AN 'ENERGY REFUND' FOR A 'CLIMATE CLUB' [1]

Practical proposals for refunded, complete, coordinated carbon taxes are outlined.

The `Energy Refund' is a levy of $\$200/tCO_2^e$ imposed immediately by countries (or trading blocs) that are members of a `Climate Club' on any fossil fuels or other goods that typically produce greenhouse gases; plus goods that have already produced greenhouse gases in their manufacture or transportation in countries (or international space) not in the club. The revenues generated would be refunded to taxpayers, business and local resource owners as contracts to develop low-carbon electricity generation The purpose of the refund is to prevent large rises in the world market price of oil and other fossil fuels, over the next few years, and to accelerate the fight against climate change. It is envisaged that the `Climate Club' would include the majority of the Western (OECD) nations, with the optional addition of India and China [2] [3]

1 Author: Stephen Stretton <stephen@stephenstretton.org.uk> Last Updated: 11th March 2010

2 Similar proposals have been outlined before, for example the `Refunded Emission Tax' proposed by Johnson (2007b; 2007a) and the `Untax' proposed by Stoft (2008).

3 This paper elaborates on a suggestion made by Barker (2008) `It would greatly help to establish simultaneously [with fixed exchange rates] other global prices as signals to support accelerated decarbonization of the global economy, namely the carbon price and the prices of the main fossil fuels. This involves recognizing existing and instituting new cartels, but it will encourage consuming countries to compete for carbon rents by raising carbon taxes and tightening their targets in trading schemes. It could also be extended to encourage the supplying countries to lock undeveloped fossil resources into the ground, preserve existing forests, and develop new ones. .'

Background

Fossil Fuel Prices

Between 2000 and 2007, oil prices rose steadily, from $10/bbl in 2000 to $60/bbl in 2006 and to $150/bbl in 2007 (IEA 2009). Gas and coal prices have also risen significantly in this period. Fossil fuel prices fell back during the early part of the recession but are now increasing again (Fig. 1).

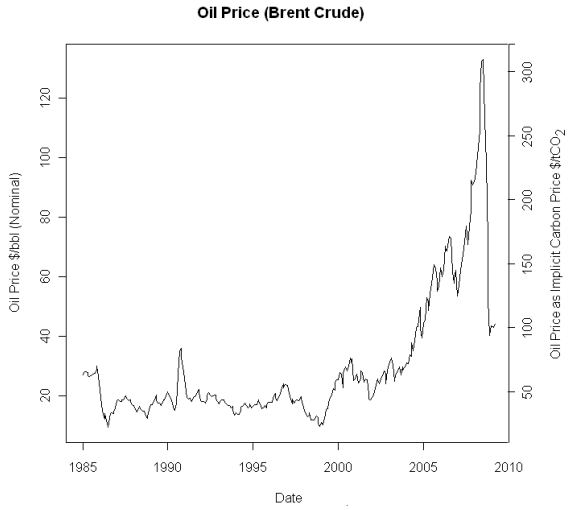

Figure 1: Oil Prices since 1985 (IEA 2009)

The supply of oil is likely to be constrained relative to demand in the near term due to inherent resource limitations (IEA 2008) and the increasing concentration of remaining resources (and therefore market power) in the hands of the National Oil Companies (NOCs) of the Organization of Petroleum Exporting Countries (OPEC). It therefore must be considered likely that the price of oil will rise from the current level of around $65 per barrel of oil (/bbl) to over $100/bbl and then on to the levels seen in 2007 (around $150/bbl). An increase of $85/bbl (from $65/bbl to $150/bbl) is equivalent to a Carbon price of $200/t$CO_2$ (EPA 2009).

Inflation Outlook

The threat of falling prices during the global recession of 2008-9 has only been assuaged by highly interventionist government support. A low or negative inflation rate has serious dangers. Deflation, in a society with high debts, threatens to create a debt-deflationary spiral (Fisher 1933), where falling prices *increase* the *real* value of debt, further depressing demand and reducing prices further.

