**JEI Working Paper 2 – On Carbon Taxes and Reinvestment**

**Mimi Reichenbach**

**Yale University**

***Executive Summary***

In 2013, 36 Gigatons of carbon dioxide were released into the atmosphere by polluters; the top three emitting countries were China (28%), the United States (14%) and India (7%). These top three polluters, responsible for 49% of global carbon dioxide emitted annually, currently do not have a national carbon pricing policy. This paper analyses potential carbon pricing plans for the United States to decrease emissions; the recommendation is a graduated revenue-neutral carbon tax, gas tax, and rechanneling of current taxpayer subsidies for fossil fuel exploration and production towards clean technology investments.

At the current rate of annual emissions, if an energy transition does not occur within the next sixteen years from a fossil fuel based economy to one of clean technology, the atmospheric temperature will certainly surpass a 2°C increase; a carbon tax is an essential step to avoid detrimental effects associated with climate change. A rate of $25-$50 per ton of CO2 for a revenue neutral carbon tax would decrease emissions, incentivize private investors towards clean technology investments, while also decreasing income and business taxes for US taxpayers. Currently low gasoline prices present an opportunity for a heightened rate of carbon taxation for gasoline due to the inelasticity of gasoline sales; a $0.75-$1.00 tax per gallon at the pump would correspond to a $75-$100 per ton of CO2. A final recommendation is that US taxpayer money currently funding fossil fuel subsidies (specifically for production and exploration, totaling $5 billion annually) be instead redirected towards clean technology investments.

***Introduction***

 In 1908, Henry Ford built the first Ford Model-T on an assembly line. The breakthrough in production technology yielded the first affordable car, resulting in ease of travel among middle class Americans. Before long cars were commonplace with Americans zipping from work to home with ease. As with all new technology, there were opportunities for associated development. Namely, highways. The United States government paid for highways until 1932, when Hoover decided a tax was needed to fund highways and help relieve a deficit of two billion. After 1932, a 1-cent tax for each gallon of gas sold would go to the Highway Trust Fund, which in turn paid for highway development. In 1933, the government raised $125 million through the gas tax for infrastructure development. The taxation system allowed drivers to pay for their future roads, and the tax was raised incrementally- reaching a rate of 18.4¢ per gallon by 1993.[[1]](#footnote-2)

 Today, we face a similar problem to what Hoover faced in 1932. Yes, we have a national deficit of $264 billion. But in actuality there is a much larger deficit looming overhead. It’s a deficit in clean technology investments, and it is much more alarming to the future of America’s national (and the world’s) security.

 Similar to 1932, we have too much of something with no system to handle it. Instead of an increase in cars and a corresponding lack of roads, we have an increasing need for energy with a lack of environmental ability to absorb future carbon dioxide emissions without detrimental effects. “Detrimental effects” include increased drought, heat waves, wind storms, snow storms, hurricanes, and rising sea levels. Each of these effects faces an increase in intensity directly related to the amount of greenhouse gases emitted into the environment.

According to scientists, we have 565 Gt of CO2 left to burn before we reach a point where as a planet we surpass a warming of 2 degrees Celsius. For Americans- that’s an average increase of 3.6 degrees Fahrenheit. These 2 degrees serve as a safety threshold marker for where the effects of climate change still present a livable world. Yet we are blowing through the safety buffer fast. In 2013, the world collectively burned 36 Gt of CO2. At this rate, the carbon dioxide safety buffer will be surpassed within the next sixteen years. So what do we do about it?

In an ideal world, we would tax our carbon emissions and use the tax revenue to invest in clean energy technology; this structure would be similar to the gas tax of 1930s, instead of drivers paying for the construction of their future roads, polluters today would pay for the creation of their future clean energy technology. Yet after analyzing carbon taxes currently in effect, the most successful method has proven to be one of revenue neutrality, leaving no leftover tax revenue available for clean energy technology investments. U.S. taxpayers today pay $5 billion annually in fossil fuel subsidies, and the reallocation of these tax dollars could go to clean energy investments. A combination of a revenue neutral carbon tax and the channeling of current fossil fuel subsidies towards clean technology investments looks to be the best way to start financially incentivizing private clean technology investments. So why not pull a Hoover, and start a tax for our future?

***Overview***

In order to combat global warming, a carbon dioxide emission tax is essential. Without a tax for carbon pollution, the transition from a fossil fuel based economy to one of clean energy will take too long to occur to appropriately combat climate change; currently financial incentives are not strong enough to engage private investors towards clean technology and away from fossil fuel based investments. An additional $703 billion for clean technology investments are needed annually at this stage in order to provide the best chance of avoiding a 2 degrees Celsius increase in the atmosphere’s temperature. This report analyzes suggestions presented by the Ceres Clean Trillion Report regarding carbon taxation, the current state of global emissions, various countries’ methods of taxing carbon dioxide emissions, as well as fossil fuel subsidies; overall concluding that a revenue-neutral carbon tax of $20-$50 per ton of CO2 must be implemented in the United States, China and India, along with the reallocation of fossil fuel subsidies paid by taxpayers towards clean energy technology investments.

