more gas you will burn. The car was also hard to control with such low pressure because of the excessive tire surface in contact with the road. If the tires were filled with too much pressure, they would give a very poor ride and can burst when going through a pothole. The tires with the 15 psi had the most friction. That is why your tires should be at a medium air level, which corresponds to the manufacturer's recommendation of typically 35 psi (241.32 kPa).

Sustainability Essay

Save the World

The world has been facing many problems that have affected us in many ways. One of the biggest problems is Global Warming. This is a problem that we the people have caused this issue to expand.

There are many consequences to global warming. One of the biggest contributors to global warming is pollution. Pollution comes from many man made elements. One of them is right at your home. The cars everyone drives contribute to twenty-five percent of the world's pollution problem. If we the people understand that this is a great problem, why don't we do anything about it?

Sure there are many companies now promoting "going green," but there is so much more that can be done. Something as easy as your car's tire pressure can be a great part of how much pollution your car is making. This is very important now that the economy is not so great, you can save money when you save energy.

If we all knew our science, there would not be any of these problems because everyone would be able to know the main cause of a problem. In the case of your car's tires, frictional force has a lot to do with the amount of energy your car is using, which is what makes you waste a lot of money on gasoline.

The manufacturers recommend an air pressure of about 35 psi (241.32 kPa). If the tires were to be put at an air pressure of about 32 psi, there would be more energy saved.

This pollution problem has been costing many animal lives. One of the most endangered animals at the moment at the risk of extinction is the polar bear in the arctic. Global warming has caused the arctic ice to melt at earlier times when polar bears are still in hunting season. Polar bears have to now swim for great distances until they find their main food in ice bergs, the arctic seal.

The ice is melting and separating in great distances that make it hard for polar bears to make it. Specialists on tracking polar bears have found at least 10 drowned polar bears per hunting season. All of these issues come from pollution.

Remember, we the people have been causing this problem and can change the world by helping this situation.

Another component that contributes to global warming we are taking part in is filling up our landfills. By filling up our landfills we are increasing the amount of pollution buried inside earth. We are destroying many animals' homes so we can fit all our garbage we are making.

A perfect example of the future would be from the Disney film WALL-E. In this movie, it shows how all of the humans had to leave earth because of global warming and the ruling of our garbage throughout the years. There was no more room for

humans because of all of our waste and contamination. This is what earth will come to if humans do not start to take action in helping save the earth.

We need more environmental heroes. The best way that you can start is by recycling. What about the food we throw away? This can be recycled by burying the non-processed food in your own back yard. The food would then degrade and make your soil richer, and at the same time, you would be helping to save the world.

When you recycle you are minimizing the amount of garbage being thrown in landfills. Also, buy ONLY recycled products. Stop using plastic products! This is a major percentage of waste in our landfills. The worst part is that it is one of the elements that take the longest to degrade.

Saving electricity is also very important. This can save you money and also save the earth. Only use light when you REALLY need it. There are alternatives such as flashlights, candles or even lights that save more energy. If the Amish can live without using an electric provider, we also can. Try to buy as many rechargeable things instead of having them plugged in to the electricity.

When things are told to the people, only a very small percentage of people actually do what they are told. The only way all of the people would listen is by making it mandatory. Laws can help this process speed up greatly. Government needs to have much of the blame for not enforcing some of the energy bills.

One major law that needs to be passed is the "Recycling Law." Not all states/ cities have a recycling system. Government must pass a law that makes it mandatory that all states/ cities have a recycling program. Another law would be about making factories and companies not exceed a certain amount of energy being used and pollution level. And last but not least, making car companies increase the number of hybrid cars being made.

In the end, we all know we can help global warming diminish if we just try. Remember; people make pollution, pollution causes global warming, global warming causes death of animals and inconveniences to us humans also. If we all contribute to helping the world, people would not make pollution, there would be no global warming, and everyone would be happy. Don't be greedy, be green!

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"If anyone needs proof that appliances are sucking up energy when they are sitting unused, just turn off the lights one evening and watch the (Light Show); all the cool red, yellow and blue lights just blinking. This is a clear sign that our household's appliances and lights are spending money while we are not even thinking about it."

Gary R. Prichett

Grade 9, Brooks College Prep Academy High School

Project Essay

Effects of Cigarette Waste on Flora and Fauna

First I would like to state the purpose and the hypothesis of what is to be accomplished by doing this project, and a description of what I expected the outcome to be. The purpose in doing this project was to see if the toxic chemicals found in cigarette butts discarded by the trillions each year have an effect or threaten the well-being of marine life as well as the quality of our soil. The outcome is just an educated guess, but due to my prior research of the chemicals found in cigarette tobacco and the filters, I felt the Buttercrunch Lettuce Seeds would be the most effect.

For everyone contemplating the Earth's fate, it might be closer than you think! Today, the quality of the air we breathe and the water we drink, and even the food we consume does not argue well for our future health and well-being. We have polluted our air, water and soil to the point that its ability to sustain life comes into question. I think that finally we have to understand what is happening and take the necessary steps to prevent a divesting outcome of our Earth's food resources.

Cigarettes contain over 165 chemicals and 95% of cigarette filters are made of Cellulose Acetate (which is a plastic made from rayon and paper). Within one hour of contact with water such as rain, chemicals in a cigarette butt can leach out and get carried through storm water ending up in our harbors, lakes, streams, our gardens and our fields, this in turn threatens our food supply; food that comes from our oceans and our soil.

In this project I tested the effects cigarette butt litter has on marine life and soil. I used two test indicators which were Buttercrunch lettuce seeds and Daphnia Magna. I wanted to establish if the chemicals found in discarded cigarette filters along with the tobacco would effect the normal development of plants such as Buttercrunch lettuce seeds and how fast would it produce death in Daphnia Magna.

First I made a cigarette butt solution in which I soaked ten smoked cigarette for 12 hours. Then I was ready to use my test indicators. In performing the test on my Buttercrunch lettuce seed I took a ten seed starting pot and filled them with soil from my back yard. I then planted eight seeds in the soil and covered them lightly. I placed them in my kitchen window. I watered nine of them daily with my cigarette butt solution; for my control pot I used bottle water. I watched to see how many would grow. After seven days I counted how many sprouted and then recorded my data.

In testing my Daphnia Magna, which I had ordered, I set out 10 Petri dishes. In each Petri dish I placed four Daphnia Magna using a turkey baster. I poured three tablespoons of cigarette butt solution into nine of the Petri dishes, and in my control dish I used bottled water. I observed and recorded my data every hour, up to seven hours.

From both of these tests I got just the results I was looking for. My land-based test organism, which was my Buttercrunch lettuce seed, faired very well anywhere from six to seven seeds germinated. As for my Daphnia Magna, I recorded that some died or acted abnormal within the seven hours.

Sustainability Essay

Unplug your Electronic Leaches

I am very glad that I was born in a time when technology is the key to life. Technology has affected society more than anyone can imagine. The human race has gone from the prehistoric discovery of fire to the wheel that helped humans to travel. We have gone from land line phones to cell phones, from analogue TVs to HDTVs. We have gone from typewriters to text message. We are an ever moving society. Even though we are driven through our discoveries, with that comes a price to pay.

When I was given the assignment finding solutions to help reduce global warming, the first thing that came to mind was hearing my mom telling me to turn off the lights and appliances if I were not using them. At times I would have on every light in the house. Sometimes at night I fall asleep with my TV on; I play movies in my DVD player and leave it on when the movie is done. I also leave my laptop computer along with my Xbox 360 running when I have stepped away. Now I realize what she is saying. Even though these things are not in use they are still using energy. Some call this *phantom energy* or *phantom loads*. I will call it *Electronic Leaches*.

If anyone needs proof that appliances are sucking up energy when they are sitting unused, just turn off the lights one evening and watch the (Light Show); all the cool red, yellow and blue lights just blinking. This is a clear sign that our household's appliances and lights are spending money while we are not even thinking about it.

Power switches can only do so much in cutting down on the energy we use. Even if you turned off, your electronic devices they are still pulling a charge as long as they are plugged in. And while the trickle of electricity consumed by the so-called Electronic Leaches is often just a watt or two, over time it all adds up.

The problem is not the electricity, using electricity in and of itself does not affect global warming, but it is how we produce it. Most of the electricity in the United States is accomplished by burning coal. That releases massive quantities of CO2 into the atmosphere, producing the greenhouse effect that causes global warming.

According to *Coal Education.org*, "it takes one ton of coal (2000 lbs.) to make 2500 KWh of electricity. This works out to 0.8 lbs per kWh, or 720 lbs a month for a household that uses 900 KWh/mo. So it might sound trivial but when I leave my Electronic Leaches plugged in or on it accounts for about 10% of my electrical household use.

I am now more aware of what needs to be done to cut electrical cost and most of all help in eliminating carbon dioxide in the atmosphere. I have taken the pleasure of replacing all light bulbs around my house with energy efficient fluorescent ones. I read that if every American household replaces just one incandescent light bulb, 90 billion pounds of CO2 emission would be prevented from getting into the atmosphere. I also have installed power strips so I can just hit one button to turn off my TV, desktop computer, and printer. Before I leave for school I make sure my X-Box 360 and the lights are turned off.

Combining just a few of these suggestions can make more of a dramatic effect than most people understand. I have also talked to my aunt about making a few simple changes that would help prevent Global Warming.

"The earth that we all live on is hurting and by conserving energy and water we could help repair it …

Whose world is this? It is ours, and we all have to live on it. DON'T YOU CARE?"

Jaeda Branch

Grade 7, Morgan Park High School

Project Essay

Suntricity

The purpose of the experiment is to investigate the effect of using conductors with a solar cell. The goal is to be able to use less material in the solar cell since they are very expensive. The conductors used in this experiment are less expensive. The results of this experiment could possibly be added to solar designs in the future to cut down the cost of energy.

A solar cell is a device that converts sunlight to electricity (Klutz, 2002). It does not hold electricity, but it changes it to electricity when it is available.

Solar cells convert about 15% of the sunlight to electricity. Solar cells are made of silicon, which is very expensive because most of it is lost when it is cut by a saw. Other ingredients are also very expensive (Douglas 2007).

Some of the advantages of using a solar cell are that it is free from pollution; it is not hard to keep it up; it does not need fuel; it is quiet (Revkin, 2007). Some of the disadvantages of using a solar cell are it is very expensive; it is only 15% efficient; solar cells still require batteries to store the energy; Solar cells do not work well when the sun is low or it is cloudy (Revkin, 2007).

Conductors are materials that let electrons flow freely. An object made of conducting material will let energy transfer across the surface of the object. The charge comes from the moving of electrons. If a charged conductor is touched to another object, the conductor can also charge that object (Electricity Basics). Most metals are good conductors. Silver is the best conductor. Copper is almost as good at conducting as silver. Copper also costs a lot less than silver. It is the most popular material used in electrical circuits (Maki, 1999).

For this project I put a conductor (silver, copper, and tin) at a 90 degree angle to the solar panel, hooked the digital multi-meter up to the solar panel, and it told me how much energy the solar panel was giving out. This project was so much fun to do. It could be a little difficult at times but the overall experience was fun to just know I can help the environment with the things I do.

Sustainability Essay

The earth that we all live on is hurting and by conserving energy and water we could help repair it. Here are some things we could all do to help conserve energy and water.

I'll start first by talking about conserving energy.

- The first thing we could do to conserve energy is use solar panels. Solar power is a renewable energy we get from the sun. A solar cell is a device that converts sunlight to electricity.
- Whenever you get the chance to you should walk, ride a bike, or carpool to get to your destination. You can save a lot more energy this way, because by taking public transportation and using your car you are wasting a lot of energy just to get somewhere that's across the street. Also, this is a fun way to get exercise.
- You should also buy compact fluorescent bulbs. They use about ¼ of the energy regular bulbs do. They also last longer and are brighter than regular light bulbs. Only 10% of the energy consumed by a normal light bulb generates light. The rest just makes the bulb hot.
- Also, while you're sleeping turn the TV off. Why leave the TV on if no one is watching it. The only thing you're doing is running the electric bill higher.

Of course these are just some of the ways we could conserve energy. We could turn off the lights while we are not using them, but you only use the lights when it is getting dark outside. During the day we should use the SUN to power our houses. The sun is a natural resource; why not take advantage of that natural resource.

Now I will talk about how we can conserve water, indoors and outdoors.

- When you are cleaning walkways, driveways, and other entrances use a broom not a hose. Although using a hose is a lot faster than using a broom, you can think about how much water you are saving.
- Never, ever, EVER discard chemicals, pharmaceuticals, litter or motor oil down any drain or sewer.
- Fix leaks in the irrigation system.
- Apply mulch around shrubs and flower beds. This helps reduce evaporation. Now you will not have to water your garden as much as you usually do.
- Turn off the water while brushing your teeth or shaving.
- Fix leaky faucets or toilets.
- Install a low flow shower head.
- Run your washing machine or dishwasher only when full. Rinse dishes in a sink full of water. If you do have a dishwasher, use that because it saves more water than washing your dishes by hand.
- Last, while waiting for your bath water to get warm put a bucket under the faucet. Use that water to water your plants with.

These are some of the ways we can conserve energy and water. I hope you use these ideas around the house. Any little thing we do can help the earth.

Whose world is this? It is ours. And we all have to live on it. DON'T YOU CARE?

"Global warming is approaching, and we should figure out some ways to stop it.

[There] are three ways I can help stop global warming. Everyone else can help in these ways, too. I recycle, reduce and reuse on a daily basis.

Help save our planet!"

Jennifer Nelson

Grade 9, Chicago High School for Agricultural Sciences

Project Essay

Can Solar Panels Be Made More Efficient?

Purpose:

The purpose of this project is determine if it's possible to increase solar panel output by modifying light representation to the panel. One of the three solar panels will have mirrors on two sides. One will have magnifying glasses covering it. One will be a regular solar panel. The reason this project is being done is to figure out which will generate the most energy when added to a solar panel.

Procedure:

The procedure of this project is to first gather all materials. Next, set all three panels out on a table next to each other. Third, record the data to ensure that each solar panel generates about the same amount of energy. Then cut the wood as needed to build two solar panel stands. On one stand, attach two mirrors to each side. On another stand, attach five full sheet magnifying glasses. Attach the controlled solar panel to an easel. Mount one solar panel to each stand. Then, clip the multi-meter to the solar panel wires. Set the multi-meter to VDC (Volts Direct Current). Finally, record the data three times a day for three days.

Conclusion:

The hypothesis was partially correct. The mirrored solar panel did not produce the most energy due to the mirrors blocking the sun for half of the day. The controlled solar panel ended up producing the most energy. The magnified solar panel produced the least amount of energy. The magnifiers blocked the sun from reaching the panel, and drowned most of the energy from it. The solar panel did not receive all of the energy from the sun.

Sustainability Essay

What Can I Do to Reduce Global Warming?

Global warming is approaching, and we should figure out some ways to stop it.

Recycle

I think a great way to help stop global warming is to recycle. Recycling is the process of taking a product after its original use and using all or part of it to make another product. Recycling keeps valuable items out of landfills and uses it for another purpose. It prevents hazardous materials and chemicals in our landfills. The U.S. EPA estimates that 75 percent of our waste is recyclable. By recycling, we can reduce the amount of energy used in the production of new products. If you start to recycle, you can help save our earth from global warming. I have recently begun recycling in my own home. Ever since the city has passed out recycling garbage cans to each of the houses, my family has been filling up our recycling bin more than our garbage

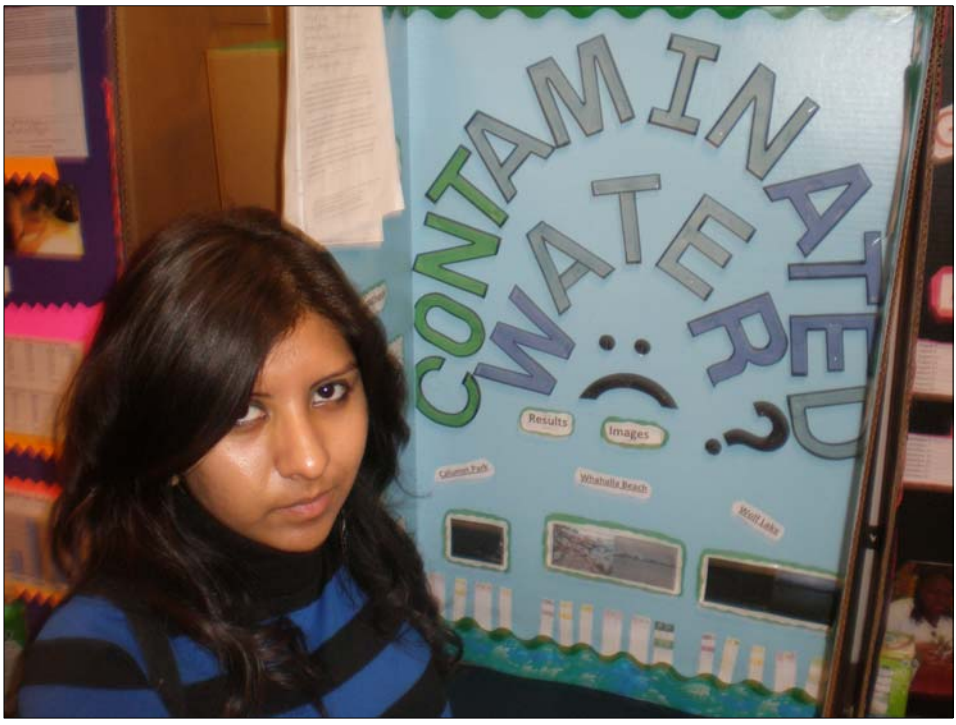
can. This is just a small step for our community, but the little things can make a big difference.

