A Price on Carbon:
Carbon Taxes v. Carbon Trading

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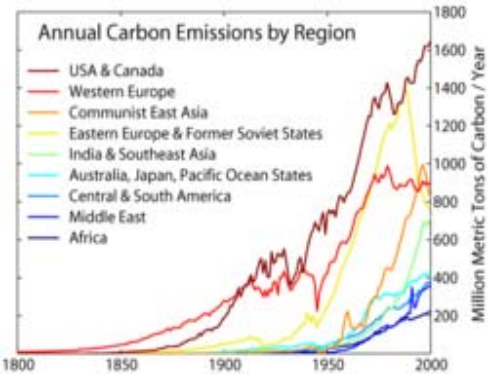
Introduction

This paper discusses greenhouse gas emissions and the current issues regarding the regulation of emissions worldwide. The primary focus will be concentrated on carbon emissions worldwide and the paper will discuss how these emissions are being reduced. The two ways which are discussed on how to reduce emissions are by use of a cap and trade system, used under the Kyoto Protocol, and the carbon emissions tax used in several different countries.

Beginning

Greenhouse gas (GHG) emissions being produced by humans has been happening in a relatively short time (approximately 250 years) when considering the entire history of the world. GHGs in the earth's atmosphere are essential to keeping the earth at a steady temperature. The problem occurs when there is an increase in greenhouse gas emissions in the atmosphere. Increasing emissions according to most scientific organizations will increase the earth's temperature to dangerous levels. Since this is the case there is plenty of controversy about this topic which will not be discussed in this paper.

GHGs consist of ozone O_3, methane CH_4, sulfur dioxide SO_2, nitrous oxide NO_2, and Hydrofluorocarbons (HFCs), but the most important gas emitted into the atmosphere is carbon dioxide CO_2. CO_2 is a GHG that is emitted by practically everything that is used in society across the globe. This gas is not new to the earth and is actually essential to life on earth. In fact plants use CO_2 during photosynthesis which helps produce the energy that is needed for plant life. Since this gas is emitted by practically every industry in every country it is difficult to say who is responsible to decrease CO_2 outputs. The following figure shows the annual carbon emissions that are emitted by different regions across the world.



Annual Carbon Emissions by Region in the World Source: Global Warming Art

Looking at this figure shows that there has been a tremendous increase in CO_2 emissions in the last 150 years. The major regions that have contributed to these emissions for the entire time period show that the United States, Canada, and Europe have lead the way in producing emissions. In more recent years though, there has been an increase in emissions from the rest of the world, particularly Southeast Asia.

Actors

- United States
- China
- European Union
- Kyoto Protocol Countries
- EPA
- Sweden
- Finland
- British Columbia, Canada
- New Zealand
- Sulfur Dioxide Trade
- Clean Air Act

Timeline

• 1824	The greenhouse effect was theorized by Joseph Fourier
• 1990	Clean Air Act establishes Sulfur Dioxide trade
• 1990	Finland is the first to enact a carbon tax
• 1991	Sweden enacts carbon tax
• December 11, 1997	Kyoto Protocol initial adopted
• 2001	Great Britain introduces climate change tax
• 2005	New Zealand proposes carbon tax, but abandoned
• January 1, 2005	European Union Emissions Trading System introduced
• April 1, 2007	Boulder, Colorado taxes electricity for carbon emissions
• October 1, 2007	Québec, Canada is first province in Canada to tax carbon
• July 1, 2008	British Columbia, Canada enacts carbon tax

Emission Trading

Emissions trading are not a new concept and have been used for different emissions in different parts of the world. This includes trading SO_2 emissions in the United States. SO_2 emissions were first being reduced during the Clean Air Act Amendment of 1990. This act set up a goal of reducing annual SO_2 emissions by 10 million tons below the 1980 levels. In order to do these two phases were undertaken to reduce the emissions. Phase I began in 1995 and affected 110 coal-burning electric utility plants in 21 states in the east and Midwest. Phase II began in 2000 and tightened the annual emissions limits imposed on large, higher emitting plants. This includes all new utility plants and any current operating plant that produces 25 megawatts or more (EPA). With these regulations to meet certain air quality requirements, the EPA decided to begin a market-based cap and trade system. In order to properly conduct a cap-and-trade system, allowances had to be given initially and are considered currency in this system. Allowances are equal to one ton of SO_2 emitted by a utility or industry. The allowances were allocated for each year beginning in 1995 for Phase I and then continued allocating allowances for Phase II in 2000. Phase II added additional constraints to the SO_2 emissions in the United States and

spread the allowances across the entire country. Goals that are achieved by this act are the same goals that are involved in carbon trading as well.