***Ceres Clean Trillion Report***

 The Ceres Clean Trillion Report (2014) written by Reid Capalino and Mark Fulton, proposes that a one trillion dollar investment must be directed towards clean energy technology annually in order to combat climate change. Fulton and Capalino make ten recommendations for institutional investors, yet Fulton and Capalino write that in order to turn the Clean Trillion into a reality, there will have to be, “comprehensive government policies that incentivize clean energy and fully price higher-polluting technologies,” as well as an action by, “regulators and policy makers to pursue necessary policies and actions to accelerate clean energy investment.” As a report targeted at institutional and private investors, their ninth and tenth recommendations take a policy approach by requesting, “government policies that result in a strong price on carbon pollution from fossil fuels (and phase out fossil fuel subsidies)” and “policies to de-risk deployment of clean energy sources and technologies” respectively. This paper will address the final two recommendations, specifically by proposing possible governmental carbon taxation policies and the allocation of specific fossil fuel subsidies directly towards clean energy technology investments. The Ceres Clean Trillion Report’s ninth and tenth recommendations highlight the necessity for policy changes, particularly in the pricing of carbon pollution, to act as an incentive to spur clean energy investments. Without a monetary downside to irresponsible polluter activity, there is little reason financially to divest from current fossil fuel energy sources or seek alternative investments towards clean technology.

Capalino and Fulton suggest that a carbon tax take effect at a rate of $20 to $50 per ton of carbon dioxide, and seek a goal to tax 50% of the world’s carbon emissions (compared to 7% today) by 2020, a phasing out of fossil fuel subsidies ($548 billion worldwide in 2013), as well as a promotion of large-scale deployment of clean energy technology to reduce costs. To aid in a taxation transition, Capalino and Fulton also recommend businesses adopt internal “shadow” carbon pricing to prepare their potential financial effects in advance, and the two authors also recommend there be assistance to groups affected by a carbon tax and fossil fuel subsidy elimination. In terms of technological policies, Fulton and Capalino endorse a policy plan that for each clean technology would be of adequate duration, correlated to a technology’s maturity, available to the largest pool of capital, and not retroactive. For carbon pricing, Fulton and Capalino suggest sector-specific mandates for a variation in pricing per ton of CO2. With all of these suggestions, along with many more highlighted in their paper, Reid and Capalino expect to see energy policy transition to a “level playing field”, much different from the environment where fossil fuel companies today are playing an altogether different game in comparison to cleaner forms of energy.

This paper will touch upon many of the points highlighted in the Ceres Clean Trillion Report, focusing specifically on how a carbon taxation policy should be adopted to effectively spur clean energy technology investments.

***Carbon Emissions Today*** According to the Global Carbon Project, 36 Gt of CO2 were emitted into the atmosphere in 2013.[[2]](#footnote-3) (a 61% increase from the 1990, Kyoto Protocol benchmark) The 36 Gt of CO2 composed of coal burning (43%), oil (33%), gas (18%), cement (5.5%), and gas flaring (0.6%).[[3]](#footnote-4) In 2013, the largest contributors were China with 28% of carbon emissions, the United States with 14%, followed by the EU with 10% and India with 7%. Economic growth rates are an important factor to consider, as China, the United States and India all had positive growth rates in 2013 (China: 4.2%, USA: 2.9%, India: 5.1%) whereas the EU had a decrease in growth (EU: -1.8%). A growing economy tends to correspond to an increase in CO2 emissions. Almost every country with a positive growth rate also increased their carbon emissions in 2013, whereas those with a negative growth reduced their emissions. This can be seen as China, the US, and India all increased their CO2 emissions (China: 58%, USA: 20%, India: 17%) whereas the EU, with a decrease in growth, also decreased their emissions (EU: 11%). The reduction in emissions in the European Union may be tied to their lower growth rate, but it is also likely to be linked to their current carbon taxation policies that are much more developed than any of the minimal efforts made by China, the United States, or India. The one exception to positive correlation of carbon emissions and economic growth is British Columbia (BC), Canada. BC currently has a revenue-neutral carbon tax in effect which allows for a CO2 emission reduction while keeping the same amount of money in taxpayers’ pockets.

As a country’s economic well being is commonly reflected in its growth rate, it is important to find a future scenario where carbon emissions can decrease in countries with a positive economic growth rate. British Columbia presents a successful model to emulate in this regard.

***Clean Energy Investments Worldwide***

 According to the Ceres Clean Trillion report, based on data from the Climate Policy Initiative, $297 billion was invested in clean energy in 2012.[[4]](#footnote-5) Of the $297 billion, $265 billion consisted of renewable energy generation investments, $32 billion went towards energy efficiency, and $40 billion went towards “other mitigation measures” such as processing emissions and modal shifts towards other types of transport. Therefore, in order to reach a $1 trillion target of investments, an additional $703 billion must go towards clean energy investments annually.

