

# LOOKING AHEAD

The Cornell Roosevelt Institute Policy Journal

Center for Energy and Environmental Policy

Issue No. 4, Spring 2013



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# TABLE OF CONTENTS

<b>About the Roosevelt Institute</b>	<b>4</b>
<b>Letter from the Policy Director</b>	<b>5</b>
<b>Jatin Khanna (ENGR '14)</b> <b>“Putting a Price on Carbon: The Crucial Step in Mitigating Climate Change”</b> <i>Currently, corporations are allowed to pollute the atmosphere and environment and pay little to nothing for the right to do so. This activity is gravely endangering the livelihood of humans and other life on Earth. By putting a price on carbon emissions, we will take a major step towards mitigating catastrophic climate change.</i>	<b>6 - 8</b>
<b>Kelsey Clough (A&amp;S '15)</b> <b>“Prohibiting Plastic Caps on Gable-Top Cartons”</b> <i>Gable-top cartons are designed with a spout for pouring its liquid contents, but also typically possess a polypropylene plastic cap. These extraneous plastic caps significantly contribute to ocean debris and littering. Therefore, banning plastic caps on gable-top cartons will dramatically reduce the degradation of marine and terrestrial ecosystems, as well as protect humans from chemical contamination.</i>	<b>9 - 11</b>
<b>Hilary Yu (A&amp;S '15)</b> <b>“Modifying the Concept of Food Miles for Widespread Implementation”</b> <i>The additional inputs of nitrogen and phosphorus that reach aquatic ecosystems as a result of excessive fertilizer use reduce water quality, harm aquatic life, and can be detrimental to human health. County-level regulations on fertilizer use for non-crop lands, and statewide policies pursuing slow-release nitrogen fertilizers, particularly in agriculturally-dependent states, should be implemented to address these concerns.</i>	<b>12 - 14</b>
<b>Stephanie Tam (CALs '15)</b> <b>“Labeling Genetically Engineered Food”</b> <i>The US remains one of the few industrialized nations refusing to label genetically engineered foods because opponents fear rising costs for corporations, higher prices for consumers, and the spreading of negative associations with GE food. Food labeling, however, can be beneficial for everyone, empowering the consumer by disclosing ingredients and empowering the corporation through reduced operational complications. By creating a standardized labeling system, with government support, this nationwide GE labeling policy will help America to realize such benefits.</i>	<b>15 - 16</b>
<b>Alex Fields-Lefkovic (A&amp;S '16)</b> <b>“Hydrogen Fuel Vehicles: A Transformation in Transportation”</b> <i>The race for hydrogen fuel cell technology has begun. Investors have been encouraging manufacturers to utilize fuel cells in personal vehicles and buses on a monumental scale. There are great prospects for commercializing fuel cells and producing spinoff ventures in the transportation and energy sectors. The federal government must initially provide loan guarantees for companies that develop and promote fuel cells. This is imperative to reducing carbon emissions and weaning the United States from its heavy reliance on oil.</i>	<b>17– 20</b>
<b>Chris Harvey (A&amp;S '15)</b> <b>“Reducing Food Waste Through a Tax”</b> <i>In the United States, 40 percent of food goes to waste. This represents an economic loss of \$165.6 billion annually, and a tremendous amount of unnecessary environmental damage. By imposing a tax on food waste similar to the one being implemented in South Korea, the United States can cut back on resource depletion, greenhouse gas emissions, and economic loss.</i>	<b>21- 23</b>
<b>Valeria San Juan (CALs '16)</b> <b>“Changing the Sulfur Content of Fuel”</b> <i>To reduce the negative environmental and health effects of sulfuric acid, the Environmental Protection Agency should not only implement the Tier 3 program, but it should expand the program so that it includes the reduction of sulfur contents in fuel designated for heavy-duty vehicles.</i>	<b>24-27</b>
<b>Jenna Behrendt (HumEc '15)</b> <b>“Prohibiting Filler Feed: Altering Meat Production Methods”</b> <i>The US's current state of meat production has hazardous impacts on our health and our environment. Prohibiting the use of fillers as feed for cows would prevent tons of greenhouse gases from entering the atmosphere annually.</i>	<b>27– 29</b>

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# About the Roosevelt Institute

The Roosevelt Institute at Cornell University is a student-run think tank that generates and promotes progressive policy initiatives and that seeks to inform and inspire public policy debate in the Cornell and greater-Ithaca communities. Members write for our *Looking Ahead* journals, craft blog posts on important current events, organize political debates, host speaker series, and coordinate advocacy and education projects. The Cornell Roosevelt Institute is one of over eighty chapters in the larger Roosevelt Institute Campus Network.

## **The Roosevelt Institute is organized in six policy centers:**

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# Letter from the Policy Director

Dear Readers,

I am very pleased to present the second issue of *Looking Ahead: The Cornell Roosevelt Institute Policy Journal* from the Center For Energy and Environment. As Policy Director and Editor of this journal since Fall 2012, the talent and innovation displayed by the analysts of the Center for Energy and Environment never ceases to amaze me.

Each analyst has combined creativity and passion with careful research and hard work to produce the eight policy proposals that comprise this publication. I have found each piece to be enjoyable to read and incredibly thought-provoking and I hope you will as well.

Sincerely,

**Janisa Mahaparn**

Psychology and Cognitive Science '15 (A&S)  
Policy, Education and Advocacy Director  
Center for Energy and Environmental Policy  
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# Putting a Price on Carbon: The Crucial Step in Mitigating Climate Change

By Jatin Khanna '14, Major: Material Science & Engineering (ENGR), Email: jk857@cornell.edu

*Currently, corporations are allowed to pollute the atmosphere and environment and pay little to nothing for the right to do so. This activity is gravely endangering the livelihood of humans and other life on Earth. By putting a price on carbon emissions, we will take a major step towards to mitigating catastrophic climate change.*

## Background:

At our current rate of fossil fuel consumption, the Earth is set to reach and surpass the 2° C limit set by the IPCC. There is still no worldwide plan of action, and every global summit on the topic so far has failed to create a unified platform for combating climate change. Countries like Germany, France, Spain, and Costa Rica are producing large portions of their energy from renewable sources, but the two largest polluters, China and the US, show no signs of slowing down.

### Key Facts:

- The IPCC has set a limit of a 2° C rise in global mean temperature as the “safe limit” for preventing catastrophic climate change
- The Earth has already warmed 0.8° C above pre-industrial temperatures due to emissions from human activities
- Temperatures are predicted to rise another 0.8° C based solely on past emissions

Climate experts estimate that humans can emit at most 565 gigatons of carbon dioxide by 2050 if we want to stay under the safe limit for global warming<sup>2</sup>. If all known reserves of hydrocarbons that are owned by corporations or countries are burned—these are fossil fuels that are on paper and accounted for—they will release 2,795 gigatons of carbon dioxide. This is five times as much carbon dioxide that is the upper limit for the “safe” amount, and those who own these resources currently have no incentive to not burn them.

## Analysis:

The definition of an externality is a side effect or consequence of an industrial or commercial activity that affects other parties without reflection in the cost of the product. Since the onset of the industrial age, corporations have been allowed to profit by unsustainably harvesting natural resources and polluting the environment for free.

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Historically, the government has not prevented the companies from doing so based on the justification that it would stifle economic activity. However, scientists unanimously agree that the acts polluting the land and water and emitting greenhouse gases have harsh negative long-term consequences on the welfare of humans and other organisms on Earth<sup>1</sup>.

When allowed to pollute for free, corporations will pollute at the level that will maximize their profits because that is the inherent role of a corporation. They will not reduce their polluting of their own free will, and even if they do for the sake of public image, the amount they reduce by will not be significant enough to help stay under our 2° C limit. So it seems that the most effective and fair way to reduce pollution would be to put a price on carbon. This will force the polluting entities to initially lower their pollution in order to lower costs. Over the long term, they will invest in cleaner and more efficient technology to reach the same level of profitability without emitting at dangerous levels. The methods for doing so include, but are not limited to, renewable energy, energy efficiency, solar heating, and carbon capture and sequestration.