The United States is not the only country in the world that has a current emissions trading system in place. European countries have adopted a European Union Emission Trading System which began in the beginning of 2005. The European Union Emission Trading System is in place to regulate all GHG emissions, but is primarily in place to reduce CO_2 emissions. The first phase of the trading system which began in 2005, went until 2007, and included approximately 12,000 installations in 15 European countries. This includes power producers, mineral oil refineries, mineral industries, and pulp and paper industries, along with other high emitting industries. Emissions from these sources contribute to approximately 40% of the European Unions CO_2 emissions.

Carbon Trading Definition

Carbon trading is using an organizational approach in order to control the amount of CO_2 released into the atmosphere. Carbon trading is when a specific amount of carbon allowances are given for an entire group and cannot exceed a set amount or cap. These allowances are given by governments in order to set limits, or cap, of the amount of pollutants allowed into the atmosphere. In order for parts of the group emitting carbon to meet the reduction goals, the allowances can be traded between parts of the group. Trading carbon units benefits both parties involved by letting one reach its mandatory goals while the other receives additional profit for selling the allowances. Additional credits can also be received from using sustainable energy. These credits can be traded in order to reduce emissions and help groups meet goals set by the government.

Carbon Tax Definition

A carbon tax is an energy tax paid by individuals, industries, and countries. This type of taxing is not a new idea and has been used by countries around the world. An energy tax is a tax on various forms of energy, primarily fossil fuels like oil, coal, natural gas, liquefied petroleum, and aviation fuel. The purpose for an energy tax is not to increase revenue, but to promote the use of sustainable technologies.

Carbon, or energy, taxes have been used by different countries around the world since the 1990s. Other countries have proposed taxes, but they have not implemented these taxes.

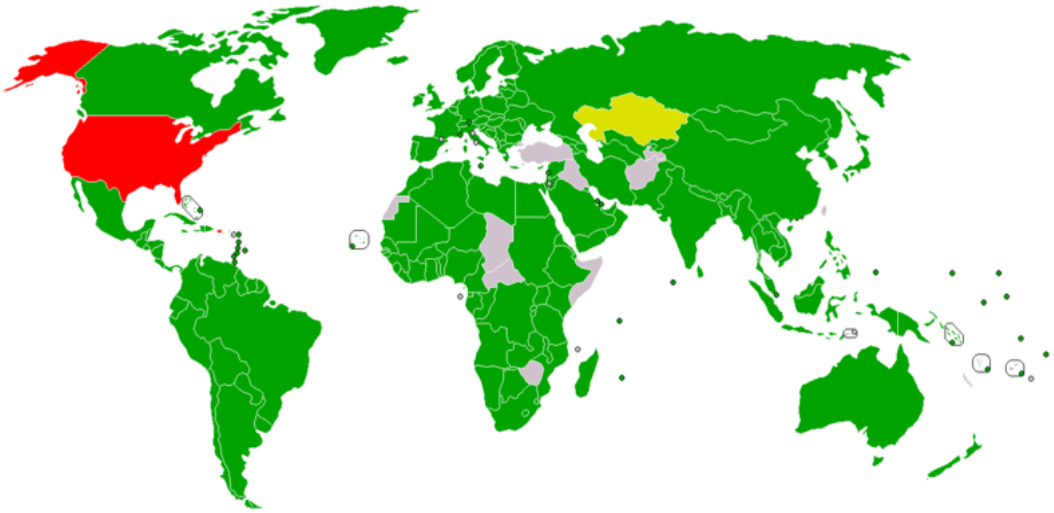
The control of carbon has led to international agreements in addition to carbon taxing. One of the principle international treaties to control carbon emissions is the Koyto Protocol.

The Kyoto Protocol

As the effects of global temperature increase becomes more prevalent through scientific observation, from the loss of polar ice, permafrost and other effects, international treaties have been passed to control global warming. The build up of man-made emissions most notably carbon dioxide CO_2 has lead to the 1997 formation of the Kyoto Protocol. The Kyoto Protocol is an international agreement between nations linked to the United

Nations to reduce global warming gases. The gases that the Kyoto Protocol covers are: CO_2, Methane CH_4, nitrous oxide NO_2, hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The scientific community strongly believes that these molecules are the chief cause of global warming (Hansjurgens 2005).