***Carbon Taxation Worldwide***

There is some form of carbon pricing present in many nations today. Those with established policies include British Columbia (Canada), Chile, Ireland, Sweden, Finland, Great Britain, Boulder (Colorado, USA), and Quebec (Canada); Australia also implemented a carbon tax from 2012-2014. Carbon taxation policies are lacking in uniformity worldwide, with each country taking a different approach in terms of pricing and sector specificity. This section will compare the differences in policies along with their respective outcomes in terms of CO2 emission changes and their societal reception.

The most successful carbon taxation policy to date has been the one implemented in British Columbia (BC), a province of Canada. In 2008, BC implemented a carbon tax of $10 (Canadian) per ton of CO2. The tax has been revenue neutral, meaning that the tax revenue from carbon pricing has been returned to residents of BC via personal income tax and business income tax reductions, resulting in the lowest Canadian income taxes. In fact, throughout its implementation period, the tax has had positive economic benefits; income taxes have been cut by a larger amount than the associated carbon tax increase, resulting in less overall taxation per capita following the carbon tax. BC’s growth has also remained unaffected, as BC’s GDP growth has continued to outperform the rest of Canada. Due to the monetary effects, this policy has been widely accepted by the BC population, with 54% of the population in support. The tax has gradually increased over time, increasing to today’s taxation rate of $25 (US)/ ton of CO2. Since 2008, fuel consumption per person has dropped by 4.5% and from 2008-2010, green house gas (GHG) per person dropped by 9.9%. British Columbia exemplifies an ideal carbon tax; BC’s tax has done its job of decreasing CO2 emissions while maintaining support among the population.[[5]](#footnote-6)

Another important taxation policy to look at is the national carbon tax in Australia that was implemented in 2012 before being repealed in 2014. The tax priced carbon at $19.60 (US)/ ton of CO2, and did not tax petroleum, but rather focused on industries. The tax was effective in terms of emission reductions, as usage of lignite coal fell 14% from 2012-2013, and renewable electric generation increased 24% in the same time period, yet it failed to gain support among the Australian population. Many Australian citizens were upset by the tax as their Prime Minister, Julia Gillard, had promised in 2010 that there would be no carbon tax. Overall, there was a lack of understanding among the Australian population regarding carbon taxation; many in the population blamed increasing gas prices on the tax although there was no petroleum carbon tax in place. Transparency remained an issue for tax revenue as the money went towards renewable energy projects, biodiversity, low carbon agriculture, and indigenous communities; additionally, more than half of the revenue was directed towards low and middle income households that were most effected by the carbon tax. The complexity of tax revenue distribution and misunderstanding by taxpayers eventually led to the tax’s repeal in 2014, showing that transparency, understanding and support among the population is essential for a carbon tax to be accepted. 4

Sweden’s carbon tax is by far the most progressive and aggressive of all current countries. Sweden has had a carbon tax since 1991, yet it is not applied to fuels used for industry electricity generation, and only half of the tax is required to be paid by industries. The tax is currently $150 per ton of CO2, therefore presenting an effective rate of $75/ ton CO2 for industries. Non-industrial consumers pay a tax on electricity, while renewable sourced fuels are tax-exempt. This has led to a shift to renewably sourced fuels as well as heavy industry reliance on non-oil sources. According to the International Energy Agency, in 2010, 30% of Sweden’s electricity was generated by nuclear power plants, and 35% by biomass and hydro plants.[[6]](#footnote-7) This left only 28% of Sweden’s energy dependence on oil in 2010, showing a remarkable transition as in 1970 Sweden relied on oil for 77% of its energy.[[7]](#footnote-8) By 2020, Sweden expects to be independent from reliance on oil, projects Mona Sahlin, Sweden’s former Minister of Sustainable Development.[[8]](#footnote-9)

Finland was even more precocious than Sweden in regards to carbon taxation, with a carbon tax in 1990. The tax has graduated over time, originally at **€**1.2 per ton of CO2 in 1990, and by 2013 rising to €35 per ton of CO2.[[9]](#footnote-10) The carbon tax also morphed over time from a simple carbon tax on heat and electricity production to also cover transportation and heating fuels.

