

Feasibility of Imposing a Tax on the Emissions of Carbon Dioxide in the Philippines^{*}

I. INTRODUCTION

Global warming has become one of the most alarming problems of the world over the last decade. The earth's climate is changing into a disturbing state causing and resulting in the rise of the sea level, severe floods, increased ferocity and frequency of storms, scorching heat and severe drought throughout the globe. In fact, according to the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA), the year 2015 was the Earth's warmest since 1980.

The Philippines is tagged as one of the world's most vulnerable countries to climate change. Based on the 2016 Climate Change Vulnerability Index (CCVI)¹, released by risk analysis company Verisk Maplecroft, the Philippines ranked 13th most climate-vulnerable country, an improvement from the 2015 Index in which it was at 8th place. On the average, the country is hit by 20 typhoons or tropical storms each year.

According to the NASA, the main cause of the current global warming trend is human expansion of the "greenhouse effect"². Gases such as water vapor, carbon dioxide (CO₂), methane, nitrous oxide, chlorofluorocarbons (CFCs) respond physically or chemically to changes in temperature which greatly contribute to the greenhouse effect.³ Based on the global emission data from 2010 to 2014, CO₂ emissions contributed about 76% of the global greenhouse gas (GHG), followed by methane (16%), nitrous oxide (6%) and fluorinated gases (2%).⁴

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¹ The 2016 CCVI, released on November 13, 2015, evaluates the vulnerability of 186 countries to extreme climate-related events and changes in climate parameters over the next 30 years.

² The warming that result when the atmosphere traps heat radiating from Earth toward space.

³ National Aeronautics and Space Administration (NASA), "A blanket Around the Earth" (<http://climate.nasa.gov/causes/>), accessed date: January 2016.

⁴ United States Environmental Protection Agency (EPA), "Global Greenhouse Gas Emissions Data" (<http://www3.epa.gov/climatechange/ghgemissions/global.html>), accessed date: January 2016.

There is, therefore, an urgent need to control the levels of CO₂ to address the distressing effects of climate change not only to the environment but also to human health. This paper explores the possibility of imposing a carbon tax on selected priority sectors as a mechanism for reducing carbon emissions in the country. Moreover, the paper provides information on the tax practices in other countries to reduce carbon emission.

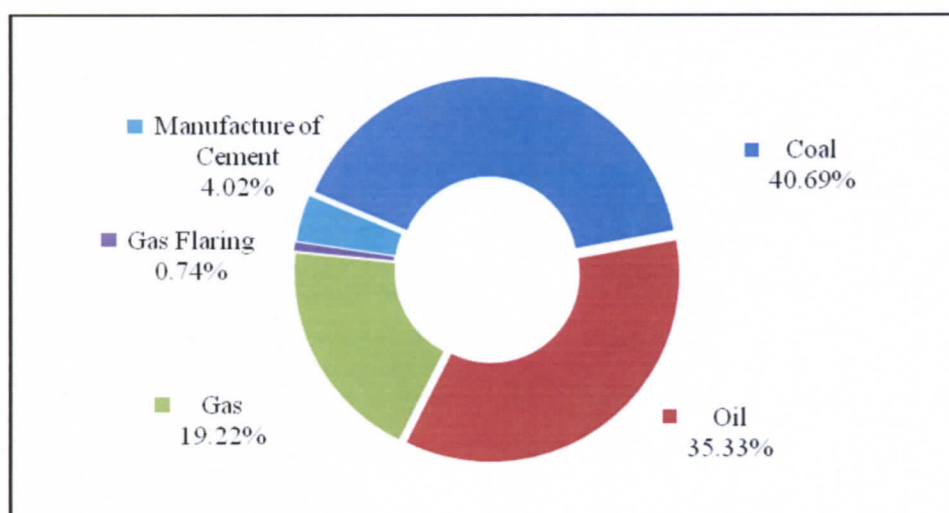
II. BACKGROUND INFORMATION

A. CO₂ Emissions

Carbon dioxide or CO₂ is naturally present in the atmosphere as part of earth's carbon cycle.⁵ However, human activities such as the combustion of fossil fuels for energy and transportation, among others, change the earth's natural carbon cycle. CO₂ is the primary GHG emitted through these human activities. In fact, according to the United States' Environmental Protection Agency (EPA), human activities release over 30 billion tonnes of CO₂ in the atmosphere every year.

Historical data show that from 22,149 million tonnes (Mt) in 1990, the world's territorial CO₂ emissions reached 34,173 Mt in 2014, a growth rate of 54% in 25 years or about 2% annually. The highest growth rates of 5.45% and 5.05% in the world's CO₂ emissions were recorded in 2003 and 2004, respectively. Out of the total CO₂ emissions, on the average, 41% came from coal emissions, 35% from oil, 19% from gas, 4% from production of cement and 1% from gas flaring.⁶ (Figure 1 and Table 1)

Figure 1. AVERAGE PERCENTAGE SHARE OF WORLD'S CO₂ EMISSIONS BY SOURCE: 1990-2014



⁵ Refers to the natural circulation of carbon among the atmosphere, oceans, soil, plants, and animals.

⁶ Global Carbon Atlas, <http://www.globalcarbonatlas.org/?q=en/emissions>, date accessed January 2016.

Table 1. WORLD's ANNUAL CO₂ EMISSIONS BY SOURCE: 1990-2014
(In Million Tonnes)

Year	Coal	Oil	Gas	Gas Flaring	Manufacture of Cement	Total	Growth Rate (%)
1990	8,852	8,672	3,922	163	539	22,149	-
1991	8,789	8,658	3,966	152	555	22,120	(0.13)
1992	8,581	8,570	4,012	148	586	21,896	(1.01)
1993	8,688	8,585	4,127	149	617	22,165	1.23
1994	8,803	8,596	4,171	152	659	22,380	0.97
1995	9,026	8,652	4,279	147	702	22,806	1.90
1996	9,261	8,906	4,461	151	723	23,501	3.05
1997	9,233	8,986	4,468	158	739	23,583	0.35
1998	8,876	9,034	4,526	141	736	23,312	(1.15)
1999	8,838	9,211	4,680	136	767	23,631	1.37
2000	9,165	9,392	4,793	178	797	24,326	2.94
2001	9,203	9,469	4,831	180	841	24,524	0.81
2002	9,396	9,455	5,013	190	895	24,948	1.73
2003	10,322	9,666	5,154	187	980	26,308	5.45
2004	11,058	9,986	5,324	213	1,057	27,638	5.06
2005	11,559	10,007	5,455	233	1,137	28,391	2.72
2006	12,192	10,072	5,610	240	1,258	29,372	3.46
2007	12,669	10,068	5,820	256	1,352	30,166	2.70
2008	12,899	10,032	5,967	260	1,377	30,534	1.22
2009	12,999	9,937	5,828	246	1,471	30,481	(0.17)
2010	13,608	10,150	6,279	253	1,593	31,883	4.60
2011	14,436	10,075	6,430	249	1,762	32,951	3.35
2012	14,579	10,174	6,564	250	1,851	33,418	1.42
2013	14,861	10,291	6,627	250	1,967	33,997	1.73
2014	14,978	10,310	6,613	250	2,021	34,173	0.52
Average	10,915	9,478	5,157	197	1,079	26,826	1.84
Share to Total (%)	40.69	35.33	19.22	0.74	4.02	100.00	-
Annual Ave. Growth Rate (%)	2.26	0.73	2.22	2.07	5.69	1.84	-

Notes: Coal: Carbon dioxide emissions from the oxidation of coal.

Oil: Carbon dioxide emissions from the oxidation of oil.