The Kyoto Protocol has been signed and ratified by over 160 countries. Most countries in the developed world and the developing world have ratified the treaty. The United States has declined ratification of the treaty and Kazakhstan has ratification pending. A few other countries have taken no position on the issue. (See map below) The Kyoto Protocol sets binding emissions targets for developed countries to reduce their GHG emissions relative to levels emitted in 1990, between the years 2008 and 2012 (EIA-DOE 2002). The Kyoto Protocol has helped develop some flexible carbon trading mechanisms such as cap and trade that encourages the trade of carbon to help reduce the need for carbon use and develop more effective technologies to control GHG emissions (Hepburn 2007). There are four mechanisms that the Kyoto Protocol uses to control harmful GHG. 1) International Emissions Trading: This assists countries that are unable to meet their own emissions goals by allowing them to purchase needed credits from other countries that have met their emissions goals. 2) Domestic Emissions Trading: This allows countries that have developed their own cap and trade emissions standards to trade credits between states, regions and domestic firms to trade with one and other. This trading is meant to meet the emissions goals set by the particular countries emissions goal. 3) Clean Development Mechanism (CDM): This allows developed countries to make up for their own excess emissions through helping developing countries reduce their emissions. Finally, 4) Joint Implementation (JI): Is similar the CDM but applies to the East Bloc countries that are developed but have their own unique set of emissions problems and are categorized separately (Celsias 2008).



Nations Participating in the Kyoto Protocol as of 2005

Signed and ratified.
Signed, ratification pending.
Signed, ratification declined.
No position.

(Wikipedia 2005)
http://en.wikipedia.org/wiki/Image:Kyoto_Protocol_participation_map_2005.png

Carbon Trading: What is it and how does it Work? How effective is it?

Under the Kyoto Protocol emissions trading (as stated earlier) is a system used to reduce the cumulative buildup of GHG agents. Other agents such as acid rain pollutants have also been traded to encourage new innovation in emissions control under the, U.S. Clean Air Act. Carbon or emissions trading is a policy that allows the buying and selling of credits or allowances regulated by an emissions cap (PEW 2008). Efforts in world economies have taken climate change economics and carbon trading from academia to the mainstream via heavy media coverage of large scale weather events (Hepburn 2007). With overwhelming evidence suggesting that climate change is a global problem, with grave consequences, carbon emissions trading has attracted significantly broader interest (EPA 2005). Carbon trading or emissions trading is not entirely a new concept. Trading of SO_2 and NOx has been practiced in the United States since the 1990s with some success. In terms of value the volume of CO_2 emissions trading has seen the largest increase in recent years (iPath 2008). The overall limiting of emissions trading is defined as a cap and trade market that first, limits the quantity of emissions allowed by firms or entities covered under the trading scheme. Second, the government under the trading scheme issues carbon allowances to entities in the scheme that must fall in line with the emissions cap set by the government. Third, a fine or sanction is applied to the entities covered by the scheme that does not provide adequate credits to meet their emissions requirements. And fourth, entities trade carbon allowances with each other to support emissions compliance. If a firm emits less than the number of allowances, that they have, they can sell the remaining allowances to other entities that are not meeting the emission goals. This yields an incentive for entities to reduce their emissions (iPath 2008).

The basics of carbon trading or emissions trading are first described via a rudimentary example. The effectiveness of emissions trading is also briefly discussed.

Carbon trading is a major player towards controlling the harmful excess of greenhouse gases. It is really a form of emissions trading that is a market based tool that grants economic incentives for controlling pollution. Carbon trading as mentioned above has also been called “Cap and Trade” (EPA 2008). The economic trade of GHG and the other types of emission agents is discussed.

Carbon trading has two forms, one is voluntary and the other is mandatory. Mandated carbon trading in a participating country is obligated to reduce their GHG under a scheme called cap and trade to a set level (Celsias 2007). Voluntary markets allow or encourage individuals, firms, markets and countries to make up for their emissions without legal obligations or requirements. Cap and trade is a form carbon trading used by many governments to control emissions under the Kyoto Protocol.

