

Can emission trading schemes and emission taxes be harmonized? The European Union's Emission Trading Scheme beyond the Kyoto Protocol

**Why the EU must defend the ideal of a carbon price and its ETS institutions
and avoid being captured by the vested interests of European Industry.**

by

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Abstract (revised)

The next Conference of Parties under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC) will take place in Durban, South Africa in late November 2011. The mood among climate negotiators is gloomy and pessimistic and they expect the most likely outcome of the Durban conference to be that there will be no successor agreement to the Kyoto Protocol.

The EU has planned to make large cuts in its emissions of Green House gasses by the year 2020 and intends to make major improvements to its Emission Trading Scheme (the EU-ETS). What will the EU do once it observes that the rest of the world is reluctant to follow its lead on climate mitigation? Will it abandon its ETS? Or will it take measures to defend it?

The first part of the paper discusses two alternative policies that the EU may use to defend its energy intensive and trade exposed industries and thus the EU-ETS. These are (a) the imposition of border tax adjustments and (b) the introduction of integrated emissions trading.

The second part of the paper address what seems to be a general frustration with emission trading schemes and a desire to switch the main thrust of carbon pricing policy towards systems based on emission taxes. A review of the theoretical literature and the history of the institutional development of ETSs reveals that there is actually a considerable degree of complementarity between these two apparently diametrically opposed policies.

Emission Trading Schemes Glossary of Acronyms

CDM	Clean Development Mechanism (of Kyoto Protocol).
COP	Conference Of Parties (to the UN FC CC).
EITA	Emission Intensive Trade Exposed.
EPA	Environmental Protection Agency (of the USA).
ETS	Emissions Trading Scheme.
EU	European Union.
EU-ETS	European Union – Emission Trading Scheme.
GATT	General Agreement on Trade & Tariffs
GHG	Green House Gas.
RECLAIM	Regional CLean Air Incentives Market.
RGGI	Regional Greenhouse Gas Initiative.
SAP	Sulfur Allowance Program.
UNFCCC	United Nations Framework Convention on Climate Change.

A. Introduction

In 1997 the European Union set itself the ambitious target of reducing the total emission of carbon dioxide [GHGs] from its member states by 20% (compared to the benchmark year) by 2020 and has offered to reduce its emissions by a further 10% if other countries agree to commit themselves to cooperate on the broad agenda of climate mitigation policies.

International negotiations on climate mitigation and adaptation policies take place under the United Nations Framework Convention on Climate Change (UNFCCC) at its annual Conference of Parties (COP). The next Conference, COP17, will be held in Durban South Africa in late November 2011. At the top of the agenda at Durban will be the task of hammering out an agreement to replace the Kyoto Protocol which is due to expire at the end of 2012.

The mood amongst climate negotiators is gloomy and pessimistic. Amid the endless wheeling and dealing between the blocks of negotiating countries, a small band of developed countries are determined to block a viable successor agreement to the Kyoto Protocol, they are hell bent on “killing” the Kyoto Protocol. All the while developing countries seem to be ratcheting up their demand for assistance from developed countries. Thus many now believe that the most likely outcome of the Durban conference will be that there will be no suitable successor to the Kyoto Protocol.

What is absolutely predictable is that energy intensive export industries in the EU, referred to in the climate literature mentioned as emission intensive and trade exposed industries (EITE), will put a great deal more pressure on the EU to protect them from competitors unfettered by the regulation of greenhouse gas emissions. This paper addresses the no successor to Kyoto scenario in terms of some of the main responses available to the European Union, specifically in terms of policy regarding its emission trading scheme (the EU-ETS).

1. The most radical option would be to close down the European Emission Trading (the EU-ETS) and release energy intensive industries in Europe from the confines of regulations on carbon emissions.
2. Most discussion seems to have been around the merits of introducing Border Adjustment Taxes (BAT). These would be levied on imports from countries which do not have carbon pricing institutions, on the basis of the emissions intensity of imports.
3. Finally the paper presents the arguments for what currently appears to be the most attractive option namely the introduction of Integrated Emission Taxes.