Chile has designed a tax that will take effect in 2018, and will address 55% of the country’s carbon emissions, targeting large factories and the electricity sector.[[10]](#footnote-11) Chile aims to reduce their emission levels 20% by 2020 in comparison to 2007 levels. The proposed tax is a modest $5 per ton of CO2, and will have to be increased after 2018 to make a more impactful effect on carbon emissions. Chile’s geography presents an advantageous situation for renewable energy generation, as it is a country filled with deserts suited for solar energy generation, as well as mountains that provide potential to harness wind. Currently, the country is installing the largest solar plant in South America, capable of generating 141 Megawatts.[[11]](#footnote-12)

 Ireland imposed a carbon tax in 2010 that varies from traditional carbon taxation at a uniform per ton basis. The Irish government now taxes fossil fuel used in homes, offices, and by vehicles and farms. The taxation varies for mineral oil, natural gas, and solid fuel. Due to this variance, Irish citizens are taxed different amounts dependent on their car make and its emissions. From 2008-2012, Ireland’s emissions dropped over 15%. While 2008-2012 also coincided with a recession in Ireland, and the reduction in emissions could have been due to decreased spending in all sectors, it is likely that the tax has played a role as in 2011 emissions were reduced 6.7% as the economy grew.[[12]](#footnote-13)

Another tax worth mentioning is that of Quebec, another province of Canada. Quebec was the first North American region to charge a carbon tax in 2007. Currently, the province taxes energy companies and oil companies. In 2008, this equated to just 3.1¢ per gallon of gasoline, and 3.6¢ per gallon of diesel. The annual taxation revenues from this tax result in $200 million, for an average annual tax of $26.75 (US) per capita.[[13]](#footnote-14) While the tax is relatively small, its revenue went towards energy efficiency projects such as public transit.

Lastly, carbon taxes are present today in Montgomery County (Maryland), San Francisco Bay Area (California), and Boulder (Colorado) in the United States, the most developed being that of Boulder, Colorado. Montgomery County charged $5 per ton of CO2 for stationary carbon dioxide emitters in 2010, the Bay Area charged 4.4¢ per ton of CO2 for businesses in 2008, and Boulder started charging a carbon tax for electricity in 2006. Boulder has charged residential, commercial and industrial buildings at different rates per kilowatt-hour ($0.0049, $0.0009, and $0.0003 respectively).[[14]](#footnote-15) In Boulder, energy sourced by alternative sources received a discount on taxation dependent on the amount of energy sourced through non-fossil fuels. Boulder renewed the tax in 2012, showing a strong support for the carbon tax. This support is most likely due to the liberal and environmentally conscious population.

***Suggested Strategy for Carbon Taxation***

 As seen in the previous section, every country has decided to tax carbon in a slightly different way; there is no globally unified strategy. Boulder, CO has taxed carbon dioxide pollution on a kilowatt-hour basis, Ireland has based their tax on a customized individual polluter basis, whereas other countries have preferred to set a standard rate per ton of CO2 and tax uniformly across all fields. Countries have varied widely even within the tax rate per ton of CO2 pricing; for example, Chile has proposed a mere $5 tax per ton of CO2 planned for 2018, while Sweden’s has already reached a $75 tax per ton of CO2.

 Most importantly, a global carbon taxation must be reached. This is one of Ceres Clean Trillion goals, to reach 50% taxation of the world’s carbon emissions by 2020. Shown in the previous section, *Carbon Emissions Today*, China, the United States, and India were responsible for 49% of the world’s carbon dioxide emissions in 2013. With a rate of only 7% of carbon emissions being taxed in some form today, it is essential to begin taxing China and the United States to at least reach 49% taxation of carbon emissions; if India were to be included, this figure would jump to 56% of the world’s carbon emissions taxed, surpassing the Ceres Clean Trillion goal for 2020.

 While none of the top three polluting countries have a carbon tax currently, there has been progress in China and the United States. In November of this year, United States President Barack Obama and President Xi Jinping of China came to a joint agreement to reduce carbon emissions. Obama pledged to reduce carbon emissions by 26% from 2005 levels by 2025, and President Jinping declared China’s emissions would peak around 2030 before beginning to decrease. India’s Prime Minister Narendra Modia has not committed to any carbon dioxide pollution reduction. Although a Chinese and American pledge to reduce carbon dioxide emissions brings hope for fewer emissions, experts declare that the reductions are too few and too far into the future to prevent the earth’s temperature from increasing two degrees Celsius.[[15]](#footnote-16)

 Due to the predictions that governmental pledges will not achieve the final goal, it is obvious that a carbon tax will be required in major polluting countries- such as China, the United States, India, as well as countries with fast paced economic growth and fossil fuel production. Although many countries have already implemented carbon taxation of some sort, those that have committed to pricing carbon are not among the world’s largest polluters. A carbon tax is essential in at least the top three polluting countries; a tax will bring with it a reduction in pollution due to direct monetary reasons, as well as an increase in private alternative energy investments as a downstream effect of higher fossil fuel pricing.

 The Ceres Clean Trillion report suggests a carbon price of $20-$50/ ton of CO2. With the world’s current carbon taxation providing a wide range of carbon tax pricing, the following tables show the tax revenues that would result from a carbon price of $5- $75, in three categories: the USA, 50% of the world, and an idealistic scenario of uniform carbon pricing throughout the world. The data below (Figure 1) is calculated from 2013 carbon emissions levels, showing the corresponding tax revenue for each carbon price.