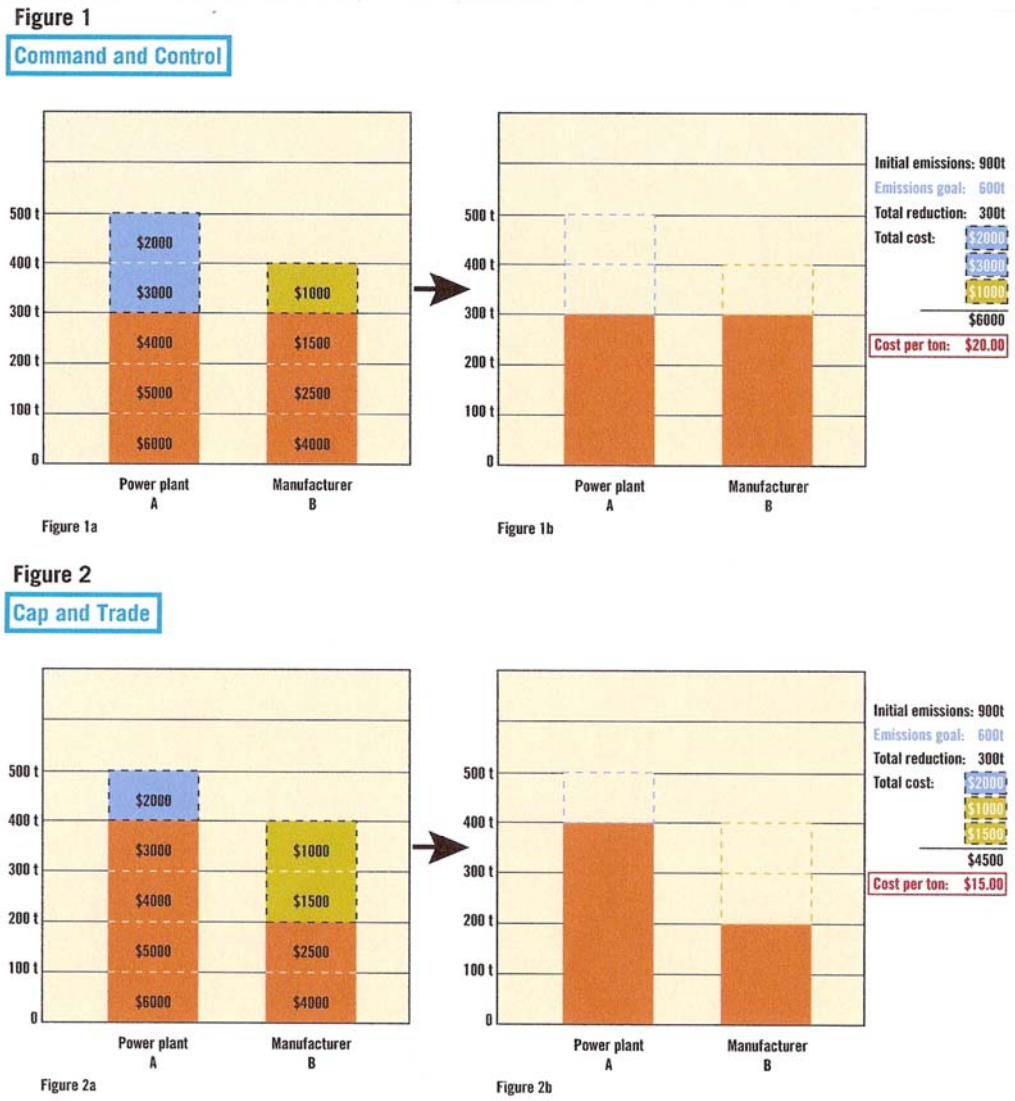
Cap and trade first sets a maximum limit or an aggressive cap on emissions. This cap is usually determined by the government that sets an emissions target or “cap” on certain organizations or entities (PEW 2008). Cap and trade assumes that GHG emissions or acid rain producing compounds such as sulfur dioxide SO_2 or NOx is a global problem. Emissions from a plant in say New Jersey have the same effect as emissions from a plant in Japan. The emissions effect on global climate is identical. The goal of cap and trade is the same regardless of the source (Celsias 2007). Cap and trade is way of incorporating

GHG emission control technologies and measures into an effective and economical way. Once a cap to control emissions is established for a given country or industry a goal is set to reduce emissions below the set cap. The participants in the cap and trade system either purchases or are given what is called "allowances" (Celsias 2007). The allowances are amounts of usually metric tones of CO_2, SO_2 or NOx emissions that the participants are allowed to emit. Thus the total number of allowances adds up to the cap (Celsias 2007).

Trading allowances between firms or entities can occur because not all companies emit the same amount of GHG and have different emissions costs. A firm might be able to reduce its costs by installing relatively inexpensive emissions control technology. This firm's costs to control its emissions will be less than other firms that must use costly emissions technology. A ton of CO_2 or SO_2 is assumed to have the same environmental effect no matter where it is located. Thus if factory A installs emission controls and is able to easily reduce its emissions below its allowances, factory A has excess allowances. It costs factory B excessively to install emissions controls to the required emissions level. So factory B buys extra allowances from A and the total emissions remains below the cap. Each participant profits from the benefits of trading (PEW 2008). For example, Factory A has excess allowances. The firm with lower emissions costs can buy fewer allowances or sell their extra allowances to firms that face far higher emissions costs. Firms have financial incentive to control emissions by determining when and how emissions will be reduced, and this minimizes overall capping costs. Factory B has the option under Kyoto to finance a carbon reduction project (planting a new forest) in a developing country or buying factory A's extra allowances (Celsias 2007).