Central banks can influence the real economy through the real interest rate, which is equal to the bank base rate minus the inflation rate[4]. The main macroeconomic policy tool is the central bank base rate[5].

A lower inflation rate will, for a given *nominal* base rate, *increasing* the *real* interest rate. Normally, the nominal interest rate would be adjusted accordingly so this is not important, but in cases of depression, the interest rate may be near, or at, the *lower bound* of zero. Interest rates cannot fall

4 In this case, the GDP deflator, which includes the price changes according to the whole economy.

5 The particular rate of interest targeted by a central bank (the base rate) varies by jurisdiction. The *Federal Funds Rate* (US), the target base rate in the United States, is the rate at which banks are charged to lend balances at the Federal Reserve to one another. The Official bank rate (UK) is the interest rate that the Bank of England charges Banks for secured overnight lending from the Bank. In practice all of these interest rates are approximately the minimum rate of interest charged on the short term (e.g. overnight) lending between essentially credit-risk-free institutions).

below zero, because people would store bank notes at home rather than invest them in the bank. For example it has been estimated that the ideal interest rate in the United States in early 2009 would be minus 5% (Guha 2009). The increasing ineffectiveness of macroeconomic policy when interest rates approach zero is known as the *Liquidity Trap*.

Governments can engage in alternative activities to stimulate demand (e.g. *quantitative easing*, a form of monetary creation, and *increased government spending (transfer payments, consumption and investment) funded through borrowing*. Such measures risk stoking inflation in the medium term Carbon price provide an alternative method.

What is the Energy Refund?

The Energy Refund is a levy on the importation and extraction of fossil fuels according to carbon content which is then refunded to citizens, business and resource owners as valuable incentives to develop low-carbon sources of energy.

What Level Should The Energy Refund Be Set At?

I suggest a level of $200/tCO$_2^e$. This can be compared to the level of tax needed to encourage the following technologies:

- Coal with Carbon Capture and Storage: $85-130/tCO$_2^e$ for new demonstration plants and $40-60/tCO$_2^e$ in 2030 for commercialized plants[6] [5]
- Concentrated Solar Power: $115/tCO$_2^e$ (Staley et al. 2009)
- Capture and Storage of Carbon Dioxide from Thin Air: > $140/tCO$_2^e$ [7][6] (Keith et al. 2006)

Since recent evidence suggests that we will need to draw down carbon dioxide from the atmosphere, now, or at some point in the future (Hansen et al. 2008) charging for CO_2 at a price higher than that needed to support backstop technologies, which may be enough to draw down CO_2 from the air.

What Is The Coverage Of The Scheme?

The scheme will cover all energy-related, agricultural and industrial emissions of greenhouse gases associated with domestic emissions and foreign emissions associated with imports of all participating countries. There will be levy on fossil fuels at import or extraction, according to carbon content. There will also be an equivalent levy on other greenhouse gases such as those arising from agriculture (methane from cows – levied on the sale of meat; Nitrous Oxide from fertilizers – levied on the sale of fertilizers), fossil fuel extraction (escaped methane – levied on mines, wells or pipelines), and industrial gases (levied on their intended or unintended manufacture). Any products that could decompose or accidentally release carbon should be taxed appropriately.

At What Point Is The Levy Charged?

The tariff could be charged at the point of entry of coal, oil or gas into a member of the Climate Club. The money could either go to the country at which fossil fuels are imported; or it could be that the money is used to centrally fund the EU; to replace the funding by the nation states.

---

6 Nauclér et al. (2008) suggest €60-90/tCO2e for new demonstration plants and €30-45/tCO2e in 2030 for existing plants. Exchange rate used: €1=$1.4

7 $500/tC (Keith et al. 2006); 1/tC = 0.27/tCO$_2$

Wherever fossil fuel is imported, the tax incidence will end up with the end-consumer - in other words, the scheme from the point of view of incidence is equivalent to cap-and-trade, but easier to administer.

Who Gets The Refund?

Both the political viability and economic efficiency of this scheme depends substantially on the use of the revenues; but political viability and economic efficiency often pull in opposite directions! I propose that the refund will be rebated to taxpayers, businesses and owners of natural resources within participating countries.