A study published in Nature Magazine displays the likelihood of staying under the 2° C limit plotted against the price of carbon emissions in \$/gigatons CO<sub>2</sub><sup>3</sup>. The study views the probability of keeping within the limit and how it changes with carbon price. The study shows that out of all the factors affecting mitigation, political inaction plays the largest role. If we put a moderate price of \$50/ton CO<sub>2</sub> on carbon today, the Earth stands a 70% chance of avoiding warming to the safe limit. However, if we wait till 2025 to act, this probability drops to around 40%. Waiting until 2030 gives a 20% probability of avoiding 2° C warming<sup>3</sup>. Therefore, we must act immediately if we want to avoid extinction of animal and plant life, severe drought and flooding, more frequent weather calamities, flooding of coastal cities, and the Earth becoming inhabitable for humans.

### Talking Points:

- Experts say that human life on Earth becomes heavily endangered at 2° C warming
- We can not emit more than 565 gigatons CO<sub>2</sub> by 2050 if we want to stay under this limit
- Current known fossil fuel reserves, if burned, would release 2,795 gigatons of CO<sub>2</sub>
- The most important factor in preventing 2° C warming is immediate political action
- If we delay action till 2030, it will be nearly impossible to mitigate to levels where there is more than a 20% chance of temperatures staying below 2° C

### Next Steps:

The clear next step is to immediately implement a global price on carbon. It does not necessarily need to be a single price on all companies and entities; it should scale based on the historical pollution. For example, countries like India, China, and Brazil should be allowed to pollute at higher levels than the United States since we have been polluting at high levels for much longer than any of those nations. Furthermore, we are economically much more stable than those nations, and possess the capability to transition to cleaner technologies without incurring too much of an economic loss. In fact, enacting large-scale energy efficiency standards actually saves money and creates jobs in the long run, so climate change mitigation can have net economic benefits.

## Endnotes:

[1] IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[2] McKibben, Bill. "Global Warming's Terrifying New Math." *Rolling Stone* 19 July 2012: 40-45. Print.

[3] Rogelj, Joeri et. al. "Probabilistic Cost Estimates for Climate Change Mitigation." *Nature* 493.7430 (2013): 79-83. Print.

# Prohibiting Plastic Caps on Gable-Top Cartons

By Kelsey Clough, Major: College Scholars Program (A&S), Email: kec93@cornell.edu

*Gable-top cartons are designed with a spout for pouring its liquid contents, but also typically possess a polypropylene plastic cap. These extraneous plastic caps significantly contribute to ocean debris and littering. Therefore, banning plastic caps on gable-top cartons will dramatically reduce the degradation of marine and terrestrial ecosystems, as well as protect humans from chemical contamination.*

## Background:

Gable-top cartons, the common refrigerated drink cartons, contain liquid products such as milk, juice, cream, egg substitutes, and milk substitutes.<sup>1</sup> The gable-top carton has inclined roof panels, which create a gable opening, and a pair of end closure panels for closing opposite ends of the gable opening. Ultimately, the end closure panels can snap outwardly and form a pouring spout, making transfer of its liquid contents accessible and efficient,<sup>2</sup>

Many gable-top cartons have also adapted a plastic screw cap, typically composed of polypropylene, to be used for pouring. This extraneous cap was added solely for consumer convenience, and thus, is not necessary for the function of the carton. Inclusion of the plastic cap complicates the process of carton disposal; plastic from the cap closure on the carton must be removed, and the cap disposed separately.<sup>3</sup> Furthermore, although the plastic caps can theoretically be recycled, most are discarded as trash, contributing to ocean debris and land litter.

On average, the weight of plastic on the ocean surface outweighs all marine life six to one, and of this, plastic caps are the second item most commonly found.<sup>4,5</sup> Through the process of 'photodegradation,' plastics are broken down into very small pieces in the ocean, causing fish and other marine organisms to mistake the inorganic substances for food.<sup>6</sup> Similarly, plastic caps found as land litter are mistaken by birds for food.<sup>7</sup> These feeding mistakes are harmful and sometimes fatal for the marine and avian creatures; ingesting plastic caps causes suffocation, dehydration, reduced body weight, starvation, clogged gizzards, and increased risk of disease.<sup>8</sup> The Laysan Albatross, for example, is particularly at risk due to increased plastic caps.<sup>9</sup>

### Key Facts:

- Gable-top cartons commonly possess extraneous plastic caps
- Plastic caps significantly contribute to marine debris and land litter
- Chemicals from the plastic caps can be ingested by marine species that are then consumed by humans

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The ingestion of plastic caps by fish, moreover, can have severe consequences on human health. Polypropylene plastic caps have plasticizers, dyes, and flame-retardant chemicals.<sup>10</sup> Any fish on the food chain can ingest these chemicals, and consequently make it possible for humans to consume these toxins. Adverse effects from flame-retardant chemicals include long-term neurological damage, damage to the liver, and thyroid, and reproductive and developmental impairment.<sup>11</sup>

Legislatively, there have been no resolutions to ban plastic caps on gable-top cartons. Acts such as the “Marine Plastic Pollution Research and Control Act of 1987, however, require the Environmental Protection Agency and National Oceanic and Atmospheric Administration to study the adverse effects of the improper disposal of plastics on the environment.<sup>12</sup> Therefore, there is legislative traction in preventing plastic waste from entering the ecosystem. This small step in supporting preventative waste legislation, therefore, can make a big environmental impact.

## Analysis:

Prohibiting plastic caps on gable-top cartons will significantly decrease the amount of plastic caps that end up as waste in the ocean or on land. As a result, the chance of animals ingesting plastic caps will be dramatically lowered, enhancing animals’ health and mortality. Therefore, the ecosystem will remain in balance, ensuring sustainable sources of seafood, water quality, and tourism opportunities. These advantages will also supplement the economy; there will be increased revenue in the seafood and tourism industry. In addition, by maintaining the marine and terrestrial ecosystems currently affected by plastic cap waste, scientific and technological progress can be made. For example, organism research and development of alternative ocean energy can be fortified. Another positive impact of banning plastic caps on gable-top cartons will be the decreased likelihood that humans will consume toxins released from the plastic caps. This ban will, accordingly, decrease medical costs.

### Talking Points:

- Prohibiting plastic caps on gable-top cartons will increase the health and mortality of marine, avian and terrestrial species
- There is no financial or structural advantage to having a plastic cap on gable-top cartons

The banning of plastic caps on gable-top cartons will primarily affect the businesses that sell and utilize the plastic caps. Companies that currently utilize gable-top cartons with plastic caps will actually save money due to use of less material. Although consumers may feel more inconvenienced with the lack of plastic cap, this inconvenience

is negligible and there will be no difference in price or accessibility of the product within the carton. This is evident through historical analysis; until very recently, gable-top cartons did not have plastic caps, and there were no predicaments associated with the function or viability of the product. Companies such as Clover Stornetta Farms have gable-top cartons without plastic caps, with no resulting impact on consumer support of its product.<sup>13</sup>

## Next Steps:

National legislation should be enacted that bans the use of plastic caps on gable-top cartons. Through the enforcement of the United States Food and Drug Administration, this packaging regulation can be easily monitored and controlled. If the United States sincerely desires an approach to diminish marine debris and land litter, and thus protect the ecosystem and human health, this proposed regulation should be promptly enacted.

