INSTITUTE FOR CLIMATE AND SUSTAINABLE CITIES

POLICY BRIEF

The proper approach to coal and natural gas taxation in the Philippines

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This policy brief is in support of the efforts of the Department of Finance (DOF) in reforming the tax system toward a fairer and more sustainable one, especially in regard to fossil fuels. The DOF intends to propose a coal tax to the legislature before the end of the year (Package 5). Because coal interests will naturally ask why natural gas should be exempted, we tackle that issue as well.

ICSC is also aware of the DOF initiative to tax coal based on an inflation-adjustment mechanism starting with the excise tax on coal as of 1997, as proposed by Senator Loren Legarda. In this brief, we offer two alternative approaches and evaluate their relative merits.

The first one is inspired by the spirit of the BTU (British thermal unit) tax first proposed by President Clinton in 1993, at the outset of his first term, as a form of energy tax. This imposed a tax on all fossil fuels based on their heat content, and was meant to level the field for renewable energy. While the proposed bill passed the House, it was rejected by the Senate. It was thought that the House Democrats that lost in the mid-terms in 1994 were rejected based on their support for the BTU tax.

The second approach is based on the carbon content of the fossil fuels. Here, there are three possible pathways. The first is based on climate-change effects, the second is based on local health and other externality effects, and the third is a combination of the first two. In this exercise, we simply consider the proposed bunker tax as a reference. This should be both logical and uncontroversial.

We do not consider here the timing of the fuel excise taxes as this is preliminary, and we want to avoid unnecessary clutter.

The energy tax approach

We apply this approach based on the existing DOF proposal to levy a tax on bunker fuel at ₱3/liter. We have proposed ₱6/liter because we do not see any rationale for tax differentiation between the gasolines, and diesel and bunker, especially since the latter two are starting at a zero rate. Still, we calculate the effects from both the DOF rate and ours (₱3 versus ₱6).

The procedure is simple and transparent. We don't ask the wherefores of the proposed DOF tax rate, and take that as given, in terms of pesos per unit heat, and convert this into pesos per unit mass or volume. We then apply that rate to the heat content of coal and natural gas.

The carbon tax approach

Because ICSC supports full-cost pricing as a way for the country to achieve its Paris Agreement commitments at a lower cost, we favor the carbon tax approach. Here, our simulation of the approach does not yet take into account health and non-greenhouse gas emission effects. The procedure is also just as simple. We take the proposed tax rates as given, and proceed to calculate what the tax rates would be if we interpret the DOF rates as based on a charge on CO_2 emissions per unit mass or volume of the fuels.

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According to the World Bank, as of May 2017, more than 40 countries and subnational jurisdictions that account for about 25% of global GHG emissions have put a price on carbon, though the pricing initiatives cover only 14% of the emissions.

Results

Using the carbon content of bunker to calculate the potential CO_2 emissions per liter when fully combusted, we convert the volumetric tax rate into a rate per kilogram of CO_2 emissions.

Using the energy content of a liter of bunker, we convert the volumetric tax rate into pesos per BTU.[1] The resulting rates are shown in Table 1.

TABLE 1. Interpreting the tax on bunker as either a tax on CO_2 emissions, and as an energy tax

	Carbon Tax		Energy Tax	
Rate / Fuel	₱3 per liter	₱6 per liter	₱3 per liter	₱6 per liter
Bunker	1.03	2.05	7.68E-05	1.54E-04
	₱ per kg of CO_2		₱ per BTU	

Since excise taxes are expressed in pesos per physical unit (mass or volume), we further convert the rates in Table 1 to pesos per kilogram for coal, and in pesos per standard cubic meter for natural gas. It should be noted that our calculated carbon tax based on the ₱3 per liter bunker tax is equivalent to a a carbon tax of \$20/ton CO_2, at the lower range of a WB carbon pricing survey. The results are shown in Table 2.

TABLE 2. Applying the bunker tax rate to coal and natural gas in mass and volumetric units

₱ per Mass or Vol	Carbon Tax		Energy Tax	
Rate / Fuel	₱3 per liter	₱6 per liter	₱3 per liter	₱6 per liter
Coal/ (kg)	1.82	3.65	1.47	2.93
Nat. Gas/(m^3)STP[2]	2.22	4.43	3.13	6.26

Our main data source for this exercise is here. We add notes of caution in regard to our assumptions and calculations:

- For coal, we used bituminous coal although there are many grades of coal used by Philippine power plants, that have varying ranges of energy content and chemical composition[3].
- Also, we used the higher heating values (HHVs) instead of lower heating values (LHVs) owing to a lack of comparable data on LHVs. The LHVs net out the energy required to vaporize the water content of a fuel; this is preferred by the industrial users of the fuel since lower values lead to lower tax payments.
- Finally the use of volumetric units for liquids and gases can be problematic. This is because both the prevailing temperature and atmospheric pressure matter in measuring volumes for calculating tax liabilities.