Johnson (2007a; 2007b) sets out a strong case for taxes that are refunded to the emitter according to historical emissions, in a similar way that emissions trading permits are often given away (`grandfathered') to existing polluters. Revenue neutrality within the sector is maintained.

However, it should be noted that behind the existing practice of `grandfathering' there may be a naive theory of tax incidence; namely the `Flypaper Theory' of tax incidence (the incidence of the tax is the same as that entity on which it is levied). The e*conomic incidence of a* tax is not the same as the legal incidence (those on which the tax is levied (Entin 2004)). For example, a perfectly competitive electricity market would simply pass on the marginal cost of carbon permits to the consumers, whoever is given the permits or refund.

This suggest a new criterion for refunds. Political actions should leave unchanged or increase the valuation of assets of key actors. The relevant `losers' are infrastructure owners and resource owners. Carbon resource owners could be compensated by an endowment fund; infrastructure owners by first bite on scarce subsidies to construct alternatives to the infrastructure retired.
It also should be noted that interest groups generally have short-term horizons, whereas the common interest is long-term. In the short term, rebates will be paid to companies, resource owners, and to individuals; in the longer term, as alternatives to fossil fuels are developed, the revenues would be used to pay off the national debt.

Interaction With Existing Cap-and-Trade Schemes

The Energy Refund is complementary to long term greenhouse gas reduction targets or schemes; and supplements cap and trade schemes. It should be noted that fixed-price (this scheme; Carbon Taxes) and fixed-quantity schemes (cap-and-trade) are not inconsistent with one another; and are not necessarily mutually exclusive. If both this scheme and a cap-and-trade scheme are implemented, the combination is a system that puts a floor on *both* prices and quantities; and therefore combines the best elements of both. The combined carbon price could therefore include both the carbon levy/tax and the price of permits.

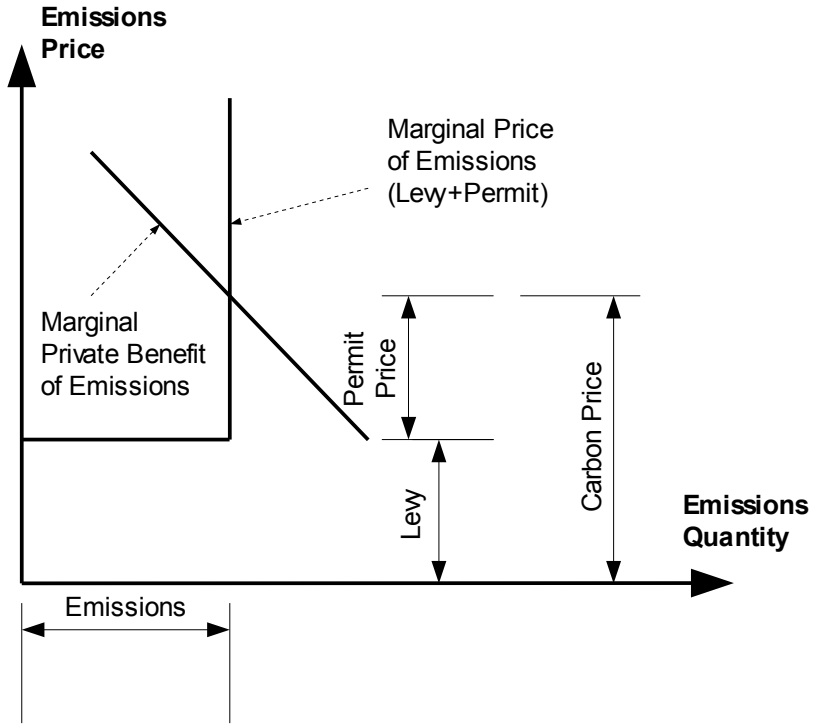

Figure 2: Levy plus Cap-and-Trade: Quantity Constrained.