## Endnotes:

- [1] "We Recycle Cartons: The Carton." *Carton Council*. Web. <<http://www.recyclecartons.com/why-juice-box-milk-carton-recycling-matter/#text-18>>
- [2]Zao, Julius, et al. "Carton Having a Collapsible Pouring Spout." Patent US003871305. 1 Jan. 1963.
- [3]Nowak, Brennan. "Dumb Design: Milk Cartons with Plastic Caps. Say No!" *Syres.org*. 5 Gyres. Web. 9 April 2012. <[http://Syres.org/posts/2012/04/09/dumb\\_design\\_milk\\_cartons\\_with\\_plastic\\_caps\\_say\\_no/#](http://Syres.org/posts/2012/04/09/dumb_design_milk_cartons_with_plastic_caps_say_no/#)>
- [4]Kostigen, Thomas. "The World's Largest Dump: The Great Pacific Garbage Patch." *Discovermagazine.com*. Discover. Web. 10 July 2008. <<http://discovermagazine.com/2008/jul/10-the-worlds-largest-dump#.UW6iVYle5g>>
- [5] "International Coastal Cleanup 2012 Data Release." *Oceanconservancy.org*. Ocean Conservancy. Web. 2012. <<http://www.oceanconservancy.org/our-work/marine-debris/check-out-our-latest-trash.html>>
- [6] "Why Study Plastic Pollution?" *algaita.org*. Algalita Marine Research Institute. Web. <<http://www.algalita.org/research/index.html>>
- [7] "Water Marine Debris." United States Environmental Protection Agency. Web. <[http://water.epa.gov/type/oceb/marinedebris/factsheet\\_marinedebris\\_debris.cfm](http://water.epa.gov/type/oceb/marinedebris/factsheet_marinedebris_debris.cfm)>
- [8]Ibid.
- [9]Klavitter, John. "Discarded Plastics Distress Albatross Chicks." *Fmw.gov*. United States Fish & Wildlife Service. Web. 24 Oct. 2012. <<http://www.fws.gov/news/blog/index.cfm/2012/10/24/Discarded-plastics-distress-albatross-chicks>>
- [10] "Making Plastic Bottle Caps." *Ugandainvest.go.ug*. UgandaInvest. Web. <<http://www.ugandainvest.go.ug/index.php/services/making-plastic-bottle-caps?tmpl=component&print=1>>
- [11] "Decade Study: A Review of Available Scientific Research." *Epa.state.il.us*. Illinois Environmental Protection Agency. Web. 25 Jan. 2006. <<http://www.epa.state.il.us/reports/decade-study/available-research-review.html#>>
- [12] "Water Marine Debris." United States Environmental Protection Agency. Web. <[http://water.epa.gov/type/oceb/marinedebris/factsheet\\_marinedebris\\_debris.cfm](http://water.epa.gov/type/oceb/marinedebris/factsheet_marinedebris_debris.cfm)>
- [13] "News & Events." *Cloverstornetta.com*. Clover Stornetta Farms. Web. 2013. <<http://cloverstornetta.com/category/news-events/in-the-news/>>

# Limit Fertilizer: Mitigating Nutrient Pollution

By Hilary Yu '15, Major: Government & Biology (A&S), Email: hcy25@cornell.edu

*The additional inputs of nitrogen and phosphorus that reach aquatic ecosystems as a result of excessive fertilizer use reduce water quality, harm aquatic life, and can be detrimental to human health. County-level regulations on fertilizer use for non-crop lands, and statewide policies pursuing slow-release nitrogen fertilizers, particularly in agriculturally-dependent states, should be implemented to address these concerns.*

## Background:

Fertilizer use is widespread, from lawns to parks, to advancing the successes of agricultural production. A practice of indiscriminate use cannot, however, continue without the potential for causing extensive harm.

Nitrogen and phosphorus are among the primary nutrients that limit growth, hence their importance in fertilizers.<sup>1</sup>

When fertilizers are applied in excess, these nutrients can enter lakes, rivers, and eventually the ocean, through runoff from terrestrial applications. The addition of these elements to aquatic systems promotes primary production in these systems, predominantly in the form of algal blooms.<sup>2</sup> When the blooms die and decompose, the amount of dissolved oxygen in the water is reduced such that fish and other aquatic life may be suffocated.<sup>2</sup> Widespread fertilizer application in the agricultural Midwest has resulted in significant hypoxia in the waters of the Gulf of Mexico, leading to a “dead zone” of reduced aquatic life. This has significant ramifications not just in terms of ecosystem health, but also for commercial fishing.<sup>2</sup>

Nitrogen and phosphorus can also affect water quality and human health more directly. In some instances, the algae that grow as a result of added nutrients can produce toxins that are harmful if ingested.<sup>3</sup> In addition, high levels of nitrates in water can be harmful, causing methemoglobinemia.<sup>4</sup> For those who are more susceptible, such as infants, the presence of nitrates in water can cause serious illness and even death if untreated. The Environmental Protection Agency (EPA) notes that infants under the age of six months are at the greatest risk if they drink water with nitrate levels

### Key Facts:

- Nitrogen and phosphorus are important limiting nutrients in both terrestrial and aquatic ecosystems.<sup>1</sup>
- Excessive nitrogen and phosphorus inputs, such as from fertilizer use and agricultural runoff, cause algal blooms in aquatic systems, which eventually lead to hypoxia and a reduction in aquatic life.<sup>2</sup>
- Nitrates from agricultural runoff that enter drinking water supplies in levels above EPA standards are harmful to human health.<sup>5</sup>

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above the maximum contaminant level of 10 ppm; symptoms include blue baby syndrome and a shortness of breath.<sup>5</sup> Pregnant women are also susceptible.<sup>4</sup>

Prior legislation has been minimal. Although the Clean Water Act identifies excess fertilizers as a non-point source pollution, the primary approach towards a solution has been to encourage best management approaches, with little active enforcement.<sup>6</sup> Minnesota was the first state to take a more proactive approach, but this has been in the reduction of only phosphorus in fertilizers. Since 2002, the Minnesota Phosphorus Lawn Fertilizer Law (Minnesota Statutes 18C.60) has restricted phosphorus use in the application of fertilizer to turf – non-crop land – statewide.<sup>7</sup> A 2007 report on the effectiveness of the law found that by 2006, 82% of lawn fertilizer used by consumers was phosphorus-free.<sup>8</sup> Today, ten other states (Illinois, Maine, Maryland, Michigan, New Jersey, New York, Vermont, Virginia, Washington and Wisconsin) have similar laws restricting phosphorus fertilizer use or sale.<sup>9</sup>

## Analysis:

Reducing nitrogen and phosphorus runoff from the application of fertilizers would improve water quality in lakes and streams, aesthetically and functionally, as well as to the benefit of human health. Water is necessary to life, both human and non-human, such that reducing nutrient pollution would improve water quality and prevent the hypoxia

of nutrient-rich waters as a threat to aquatic life. Although the Clean Water Act and Safe Drinking Water Act, under the oversight of the EPA, are meant to ensure water quality standards, a national policy on fertilizer use is too broad to effectively resolve this issue. In addition, the eleven states that currently have fertilizer use policies on turf application only address phosphorus, and not nitrogen.

### Talking Points:

- The reduction of phosphorus in fertilizers has already been targeted, and the concentrations of nitrogen must be similarly limited.
- County and state-level policies to limit fertilization of non-crop lands and to promote slow-release nitrogen fertilizers would help to mitigate the problem of over-fertilization without impairing agricultural production.

## Next Steps:

Considering the wide variation in the economic importance of agriculture among states, national legislation is neither feasible nor desirable. Although there should be a push toward increased and closer monitoring of fertilizer use in large-scale agricultural production, the path toward doing so will likely be gradual. A first step should be for states largely dependent on agriculture to pass statutes similar to that of Minnesota, with the modification that the application of both nitrogen and phosphorus-containing

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fertilizers should be restricted in non-crop land. Statewide policies that may be more practicably pursued include the restricted use of traditional fertilizers in favor of slow-release nitrogen fertilizers; these would help to reduce nitrogen concentrations in runoff.

Nitrogen and phosphorus inputs from fertilizers harm aquatic systems and degrade water quality, such that human health may be negatively affected. Current best management practices to limit excessive fertilizer use in agricultural production can be used in tandem with new policies restricting the fertilization of non-crop lands and promoting the use of slow-release nitrogen fertilizers, to help resolve present issues of water pollution.