Reduce
Another way to help stop global warming is by reducing the items I use daily. Reduction is the process of making something smaller or using less, which results in a smaller amount of waste. By reducing you are conserving, which uses natural resources wisely and uses less than usual; therefore, it conserves waste. One way I can reduce and conserve is by buying only what I need. Also, I need to use all of what I buy. If I only use a small portion, I save it for some later use. I can precycle by choosing a product that is packaged in something I can easily recycle. If you buy things in bulk, you reduce the amount of packaging used. At school we are using vermiculture with worms. This means we can reuse the food people do not usually eat and feed it to worms. This cuts down on the food waste that goes into landfills.

Reuse
You can reuse materials in their original form instead of throwing them away. When I go to the grocery store, I keep the bags my food comes in. I use them for many other purposes other than just to carry my groceries. When you go out, you should carry your own cup or mug instead of using a disposable one. This reduces the waste of the disposable cups. When you decided to replace some large and reusable, be sure to give the old one to charity instead of just throwing it away. I also reuse my materials by giving my old clothes away to charity, or by having a garage sale. This way I am not throwing away my old clothes and toys, I am giving or selling them to somebody else who is interested in them.

These are three ways I can help stop global warming. Everyone else can help in these ways, too. I recycle, reduce and reuse on a daily basis.

Help save our planet!



"We have taken our lakes, as well as our environment, for granted many times. We need to begin making movements and speaking our concerns about the degradation of these habitats. The disposing of wastes in lakes is a very common action that needs to cease."

Karen Ramirez

Grade 12, George Washington High School

Project Essay

Contaminated Water?

My science project, named Contaminated Water, is about the amount of chemicals that one can find in different lakes and in different areas: Lake Michigan and Wolf Lake. The many factories that surround this area have disposed their wastes in the lakes without the concern of how much it will affect them. For this reason, I became curious of the amount of chemicals found in this area.

I had hypothesized that the area of Lake Michigan found in Calumet Park was the most contaminated chemically. This is due to the amount of factories that surround the lake in this area and could be disposing their wastes in the lake. It is also due to the amount of waste disposing that I have seen done by many visitors in my previous visits. I believe that Wolf Lake will be the second most contaminated due to it being a much smaller lake without the flow and connection to any other body of water and consequently allowing the chemicals and toxins to be more concentrated in the area. I have also seen green foam form on the surface and edges of rocks around the lake that has led me to believe that this lake is greatly contaminated.

I collected water samples from Wolf Lake and two distinct areas from Lake Michigan. I then tested each sample three times for pH and total alkalinity, copper, nitrate and nitrite, free and total chlorine, iron, and total hardness. I dipped each strip for a couple seconds and immediately comparing the color with a table that I had to measure the amount of chemicals found. I then recorded my results.

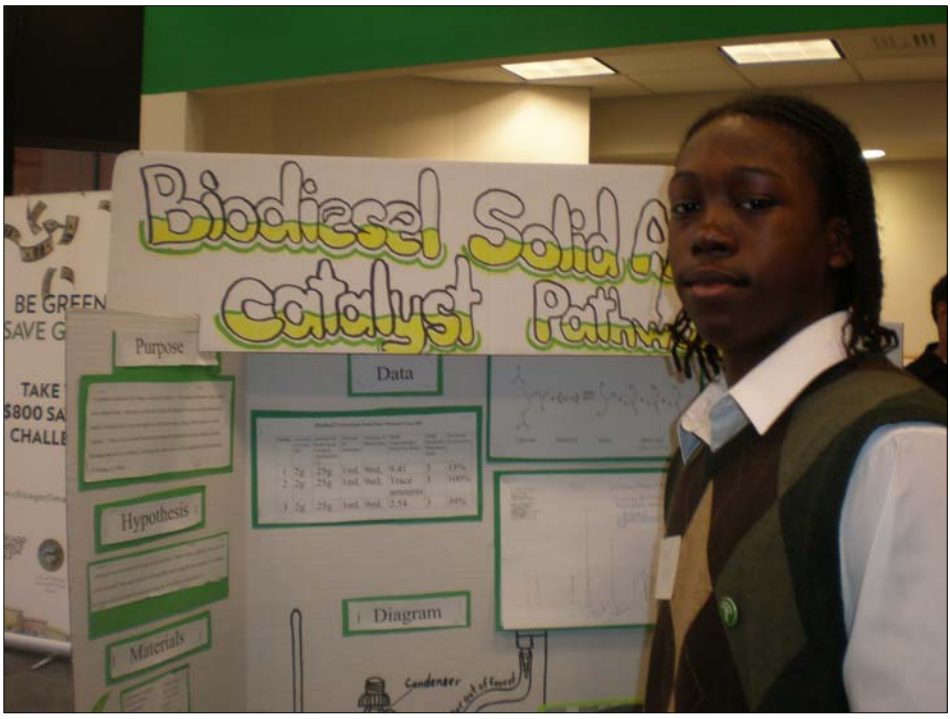
Based on my results, I have concluded that the water found in Lake Michigan in Calumet Park is the most contaminated out of the three. It had higher levels of alkalinity and of total hardness. The total hardness however, is not necessarily harmful due to it just being the amount of minerals found in a body of water. Alkalinity, on the other hand, can have a negative effect on someone who would be drinking water that had high levels of it. After a certain amount of time, alkalinity may cause illnesses such as cancer.

Sustainability Essay

We have taken our lakes, as well as our environment, for granted many times. We need to begin making movements and speaking our concerns about the degradation of these habitats. The disposing of wastes in lakes is a very common action that needs to cease. We have seen the negative affects they have on our community and on the habitats on the species that live in these lakes. We can help by not disposing our own wastes in our lakes and help clean them. We can also become involved and write petitions to stop these major companies from disposing their wastes into our lakes.

For years humans have degraded the Earth many times without realizing it. We have disposed our wastes in lakes, have not done an effort to recycle or try to minimize the amount of waste we produce, and have preferred to live a life of comfort instead of realizing and helping the environment. However, we can help maintain the environment as a healthier place. With many different actions, some being extremely simple, we can slowly, but surely improve the situation which we have put our world through.

There are many different ways we can help improve the environment. One way is by recycling. We can recycle plastics, paper, cans, aluminum, and batteries. We can also reuse these items such as purchasing rechargeable batteries or plastic reusable bottles in order to reduce the amount of production and use of natural resources for the regular ones. If we want to clean and help maintain our homes, offices and schools clean, we can use eco-friendly natural cleaning products that reduce the amount of chemical release in the atmosphere. For transportation, we can purchase hybrid vehicles, carpool, or use bicycles and public transportation to reduce the amount of emissions released by the vehicle.



"The use of biofuels reduces the amount of money spent on gas, and it also reduces the amount of toxins from regular oil. Vehicles will run better and be more efficient.

Every one on earth will be happier because they are saving money, living in a healthier environment, and reducing greenhouse gases; therefore, reducing global warming."

Leander Gibbs

Grade 11, Marie Sklodowska Curie Metropolitan High School

Project Essay

Biodiesel Solid Acid Catalyst Pathway

My purpose of this experiment was to produce biodiesel using a solid acid catalyst. I know many people were affected by the increase in gas prices, and it has many Americans looking into biodiesel as an alternative fuel source for their cars. Gas prices are reaching a national high. With the state of the economy today, biodiesel using a solid acid catalyst is a sure win to helping the world.

Furthermore, I believe our environment is affected by a lot of the harmful fuels and pollutants used today. These pollutants go into the soil and harm our environment. Biodiesel using a solid acid catalyst is one of the safest things to use that will help our environment. The following is the procedure and will help anyone who has an interest in biodiesel solid acid catalyst explore the subject.

Procedure:

First, I measured out 2.0 grams of Wesson corn oil, 0.25 grams of Amberlyst 15 using an electronic balance. Then, I measured out 1ml of methanol, 9ml of Mesitylene using a graduated cylinder and an electronic balance. I mixed it all together in the Florence flask and connected the Florence flask to the condenser that is connected to two rubber tubes. Then I attached one tube to the faucet and the other rubber tube was connected to allow the water to flow into drain. Next, I plugged in Stirrer and the warmer and set both on 3. I then let the solution mix for 24 hours.

After 24 hours I turned off the reaction. I then performed the wash test by inverting the biodiesel using 25ml of hexane and 25ml of DI water in a separatory funnel. I later decanted the bottom layer; I repeated steps, each time just not adding additional hexane for 4 five-minute increments. After the last five minutes of decanting bottom layer, I then poured the solution into a beaker. I added three (wood splints) of Sodium Sulfate to the biodiesel and then filtered it through a funnel with filter paper. After it had filtered all the way completely, I let it sit for an additional 24hrs. After the 24hrs it was then taken to UIC to detect the biodiesel molecules using a Nuclear Magnetic Resonance (NMR) machine.

Based on my results from the three trials, 100%, 15%, and 39% I was able to prove that biodiesel could be made from solid acid catalyst Amberlyst 15. Although my trial percents of triglycerides conversion to biodiesel varied so much, I still believe my next attempt at this experiment will have better results.

In conclusion, biodiesel made the acid catalyst way is a great science experiment. I enjoyed learning all about biodiesel and I hope this experiment helps those who wish to continue this experiment. Biodiesel made the acid catalyst way may just be the answer to going green and helping save our environment.

Sustainability Essay

Global warming is now the leading result of most of the greenhouse gases. Some of the effects of global warming caused by green house gas are also the cause of many of our glaciers melting. As a result of this, the earth and many of its cold climate habitats are becoming hotter and hotter. The more and more the glaciers melt, the higher the sea level rises making it more dramatic when a disaster like Hurricane Katarina occurs.

One way in which we can reduce global warming is to reduce the amount of energy used throughout the world. According to Barack Obama and Joe Biden, their solution to solving the global warming epidemic crises is to make plans to cut and reduce the energy uses that are apparent in this day and age.

Barack Obama and Joe Biden are going to implement a strategy to reduce the amount of oil that is consumed by vehicles in the U.S. They are planning on giving out 4 million dollars to support auto companies in their use of reducing oil consumption in vehicles.

Barack Obama and Joe Biden are also looking into biofuel infrastructures in which they can modify the use of [fossil] oil in vehicles to plant oils in vehicles. They expect by 2030 that they will have at least 60 billion gallons of biofuels. They are also implementing by 2010 that they will reduce the carbon used in cars by five percent and in five years reduce the use of carbon by ten percent.

The public will like this because now they will be getting more gas and mileage for their cars, which will make purchasing a new car worth while. I am a big fan of biofuels since I did my experiment on it.

I believe I can reduce global warming by using biofuels. Biofuels are great in helping the economy and also global warming. It is natural oil that comes from plants. It also reduces carbon dioxide and carbon monoxide emissions. The use of biofuels reduces the amount of money spent on gas, and it also reduces the amount of toxins from regular oil. Vehicles will run better, be more efficient, and every one on earth will be happier because they are saving money, living in a healthier environment, and reducing greenhouse gases; therefore, reducing global warming.

"... all of this cannot be done without the help of the community. Yes, you, the people of today. You can be these inventors of new technologies and methods of saving our planet. You can take the small steps right now and prevent a tree from being cut down somewhere else on this earth. Involve your family, your school, or your whole community into this project. With this, you are making history. There is no good time like the present to be making change from 'sea to shining sea.'"

Lucy Zhuo

Grade 8, Whitney M Young Magnet High School

Project Essay

Organic Sanitizers vs. Chemical Sanitizers

In general, my project dealt with chemical and organic sanitizers against one of the most common bacteria on a child's hand, E. coli. The reason I did this type of project was because the chemical sanitizers were widely used but had huge side effects against the human body and environment, while the organic matter was biodegradable and was not harmful to the human body.

The purpose of this experiment is to test organic sanitizers against chemical hand sanitizers because chemical sanitizers are toxic when ingested and hurt the environment if they are not treated properly. My hypothesis was that the Triclosan 60% would prohibit the growth of the most bacteria.

How I did this project was I first created fresh juices from the garlic, onions, jalapeno peppers, and lemons (organic sanitizers) using a juice maker. Then I separated the chemical sanitizers into separate beakers as well (Triclosan 15%, 46%, and 60%, and Ethyl Alcohol 62%). Afterwards I soaked sterile disks into every solution. While they were soaking, I labeled the Petri dishes and spread E. coli onto the growth medium on the Petri dishes using an inoculating loop. After the several minutes of soaking were up, I took the disks out and placed three disks of each solution on the corresponding plates of four trials. I placed the dishes in an incubator at 37 °C for three days. Afterwards, I drew an approximate zone of resistance, which is the extent where the solution prohibited the growth of the bacteria and recorded the data.

In conclusion, the Triclosan 60% (chemical sanitizer) did prohibit the most growth. The garlic was the strongest after all the concentrations of Triclosan, and then came the lemon and then the ethyl alcohol. The only solutions that didn't prohibit the growth of anything were the control (water), onion juice and jalapeno pepper juice.

Sustainability Essay

Every action has a consequence and it is no secret that the humans of this earth plotted global warming on themselves. Global warming is now a worldwide concern that has everybody thinking of ways to stop it and prevent it. Signs such as melting polar ice caps, hotter than normal summers, and more unusual holes in the ozone layer are hints that a serious meltdown may eventually affect this earth. But how can we stop it? It has gotten so big; I believe not a single solution, but many small solutions revolving around.

Like the way global warming occurred, small steps can be taken to lower the costly effects. For example, small actions like unplugging the cell phone charger cord from the electrical outlet when it is not being used, or turning off the lights when they are not needed. Taking walks, carpooling or taking public transportation instead of riding in separate, gas-hungry, pollution making cars can benefit the air.

Taking a longer run to recycle some paper and plastic instead of just dumping it in the nearby trash bin can also save quite a bit. Research shows that to make each Sunday's newspaper, more than 500,000 trees are cut down. However, if all of our newspapers were recycled, we could save about 250,000,000 trees from destruction.

As for plastic, people more commonly carry around plastic water bottles instead of reusable bottles; in fact, there is probably not one person who has not seen some form of plastic water bottle every day in his or her life. The fact is, about 250,000,000 bottles are used per hour, and most of them are thrown away into the trashcan to be sent to a landfill or an incinerator. We can try to find ways to recycle man-made substances such as plastic into things that could be useful in our lives and not waste more energy on making new plastics and throw out the old.

Of course, these are just the small steps. The larger steps are to find alternative ways to reverse the effects of global warming. For example, Obama's plan to fund research for alternative energy sources is a step in the right direction. Using renewable sources of energy such as the sun and the wind can not only decrease the amounts of carbon dioxide in the air, it can also provide a sure way of knowing in the future that when coal or gas runs out, the future generations will have a source of energy.

New inventions are also beneficial. Inventions are created to either make human lives easier or to benefit human society. Smog eating cement, CFL bulbs (compact fluorescent light bulbs) and hybrid cars are examples of the latest inventions that have helped society walk closer to a solution. Perhaps future technology such as hover cars can help contribute to the air pollution mess as well.

However, all of this cannot be done without the help of the community. Yes, you, the people of today. You can be these inventors of new technologies and methods of saving our planet. You can take the small steps right now and prevent a tree from being cut down somewhere else on this earth. Involve your family, your school, or your whole community into this project. With this, you are making history. There is no good time like the present to be making change from "sea to shining sea."