Gas: Carbon dioxide emissions from the oxidation of gas.

Gas flaring: Carbon dioxide emissions from the combustion of vented gas in the oil and gas industry converting methane into carbon dioxide.

Cement: Carbon dioxide emissions from chemical reactions in the manufacture of cement.

Figures may not add up to total due to rounding.

Source of basic data: Global Carbon Atlas (<http://www.globalcarbonatlas.org/?q=en/emissions>), date accessed January 2016.

The top CO₂ emitter in the world for the period under review was the United States of America (USA) with global share of 21% of the total CO₂ emissions in the world. Closely behind was China (19%) followed by the Russian Federation (6%) and India (5%). The top 10 country emitters shared 67% of the world's total CO₂ emissions. (Table 2)

**Table 2. TOP 10 COUNTRY EMITTERS OF CO₂ IN THE WORLD: 1990-2014
(In Million Tonnes)**

Country	Total CO ₂ Emissions	Share to Total (%)
Top 10	446,893	66.64
United States of America	140,199	20.90
China	130,384	19.44
Russian Federation	40,646	6.06
India	34,874	5.20
Japan	30,262	4.51
Germany	22,063	3.29
United Kingdom	13,425	2.00
Canada	13,099	1.95
South Korea	11,128	1.66
Italy	10,812	1.61
ASEAN	23,140	3.45
Others	200,623	29.91
Total	670,656	100.00

Notes: Figures may not add up to total due to rounding.

Source of basic data: Global Carbon Atlas

(<http://www.globalcarbonatlas.org/?q=en/emissions>), date accessed January 2016.

The ASEAN member-countries, on the other hand, emitted 3.45% of the total CO₂ emissions in the world from 1990 to 2014. On the average, CO₂ emissions of ASEAN countries grew by 6% annually since 1990. Of the total ASEAN CO₂ emissions, 37% came from Indonesia followed by Thailand (24%) and Malaysia (17%). The Philippines accounted for 8% during the same period and ranked 4th among ASEAN and 43rd globally. On the average, total CO₂ emissions of the country grew by 4% annually during the period. (Table 3)

Meanwhile, data from the Department of Energy (DOE) show that the country's CO₂ emissions recorded an annual average of 69 Mt from 2000-2014. Majority of the CO₂ emissions of the country came from the electricity generation sector (41%) followed by transportation (34%) and industry (15%) sectors. (Table 4)

**Table 3. TOTAL CO₂ EMISSIONS OF ASEAN MEMBER-COUNTRIES: 1990-2014
(In Million Tonnes)**

ASEAN	Total CO ₂ Emission	Share to Total (%)	Annual Ave. Growth Rate (%)	Ranking ^{1/}
Brunei Darussalam	164	0.71	4.18	8
Cambodia	62	0.27	13.72	9
Indonesia	8,483	36.66	6.70	1
Laos	22	0.10	8.75	10
Malaysia	3,842	16.60	6.81	3
Myanmar	222	0.96	4.67	7
Philippines	1,740	7.52	3.81	4
Singapore	987	4.27	0.44	6
Thailand	5,501	23.77	5.53	2
Vietnam	2,117	9.15	9.85	5
Total	23,140	100.00	5.77	-

Note: ^{1/} Rankings are from highest to lowest total CO₂ emissions among ASEAN.

Source of basic data: global Carbon Atlas (<http://www.globalcarbonatlas.org/?q=en/emissions>), date accessed January 2016

**Table 4. PHILIPPINES' ANNUAL CO₂ EMISSIONS BY SECTOR: 2000-2014
(In Million Tonnes)**

Year	Industry	Transportation	Energy Sector's Own Use	Other Sectors ^{1/}	Electricity Generation	Total
2000	8.99	23.57	2.19	7.08	21.44	63.26
2001	8.52	23.58	1.83	7.00	22.48	63.40
2002	7.96	24.41	1.79	7.17	21.45	62.78
2003	8.86	23.89	2.15	7.10	22.56	64.56
2004	8.88	24.7	1.71	6.66	23.95	65.91
2005	9.33	23.45	1.59	5.88	26.53	66.78
2006	9.51	22.06	1.15	5.53	23.12	61.38
2007	10.02	22.99	1.18	5.13	25.00	64.33
2008	11.71	21.13	0.98	5.28	27.76	66.89
2009	10.09	22.26	0.90	6.05	28.27	67.57
2010	11.68	22.96	1.02	5.92	31.28	72.85
2011	11.38	22.75	0.94	5.90	32.32	73.29
2012	10.54	23.68	1.04	5.80	34.58	75.64
2013	12.16	24.75	0.89	6.22	40.18	84.20
2014	12.67	25.69	1.05	7.04	43.07	89.53
Average	10.15	23.46	1.36	6.25	28.27	69.49
Share to Total (%)	14.61	33.76	1.96	8.99	40.68	100.00

Notes: ^{1/} - Other Sectors include CO₂ emission from Commercial, Residential and Agriculture sectors.

Figures may not add up to total due to rounding.

Source of basic data: Department of Energy (DOE).

In terms of CO₂ emissions by type of fuel, majority or 58% came from the use of oil, followed by coal (34%) and natural gas (8%). (Table 5)

Table 5. PHILIPPINES' ANNUAL CO₂ EMISSIONS BY TYPE OF FUEL: 2000-2014
(In Million Tonnes)

Year	Coal	Natural Gas	Oil	Total
2000	17.50	0.02	45.74	63.26
2001	17.11	0.27	46.02	63.40
2002	16.11	3.39	43.28	62.78
2003	16.30	5.17	43.09	64.56
2004	17.06	4.77	44.07	65.91
2005	20.25	6.32	40.21	66.78
2006	19.08	5.92	36.37	61.38
2007	20.33	7.10	36.90	64.33
2008	24.21	7.47	35.17	66.89
2009	23.07	7.53	36.98	67.57
2010	27.05	7.09	38.71	72.85
2011	29.75	7.65	35.88	73.29
2012	31.11	7.34	37.20	75.64
2013	38.59	6.76	38.85	84.20
2014	40.93	7.11	41.50	89.53
Average	23.90	5.59	40.00	69.49
Share to Total (%)	34.39	8.05	57.56	100.00

Notes: Figures may not add up to total due to rounding.

Source of basic data: Department of Energy (DOE).

B. Philippine Policies and Strategies on Climate Change

The Philippines has a long history of addressing environmental issues. Prior to the adaptation of the United Nations' Framework Convention on Climate Change (UNFCCC)⁷ in 1992 and the Kyoto Protocol⁸ in 1998, the Philippines has already

⁷ The UNFCCC is an international environmental treaty drafted on May 9, 1992, signed on June 4, 1992 and became effective on March 21, 1994 which aims to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The Philippines signed the UNFCCC on June 12, 1992 and ratified on August 2, 1994. In 2000, the Philippines submitted to the UNFCCC the accomplishments of the country which include the gains made in the fields of GHG abatement and inventory as well as significant achievements in strengthening institutions and processes in relation to mitigation, prevention and adaptation in the country.