*Figure 1. Tax Revenues dependent on carbon taxation participants and carbon pricing.*

|  |
| --- |
| 2013 Carbon Emissions Data |
| **USA** |
|  Gigatons of CO2  | 5.4 |
| Tax Rate | Tax Revenue ($B) |
|  $5 Carbon Tax  | $27  |
|  $20 Carbon Tax  | $108  |
|  $25 Carbon Tax  | $135  |
|  $50 Carbon Tax  | $270  |
|  $75 Carbon Tax  | $405  |
| **50% World**  |
| Gigatons of CO2 | 18 |
| Tax Rate | Tax Revenue ($B) |
| $5 Carbon Tax | $90  |
| $20 Carbon Tax | $360  |
| $25 Carbon Tax | $450  |
| $50 Carbon Tax  | $900  |
| $75 Carbon Tax  | $1,350  |
|  **World**  |
|  Gigatons of CO2  | 36 |
| Tax Rate | Tax Revenue ($B) |
|  $5 Carbon Tax  | $180  |
|  $20 Carbon Tax  | $720  |
|  $25 Carbon Tax  | $900  |
|  $50 Carbon Tax  | $1,800  |
|  $75 Carbon Tax  | $2,700  |

 According to *Figure 1*, if the Ceres Clean Trillion goal of 50% taxation were to be reached by 2020, with a carbon tax of $20-$50/ ton of CO2, a tax revenue of half a trillion to just shy of a trillion would be reached annually based off of 2013 carbon emissions. Therefore, in order to even achieve the $703 billion required to reach a clean trillion annually through tax revenue (taking into account the $297 billion currently invested annually), a carbon tax of around $39/ton of CO2 would be required for 50% of the world. These numbers are tremendously revealing, and show how important the downstream effects of carbon taxation are. $39/ton of CO2 is high for a carbon tax in comparison to nations currently taxing carbon, and if a tax were to be that large, it would have to be revenue neutral in order to gain popularity. A carbon tax’s biggest contribution to the fight against climate change is not in its allocation of tax revenue, but rather lies with a tax’s ability to make alternative clean energy technologies more attractive- therefore changing private investor’s financial decisions.

 An important characteristic of a tax, second only to the goal that carbon taxation reduce carbon emissions, is that the tax be supported by the population it is effecting. A carbon tax has little purpose for the future if there is no hope for longevity; this can be seen in the case of Australia, where a carbon tax did the primary job of reducing emissions and spurring on clean energy but was repealed after two years as it failed to gain population support. The clearest case of support of a carbon tax, once again, is in British Columbia, Canada. The tax has done its job by reducing emissions while also allowing the economy to grow; it has been able to do this because it is revenue neutral. The carbon tax in British Columbia in turn reduces income taxes, overall leaving the same (or in BC’s case, more) money in taxpayers’ pockets.

***Gas Tax***

The previous two sections clarify that a carbon tax must be revenue neutral, or as close to it as possible, in order to gain support among taxpayers. Yet the best way to format a carbon tax is not entirely clear. The current gasoline climate suggests that a higher rate of taxation per gallon of gasoline would be an effective way to generate additional tax revenue.

 A 2014 Forbes article written by energy and environmental contributor James Conca analyzed Washington State gasoline pricing and sales data. The data showed gasoline sales to be extremely inelastic in the United States. Conca pointed out that within four years, from 2004-2008, Washington gasoline prices increased by $2.87 per gallon. Conca further emphasized the volatility of gasoline prices, and the consistency of consumers; from February 2014 to July 2014, in a span of six months, gasoline prices rose $0.70 while gallons purchased stayed constant.[[16]](#footnote-17)

 Today, gasoline prices in the United States are the lowest they have been in five years. Due to an increase in United States oil production, more fuel efficient vehicles, a decrease in oil demand in Europe and Asia along with a refusal by OPEC to reduce production to increase barrel prices, gas in the United States has reached an average of $2.55 a gallon.[[17]](#footnote-18) This notes a significant change, as from 2011 to late 2014 gas prices remained above $3.50 on average.[[18]](#footnote-19) In just a couple months (gas prices started to fall significantly in September, 2014), there has been a decrease of nearly a full dollar due to market fluctuation. This fluctuation presents an opportunity for carbon dioxide taxation at a higher level for vehicle emissions.

 As seen in *Figure 2* below, 135 billion gallons of gas were consumed in the United States in 2013, with the average gallon of gas producing around 20 pounds of CO2. *Figure 3* shows potential taxation per gallon of gas, and how a gallon tax unit would relate to an overall taxation rate per ton of CO2. For example, a $1.00 carbon tax per gallon of gas would be indicative of a $102.40 carbon tax per ton of CO2, resulting in $135 billion in tax revenue just from gasoline purchases.

