

The case against a carbon tax for South Africa

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Treasury has made a proposal that there should be a carbon tax in South Africa. In its discussion paper, the rationale for the tax is given as "Climate change and its effects are the result of GHG emissions, which are not paid for by the emitters. Such emissions impose external costs on society – an "externality" in economic terms. Because these costs have not been factored into the prices of goods and services, this is a "market failure", which can be corrected by a pricing instrument." But greenhouse gas [GHG] emissions are global, and the South African contribution is minor.

If one accepts that the polluter should pay, then the major polluters should pay the major burden and the minor polluters a lesser burden of the external costs caused. Of course, there is an assumption that the external costs can be quantified and agreed. If the debate around climate change is any guide, there is not likely to be any agreement on the sources, let alone the magnitude, of the external costs any time soon.

That should not, however, detract from the underlying principle, which is widely accepted, that the polluter should pay. In this sense, it is totally inappropriate to consider a tax on South Africans that approaches the levels accepted by the EU, and certainly not before the North Americans have made equivalent commitments.

Yet this is what Treasury proposes. It is argued that a tax on carbon constitutes a tax on energy consumption, and that because energy consumption and economic development are directly correlated, a carbon tax on South Africa is in fact a tax on development, and should therefore be rejected out of hand.

There is a growing movement in South Africa to introduce a tax on carbon emissions. The National Treasury has published a discussion paper [1]. The paper follows the announcement by South Africa at the 2009 Copenhagen conference of its intention to reduce greenhouse gas emissions by 34% by 2020 and 42% by 2025 below the business as usual scenario. The Long Term Mitigation Scenarios [2] and the National Climate Change Response Green Paper [3] recognise the use of market-based policy measures, such as an escalating carbon tax, to price carbon so that the cost of climate change can be reflected in the price of goods and services.

However, the Copenhagen Accord was contingent upon the provision of financial assistance to developing nations: "developed countries shall provide adequate, predictable and sustainable financial resources, technology and capacity-building to support the implementation of adaptation action in developing countries." Furthermore, "scaled

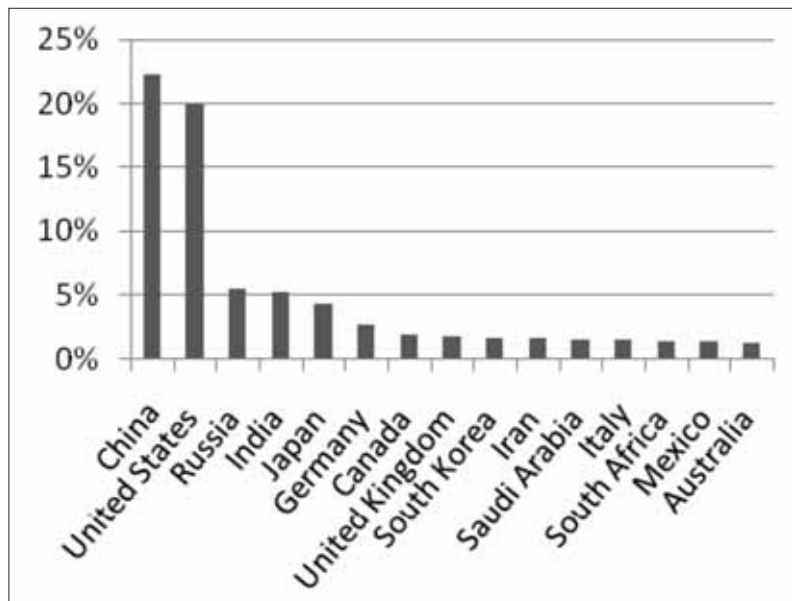


Fig. 1: The 15 leading global contributions to carbon dioxide emissions, 2010.