## Endnotes:

1. James J. Elser, Matthew E.S. Bracken, Elsa E. Cleland, et al., "Global analysis of nitrogen and phosphorus limitation of primary producers in freshwater, marine and terrestrial ecosystems," *Ecology Letters* 10 (2007): 1135, accessed April 8, 2013, doi: 10.1111/j.1461-0248.2007.01113.x.
2. David Biello, "Fertilizer Runoff Overwhelms Streams and Rivers – Creating Vast 'Dead Zones,'" *Scientific American*, March 14, 2008, accessed April 10, 2013, <http://www.scientificamerican.com/article.cfm?id=fertilizer-runoff-overwhelms-streams>.
2. *Ibid.*
3. "Nutrients: Phosphorus, Nitrogen Sources, Impact on Water Quality," Minnesota Pollution Control Agency, published May 2008, accessed April 10, 2013, <http://www.pca.state.mn.us/index.php/view-document.html?gid=7939>.
4. J.R. Self and R.M. Waskom, "Nitrates in Drinking Water," Colorado State University Extension, last modified March 26, 2013, accessed April 10, 2013, <http://www.ext.colostate.edu/pubs/crops/00517.html>.
5. "Basic Information about Nitrate in Drinking Water," United States Environmental Protection Agency, last modified May 21, 2012, accessed April 11, 2013, <http://water.epa.gov/drink/contaminants/basicinformation/nitrate.cfm>.
4. Self and Waskom, "Nitrates in Drinking Water."
6. "Nutrient Management and Fertilizer," United States Environmental Protection Agency, last modified November 14, 2012, accessed April 11, 2013, <http://www.epa.gov/agriculture/fer.html>.
7. "Phosphorus Lawn Fertilizer Law," Minnesota Department of Agriculture, accessed April 11, 2013, <http://www.mda.state.mn.us/phoslaw>.
8. "Report Summary: Effectiveness of the Minnesota Phosphorus Lawn Fertilizer Law," Minnesota Department of Agriculture, report completed March 2007, accessed April 11, 2013, <http://www.mda.state.mn.us/Global/MDADocs/protecting/waterprotection/07phoslawrptsumm.aspx>.
9. Kristen L. Miller, "State Laws Banning Phosphorus Fertilizer Use," OLR Research Report, February 1, 2012, accessed April 11, 2013, <http://www.ola.ct.gov/2012/rpt/2012-R-0076.htm>.
1. Elser, Bracken, Cleland, et al., "Global analysis."
2. Biello, "Fertilizer Runoff."
5. "Basic Information."

# Labeling Genetically Engineered Food

By Stephanie Tam '15, Major: Natural Resources (CALs), Email: sht36@cornell.edu

*The US remains one of the few industrialized nations refusing to label genetically engineered foods because opponents fear rising costs for corporations, higher prices for consumers, and the spreading of negative associations with GE food. Food labeling, however, can be beneficial for everyone, empowering the consumer by disclosing ingredients and empowering the corporation through reduced operational complications. By creating a standardized labeling system, with government support, this nationwide GE labeling policy will help America to realize such benefits.*

## Background:

Genetically Engineered (GE) foods are foods derived from organisms whose genetic material (DNA) has been modified in a way that does not occur naturally, e.g. through the introduction of a gene from a different organism<sup>1</sup>. Foods that have been genetically altered can have increased tolerance to pesticides and herbicides, and increased resistance to pests. This can benefit farmers by

lowering food production costs and improving crop yields. GE crops are very common in the United States, with an estimated 60% to 70% of processed foods on U.S. grocery shelves containing genetically modified ingredients<sup>2</sup>. Yet, with the exception of food that contains significantly different nutritional properties, the US government does not require mandatory food labeling of genetically engineered foods.

The United States of America remains one of the only leading industrialized nations that does not mandate labeling of Genetically Engineered (GE) foods. In this respect, the USA is an outlier compared to many other countries like Japan, Thailand, Australia, Russia, Europe, Brazil, and more, which all require labeling when ingredients are derived by genetically modified processes past a certain threshold. Dominant GE manufacturers like Monsanto have argued that labeling implies that GE foods have negative health effects, when there has been no scientific evidence, to date, indicating significant differences between GE and non-GE manufactured foods. In addition, there are high costs associated with accurate labeling, which can vary from a few dollars per person per year to 10 percent of a consumer's food bill<sup>3</sup>. However, a growing number of statewide labeling movements suggest that more and more consumers want to see GE food labeled. Not only have various non-profit organizations and campaigns like *LabelGMOs* and *Just Label It* have been forced to lobby for mandatory labeling, but

### Key Facts:

- An estimated 60% to 70% of processed foods on U.S. grocery shelves contains genetically modified ingredients
- United States remains one of the few countries that does not mandate labeling of genetically engineered foods

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several states like Vermont are close to passing bills to mandate GE labeling within the state. In addition, supermarket giant Whole Foods Market recently announced its decision to require labeling for GE foods sold in stores after 2018<sup>4</sup>.

## Analysis:

In the past few years, support for GE labeling has been growing and it is likely that labeling will benefit both consumers and large corporations. GE labeling can benefit consumers by giving them the right to know where their food comes from and empowering consumers to make decisions with this knowledge. To address the concerns that consumers may view GE foods negatively after labeling, governments and food associations should make clear to the public that there has been no scientific data indicating differences between GE and non-GE food. Consumers should have the final say as to how they view GE food and their decision to purchase it or not.

GE labeling can also benefit corporations by introducing a clear and standardized labeling system. Major food corporations such as WalMart and PepsiCo have expressed their frustration with the current ambiguity surrounding labeling. States across the country have been dealing with GE labeling issues on their own and different labeling laws across the country could create operational difficulties and inconvenience for corporations. Though labeling laws will likely mean corporations passing on costs to consumers, a standardized system would reduce potential complications for stores operating in different states. In addition, to accompany a statewide implementation of GE labeling, governments should develop and provide efficient systems and infrastructures to reduce the cost burden on corporations and consumers. Such support and subsidy will encourage corporations to abide by GE labeling policies.

## Next Steps:

The strong support for GE labeling indicates that the US government should implement a nationwide policy mandating labeling of genetically engineered foods. This will not only empower consumers with the knowledge in their food purchase decisions, but also create a standardized system that can reduce operational costs and increase efficiency for corporations. In addition, the government itself should subsidize the new policy by developing the necessary infrastructure and systems regard for an efficient labeling process, in order to reduce the economic cost burden associated with labeling.

## Endnotes:

1) World Health Organization, "Food, Genetically modified," Last modified 2013. Accessed April 18, 2013. [http://www.who.int/topics/food\\_genetically\\_modified/en/](http://www.who.int/topics/food_genetically_modified/en/)

2) WebMD, "Are Biotech Foods Safe to Eat?" Last modified 2013. Accessed April 18, 2013. <http://www.webmd.com/food-recipes/features/are-biotech-foods-safe-to-eat>

3) Colorado State University, "Labeling of Genetically Engineered Foods," Last modified March 26, 2013. Accessed April 18, 2013. <http://www.ext.colostate.edu/subs/foodnut/09371.html>

4) Polis, Carey, Huffington Post, "Whole Foods GMO Labeling To Be Mandatory by 2018," Last modified March 8, 2013. Accessed April 18, 2013. [http://www.huffingtonpost.com/2013/03/08/whole-foods-gmo-labeling-2018\\_n\\_2837754.html](http://www.huffingtonpost.com/2013/03/08/whole-foods-gmo-labeling-2018_n_2837754.html)

# Hydrogen Fuel Vehicles: A Transformation in Transportation

By Alex Field-Lefkovic '16, Major: Government (A&S), Email: af395@cornell.edu

*The race for hydrogen fuel cell technology has begun. Investors have been encouraging manufacturers to utilize fuel cells in personal vehicles and buses on a monumental scale. There are great prospects for commercializing fuel cells and producing spinoff ventures in the transportation and energy sectors. The federal government must initially provide loan guarantees for companies that develop and promote fuel cells. This is imperative to reducing carbon emissions and weaning the United States from its heavy reliance on oil.*

## Background:

Harry Karl Ihrig invented the first hydrogen fuel cell vehicle in 1959 when he installed a 15 kW fuel cell in an ordinary tractor.<sup>1</sup> In 1966, General Motors manufactured the first hydrogen fuel cell car, but found that it was far too expensive to extensively produce<sup>2</sup>. During the Apollo program, scientists made fuel cell technology much more durable and efficient, especially for rocket propulsion. After many fuel cell scientists migrated

to the private sector, President Bush announced the Hydrogen Fuel Initiative in 2003 and enacted it as part of the 2005 Energy Policy Act. This measure subsidized attempts to make fuel cell vehicles and their supporting infrastructure practical and cost-effective by 2020. In 2009, President Obama tried to suspend the program's funding, but was unsuccessful<sup>3</sup>. Since 2012, federal spending on hydrogen fuel cells has continually decreased.