"We need to change right now in order to start helping our dear planet …

You see all we need to do is take action and stop making up excuses! We also need to collaborate despite our differences! Everything else will appear as we show the initiative to change for the better!"

Margarita Santamaria

Grade 8, Donald Morrill Math & Science Elementary School

Project Essay

Foil's Efficiency on a Solar Cell

Purpose

The purpose of this experiment is to make this solar panel more efficient by increasing the amount of light that is converted into electricity.

Procedure

On the back of the solar panel connect the PV cell connectors. From left to right connect 1 to 3, 2 to 4, and 4 to 6. Place the solar panel in its stand imitating the angle of a roof. Connect the motor to the back of the solar panel on 1 and 2. Connect the black lead and red lead to the multimeter and the back of the solar panel. If they do not stay in place, secure them with the alligator connector. Place lamp above the solar panel. Turn on the lamp and record. Turn off the lamp. Place foil square on the border of the solar panel, secured. Turn on lamp, record data. Turn off lamp.

Conclusion

The hypothesis was supported because according to the results a solar panel with foil does generate more volts than a normal solar panel. The results are logical, while light can either be absorbed, pass right through, or be reflected, the light that would normally be reflected would then be reflected to the solar panel, generating electricity.

Sustainability Essay

Let's Change Now!

Global warming is a big issue right now, and we need to take action! We all know what we need to do. We have heard it too many times to not know, but there are certain obstacles that we ourselves have placed that don't allow us to take action!

One thing holding us back from saving our planet is our inability to change. Most of us resist change with every inch of energy we have, and we try to keep things the same. We need to change right now in order to start helping our dear planet.

We have all wanted something, and we have all gotten it if we really wanted it. There was nothing standing in our way. If there was, we destroyed it. So we should easily be able to recycle and drive less. We have no obstacles or excuses except the ones we ourselves put in our way. We need to use our will power to change and take action!

That is not the only thing that is holding us back. Our refusal to work together is another obstacle.

We all need to work together to start helping our planet and ourselves. We need to encourage other people to recycle and drive less, and we also need to do it. You are

probably thinking, who cares what anybody else does, at least I'm recycling and driving less. But these are selfish thoughts, ignorant thoughts.

If you ponder on the problem of global warming, you'll see that the more people recycling, the greater effect it will have on the environment. So we all need to encourage our family members, neighbors, community, and city, in other words everyone. We need to put our differences aside and collaborate to help our planet!

You see, all we need to do is take action and stop making up excuses! We also need to collaborate despite our differences! Everything else will appear as we show the initiative to change for the better!

"I challenge you to see what YOU can do to reduce global warming.

There are solutions out there, but they need to be designed and brought to market. We need more of our American children to be involved in science education. Creativity should be encouraged and programs developed to help our young think, 'What if?'"

Mark J. Banik

Grade 9, Chicago High School for Agricultural Sciences

Project Essay

Which Liquids Produce the Most HHO Gas?

The purpose of this experiment is to determine which liquids best produce 2H2/O2, known as hho gas, from a hydrogen fuel cell.

This researcher's hypothesis is that food grade hydrogen peroxide will be the best liquid for producing what is known as hho gas.

Background:
Brown's gas was named after Yull Brown, who is known to have filed a patent for the process of electrolysis of water (H2O) on July 19, 1974, and issued the patent on March 29, 1977, in order to produce separate hydrogen and oxygen gas, what is commonly known today as hho gas. There has been much debate over who invented the process, since William A. Rhodes filed for a patent on March 16, 1962 and the patent was issued on July 26, 1966.

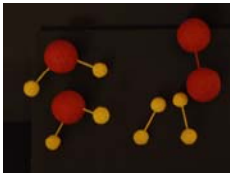
Process:
By spending time I was able to create a hydrogen fuel cell that would split water molecules into its respective parts. Starting with water, H2O, and using a process called electrolysis, I was able to split the water molecule into two hydrogen and one oxygen molecule, 2H2/O2. Since the production was not very significant, I decided to test using a variety of electrolytes to see which one would produce the most gas.

I was able to able to produce enough gas in a 3 minute time frame and was able to collect it in a water bottle to do an ignition test, which proved successful. (See picture below.) One would think, why would someone even think of doing this kind of experiment?

Since most combustion engines use petroleum based products, I was wondering if I could produce a small enough amount of combustible gas that would be useful in powering that type of engine. Since I do not drive or own a car, to experiment on the best thing I could do for a test was to see if it would ignite. If you were able to see the short video I made, you would believe it is possible to produce enough gas in a 3 minute time period.

I feel this project could be retrofitted into the production of a clean burning fuel that could someday be used in combustion engines. Then a major portion of smog could be reduced or eliminated. The reason is that hydrogen and oxygen, when combusted, produce water as an end result; thus no pollution. I will continue working on this project because I need to build a gas torch so I can build a distillation tower for next year's project. I plan to take switch grass and create a flex bio-fuel, similar to E-85, which would be less polluting than current carbon-based petroleum products. But that is a topic for next year's project.

I will continue my work of creating an Electronic Pulsing Device, which hopefully will be more efficient in the production of hho gas without the need for any additional electrolyte. The advantage of being able to produce more hho gas is it can also be used for welding or cutting of various materials. Best of all, it contains no impurities so it will keep the glass clear in the creation of the distillation tower for the switch grass experiment. Also, the gas can reach temperatures required to build the distillation tower without using gasses that could be toxic.



On the left are two water molecules and on the right side you can see the end resulting hho gas or 2H2/O2 gas.

Combustion test of hho gas – 2H2/O2 gas; you can see the hydrogen & oxygen are together since the entire bottle lit up at one time.

Sustainability Essay

A Green Planet or a Greenhouse Planet?

You make choices each day! I challenge you to see what ***YOU*** can do to reduce global warming. Businesses cannot solve this problem alone. We need your help. The President and Vice-President have put together a great plan, but we as Americans must read, understand, and embrace it, and know how we can help.

The world is covered with mostly water; marine life will be the first affected by global warming. You do not need to live by the ocean to realize that a few degrees in temperature change can be extremely hazardous to a coral reef and sea life.

If we really must drill for oil in the sea, let's do it in a way that does not cause problems to marine life. Only someone who owns stock in oil companies wants to look at an oil rig in the ocean. There are many places that have not been looked into as sources of oil; the companies that hold this land should either develop it or sell it to someone who can.

As Americans we may be addicted to oil because nothing else has been developed to fuel our vehicles. What we must realize is all modes of transportation can be made more efficient by using different building materials. If a plane's hull were made of a sustainable material stronger than steel but weighed a lot less, it would use less fuel. The same goes for trains, trucks, buses and cars.

There are solutions out there, but they need to be designed and brought to market. We need more of our American children to be involved in science education. Creativity should be encouraged and programs developed to help our young think, "What if?"

I was able to display my unique science fair project at the first museum of its kind, created by people who are encouraging young minds to think outside the box to

solve problems. Allen Rubin and Catherine Corbin introduced me to this museum called National Green Museum and National Environmental Hall of Fame.

It only takes a few minutes to start saving energy. If you drive a car, maintain the proper tire pressure, which will save gas and money. If you change your car's air filter, change its oil, and keep it well maintained, you will save in the long run by not having to replace the car so soon.

If you have the money and want to help contribute to clean air and use less fuel over the life of the vehicle, you can look into getting one of the new hybrid vehicles. I'm a big fan of the electric car to use for driving short distances each day. I also like the Tesla electric car, 0-60 in 4 seconds (Sweet!). On the other side, take some time on weekends and plan a bike trip. The exercise is good for you.

By recycling you helping the environment because it uses less energy to make an aluminum can from recycled cans vs. from scratch. If you take your cans to a metal recycling center, i.e., junk yard, they will give you money for doing so.

Insulating our homes saves energy. We will be warmer in winter. Each gap filled keeps heat in so we use less energy to heat the house. We need to build or modify homes to include solar panels, and we need to build appliances that are smart, quiet and energy efficient.

If you can, there are some very good cordless lawn mowers out there. Also, don't just throw those grass clippings away. Create a compost pile. Add your coffee grounds and vegetable scraps. Turn it over on daily so the bacteria and enzymes have a chance to break down the compost into rich soil you can use to grow your own vegetables.

A group challenged to create a farm stand in the city that would raise their own fish, use the water from the fish to water the vegetables, and grow fresh food in an urban setting. They proved it could be done. It was cost efficient and able to compete with food that had been shipped into the city from local farms. Their thought was to grow it where the market is. We have a similar set-up at my high school.

Bottom line is, we are all in this together. If we can build a high speed rail system we could move people and goods faster in some areas. We do not need to do everything today but this all starts with a leap of faith. With small, continuous steps, we will get to where we need to be. The problem is the alarm bell has been ringing for sometime, but a few have said to just stay in your seats, it's nothing.

We now know that is not the case, and we really need to act now. We need to plant trees to help put more oxygen in the air and at the same time find a way to cut or eliminate Greenhouse Gas Emissions. The US needs to be the leader showing other countries it can be done. We need to once again become a manufacturing leader in this new industry and put Americans to work in this promising new field. Somehow this outsourcing of jobs to other countries needs to stop.

"With the Obama-Biden plan for taxing CO2 emissions, it would mean fewer emissions, more cash for environment-safe programs, and cleaner air for America."

Mark Sikorski

Grade 9, Williams Preparatory High School

Project Essay

The Effects of Acid Rain on Bean Plants

This experiment is about how acid rain affects the growth of dry bean plants. This experiment will show how to create a stable environment for dry bean plants. Additionally this experiment will show the connection between dry bean plant growth and acid rain the environment.

Acidity is measured using a scale called the pH scale. This scale goes form zero to 14. Zero is most acidic and 14 is the most alkaline or basic. A pH value of 7 is considered neutral, which means that it is neither acidic nor basic. Very strong acids are hazardous and will cause burns if they come in contact with skin. Furthermore they will react with many metals causing erosion of the metal. Acid rain has a pH of 4 to 5 which is considered a weak acid and will not cause burns when it comes in contact with skin.

Rain is always slightly acidic because it mixes with naturally occurring oxides in the air. Unpolluted rain would have a pH value of between five and six. When the air becomes more polluted with nitrogen oxides and sulfuric dioxide the acidity can increase to a pH value of four. The pH of lemon juice is about 2.3 and that of vinegar varies between 2.3 and 3.2 yet these substances do not cause harm to human skin. Therefore why is there so much concern about acid rain? Some acid rain has been measured with a pH of two.

Acid rain can be carried great distances in the atmosphere, not just between countries but also from continent to continent. The acid can also take the form of snow, mists, and dry dusts. The rain sometimes falls many miles from the source of pollution but wherever it falls it can have a serious effect on the soil, trees, buildings, and water.

Forests all over the world are dying and fish are dying due to the impact of acid rain. In Scandinavia, there are dead lakes, which are crystal clear and contain no living creatures or plant life. Many of Britain's freshwater fish are threatened; there have been reports of deformed fish being hatched. This disrupts the natural food chain impacting to fish-eating birds and other animals further down the food chain. Is acid rain responsible for all this? Scientists have been doing a lot of research into how acid rain affects the environment. Acid rain has its greatest impact on aquatic habitats Acid rain runs off the land and ends up in streams, lakes and marshes.

Beans are an important crop for human societies. They provide humans with nutrients and vitamins. Dry beans are an important part of a healthy diet. They grow by sprouting and then spreading roots. There are four key factors which affect the growth and survival of bean plants. The four factors are air, soil, sunlight, and water. Soil provides a foundation for the plant and provides the reservoir for the plant. Soil

pH influences the availability of these nutrients. The more acid the less able the plant is to receive the proper nutrients.

In conclusion, in this experiment the research shows how dry bean plants would grow in an acid rain environment. This research also shows how bean plants react to harsh environments that result from acid rain.

Sustainability Essay

Reducing Global Warming Impact

To reduce America's CO2 emissions would mean a lot of change for the nation. CO2 emissions are natural gases given off in the carbon cycle. However, with the start of human activity, carbon emissions have increased greatly. In 2005 the CO2 emissions have gone up by 35% after the invention of modern machines (2).

One may say that of course carbon emissions would increase greatly over 100 years. On the other hand, one may rebuttal that yes they would go up but, if these numbers continue to rise, eventually the world's supply of oxygen will decrease. One way to solve the nation's problem of CO2 emissions would be to allow the EPA to create strict rules that insure American health (1).

CO2 emissions are not safe for our environment. With more companies dumping their waste into our air, it is causing lots of problems for America. CO2 emissions can cause health problems like asthma, cancer, and bronchitis. These health illnesses are avoidable deaths. With CO2 emissions being pumped into the air by 2020 there will be over 8 million preventable deaths (3). CO2 emissions are something, if dealt with properly, can be a great thing. Unfortunately, America hasn't been dealing with CO2 emissions correctly. With the Obama-Biden plan for taxing CO2 emissions, it would mean fewer emissions, more cash for environment safe programs, and a cleaner air for America.

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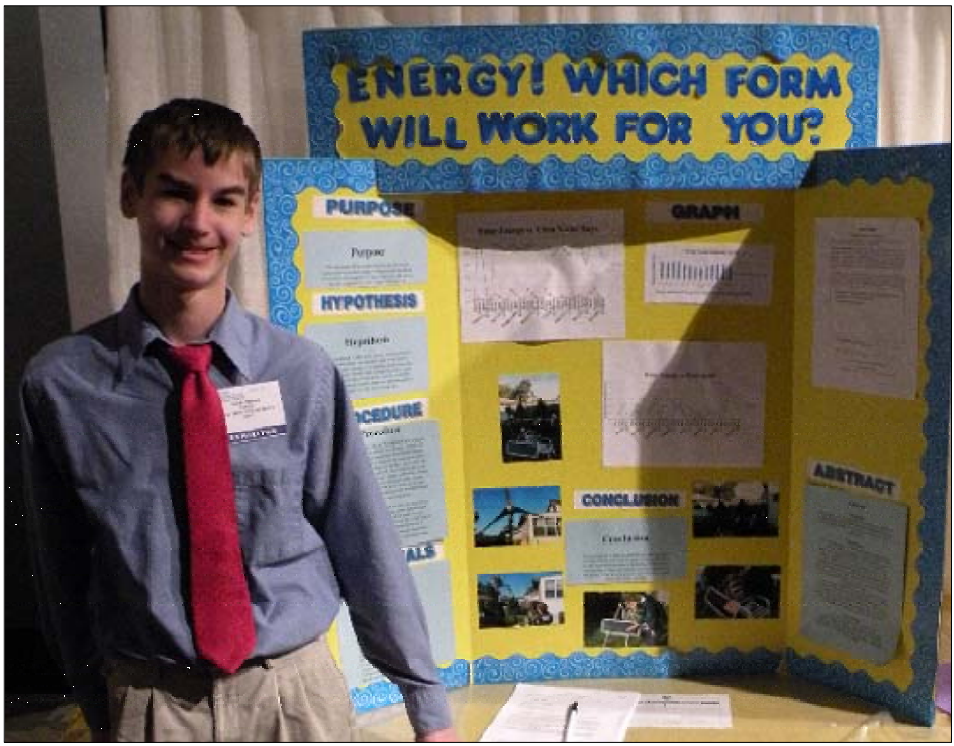


"I will do everything I can to help out the environment and to help reduce global warming. I will also try to think up new ways to help reduce global warming and to get people to help, too."

Matthew Nelson

Grade 8, George F Cassell Elementary School

Project Essay

Energy: Which Form Will Work for You?

Purpose:

The purpose of my experiment is to see which source of renewable energy will generate the most electricity in a typical Chicago backyard. My home sits on a typical 38.1x9.1 meter Chicago lot.

Procedure:

First we called the City of Chicago and got a digger number. Using a windmill we already owned, we bought a 3.04 meter steel pole from Home Depot. We hunted for quite a while in the garage for drill bits. Once we found them we drilled 3 holes into the pipe so the wires can get out. We pounded the steel pipe into the ground about 1 meter. After that I lined the holes we drilled with electrical tape to protect the wires and fed the wires through the holes and out the top. Then we connected those wires to the windmill and attached it to the top of the pole. We placed the solar panel on an easel to angle it so it faces more toward the sun. At predetermined times I would record the voltage from both energy producing devices, and UV rays and the wind speed as a form of measuring the environment. I connected a multi-meter to the wires that were connected to the windmill and solar panel and recorded my data.