⁸ The Kyoto Protocol aims to reduce the GHG emissions of 37 participating industrialized countries (Annex 1) by 5.2% based on 1990 levels of GHG emission starting 2008 to 2012. The Protocol provided three mechanisms: (1) Emission Trading; (2) Joint Implementation; and (3) Clean Development Mechanism (CDM). These mechanisms allow Annex 1 countries to meet their GHG emission limitation by purchasing exchanges, projects that reduce emissions in non-Annex 1 countries from Annex 1 countries, or from Annex 1 countries with excess allowances. The Philippines signed the Kyoto Protocol on April 15, 1998, and became the 117th State to ratify the Kyoto Convention on November 20, 2003. This signifies that the country is in consonance

started to address the impact of climate change. As early as 1987, the Department of Environmental and Natural Resources (DENR) initiated the formulation of the Philippine Strategy for Sustainable Development which aims to address the adverse effect of growth and development of pollution factories. In 1991, pursuant to Presidential Administrative Order No. 220, the Inter-Agency Committee on Climate Change (IACCC) was created to formulate policies and response strategies to climate change. The following year, the Philippine Council for Sustainable Development (PCSD) was also established to coordinate the formulation of the Philippine Agenda 21 (PA21)⁹. In 1996, pursuant to Memorandum Order No. 399, the PA21 was adopted and the PCSD was tasked to monitor and oversee its implementation.

From 1999 to 2008, several laws concerning climate change were passed.¹⁰ These include RA 8749 (Clean Air Act), RA 9003 (waste minimization and resource conservation), RA 9136 (promotion of the utilization of indigenous and new and renewable energy resources in power generation), RA 9275 (prevention, control and abatement of pollution of the country's water resources), RA 9367 (development and utilization of indigenous renewable and sustainable-sources clean energy sources as well as mitigation of toxic and GHG emissions), and RA 9513 (promotion of the development of renewable energy resources which include biomass, solar, wind, hydro, geothermal and ocean energy sources), among others.

Meanwhile, the urgent need to confront the issues of climate change and address its adverse effects led then President Gloria Arroyo to designate the DENR as the National Authority for Clean Development Mechanism (CDM) pursuant to Executive Order (EO) No. 320 in 2004 and likewise created the Presidential Task Force on Climate Change pursuant to AO 171 in 2007.

Another significant move of the government to address climate change was the enactment of RA 9729, otherwise known as the "Climate Change Act of 2009". Under the law, the Climate Change Commission was created to ensure the mainstreaming of climate change into government policies, plans and programs. Moreover, the Commission is the lead policymaking body charged with coordinating, monitoring and evaluating programs and action plans of the government relating to climate change in the country.

The National Framework Strategy on Climate Change (NFSCC) and the National Climate Change Action Plan (NCCAP) were signed on April 28, 2010. The NFSCC serves as the basis for a national program on climate change and establishes an agenda upon which the Philippines pursues a dynamic process of determining actions through the NCCAP process. Moreover, the NCCAP was developed to provide the details of the proposed strategies under the NFSCC. The NCCAP guides local

with the rest of the 192 States (as of December 2012) in gearing towards the mitigation of the effects of climate change and the strategic adaptation to the conditions.

⁹ The Philippine Agenda 21 is the nation's blueprint for sustainable development.

¹⁰ Refer to Annex A for the summary of Philippine policies and strategies on climate change from 1987 to present.

government units (LGUs) in the preparation of their respective Local Climate Change Action Plans (LCCAP). On November 22, 2011, the National NCCAP covering 18 years (2011-2028) was approved by the Climate Change Commission by virtue of Resolution No. 2. The NCCAP identified seven strategic priorities that include water sufficiency, environmental and ecological stability, climate-friendly industries and services, and sustainable energy.

In 2014, the Philippine Greenhouse Gas Inventory Management and Reporting System was established pursuant to EO 174 signed on November 2014 to enable the country to move to a transition towards a climate-resilient pathway for sustainable development.

The latest action of the government to address the impact of climate change was the enactment of RA 10771 or the “Philippine Green Jobs Act of 2016” which encourages and provides incentives to industries that produce goods and render services that benefit the environment, conserve natural resources and ensure the sustainable development of the country and its transition into a green economy.

III. THE CARBON PRICING

Reducing GHG emission, specifically CO₂, can be done through market-based approaches that put price on carbon discharges. The imposition of a tax on CO₂ emissions can reduce the use of environmentally harmful substances and the amount of waste generated. The said approach can help correct the market failure that exists in fossil fuel prices which exclude environmental and social costs in the market prices thereof.

It is worthy to mention that fuel taxes and the removal of fossil fuel subsidies and incentives, among others, can be considered as indirect ways of pricing carbon. At present, manufactured oils and other fuels in the country are subject to the excise tax ranging from PhP0.00 to PhP4.35 per liter and to 12% value-added tax (VAT).

Meanwhile, it can be noted that the refining, storage, marketing and distribution of petroleum products are among the preferred activities under the 2014-2016 Investment Priorities Plan (IPP) as implemented by the Board of Investments (BOI) and are entitled to income tax holiday (five years); additional deduction for labor expenses; minimum tax and duty of 3% and VAT on imported capital equipment; tax credit on domestic capital equipment; unrestricted use of consigned equipment; exemption from the real property tax on production equipment or machineries; exemption from taxes and duties on imported spare parts; and other applicable incentives under Article 39 of EO 226¹¹.

The country likewise grants tax incentives to cleaner energy sources to promote the use of environment-friendly energy sources. The exploration and development of renewable energy (RE) resources such as, but not limited to, biomass, solar, wind, hydro, geothermal and ocean energy sources, including hybrid systems are entitled to fiscal incentives such as

¹¹ Otherwise known as the “Omnibus Investment Code” of 1987, approved July 17, 1987.

income tax holiday (ITH) for seven years; ten-year duty-free importation of RE machinery, equipment and materials; 1.5% special realty tax rates on equipment and machinery; three-year net operating loss carry-over; a 10% corporate income tax after the ITH; accelerated depreciation allowance; zero percent value-added tax rate; cash incentive of renewable energy developers for missionary electrification; tax exemption of carbon credits; and tax credit on domestic capital equipment and services under RA 9513¹² as implemented by the BOI.

Meanwhile, there are two main types of carbon pricing: (1) emission trading system (ETS) and (2) carbon tax. The ETS, otherwise known as the cap-and-trade system, caps the total level of GHG emission and allows industries with low emission to sell their extra allowances to larger emitters. By creating supply and demand for emission allowances, an ETS establishes a market price for GHG emission. The cap helps ensure that the required emission reduction will take place to keep the emitters (in aggregate) within their pre-allocated carbon budget.¹³ It is worthy to note that in 2013, Senate Bill (SB) No. 517¹⁴ proposed a cap on GHG emission in the country. The objective of the bill is to pave the way to a cleaner environment by limiting the release of GHG by the industrial and commercial sectors in the country. However, the said bill is still pending in Congress.

On the other hand, the carbon tax is a market-based policy instrument that can be used to achieve cost-effective reduction in emission. The tax directly sets a price on carbon by defining a tax rate on the carbon content of fossil fuels.¹⁵ The economic rationale for creating a price on CO₂ emission is to correct the underlying market failure in burning fossil fuels and other activities that emit CO₂ and to encourage the development of new technologies that reduce pollution.

IV. SELECTED COUNTRIES WITH CARBON TAX

The carbon tax is not a new measure as it is already being implemented in some countries, especially those in the European Union as early as 1990s. The coverage, tax bases and rates are summarized in Annex B.

a. Finland

Finland was the first country to impose a carbon tax in 1990. It was originally based on carbon content but subsequently changed to a combination of carbon/energy

¹² Entitled "An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes", Approved December 16, 2008.

¹³ World Bank.

¹⁴ Entitled "An Act to Promote a Low Carbon Economy, Establishing for this Purpose the Emission Cap-and-Trade System in the Industry Sector to Reduce Greenhouse Gas Emissions and Creating the Climate Reinvestment Fund", sponsored by Senator Loren Legarda.