Hydrogen is an energy carrier, not an energy source. It can be generated from several different production cycles that break down fossil fuels or renewable energy. These processes convert hydrogen's chemical energy into mechanical energy, fueling motors and propulsion systems<sup>4</sup>. Hydrogen fuel cells transfer electricity extremely efficiently and generate substantial power without releasing any noxious exhaust<sup>5</sup>.

### Key Facts:

- The hydrogen production industry generates \$100 billion per year and has tremendous potential for future growth.
- Transitioning to hydrogen fuel cells could annually prevent more than 141.9 million metric tons of carbon dioxide from being emitted and di-

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Although they have been incorporated in rockets and experimental automobiles, they have not yet been widely introduced in many traditional vehicles. Currently, hydrogen production generates about \$100 billion in annual revenue and has many avid supporters, yet remains heavily reliant upon fossil fuels<sup>6</sup>. Nevertheless, there have been several breakthroughs in generating hydrogen from renewable energy sources such as simple plant sugars. Scientists at Virginia Tech have recently discovered a method to split xylose into water cells, which can create hydrogen through electrolysis<sup>7</sup>.

## Analysis:

A large-scale federal investment in fuel cell vehicle demonstration projects is essential to maintain American technological leadership. This can be achieved through providing an initial \$80 million in loan guarantees to fund vehicle development, fuel cell upgrades, fueling stations, and maintenance centers<sup>8</sup>. Numerous successful fuel cell bus trials for public

transit in California, Canada, and Brazil were made possible by loan guarantees<sup>9</sup>. Continual innovation in fuel cells will ensure future economic growth and strong international esteem. Even though the United States has successfully created some functional fuel cell vehicles, it needs to facilitate a surge in production and overcome economies of scale.

The transition to fuel cell vehicles will directly reduce global warming and air pollution<sup>10</sup>. Air pollution is especially endemic in concentrated urban areas, kills more than two million people every year, and magnifies the devastating impact of global warming<sup>11</sup>. Vehicles are directly responsible for tremendous levels of carbon and sulfur emissions by burning fossil fuels and releasing exhaust fumes. By instead releasing water vapor and heat, these vehicles could prevent 141.9 million metric tons of carbon emissions from being emitted every year<sup>12</sup>. This eight percent reduction in atmospheric carbon dioxide would be a great stride in preventing runaway global warming and would prompt other countries to be more environmentally conscious.

Adopting hydrogen fuel cell vehicles would also ensure American energy security. The United States has a massive reliance on foreign oil that is becoming progressively costlier and more detrimental to core national security interests.

### Talking Points:

- Hydrogen fuel cells vehicles are extremely efficient, generate much power, and do not release any hazardous emissions.
- To transfer energy, processing renewable energy and fossil fuels produces hydrogen.
- Investment in demonstration projects will ensure lower costs and profitable commercialization for energy producers.

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Even with occasional price decreases, consumers are still financially strained by consuming expensive gasoline and are forced to minimize their transportation. By developing fuel cell technology, researchers could greatly expand hydrogen production from alternative energy and drive down production costs<sup>13</sup>. Hydrogen fuel cells would maximize vehicles' fuel economy by moving electricity much more efficiently than traditional internal combustion engines, which frequently suffer from generation lapses<sup>14</sup>. Additionally, they could generate electricity anywhere, rather than being tied to specific fuelling locations. Using these vehicles could annually decrease national oil consumption by 15.2 billion gallons and extricate the U.S. from volatile oil and gas prices<sup>15</sup>.

Nonetheless, exorbitant costs and a lack of supporting infrastructure are the main limiting factors to widespread hydrogen fuel cell vehicle development<sup>16</sup>. Even fuel cell vehicles' most optimistic advocates believe that this mode of transportation cannot be actualized on a national scale for decades. To ameliorate this dilemma, the federal government should start investing now in demonstration projects to prove that fuel cell vehicles are feasible and will be desirable to consumers. Further testing is also necessary to overcome major issues with fuel cell reliability and to erect the necessary infrastructure, such as charging stations, to support these vehicles<sup>17</sup>. Eventually, hydrogen fuel cells can be powered by fewer valuable natural resources and will be more streamlined.

## Next Steps:

Given how successful preliminary investigations of hydrogen fuel cells have been, the federal government should substantially increase its investment in demonstration projects for fuel cell vehicles<sup>18</sup>. Expanding the framework of prior governmental programs will persuade stakeholders that this technology is feasible and practical. Funding demonstration projects will be much more cost-effective and less risky than directly funding fuel cell vehicles' complete development, which has been subject to cost overruns and delays<sup>19</sup>. Fuel cell vehicles have greatly improved transportation in several cities and should be more widely available.

Most importantly, demonstration projects will encourage widespread commercialization and private competition that will drive down production and maintenance costs. This is essential to securing the requisite startup capital to make fuel cell vehicles viable and drive up demand for them. Overcoming economies of scale now is imperative because fuel cells currently have a moderate cost, are becoming increasingly efficient, and have enormous potential for growth and innovation<sup>20</sup>. This can be achieved by establishing more major testing centers in smaller urban and suburban areas to gauge drivers' and passengers' attitudes about how well hydrogen fuel cell vehicles perform.