Conclusion:

In conclusion, I determined that for the average Chicago backyard, solar energy is more efficient for the typical homeowner. Utilizing wind power consistently within city limits would require very tall poles in backyards which may interfere with birds and other wildlife.

Sustainability Essay

Global warming is the rise in average temperature of the Earth's near-surface air and oceans since the mid-twentieth century and its projected continuation. Global surface temperature increased 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during the last century.

The Earth's climate changes in response to external forces. This includes changes in greenhouse gases concentrations, variations in Earth's orbit around the Sun and changes in solar luminosity, and volcanic eruptions. The destruction of stratospheric ozone by chlorofluorocarbons is sometimes cited in relation to global warming. Our level of CO2 in the atmosphere has not been seen since approximately 20 million years ago.

I plan to help reduce global warming by not using as much electricity or use renewable energy resources as my main way of getting electricity.

I will use my feet or a bike as my way of transportation when it is not a far distance to get where I need to go. Also, if I can, I will use public transportation more. I will

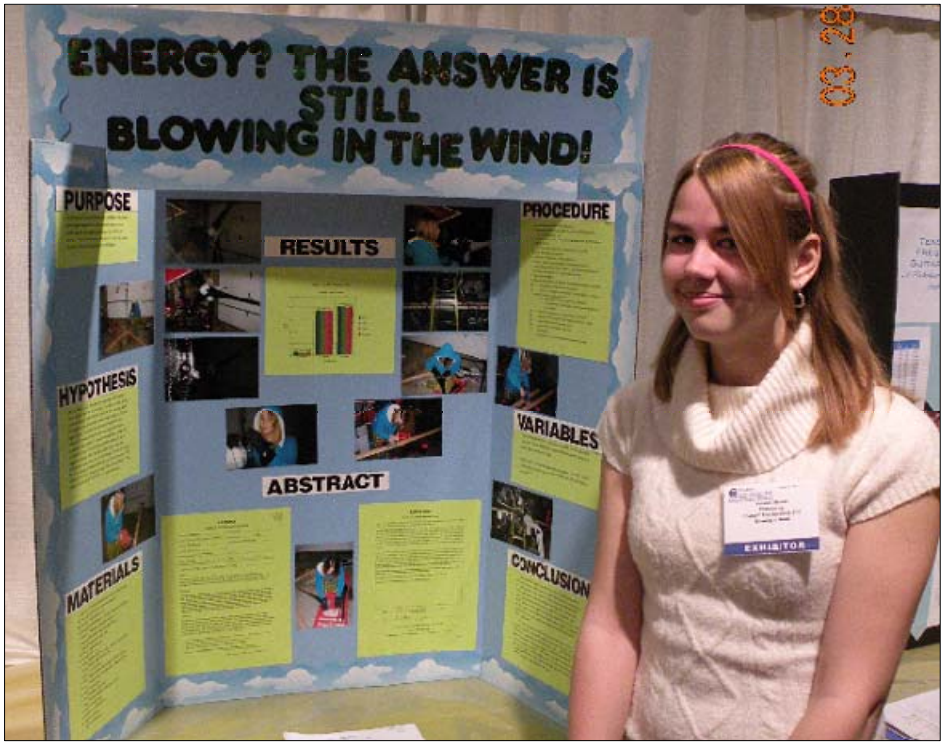
use it because if everyone drove their own car, a lot of fossil fuels would release CO2 into the atmosphere. But with public transportation more people can ride in one bus, or something else, that can bring multiple people to places they want to go to.

For my science fair experiment, I tried to see which would work better for giving power to your house. So if I can get enough electricity out of it, I would use that instead of nonrenewable resources. I will try to use other renewable resources if I can, too.

I recycle whatever is able to be recycled. And even see if new things can be recycled or just things that I did not know can be recycled and recycle them. Along with that, I will try not to waste anything and use everything to its full extent.

I will do everything I can to help out the environment and to help reduce global warming. I will also try to think up of new ways to help reduce global warming and to get people to help, too.

I hope many people will do the things I plan to do and even do things they think will help the environment even better than what all my ideas will do.



"People are looking at the cost for energy and have decided to generate their own wind power. Many companies purchase the extra energy from these people and use it to power more homes. This is even better for the people who have bought their own wind turbine; they will earn back the money they spent and have enough energy to power everything in their house and whatever else they want to power."

Melissa Nelson

Grade 11, Chicago High School for Agricultural Sciences

Project Essay

Energy? The Answer Is Still Blowing in the Wind!

Purpose:

The purpose of this experiment is to compare the power generating capabilities of aftermarket wind turbine blades against the original equipment manufacturer blades. This will demonstrate whether or not it is worth the extra cost of purchasing different blades.

Procedure:

Purchase blades. Measurements were made on a 5.08cm x 7.62cm x 2.44meters board and it was cut in half. Three holes were drilled into the board to feed the wires out of the pipe. The flange was screwed onto the pipe. The wires were fed through the pipe and board. Drywall screws were used to attach the flange to the board. The two halves of the 5.08cm x 7.62cm x 2.44meters boards were attached to the flange, making an "X" to support the windmill. The stepladder was opened and two 2.54cm x 5.08cm x 2.44meters boards are placed across the ladder. The two boards are duct taped to the ladder and each of the eight fans is attached to the boards using duct tape and/or clothesline. Attach the windmill blades and record data. The last step is repeating for each windmill blade set.

Conclusion:

My hypothesis was partially incorrect. My hypothesis was incorrect because the 73.66cm blades produced the most energy in a wind turbine. The 73.66cm blades were the largest blades tested, which gave it an advantage in being able to grab more moving wind and produce more energy. My hypothesis was correct because the original equipment blade did the worst out of the three blades. The other two aftermarket blades produced about 4 times as much energy as the original equipment blade at the same wind speed.

Sustainability Essay

One way to stop global warming is by using alternative energy sources. A few alternative energy sources are solar power, wind power, and hydro power. Alternative energy can be widely produced with basic equipment and naturally basic processes. It is a cheaper and more Earth friendly energy.

Solar is defined by Webster's Dictionary as, "utilizing the sun's rays especially to produce heat or electricity." Solar energy can be obtained in numerous ways. One way to obtain solar energy is to use solar panels. Another way to use the sun to make heat is glass for a greenhouse. The glass around the greenhouse makes a perfect way to bring heat in without letting it escape.

Wind energy is a form of solar energy that can be used to power water pumps and generate electricity or heat. Wind turbines with only two or three aerodynamic blades have replaced the windmill. Webster's Dictionary defines wind turbines as, "a wind-driven turbine for generating electricity."

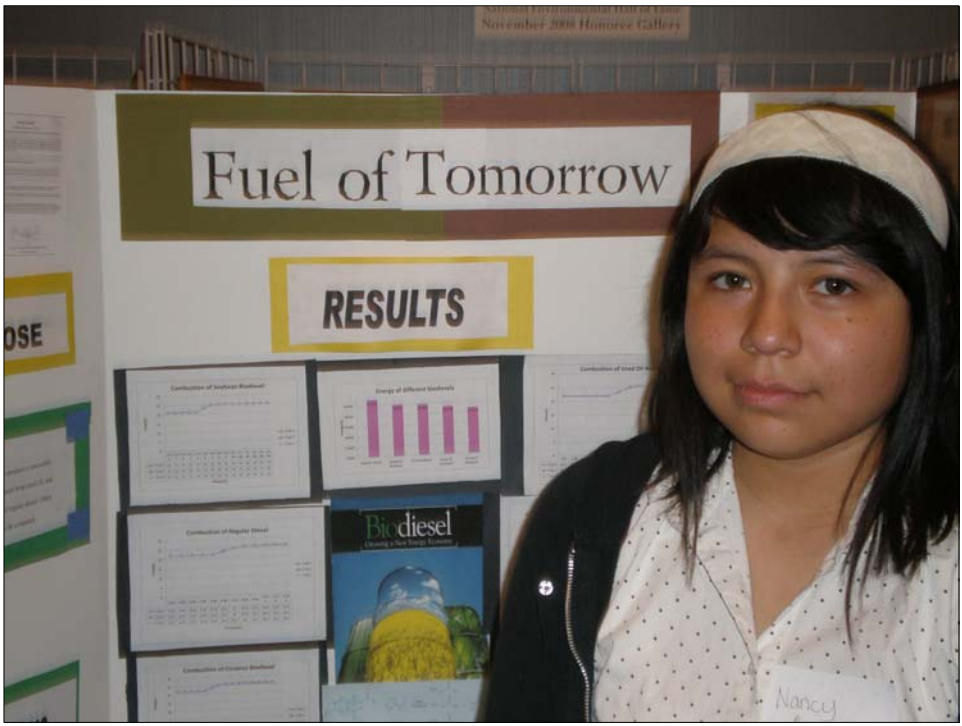
People are looking at the cost for energy and have decided to generate their own wind power. Many companies purchase the extra energy from these people and use it to power more homes. This is even better for the people who have bought their own wind turbine; they will earn back the money they spent and have enough energy to power everything in their house and whatever else they want to power.

I have taken advantage of wind power through my science experiment, generating my own energy in the process. Most wind turbines have a preferred wind speed in order to reach maximum energy, and the average wind speed for the area used must be taken into account. For example, Chicago's average wind speed is 10.3 miles per hour, according to NOAA.

Hydro power is defined as "power obtained from the natural movement of masses of water."

Even if someone does not want to create their own energy, many things can be done to make a difference. One way of doing this would be to use fluorescent light bulbs, decreasing the amount of watts used to light a room. Other things done could be recycling. Most areas have a recycling plant around them. These places will either take the recycled objects from you or pay for certain items, i.e. cans.

Alternative energy sources are the best way to go, and they are cheaper in the long run. Global warming is becoming a problem in the world and landfills are getting packed with items that do not decompose. Everything that can be done helps, no matter how small.



"It is not too late to act. If everyone did a small part to help reduce global warming like riding a bike, using Energy Star products and helping raise awareness, we can have a better tomorrow not only for the human species but for every species."

Nancy Aguilar

Grade 11, Von Steuben High School

Project Essay

Fuel of Tomorrow

My project basically focuses on the energy content certain biodiesels have when compared with petroleum diesel.

I decided to do this project because at the time gas prices in Chicago were almost reaching five dollars, and I thought there must be some other way to fuel the car. So one day I was watching TV when a newscaster was interviewing a man who went to various restaurants and asked for their used frying oil. He used the oil to fuel his car, and I thought, wow that's so cool; so I wanted to learn more.

I went online and stumbled upon the word biodiesel. After doing much research I found the topic I wanted to do. Biodiesel is not a new concept. It has being hanging in the shadows for quite some time. In fact, America's addiction to fossil fuel can be traced back to Henry Ford's invention of the car. Henry Ford's first car initially ran on alcohol and Rudolf's diesel engine ran on oil. Both these ideas were left behind when fossil fuel emerged as a potentially cheaper and more powerful energy source, out performing bio-fuel (Bourne, 2007).

Only recently has bio-fuel made a comeback, particularly in 2000 when issues like global warming and tensions between nations over booting oil became a problem. The increasing prices forced many people to look at other alternatives to these difficulties. Scientists began to look at plants as an energy source and soon enough Rudolf's idea that was hidden behind the dust was revived (Bourne, 2007).

Another goal of my project is to raise awareness. I want people to know the benefits of using biodiesel and how it can improve the environment. For example, according to the National Biodiesel Board, using biodiesel can reduce toxins in the air. In studies done by the Environmental Protection Agency, it states that biodiesel can diminish carbon monoxide emissions by 48% on average ("Biodiesel Emissions," 2008). Carbon monoxide in large quantities has been known to cause suffocation and even in our atmosphere can cause serious health problems like asthma and bronchitis. ("State of the air,"2004).

Back to my project though, at the time I did not have a sponsor and was seeking one, so I went to a university near my school. Every year they held this program called Science Fair Central where a person could go to find a sponsor for science fair and luckily I found one. I went everyday after school and worked on it. I used 4 different kinds of oils: Soybean, corn, coconut and used frying oil. A lot of people ask why coconut and I chose it because at the time I was looking for the cheapest oils and coconut just happened to be one of them.

The process to converting plant- based oils into biodiesel is called transesterification. During the process, oil is used. Methanol is added to the oil with the presence of a

catalyst. Usually the catalyst is potassium hydroxide or sodium hydroxide. The reaction with that of a triglyceride (oil) generates methyl esters and glycerin. The glycerin is then processed out leaving methyl esters (biodiesel). Glycerin can then be used to make other fabrications like soap, cosmetics, etc. The same process is used when converting animal fats and recycled greases (Hofman, 2003). It was a lengthy process especially trying to filter out the oils.

In the end, I concluded that petroleum diesel is still the winner with 42,109 joules per gram. While, used frying biodiesel measured 38,592 joules per gram. I would like to say that I am very happy for all the people who helped me make this project possible and encourage others to developed environmental projects that will benefit the future.

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Sustainability Essay

Solutions to Reduce Global Warming

We live in a world where humans are the main consumers of natural resources. Resources like fossil fuels have become the "lifeblood for the America's economy" (Oil 2007). Fossil fuel however, is also the number one cause for global warming due to carbon dioxide emissions. According to the Energy Information Administration, 29,195 million metric tons of carbon dioxide was released worldwide into the air from fossil fuels in 2006 alone. Imagine this number multiplied over and over again over the course of our history (Total emissions, 2008). Imagine the kind of world we would live in if this problem persisted. Think not only about future generations but also about the lives of living creatures that would be destroyed.

Fossils fuels are used in a number of different ways. For example, they are used for transportation, to heat our houses, and provide electricity. Manufacturers use fossil fuels to make products and provide transportation for shipping goods. To make a point, people do not have control over some of these things, like the manufacturing that goes on, the electric industry, or the trucking industry. However, we all have control over the things in our everyday lives like our transportation and how effective energy is use in our houses. We can help reduce global warming by reducing our consumption of fossil fuels.

One way to reduce global warming is to start by limiting the use of the car for transportation and trying other alternatives like riding a bike. Riding a bike is a great way to reduce global warming; it is not only cheap but it is also good for your health. If you cannot afford a bike, walking is always a good option. Studies have shown that by leaving your car at home just two days a week, it will reduce greenhouse gas emissions by an average of 1,600 pounds per year (On the Road, 2009).

Carpooling is also an alternative for people who live far away. Not only does it save you money on gas but you are being smart by cutting down on fossil fuels and helping the environment. There are even websites that tell you about people in your area who are carpooling, websites like www.erideshare.com or www.carpool-connect.com are great sites to visit to find people in your area who are carpooling.

Another way to reduce the consumption of fossil fuel is to be smart about the amount of electricity you are using and start using Energy Star appliances and products. For instance, try using Energy Star fluorescent light bulbs. Each bulb can save a family 30 dollars over the course of its lifetime. It might not seem like a lot of savings but imagine if a whole house was lighted up with these light bulbs (Change a Light, 2007). Another benefit of using Energy Star light bulbs is they also help reduce greenhouse emissions. By using an Energy Star fluorescent light bulb you are preventing the release of more than 400 pounds of greenhouse gas emissions over the light bulb's lifetime (Compact Florescent).

Other products that Energy Star offers are variety of appliances like clothes washers. The average family uses at least 400 loads each year (Clothes Washer). Using an Energy Star certified clothes washer you are saving the environment by limiting the amount of electricity, because burning fossil fuels generates electricity. To find out more information about the products or appliances that energy star offers, visit their website at www.energystar.gov. If you cannot afford such products, then at least be smart about turning off the TV, computer or any other electrical appliances when you are not using them.

One of the most important solutions to reduce global warming is to raise awareness. The more people know about global warming, the more progress society will make towards reducing its effect. Join an organization near your area or become informed about the ongoing problems and ways to reduce global warming. The more the word gets out about global warming, the more people become conscientious about it.

As the main consumers of natural resources, we have a responsibility to protect the earth that has given so much to us. It is not too late to act. If everyone did a small part to help reduce global warming like riding a bike, using Energy Star products and helping raise awareness, we can have a better tomorrow not only for the human species but for every species. The fate of every living thing lies in our hands. We need to do our part and help the environment that will not help itself.

"Many people do not realize that everything they do can have a negative impact on the environment. They constantly say; 'I can't do it,' 'I'm just one person,' or 'I can't make a difference.' The truth is you CAN make a difference. It only takes ONE person to help change the world. Earth is the only home we have...the least we can do is take care of it."