Carbon trading or emissions trading can be better understood by an expansion of the simple example above, of a world with two greenhouse gas emitters. Power plant A in country A and manufacturing plant B in the same country A. Power plant A and manufacturing plant B together emits 900 tons of CO_2 per year (PEW 2008). Power plant A and manufacturing plant B are able to reduce its emissions by using emissions control technology, where the government decides that it wants require both the emitters A and B to reduce its emissions to 600 tons per year. Figures 1 and 2 below provide a rudimentary example of the hypothetical emitters and their trading benefits (PEW 2008). The power plant and manufacturing firms have different costs for reducing emissions. In the figure the costs of reducing the emissions for power plant A is greater than manufacturing plant B. Plant A's emissions cost $2,000 for reducing the first 100 tons of CO2, while Plant B's costs $1,000 for 100 tons of emissions. When the cap and trade regulation is put into the full effect of reducing 600 tons for both emitters A and B, both would decrease their emissions by a total of 300 tons between them (PEW 2008). This would cost A $5,000 and B $1,000 equaling the 600 ton goal with a total cost between them of $6,000 or a reduction of $20 per ton (PEW 2008). This is the traditional command and control approach where a government decides how emissions will be controlled and by how much. The full cap-and-trade system is more of a market based approach were supply and demand help determine environmental goals. The government still determines the cap or level of emissions allowed and which industries it applies this cap on emissions. The cap is the total of all allowed emissions on all regulated emitters. When a cap has been determined for the entities covered under the cap the right trade emission allowances can be distributed. The allowances allow the entities to release a

specified quantity of emissions, say one ton of CO_2. The entities that are covered under regulations are required to submit allowances equal to the level of emissions for which they are responsible at the end of the compliance period (PEW 2008).



(PEW 2008)

The government could cap emissions in a cap-and-trade system to 600 tons of emissions and then issue 600 issue allowances. Ideally the allowances would be divided evenly between the power plant A and manufacturing plant B. This would give both emitters the incentive to trade with each other because emissions are higher for power plant A than manufacturing plant B (PEW 2008). See figure 2. Hypothetically plant B could reduce its emissions by 200 tons of CO_2 (or SO_2 if both emit this instead of CO_2 in this example) and then sell its surplus allowances to plant A for a lower value than it would have cost plant A to by itself make its own reductions (Pew 2008). In this hypothetical example, the goal emission levels are reached at a reduced total cost of $4,500 and a reduced per

ton cost of $15 for plants A and B under the imposed government regulation of at or below 600 tons per year (PEW 2008).

Where a firm can reduce its emissions in a cap and trade program at a lower cost than the allowance price it can reduce its compliance costs or sell allowances to other firms. This gives firms financial incentives to invest in new innovative ways to reduce emissions or develop emissions reducing technologies (PEW 2008).

Cap-and-Trade Advantages

Cap and trade has the advantage of providing incentive to reduce emissions through new technology or innovation over time. Cap and trade provides incentive over command and control or traditional regulatory measures (Pew 2008). Cap and trade allows the market to set a price for pollution emissions. Cap and trade allows flexibility from emissions trading markets and helps better identify new technological cost saving measures faster than emissions technology mandated by the government. This flexibility of the market fosters the development of new technologies that can lead to even greater cuts in harmful greenhouse gases or other emissions at lower costs than what regulators would not have likely discovered on their own (Pew 2008).

Has Cap-and-Trade Worked? What are some of the Problems?

There are many investors around the world who are not familiar with cap and trade economics. The cap and trade programs around the world have had some success (iPath 2008). The United States successfully implemented it for the control of acid rain emissions. The United States Congress required a 50-percent reduction of SO_2 and NOx emissions by the year 2012. The control of acid rain required industry wide emissions caps and distributed credits to companies through the acid rain program. This gave companies incentive to find better ways to reduce their emission. In the U.S. case cap and trade economics helped reduce SO_2 by 40-percent. Under the cap and trade economics acid is no longer a significant problem for U.S. emitters (iPath 2008).