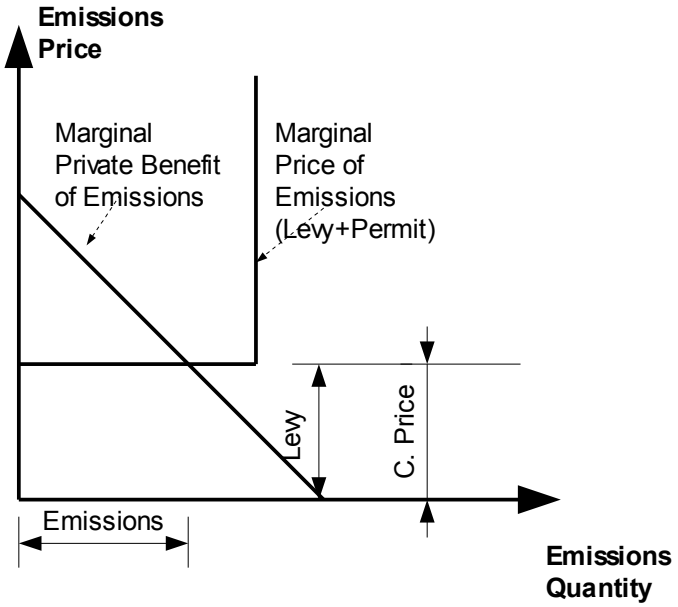

Figure 3: Levy plus Cap-and-Trade: Price Constrained

The Energy Refund provides the price certainty needed by investors in technologies such as carbon capture and storage and solar energy (needing carbon prices of $\$100/tCO_2$), whilst not `picking-winners'.
The advantages of this proposed policy scheme are gains to Organization of Economic Cooperation and Development (OECD) taxpayers, especially if the levy displaces fossil fuel rent that would go to oil-rich countries. It would prevent an rise in the global price of oil of a similar magnitude in the near future which would be damaging to the economic interests of the West. If the tax is perfectly harmonized across the world, we approximate that the levy would prevent an equivalent amount of oil consumption, and therefore provide a net benefit to OECD companies, domestic resource owners and individuals of $42-$85/bbl, or around $1000 per citizen. There may also be a case for increases in carbon prices now, preventing deflation now and preventing the future inflation associated with a rise in fossil fuel prices.

Who Joins The Club?

The energy refund is coordinated (ideally at the same level) across countries, such that they all have a common carbon tariff for the import of carbon-based fuels. Participation in this `Climate Club' is optional. The members of the club (for example, in the first instance, the EU and US and other members of the OECD) would impose a common external tariff on such goods. The carbon price is proposed to be enough to solve climate change once and for all", around $\$200/tCO_2$.

What About Countries Who Do Not Participate?

Two things are charged on import: fossil fuel, and embodied energy. For imports and exports to those countries not participating in the scheme, border adjustments are made. A levy at an equivalent level is also placed on imported goods and services, according to the estimated total greenhouse gas produced in their manufacture and transportation (a so called `border tax adjustment'). The unified levy excludes the case of explicit or implicit subsidies. Fossil fuel border tax adjustment would ensure that all consumption-based emissions are accounted for. See (Helm et al. 2007) for a demonstration of the importance of the emissions embodied in imports and international travel for the UK.

Major Technical Issues

There are major technical issues associated with this proposals:

1. How to *measure* the carbon levy in different countries; Nordhaus (2007) discusses the measurement issue when proposing harmonized carbon taxes.
2. How to determine the border tax adjustments for 'embodied carbon', ensuring legality? This has been dealt with extensively elsewhere (Ismer & Neuhoff 2007).
3. How to enforce price based agreements? One option is so called options for difference on the carbon price (Ismer & Neuhoff 2006).

Major Criticisms of Price-based Approach

Stern (2009) suggests three major criticisms of a tax-based system: First they "do not give much certainty on how big the resulting reductions will be"; Second "taxes are very hard to coordinate internationally"; third "electorates are mistrustful of governments' use of tax revenue".

Regarding the first criticism, obviously, for a given carbon price, whichever instrument has the higher price would reduce emissions the most. There are some reasons, relating to investment incentives, to suggest thatan emissions trading scheme is likely to lead to higher volatility, and therefore higher carbon prices, for a given level of stringency than a tax-based system.