# Endnotes:

1. Gavin D.J. Harper, TAB Electronics, "History of Hydrogen and Fuel Cells." Date Accessed: April 9, 2013, [http://www.mhprofessional.com/downloads/products/0071496599/harper\\_0071496599\\_chapter-01.pdf](http://www.mhprofessional.com/downloads/products/0071496599/harper_0071496599_chapter-01.pdf)
2. Ibid.
3. <http://www.washingtonpost.com/wp-dyn/content/article/2009/10/16/AR2009101601002.html>
4. U.S. Department of Energy, "2012 Technical Plan- Production." Date Accessed: April 3, 2013, <http://www1.eere.energy.gov/hydrogenandfuelcells/mypp/pdfs/production.pdf>
5. Santa Barbara County Air Pollution Control District, "Fuel Cells, Fuel Vehicles, and Air Pollution: Frequently Asked Questions." Date accessed: April 6, 2013, <http://www.sbcpd.org/edu/fcfaqs.pdf>
6. Virginia Tech News, "Breakthrough in Hydrogen Fuel Production Could Revolutionize Alternative Energy Market." Last modified: 4/3/2013, Date Accessed: April 7, 2013, [http://www.vtnews.vt.edu/articles/2013/04/040413-cals-hydrogen.html?utm\\_campaign=Argyle%2BSocial-2013-](http://www.vtnews.vt.edu/articles/2013/04/040413-cals-hydrogen.html?utm_campaign=Argyle%2BSocial-2013-)
7. Ibid.
8. Fuel Cell and Hydrogen Energy Association, "Building a Commercially Viable National Fuel Cell Electric Bus Program." Last modified: 3/25/2011, Date Accessed: April 6, 2013, [http://cafcp.org/sites/files/Building%20a%20Commercially%20Viable%20National%20Fuel%20Cell%20Transit%20Bus%20Program.FINAL\\_v10.03-25-11.pdf](http://cafcp.org/sites/files/Building%20a%20Commercially%20Viable%20National%20Fuel%20Cell%20Transit%20Bus%20Program.FINAL_v10.03-25-11.pdf)
9. Ibid.
10. Ibid.
11. Environmental News Service, "World Health Experts Warn Air Pollution Kills Two Million a Year." Last modified: 10/06/2006, Date accessed: April 10, 2013, <http://www.ens-newswire.com/ens/oct2006/2006-10-06-01.html>
12. John Boesel, President and Chief Executive Officer of CALSTART, "Constructing a Green Transportation Policy, Transit Modes, and Infrastructure." Last modified: 3/19/2009, Date accessed: April 8, 2013, <http://www.gpo.gov/fdsys/pkg/CHRG-111/hrsg2187/html/CHRG-111/hrsg2187.htm>
13. Fuel Cell and Hydrogen Energy Association, "Building a Commercially Viable National Fuel Cell Electric Bus Program." Last modified: 3/25/2011, Date Accessed: April 6, 2013, [http://cafcp.org/sites/files/Building%20a%20Commercially%20Viable%20National%20Fuel%20Cell%20Transit%20Bus%20Program.FINAL\\_v10.03-25-11.pdf](http://cafcp.org/sites/files/Building%20a%20Commercially%20Viable%20National%20Fuel%20Cell%20Transit%20Bus%20Program.FINAL_v10.03-25-11.pdf)
14. National Environmental Trust, "Reducing Oil Dependency to Increase National Security- Re-Engineering the Automobile." Date Accessed: April 9, 2013, [http://lobby.la.psu.edu/\\_107th/126\\_CAFE\\_Standards\\_2/Organizational\\_Statements/NET/NET\\_Reducing\\_Oil\\_Dependency.htm](http://lobby.la.psu.edu/_107th/126_CAFE_Standards_2/Organizational_Statements/NET/NET_Reducing_Oil_Dependency.htm)
15. John Boesel, President and Chief Executive Officer of CALSTART, "Constructing a Green Transportation Policy, Transit Modes, and Infrastructure." Last modified: 3/19/2009, Date accessed: April 8, 2013, <http://www.gpo.gov/fdsys/pkg/CHRG-111/hrsg2187/html/CHRG-111/hrsg2187.htm>
16. Santa Barbara County Air Pollution Control District, "Fuel Cells, Fuel Vehicles, and Air Pollution: Frequently Asked Questions." Date accessed: April 6, 2013, <http://www.sbcpd.org/edu/fcfaqs.pdf>
17. Fuel Cell and Hydrogen Energy Association, "Building a Commercially Viable National Fuel Cell Electric Bus Program." Last modified: 3/25/2011, Date Accessed: April 6, 2013, [http://cafcp.org/sites/files/Building%20a%20Commercially%20Viable%20National%20Fuel%20Cell%20Transit%20Bus%20Program.FINAL\\_v10.03-25-11.pdf](http://cafcp.org/sites/files/Building%20a%20Commercially%20Viable%20National%20Fuel%20Cell%20Transit%20Bus%20Program.FINAL_v10.03-25-11.pdf)
18. Ibid.
19. U.S. Department of Transportation, "A Report on Worldwide Hydrogen Bus Demonstrations, 2002-2007." Last modified: 3/2009, Date Accessed: April 6, 2013, <http://www.fuelcells.org/wp-content/uploads/2012/02/busreport.pdf>
20. Ibid.

# Reducing Food Waste Through a Tax

By Chris Harvey '15, Major: Economics (A&S), Email: cph52@cornell.edu

*In the United States, 40 percent of food goes to waste. This represents an economic loss of \$165.6 billion annually, and a tremendous amount of unnecessary environmental damage. By imposing a tax on food waste similar to the one being implemented in South Korea, the United States can cut back on resource depletion, greenhouse gas emissions, and economic loss.*

## Background:

Every year, nearly half of all food produced in the United States goes to waste. With food production consuming 10 percent of the U.S energy budget, taking up 50 percent of land, and requiring 80 percent of the freshwater used in the country, this waste equates to the unnecessary depletion of tremendous amounts of resources and an economic loss of \$165.6 billion annually.<sup>1</sup> 97 percent

of uneaten food ends up in a landfill or an incinerator;<sup>2</sup> and the decomposition of this food accounts for 23 percent of U.S methane emissions –a greenhouse gas that has a 25 percent greater impact on global warming than carbon dioxide.<sup>3</sup> In addition, food disposal costs in the United States amount to \$1 billion. Therefore, reducing the amount of wasted food in the country would subsequently reduce this cost.<sup>4</sup>

To address this issue, the Environmental Protection Agency (EPA) has created a food recovery challenge as a part of its Sustainable Materials Management Program. This challenge establishes a ranking of “most preferred” to “least preferred” options of dealing with food waste and encourages participants to exhaust the higher ranking options before resorting to the lowest ranking one, landfill deposition. The highest priority on the hierarchy is source reduction, which involves reducing the amount of unused food in general. This is followed by, in order of most preferred to least preferred, feeding hungry people, feeding animals, putting waste towards industrial uses, composting waste, and finally, after all other options have been exhausted, allowing food waste to end up in a landfill. This program has been adopted by a multitude of organizations and has exhibited a large degree of success within them.<sup>5</sup> For example, Cornell, which is one of the participants in the challenge, prevented 515 tons of food waste from ending up in a landfill last year through the use of its composting scheme.<sup>6</sup>

### Key Facts:

- In the United States, 40 percent of food goes uneaten and goes to waste.
- This waste equates to an economic loss of \$165.6 billion.
- 97% of uneaten food ends up in a landfill, resulting in 23% of U.S methane emissions.

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An effective proposal that is designed to increase source reduction, which is the highest priority on the EPA food recovery hierarchy, is currently being introduced in South Korea. By placing waste into plastic baskets that are monitored by radio frequency identification (RFID), waste collectors will be able to weigh household food waste, and assign an appropriate tax as part of the removal fee. In theory, raising the costs of waste removal will encourage households to waste less food and reduce the amount of uneaten food that ends up in landfills. Using this plan, the government hopes to reduce food waste by 20 percent, save 5 trillion won (\$885,253,000.00) in food disposal costs, and prevent the emission of 4 million tons of greenhouse gases into the atmosphere.<sup>7</sup>

## Analysis:

Were a food waste tax similar to the one being implemented in South Korea enacted in the United States, households and businesses would have a greater incentive to reduce the amount of food that is thrown out every year, lowering both the amount of money wasted on uneaten food and the cost of food waste disposal. With \$165.6 billion of food being wasted every year (\$390/capita/year)<sup>8</sup> and food disposal costing \$1 billion annually<sup>9</sup>, it is clear that implementing such a tax would lead to substantial economic savings for both businesses consumers.

Environmentally speaking, a tax that reduces the amount of food waste will also reduce greenhouse gas emissions. In the case of the United States, reducing food waste by 25% will result in an emissions reduction of 65 million metric tons of greenhouse gases.<sup>10</sup>

An obvious concern is the cost of the this policy's implementation. Under this proposal, the revenue generated from the tax should be used to pay for the cost of distributing RFID containers and paying for the overall implementation of the plan. Therefore, this measure will neutralize the cost of implementation and ultimately lead to economic savings for consumers. Considering the environmental and economic benefits of implementing a waste tax in the United States, as well as the zero cost associated with it, there should be no hesitation in establishing such a beneficial program.

### Talking Points:

- Implementing a waste tax can be done in a cost neutral way.
- Reducing food waste by 25% would result in the mitigation of 65 million metric tons of greenhouse gas emissions.
- By reducing food waste, both consumers and businesses will enjoy economic savings.

## Next Steps:

The government should set a target for food waste reduction at 25 percent and determine an acceptable amount of waste per capita. With current food waste being approximately 209-253 pounds/person/year, a waste quota of 165 pounds per year should be enacted, and any waste generated in excess of this amount should be taxed by the pound in a method similar to South Korea's RFID equipped waste baskets.