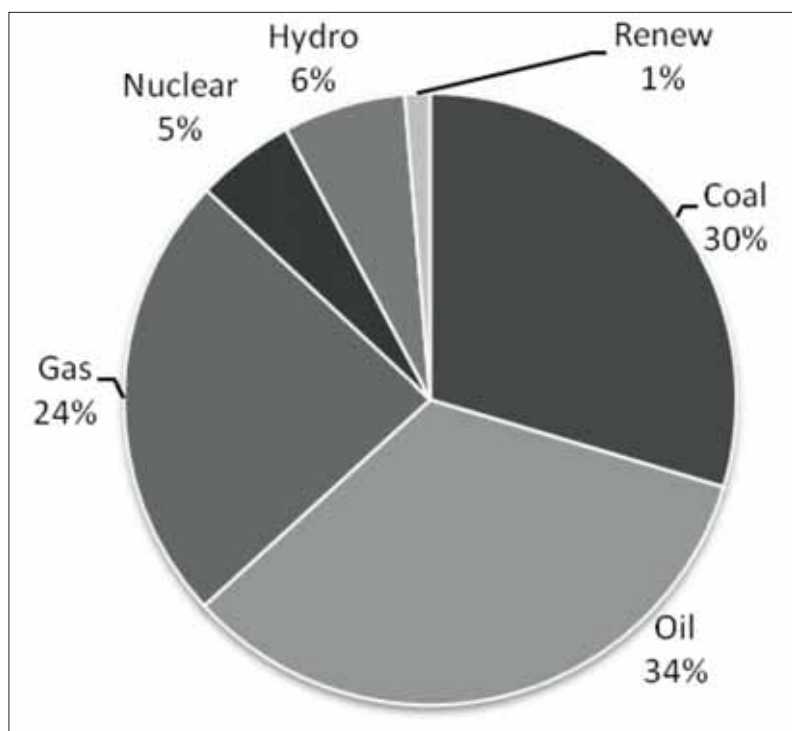


Fig. 2: The primary energy mix of the average nation of the world.

up, new and additional, predictable and adequate funding as well as improved access shall be provided to developing countries to enable and support enhanced action," while a goal was agreed "for the world to raise \$100-billion per year by 2020, from "a wide variety of sources", to help developing countries cut carbon emissions.

In this light there is merit in enquiring the purpose of a carbon tax. If emission reductions are already agreed, and the world has agreed to pay for the costs of making the reductions, what can an additional impost on carbon achieve?

Carbon emissions

At present, the world emits approximately 30-billion metric tons of carbon dioxide annually. The relative contributions of the fifteen largest emitters are given in Fig.1.

While the EU is not shown separately, the nations of the EU together contribute about 14% to the total carbon dioxide load.

South Africa features on this list in part because there was an unfortunate error in our national communication, which increased our reported emissions by about 10%. However, this would only drop SA from 13th to 18th, which is still higher than our economy would suggest. The reason for this is soon found in the energy mix. The average nation obtains about 87% of its primary energy from fossil fuels, and those fossil fuels comprise approximately equal amounts of coal, oil and gas, as shown in Fig. 2.

In contrast, South Africa obtains 97% of its primary energy from fossil fuels, and 76% of that energy is coal. This is illustrated in Fig. 3.

Firstly we must note that coal emits nearly three times as much GHG as gas for the same amount of energy. So the dominant role played by coal in our economy plays a major part in boosting our emissions relative to our peers. Secondly, we are low on nuclear and very low on hydro power, relative to the average country. This also boosts our emissions. Indeed, if our primary energy supply bore any resemblance to that of the average nation, we would be about 30th in the list of emitting nations, which is about right for our economy.

Any reflection on the data given in Fig. 1 immediately shows a challenge. If there were to be a global agreement on reducing carbon emissions, how would it be made equitable?

In the case of the Kyoto Protocol [4], it was agreed that Annex 1 countries (and only the Annex 1 countries) would reduce their emissions by an agreed percentage below their 1990 emissions. Some nations have found this inequitable, in part because non-Annex 1 countries had no agreed reduction. The US, for instance, refused to be party to the protocol, citing this as one reason for their failure. Another way