Regarding the second criticism; measurement is certainly an issue for tax-based systems; but countries have coordinated external tariffs before.
The third criticism (use of revenues) is a problem for both cap-and-trade and for carbon taxes; and is a question of how a policy is framed. Governments desperately need revenues in the medium term.
Hamilton (2009) criticizes Nordhaus on grounds of ethics. He suggests that a tax-based system "discards fairness". This is a serious concern. However, it should be mentioned that membership of the Climate Club is optional; and fulfils the principle that, for countries not in the club, emissions from embodied carbon are the responsibility of the importing nation and not the exporting one.

Much of the rest of Hamilton's article is an attack on Nordhaus's economic models and economic philosophy; and therefore is not relevant. Hamilton clearly thinks that more stringent emissions reductions are required; and this proposal aims to fulfil this objective.

Summary: The Case For A Climate Club

1. When the global economy was doing well the oil price shot up to $150/bbl. Part of that price rise was speculative, but lots of it was the constraint on supply and high demand.
2. When the global economy starts to `grow' again we'll eventually (probably quite soon) be back at a similar price, because supply is constrained. This would amount to a `scarcity rent' of about $100/bbl going from Oil Importing Countries (US, EU etc.) to Oil Exporting Countries (the cheapest oil costs $2/bbl to produce).
3. This is a) unfair (unearned income, from economic rent of natural opportunities - what have they done to deserve this) and b) bad for the oil consumer's interests and c) bad for the environment, because it encourages companies to look for new, often dirtier, forms of oil.
4. A coordinated external tariff duty (framed as a `tariff' for internal EU/US consumption and as a neutral `externality tax' for the purposes of WTO rules) can manage down the global price of oil and provide an alternative.
5. Embodied energy needs to be accounted for in Western emissions policy. Much of the emissions from consumption behaviour take place in other countries (e.g. imported TVs from China).
6. The charging for embodied energy gives a huge incentive to join the scheme. because, potentially, carbon could be charged upstream (and accrue to the producing country)
7. So the Climate Club can set rigorous terms for joining the club.

Appendix 1: Frequently Asked Questions (Draft Only)

How Would The Club Enforce Agreements?

The Climate Club enforces its agreements with contracts; it is possible for one country to impose a different carbon price at the border, but it would have to compensate the other members of the club with a certain cost if it were to do this.

How Would We Calculate Embodied Carbon For Imports From Outside The Club?

One simple way is to calculate overall emissions per unit GDP and count the value of imports; or emissions per weight and count the weight. In addition exports should be exempted from the levy to avoid a competitive disadvantage. A discussion of border taxes is available (Ismer & Neuhoff 2007)

Are There Any Trade Concerns?

This scheme is equivalent to a neutral carbon tax where imports and domestic production are charged equivalently. As environmental damage is a real cost; *not* charging for emissions might constitute an unfair subsidy. Recent report from the WTO suggests that border tax adjustments are allowable under WTO rules (Harvey 2009; Tamiotti et al. 2009).

What About Agriculture?

N_2O from fertilizers and Methane emissions from cattle should face an equivalent levy according to their relative contributions to climate change (GWP100). This levy should be imposed upstream, on the manufacture of fertilizer, and as a `grazing license'.

What About Land Use Change?

Changes in forests and other natural sinks is outside the Club's scope. Nevertheless, revenues could be refunded to those with standing carbon (Joslin 2009).

Appendix 2: Other Policy Ideas

- Minimum tax on coal for electricity generation.
- Minimum fossil fuel import tax; minimum fossil fuel extraction tax.
- Guarantee the carbon price / energy tax into the future in order to de-link current behaviour (which causes a political backlash) with investment behaviour.
- The current proposals keep all of the funds within the country that imposes the levy. In addition there could be a small *International* Carbon Tax to fund the United Nations
- To prevent a voter backlash, we could allow "grandfathering" (e.g. based on last year's consumption) for individual energy consumption. In that way nobody would lose in the short term. Ha – that's what grandfathering is.!..