There is considerable debate on the need for reform of the Clean Development Mechanism, an institution that is closely associated with the EU-ETS. However this paper does not address the CDM.

There appears to be considerable support for introducing carbon pricing based on emission taxes. The paper addresses some of the issues in the debate of the relative merits of emission taxes versus emissions trading. A review of the theoretical literature and the history of the institutional development of ETSs reveals that there is actually a considerable degree of complementarity between these two apparently diametrically opposed policies.

B. Policies option for the European Union regarding its Emission Trading Scheme

B1. Shutting down or suspending the EU Emission Trading Scheme

Under the currently most likely, scenario where there is no successor agreement to the Kyoto Protocol, European companies that are emission intensive trade exposed (EITE) would will be at a considerable disadvantage compared to the competitors from countries where there are no carbon price institutions. Such companies in the EU will be tempted to move their operations to unregulated countries or *pollution havens*, outside the EU, and this would lead to *carbon leakage*.

A radical option would be for the EU to temporarily suspend or permanently dismantle the EU-ETS. The effect of such a move on international carbon markets would be devastating because, since it began operating in 2005, the EU ETS has accounted for around about 80% of the dollar value of the total trade in the world's carbon markets. The closure of the EU-ETS would be a worst case scenario and would amount to a unilateral declaration of surrender in the enterprise of developing an international carbon price. We must hope that this will remain an unthinkable option.

Considering the large investment in institution capacity made over many years, the European Commission would probably be extremely reluctant to dismantle the EU-ETS. Furthermore a number of major improvements are planned in phase 3 (2013 to 2020). Perhaps the most significant of which will be the auctioning for permits across all the regulated industries but particularly in the electricity sector were from 2013 most permits will be auctioned.

It is probably not too much of an exaggeration to say that environmentalism is a significant and growing "secular religion" in Europe and that it has membership and appeal across the political spectrum. Thus to openly dismantle the EU-ETS with no clear replacement would be political suicide. A corollary this observation is that exporters from a small open economy such as South Africa, wanting to trade with the EU, neglect environmental issues and regulations at their own peril.

Therefore the option of suspending or shutting down the EU-ETS is for currently policy purposes the unthinkable option! A more likely option may be delays in the implementation of the numerous and significant improvements to the EU-ETS that are planned for phase 3. Certainly there will be strong pressure from EITE industries to slow down implementation until at least some form of "protection" is put in place vis-à-vis companies from countries with no carbon price institutions.

B2. The Introduction of Border Tax Adjustments on imports into the EU

At the simple conceptual level a border tax adjustment would be levied on goods imported into the EU from countries that do not have a carbon price. The tax would be levied in proportion to an assessment of the embodied carbon content of the product adjusted (multiplied) by an average or minimum base level of the carbon price in the EU-ETS. The proposal also includes a rebate of the carbon price paid by EU companies which export their products to countries without carbon price institutions. Finally the emission intensive trade exposed industries in the EU are grouped into two sectors for different policy for each sector. The first sector is the electricity generation industry, and second sector being all the other emission intensive industries such as cement, iron and steel etc.

The proponents of the border tax adjustments appear confident that their policy formulations would be compliant with the rules of the World Trade Organization (WTO). However even if this were to turn out to be true in practice, the policy of border tax adjustments would nevertheless involve a considerable risk triggering some form of retaliation, with the scenario of an escalation into trade war, lurking in the background.

Lockwood and Whalley (2010) argue that a border tax adjustment would essentially be “old wine in green bottles”. They give allude to events the period between the end of the Kennedy Round (1967) and up to before the start of the Tokyo Round (1973) of GATT negotiations. According to their account the USA came close to declaring a formal trade dispute against the EU. They argue that the dispute was settled by a wide ranging debate between academic economists. They suggest that the relevant academic literature will provide considerable guidance on border tax adjustments that have been recommended to address the current associated with protecting the EU-ETS (p818).