## Endnotes:

1. Gunders, Dana. *Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*. Report. August 2012. <http://www.nrdc.org/food/files/wasted-food-IP.pdf>.
2. "Food Recovery Challenge." EPA. April 11, 2013. Accessed April 16, 2013. <http://www.epa.gov/foodrecoverychallenge/>.
3. Gunders, Dana. *Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill*. Report. August 2012. <http://www.nrdc.org/food/files/wasted-food-IP.pdf>.
4. Society of Saint Andrew. "Environmental Impact of U.S Food Waste." SoSA | Food Waste in America. Accessed April 13, 2013. [http://endhunger.org/food\\_waste.htm](http://endhunger.org/food_waste.htm).
5. "Food Recovery Challenge." EPA. April 11, 2013. Accessed April 16, 2013. <http://www.epa.gov/foodrecoverychallenge/>.
6. Cornell University. "Dining Compost." Cornell Sustainable Campus. Accessed April 13, 2013. <http://www.sustainablecampus.com.ell.edu/initiatives/dining-compost>.
7. Sook, Bae Ji. "Electronic Chips to Trace Food Waste Disposal." *Electronic Chips to Trace Food Waste Disposal*. April 04, 2010. Accessed April 16, 2013. [http://www.koreatimes.co.kr/www/news/nation/2010/04/113\\_64465.html](http://www.koreatimes.co.kr/www/news/nation/2010/04/113_64465.html).
8. Buzby, Jean C., and Jeffery Hyman. "Total and Per Capita Value of Food Loss in the United States." *Elsevier* 37 (June 20, 2012): 561-70. <http://ucce.ucdavis.edu/files/datastore/234-2425.pdf>.
9. "Food Recovery Challenge." EPA. April 11, 2013. Accessed April 16, 2013. <http://www.epa.gov/foodrecoverychallenge/>.
10. Lyutse, Sasha, and Matthew Eisenson. *Simple and Inexpensive Actions Could Reduce Global Warming Emissions by One Billion Tons*. Report. Accessed April 13, 2013. [https://www.nrdc.org/energy/files/billiontons4pgr\\_r3\\_final.pdf](https://www.nrdc.org/energy/files/billiontons4pgr_r3_final.pdf).

# Changing the Sulfur Content of Fuel

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*To reduce the negative environmental and health effects of sulfuric acid, the Environmental Protection Agency should not only implement the Tier 3 program, but it should expand the program so that it includes the reduction of sulfur contents in fuel designated for heavy-duty vehicles.*

## Background:

Though the research focused on improving transportation technologies is centered on the reduction of carbon dioxide emissions, it is essential to note the deleterious effects of the other emitted byproducts. One particular byproduct that has recently come to focus is sulfur. As part of its natural chemical makeup, crude oil contains up to 4.5% of sulfur, a percentage deemed as high.<sup>1</sup> Derived from crude oil, gasoline and diesel contain similar sulfur concentrations unless they are removed during the refining process. This high sulfur content has an impact on the environment and also more directly on the lives of Americans. Greater sulfur concentrations in fuel result in structural damage to architecture, significant wear of a vehicle's motor and catalytic converter, and in turn increased greenhouse gas emissions. When the sulfur in fuel combines with water vapor during combustion, sulfuric acid is produced. Part of this sulfuric acid remains inside the motor, corroding the vehicle's valve and cylinders, while the rest is directly emitted through exhaust and into the atmosphere, acting as a potent environmental pollutant.<sup>3</sup>

In addition, as a consequence of sulfur release, the sulfuric acid precipitates into acid rain which corrodes physical infrastructure and damages vegetation. Acid rain also reduces the overall health of water ecosystems, and destroys plant life and arable land. Currently, acid rain costs the United States and Canada a total of 5 billion dollars in agricultural and architectural damage, and in the impairment of ecosystem regulating and provision services.<sup>2</sup>

To reduce vehicles' output of sulfuric acid into the environment, the EPA created and implemented a policy named Tier 2 that effectively reduced 90% of the sulfur content in fuel.<sup>1</sup> The policy stemmed from a component of the Clean Air Act that ruled that the EPA was obliged to increase their "tailpipe emissions" standards by 2004.<sup>2</sup> As a secondary result of lowering the sulfur content of fuel in the initial refining process, the Tier 2 policy also enhanced the emission control system in cars; vehicles manufactured after 2004 were 77-95% more effective in reducing emissions.<sup>2</sup> While the Tier 2 effectively fulfilled its purpose, the Tier 3 program is now being proposed as a means to further advance towards an even lower sulfur content and sulfuric acid production.

This program takes more of a comprehensive approach than that of the Tier 2 program. The standards of the new Tier 3 policy would not only further reduce sulfur fuel contents but it would also target and measure the reduction of the sulfuric acid content in evaporative emissions. While this program would set higher sulfur-fuel standards, it should not be limited to passenger cars. The program should specifically target the reduction of sulfur concentrations in fuel used for heavy-duty vehicles in the public and private transportation sectors, which include but are not limited to: public buses, transportation trucks, and agricultural machinery. The fuel used for these heavy-machinery vehicles contains sulfur at 30 parts per million, a quantity that is significantly higher than the 15 parts per million designated for small passenger cars.<sup>3</sup> Thus, in order to more efficiently reduce the amount of sulfuric acid released, the Tier 3 program should specifically assign sulfur concentration standards for fuel designated to heavy duty transportation.

## Analysis:

While many focus on reducing our oil consumption by promoting transportation methods that use alternate energy, it appears that currently, the most feasible way to reduce the negative environmental impacts of individual transportation is by improving the contents of fuel itself.

Before reducing our fossil fuel demands for transportation, there has to be a significant increase in the availability of green transportation technology. Prior to investment in the mass-production of “green transportation technologies” there has to be a well-developed nationwide infrastructure to provide the alternative energy each of these vehicles would use. Before the development of this infrastructure, investing in the mass production of “green” personal vehicles would not lead us as far in our efforts to reduce the environmental impacts of transportation as would reducing the negative effects of fuel.

The increased manufacturing costs of the low sulfur-content fuel, an initial 10-17 billion dollar investment and an annual 5-13 billion cost, would translate in an increase of 9-25 cents per gallon of fuel sold.<sup>3</sup> The 9-25 cents reflects the immediate monetary gain, while the actual long-run social and environmental benefits would be far greater.<sup>3</sup> Statistics show that for every dollar that is spent on sulfur-reducing strategies, a seven dollar health benefit would ensue. In fact, the total health benefit after the successful mass production of low-sulfur fuel is approximated to be an initial 8 billion dollars per year with the potential to rise to about 23 billion dollars annually.<sup>1</sup> Once again, these benefits would only be amplified if the Tier 3 program were modified to include sulfur reduction in fuel for heavy-duty vehicles. Reduced degradation of environmental services, while harder to assess economically, would bring a monetary benefit of more than 6 billion dollars. While at the same time meeting emission reduc-

tions, increased car efficiency would result in an added value of 130 dollars per vehicle.<sup>3</sup> These statistics are based on data from passenger cars, meaning that if the Tier 3 program is modified to include heavy-duty vehicles and implemented on a national level, the benefits will be far greater than previously stated figures.

## Next Steps:

The previously demonstrated success of the EPA's Tier 2 program in terms of reduced sulfuric acid byproduct and increased efficiency in the reduction of emissions should be motivation enough for the modification of the Tier 3 program to formulate standards beyond passenger vehicles. This new program would further raise the standards for the sulfur component of fuel and further increase the quality of the emission control system in passenger vehicles. The limitation of the Tier 2 program was its sole focus on passenger vehicles, and blatant disregard for heavy-duty transportation. For this reason, the current Tier 3 program should be modified in order for the sulfur-concentration standards to apply to fuel used by heavy-duty transportation, creating a uniformed standard for all vehicles regardless of size.

In order to protect the ecosystems from where we derive our many ecological services, it is essential for the EPA to modify the Tier 3 program to include heavy-duty transportation and for them to mitigate all the opposition. It is also essential to note that this improvement in the quality standard for fuel should not deter current research on transportation methods that do not rely on fuel as a means of power. While research in the field of more ecological sound transportation technologies should in fact continue, currently the best method to mitigate transportation's negative environmental effects is to reduce the sulfur content of fuel, especially the fuel used in heavy-duty transportation and machinery.