Nia Moreno

Grade 8, Morgan Park High School

Project Essay

Water Around the World: Is It Safe?

Have you ever wondered what's in your water? You can't see, smell, or taste nitrates, lead, pesticides, bacteria and other substances that can contaminate your drinking water. The only way to find out if your water is safe to drink is by having it tested. The purpose of this project is to discover if there is any difference in the water in North American urban areas in the United States and other countries or continents, such as Africa and Asia.

The purpose of this experiment was to discover from collected samples, which region/continent/country/area has the safest and cleanest water based on drinking water safety guidelines set by the Environmental Protection Agency (EPA). This experiment will compare the quality of the tap water from other locations to the tap water here in Chicago. This experiment will also help others to find out about the different ways water is filtered around the globe and see the impact it makes on the quality of the drinking water.

The investigator believes that one of the locations in North America will have the safest water because of the high quality filtration system. It is predicted that China will have the least safe water because all of the pollution may have an effect on the water.

For this experiment, I tested for Lead / Pesticides, Nitrate / Nitrite, pH / Hardness / Chlorine, and Bacteria. Each test was repeated twice.

The results indicated that Las Vegas, Nevada; Oranjestad, Aruba; and Chicago, Illinois had the highest pH level, with a pH of 10. Bowling Green, Kentucky had the lowest pH level, 6.0. Accra, Ghana had the hardest water at 450 ppm (parts per million). Indianapolis, Indiana and Luxor, Egypt had the highest level of chlorine, which was 120 ppm (parts per million). Chicago, Illinois; Cairo, Egypt; and Cape Town, South Africa had the highest Nitrate/Nitrite level at 2 ppb (parts per billion). The other sites that tested positive for Nitrate/Nitrite were Cabo San Lucas, Mexico; Tupelo, Mississippi; Oranjestad, Aruba; and Luxor, Egypt, all with Nitrate/Nitrite of 0.5.

All sites tested negative for Lead and Pesticides (except for Oranjestad, Aruba, which tested positive for Pesticides). It was surprising when it was revealed that Aruba had tested positive for pesticides because Aruba's tap water is often called "champagne from a tap." Beijing, China was the only site that tested positive for bacteria. This was not a surprise due to the articles written on the pollution in China.

The tap water in Chicago, Illinois did exceptionally well when compared to water from other sample sites. It was predicted that areas in the Midwest region of North America would have the safest and cleanest water because of the high quality

filtration system. However; Luxor, Egypt turned out to have the safest water according to the Tap Water Safety Guidelines set by the EPA (Environmental Protection Agency). These results were shocking because one would assume that the safest water would be in one of the locations in the United States.

Sustainability Essay

There has been a lot of talk about a theory of global warming and "going green." But what is "going green," and how can we help slow down the process of global warming?

Going green is taking small steps and making changes to your daily lifestyle to help conserve resources and help the planet. Going green is not hard. Even taking small steps can make a huge difference.

A change in your daily transportation is one way of going green. By riding your bike or walking, you can reduce the amount of carbon emissions released into the atmosphere. Carbon emissions can lead to serious air pollution. Smoking can also lead to air pollution and lung cancer. Carpooling to work is also another way to reduce the number of carbons in the air.

You can help preserve the environment by using your resources wisely. A simple way is turning off the water while you are not using it. By turning off the water while brushing your teeth, you can save gallons of water a day. Try taking showers instead of baths (baths use more water).

Instead of throwing away your old paper, try recycling it. If you simply recycle paper when you are done with it, you can prevent thousands of new trees from getting cut down. About 60,000 acres of trees are cut down each year. That is the size of Ireland! It also takes between 40 and 50 years for a tree to grow.

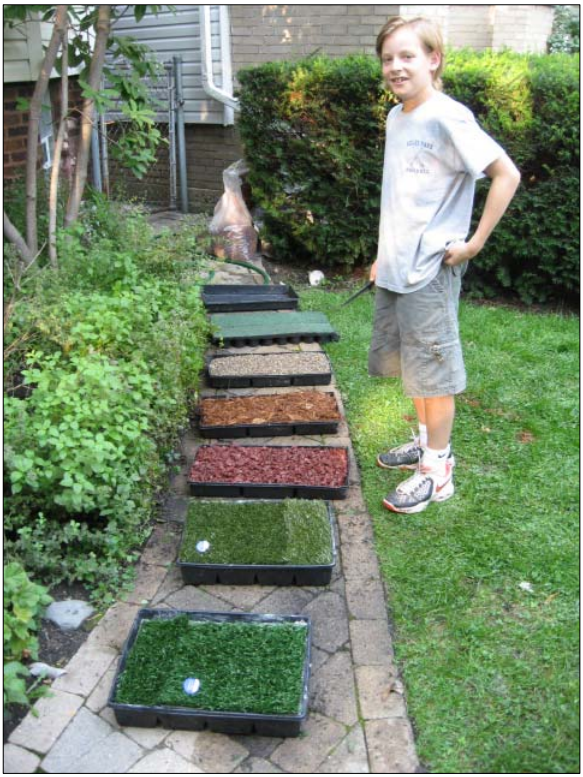
If we continue to cut down trees, there will be no trees left. By cutting down trees, many animals lose their homes and the equipment releases carbon emissions into the air. When you put your paper in a blue bag (recycling bag), you help decrease the amount of paper. You can also recycle plastic bottles and milk jugs and aluminum cans.

It can take more than 10 years for a plastic bottle in a landfill to decompose. Reuse your water bottles. Instead of getting a new water bottle each time, refill it. You can decrease the amount of plastic bottles found in landfills.

Alternative energy sources can also help you go green. Try using compact fluorescent light bulbs (CFLs). CFLs last between 5 to 10 years longer than regular light bulbs. CFLs also save energy and money. This means more green for your wallet and the environment.

Many people do not realize that everything they do can have a negative impact on the environment. They constantly say, "I can't do it," "I'm just one person," or "I

can't make a difference." The truth is you CAN make a difference. It only takes ONE person to help change the world. Earth is the only home we have…the least we can do is take care of it.



"The idea of urban hot spots and the urban heat island effect is a relatively new concept. Three years ago when a man by the name of Dr. Stuart Gaffin did a satellite survey of New York City he found a large number of hot spots in places where they would normally not expect to see them, such as parks and playgrounds.

When the scientists actually went to the locations of these hot spots to investigate, they discovered that the playgrounds and natural grass fields had been replaced by artificial surfaces that were showing up on a satellite survey as red hot spots."

Noah Asimow

Grade 8, Hawthorne Scholastic Academy

Project & Sustainability Essays Combined

Natural vs. Artificial Surfaces

My school, Hawthorne Scholastic Academy, has a natural grass or should I call it natural mud, field. However, it has been decided by the PTA, LSC and Alderman Tom Tunney that it will soon be replaced by artificial turf. It seems as if there is a trend among schools in the city of Chicago to replace their natural grass fields with artificial turf. This problem affects me directly and is the main reason why I chose to address it as my science fair research project.

For the past twenty years, cities, private organizations and families have been replacing natural grass lawns, soccer fields, football fields in sporting venues and public parks with synthetic or artificial turf. There are many reasons for this; artificial turf is easier to maintain, it doesn't require mowing, watering, or fertilizing. In this way, it would appear to be perfectly environmentally friendly.

In recent years, cities have also been replacing mulch or woodchips in public parks and playground areas with either rubber mulch, which can be ground up tires that are painted many different colors, or rubber tiles (also made from recycled products such as tires or sneakers). In addition, some artificial surfaces can be a poured rubber surface. There is one problem however; synthetic turf, rubber mulch and tiles are known to get much hotter than natural grass and mulch. So much so, that they are the cause for many of New York City's urban hot spots.[1] Urban hot spots are isolated urban areas that are significantly hotter than the rest of the city.

People though, don't know much about this topic. The idea of urban hot spots and the urban heat island effect is a relatively new concept. Three years ago when a man by the name of Dr. Stuart Gaffin did a satellite survey of New York City he found a large number of hot spots in places where they would normally not expect to see them, such as parks and playgrounds. When the scientists actually went to the locations of these hot spots to investigate, they discovered that the playgrounds and natural grass fields had been replaced by artificial surfaces that were showing up on a satellite survey as red hot spots.

The questions behind my research were when, and by how much, do artificial surfaces get hotter than natural ones. Does it matter what time of day it is? What about weather conditions? What impact does the air temperature have on the surface temperature of the artificial and natural surfaces? Therefore, what I decided to do was compare the surface temperature of natural and artificial surfaces during different times of the day and during different types of weather conditions. It is a relatively simple idea and I hoped it would get me conclusive evidence that this is a serious environmental problem.

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[1] Fact taken from a *National Public Radio* broadcast

For my project, I measured a total of seven different artificial and natural surfaces.

The natural ones were
1. A 25 by 50 cm piece of Kentucky bluegrass
2. *Premier Landscape* Mulch/Woodchips
3. Pea Gravel

The artificial ones were
1. A 25 by 50 cm sized sample of *ForeverLawn Pro* artificial grass
2. A 25 by 50 cm sized sample of *ForeverLawn Ultra* artificial grass
3. *NuPlay Redwood Rubber Mulch*
4. Two 12 by 50 by 10 cm deep, green rubber tiles

All surfaces were placed in identical black plastic annual trays. The trays were 25cm by 50cm by 10 cm in size. The trays were set up in my front yard where they would be exposed to an equal amount of the sun during the middle of the day and shade in the afternoon and morning. They were lined up about five centimeters from each other in one row. The two trays with artificial grass were filled with limestone screening under the artificial grass. Screenings are ground up limestone rocks that are put under artificial grass so it has a base to rest on.

The temperatures of the surfaces of the materials were measured during the morning, afternoon and evening when it was warm or cold outside. Some measurements were taken in the rain, some in the sun, and some when it was overcast. To measure their surface temperatures an infrared non-contact thermometer was used. Its surface temperature range is -20C to 550C. It can measure in Fahrenheit or centigrade. The farther the thermometer is held from the target, though, the larger the target area will be. For example, at a distance of 8 feet the target would be one foot in diameter, and at a distance of 16 feet the target would be 2 feet in diameter. A ruler was held vertically on top of the surfaces exactly one foot away from the surface, so when I measured the temperature each target area was the same size.

Records of the procedures were taken visually and in written form. Readings were entered into a chart on Microsoft Excel, where it would be easy to graph the information. Most of my measurements were taken in the early part of September during different times of day.

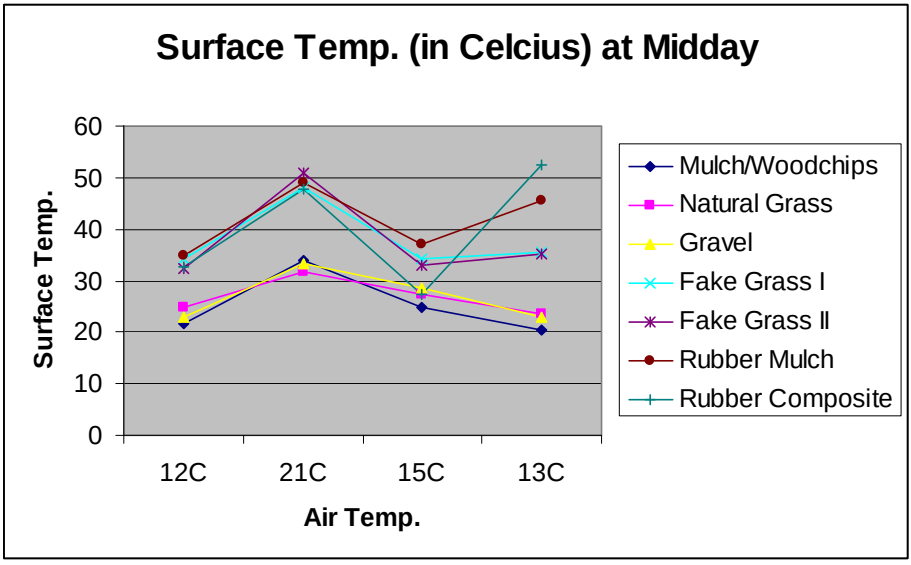
It was determined that the day of the week on which measurements were being made would not be as important a variable as the weather conditions and time of day; so not only were the days and times recorded, but also surface temperature readings, the air temperature outside my house in the front yard, and if it was rainy or sunny.

During the morning and afternoon, the surface temperatures of the natural and artificial surfaces did not differ by a substantial amount. In fact, they were nearly identical. On any given day when readings were taken in the morning (7:30-8:30) or in the afternoon (3:30-4:30) the range of the surface temperatures between the natural and artificial was, at a maximum, 5 degrees Celsius. Air temperature did not seem to

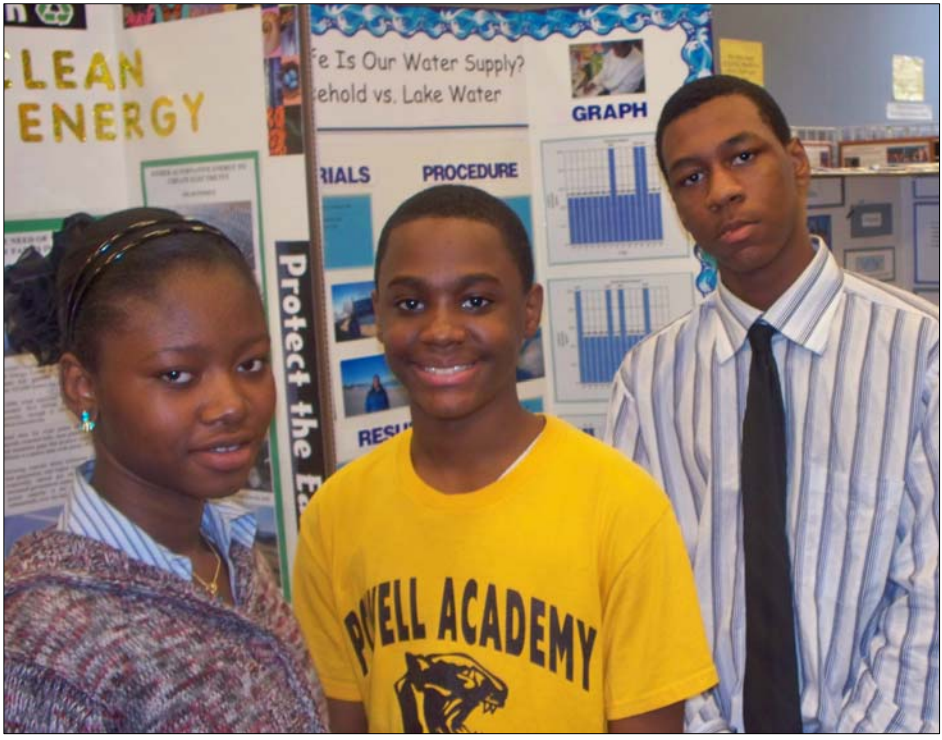
matter during the readings that were taken in the morning and afternoon. On a hotter day, yes, the surfaces were hotter, but the range was about the same.

Both sets of data were taken when the sun was not shining on any of the surfaces. All readings are in centigrade. The data shows that, regardless of the type of material, the temperatures were within a 5 degree centigrade differential. The surface temperature thermometer used has a +2/-2 degrees accuracy range.

Although the temperature readings in the morning and afternoon were contrary to my hypothesis that air temperature would make a difference, the readings during the middle of the day (10:30-12:30) when the sun was shining on the surfaces were, quite frankly, shocking. There was a substantial difference between the temperatures of the natural and artificial surfaces, regardless of the air temperature as you can see in the graph below.



The three lines on the bottom of the graph are natural surfaces and the four lines above those three are artificial surfaces. These show the natural surfaces are cooler than the artificial surfaces. There is, obviously, a substantial difference in surface temperature between them when they are exposed to direct sunlight. On one day, for example, it was 13 degrees Celsius outside. The natural surfaces were about ten degrees hotter than the air temperature, but the artificial surfaces were 30 to 40 degrees hotter than the air temperature.



"In reducing global warming we all need to put in an effort as a whole nation because if not, the future humans might have to suffer the bad effects of global warming.