However, one must seemingly separate out the price level and relative price effects involved in assessing the impacts of BTAs, and also separate out the motivation for their use from assessment of impact. Their potential price-level effects will likely have no impacts on real trade and offer no offset to either leakage or competitive disadvantage from cost impacts. What may appear as an offset to competitiveness effects may not be so. Indeed, the seeming relative price effects themselves may not even have an impact on trading patterns if there is sufficient specificity in the production technology. If there are rents involved, either with sector-specific wage rates or through specific factors which would absorb the effects of the tax change again, there would again be no effect on trade. Finally, ... BTAs are not the only instrument available for the chosen objectives; corporate tax manipulation of rates and structure is another.

A trade war would slow international trade and thus economic growth, which would in turn slow emissions. Might this not be a good thing for the environment!/? Yes it would be, but probably not, in the long term. A contraction in the volume of international trade would significantly slow the transfer of low-carbon *green technologies*. Technology transfer is seen by many as *the* mechanism for achieving viable climate change mitigation in developing countries and thus achieving the Holy Grail of *sustainable development*.

Should it come down to the unpleasant choice between shutting down the EU-ETS or introducing border tax adjustments and triggering a trade war, the latter would be clearly preferable. Even if Lockwood and Whalley turn out to be correct and border tax adjustments prove to be an ineffective instrument for protecting emission intensive trade exposed industries in the EU, providing that their introduction allows the EU to keep the EU-ETS in operation then the most fundamental goal, that of improving our long term chances of survival will have been served.

B3. The introduction of Integrated Emission Trading for companies importing into the EU

Alexeeva-Talebi Loschel & Mennel (2008) have proposed a beguiling policy which they call *Integrated Emission Trading*. With this policy an importer good from a country which does not have carbon price institutions is required to purchase permits or allowance from the domestic EU emissions trading scheme. They argue that this policy will be less hostile than a border tax adjustment policy and that it creates “an intermediate step in multilateral cooperation on climate change issues”. It would tend to engage and pull in countries which are not nor are part of an emission trading schemes. It keeps them in the loop and leaves the door open to future negotiations on climate mitigation. Because their tightly written contains a wealth of ideas, a long passage from their article is presented below.

As for the practical implementation, the ultimate choice of an appropriate offsetting measure should be based on two considerations, concerning the institutional arrangements and the degree of international cooperation. The implementation of both instruments is likely to go along with considerable administrative efforts in the domestic or foreign country, respectively. Additional to the domestic environmental administration (national carbon registers) authorities must be established to define benchmarks, to measure and to report carbon content of the imported goods. While the BTA regime calls for a home-based authority defining carbon standards, IET requires international cooperation to run comparable institutions (branch offices) abroad. Thus, IET represents, in principle, an intermediate step in multilateral cooperation on climate change issues. The introduction of the IET regime could finally result in launching emission reduction schemes with binding constraints abroad, which could then be linked with the domestic scheme. In that case, IET would be an example of the export of EU regulation - a phenomenon that has recently attracted attention (compare the article “Brussels rules OK - How the European Union is becoming the world’s chief regulator” in *The Economist* of September 27, 2008). Instead, BTA is per-se a non-cooperative policy option. Its introduction may cause retaliatory measures by trading partners resulting in the welfare-decreasing trade wars. The study of such a scenario requires a game-theoretic setup.

It seems that since it was first mooted, the concept of Integrated Emissions Trading has gain considerably support. However to assess the relative merits of an Integrated Emission Trading scheme compared to Border Tax Adjustments the argument a detailed knowledge of trade theory would be necessary. Therefore this paper does not offer neither an assessment of these alternative policies for the reason that its author is unfamiliar with trade theory and policy. Such an assessment will have to be the enterprise of a future and hopefully collaborative paper.

C. Can Emission trading schemes and taxes be harmonized?

It should be remembered that emission taxes were the clear first choice of policy makers in the EU who battled for about 5 years before giving up their attempts to get a consensus to introduce such taxes. So perhaps it is not surprising that EU climate policy makers may pine for their first love, when the going has got so hard for the substitute for their true affections.