*Figure 2. Gasoline statistics for 2013, USA.*

|  |  |
| --- | --- |
| **Gallons of Gas Consumed USA (2013, billions)**  | **134.51** |
| **Gas Carbon Factor (C02 emission lbs/gallon)** | **19.6** |
| **CO2 Tons/ gallon (average)** | **0.0098** |

*Figure 3. Potential USA Annual Tax Revenue dependent on gasoline tax pricing.*

|  |  |  |
| --- | --- | --- |
| **Tax per Gallon** | **Corresponding Taxation Rate Per Ton CO2 for Gallons of Gas**  | **Tax Revenue for USA ($B, annually)** |
| $0.05 | $5 Carbon Tax | $6.59 |
| $0.20 | $20 Carbon Tax | $26.36 |
| $0.25 | $25 Carbon Tax | $32.95 |
| $0.49 | $50 Carbon Tax | $65.91 |
| $0.74 | $75 Carbon Tax | $98.86 |
| $1.00 | $102.40 Carbon Tax | $134.51 |
| $1.50 | $153.06 Carbon Tax | $201.77 |

This section was included in this report to show how specific sectors of the fossil fuel economy can be taxed at higher rates than the average rate per ton of CO2, and to highlight the opportunity currently available in the United States due to the current low gasoline prices.

***Reallocation of Fossil Fuel Subsidies***

 The International Energy Agency (IEA) estimated annual fossil fuel subsidies at $548 billion in 2013.[[19]](#footnote-20) Oil Change International’s 2014 report logged the United States’ fossil fuel subsidies (federal and state) at $32.8 billion in 2013 for oil, gas and coal production, exploration and consumption.[[20]](#footnote-21) Among these federal and state subsidies, $21.6 billion were for production and exploration of oil, gas and coal, among which United States taxpayers provided $5 billion (21.3% of production and exploration subsidies).

 In order to avoid increasing the temperature of the planet by 2 degrees Celsius, we cannot burn all of the oil reserves presently discovered, a concept referred to as “unburnable carbon” which presents the risk of future stranded assets if a carbon budget were to take effect. According to the IEA, only one third of present fossil fuel reserves can be burned before 2050 without surpassing the 2 degrees benchmark.[[21]](#footnote-22) Acknowledging this risk, it is unethical to allocate $21.6 billion of government dollars annually towards increasing the amount of “unburnable carbon”. An annual allocation of $5 billion in taxpayers’ dollars towards fossil fuel subsidies counteracts the any government’s basic fiduciary duty to protect its citizens. The decision to distribute taxpayers’ money towards fossil fuel subsidies ensures that every paying citizen is accelerating the degradation of the planet.

A similar view has been stated by President Barack Obama, who presented a bill in 2012 to end taxpayer funded subsidies for oil companies.[[22]](#footnote-23) President Obama’s bill was rejected in the Senate, along with budget reduction proposals since 2012 sent to Congress. In 2013, President Obama proposed a reduction of $6.1 billion in fossil fuel subsidies, again rejected by Congress.[[23]](#footnote-24)

The lack of progress towards reducing fossil fuel subsidies shows that American taxpayers have not pressured their representatives enough to make fossil fuel subsidy reduction a high enough priority. The process is infinitely harder when taking into account the fossil fuel lobbying present in Washington; in 2013, $213 million were spent by fossil fuel corporations on lobbying.[[24]](#footnote-25)

The most likely way to eliminate these fossil fuel subsidies is to present an option of substitution, by reallocating the $5 billion of annual taxpayer revenue currently directed towards fossil fuel subsidies and place it towards clean energy technology investments. The substitution would provide a clear tradeoff to taxpayers.

 While the previous sectors have shown that a carbon tax is most supported when it is revenue-neutral; this does not allow for tax revenue to be allocated towards clean energy technology. As described in the Ceres Clean Trillion, fossil fuel subsidies must be phased out, as well as a promotion of large-scale deployment of clean energy technology to reduce costs for clean energy technology. In order to achieve this, money must be invested in large scale clean energy technology deployment; this money should be taken from fossil fuel subsidies.

***Conclusion***

 A carbon tax must be implemented in the United States and China to reach the suggested carbon taxation goal of 50% of emissions by 2020 highlighted in the Ceres Clean Trillion Report. India, as another major emitter of carbon dioxide, is another country of high priority. Agreeing with the Ceres report, this carbon tax must be large enough ($20-$50 per ton of CO2) in order to be effective, yet a carbon tax must also be supported by the local population. A clear-cut way to gain support is to make a carbon tax revenue neutral- so that a country’s economic growth is not hindered by less spending power- as well as graduated so that a country has time to adjust to the carbon pricing. Although $20-$50 is the recommended pricing per ton of CO2 emitted, current gasoline prices in the United States allow for higher potential pricing per ton of CO2 when taxing gasoline on a per-gallon basis (a $50- $100 tax rate per ton of CO2 emissions could reasonably be instated). Lastly, fossil fuel subsidies must be reduced so that taxpayers are not paying to help oil companies search for additional pollution sources. It is strongly recommended that current fossil fuel subsidies (starting at $5 billion annually) be redistributed to clean energy technology investments, providing financial support for clean energy technology development as well as additional incentive and security for private investors to redirect their investments away from fossil fuels and towards clean energy technology.