¹⁵ World Bank.

tax and initially covered only heat and electricity production but was later expanded to cover transportation and heating fuels. The CO₂ tax is imposed on liquid fuels (e.g., motor gasoline, bioethanol, biogasoline, diesel, light and heavy fuel oil, kerosene, aviation gasoline, etc), coal, coal bricks, solid fuels produced from coal, and natural gas.¹⁶

b. Norway

Norway imposed a CO₂ tax in 1991. As of 2015, the CO₂ tax is imposed on petroleum, mineral oil, gasoline, natural gas and liquefied petroleum gas (LPG).¹⁷

c. Sweden

Sweden imposed a CO₂ tax in 1991. The CO₂ tax is imposed on petrol, gasoline, aviation gasoline, fuel oil, diesel oil, kerosene, natural gas and coal/coke.¹⁸

d. Denmark

In 1992, Denmark joined the bandwagon and imposed a carbon tax on the use of gas and diesel, fuel oil, petroleum coal, LPG, natural gas, petroleum coke, biogas, lubricating oil, brown coal and lignite, petrol and hard coal.¹⁹

e. Costa Rica

Costa Rica introduced the carbon tax in 1997 on hydrocarbon fossil fuels.²⁰

f. British Columbia, Canada

British Columbia imposed a carbon tax in 2008 on the purchase or use of fuels such as gasoline, diesel, light and heavy fuel oil, aviation fuel, jet fuel, propane and

¹⁶ Excise Taxation Customer Bulletin 21 Energy Taxation May 2015 (http://www.tulli.fi/en/finnish_customs/publications/excise_tax/excise_taxation/021.pdf).

¹⁷ Ministry of Finance, Norway (<https://www.regjeringen.no/no/tema/okonomi-og-budsjett/skatter-og-avgifter/Avgiftssatser-2015/id2005679/>).

¹⁸ Swedish Tax Agency, "Tax Rates on Fuels and Electricity 2016" (<https://www.skatteverket.se/foretagorganisationer/skatter/punktskatter/energiskatter/skattesatser.4.77dbcb041438070e0395e96.html>).

¹⁹ Act to amend the Waste and Raw Materials Tax Act, the Act on carbon dioxide tax on certain energy products, the law concerning tax on electricity, VAT Act and various other laws (<https://www.retsinformation.dk/Forms/R0710.aspx?id=152727&exp=1>).

²⁰ <http://www.c2es.org/publications/options-considerations-federal-carbon-tax>

natural gas within the province. The carbon tax is a separate tax on fuel in addition to the motor fuel tax.²¹

g. Switzerland

Switzerland introduced a CO₂ levy in 2008 on all fossil thermal fuels (e.g., heating oil, natural gas). The CO₂ levy is indicated on invoices for purchases of thermal fuels. It can be noted that the carbon tax rate depends on the emission targets of the country. If the emissions fall below the interim target, the previous year's carbon tax rate is unchanged. However, reaching the emission target triggers an increase in the carbon tax. The latest increase in Switzerland's carbon tax rate occurred this year as the emissions from thermal fuels in 2014 exceeded the required 78% of the 1990 base year.²²

h. Ireland

Ireland introduced the carbon tax in 2009 and is updated on a yearly basis. The said tax applies to the emissions of light oil, heavy oil, LPG, substitute fuels and natural gas in addition to excise duty. Moreover, the carbon tax is also imposed on solid fuel such as milled peat, peat briquettes, other peat and coal.²³

i. Iceland

Iceland introduced the carbon tax in 2010 on all importers of fossil fuels such as gas and diesel oils, petrol, aircraft and jet fuels and fuel oils regardless of whether it is for retail or personal use.²⁴

j. Japan

Japan enforced the carbon tax in 2012 on fossil fuels such as oil, natural gas and coal, depending on the CO₂ emissions in addition to its existing petroleum and coal tax. The tax rate corresponding to the amount of CO₂ emission for all fossil fuels is set at a fixed rate per tonne of CO₂. The CO₂ emission tax rates per tonne of CO₂ emissions is inclusive of the petroleum and coal tax. The said tax increased gradually over the past three and a half years.²⁵

²¹ British Columbia, Ministry of Finance, "Tax Bulletin: Tax Rates on Fuels" July 2015 (http://www.sbr.gov.bc.ca/documents_library/bulletins/mft-ct_005.pdf).

²² <http://www.bafu.admin.ch/klima/13877/14510/14748/index.html?lang=en>

²³ Irish Tax and Customs (<http://www.revenue.ie/en/tax/excise/duties/excise-duty-rates.html>).

²⁴ PWC, Taxes in Iceland 2014 (https://www.pwc.is/is/assets/document/pwc_tax_brochure2014.pdf).

²⁵ Ministry of Environment Japan, "Details on Carbon Tax (Tax for Climate Change Mitigation)" (https://www.env.go.jp/en/policy/tax/env-tax/20121001a_dct.pdf).

k. Mexico

Mexico implemented the carbon tax based on the CO₂ emissions of fossil fuels in 2014. The carbon tax is imposed on every liter of propane, butane, gas (regular or premium), jet fuel, turbosine and other kerosene, diesel, fuel oil, oil coke and mineral carbon. Meanwhile, it is worthy to note that the use of natural gas in Mexico is exempt from the carbon tax.²⁶

l. United Kingdom (UK)

The UK first introduced the carbon tax or the climate change levy in 2014 on generators of fossil-fuel based electricity, including combined heat and power operators and auto generators; those supplying such generators and electricity utilities. The carbon tax is imposed on natural gas, LPG, coal and other taxable solid fossil fuels, gas oil, rebated bioblend, kerosene, fuel oil, other heavy oil and rebated light oil.²⁷

m. France

France adopted in 2014 a carbon tax based on the CO₂ content of different energy products at a fixed rate and gradually increases within three years. The carbon tax is imposed on the use of natural gas, heavy fuel and carbon.²⁸

n. Chile

Chile approved a legislation on the imposition of a carbon tax in 2014 to be implemented in 2017. The carbon tax is applicable to CO₂ emissions from fixed sources made up of boilers and turbines with a thermal power greater or equal to 50 megawatt thermal capacity.²⁹

²⁶ Secretariat of Environment and Natural Resources, "Carbon Tax in Mexico" (<https://www.thepmr.org/system/files/documents/Carbon%20Tax%20in%20Mexico.pdf>).

²⁷ HM Revenue and Customs, "Carbon Price Floor: Reform And Other Technical Amendments" (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/293849/TIIN_6002_7047_carbon_price_floor_and_other_technical_amendments.pdf).

²⁸ Ministry of Ecology, Sustainable Development and Energy, "Energy Efficiency Action Plan for France – 2014" (http://ec.europa.eu/energy/sites/ener/files/documents/2014_neeap_en_france.pdf).

²⁹ Norton Rose Fulbright, "Legal Update: Chilean Congress Approves Legislation to Introduce Carbon Tax and Green Taxes" (<http://www.nortonrosefulbright.com/files/chilean-congress-approves-legislation-to-introduce-carbon-tax-and-green-taxes-pdf-41kb-122154.pdf>).

o. South Africa

Similar to Chile, South Africa is set to impose a carbon tax in 2017. Entities that will be subject to carbon tax include fossil fuel combustion emissions, industrial processes and product use emissions and fugitive emissions from coal mining.³⁰

V. THE PROPOSED CARBON TAX ON CO₂ EMISSIONS

To address the growing concerns on the rapid accumulation of GHG, particularly CO₂ in the country, it is imperative to design an ideal carbon tax. The proposed tax should be effective, efficient and easy to administer, among others. To consider the effectiveness of the proposed carbon tax, the tax should have positive behavioral effects that shall foster change in attitude and awareness of the polluters. Likewise, the proposed tax should be an instrument of innovation in pollution technology.