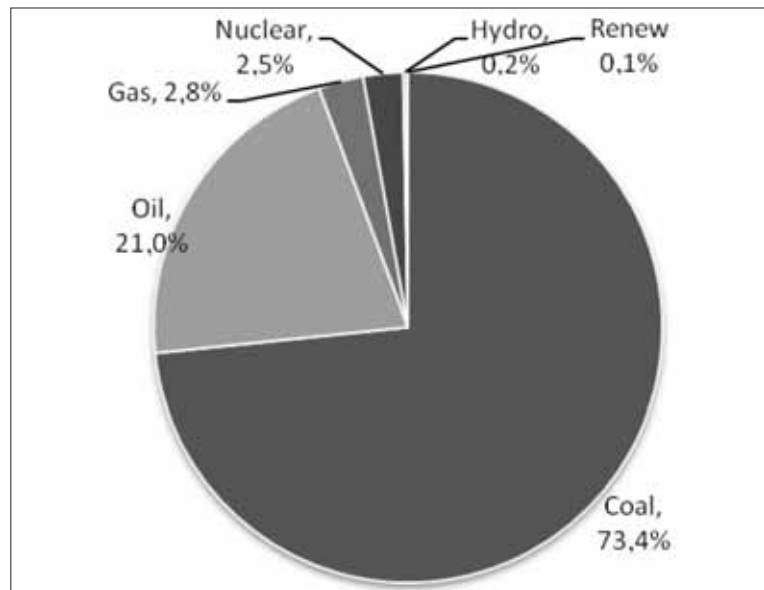


Fig. 3: The primary energy mix of South Africa.

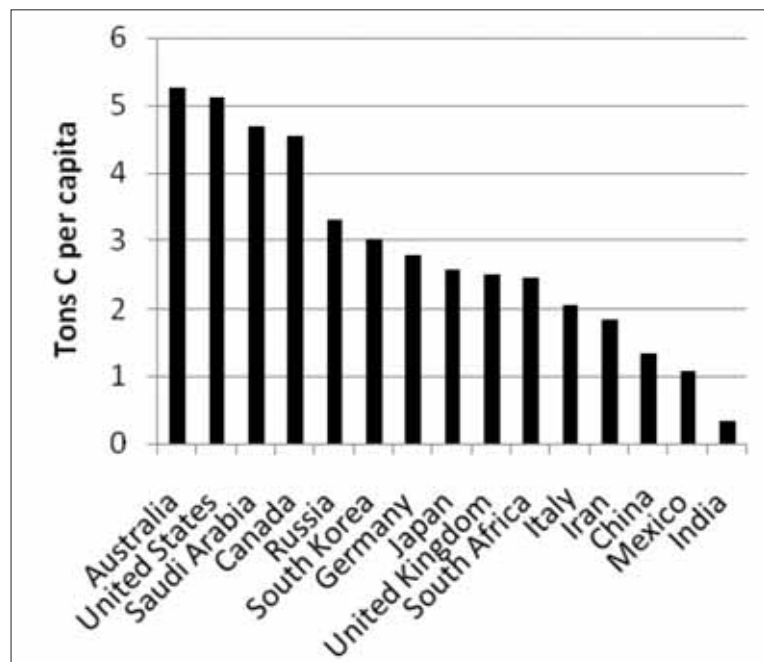


Fig. 4: Per capita carbon emissions of 15 leading emitting nations.

of addressing the challenge is to study the per capita emissions. Fig. 4 shows the data for the same 15 countries analysed in Fig. 1.

The position of many nations changes dramatically. On a per capita basis, Australia moves from being 15th to 1st. China moves from being first to 13th. Saudi Arabia and Canada are far higher on the list than when total emissions were considered. India moves from being a significant emitter (measured by total emissions) to being insignificant (measured by per capita emissions).

This illustrates a problem trying to reach agreements on the control of emissions. There is a strong tendency to look at total emissions, and to try to agree limits based on those. Developing countries such as

India and China, however, call upon those with high per capita emissions to reduce theirs, while the developing nations increase their per capita emissions. Equity would then be achieved when nations had similar per capita emissions.

To date, none have pursued the per capita option as a basis for limiting emissions. It has much to commend it, but again countries such as the US have a difficulty. If, for instance, there were to be a cap on per capita emissions at, say, 2.5 t of carbon per annum, then the US would have to make a massive reduction, nearly halving its output, while China would be allowed to nearly double its emissions. The US economy would be radically transformed while the Chinese economy would continue to race ahead. Within a