Some ways to reduce global warming are:

1) Use Your Power Company's Renewable Energy Option
2) Stop Driving to Greatly Reduce CO2 Emissions
3) Recycle Paper to Prevent Climate Change
4) Eating Less Meat Helps Stop Global Warming
5) Take Trains, Not Planes!
6) Turn Off Electronics"

Oluwatobi Opakunle
Jaleel Thomas
Charles Taylor

Grade 8, Powell Academy

Project Essay

Utilizing Clean Alternative Energy

Basically, our project is based on how using clean alternative energy can help reduce the cost of electricity and also help our environment. We asked a question: Should the state of Illinois be a model state that shows the benefit of using clean alternative energy? Throughout our presentation, we focused on the advantages and disadvantages of using and not using clean alternative energy. First we researched different types of clean alternative energy and then we examine how electricity is created. Third we look into the effects of not utilizing clean alternative energy. Finally we look at the benefits of using clean alternative energy in Illinois.

Different types of clean alternative energies are: wind energy, hydro energy, solar energy, wave energy, and thermal energy. We believe that Illinois can mostly benefit with both micro hydroelectric energy and wind energy since there is usually not a lot of sun in the state.

Wind energy is a free source of energy that can power our country by using wind turbines. The world's largest wind farm is Horse Hollow Wind Center located in Texas that has 421 wind turbines that generate enough electricity to power 220,000 homes per year. In 2006, wind machines in the United States generated 26.6 billion kWh per year of electricity, enough to serve more than 2.4 million households. Good sites for wind plants are top of smooth rounded hills, open plains or shorelines, and mountain gaps that produce wind funneling. Illinois is a plains state with plenty of wind funneling.

Growing concern about emissions from fossil fuel generating and higher costs for fossil fuels (especially natural gas and coal), with the increased government support, have helped wind power capacity in the United States grow substantially over the last 10 years. We believe Illinois can mostly benefit with both micro-hydroelectric energy and wind energy together.

Since the cost of electricity is getting higher, many are looking for ways to use smaller dams to generate electricity. To many people's surprise, Illinois has about 1,200 dams. Only one of the dams is a large hydroelectric dam located in Lockport Illinois. Building a small scale hydropower system can cost from $1,000 - $20,000, depending on the site's electricity requirements and location. Technology advances ensure that these systems are often more reliable in remote areas. Often these systems are more dependable than the local power main.

The energy output is dependent on two major factors: the stream flow (how much water runs through the system) and drop (or head), which is the vertical distance the water will fall through the water turbine. If the hydro electric dams produce a large amount of excess energy, some power companies will buy back the electricity overflow. The state of Illinois can use this to generate extra revenue. Smaller dams were used as water storage and for irrigation. We feel Illinois can mostly benefit with micro-hydro electric and wind energy

Sustainability Essay

How to Prevent Global Warming

Global warming has been an issue that almost everyone knows about. Research, says many scientists have agreed that the earth is getting warmer due to many of the environmental issues. Global warming has exposed a lot of people to famine, water shortages, extreme weather conditions and a 20 - 30% loss of animal and plant species. Earth's air and oceans are gradually heating up to a point that disrupts balance, a problem that is continually getting worse.

There are easy ways we can help prevent global warming. We need to replace a regular incandescent light bulb with a compact fluorescent light bulb. These light bulbs use significantly less energy than a regular bulb. This simple switch will save a couple thousand pounds of carbon dioxide a year. If every household in the United States replaced one regular light bulb with a an energy saving model, we could reduce global warming pollution by more than a couple billion pounds over the life of the bulbs.

If an air conditioner is available to you, you should clean and replace filters on your furnace and air conditioner. This can save about 400 pounds of carbon dioxide a year.

Sometimes, people don't remember to switch off their appliances. This affects the amount of energy that is used. We should stop leaving our appliances on standby because it is still burning up energy. Another way to reduce global warming is to unplug extra refrigerators or freezers you rarely use. This can reduce the typical carbon dioxide emitted by a family by nearly ten percent.

Various people like cooking, but don't know that leaving open pot lids while cooking is one of the factors of global warming. Covering your pots while cooking food will not only save the energy used to cook the food, but can also keep the area cleaner. It has been shown that you can save over 70% of the energy used.

Toxic wastes are also part of the reason there is global warming. Hazardous wastes are poisonous byproducts of manufacturing, city septic systems, automotive garages, laboratories, hospitals, and other industries. The waste may be liquid, solid, or sludge and contain chemicals, heavy metals and radiation. Households generate waste from items such as batteries, used computer equipment, and leftover paints. Toxic waste can harm humans, animals, in groundwater that supplies drinking water, or in flood waters, as happened after Hurricane Katrina.

In reducing global warming we all need to put in an effort as a whole nation because if not, the future humans might have to suffer the bad effects of global warming. Some ways to reduce global warming are:

1) Use Your Power Company's Renewable Energy Option
2) Stop Driving to Greatly Reduce CO2 Emissions
3) Recycle Paper to Prevent Climate Change
4) Eating Less Meat Helps Stop Global Warming
5) Take Trains, Not Planes!
6) Turn Off Electronics

These ways can help reduce global warming with every body's help.

"As you can see there are many things you, friends, family, or just neighbors can do to help keep our planet clean and safe for us and the next generation. Remember, every little step counts. So when you say, 'Oh, this doesn't make a difference,' just get that idea out of your head and say 'I CAN MAKE A DIFFRENCE.'"

Stephanie Santiago

Grade 8, Casals Elementary School

Project Essay

Wind Power

The purpose of my project was to see which of the three propellers I made was more efficient. There was the wave shaped, the fan shaped, and the cross shaped; I thought the wave shape propeller would be the best because its more curved shape and its ability to bend easily.

I made a house out of wood and glue to simulate the use of a wind turbine in a house. I cut the propellers using sheet metal. I built a house of wood and used two flashlights for the LED lights and to use it as a generator. It was a hand-powered flashlight so it basically worked the same as a wind turbine. The rotation causes the metal circle to spin and the magnetic field creates electricity that is sent through the wires.

To make holes in the house I used a drill. While to connect the wire I used soldering paste and a heating screwdriver. Once I slipped in the propellers, I just gave it a tap and let the wind created by my fan carry it for a few seconds. I measured and read the electricity going through the wires by using a volt meter. This told me which propeller was producing more energy. I did five tests for each propeller on high, medium, and low wind produced by my fan. After I got those results, I get the averages for each trial. It took about two days to do this project because I made the house and propellers from scratch.

Throughout the entire test the wave shaped was always the best in the separate test and averages. So my hypothesis was correct because the wave shaped was the best. It is a much cleaner energy source then fossil fuels. There is even wind turbines come to Chicago. In this project I learned a lot about wind turbines and wind energy. I believe if they come, our air will be cleaner and it will be better for the community. I'm glad that I got an opportunity to highlight an alternative fuel that is safer for the environment. This issue is something that affects us and the future. We need to protect the Earth from further harm.

I hope to either further my research or most likely do something involving environmental science in the future if I have the sources to do so. Hopefully my future project will be more insightful and teach me more about alternative fuel or how I can help the environment.

Sustainability Essay

Saving the Planet

Everyone can do their part to save the planet. Whether you just recycle or plant a tree. Every little step counts. Big or small, you can do things at home, in your local

community or get as many people as you can involved in any project to help our planet.

Why should we care what happens to our planet? That is an easy question to answer. We live on this beautiful planet called Earth, and we need to keep it clean for the future. Global warming is causing all sorts of change in climate and causing the polar caps to melt, which is leaving the polar bears homeless. Not to mention our water and air supply can become contaminated.

You see we all create pollution whether we know it or not. If you drive a car the excess fumes coming from your car go to our air. If you threw a simple candy wrapper it could land in the ocean where a fish can eat it and die.

Every step we make affects our Earth. But there are simple things we can do to protect the planet. Instead of throwing everything in the garbage, put a separate bag for paper, aluminum cans, and plastics. Then take it to a recycling plant where it can be processed and reused.

You can also switch your light bulbs to fluorescent light bulbs. They not only use less power, but last longer than your regular light bulb. Not only good for the environment, but it is cheaper.

You can unplug electronics that you are not using so they do not waste any power. Even though you think they are not using any power they are, so it is good for your electric bill and the environment.

You can make a compost of biodegradable materials.

Another way to help that is so simple to do is turn off the lights when your not in the room. Not wasting energy and cheaper electric bill. You see being green can actually save you money by doing a few simple steps. Even if you only do one of these things it really makes a difference.

You don't have to be the only one turning green; share this information with your friends and family. Get people involved in projects that help our planet. You can get your school officials to approve a planting project and get your schoolmates to participate. It not only makes your school look prettier, but creates more oxygen.

You can start a recycling program with the support of school officials. Millions or billions pieces of paper get thrown out everyday, so why not recycle it for some one else to use. You can just go with a group of friends and people from your neighborhood to collect trash in the park. Then take the trash that can be recycled to a recycling plant and the other trash in the garbage, or the biodegradable materials can be used to make compost.

You and a group can just spread the word and make flyer out of recyclable paper so you can create a "Green Team" that will be devoted to make the neighborhood or community more eco-friendly.

You can contact your local officials to tell them your ideas and get them involved, or ask for help of any form. People who are about 16 and older can help by making sure their car tires are always inflated properly so the car does not use as much gasoline, which leads to excess fumes going into the air.

They can also contact local officials to tell them about using different energy sources such as solar, hydro, or wind energy and how we can start big scale "green projects."

As you can see there are many things you, friends, family, or just neighbors can do to help keep our planet clean and safe for us and the next generation. Remember, every little step counts. So when you say, "Oh, this doesn't make a difference," just get that idea out of your head and say "I CAN MAKE A DIFFRENCE."

"Global warming, pollution, and climate change are all things that are so hard to deal with. They are things that are happening to the environment, and technically it is all because of us. Are people of the world the ones to blame for these changes to Earth (our home)? Well if we are, there are ways to help. We can make a difference, and here is how."

Stephany Virrueta

Grade 8, James Shields Elementary School

Project Essay

Heat Conductors

What is brownish, reddish, orangeish all over, a good conductor of heat, energy efficient, and great for the environment? Yes, it is copper! Who would have known that metals could be so awesome for the environment? Did you know that being great conductors of heat means they are very energy efficient? Fascinating, well here I go about my project. My project can be linked to the environment in various ways. The easiest way to do it is by telling how it affects the environment as a whole and then telling how it effects as individual metals.

My project is not only testing the heat conductivity of metals, but it is also testing which metals are better for bridge expansion and contraction. This is very important in the environment because these two things are ultimately caused by environmental changes such as weather\climate change. Heat causes bridges to expand and when it cools off it will again contract. This leads back to why bridges do this, all because of global warming, which causes it because of extreme heat and extreme cold weather. This causes the bridges to expand and contract, and if the right metals are not used things can go wrong and many people can get hurt. Like the rare case of the Tacoma Bridge, the right things were not used, and the bridge ended up in a disaster and luckily no one was hurt.

Copper is very important to the environment because of its great conductivity. Copper can be used to replace other metals in order to save energy. Copper is used in electric wiring and also in hot water tubing. Both these things are done because copper is a great conductor of heat. You save a lot of energy because being a good conductor also means they save energy because energy efficiency and the temperature rise are both related immensely.

All in all, copper helps the environment because it is a great conductor and saves energy. Aluminum ends up being the same thing as copper; their great conduction leads them to save loads of energy.

Steel is very important to the environment because many things that help us save energy are made from steel. For example wind turbines, which are poles with long blades that turn in the wind and are inventions made to save energy by using the energy created from the wind turning the blades instead of electricity, are made from steel; the steel is just painted light grey. That is one way steel helps the environment; it creates inventions to help us save energy, or make cleaner, better kinds.

Stainless steel and brass are better metals in the case of the environment because they are actually 100% recyclable. This means that stainless steel and brass products can be recycled, which means less garbage in landfills, which can eventually mean that the environment is cleaner and overall much better. Stainless steel and brass

being 100% recyclable really does make a difference in the end, like I explained before; it ends up really affecting our whole environment and overall world.

As you can see, the metals used in my experiment are all metals that affect the environment because of what they do. Some help us save energy, and some are just great because they are 100% recyclable and cause less waste. Others help make the new energy-efficient things\products we need today to help keep and save our environment.

Sustainability Essay

Keeping Earth Cool:
Ways you can help save your home planet Earth

Global warming, pollution, and climate change are all things that are so hard to deal with. They are things that are happening to the environment, and technically it is all because of us. Are people of the world the ones to blame for these changes to Earth (our home)? Well if we are, there are ways to help. We can make a difference, and here is how.

The first and one of the easiest things to do is to use the new energy-efficient light bulbs. They are so easy to use, and they can last multiple times more than the regular ones. It is a small thing to do, but when it comes to the environment, it really makes a difference. The actual name for energy-efficient light bulbs is Compact Fluorescent Light Bulbs or CFL bulbs. A great website to learn more about this is http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_about. This website explains all the functions well and answers any further questions you may have about them.

Although you may think one light bulb does not make a difference, you are wrong. These bulbs can save up to 75% energy than incandescent bulbs (regular bulbs). After a study done by Energy Star, they found that if every home in America replaced just one bulb, we would save\have enough energy to power more than three million homes We would save the green gas emissions that equal to that of 800,000 cars. So by having just one bulb, you can really make a big difference.

Another easy way to help the environment is to recycle. All you have to do is take five minutes of your time and separate the recyclables from real garbage. If you do not know what qualifies as a recyclable, I will tell you a few; glass, plastic, cardboard, paper, steel, and aluminum. If your community or city does not provide you with recycling cans, you can still do it. All you need are the blue recycling bags. These bags let the garbage people know they are recyclable materials. If you need help getting started on your recycling, you can visit this website: http://earth911.com. On this website you can find recycling centers near you and recycling centers that recycle special materials.

One reason why we actually have global warming is because we cut down too many trees! We cut down trees for things we need like paper, pencils, and toothpicks (maybe toothpicks we do not really need). In the world we live in today, trees are used for everything. But people forget that trees do not just make good paper or toothpicks, we need trees to live. We need trees to live because they purify our air;

they take in CO2 and release oxygen. They provide oxygen, and we need oxygen to live; without it we all die.

Although many products do come from trees, people are forgetting the most important thing trees do for us and what we truly need them for; for the air we breathe. So one way anyone can help the environment out is by planting a tree! If you want to know more information about this or even how you can get some free trees you can visit the website http://www.arborday.org/trees/video/howTo-Plant.cfm. This website can really help you out. It even tells you how to plant trees.

Cars are also a huge contributor of the problems we have with the environment. Some scientists estimate that one car can produce an average of eight tons a year, but it is not exactly known for sure. One thing is for sure though, using a bike, skating, or scooting are a lot better ways of transportation than a car when it comes to the environment. Not only does it help the environment, but it is a great form of exercise and it can be an immense amount of fun as well.

If you cannot do any of the alternates for some reason, hybrid cars are a good alternate, too. Or simply car pooling is great. Now with technology scientists are able to create solar powered cars which are even better, but the other solutions are ok as well. If you are interested in more advantages of biking over driving this website can tell you more: http://www.ibike.org/encouragement/benefits.htm.

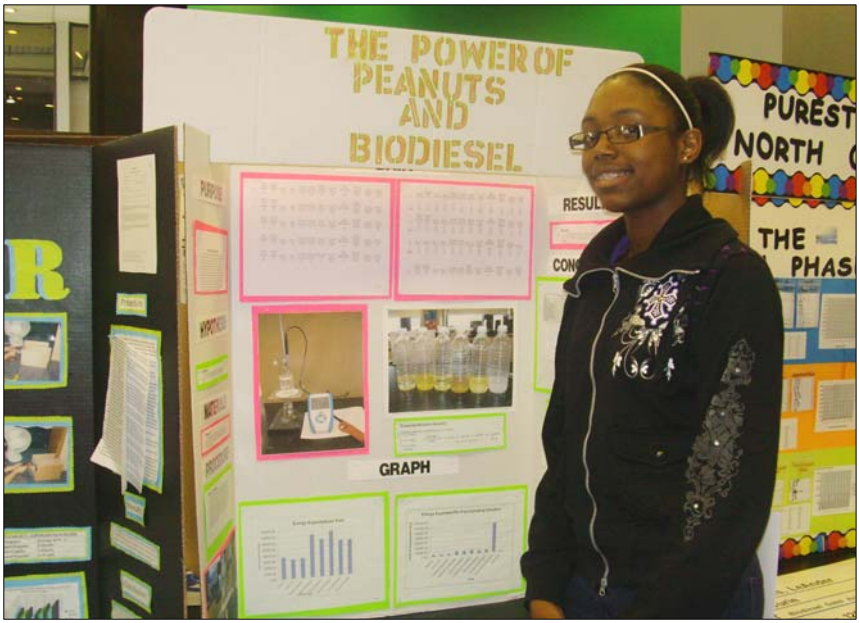
I have given you a few ways to help the environment, but there are still many more. You can do things as simple as turning off the water while you brush your teeth, turning off unnecessary lights, or even picking up the trash in your community or just around you home. We can all keep Earth Cool (from Global Warming) by doing our part.