A. Proposed Sector to be Covered by the Carbon Tax

Based on the Philippine Energy Plan 2012-2030, CO₂ emissions in the country is estimated to reach 122 Mt annually from 2015-2030. Majority of the estimated CO₂ emissions would come from electricity generation (53%) followed by transportation (23%), industry (17%), residential (3%) and commercial (3%). By type of fuel, the bulk or 57% of CO₂ emissions is estimated to come from the use of coal, 33% from oil and 10% from natural gas. (Tables 6 and 7) Thus, it is necessary to abate now the use of coal especially since CO₂ emissions therefrom is expected to rise by 169% from 39 Mt in 2015 to 106 Mt in 2030.

Table 6. PHILIPPINES' CO₂ EMISSIONS OUTLOOK BY SECTOR: 2015-2030
(In Million Tonnes)

Year	Industry	Transportation	Commercial	Residential	Agriculture	Electricity Generation	Total	Growth Rate (%)
2015	11.96	23.92	3.08	2.83	0.47	40.30	82.56	-
2016	12.74	24.28	3.18	2.95	0.46	43.51	87.12	5.52
2017	14.40	24.98	3.29	3.08	0.45	46.39	92.58	6.27
2018	15.46	25.82	3.40	3.21	0.44	49.50	97.84	5.68
2019	16.59	26.70	3.52	3.34	0.43	51.88	102.48	4.74
2020	17.54	26.35	3.51	3.47	0.41	55.00	106.30	3.73
2021	18.55	27.14	3.62	3.60	0.40	58.69	112.00	5.36
2022	19.63	27.92	3.73	3.73	0.40	62.48	117.89	5.26
2023	20.78	28.72	3.85	3.86	0.39	64.98	122.58	3.98
2024	22.17	29.52	3.97	4.00	0.39	68.99	129.02	5.25
2025	23.27	28.72	3.77	4.13	0.34	72.92	133.16	3.21
2026	24.68	29.51	3.89	4.26	0.34	77.54	140.21	5.29
2027	26.18	30.30	4.01	4.38	0.34	80.76	145.97	4.11
2028	27.80	31.11	4.13	4.51	0.34	85.25	153.13	4.91

³⁰ Deloitte, "Draft Carbon Tax Bill released South Africa moves to reduce greenhouse gas emissions" (<http://www2.deloitte.com/za/en/footerlinks/pressreleasespage/carbon-tax-bill.html>).

Year	Industry	Transportation	Commercial	Residential	Agriculture	Electricity Generation	Total	Growth Rate (%)
2029	29.53	31.89	4.25	4.63	0.33	89.92	160.56	4.85
2030	31.39	32.67	4.38	4.75	0.33	94.67	168.19	4.75
Average	20.79	28.10	3.72	3.80	0.39	65.17	121.97	4.86
Share to Total (%)	17.05	23.04	3.05	3.11	0.32	53.43	100.00	-

Note: Figures may not add up to total due to rounding.

Source of basic data: Philippine Energy Plan (PEP) 2012-2030, Department of Energy (DOE).

**Table 7. PHILIPPINES' CO₂ EMISSIONS OUTLOOK BY TYPE OF FUEL: 2015-2030
(In Million Tonnes)**

Year	Natural Gas	Oil	Coal	Total	Growth Rate (%)
2015	7.84	35.33	39.39	82.56	-
2016	8.51	35.39	43.23	87.12	5.52
2017	9.50	36.25	46.83	92.58	6.27
2018	9.74	37.40	50.70	97.84	5.68
2019	10.26	38.61	53.61	102.48	4.74
2020	10.36	38.33	57.60	106.30	3.73
2021	10.50	39.35	62.16	112.00	5.36
2022	10.68	40.38	66.83	117.89	5.26
2023	11.42	41.49	69.66	122.58	3.98
2024	11.74	42.54	74.75	129.02	5.25
2025	12.39	41.34	79.43	133.16	3.21
2026	12.71	42.27	85.23	140.21	5.29
2027	14.06	43.22	88.70	145.97	4.11
2028	14.83	44.12	94.18	153.13	4.91
2029	15.56	45.09	99.90	160.56	4.85
2030	16.39	45.93	105.88	168.19	4.75
Average	11.66	40.44	69.88	121.97	4.86
Share to Total (%)	9.56	33.15	57.29	100.00	-

Note: Figures may not add up to total due to rounding.

Source of basic data: Philippine Energy Plan (PEP) 2012-2030, Department of Energy (DOE).

B. CO₂ Tax Rate

Economic theory suggests that a carbon tax should be set equal to the social cost of carbon, which is the present value of estimated environmental damages over time caused by an additional tonne of CO₂ emitted today.³¹ Moreover, the level of the

³¹ Center for Climate and Energy Solutions, "Options and Considerations for a Federal Carbon Tax", February 2013 (<http://www.c2es.org/publications/options-considerations-federal-carbon-tax>).

carbon tax should be in direct relation to the CO₂ emission. Thus, the tax is calculated by measuring the carbon content of different fossil fuels. Also, experts in carbon tax are in agreement that imposing higher tax rates would lead consumers to change behavior, while lower rates may not do much to change behavior but can provide funds for carbon mitigation programs. The carbon tax formula will be:

$$\text{Carbon Tax} = \text{CO}_2 \text{ emission} \times \text{Tax Rate}$$

Although the carbon tax should be set equal to the social cost of carbon, it can be noted that social cost is not always obvious and not easily accounted. Meanwhile, a study in 2007³² projected that a PhP100.00 carbon tax for every tonne of carbon emission would result in a 1% reduction in carbon emission in the country. The demand for carbon intensive energy inputs, such as coal and oil, would likewise decrease but the reduction in coal demand would be higher because it is more carbon-intensive than oil. Likewise, the demand for electricity would fall as it uses coal and oil intensively. On the other hand, the demand for less carbon-intensive energy (e.g. natural gas and carbon-free energy such as hydro-power and geothermal power) would increase as the electricity sector, to some extent, substitutes carbon-intensive energy with less carbon-intensive sources and carbon-free energy inputs.³³

C. Estimated Revenue from the Proposed Carbon Tax

For purposes of estimating revenue from the proposed carbon tax, the rates of say PhP100.00 to PhP1,000.00 per tonne of CO₂ is suggested to be at par with countries already implementing a carbon tax. Later, if the proposed carbon tax pushes through, it may be set at progressive rates to reflect the ability to pay of taxpayers. Based on the country's CO₂ emissions outlook from 2015-2030, the government may generate estimated revenue amounting to an annual average of PhP12.20 billion to PhP121.97 billion, covering the same period. Of the amount, PhP6.52 billion to PhP65.17 billion may be generated from the electricity generation sector, PhP2.81 billion to PhP28.10 billion from the transportation sector, PhP2.08 billion to PhP20.79 billion from the industry sector and a total of PhP0.79 billion to PhP7.91 billion from the commercial, residential and agriculture sectors. (Table 8) Meanwhile, by type of fuel, PhP6.99 billion to PhP69.88 billion may be generated from the use of coal, PhP4.04 billion to PhP40.44 billion from oil and PhP1.17 billion to PhP11.16 billion from natural gas. (Table 9)

³² Corong, Erwin L., "Tariff Reductions, Carbon Emissions, and Poverty: An Economy-Wide Assessment of the Philippines" February 2007.

³³ Ibid.