It has been reported that cap and trade is receiving much more attention for CO_2 emissions globally with more financial entities participating (IPath 2008). The problem is that the marketplace is very fluid and carbon trading is still a fledging issue for investors. The regulatory system is the force behind the supply and demand. If there is a change in regulations by increasing or decreasing supply, it will impact the market price of carbon credits (iPath 2008). A change in the support of policymakers and businesses towards the agreement about how carbon markets should work could significantly impact the market (iPath 2008).

Data from the World Bank for 2005 indicate that there has been a reduction of about 374 million tons for GHGs (mainly CO_2) with the overall transactions totaling $7.5 billion U.S. dollars. Many of the credits from the Clean Development Mechanism (CDM) segment of Kyoto (49.2%), has gone towards developing countries (IETA 2006). Much of the other half has been traded between developed countries often for emissions control technology.

There are some that believe carbon trading will not be successful because it is a global problem.

A Problem in Europe has been to issue too many allowances (called EU Allocations or EUAs), that inundated the market with credits and decreased the need to reduce emissions (Celsias 2007).

The cap and trade has not been successfully determined to work in international markets. In an article on carbon trading (Los Angeles Times, April 1, 2007) asserts that carbon trading amounts to "an untested economic experiment". The article also states that the EU distributed carbon credits or pollution permits to firms. These credits were based on the firms own estimated carbon emissions. These credits were granted by the EU to the firms and were not auctioned off. That is, the firms did not pay for their pollution and were in a position to make money by selling the credits.

The same Los Angeles Times article also states through Larry Lohmann, of Corner House a British research organization that "carbon trading is little more than a license for big polluters to carry on business as usual". Lohmann in the article also says that Under the Greenhouse Gas Emissions Trading Scheme new conditions were put in place that further allowed the largest polluters to buy cheap 'offset' credits from other countries. For example a British cement company that did not have enough credits to keep on polluting could buy credits from a wind farm in a developing country or a project that burns landfill gas to generate electricity in a developing country. These projects says Lohmann are actually "supplementing fossil fuel … not replacing it."

One of the major problems of cap and trade is that its emissions caps do not go far enough towards reducing GHGs. Carbon markets represent only a small fraction of the CO_2 emissions problem (Hepburn2007). The scope of the trading is small. More countries need to be covered by emissions trading that cover more sectors of economies over long periods of time to have an impact. Emissions caps need to be stricter on an international scale to obtain some beneficial level of effectiveness (Hepburn 2007). Despite these weaknesses in carbon trading, it remains an effective starting point for controlling emissions that cause global warming (Hepburn 2007). The question is will these efforts be enough to curtail the potential global catastrophe?

The progress of the carbon tax is further described using some selected countries that use the carbon tax. The carbon tax could be thought of as a supplement to the Kyoto Protocol's cap and trade to further reduce carbon emissions worldwide.

Finland

In 1990, Finland became the first country who enacted the carbon tax, which was first purely based on carbon content. The initial price was Mk 6.66 (about $1.45) per metric ton of CO_2. The level of the tax has been consistently rising, from Mk 13.59 (about $2.96) in 1993 to Mk 38.3 ($8.34). And the price was €18.05 (about $24.39) in 2007 and €20 in 2008. The tax rates are based on different kinds of fuel, which are listed in the table below.

Excise tax rates and strategic stockpile fees in Finland (January 2008)

Fuel	Basic tax	Surtax (*=carbon comp., €20/tonne CO_2)	Strategic stockpile fee
Unleaded petrol, euro cents/litre - reformulated sulphur free - other grades	 57.24 59.89	 * 4.78 * 4.78	 0.68 0.68
Diesel oil, euro cents/litre - sulphur free - other grades	 30.67 33.32	 * 5.38 * 5.38	 0.35 0.35
Light fuel oil, euro cents/litre	2.94	* 5.41	0.35
Heavy fuel oil, euro cents/kg	-	* 6.42	0.28
Jet fuel (kerosene), euro cents/litre	33.32	* 5.38	0.35
Aviation gasoline, euro cents/litre	37.54	* 4.78	0.68
Coal, euros/tonne	-	* 49.32	1.18
Peat	-	-	-
Natural gas, euros/MWh	-	* 2.016 (reduced rate)	0.084
Electricity, euro cents/kWh - rate I (households,services, agric.) - rate II (mining, manufacturing)	 - -	 0.87 0.25	 0.013 0.013
Pine oil (heating), euro cents/kg	6.70	-	-

Notes: The table above is not all-inclusive; substitutes for liquid fuels may face the same rate. Leaded petrol is no longer sold in Finland. Fuels for electricity production (mainly), commercial aviation and commercial yachting exempted; also other exemptions exist. Carbon com ponent for natural gas: reduced rate. Strategic stockpile fee = pre cautionary stock fee. (For time series use: 1 euro = 5.94573 markka)
Source: Environmentally related energy taxation in Finland (http://www.environment.fi/default.asp?contentid=147208&lan=en)

The revenue of tax on energy is about €3000 million per year and the share of carbon tax revenue is around €500 million annually. The revenue is used to reduce income and capital tax. (Hunter, 2008) According to Finland government, the carbon tax brings a reduction of 5% of emission of CO_2.