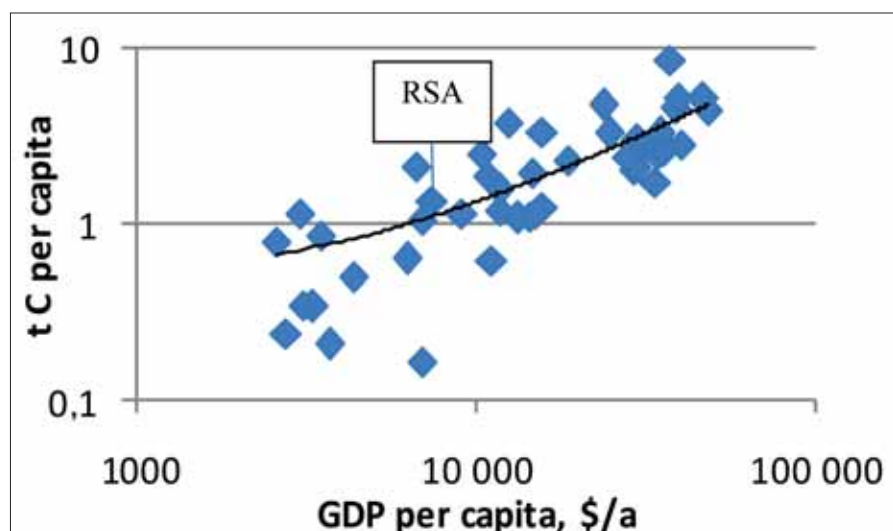


Fig. 5: Relation between per capita income and carbon emissions, for the 50 highest emitting nations.

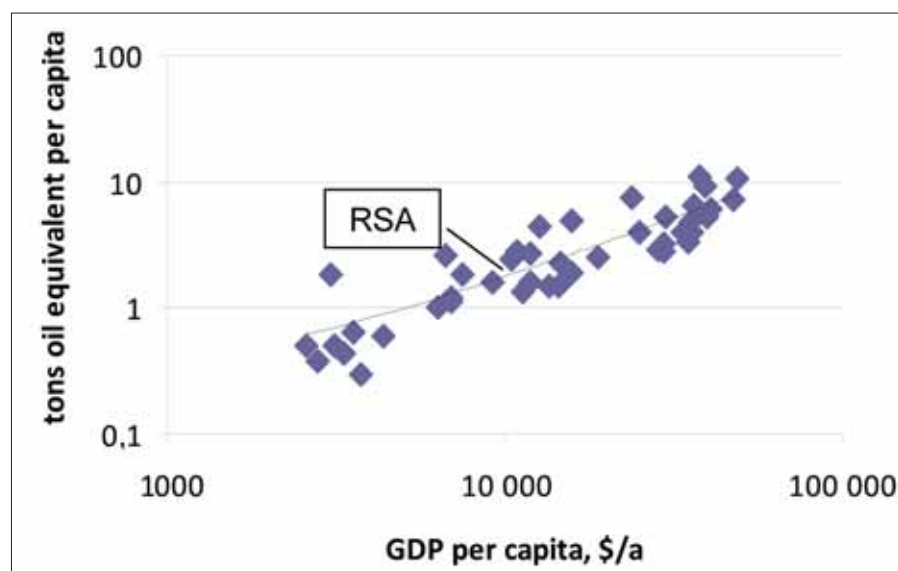


Fig. 6: Relation between GDP and total energy consumption.

few years China's total emissions would be at least four times those of the US.

This underlines the relationship between carbon emissions and the economy, which we must now consider.

Carbon emissions and the economy

Fig. 5 shows a relationship between the per capita GDP and emissions. It is not a very strong relationship. However, as was noted earlier, carbon emissions are quite strongly dependent upon the mix of primary energies, as the example of South Africa so clearly shows. It transpires that the relation is far stronger if the primary energy rather than the fossil fuel energy is considered. Fig. 6 shows the relationship between GDP and the total primary energy in all forms, expressed as tons of oil equivalent [5]. It will be noted that in both Figs. 5 and 6 South Africa is very close to the trend line. It is not exceptional as often claimed. (See, for instance, Fig. 2 in the Treasury Discussion Paper [1]). Fig. 6 shows that there is a strong relationship between wealth and primary energy consumption.

A nation's wealth and its use of energy are intimately linked. This is a key observation. The relationship is generally accepted, and sometimes the implications are followed through. For instance, during the course of the IRP2010 process, it was necessary to estimate South Africa's future demand for electricity [6]. The prediction was based upon the estimated growth in the GDP, allowing for shifts in the energy intensity, i.e. the energy required per unit of GDP. The energy intensity in South Africa is falling, as the mining industry becomes less dominant in the economy and the service sector grows.