**Table 8. ESTIMATED REVENUE FROM CO₂ EMISSIONS BY SECTOR: 2015-2030
(In Billion Php)**

Year	Industry	Transportation	Commercial	Residential	Agriculture	Electricity Generation	Total
<i>PhP100.00 per tonne of CO₂</i>							
2015	1.20	2.39	0.31	0.28	0.05	4.03	8.26
2016	1.27	2.43	0.32	0.30	0.05	4.35	8.71
2017	1.44	2.50	0.33	0.31	0.05	4.64	9.26
2018	1.55	2.58	0.34	0.32	0.04	4.95	9.78
2019	1.66	2.67	0.35	0.33	0.04	5.19	10.25
2020	1.75	2.64	0.35	0.35	0.04	5.50	10.63
2021	1.86	2.71	0.36	0.36	0.04	5.87	11.20
2022	1.96	2.79	0.37	0.37	0.04	6.25	11.79
2023	2.08	2.87	0.39	0.39	0.04	6.50	12.26
2024	2.22	2.95	0.40	0.40	0.04	6.90	12.90
2025	2.33	2.87	0.38	0.41	0.03	7.29	13.32
2026	2.47	2.95	0.39	0.43	0.03	7.75	14.02
2027	2.62	3.03	0.40	0.44	0.03	8.08	14.60
2028	2.78	3.11	0.41	0.45	0.03	8.53	15.31
2029	2.95	3.19	0.43	0.46	0.03	8.99	16.06
2030	3.14	3.27	0.44	0.48	0.03	9.47	16.82
Average	2.08	2.81	0.37	0.38	0.04	6.52	12.20
Share to Total (%)	17.05	23.04	3.05	3.11	0.32	53.43	100.00
<i>PhP1,000.00 per tonne of CO₂</i>							
2015	11.96	23.92	3.08	2.83	0.47	40.30	82.56
2016	12.74	24.28	3.18	2.95	0.46	43.51	87.12
2017	14.40	24.98	3.29	3.08	0.45	46.39	92.58
2018	15.46	25.82	3.40	3.21	0.44	49.50	97.84
2019	16.59	26.70	3.52	3.34	0.43	51.88	102.48
2020	17.54	26.35	3.51	3.47	0.41	55.00	106.30
2021	18.55	27.14	3.62	3.60	0.40	58.69	112.00
2022	19.63	27.92	3.73	3.73	0.40	62.48	117.89
2023	20.78	28.72	3.85	3.86	0.39	64.98	122.58
2024	22.17	29.52	3.97	4.00	0.39	68.99	129.02
2025	23.27	28.72	3.77	4.13	0.34	72.92	133.16
2026	24.68	29.51	3.89	4.26	0.34	77.54	140.21
2027	26.18	30.30	4.01	4.38	0.34	80.76	145.97
2028	27.80	31.11	4.13	4.51	0.34	85.25	153.13
2029	29.53	31.89	4.25	4.63	0.33	89.92	160.56
2030	31.39	32.67	4.38	4.75	0.33	94.67	168.19
Average	20.79	28.10	3.72	3.80	0.39	65.17	121.97
Share to Total (%)	17.05	23.04	3.05	3.11	0.32	53.43	100.00

Note: To arrive at the estimated revenue, the estimated CO₂ emissions of sector were multiplied by the proposed carbon tax rate of PhP100.00 and PhP1,000.00.

**Table 9. ESTIMATED REVENUE FROM CO₂ EMISSIONS BY TYPE OF FUEL:
2015-2030
(In Billion PhP)**

Year	Proposed Rates							
	PhP100.00 per tonne of CO ₂				PhP1,000.00 per tonne of CO ₂			
	Natural Gas	Oil	Coal	Total	Natural Gas	Oil	Coal	Total
2015	0.78	3.53	3.94	8.26	7.84	35.33	39.39	82.56
2016	0.85	3.54	4.32	8.71	8.51	35.39	43.23	87.12
2017	0.95	3.63	4.68	9.26	9.50	36.25	46.83	92.58
2018	0.97	3.74	5.07	9.78	9.74	37.40	50.70	97.84
2019	1.03	3.86	5.36	10.25	10.26	38.61	53.61	102.48
2020	1.04	3.83	5.76	10.63	10.36	38.33	57.60	106.30
2021	1.05	3.94	6.22	11.20	10.50	39.35	62.16	112.00
2022	1.07	4.04	6.68	11.79	10.68	40.38	66.83	117.89
2023	1.14	4.15	6.97	12.26	11.42	41.49	69.66	122.58
2024	1.17	4.25	7.48	12.90	11.74	42.54	74.75	129.02
2025	1.24	4.13	7.94	13.32	12.39	41.34	79.43	133.16
2026	1.27	4.23	8.52	14.02	12.71	42.27	85.23	140.21
2027	1.41	4.32	8.87	14.60	14.06	43.22	88.70	145.97
2028	1.48	4.41	9.42	15.31	14.83	44.12	94.18	153.13
2029	1.56	4.51	9.99	16.06	15.56	45.09	99.90	160.56
2030	1.64	4.59	10.59	16.82	16.39	45.93	105.88	168.19
Average	1.17	4.04	6.99	12.20	11.66	40.44	69.88	121.97
Share to Total (%)	9.56	33.15	57.29	100.00	9.56	33.15	57.29	100.00

Note: To arrive at the estimated revenue, the estimated CO₂ emissions of the type of fuel were multiplied by the proposed carbon tax rate of PhP100.00 and PhP1,000.00.

D. Monitoring and Collection

The carbon tax can be levied at any point in the energy supply chain. However, for administrative simplicity, it may be levied at a point where there are relatively few entities subject to tax. Most proposals suggest the tax may be better applied to upstream suppliers (firms engaged in exploration and production) of coal than to “midstream” (electric utilities). For firms, their ultimate burden will depend on their ability to pass through abatement and tax costs to their customers and on the ensuing reductions in demand they experience in response to higher product prices.³⁴

E. Proceeds of the Tax

The revenue that could be generated from imposing the carbon tax could be used to finance environment-related programs and projects of the DENR. The fund may also be used to improve and upgrade the facilities of DENR, particularly, those that are used in monitoring air quality of the country.

³⁴ Center for Climate and Energy Solutions (C2ES), “Options and Considerations for a Federal Carbon Tax”, February 28, 2013.

VI. CONCLUSION

The disturbing state of the environment brought about by continued emissions of GHG, particularly CO₂, has long been an alarming global issue. Although climate change is irreversible, it is however, not unstoppable. Similar to other countries, the imposition of the carbon tax will combat the inefficient use of energy. Imposing it on sectors that emit CO₂ would help minimize GHG emissions. At the same time, the estimated revenue from the proposed carbon tax could be used to finance environment-related programs and projects of the government.



