CARBON TAXATION IN THE EU: EXPANDING EU CARBON PRICE

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WP11/15

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Carbon Taxation in the EU: Expanding EU Carbon Price

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CARBON TAXATION IN THE EU: EXPANDING EU CARBON PRICE

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Abstract

The current pricing mechanism for carbon in the EU, the EU emissions trading system, only covers 40 percent of emissions. Carbon taxation currently plays no role. The Commission has recently proposed to revise the energy tax system in the EU to include a carbon tax component. This paper evaluates the Commission proposal and considers the possible expansion of the EU carbon pricing base either by expanding emissions trading to cover more sectors or by enacting a carbon tax. It concludes that there are strong arguments for expanding the carbon pricing base, as suggested by the Commission. Nevertheless, expanding the base should done through a unified system, such as expanding the coverage of the emissions trading system or enacting an economy-wide carbon tax rather than through having side-by-side taxes and trading, as in the Commission proposal.

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The EU has set an ambitious goal of reducing greenhouse gas emissions by 20 percent below 1990 levels by 2020.[1] To achieve these reductions, the EU has put in place a portfolio of policies. The centerpiece is an emissions trading system, the EU ETS. The ETS requires large industrial plants to buy and sell permits to release carbon dioxide into the atmosphere, with the number of permits declining over time to meet specified emissions goals for the covered sectors.[2] The ETS covers only 40 percent of greenhouse gas emissions, however. It does not include key polluting sectors such as household use of fuels, most commercial facilities, transport, and agriculture. Emissions from these sectors are instead subject to command-and-control regulations, such as fuel economy standards for transport and efficiency codes for buildings.

Carbon taxation does not yet play a role in the EU emissions reductions strategy. Since the early 1990s, there have been several attempts to introduce a unitary carbon tax across all EU member states. These attempts failed. Member states objected to ceding taxing authority to Brussels and were concerned about the economic impact of carbon taxation. Instead, in 2003, the Commission enacted the Energy Tax Directive.[3] The ETD focuses on improving the functioning of the internal market by imposing common and low rates of tax on fuel uses of energy, such as transport and heating, and on electricity. Rates are not related to carbon dioxide emissions (and would be too low in any event) and the base does not cover many large sources of emissions.

[1] Commission, '20 20 by 2020: Europe's climate change opportunity' (Communication) COM (2008) 30 final.

[2] The major sectors in the ETS are large combustion installations such as power generation facilities, mineral installations, and pulp and paper production. It excludes transport, households, and agriculture.

[3] Council Directive 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity [2003] OJ L 283/51.

In April 2011, the Commission proposed to modify the ETD so that it includes an explicit carbon tax. The Commission argued that the existing structure, with a carbon price covering only 40 percent of emissions, will make it difficult for the EU to reach its ambitious carbon reduction goals. Moreover, the existing structure covers some sectors twice and others not at all, creating inefficiencies. The Commission concluded that it is time to revisit the ETD to make it better align with the EU's climate policy.

The proposed revision divides the ETD into two components: an explicit carbon tax based on the carbon content of fuels and a separate tax on energy use based on the caloric content of fuels. The carbon component would cover most uses of fossil fuels not already part of the ETS. In doing so, it would expand the carbon-pricing base to around 80 percent of EU emissions. The rate would be €20/ton of CO_2 as of 2013.

The Commission's proposal provides an opportunity to rethink the role of carbon taxation in the EU. The standard objection to an EU carbon tax is that it cannot overcome the unanimity requirements needed to enact an EU-wide tax. If the Commission's proposal is to be accepted, however, the unanimity problem must be overcome. Once we assume that this is a possibility, however, we can consider a wider set of possibilities. That is, once we allow for the possibility of passing an EU-wide tax, the set of possible carbon pricing systems opens up. The goal of this paper, therefore, is to evaluate the possible role of carbon pricing in the EU generally, to evaluate the Commission's proposal, and to consider alternatives.

The conclusions are as follows. The proposed revision would expand the carbon tax base and, as a result, is a clear improvement over the current system. A broad carbon-tax base ensures that the lowest-cost mitigation options are pursued, thereby lowering the overall cost and likelihood of meeting the EU's targets. Going from a base of 40 percent of emissions to 80

percent of emissions has the potential to significantly lower costs. Member states seeking to minimize the cost of meeting their emissions reductions targets should support it.