Sweden

Carbon tax in Sweden was introduced in 1991, and the initial rate is 250 SEK (about $36.8) per metric ton but the industry was only charged by 50%. The rate was adjusted in 1993. The carbon tax for the industry was reduced to 80 SEK (about $12) per metric ton but for other consumers it was raised to 320 SEK (about $47.2). After that, the rate has gone up every year and reached 370 SEK (about $50.1) per metric ton in 1996. The percentage industry has to pay, however, further decreased to 25%. The tax is only based on motor and heating fuels, including oil, coal, natural gas, liquefied petroleum gas, petrol, and aviation fuel used in domestic travel. But there are some exempts such as biofuels and fuels used to generate electricity. Like Finland, the revenue also goes to public use or tax reduction. (Hunter, 2008)

The reason for the different rates for industry and consumers is that the government realized the different nature of these two groups. Consumers mostly use energy for heating and transportation while the industry uses energy for producing goods. Furthermore, consumers generally have positive attitudes on environmental regulation and the tax on pollution, but the industry opposes the government's regulation and tax increase, which will likely hurt their global competitiveness. In fact, there was an energy

tax before the carbon tax in Sweden, which attempted to reduce the carbon emission by limiting the use of energy. The direct tax on the sale of oil and energy made the energy rate in Sweden one of the highest in Europe. In order to lower the carbon emissions more efficiently, the Government designed a new tax that took the differences of industry and consumers into account.

The effect of the tax is positive. The level of carbon emissions was reduced by 13%, which is 6 to 8 million metric tons, between the years 1987 and 1994. Another positive effect we could notice is the increased use of biomass in energy and decreased use of fossil fuel energy. This change is mainly from the price change brought by the carbon tax. Despite the carbon tax with its positive effects, there are still some failures. First, as the waste fuel is exempt from the carbon tax, its use greatly increased and thus brought much pollution. Second, the total reduction of CO_2 is much less than the government's original goal. This is because the tax has little impact on the industry. Third, the tax failed to distinguish between the different levels of emission on the same kind of fuel. For example, high emission diesel fuel and low emission diesel fuel are subject to the same rate. (Tietenberg 2001)

Great Britain

A so-called "climate change tax" was introduced in 2001. The rate of the tax is listed below:

Carbon Tax rate of Great Britain

item	gas	Liquefied petroleum gas	electricity	Other taxable commodity
Rate p/kWh	0.15	0.07	0.44	0.12

Source: Department for Environment Food and Rural Affairs, Great Britain
http://www.defra.gov.uk/environment/climatechange/uk/business/ccl/intro.htm

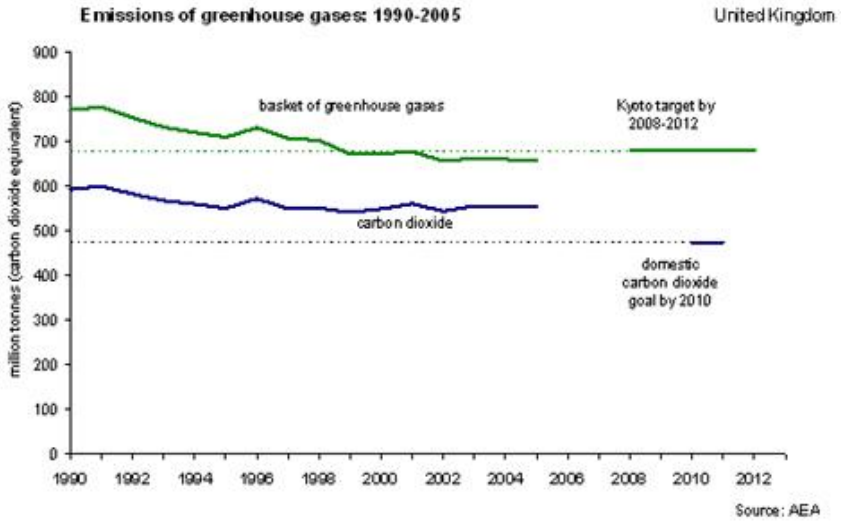
There are several exemptions from the levy, which are electricity generated from new renewable energy, fuel used by good quality combined heat and power schemes, fuels used as a feedstock and electricity used in electrolysis processes. The uses of energy in industry, commerce and the public sector are all subjected to this tax. The design of this tax follows the report of Lord Marshall, which says that "any tax needed to be designed in a way that protected the competitiveness of UK firms." (DEFRA.2007) Thus, the revenue of the tax is returned to the non-domestic sector, mainly by the way of cutting employers' National Insurance Contributions. In addition, the revenue is also used to support energy efficiency schemes and renewable sources of energy.