However, the converse of this relationship is often ignored. Just as growth in the demand for energy will depend on the growth in the GDP, so the growth in GDP will depend on the growth in the demand for energy. If, for some reason, the growth in the demand for energy is constrained in some way, then the growth in the GDP will be reduced. New projects will be stalled, new jobs will not be created,

and the nation will be impoverished. This is precisely what is happening in South Africa at present. The rolling blackouts of early 2008 proved that blackouts had really disastrous impacts on the economy. Production did not restart the moment power was re-supplied, so that every hour of blackout led to two or more hours of lost production. The cost of unserved energy is significantly higher than had been assumed. The message to Eskom is now clear – keep the lights on at all costs.

The result of the lack of power is that there can only be limited growth in the economy. Lack of electricity is a constraint on our economic development. Where other nations in the BRIC alliance are seeing annual GDP growth rates of 6 to 9%, our economy struggles to reach 3%. The implications of this are clear – we have to balance a desire to reduce carbon emissions with the absolute need to ensure that we have sufficient power for growth. 97% of our energy comes from fossil fuels. Calling for an immediate reduction in carbon emissions is tantamount to calling for an immediate reduction in our energy supply – which will cause a contraction in our growth, in conflict with our policy to create as many jobs as possible.

The rationale for a carbon tax

In its Discussion Paper [1], Treasury states:

"Climate change and its effects are the result of GHG emissions, which are not paid for by the emitters. Such emissions impose external costs on society – an "externality" in economic terms. Because these costs have not been factored into the prices of goods and services, this is a "market failure", which can be corrected by a pricing instrument."

"The need for government policy intervention to address climate change concerns stems mainly from this market failure. Moreover, the fact that external costs of damages are not reflected in final prices encourages the over allocation of resources for the production and consumption of commodities."

Even if one accepts the thesis that climate change causes identifiable external costs (and this is doubted in many quarters), there is the question of who are the 'emitters' referred to. Fig. 1 makes it clear that the primary emitters are China and the US. Between them they contribute nearly half the total annual anthropogenic load on the atmosphere. In contrast, South Africa contributes about one-fiftieth of the annual load.

So if the purpose of a tax on South African emitters is to reduce South African carbon emissions (as is clearly Treasury's intent), then it will fail in its stated objective. The external costs will continue unabated, because South African emitters are not the prime source of any damage. Indeed, we could commit economic suicide, and stop all our carbon emissions, and

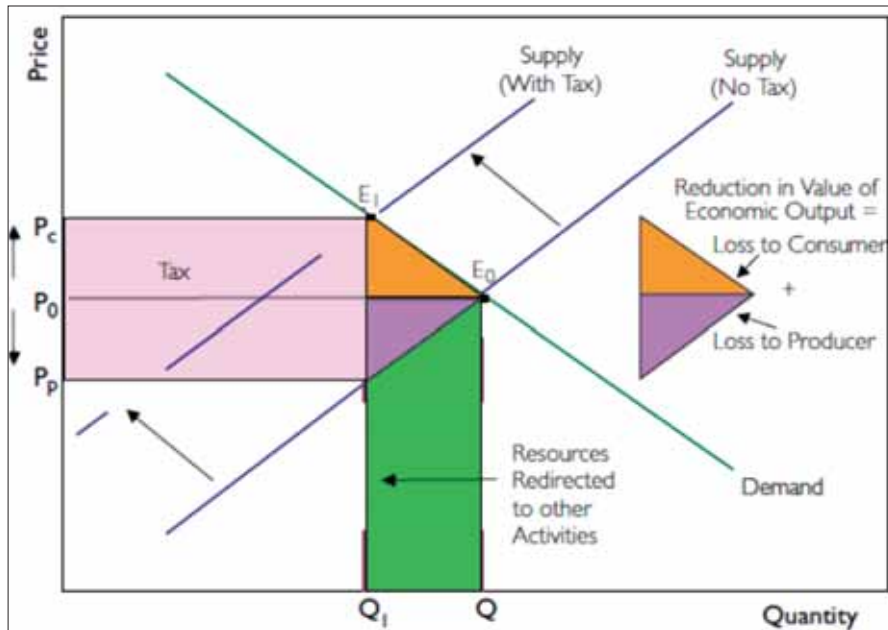


Fig. 7: The impact of tax on the quantity of a resource.

the impact on any damage caused by climate change would not be noticeable. It is thus apparent that the rationale for a carbon tax is flawed. However, we must enquire whether, even if it did no good, it is likely to do any harm.