Earth – what time can do

Before

After some work

Now



"There are many things that can be done to reduce global warming:

Plant trees in your yard.

Carpool to and from work when possible.

Use cloth bags when shopping at the grocery store.

Finally, turn off and unplug TVs, computers and other electronics when they are not in use."

Tashaina Collier

Grade 9, Simeon Career Academy

Project Essay

The Power of Biodiesel and Peanuts

My overall reason for conducting this experiment was to find out which crop-based plant, if turned into biodiesel, would be the best fuel in bio-fuel cars.

I expanded this project from a previous project I conducted about peanuts. I was testing the peanut's energy to see how much they give off as fuel, when I decided to turn my project into biodiesel. I thought about the economy, and how gas prices are constantly going up and down. I also thought about global warming, and how my project would be a benefit to reducing it.

Oil is one of the world's natural resources, so I think it is very important for it to stay around for years to come. That is where my project comes in; I made an alternative fuel that reduces the use of conventional gas for cars. I took 6 crop-based plant oils (peanut, olive, canola, corn, soybean, and coconut), and I transformed each oil into biodiesel using ethyl alcohol potassium hydroxide.

Biodiesel gas does not cause great pollution to the air like conventional gas. It goes through a filtering process before it is actually used as gas for cars. This process is how biodiesel fuel does not become a pollution problem to the air. After I made the biodiesel, I allowed my mixtures to sit for a week so the biodiesel could have complete separation from its original oil. Even though I did not make a large amount of biodiesel due to my flammable substances (potassium hydroxide, ethyl alcohol), I still collected several samples of biodiesel from each oil, and they were placed in small metal tins with a wick.

I collected the mass of tin using an electric balance and then the samples were each burned for 180 seconds. A calorimeter connected to a Lab Quest digital thermometer was used to monitor and record the changes in water temperature. The heat of combustion for each biodiesel sample was calculated using an equation. I predicted that the peanut oil biodiesel would make the best bio-fuel for cars because in a previous project I found out that peanuts contained a large amount of energy, and when burned, could elevate the temperature of water by as much as 5 degrees.

Comparing my data tables, though, I observed that coconut oil biodiesel had the highest heat of combustion, and the peanuts as well as the peanut oil biodiesel had the highest change in temperature.

My reasoning behind coconut biodiesel as the best alternative fuel for bio-fuel cars is, coconut oil has fine minerals and a rich texture. I say this because the coconut oil was actually solid and had to be melted in order to use it in the experiment. That is probably what caused it to have higher heat of combustion and long burn duration compared to the other bio-fuels tested. This is a great benefit because now I know the best alternative fuel if I decide to drive a car on biodiesel. Coconut trees are a

renewable resource and could be grown in abundance in warm climates, including the United States.

Sustainability Essay

Global warming is a serious epidemic that is affecting our world. It is the increase in the average temperature of the Earth's near-surface air and oceans. It began in the mid-twentieth century and it is projected continuation.

Global surface temperature increased 0.74 ± 0.18 °C (1.33 ± 0.32 °F) during the last century and the Intergovernmental Panel on Climate Change (IPCC) concludes that anthropogenic greenhouse gases are responsible for most of the observed temperature increases. Climate model projections summarized in the latest IPCC report indicate that global surface temperature will probably rise a further 1.1 to 6.4 °C (2.0 to 11.5 °F) during the twenty-first century depending on climate sensitivity.

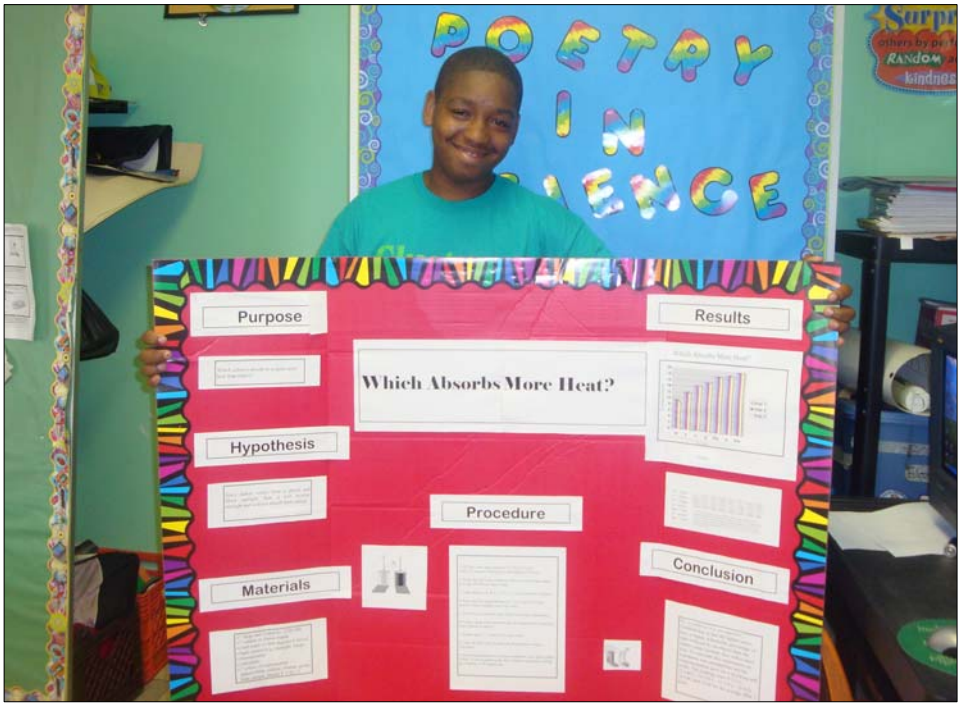
There are many things that can be done to reduce global warming:

- Plant trees in your yard. Trees will shade your home, reducing the need for air conditioning. Trees also drink up about one ton of CO2 during their lifetime.

- Carpool to and from work when possible. Fewer cars on the road equals less CO2 released into the atmosphere.

- Use cloth bags when shopping at the grocery store. Electricity is required to make plastic, which puts more CO2 into the air.

- Finally, turn off and unplug TVs, computers and other electronics when they are not in use to reduce the amount of electricity needed for your home.



"The rising energy costs are affecting the environment and us as well. It is not only affecting our wallets, but it is also affecting us emotionally because we have to live in an unsafe environment.

In the future we can help preserve our natural resources. CHANGE HAS COME!"

Trivon Wells

Grade 8, Wendell E. Green Elementary School

Project Essay

Which Absorbs More Heat?

There were several components that I followed when I was conducting my science fair project. There was a problem that I was trying to solve called the purpose. To solve this problem, I had to follow detailed steps called the methods of the procedure. After conducting the experiment, I had made possible inferences from the data or results called the conclusion. After coming up with purpose, I began to follow the steps of the procedure. I made an educated conclusion from all of my data and I summarized it in my Abstract. These were the important keys that I listed in my Abstract.

To begin with, the purpose of this experiment was to determine which color(s) absorb more heat energy than others. My main objective was to not only see what color absorbed the most heat but to make a specific generalization of what happened to the other colors so other people can realize how this situation is applied to our everyday lives and how it could be used in learning more about our environment.

Hence forward, I followed an in-depth procedure when I was conducting my experiment. I filled each jar with equal amounts of 750 ml of cold water. Secondly, I wrapped each jar with a different color of construction paper. The colors were white, yellow, orange, green, blue, purple and black. After wrapping them, I secured them with a rubber band. Third, I placed each jar a half meter away from my light source (shiny window). Conduct all three trials at the same time to have accurate results. Fourth, I sealed each jar with a metal lid. I allowed all of the jars to stand for one hour before I checked the temperatures. Lastly, I took the temperature of each jar from lightest to darkest and I average the temperatures using a calculator. Note, you should add water to the jars first to prevent paper damage.

Lastly, from the data and evidence of the results, I made a shocking conclusion. I thought since the darker colors form and block sunlight therefore it will refract sunlight and not absorb heat energy. My hypothesis was unsupported. The readings were 9.312 C, 12.148 C, 14.324 C, 15.754 C, 18.023 C, 18.536 C, 19.86 C for the averages after three trials. I learned that in fact the lighter colors have a higher Albedo (the percentage of light refracted or to bend by an object) than the darker colors because they reflect more heat.

Overall, there were some key points I had achieved when I finished my experiment. I also achieved the goal of my project. Following the procedure, I used exact measurements to get accurate results. The data that I recorded in my results seemed to be different from what I thought in my hypothesis. In final words, I made a vivid and detailed conclusion from my experiment. With the surprising information that I found out from the experiment, I learned that the darker colors absorb more heat energy than lighter colors and I learned a new concept.

Sustainability Essay

Global warming is terribly affecting our environment. It is affecting people and affecting the air we breathe. Over the years, global warming has affected the population in different areas. The temperature is rising and the people are falling. The greenhouse gas has increased in the atmosphere. The price of energy is seriously affecting our economy. It often refers to the shortage of oil, electricity and other natural resources.

What can we do to reduce the energy costs??? What can we do about global warming??? We have to react soon before they both affect us.

To begin with, global warming is a huge problem. It is affecting us and the environment. Many people are blind by what has come when global warming has affected our world. The greenhouse gases have taken a tremendous rise over the last decade. This increase is affecting the plants and the people. All of our nature, such as plants, animals and trees, are dwindling as time goes by. The people and the human body seem to come up short due to global warming. The 30-37% increase is a big deal! It may not be a lot, but it is affecting us.

What can we do to stop global warming? What can do to protect us and our environment?

Furthermore, the rising energy costs are threatening our economy. The rising oil and electricity costs are affecting us and our environment. Burning fossil fuels is adding more air pollution to the atmosphere and is killing the plants and trees that give off oxygen. Gas prices are soaring, and are decreasing and increasing over the years. Preserving water is vital to us today. Water provides the plants and trees food to feed from.

How are the rising energy costs affecting us? What can we do to reduce it?

Overall, although global warming and energy costs are affecting us, there can be change. Turning the light off when you leave out of your room is a good way to preserve electricity. Turning the radiator off before you leave your house in the winter is a good way to preserve heat.

Using unwanted paper instead of throwing it away is a good way to save trees. Recycling old junk is a good way to keep our energy from being burned. Buying water from the store instead of letting the faucet run is a good way to preserve water that feeds our environment. Riding a bike to work instead of buying gas is a good way to reduce the tremendously rising gas prices.

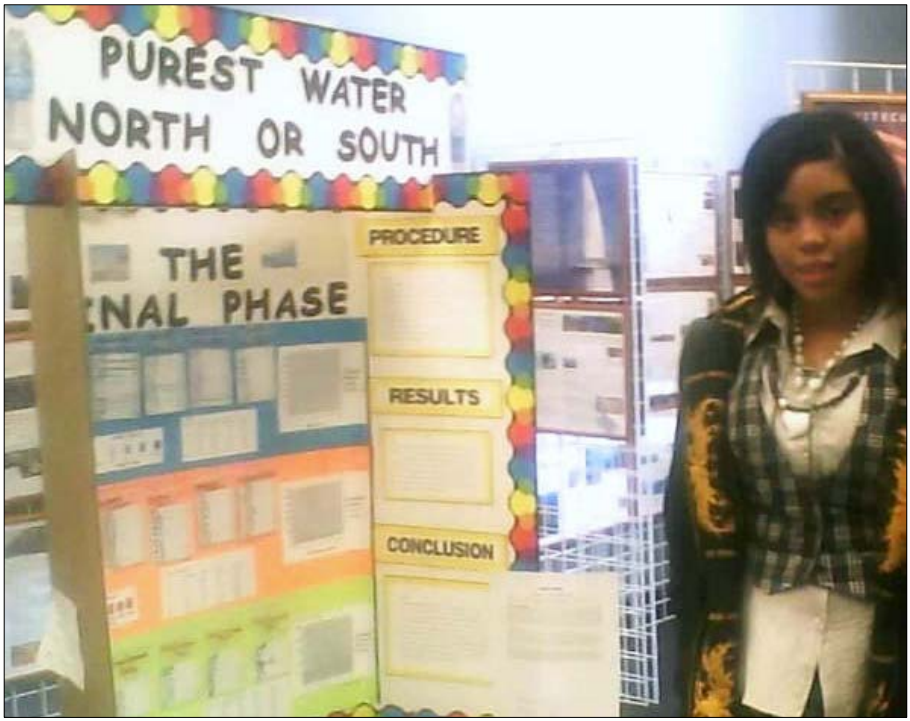
Will you help reduce the energy prices? YES WE CAN!

In closing, global warming and energy costs are giving us a struggle. We have to live in an environment that is being taken over by global warming. Every day the

percent is slowly increasing. It is also taking over the people like a contagious disease that is constantly spreading.

The rising energy costs are affecting the environment and us as well. It is not only affecting our wallets, but it is also affecting us emotionally because we have to live in an unsafe environment.

In the future we can help preserve our natural resources. CHANGE HAS COME!



"Now wouldn't it be cool if we could create new devices for our homes to make life easier and greener; like the old cartoon, THE JETSONS. If you noticed, a lot of their home appliances and gadgets looked cool and high tech. What if we duplicated some of those cool gadgets and made them come to life only using green methods; everything would be made to conserve energy."

Victoria Price

Grade 8, Henry O Tanner Elementary School

Project Essay

Purest Water North or South: The Final Phase

What I have been doing for the past 3 years is testing 4 samples of water for various tests. Every year I tested two brands of purified water vs. the north and south beaches of Chicago. I used the same locations and brands of water but get fresh samples for my test. The bottled water brands I used were *Aquafina* purified water and *Dasani* purified water.

I used purified water and beach water because the labels say that the water is pure; so if it is, that means it should have absolutely nothing in it. The beach waters I know are not the purest sources, so I wanted to know how far away from standardized bottled water are our beaches because we want our local beaches to be a pure as possible. Also, I wanted to get a range of Chicago waters to see if there were any differences from the north sides of Chicago to the south.

Over the years I have tested these samples for a collection of 9 tests. They are Ph Balance, Total Chlorine, Nitrates + Nitrites, Bacteria Growth, Water Hardness, Total Alkalinity, and most recently Dissolved Metals, Dissolved Solids, and Iron. Collectively my results show that the *Aquafina* brand is the safest and the purest. The south side is the most impure. The location where I received my samples is Rainbow Beach for the south side, which is around 7800 south. For the north side I received my samples from the end of Chicago, where Chicago waters meet Evanston

The purpose of my project was to find out which sample of store bought bottled water and which sample of Chicago beach water contained the most dissolved metals, dissolved solids, and iron.

The procedure for my project was to first fill up the vial of ¼ water sample. Then I dipped the test strip in the vial for 5 seconds. I had to wait 30 seconds or hold it leveled for 2 minutes depending on which test it was. After the strips turned color, I matched up the strips with the percentage of concentration and recorded my results.

My results proved my hypothesis right about the *Aquafina* sample being the purest and the south side sample the most impure. Next year I plan to continue this project only using more samples and more tests. So this was not really the final phase for my project.

Sustainability Essay

How to Save the Planet

Everyone has heard of Green Technology right? For those who have not, Green Technology is using new environmentally sound methods for constructing, renovating, and operating homes and buildings. Some of these methods might be

using natural and recycled products for the materials of the buildings, creating natural light buildings, and recycling water from natural sources like rain.

Now wouldn't it be cool if we could create new devices for our homes to make life easier and greener; like the old cartoon, THE JETSONS. If you noticed, a lot of their home appliances and gadgets looked cool and high tech. What if we duplicated some of those cool gadgets and made them come to life only using green methods; everything would be made to conserve energy. That would really be something. That way life would be simpler but healthier for our planet. We are wasting too much energy and resources on things when we can just use what is around us. It's a thought.

Here is another thought, create a clothes line in your house to dry your clothes. Sounds a little country right, but it is a great idea, just think about it. Your clothes are damp after coming out of the washer and you just hang them on a line to dry. Then turn a fan on or crack a window. Trust me it works. That way you are saving energy from using a clothes dryer. It may take a little while longer, so wash your clothes a couple hours in advance. When you really think about it, it is saving you money, too. The less energy you use, the less money you spend. One more thing, it will give you a work out. At least it is a greener way to live and stay clean.

