

# Carbon Tax, Carbon Dioxide (CO<sub>2</sub>) Tax & Carbon Pollution Tax

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**Key points:** Carbon tax, CO<sub>2</sub> tax and Carbon pollution tax are synonyms and can be used interchangeably and referred to here as C Tax. C tax is one of the policy measures that can help to reduce green house gas (GHG) emissions from fossil fuels (e.g. coal, petroleum, and natural gas). C tax set a price for CO<sub>2</sub> emissions and is levied on the production, distribution or use of fossil fuels based on how much carbon their combustion emits. Economists and international organizations recommend C tax as the most efficient market-based mitigation instrument to tackle carbon pollution but only few countries have implemented C tax. There are both pros and cons of C tax.

A carbon tax or more accurately carbon dioxide (CO<sub>2</sub>) tax is a tax on energy sources which emit carbon dioxide. Carbon dioxide occurs naturally in our environment and atmosphere; however, excess carbon dioxide (= carbon pollution) is causing much effect on our planet causing global warming or climate change. The carbon pollution (i.e. pollution through the production of CO<sub>2</sub> from human activities) is caused by burning of fossil fuels such as natural gas, petroleum and coal (Figure 1). CO<sub>2</sub> is a greenhouse gas (GHG) that is responsible for most of the enhanced greenhouse effect [1]. Currently, China, USA, Russia, India, Japan, Germany accounts for most of global CO<sub>2</sub> emissions (Table 1). Australia is heavily reliant for its electricity on fossil fuels (coal) and is one of the top twenty polluters in the world (per capita emissions basis) along with USA, Canada, Saudi Arabia and Russia (see Table 1). In short, Carbon tax, CO<sub>2</sub> tax and Carbon pollution tax are synonyms and can be used interchangeably and referred to here as C Tax.



Figure 1: Coal power plant, Germany.

Photo source: <http://www.flickr.com/photos/davipt/164341428/>

C tax is one of the policy measures that can help to reduce GHG emissions from fossil fuels. It is based on either the C content of fuels or the CO<sub>2</sub> they produce when combusted, usually measured in tonnes. Carbon is present in every hydrocarbon fuel (natural gas, petroleum, and coal) and is released as carbon dioxide (CO<sub>2</sub>) when they are burnt [3,4]. C tax is a sort of Pigovian tax or Pigouvian tax that levied on a market activity that generates negative externalities or social costs (in this case carbon pollution is a negative externality) [4,5]. The respective government usually sets a price on per tonne of carbon and then translates it into a tax on electricity, natural gas or oil etc [6]. For example, natural gas emits the least CO<sub>2</sub> (1.9393 kg/m<sup>3</sup>) when burned, and coal the most (2.47-2.84 kg/kg), with petroleum (oil) products in the middle (2.35-2.68 kg/L) [4,7]. Therefore a carbon tax would follow taxing coal more heavily than petroleum products, and much more than natural gas. An amount of CO<sub>2</sub> pollution is measured by the weight (mass) of the pollution. One tone of carbon (tC) is roughly equivalent to 4 tonne of CO<sub>2</sub> (tCO<sub>2</sub>).

Economists and international organizations recommend C tax as the most efficient market-based mitigation instrument to tackle carbon pollution (see Figure 2 for economic effect of a C tax). However, only few countries have implemented C tax [4,5]. In Australia, senate has voted to pass C tax bills in November 2011 imposing a C tax from July 2012 (see Figure 3).

Table 1: Worlds top twenty countries with highest CO<sub>2</sub> emissions (data for 2008) [2]. Note Australia is the top polluters in the world (on the basis of per capita CO<sub>2</sub> emissions).

Rank	Country	Total emissions (million metric tons of CO <sub>2</sub> )	Per Capita Emissions (Tons/Capita)
1	China	6534	4.91
2	USA	5833	19.18
3	Russia	1729	12.29
4	India	1495	1.31
5	Japan	1214	9.54
6	Germany	829	10.06
7	Canada	574	17.27
8	UK	572	9.38
9	Korea, South	542	11.21
10	Iran	511	7.76
11	Saudi Arabia	466	16.56
12	Italy	455	7.82
13	South Africa	451	9.25
14	Mexico	445	4.04
15	Australia	437	20.82
16	Indonesia	434	1.83
17	Brazil	428	2.18
18	France	415	6.48
19	Spain	359	8.86
20	Ukraine	350	7.61

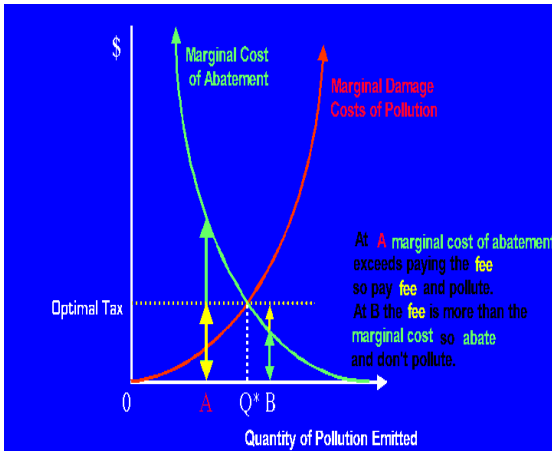


Figure 2: Showing the economic effect of a carbon tax. The figure shows that carbon tax would be most efficient if set at a level that would reflect the marginal cost of abatement as well as the marginal damage costs of pollution [9].