There seems to be considerable advocacy in the USA for the adoption of emission taxes, with the Brookings institute probably being the lead advocate (). The supporters of emission taxes have a very jaundiced view about the attempts to get a national emissions trading scheme through the legislative process. They are dubious of the generous exemptions and allowances offered to vested interests, of the swarms of middlemen and advisors associated with emissions trading, and of course of the strong role that the banking system would play. However as Cleetus (2011, p22) eloquently points out the same political realities that beset the process of drafting of emissions trading legislation would inevitably be brought into play during an attempt to introduce an emissions tax.

To become law, climate legislation requires approval from Congress and the president. During the legislative process, the authors of the proposed cap-and-trade bills underwent significant pressure to recognize myriad special interests as is evidenced by their complex emission allowance allocation formulas. If a carbon tax of any significance were on the legislative slate tomorrow, it too would undergo enough contortions so as to have small resemblance to the theoretically pure solution some advocate. It would be dangerously naïve, and out of keeping with all previous experience, to assume that a tax would pass this process unscathed. The same players who worked successfully to lower the stringency of the cap would now be lobbying for lowered tax rates, exemptions, delays, inclusion of offsets, and other loopholes. Also, the fights over allowance allocations would now shift to the division of tax revenues through appropriations.

C.1 Theoretical literature has recommend introducing emission tax features into ETs

There is the argument that emission taxes are in theory inherently superior to emission trading schemes. This argument is based on experience regarding of stock pollutants, where the marginal social cost curve (aka the marginal damage curve or marginal benefit curve) tends to be relative flat when compared to the marginal control (abatement) cost curve. Thus should the situation turn out where the marginal control cost curve is considerably steeper than initially expected by the environmental regulator, then the environmental regulator set the cap on total of emission too low. The result will be a spike in the permit price.

This problem was almost inadvertently addressed in the infancy of the theoretical debate concerning quantity instruments. Weitzman (1974) argued that the fundamental weakness of a quantity based instrument (emission trading) could be remedied by a fixed penalty at the top end and a subsidy at the bottom end of the suitable price range. At virtually the same taking time Roberts and Spence (1974) came to an essentially similar conclusion. The arguments were restated and refined in the specific institutional context of emission trading schemes by Pizer (2004) and Burtraw & Palmer and Kahn (2009). In some of the literature and particular in the context of operating emission trading schemes the price ceiling is referred to as the safety valve. When an arrangement which includes both a price ceiling and floor was considered a rather unusual piece of terminology called the *symmetrical safety value* came into use. In the finance literature most of us would refer to a symmetrical safety values simply as a “collar”. Many of the current emission trading schemes incorporate at least a price ceiling and quite a few also incorporate a price floor.

C. 2 Emission tax features have been incorporated into operating emission trading schemes

Regulated industries and companies have over the years expressed the recurring fear of a scenario in which due to a shortage of available permits leads to a sharp spike in permit prices.

The events that unfolded in the RECLAIM (Regional Clean Air Incentives Markets) scheme in the Los Angeles area during 2000 and 2001, illustrate what a *perfect storm* in an emission trading market would look like. The designers of the RECLAIM scheme had set particularly demanding emission reduction targets and had consequently incorporated features that were considerably more restrictive than those, of say, those of the Sulfur Allowance Program. The RECLAIM scheme forbade banking of permits between one year and the next and it imposed restrictions on the trading of permits between the two different zones within the scheme area. Because of a particularly hot summer in 2000, the demand for electricity in California increased considerably, and at the same time the supply of electricity available from outside the state of California dropped. Californian electricity companies brought back into service various old power plants. However these plants were not fitted with the current emission control technology and therefore the additional supply of electricity that was generated was highly emission intensive. At the time Enron was the dominant and highly manipulative participant in the recently and partially developed California energy markets.