Annex A

SUMMARY OF PHILIPPINE POLICIES AND STRATEGIES ON CLIMATE CHANGE

Year of Implementation	Law / Issuance / Date Approved	Strategy/Activity
1987	Cabinet Resolution No. 37 (November 29, 1989)	Formulation of the Philippine Strategy for Sustainable Development (PSSD).
1991	Presidential Administrative Order No. 220 (May 8, 1991)	Creation of the Inter-Agency Committee on Climate Change (IACCC)
1992	Executive Order No. 15 (September 1, 1992)	Creation of the Philippine Council for Sustainable Development (PCSD)
1996	Memorandum Order No. 399 s. of 1996 (September 26, 1996)	Adoption and Operationalization of the Philippine Agenda 21
1999	Republic Act No. 8749 (October 23, 1999)	Enactment of the Clean Air Act of 1999
2000	Republic Act No. 9003 (January 26, 2001)	Enactment of the Ecological Solid Waste Management Act of 2000
2001	Republic Act No. 9136 (June 8, 2001)	Enactment of the Electric Power Industry Reform Act of 2001
2004	Republic Act No. 9275 (March 22, 2004)	Enactment of the Philippine Clean Water Act of 2004
2007	Republic Act No. 9367 (January 12, 2007)	Enactment of the Biofuels Act of 2006
	Presidential Administrative Order No. 171 (February 20, 2007)	Creation of the Presidential Task Force on Climate Change
2008	Republic Act No. 9513 (December 16, 2008)	Enactment of the Renewable Energy Act of 2008
2009	Republic Act No. 9729 (October 23, 2009)	Enactment of the Climate Change Act of 2009
2011	Resolution No. 2 of the Climate Change Commission (November 22, 2011)	Signed the National Climate Change Action Plan (NCCAP)
2014	Executive Order No. 174 (November 24, 2014)	Establishment of the Philippine Greenhouse Gas Inventory Management and Reporting System
2016	Republic Act No. 10771 (April 29, 2016)	Enactment of the Philippine Green Jobs Act of 2016

Annex B

SELECTED COUNTRIES WITH CARBON TAX

Country	Year Implemented	Coverage	CO ₂ Tax Base	CO ₂ Tax Rate	In PhP Equivalent
Finland	1990	Liquid Fuels			
		Bioethanol T	Per liter	€0.00	PhP0.00
		Biogasoline T	Per liter	€0.00	PhP0.00
		Biodiesel oil T	Per liter	€0.00	PhP0.00
		Biodiesel oil P T	Per liter	€0.00	PhP0.00
		Biofuel T	Per liter	€0.00	PhP0.00
		Methanol T	Per liter	€0.00	PhP0.00
		Ethanol-diesel T	Per liter	€1.07	PhP 56.14
		Methanol R	Per liter	€4.06	PhP213.03
		Bioethanol R	Per liter	€5.33	PhP279.67
		Biofuel oil R	Per liter	€5.87	PhP308.00
		Ethanol-diesel R	Per liter	€5.99	PhP314.30
		Biogasoline R	Per liter	€8.13	PhP426.58
		Methanol	Per liter	€8.13	PhP426.58
		Biodiesel oil R	Per liter	€8.53	PhP447.57
		Ethyl tertiary butyl ether (ETBE) T	Per liter	€8.64	PhP453.34
		Biodiesel P R	Per liter	€8.79	PhP461.21
		Methyl tert-butyl ether (MTBE) T	Per liter	€10.3	PhP540.44
		TAAE T	Per liter	€10.46	PhP548.84
		Bioethanol	Per liter	€10.67	PhP559.85
		Ethanol-diesel	Per liter	€10.90	PhP571.92
		ETBE R	Per liter	€11.18	PhP586.61
		Tert-amyl methyl ether (TAME) T	Per liter	€11.66	PhP611.80
		Light fuel oil,	Per liter	€11.74	PhP616.00
		Light fuel oil sulphur-free	Per liter	€11.74	PhP616.00
		Biofuel oil	Per liter	€11.74	PhP616.00
		MTBE R	Per liter	€11.75	PhP616.52
		TAAE R	Per liter	€12.59	PhP660.60
		TAME R	Per liter	€12.94	PhP678.96
		MTBE	Per liter	€13.21	PhP693.13
		ETBE	Per liter	€13.72	PhP719.89
		TAME	Per liter	€14.22	PhP746.12
		Heavy Fuel Oil	Per liter	€14.25	PhP747.70
		TAAE	Per liter	€14.73	PhP772.88
		Aviation gasoline	Per liter	€16.10	PhP844.77
		Motor gasoline	Per liter	€16.25	PhP852.64
		Small engine gasoline	Per liter	€16.25	PhP852.64
		Biogasoline	Per liter	€16.25	PhP852.64
		Biodiesel oil	Per liter	€17.06	PhP895.14
		Biodiesel oil P	Per liter	€17.58	PhP922.42
		Diesel oil para	Per liter	€17.58	PhP922.42
		Kerosene-type jet fuel	Per liter	€17.99	PhP943.94

Country	Year Implemented	Coverage	CO ₂ Tax Base	CO ₂ Tax Rate	In PhP Equivalent
		Diesel	Per liter	€18.61	PhP976.47
		Electricity and Certain Fuels			
		Natural gas	Per megawatt (MWh)	€8.71	PhP457.01
		Coal, coal bricks, solid fuels produced from coal	Per tonne	€106.14	PhP5,569.17
Norway	1991	Reduced rate for natural gas	Per standard cubic meter (sm ³)	NOK0.05	PhP0.28
		Mineral oil for fishing and hunting in the waters	Per liter	NOK0.27	PhP1.51
		Mineral oil to wood processing, herring meal and fishmeal industry	Per liter	NOK0.31	PhP1.74
		Natural Gas	Per sm ³	NOK0.67	PhP3.76
		Mineral overall rate	Per liter	NOK0.90	PhP5.05
		Gasoline	Per liter	NOK0.95	PhP5.33
		Petroleum Activities	Per liter or sm ³	NOK1.00	PhP5.61
		LPG	Per kilogram (kg)	NOK1.01	PhP5.67
		Mineral oil for domestic quota subject of aviation	Per liter	NOK1.05	PhP5.89
		Mineral oil for domestic aviation	Per liter	NOK1.05	PhP5.89
Sweden	1991	Petrol, other gasoline than petrol, aviation gasoline	Per liter	SEK2.59	PhP14.50
		Natural gas	Per cubic meter (m ³)	SEK2,399.00	PhP13,434.40
		Coal, coke	Per 1,000 kg	SEK2,788.00	PhP15,612.80
		Fuel oil, diesel oil, kerosene	Per m ³	SEK3,204.00	PhP17,942.40
		LPG	Per 1,000 kg	SEK3,370.00	PhP18,872.00
Denmark	1992	Biogas used as engine fuel in stationary piston engine plant with a rate thermal input exceeding 1,000kW	Gigajoules (GJ)	DKK1.10	PhP7.76
		Natural gas and town gas used or intended for use as fuel in stationary piston engine systems	Per normal metered cube (Nm ³)	DKK6.50	PhP45.83
		Petroleum coke	GJ	DKK15.40	PhP108.57
		Coal, coke, furnace coke and coke breeze	GJ	DKK15.90	PhP112.10
		Brown coal briquettes and lignite	GJ	DKK15.90	PhP112.10
		Autogas (LPG)	Per liter	DKK27.00	PhP190.35
		Natural gas and town gas	Per Nm ³	DKK37.70	PhP265.79
		Petrol by 4.8% biofuels	Per liter	DKK38.10	PhP268.61