## Endnotes:

1. "E.P.A. Wants to Cut Amount of Sulfur in Gasoline - NYTimes.com." The New York Times - Breaking News, World News & Multimedia. N.p., n.d. Web. 23 Apr. 2013. <[http://www.nytimes.com/2013/03/29/business/energy-environment/epa-wants-to-cut-amount-of-sulfur-in-gasoline.html?\\_r=0](http://www.nytimes.com/2013/03/29/business/energy-environment/epa-wants-to-cut-amount-of-sulfur-in-gasoline.html?_r=0)>.
2. "Gasoline Fuels | Fuels & Fuel Additives | Transportation & Air Quality | US EPA." US Environmental Protection Agency. N.p., n.d. Web. 23 Apr. 2013. <<http://www.epa.gov/otaq/fuels/gasolinefuels/index.htm>>.
3. "Gasoline Sulfur Program | Fuels and Fuel Additives | US EPA." US Environmental Protection Agency. N.p., n.d. Web. 23 Apr. 2013. <<http://www.epa.gov/otaq/fuels/gasoline>>

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# Prohibiting Filler Feed: Altering Meat Production Methods

By Jenna Behrendt '15, Major: Human Development (HumEc) , Email: jhb327@cornell.edu

*The US's current state of meat production has hazardous impacts on our health and our environment. Prohibition the use of fillers as feed for cows would prevent tons of greenhouse gases from entering the atmosphere annually.*

## Background:

Livestock are an important, yet not often discussed, contributor to greenhouse gas (GHG) emissions, due to animal respiration cycles. Estimates claim that replacing livestock products with soy and vegetable products would have a larger impact in terms of GHG reduction than replacement of fossil fuels with renewable energy.<sup>4</sup>

World Watch estimates that 32.5 billion metric tons of carbon per year are directly a result of livestock - that's over 40% of annual GHG.<sup>4</sup> The National Institute of Livestock estimates that producing 2.2 pounds of beef has the CO levels equivalent to driving a car 155 miles.<sup>4</sup>

Thirty seven percent of methane resulting from human action comes from livestock, equating 103 million tons. This is analogous to 2369 million tons of carbon, in terms of negative environmental impact.<sup>4</sup> According to the EPA, last year in Brazil, 74% of the country's methane emissions were from cattle production.<sup>2</sup> This is largely due to the fact that instead of feeding cows grass, the beef industry feeds them corn (a cheap filler), which is much harder for them to digest. Cows perform a unique process called rumination, in which cows digest grass twice. Feeding cows fillers, like corn, is not only a blatant instance of animal mistreatment, but also the cows' excessive indigestion causes them to release large amounts of methane into the air.<sup>2</sup>

On April 24th 2013, the Agriculture Secretary Vilsack renewed an agreement between the Innovation Center for U.S. Dairy and the U.S. Department of Agriculture to improve dairy and meat production. This includes support for research into new methods to reduce methane production. Particularly, they are examining anaerobic digester technology, to help capture methane being released from production processes of these foods. The agreement is proposed as a means to reach the goal of the reduction of

### Key Facts:

- Livestock account for 18-21% of human related GHG emissions
- The amount of methane released from livestock is equivalent to 2369 million tons of carbon dioxide annually
- 74% of all methane produced in Brazil results from cattle production

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GHG by 25% in 2020.<sup>6</sup> While this agreement does explore new methods to reduce methane production, getting rid of fillers in animal feed is another possible venue through which methane can be controlled. Removing fillers results in better treatment for the animals as well. This legislation is a step moving toward changing our agriculture system, in that other venues for methane production are being explored. However, this path does present some challenges, like monetary expenses and time, that could be absolved by prohibition of filler feed. Research is instrumental, but will take time to have an impact, and thus will have a delayed benefit in improving our GHG emissions level.

## Analysis:

Prohibiting the use of fillers as food for cows would drastically reduce our GHG emissions. If this policy was successfully implemented, it could reduce emissions by 18%.

Allowing the agriculture sector to use these fillers to meet the demand of the American population is having disastrous consequences for our environment.

There is little doubt as to the negative impacts of these gases on the environment.<sup>2</sup> Simply feeding cows their proper diet, grass, could vastly decrease the GHG emissions level of the agriculture sector.

Using grass as the main food source, significantly reduces the need for fertilizer for filler crops. Fertilizer production emits 41 million metric tons of CO<sub>2</sub> a year.<sup>8</sup> Cattle grazing also helps spur the growth of new grass.

Opponents of this legislation will argue that grass - fed beef is more expensive, because it takes longer to raise, and will thus create a discrepancy in meat consumption based on income. But one study suggests that obesity and vegetarianism are negatively correlated, indirectly establishing a relationship between meat consumption and health problems.<sup>5</sup> Thus, a positive externality of this legislation could be increased health in Americans, due to an economic reason of decreasing consumption of meat. As a result, healthcare costs could potentially decrease, as could obesity levels.

### Talking Points:

- A large proportion of this methane is the result of inappropriate human care
- Prohibiting fillers in meat production could reduce emissions by 18%
- A positive externality could be increased health due to diminished meat consumption

## Next Steps:

National legislation relating to methane production should be enacted, through the enforcement of U.S. Department of Agriculture. In searching for a solution to help our current climate crisis, this could offer an alternative to relying on expensive "green" technologies. Enforcing this legislation at a local level will be pertinent to ensure that farmers are abiding by this policy, and provide grazing options for cattle.

If we continue fail to alter our lifestyle habits, we will not be able to counteract some of the impacts of climate change. Our production of meat products needs to be changed, by prohibiting feeding cows fillers. The government must take action to help combat GHG emissions to deal directly with industry to alter production methods.

## Endnotes:

1. Abend, L. "How Cows (Grass-Fed Only) Could Save the Planet." *Time.com*. Time Magazine. January 2010. Web. <http://www.time.com/time/magazine/article/0,9171,1953692,00.html#ixzz2RRHk4QR9>
2. Ching, Carrie. "The Hidden Costs of Hamburgers." *cironline.org*. The Center for Investigative Reporting. August, 2012.
3. Graziano de Silva, Jose. "The State of Food and Agriculture 2012." *Food and Agriculture Organization of the United Nations*.  
Goodland, Robert and Anhang, Jeff. "Livestock and Climate Change" *Worldwatch.org*. 4. World Watch. Web. December 2009. <http://www.worldwatch.org/files/pdf/Livestock%20and%20Climate%20Change.pdf>
5. Key T., and Davey G. "Prevalence of Obesity is Low in People Who Do Not Eat Meat." *Bmj.com*. BMJ Journal. Web. September 1996. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2352221/>
6. "USDA News Release No. 0076.13." *usda.org*. USDA. April 2013. <http://www.usda.gov/wps/portal/usda/usdahome?contentid=2013/04/0076.xml&contentidonly=true>
7. Wilson, G., Edwards, Melanie. "Native Wildlife on Rangelands to minimize methane and Produce Lower Emission Meat." *onlinelibrary.wiley.com*. Wiley Periodicals. July 2008. <http://onlinelibrary.wiley.com/doi/10.1111/j.1755-263X.2008.00023.x/full>
8. Kimble - Evans, A. "Grass - Fed Cows Emit Less Methane." *Motherearthnews.com*. Mother Earth News. January 2011. <http://www.motherearthnews.com/homesteading-and-livestock/grass-fed-cattle-zm0z10zrog.aspx#ixzz2RRFh02wR>

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# Meet the Center for Energy and Environment!

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**Janisa Mahaparn, Director and Editor**, is a sophomore studying Psychology and Cognitive Science in the College of Arts and Sciences. She is interested in studying the impact of environmental chemicals on developing children and promotes bridging the gap between scientific research and public policy. Janisa is also the Education and Advocacy Director and has been involved in Roosevelt Institute since Fall 2011

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**Kelsey Clough, Analyst**, a member of the College of Arts and Sciences Class of 2015, is a major in the College Scholars Program. Since her start with the Roosevelt Institute in January of 2013, Kelsey has enjoyed researching and analyzing unique and unorthodox solutions to environmental predicaments. She hopes to continue her work as a policy analyst by proposing simple modifications and regulations to practices and products that will influence larger scale changes.

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“A nation that destroys its soil destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people.”-Franklin Delano Roosevelt

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