UK emissions of CO2 as Carbon

year	1970	1980	1990	2000	2001	2002	2003	2004	2005	2006
Million ton	186.8	165.9	161.6	150.4	153.4	149	152.3	152.6	152.7	152.5

(source: AEA UK Emissions of Air Pollutants 1970 to 2006)

In fact, this tax is an important part of the Government's overall Climate Change Programme, whose domestic goal is a 20% reduction in carbon dioxide emissions. And at the same time, it helps to meet the goal of Kyoto Protocol, which is a 12.5% reduction in greenhouse gas emissions.



Emission of greenhouse gases in United Kingdom

New Zealand

A carbon tax was proposed in New Zealand in 2005 and the planned rate was NZ$ 15 per ton of CO_2 ($10.67 of U.S. per ton of carbon). (Hodgson 2005) After 2005 election, however, the new government abandoned the proposal. (Myer, 2005)

Boulder (Colorado)

The first tax on carbon emissions from electricity in U.S was imposed in Boulder (Colorado), beginning from April 1, 2007. The rate is about $7 per ton of carbon. The estimated average household cost is about $1.33 per month; the households who use renewable energy can get a discount. The expected revenue from the tax is about $6.7 million and the goal is a reduction of carbon emissions by 250,000 metric tons by 2012 when it will expire. According to the plan, the revenues will go to Boulder's climate action plan, which aims to "increase energy efficiency in homes and buildings, switch to renewable energy and reduce vehicle miles traveled." (Kelley, 2006)

Quebec

Quebec became the first state or province to charge a carbon tax in North American after beginning to levy a carbon tax on "hydrocarbons" on Oct. 1, 2007. About 50 energy companies and oil companies will be required to pay the tax. The rates are 0.8 cents (Canadian) for each liter of gasoline and 0.938 cents (Canadian) for each liter of diesel fuel (about 3.1 U.S. cents per gallon of gasoline and 3.6 U.S. cents for diesel). The estimated revenue is $200 (Canadian) million.

British Columbia

The carbon tax started on July 1, 2008 at a rate of $10 (Canadian) per metric ton of CO_2. The rate will be $30 (Canadian) per metric ton of CO_2 by 2012 with an annual rising of $5 (Canadian) per metric ton. The tax rates by fuel type are show below.

Carbon tax rates by fuel type

	Units for tax rates	Tax rate July 1, 2008
Gasoline	¢/liter	2.41
Diesel	¢/liter	2.76
Jet fuel	¢/liter	2.62
Natural gas	¢/liter	49.88
Propane	¢/liter	1.53
Coal-Canadian bituminous	¢/liter	20.79
Coal-sub-bituminous	¢/liter	17.72

The tax plan is revenue neutral, so the revenue will be returned to taxpayers by both personal tax cuts and business tax cuts. The planned carbon tax revenue, which is also the amount to be returned to taxpayers, is $338 million (Canadian) in year 2008/09. For individuals, the main impacts are related to transportation and heating costs, while for business the impacts might be case-based situations. It is estimated that the carbon tax along could reduce BC's 3 million tons of CO_2 –equivalent annually. (Ministry of Finance, British Columbia. 2008)

Taxes other than carbon tax

Besides the carbon tax, there are also other taxes related to environmental concerns and these kinds of taxes are generally put on energy. The environmental-based taxes in the Netherlands are examples of this. The so-called greener tax of taxation began in the Netherlands during the 1970s. Although these taxes, such a tax on energy, are not directly calculated based on carbon emissions, they are directly calculated based on environmental concerns and they might have an effect similar to the carbon tax.

Activities in the U.S

In 1993, President Bill Clinton proposed an energy tax based on heat content or Btu, British thermal unit. Since the tax was proposed to be levied on almost every fuel and as a part of a deficit-reduction plan, it met strong opposition from a wide range of people. Also in the 1990s, energy activists have made an effort to enact a "tax shift" by raising an energy tax and reducing property and income tax. Although this proposal was extensively discussed, it was never enacted.

Reference

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