The effects of this volatile combination, were truly spectacular spikes in the permit prices for both sulfur dioxide (SO₂) and nitrous oxides (NO_x) traded in the RECLAIM scheme. The price of sulfur dioxide permits increased from an average of just over \$800 in 1998 to a peak of \$5 765 in 2001, a seven fold increase. The price of permits for nitrous oxides increased from an average of around \$2 500 in 1998 to about \$41 000 in 2001, a 16 fold increase (Ellerman, Joskow and Harrison, 2003). As a direct consequent of the increase in permit prices the price of electricity increased considerably.

To address the situation the administrators of the RECLAIM scheme temporarily suspended trading and then removed the electricity generating industry from the RECLAIM scheme. They then imposed a fixed penalty of \$15 000 per ton of SO₂ emissions on electricity generators who had been unable to acquire emissions SO₂ permits; in other words an emission tax was imposed!

Another price spike occurred in the Sulfur Allowance Program when SO₂ permit increased from around \$200 in 2004 and peaked at above \$1 500 in early 2006, a six fold increase. At first glance the price spike in the SAP should simply not have happened! Firstly the scheme had few, if any, restrictions on trading permits between different zones. Furthermore as a result of generous banking provisions and a sharp reduction in emissions by scheme participants in the early years of the scheme, a large stockpile of banked permits equivalent to about 1 year of emissions, had accumulated. With such a large amount of permits overhanging the market, any extra demand should have been easily accommodated. Yet despite this surplus of permits the permit price went through the roof. It is now widely accepted that the price spike in the Sulfur Allowance Program was created by the external or *exogenous shock*, created by the announcement of overlapping environmental legislation called the Clean Air Inter State Act (CAIR).

Based on the experience in the RECLAIM scheme developers of subsequent ETS schemes have included generous banking provisions and have in the most part eschewed the use of zoning restrictions. Most of these newer schemes have also included explicit price ceilings of *safety valves*. In both the New Zealand and Australian ETSs this is a collar, a ceiling and floor price, and the value of these ceilings and floors escalate or increase over time. In the case of the EU-ETS the price ceiling is currently defined as price level relative to average market price over the previous year.

C.3 Climate Feedback Loops may dramatically change the shape of the social cost curve

If indeed the marginal social cost curve associated with green house gas pollutants is and remains relatively flat, then in theory emission taxes remain superior to emission trading schemes. However climate scientists are concerned about the prospect of *climate feedback loops* that could occur at various threshold levels of green house gas pollutants in the atmosphere. They are concerned that at current levels of emissions some of these thresholds will be breached in a relatively short span of years. Perhaps the most formidable of these climate feedback scenarios has to be with the melt or thaw of the permafrost in the Arctic Tundra region. Should this happen on a large scale, billions upon billions of tonnes of methane gas could be released from under the Arctic permafrost. On a comparable tonne for tonne basis, methane captures 22 times the heat that carbon dioxide does. Should large quantities of methane be released this could trigger a disastrous *game-over* scenario.

C.4 A price floor to protect against the scenario of a permit price that is too low

If the price of permits is too low then there will be little incentive for polluters to spend money and invest in new emissions control technologies. Furthermore even when the price of emission permits is at what is considered to sufficient high enough, the fear that a price collapse could occur might deter some polluters from investing in pollution control technology. In other words polluters would feel more comfortable in the presence of credible protection of their pollution control investments, i.e. with some guarantee that permit prices will not collapse.

A collapse in permit prices or a generally too low price level has occurred in three significant ETSs.

After the Sulfur Allowance Program recovered from the “CAIR scare”, the price of SO₂ permits collapsed to below around \$ 80 by 2009, a price that is considered by regulators to be much too low. In the Regional Greenhouse Gas Initiative (RGGI), which has operated since the beginning of 2009, in ten North Eastern States of the USA, permits have been sold at the reserve or floor price in the last five quarterly auctions. The RGGI scheme is at this moment entering a review process to finalize the rules for phase two, which begins in 2012. The critical issue is now whether RGGI administrators, and the States involved, will have the courage to reduce the future annual caps on emissions, i.e. the quantity of permits that will be available for auction in future years.