Figure 3: Australian Senate voted to pass carbon tax by 36 votes to 32 (8 Nov 2011). In the picture, Greens Senators congratulating each other after the Government's Clean Energy (carbon tax) Bills were passed through the Senate. Miss Julia Gillard (Australian Prime Minister), said that the carbon pricing would cut carbon pollution by at least 160 million tonnes a year in 2020 - the equivalent of taking 45 million cars off the road. The Bills will allow putting a price on pollution, fostering renewable energy technologies, encouraging energy efficiency and creating opportunities to reduce pollution on the land. A \$23 a tonne carbon tax will now be paid by about 500 high-emitting companies (top polluters/biggest polluters in Australia). However, Nationals Senate leader Barnaby Joyce said the carbon tax would hurt families but not change the temperature of the globe [8] (see Table 2 for pros and cons of C tax).

There are both pros and cons of C tax (Table 2), for example, C tax is a revenue source and the tax revenue can be used to subsidize environmental programs or low-income families. Furthermore, C tax would encourage development and use of clean energy sources (renewable or green energy such as wind, hydro, and solar). However, there are no guarantees that GHG emissions (carbon pollution) will decline or global warming (global temperature) will reduce as a result of C tax [5,9]. In fact, C tax does not eliminate carbon emissions but rather establishes the optimal level at which they are to be emitted for each source [11].

Table 2: Pros and cons of C tax [5,9].

Pros	Cons
<ul style="list-style-type: none"> <li>- C tax raises tax revenue (tax revenue can be used to subsidize environmental programs or low-income families)</li> <li>- C tax creates incentives for the development and promotion of clean energy (since C tax makes using fuels such as coal and petroleum oil more expensive, thus would encourage use of renewable/green energy sources that emits less or zero CO<sub>2</sub> such as wind, solar, hydro or nuclear power).</li> <li>- C tax may reduce consumption of fossil fuels (it may encourage people to drive less or encourage more people to cycle or walk to work. This would have health benefits such as lower risk of heart attack).</li> </ul>	<ul style="list-style-type: none"> <li>- C tax is a tax, and therefore politically unpopular (consumers donot like new taxes).</li> <li>- C tax increases the cost of the enterprises (e.g. electricity companies may shift increased cost to consumers via higher prices).</li> <li>- There is no guarantee that GHG emissions (or global warming) will decline as a result of introduction of C tax.</li> <li>- Higher taxes may encourage firms to hide carbon emissions (possibility of tax evasion) or move business offshore where there is less C tax.</li> <li>- C tax is a regressive tax that disproportionately affect low-income groups (will raise the prices of related products).</li> <li>- C tax may impose negative impacts on economic growth.</li> </ul>

Until now few countries have introduced C tax that levies on burning of fossil fuels or emitting CO<sub>2</sub> (e.g. Finland (1990), Netherlands (1990), Sweden (1991), Norway (1991), Denmark (1992), Costa Rica (1997), Canada (2007), Colorado, USA (2007), California, USA (2008), Switzerland (2008), Maryland, USA (2010), India (2010), Ireland (2010), Australia (2012) [4,5,8,12]. In contrast a number of countries (e.g. New Zealand, European Union-27 countries) prefer the cap-and-trade approach (C&T) [13]. C&T is a regulatory system that is meant to reduce certain kinds of emissions and pollution and to provide companies with a profit incentive to reduce their pollution levels faster than their peers. Under a C&T program, a limit (or "cap") on certain types of emissions or pollutions is set, and companies are permitted to sell (or "trade") the unused portion of their limits to other companies that are struggling to comply [14]. According to Keohane 2009 [15], C&T has a number of important advantages over a carbon tax, such as political feasibility, cost effectiveness, broad participation, equity in the international context, and controlling the cumulative quantity of emissions.

C tax is a tax on emissions of CO<sub>2</sub> from combustion of fossil fuels (i.e. the cost of the environmental damage it causes); however, global warming and climate change is also caused by other GHGs such as methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O). The global warming potential (warming effect of each GHG on the climate) of CH<sub>4</sub> and N<sub>2</sub>O are 21 and 310 respectively compared to 1 for CO<sub>2</sub>. Therefore, actions are also required to reduce CH<sub>4</sub> and N<sub>2</sub>O emissions to atmosphere. Nevertheless, to reduce impacts of carbon pollution on our planet, we have to

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take out our own actions (apart from C tax or C&T program), these action includes but not limited are: (a) planting trees (trees are a carbon sink); (b) building low carbon homes (homes that emit less CO<sub>2</sub>); (c) eating low carbon diets (e.g. eating less red meats will help reduce GHG emissions since livestock production cause significant release of GHGs); (d) buying or eating locally produce foods (buying locally produced food eliminate fossil fuel demand for transportation); (e) use of green electricity (e.g. solar, wind, and nuclear power are non-polluting or least polluting); (f) walking, cycling or using public transport (cause less carbon footprint) and (f) printing on both sides of paper (will save trees) etc.

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- Note:** The article is based on various sources and was compiled by Golam Kibria, Ph.D in March 2012 for <http://www.sydneybashi-bangla.com> (28) for community benefits. Views expressed in this article are those of the author and are not to be taken to be the views of any others including third parties. The information in this article may be assistance to you but the author donot guarantee that it is without flaw of any kind and therefore disclose any liability for any error, loss or other consequences which may arise from relying on any information in this article.