Bibliography:

Bastasch, Michael. "Obama: Learn from Sweden, Home of the Carbon Tax." *The Daily Caller*. N.p., 6 Sept. 2013. Web. 1 Dec. 2014. <http://dailycaller.com/2013/09/06/obama-learn-from-sweden-home-of-the-carbon-tax/>.

Baker, Brandon. "​How ​Your Tax Dollars Fund Climate Change Denial » EcoWatch."*EcoWatch Transforming Green*. EcoWatch, 16 July 2014. Web. 1 Dec. 2014. <http://ecowatch.com/2014/07/16/subsidies-gas-oil-climate-change/>

Capalino, Reid, and Mark Fulton. *Investing in the Clean Trillion: Closing the Clean Energy Investment Gap*. Rep. Boston: Ceres, 2014. Print.

Conca, James. "Can A Carbon Tax Create Jobs, Jobs, Jobs?" *Forbes*. Forbes Magazine, 6 Oct. 2014. Web. 17 Dec. 2014. <http://www.forbes.com/sites/jamesconca/2014/10/06/can-a-carbon-tax-create-jobs-jobs-jobs/>.

Davenport, Coral. "Deal on Carbon Emissions by Obama and Xi Jinping Raises Hopes for Upcoming Paris Climate Talks." *The New York Times*. The New York Times, 12 Nov. 2014. Web. 1 Dec. 2014. <http://www.nytimes.com/2014/11/13/world/asia/deal-on-carbon-emissions-by-obama-and-xi-jinping-raises-hopes-for-upcoming-paris-climate-talks.html>.

"Energy Subsidies." *IEA*. International Energy Agency, 2014. Web. 1 Dec. 2014. <http://www.worldenergyoutlook.org/resources/energysubsidies/>.

"First Solar Installs Inaugural Panel at South America's Largest PV Plant." *First Solar*. First Solar, 17 Oct. 2014. Web. 1 Dec. 2014. <http://investor.firstsolar.com/releasedetail.cfm?ReleaseID=876816>.

Galbraith, Kate. "Climate Change Concerns Push Chile to Forefront of Carbon Tax Movement." *The New York Times*. The New York Times, 29 Oct. 2014. Web. 1 Dec. 2014. <http://www.nytimes.com/2014/10/30/business/international/climate-change-concerns-push-chile-to-forefront-of-carbon-tax-movement.html?\_r=0>.

"Highway History." *U.S. Department of Transportation Federal Highway Administration*. U.S. Department of Transportation Federal Highway Administration, 17 Oct. 2013. Web. 1 Dec. 2014. <http://www.fhwa.dot.gov/infrastructure/gastax.cfm>.

Historical Price Charts." *GasBuddy.com*. Gas Buddy, Dec. 2014. Web. 17 Dec. 2014. <http://www.gasbuddy.com/gb\_retail\_price\_chart.aspx>.

Isidore, Chris. "Gas for Less than $2 Is Now Widespread." *CNNMoney*. Cable News Network, 15 Dec. 2014. Web. 15 Dec. 2014. <http://money.cnn.com/2014/12/15/news/economy/2-dollar-gas/>.

Kelley, Katie. "City Approves 'Carbon Tax' In Effort to Reduce Gas Emissions." *The New York Times*. The New York Times, 17 Nov. 2006. Web. 1 Dec. 2014. <http://www.nytimes.com/2006/11/18/us/18carbon.html>.

Le Quéré, Corinne. "Global Carbon Budget Highlights (full)." *GCP*. Global Carbon Project, 21 Sept. 2014. Web. 17 Dec. 2014. <http://www.globalcarbonproject.org/carbonbudget/14/hl-full.htm>.

Makhijani, Shakuntala, Stephen Kretzmann, and Elizabeth Bast. *Cashing in on All of the Above: U.S. Fossil Fuel Production Subsidies Under Obama* (n.d.): n. pag. Oil Change International, July 2014. Web. 1 Dec. 2014. <http://priceofoil.org/content/uploads/2014/07/OCI\_US\_FF\_Subsidies\_Final\_Screen.pdf>.

McAuliff, Michael. "President Obama's Bid To End Oil Subsidies Voted Down By Senate." *The Huffington Post*. TheHuffingtonPost.com, 29 Mar. 2012. Web. 17 Dec. 2014. <http://www.huffingtonpost.com/2012/03/29/oil-subsidies-senate-president-obama\_n\_1387789.html>.

Nesheiwat, Zana. "Sweden's Quest to Be the First Oil-free Nation." *The Energy Collective*. N.p., 11 Apr. 2013. Web. 1 Dec. 2014. <http://theenergycollective.com/znesheiwat/208421/swedens-quest-be-first-oil-free-nation>.