The most spectacular collapse in permit prices occurred in the EU-ETS, when the permit price dropped to close to zero in June 2007 and remained there until March 2008! There is a fairly straight forward explanation for the occurrence of this dramatic situation. The first part of the explanation is that by early 2007, following the release of national emissions data, it became clear that a considerably over allocation of permits had occurred. The second part of the explanation is that banking of unused permits had been prohibited between phase one and phase two. Thus at the end of phase one, any surplus unused permits would become worthless by the end of December 2007. Thus given that the market realized that there had been an over-allocation of permits, and given that the closer one got to the end of 2007, the more likely it became that unused permits would be worthless, the permit price collapsed in anticipation by March 2007. The prohibition on the banking of permits between phase one and phase two was however neither an oversight nor a mistake of design. Rather it was based on the shrewd foresight that due to political pressure there would inevitably be an over allocation of permits in phase one. The prohibition on banking was included to protect the permit price in phase two against the accumulation of a large stockpile of permits at the end of phase one.

C.5 In introduction phases of most ETSs permits have been over-allocated

With the exception of the RGGI scheme, the allocation of permits in the early phases of all currently operating emission trading schemes (for carbon and other pollutants such as SO₂), has involved issuing permits free of charge to the participating polluters. The allocation of emission permits free of charge on the basis of historical emissions levels has incensed the public, and yes, even us economists! Free allocation of emission permits in the early years of an ETS was introduced to get around political opposition by large polluters.

A closely related issue is *grandfathering*, where permits are issued on the basis of historical levels of emissions. The general public and most commentators have pointed out that *grandfathering* in effect rewards the worst polluters for their inefficient pollution control practices. With *grandfathering* the allocation of permits is based on historical emissions levels, or some proxy for emissions such as fuel purchases. Under *grandfathering* polluters have a perverse incentive to exaggerate their emissions and even to deliberately create extra emissions during the period when their benchmark is being measured. This dawning of this realization has had a significant effect on the design of allocation rules where permits are initially issued free of charge. In the newer schemes, the permits are allocated on the basis of either some measure of output, e.g. electricity generated, or on an emission intensity benchmark such as the Best Available Control Technology (BACT). Thus the companies which are most efficient at controlling pollution set the benchmark by which permits are allocated.

At the current stage of the development of emission trading schemes an over-allocation of permits and thus the risk of a collapse and/or too low a permit price has been the main problem. In the course of our discussion a number of solutions have been mentioned. (a) The most general approach has been to introduce ETSs in distinct phases, with each phase having stricter rules and a lower cap on the permits issued. (b) In the case of the EU-ETS this involved prohibiting the use of banking between phase one and phase two. (c) Using output or emissions intensity measures for the allocation of initial free permits. (d) Bringing in the use of auctions as soon as possible, as was the case with the RGGI scheme. (e) The schemes in Australia and New Zealand will right from the start incorporate a collar, i.e. introduce a price floor at the same time as price ceiling or safety valve. However until auctioning accounts for a significant share of the permits issued, the price floor will be difficult to enforce.

It is now vital for the evolution of the higher and more realistic international carbon price that the EU goes ahead with the reforms and improvements that it has planned for phase three of the EU-ETS. Those of us outside of the EU should be willing to tolerate the reasonable and not so reasonable measures that the EU will take to protect its emissions intensive and trade exposed industries. We should be willing to tolerate these measures providing that in the process the EU-ETS is protected against the vested interests inside the EU which could seek to emasculate and dismantle the EU-ETS.

D. Summary and Conclusions

The European Union (EU) has set itself the ambitious target of reducing the total emission of carbon dioxide [GHGs] from its member states by 20% by 2020 and has offered to reduce its emissions by a further 10% if other countries agree to commit themselves to cooperate on the broad agenda of climate mitigation policies. Furthermore the EU plans to implement a range of improvements to its Emissions Trading Scheme (the EU-ETS).

However it now appears likely that the climate negotiations that are due to take place in Durban later this year will confirm that various other countries will not commit to reciprocal escalations in their efforts emissions reduction targets. The EU will therefore face the situation where its domestic emission intensive trade exposed industries (energy intensive export industries) will be placed at a competitive disadvantage *via-a-via* competitors that are located in countries which do not have a carbon price. The paper poses the question of what the EU is likely to do to remedy this situation.