How to save some cash! This is environment and wallet friendly. Instead of buying those purified water bottled brands buy a water filter. Over time it all adds up. Buying and buying water when you can just use the tap. Also, it not only saves you money, but did you know it can save lots of container waste? And besides, who knows that the plastic is not hazardous to the health anyway. How do we know the chemicals made into plastic will not do some internal damage later on? For all we know, it could lead up to something big like cancer. If you put plastic bottles in the garbage, it will stay in landfills for hundreds of years. That is why they make you pay for plastic bottles.

Those are a few ways to make life simpler, safer and greener, but the best way to save our planet is to keep experimenting.

How to Talk About Sustainability

Sustainability Definition I

Sustainability is the capacity to endure. In ecology the word describes how biological systems remain diverse and productive over time. For humans it is the potential for long-term maintenance of wellbeing, which in turn depends on the wellbeing of the natural world and the responsible use of natural resources.

Sustainability has become a wide-ranging term that can be applied to almost every facet of life on Earth, from a local to a global scale and over various time periods. Long-lived and healthy wetlands and forests are examples of sustainable biological systems. Invisible chemical cycles redistribute water, oxygen, nitrogen and carbon through the world's living and non-living systems, and have sustained life for millions of years. As the earth's human population has increased, natural ecosystems have declined and changes in the balance of natural cycles has had a negative impact on both humans and other living systems.*

There is now abundant scientific evidence that humanity is living unsustainably.* Returning human use of natural resources to within sustainable limits will require a major collective effort. Ways of living more sustainably can take many forms from reorganizing living conditions (e.g., ecovillages, eco-municipalities and sustainable cities), reappraising economic sectors (permaculture, green building, sustainable agriculture), or work practices (sustainable architecture), using science to develop new technologies (green technologies, renewable energy), to adjustments in individual lifestyles that conserve natural resources.

Source: http://en.wikipedia.org/wiki/Sustainability

Achieving sustainability will enable the Earth to continue supporting human life as we know it. (Photo: Blue Marble NASA)

* Earth-Policy.org

Sustainability Definition II

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

This definition was created in 1987 at the World Commission on Environment and Development (the Brundtland Commission). It is enshrined in the Swiss federal constitution. It is similar to the "seventh generation" philosophy of the Native American Iroquois Confederacy, mandating that chiefs always consider the effects of their actions on their descendants seven generations in the future.

There are many ways to measure or define sustainability. As described in the book Natural Capitalism, in business, these should include the sustainable development and use of, at least, the following four types of capital:

- Financial Capital
- Natural Capital
- Manufacturing Capital
- Human Capital

In addition, many organizations use the following criteria to assess sustainable products, services, and other activities:

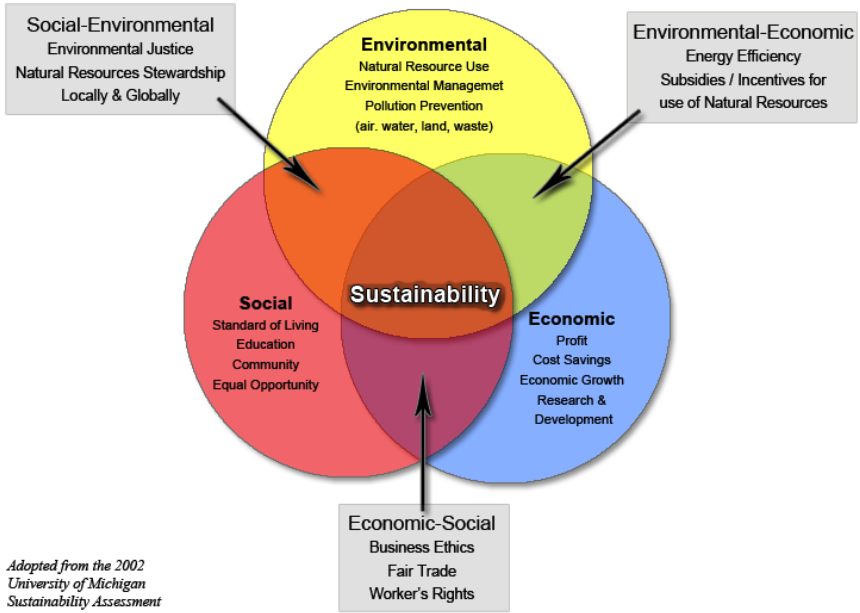
Social Criteria:
- Socially desirable
- Culturally acceptable
- Psychologically nurturing

Financial Criteria:
- Economically sustainable
- Technologically feasible
- Operationally viable

Environmental Criteria:
- Environmentally Robust
- Generationally Sensitive
- Capable of continuous learning

Source: http://www.sustainabilitydictionary.com/

The Three Spheres of Sustainability



Adopted from the 2002 University of Michigan Sustainability Assessment

50 Ways to Reduce Energy Costs & Increase Sustainability

Adapted from http://globalwarming-facts.info/50-tips.html

1) Replace a regular incandescent light bulb with a compact fluorescent light bulb (CFL)

CFLs use 60% less energy than a regular bulb. This simple switch will save about 300 pounds of carbon dioxide a year.

> **EDITOR'S NOTE**: **CFLs contain mercury** so you may want to consider LED bulbs as soon as their price comes down in the next year or two. If you do use CFLs, be sure to dispose of them properly. Here are instructions from the EPA:
>
> > **Break a bulb? Five steps for cleanup**
> > The EPA offers a detailed, 11-step procedure you should follow: Air out the room for a quarter of an hour; wear gloves; double-bag the refuse; use duct tape to lift the residue from a carpet. Do not use a vacuum cleaner, as that will only spread the problem. The next time you vacuum the area, immediately dispose of the vacuum bag.
>
> **Qualified places to recycle CFLs are so few** that the largest recycler of fluorescent bulbs in America is Ikea, the furniture chain. Once in a landfill, bulbs are likely to shatter even if they are packaged properly. If the disposal problem is to be solved, speed would appear to be called for.
>
> **Consumers bought more than 300 million CFLs in 2007, according to industry figures, but they may be simply trading one problem (low energy-efficiency) for another (hazardous materials by the millions of pounds going right into the earth).**

2) Install a Programmable Thermostat

Programmable thermostats will automatically lower the heat or air conditioning at night and raise them again in the morning. They can save you $100 a year on your energy bill.

3) Move your thermostat down 2° in winter and up 2° in summer

Almost half of the energy we use in our homes goes to heating and cooling. You could save about 2,000 pounds of carbon dioxide a year with this simple adjustment

4) Clean or replace filters on your furnace and air conditioner

Cleaning a dirty air filter can save 350 pounds of carbon dioxide a year

5) Choose energy efficient appliances when making new purchases

Look for the Energy Star label on new appliances to choose the most energy efficient products available.

6) Do not leave appliances on standby

Use the "on/off" function on the machine itself. A TV set that's switched on for 3 hours a day (the average time Europeans spend watching TV) and in standby mode during the remaining 21 hours uses about 40% of its energy in standby mode.

7) Wrap your water heater in an insulation blanket

You'll save 1,000 pounds of carbon dioxide a year with this simple action. You can save another 550 pounds per year by setting the thermostat no higher than 50°C.

8) Move your fridge and freezer

Placing them next to the cooker or boiler consumes much more energy than if they were standing on their own. For example, if you put them in a hot cellar room where the room temperature is 30-35ºC, energy use is almost double and causes an extra 160kg of CO2 emissions for fridges per year and 320kg for freezers.

9) Defrost old fridges and freezers regularly

Even better is to replace them with newer models, which all have automatic defrost cycles and are generally up to two times more energy-efficient than their predecessors.

10) Don't let heat escape from your house over a long period

When airing your house, open the windows for only a few minutes. If you leave a small opening all day long, the energy needed to keep it warm inside during six cold months (10ºC or less outside temperature) would result in almost 1 ton of CO2 emissions

11) Replace your old single-glazed windows with double-glazing

This requires a bit of upfront investment, but will halve the energy lost through windows and pay off in the long term. If you go for the best the market has to offer (wooden-framed double-glazed units with low-emission glass and filled with argon gas), you can even save more than 70% of the energy lost.

12) Get a home energy audit

Many utilities offer free home energy audits to find where your home is poorly insulated or energy inefficient. You can save up to 30% off your energy bill and 1,000 pounds of carbon dioxide a year. Energy Star can help you find an energy specialist.

13) Cover your pots while cooking

Doing so can save a lot of the energy needed for preparing the dish. Even better are pressure cookers and steamers: they can save around 70%!

14) Use the washing machine or dishwasher only when they are full

If you need to use it when it is half full, then use the half-load or economy setting. There is also no need to set the temperatures high. Nowadays detergents are so efficient that they get your clothes and dishes clean at low temperatures.

15) Take a shower instead of a bath

A shower takes up to four times less energy than a bath. To maximize the energy saving, avoid power showers and use low-flow showerheads, which are cheap and provide the same comfort.

16) Use less hot water

It takes a lot of energy to heat water. You can use less hot water by installing a low flow showerhead (350 pounds of carbon dioxide saved per year) and washing your clothes in cold or warm water (500 pounds saved per year) instead of hot.

17) Use a clothesline instead of a dryer whenever possible

You can save 700 pounds of carbon dioxide when you air dry your clothes for 6 months out of the year.

18) Insulate and weatherize your home

Properly insulating your walls and ceilings can save 25% of your home heating bill and 2,000 pounds of carbon dioxide a year. Caulking and weather-stripping can save another 1,700 pounds per year. Energy Efficient has more information on how to better insulate your home.

19) Be sure you are recycling at home

You can save 2,400 pounds of carbon dioxide a year by recycling half of the waste your household generates.

20) Recycle your organic waste

Around 3% of the greenhouse gas emissions through methane are released by decomposing bio-degradable waste. By recycling organic waste, or composting it if you have a garden, you can help eliminate this problem! Just make sure that you compost it properly, so it decomposes with sufficient oxygen, otherwise your compost will cause methane emissions and smell foul.

21) Buy intelligently

One bottle of 1.5l requires less energy and produces less waste than three bottles of 0.5l. As well, buy recycled paper products: it takes less 70 to 90% less energy to make recycled paper and it prevents the loss of forests worldwide.

22) Choose products that come with little packaging and buy refills when you can

You will also cut down on waste production and energy use... another help towards sustainable living.

23) Reuse your shopping bag

When shopping, it saves energy and waste to use a reusable bag instead of accepting a disposable one in each shop. Waste not only discharges CO2 and methane into the atmosphere, it can also pollute the air, groundwater and soil.

24) Reduce waste

Most products we buy cause greenhouse gas emissions in one or another way, e.g., during production and distribution. For example, by taking your lunch in a reusable lunch box instead of a disposable one, you save the energy needed to produce new lunch boxes.

25) Plant a tree

A single tree will absorb one ton of carbon dioxide over its lifetime. Shade provided by trees can also reduce your air conditioning bill by 10 to 15%. The Arbor Day Foundation has information on planting and provides trees you can plant with membership.

26) Switch to green power

In many areas, you can switch to energy generated by clean, renewable sources such as wind and solar. In some of these, you can even get refunds by government if you choose to switch to a clean energy producer, and you can also earn money by selling the energy you produce and don't use for yourself.

27) Buy locally grown and produced foods

The average meal in the United States travels 1,200 miles from the farm to your plate. Buying locally will save fuel and keep money in your community.

28) Buy fresh foods instead of frozen

Frozen food uses 10 times more energy to produce.

29) Seek out and support local farmers markets

They reduce the amount of energy required to grow and transport the food to you by one fifth. Seek farmer's markets in your area, and go for them.

30) Buy organic foods as much as possible

Organic soils capture and store carbon dioxide at much higher levels than soils from conventional farms. If we grew all of our corn and soybeans organically, we'd remove 580 billion pounds of carbon dioxide from the atmosphere!

31) Consider eating grass-fed beef and purchasing milk and dairy products that come from pasture-fed dairy cattle

These cattle are not fed grain and are allowed to roam in organic (no pesticide or herbicide) pastures. (Most beef in our stores comes from feedlot cattle that are routinely fed hormones—to induce growth—and antibiotics to deter health problems associated with feedlots.) Some of the environmental benefits of grass-fed beef are:

- Reduction in heat-trapping gases
- Decreased fuel use
- Decreased soil erosion
- Improved air quality
- Reduction of antibiotic residues in water supplies

32) Reduce the number of miles you drive by walking, biking, carpooling or taking mass transit wherever possible

Avoiding just 10 miles of driving every week would eliminate about 500 pounds of carbon dioxide emissions a year! Look for transit options in your area.

33) Start a carpool with your coworkers or classmates

Sharing a ride with someone just 2 days a week will reduce your carbon dioxide emissions by 1,590 pounds a year. eRideShare.com runs a free service connecting north American commuters and travelers.

34) Don't leave an empty roof rack on your car

This can increase fuel consumption and CO2 emissions by up to 10% due to wind resistance and the extra weight - removing it is a better idea.

35) Keep your car tuned up

Regular maintenance helps improve fuel efficiency and reduces emissions. When just 1% of car owners properly maintain their cars, nearly a billion pounds of carbon dioxide are kept out of the atmosphere.

36) Drive carefully and do not waste fuel

You can reduce CO2 emissions by readjusting your driving style. Choose proper gears, do not abuse the gas pedal, use the engine brake instead of the pedal brake when possible and turn off your engine when your vehicle is motionless for more than one minute. By readjusting your driving style you can save money on both fuel and car maintenance.

37) Check your tires weekly to make sure they are properly inflated

Proper tire inflation can improve gas mileage by more than 3%. Since every gallon of gasoline saved keeps 20 pounds of carbon dioxide out of the atmosphere, every increase in fuel efficiency makes a difference!

38) When it is time for a new car, choose a more fuel efficient vehicle

You can save 3,000 pounds of carbon dioxide every year if your new car gets only 3 miles per gallon more than your current one. You can get up to 60 miles per gallon with a hybrid! You can find information on fuel efficiency on FuelEconomy and on GreenCar websites.

39) Try car sharing

Need a car but don't want to buy one? Community car sharing organizations provide access to a car and your membership fee covers gas, maintenance and insurance. Many companies – such as ZipCar - offer low emission or hybrid cars too!

40) Try telecommuting from home

Telecommuting can help you drastically reduce the number of miles you drive every week. For more information, check out the Telework Coalition.

41) Fly less

Air travel produces large amounts of emissions so reducing how much you fly by even one or two trips a year can reduce your emissions significantly. You can also offset your air travel carbon emissions by investing in renewable energy projects.

42) Encourage your school or business to reduce emissions

You can extend your positive influence on sustainable living well beyond your home by actively encouraging other to take action.

43) Join the virtual march

The Virtual March is a non-political effort to bring people concerned about sustainable living together in one place. Add your voice to the hundreds of thousands of other people urging action.

44) Encourage the switch to renewable energy

Living more sustainably requires a national transition to renewable energy sources such as solar, wind and biomass. These technologies are ready to be deployed more widely but there are regulatory barriers impeding them. U.S. citizens, take action to break down those barriers with Vote Solar.

45) Protect and conserve forest worldwide

Forests play a critical role in sustainable living: they store carbon. When forests are burned or cut down, their stored carbon is release into the atmosphere—deforestation now accounts for about 20% of carbon dioxide emissions each year. Conservation International has more information on saving forests.

46) Consider the impact of your investments

If you invest your money, you should consider the impact that your investments and savings will have on sustainable living. Check out SocialInvest and Ceres to learn more about how to ensure your money is being invested in companies, products and projects that address issues related to sustainability.

47) Make your city cool

Cities and states around the country have taken action to be more sustainable by passing innovative transportation and energy saving legislation. If you're in the U.S., join the cool cities list.

48) Tell Congress to act

We need to set a firm limit on carbon dioxide emissions and then use free market incentives to lower costs, promote efficiency and spur innovation. Tell your representative to support these types of plans.

49) Make sure your voice is heard!

Americans must have a stronger commitment from their government in order to implement solutions, and such a commitment won't come without a dramatic increase in citizen lobbying for new laws with teeth. Get the facts about U.S.

politicians and candidates at Project Vote Smart and The League of Conservation Voters. Make sure your voice is heard by voting!

50) Share this list!

Send this page via e-mail to your friends! Spread this list worldwide and help people doing their part: the more people you will manage to enlighten, the greater YOUR help to the planet will be (but please take action on first person too)!

If you like, you are free to republish, adapt or translate the list and post it in your blog, website or forum as long as you give us credit with a link to the original source. Thank you.