Country	Year Implemented	Coverage	CO ₂ Tax Base	CO ₂ Tax Rate	In PhP Equivalent
		Petrol	Per liter	DKK40.00	PhP282.00
		Gas and diesel by 6.8% biofuels	Per liter	DKK41.30	PhP291.17
		Gas and diesel	Per liter	DKK44.30	PhP312.32
		Petroleum	Per liter	DKK44.30	PhP312.32
		Lubricating oil and the like	Per liter	DKK44.30	PhP312.32
		Fuel Tar	Per kg	DKK47.60	PhP335.58
		Gas (other than LPG) used in the refining of mineral oil (refinery gas)	Per kg	DKK49.50	PhP348.98
		Other bottled gas (LPG)	Per kg	DKK49.90	PhP351.80
		Fuel oil	Per kg	DKK52.90	PhP372.95
		Non-biodegradable waste used as fuel	Per tonne	DKK166.90	PhP1,176.65
		Brown coal and lignite	Per tonne	DKK301.30	PhP2,124.17
		Hard coal, coke, furnace coke and coke breeze	Per tonne	DKK444.10	PhP3,130.91
		Petroleum coke	Per tonne	DKK506.90	PhP3,573.65
Costa Rica	1997	Hydrocarbon fossil fuels	Market value	3.50%	-
British Columbia, Canada	2008	Motor Fuels			
		Propane	Per liter	CAD4.62	PhP164.98
		Natural Gas	Per m ³	CAD5.70	PhP203.55
		Gasoline	Per liter	CAD6.67	PhP238.19
		Jet Fuel	Per liter	CAD7.38	PhP263.54
		Light Fuel Oil - Diesel	Per liter	CAD7.67	PhP273.90
		Light Fuel Oil - Locomotive Diesel	Per liter	CAD7.67	PhP273.90
		Light Fuel Oil - Diesel (Marine Gas Oil)	Per liter	CAD7.67	PhP273.90
		Heavy Fuel Oil (Marine Bunker Oil)	Per liter	CAD7.67	PhP273.90
		Aviation Fuel (non-jet)	Per liter	CAD9.45	PhP337.46
		Fuels/Substances Used in Internal Combustion Engines			
		Ethane	Per liter	CAD2.94	PhP104.99
		Methanol	Per liter	CAD3.27	PhP116.77
		Propane	Per liter	CAD4.62	PhP164.98
		Coke Oven Gas	Per m ³	CAD4.83	PhP172.48
		Gas Liquids	Per liter	CAD4.95	PhP176.76
		Butane	Per liter	CAD5.28	PhP188.55
		Pentanes Plus (includes Iso-octane)	Per liter	CAD5.28	PhP188.55
		Refinery Gas	Per m ³	CAD5.28	PhP188.55
		Naphtha	Per liter	CAD7.65	PhP273.18
		Light Fuel Oil - heating oil/industrial oil, non-motor fuel oil	Per liter	CAD7.67	PhP273.90
		Kerosene	Per liter	CAD7.83	PhP279.61
		Petroleum Coke	Per liter	CAD11.01	PhP393.17
		Low Heat Value Coal	Per tonne	CAD53.31	PhP1,903.70
		High Heat Value Coal	Per tonne	CAD62.31	PhP2,225.09
		Coke	Per tonne	CAD74.61	PhP2,664.32

Country	Year Implemented	Coverage	CO ₂ Tax Base	CO ₂ Tax Rate	In PhP Equivalent
		Fuels/Substances Not Used in Internal Combustion Engines			
		Peat	Per tonne	CAD30.66	PhP1,094.87
		Tires - Whole	Per tonne	CAD62.40	PhP2,228.30
		Tires - Shredded	Per tonne	CAD71.73	PhP2,561.48
Switzerland	2008	All fossil thermal fuels (heating oil, natural gas, coal, petroleum coke)	Per tonne	CHF84.00	PhP3,961.44
Ireland	2009	Light oil (excise duty and carbon tax)			
		Petrol	Per 1,000 liters	€587.71	PhP30,837.14
		Aviation gasoline	Per 1,000 liters	€587.71	PhP30,837.14
		Heavy oil (excise duty and carbon tax)			
		Fuel Oil	Per 1,000 liters	€50.73	PhP2,661.80
		Other heavy oil (including marked gas oil)	Per 1,000 liters	€76.53	PhP4,015.53
		Used as a propellant	Per 1,000 liters	€479.02	PhP25,134.18
		Used for air navigation	Per 1,000 liters	€479.02	PhP25,134.18
		Used for private pleasure navigation	Per 1,000 liters	€479.02	PhP25,134.18
		Liquefied Petroleum Gas (excise duty and carbon tax)			
		Other LPG	Per 1,000 liters	€32.86	PhP1,724.16
		Used as a propellant	Per 1,000 liters	€96.45	PhP5,060.73
		Substitute Fuel (excise duty and carbon tax)			
		Natural gas measured based on gross calorific value	Per MWh	€3.70	PhP194.14
		Natural gas measured based on net calorific value	Per MWh	€4.10	PhP215.13
		Used other than as a propellant	Per 1,000 liters	€102.28	PhP5,366.63
		Used as a propellant instead of unleaded diesel	Per 1,000 liters	€479.02	PhP25,134.18
		Used as a propellant instead of unleaded petrol	Per 1,000 liters	€587.71	PhP30,837.14
		Solid Fuel			
		Milled peat	Per tonne	€17.99	PhP943.94
		Other peat	Per tonne	€27.25	PhP1,429.81
		Peat briquettes	Per tonne	€36.67	PhP1,924.07
		Coal	Per tonne	€52.67	PhP2,763.59
Iceland	2010	Gas and diesel oils	Per liter	ISK5.90	PhP5.90
		Petrol	Per liter	ISK5.15	PhP5.15
		Mineral oil gas and other carbohydrate gases	Per kilo	ISK6.50	PhP6.50
		Fuel oil	Per kilo	ISK7.30	PhP7.30
Japan	2012	All fossil fuels (crude oil,	Per tonne	JPY289	PhP123.38

Country	Year Implemented	Coverage	CO ₂ Tax Base	CO ₂ Tax Rate	In PhP Equivalent
		petroleum products, gaseous hydrocarbon and coal)			
Mexico	2014	Natural gas	Per liter	Mx\$5.91	PhP14.60
		Propane	Per liter	Mx\$7.76	PhP19.17
		Butane	Per liter	Mx\$10.38	PhP25.64
		Gas (regular and premium)	Per liter	Mx\$10.38	PhP25.64
		Jet fuel	Per liter	Mx\$12.40	PhP30.63
		Turbosine and other kerosene	Per liter	Mx\$12.59	PhP31.10
		Diesel	Per liter	Mx\$13.45	PhP33.22
		Fuel oil (heavy and regular 15)	Per liter	Mx\$15.60	PhP38.53
		Oil coke	Per tonne	Mx\$27.54	PhP68.02
		Mineral carbon	Per tonne	Mx\$5.91	PhP14.60
United Kingdom	2014	Natural gas	Per KWh	£0.00331	PhP0.22
		Gas oil, rebated bioblend, kerosene	Per liter	£0.04916	PhP3.30
		LPG	Per kg	£0.05280	PhP3.54
		Fuel oil, other heavy oil, rebated light oil	Per liter	£0.05711	PhP3.83
		Coal and other taxable solid fossil fuels	Per GJ	£1.54790	PhP103.80
France	2014	Gas, heavy fuel oil, and coal	Per tonne	€22	PhP1,154.34
Chile	2017	Boilers and turbines with a thermal power greater or equal to 50 megawatt thermal capacity		ZAR120.00	PhP371.46
South Africa	2017	Emissions from fossil fuels combustion, industrial processes, product use emissions and fugitive emissions from coal mining	Per tonne	US\$5.00	PhP230.85

Note: Conversion rates used:

Finland, Ireland and France - €1 = PhP52.47

Norway - NOK1 = PhP5.61

Sweden - SEK1 = PhP5.60

Denmark - DKK1 = PhP7.05

Canada - CAD1 = PhP35.71

Switzerland - CHF1 = PhP47.16

Japan - JPY1 = PhP0.42

Iceland - ISK1 = PhP0.38

Mexico - MXN1 = PhP2.47

United Kingdom - £1 = PhP67.06

South Africa - ZAR1 = PhP3.10

Chile - US\$1 = PhP46.17