I am convinced that the EU must take definite and principled action to defend its emission trading scheme. It must do so because the EU-ETS currently constitutes both the core and most of the substance of the world's institutions for setting an international carbon price. A principled defense of the EU-ETS will be a defense of the ideal of establishing an international carbon price. An international carbon price will for a long time remain at the heart of a range of climate mitigation policies. Failure to defend the EU-ETS will be tantamount to surrender on climate mitigation policy. Surrender would have truly appalling consequences for our planet, and us all.

The EU is currently considering the imposition of *border tax adjustments* to defend its emission intensive and trade exposed industries. The proponents of this policy appear confident that it can be designed to remain within the rules of the World Trade Organization. However despite these reassurances, the mere mention of border tax adjustments conjures up the fear of retaliation and trade war. An alternative policy, Integrated Emission Trading, has been recently proposed. This policy seems to offer a similar level of protection to emission intensive and trade exposed industries in the EU while at the same time providing inducement for the continuing development and spread of emissions trading, and thus the reinforcement of an international carbon price.

This paper does not do an assessment of these alternative policies for the reason that its author is unfamiliar with trade theory and the history of trade negotiations. Such an assessment will have to be the enterprise of a future and hopefully collaborative paper.

The second part of the paper addresses the question in the title of the paper ... *Can trading schemes and emission taxes can be harmonized*. That appears to be considerable advocacy which favours a switching the direction of thrust of carbon pricing policy away from emission trading and towards emission taxes. The irony of the situation is that both the academic theory and in institutional architecture of emission trading scheme a blending of hybridization of emission trading and taxes have occurred. Specifically the emission tax type features have been incorporated into emission trading schemes to address critical shortcomings of these schemes.

Finally I hope to press home the point that, despite the current unpopularity of Emissions Trading Schemes, the EU must be allowed and even encouraged to defend its Emission Trading Scheme.

E. List of References

- Banzhaf, S. H., Burtraw, D., & Palmer, K. (2004). Efficient emission fees in the US electricity sector. *Resource and Energy Economics*, 26(3), 317-341.
- Burtraw, D., Palmer, K., & Kahn, D. (2010). A symmetric safety valve. *Energy Policy*, 38(9), 4921-4932.
- Cleetus, R. (2011). Finding common ground in the debate between carbon tax and cap-and-trade policies. *Bulletin of the Atomic Scientists*, vol 67(1), 19-27.
- Ellerman, D. Joskow, P. L. and Harrison, D. (2003) Emissions Trading in the US: Experience, Lessons and Considerations for Greenhouse Gases. *Pew Centre on Global Climate*.
- Jacoby, H. D., & Ellerman, A. D. (2004). The safety valve and climate policy. *Energy Policy*, 32(4), 481-491.
- Lockwood, B., & Whalley, J. (2010). Carbon-motivated border tax adjustments: Old wine in green bottles? *World Economy*, 33(6), 810-819.
- 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.
- New York Times (xx May 2011) Christie pulls New Jersey from 10-state climate initiative. Retrieved from http://www.nytimes.com/2011/05/27/nyregion/christie-pulls-nj-from-greenhouse-gascoalition.html?_r=2&ref=nyregion.
- Pizer, W. A. (2002). Combining price and quantity controls to mitigate global climate change. *Journal of Public Economics*, 85(3), 409-434.
- Point Carbon (2011). RGGI kicks off 2012 Program Review in September. Retrieved from http://www.rggi.org/docs/Point_Carbon_Aug_17.pdf.
- Roberts, M. J., & Spence, A. M. (1974). Effluent charges and licenses under uncertainty. *Journal of Public Economics*, 5(3-4), 193-208.
- Tietenberg, T. (2007) Environmental Economics and Policy, 5th edition, Pearson Education, Boston.
- Weitzman, M. L. (1974). Prices vs. Quantities. *The Review of Economic Studies*, 41(4), 477-491.

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