References

Barker, T., 2008. Understanding and Resolving the Big Crunch. *Cambridge Trust for New Thinking in Economics*.

Entin, S.J., 2004. Tax incidence, tax burden, and tax shifting: Who really pays the tax. *Center for Data Analysis Report*, 4, 12.

EPA, 2009. *Green Power Equivalency Calculator Methodologies*, Available at: http://www.epa.gov/grnpower/pubs/calcmeth.htm.

Fisher, I., 1933. The debt-deflation theory of great depressions. *Econometrica: Journal of the Econometric Society*, 337–357.

Guha, K., 2009. Fed study puts ideal US interest rate at -5%. *Financial Times*. Available at: http://www.ft.com/cms/s/0/37877644-32c9-11de-8116-00144feabdc0.html.

Hamilton, C., 2009. Nordhaus' Carbon Tax: An Excuse to Do Nothing? Available at: http://www.clivehamilton.net.au/cms/media/critique_of_nordhaus.pdf.

Hansen, J. et al., 2008. Target Atmospheric CO2: Where Should Humanity Aim? *eprint arXiv: 0804.1126*. Available at: http://tinyurl.com/79u495.

Harvey, F., 2009. WTO signals backing for border taxes. *Financial Times*. Available at: http://www.ft.com/cms/s/0/d9d8ad2e-61e9-11de-9e03-00144feabdc0.html [Accessed August 3, 2009].

Helm, D., Smale, R. & Phillips, J., 2007. Too good to be true? The UK's Climate Change Record. Available at: http://tinyurl.com/csccmx.

IEA, 2009. *Energy Prices and Taxes*, Available at: http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1084.

IEA, 2008. *World Energy Outlook*, Available at: http://www.iea.org/Textbase/nppdf/stud/08/weo2008_part1.pdf [Accessed December 16, 2008].

Ismer, R. & Neuhoff, K., 2007. Border tax adjustment: a feasible way to support stringent emission trading. *European Journal of Law and Economics*, 24(2), 137–164.

Ismer, R. & Neuhoff, K., 2006. Commitments through Financial Options: A Way to Facilitate Compliance with Climate Change Obligations. *Electricity Policy Research Group Working Paper. EPRG*, 6, 25.

Johnson, K.C., 2007a. Refunded Emission Taxes: A Coherent Post-Kyoto Policy Framework for Greenhouse Gas Regulation. *SSRN eLibrary*. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=934481#.

Johnson, K.C., 2007b. Refunded emission taxes: A resolution to the cap-versus-tax dilemma for greenhouse gas regulation. *Energy Policy*, 35(5), 3115–3118.

Joslin, T., 2009. *Save the forests! A proposal for a new financial mechanism to reduce deforestation*

and promote afforestation around the world, forthcoming.

Keith, D., Ha-Duong, M. & Stolaroff, J., 2006. Climate Strategy with CO2 Capture from the Air. *Climatic Change*, 74(1), 17-45.

Nauclér, T., Campbell, W. & Ruijs, J., 2008. Carbon Capture and Storage–Assessing the Economics. *McKinsey Climate Change Special Initiative, McKinsey & Company*. Available at: http://www.mckinsey.com/clientservice/ccsi/pdf/ccs_assessing_the_economics.pdf.

Nordhaus, W.D., 2007. To Tax or Not to Tax: Alternative Approaches to Slowing Global Warming. *Rev Environ Econ Policy*, 1(1), 26-44.

Staley, B.C. et al., 2009. *Juice From Concentrate: Reducing Emissions with Concentrating Solar Thermal Power*, World Resources Institute. Available at: http://www.wri.org/publication/juice-from-concentrate [Accessed August 3, 2009].

Stern, N., 2009. *Blueprint for a Safer Planet: how to manage climate change and create a new era of progress and prosperity*, Available at: http://www2.lse.ac.uk/ERD/pressAndInformationOffice/publications/books/2009/BlueprintSaferPlanet.aspx [Accessed August 3, 2009].

Tamiotti, L. et al., 2009. Trade and Climate Change: A report by the United Nations Environment Programme and the World Trade Organization.