The destructive nature of a carbon tax

Because South Africa depends on fossil fuels for 97% of its primary energy, a tax on carbon is de facto a tax on energy. We have seen that energy and development are directly linked. Therefore a carbon tax is a tax on development. Treasury's Discussion Paper [1] recognises this explicitly. Fig. 4 in that document is reproduced here as Fig. 7.

"Under normal demand and supply conditions with no tax, the market clears at E_0 for price P_0 and quantity Q - consumers are willing to pay P_0 and producers are willing to supply quantity Q of the product at this price. Suppose a tax of $t (P_c - P_0)$ is imposed, which increases the price of the product for the consumer. This result in a corresponding decrease in consumption and quantity demanded to quantity Q_1 along the demand curve. A reduction in the quantity demanded causes suppliers to reduce the quantity of the good supplied and results in a shift in the supply curve to "supply with tax", which means that market equilibrium is reached at price, P_c and quantity Q_1 ."

So Treasury accepts that any carbon tax will cause a drop in the demand for energy, which we have shown will in turn cause a drop in our development. It spells this out in its Discussion Paper (Para.151):

"The effects on GDP under the different non-closure and closure scenarios demonstrate that GDP declined by 0,5% and 13,9% respectively for carbon taxes of R25 and R1000 respectively."

Discussion and conclusions

We have shown in this paper that, because the quantity of carbon dioxide in the atmosphere is a global problem, any unilateral action by South Africa, such as the imposition of a carbon tax, will be totally ineffective. In the present case, any economic damage caused by rising carbon dioxide levels would continue unabated even if our economy were closed down. The global problem can only be addressed by a global solution, not a local one.

Furthermore, we have shown that a carbon tax is in fact a tax on development. In this connection it is worth noting that only the EU and the Canadian Province of Quebec presently impose carbon taxes. If South Africa were to impose a carbon tax, it would become the first developing nation to do so.

Part of the rationale for suggesting a carbon tax is that South Africa appears, by some measures, to be emitting excessive quantities of carbon dioxide. Therefore, the argument goes, we should take a degree of leadership in showing that we are addressing the problem. However, as is clear from Figs. 5 and 6, we are in fact not exceptional. Our emissions are almost exactly what would be expected from a nation at our stage of economic development. Reducing our carbon emissions might make us feel good, but having full employment would make us feel a whole lot better.

A further reason put forward for a carbon tax is that it would improve our international competitiveness (See, for instance, the Discussion Paper Section 6.3 [1]). But perhaps this reflects the fact that we have major trading partners in the EU, who themselves are already suffering from carbon taxes. It is perhaps they who

have become uncompetitive and would seek to make us equally uncompetitive by encouraging us to accept carbon taxes. In fact, much of our trade is now with South East Asia, and there are certainly no calls for us to impose carbon taxes from that quarter. Finally it should be mentioned that there is an estimate of the external costs caused by all forms of energy, including climate change impacts [7]. For coal-fired power stations in the EU, costs varied between €0,04 and €0,10 per kWh, depending on the type of coal, the local meteorology and the population density in the vicinity. Applying the same methodology to South Africa leads to costs about one-tenth of those, i.e. about R0,04 to R0,10 per kWh. The main reason for the decrease is the much lower population at risk, although the stable inversion layer over the Highveld for much of the year also plays a part.

Treasury has suggested a carbon tax of R75 per ton CO_2 , rising to R200 per ton of CO_2 , would be "both feasible and appropriate." The typical South African power station emits close to 1t CO_2 /MWh [8], so the suggested tax would amount to between R0,075 and R0,20/kWh, approximately double the total external costs.

Thus not only is the suggested carbon tax ineffective and destructive to our development, it is even excessive when measured against independent estimates of the external costs. On every ground, therefore, there is no case for a carbon tax as presently proposed.

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