[1] British thermal unit.
[2] Standard temperature and pressure. Please see accompanying spreadsheet.
[3] The authors will soon meet with the coal suppliers of the local power plants.

ICSC will provide the DOF all the relevant spreadsheets and walk the staff through all the calculations, so that they can change the assumptions as they see fit. The Department of Science and Technology and Department of Trade and Industry, as well as the relevant industry associations, should be consulted as well.

Electricity price impacts

For both approaches, we calculate the electricity price impacts for bunker-fired diesel generation, natural gas-fired combined cycle gas turbines (CCGT), and coal generation. Bunker and coal are used by industry for purposes other than electricity generation. Bunker is used by manufacturers and commercial establishments (hotels, etc.) for boilers providing process steam or heat. Coal is used for cement furnaces. But the most important end-use for consumer impacts are via power plants and electricity prices.

Bunker is used for peaking power in the Mindanao grid, and in the interconnected Luzon and Visayas grids. Natural gas is used for mid-merit and peaking power in Luzon. Coal is used for base load nationwide. More importantly, in terms of distributional issues, bunker is used to address base load in the small island grids.

The procedures are simple. For the carbon tax impact, we simply multiply the CO_2 emission factor, for each fuel/technology, in kg per kWh by the CO_2 tax rate, to get the electricity price impact. For the energy tax simulation, we simply multiply the heat rate per technology by the energy tax rate. The heat rate is a measure of the efficiency of conversion of the energy in a fuel into electricity. The results are shown in Table 3.

TABLE 3. Electricity price impacts

₱ per kWh	Carbon Tax		Energy Tax	
Rate / Fuel	₱3 per liter	₱6 per liter	₱3 per liter	₱6 per liter
Bunker	0.80	1.59	0.80	1.59
Coal	0.96	1.92	0.77	1.55
Nat. Gas	0.42	0.83	0.59	1.18

The result for bunker-fired diesel generation is in agreement with the calculations of the National Power Corporation's Small Power Utilities Group (NPC-SPUG) expounded during the hearing of the Senate Ways and Means Committee on August 10. Note that the results for bunker do not vary using either approach, because the bunker tax rate is used as the reference, and thus the tax rate per liter remains constant under both approaches.

The two approaches result in different impacts, as is to be expected. The carbon approach favors bunker over coal, but the energy approach reverses the relative merits. That is owing to the technical fact that coal is not only cheaper per unit heat, but also that it converts latent heat into electricity more efficiently.

Liquefied natural gas (LNG) as a transition fuel to a cleaner Philippine power sector

The tax reform initiative does not yet contain any provisions for taxing LNG, but we have provided here a framework for doing that in a consistent fashion. The government has not yet enunciated any clear policy on LNG, especially on cost recovery for storage, receiving platform, and pipeline

operations. But two major players, the Energy Development Corporation and Energy World, are proceeding with their infrastructure development for their own demand. The Department of Energy sees LNG as a transition fuel and promotes integrated LNG development as replacement for Malampaya gas. Various initiatives have been pursued by Congress, including one that seeks to convert coal plants into LNG plants. But what is needed are cost-recovery mechanisms for storage and pipeline operators so that both scale economies and returns to scale are realized.

LNG plants will enable the country's grids to absorb more renewable energy because these are more flexible and can replace dirty coal. A clear price signal through a carbon tax will speed up the transition.

Note also that natural gas trumps both bunker and coal under the two approaches, because natural gas has not only lower carbon per unit heat content, it also converts latent heat into electricity more efficiently.

The DOF surely must be aware that any tax structure has long-term implications on investment decisions and on consumer welfare. It has the power to send the correct market signals to make sure the power infrastructure now and in the future, maximizes social welfare. Under the current regulatory framework of the power sector, stranded costs seem inevitable and what is debatable is the allocation of the burden. The DOF has to make a bet based on the best available evidence.

ICSC is ready to support that endeavour.

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