"Putting a Price on Carbon with a Tax." *World Bank* (2013): n. pag. Web. 1 Dec. 2014. <http://www.worldbank.org/content/dam/Worldbank/document/SDN/background-note\_carbon-tax.pdf>.

Rose, Chris. "Fossil Fuel Lobby Spent $213 Million Last Year to Influence US, EU Politicians." *DeSmogBlog.com*. DeSmogBlog.com, 18 Oct. 2014. Web. 1 Dec. 2014. <http://www.desmogblog.com/2014/10/18/fossil-fuel-lobby-spent-213-million-last-year-influence-us-eu-politicians>.

Rosenthal, Elisabeth. "Carbon Taxes Make Ireland Even Greener." *The New York Times*. The New York Times, 27 Dec. 2012. Web. 1 Dec. 2014. <http://www.nytimes.com/2012/12/28/science/earth/in-ireland-carbon-taxes-pay-off.html?pagewanted=all>.

"Unburnable Carbon." *Carbon Tracker Initiative*. Carbon Tracker Initiative, 2014. Web. 1 Dec. 2014. <http://www.carbontracker.org/resources/>.

"Where Carbon Is Taxed." *Carbon Tax Center*. CTC, 31 Oct. 2014. Web. 1 Dec. 2014. <http://www.carbontax.org/services/where-carbon-is-taxed/>.

1. "Highway History." *U.S. Department of Transportation Federal Highway Administration*. [↑](#footnote-ref-2)
2. Le Quéré, Corinne. "Global Carbon Budget Highlights (full)." *GCP*. Global Carbon Project. [↑](#footnote-ref-3)
3. Le Quéré, Corinne. "Global Carbon Budget Highlights (full)." *GCP*. Global Carbon Project. [↑](#footnote-ref-4)
4. Reid Capalino and Mark Fulton, *Investing in the Clean Trillion: Closing the Clean Energy Investment Gap*, (Rep. Boston: Ceres, 2014), 58. [↑](#footnote-ref-5)
5. "Where Carbon Is Taxed." *Carbon Tax Center*. CTC. [↑](#footnote-ref-6)
6. Bastasch, Michael. "Obama: Learn from Sweden, Home of the Carbon Tax." *The Daily Caller*. [↑](#footnote-ref-7)
7. Nesheiwat, Zana. "Sweden's Quest to Be the First Oil-free Nation." *The Energy Collective*. [↑](#footnote-ref-8)
8. Bastasch, "Obama: Learn from Sweden, Home of the Carbon Tax."  [↑](#footnote-ref-9)
9. "Putting a Price on Carbon with a Tax." *World Bank* (2013). [↑](#footnote-ref-10)
10. Galbraith, Kate. "Climate Change Concerns Push Chile to Forefront of Carbon Tax Movement." *The New York Times*. [↑](#footnote-ref-11)
11. "First Solar Installs Inaugural Panel at South America's Largest PV Plant." *First Solar*. [↑](#footnote-ref-12)
12. Rosenthal, Elisabeth. "Carbon Taxes Make Ireland Even Greener." *The New York Times*. [↑](#footnote-ref-13)
13. "Where Carbon Is Taxed." *Carbon Tax Center*. [↑](#footnote-ref-14)
14. Kelley, Katie. "City Approves 'Carbon Tax' In Effort to Reduce Gas Emissions." *The New York Times*. [↑](#footnote-ref-15)
15. Davenport, Coral. "Deal on Carbon Emissions by Obama and Xi Jinping Raises Hopes for Upcoming Paris Climate Talks." *The New York Times*. [↑](#footnote-ref-16)
16. Conca, James. "Can A Carbon Tax Create Jobs, Jobs, Jobs?" *Forbes*. [↑](#footnote-ref-17)
17. Isidore, Chris. "Gas for Less than $2 Is Now Widespread." *CNNMoney*. [↑](#footnote-ref-18)
18. “Historical Price Charts." *GasBuddy.com*. [↑](#footnote-ref-19)
19. "Energy Subsidies." *IEA*. [↑](#footnote-ref-20)
20. Makhijani, Shakuntala, Stephen Kretzmann, and Elizabeth Bast. *Cashing in on All of the Above: U.S. Fossil Fuel Production Subsidies Under Obama* (n.d.): n. pag. Oil Change International. [↑](#footnote-ref-21)
21. "Unburnable Carbon." *Carbon Tracker Initiative*. [↑](#footnote-ref-22)
22. McAuliff, Michael. "President Obama's Bid To End Oil Subsidies Voted Down By Senate." *The Huffington Post*. [↑](#footnote-ref-23)
23. Baker, Brandon. "​How ​Your Tax Dollars Fund Climate Change Denial » EcoWatch." [↑](#footnote-ref-24)
24. Rose, Chris. "Fossil Fuel Lobby Spent $213 Million Last Year to Influence US, EU Politicians." *DeSmogBlog.com*. [↑](#footnote-ref-25)