Nevertheless, there are a number of problems with the proposal. First, the ETS and related agreements (such as the Burden Sharing Agreement) were negotiated with careful attention to the distributive effects across member states. Adding a uniform carbon tax alongside the ETS has the potential to change these effects, hurting poor states. Second, the proposal creates a dual system, with some emissions covered under a trading system and others under a tax. Coordinating these systems will be difficult. The price of carbon will inevitably be different in the two systems. In addition, the administrative costs of running two separate systems will be high. And, for reasons discussed below, a dual system has to be implemented midstream, further increasing administrative and compliance costs.

All of these problems would be solved by using a single, unified pricing system, whether it is a tax or a trading system, rather than the side-by-side tax and trading system envisioned by the Commission. A single system would ensure that all sectors face the same carbon, a basic condition of efficiency. It could be implemented far more easily than a dual system. There would only be one set of rules and one administrative agency needed to enforce them. And a single system, unlike a dual system, could be imposed upstream. Finally, it would enhance rather than offset the distributive effects of the ETS. Put simply, why have two systems with all of the attendant coordination and administrative problems when the EU could simply expand the ETS? And once the ETS is expanded, its design could be greatly simplified to improve compliance and lower administrative costs.

The ETS was recently modified for its third phase. It would be difficult to modify it again in the immediate future along the lines suggested here. Perhaps the Commission's proposal can be

justified because it is the only feasible way to expand the carbon pricing base. While this may be true for the short term, carbon pricing is likely with us for the indefinite future, and if there are substantial gains from better system design, they are worth pursuing even if it takes some time to implement them. We might think of the proposals discussed here as being for the fourth phase of the ETS.

1. The current regulatory structure

Before considering changes to the EU energy taxes and its emissions reduction strategy, it is important to understand the EU's current set of policies and the reasons they were adopted. The current energy tax scheme is embodied in the Energy Tax Directive, while the centerpiece of the EU's emissions reduction strategy is the Emissions Trading System. This section reviews both these initiatives.

1.1 The Energy Taxation Directive

The Energy Taxation Directive was enacted in 2003 after a long and complex negotiation going back to 1992.[4] It requires minimum taxes on all energy products used as motor fuels or for heating, as well as electricity consumed in similar situations. The base does not include energy products used as material in production processes, such as chemical reduction, electrolytic,

[4] Detailed histories can be found in a number of sources. Key papers include Jacob Klok, 'Energy Taxation in the European Union. Past Negotiations and Future Perspectives' (2005) Instituto de Estudios Fiscales Working Paper 21/05 <http://www.ief.es/documentos/recursos/publicaciones/documentos_trabajo/2005_21.pdf> accessed 26 July 2011; Stefan Speck, 'The Design of Carbon and Broad-Based Energy Taxes in European Countries' (2008) 10 Vermont J of Environmental L 31; Henrik Hasselknippe and Atle Christer Christiansen, 'Energy Taxation in Europe: Current Status - Drivers and Barriers - Future Prospects' (2003) Fridtjof Hansen Institute Report 14/2003 <http://www.fni.no/doc&pdf/FNI-R1403.pdf> accessed 26 July 2011.

metallurgical, and mineralogical processes. In addition, it does not apply to electricity when electricity accounts for more than 50 percent of the cost of the product.

The rates are relatively low. Most of the EU15 member states except for Greece already had taxes on energy sources (other than coal) which exceeded the taxes required by the ETD. Most new member states, however, had rates that were lower than the minimums, in some cases by wide margins, so the major effect of the ETD was on accession states (plus coal in the EU15). Table 1 summarizes the ETD and compares it to tax rates in member states prior to its enactment.[5] The white fields indicate that actual taxes are less than the minimum taxes.

Table 1: Comparison of minimum and actual taxation in 2002

Energy Tax Directive			Actual taxation in member states (2002)																		
Energy Carriers	euro per….	Rate	AT	BE	DK	FI	FR	DE	GR	IE	IT	LU	NL	PT	ES	SE	UK	CZ	HU	PL	SI
Unleaded petrol	1000 l	359	414	507	548	559	581	624	296	401	542	372	628	470	396	504	729	351	409	381	276
Diesel (Transp.)	1000 l	302/330	290	304	370	304	383	440	245	304	403	253	344	269	294	341	729	264	336	255	276
LFO	1000 l	21	76	13	279	68	49	61	166	47	403	5	198	33	85	279	50	0	0	42	0
Heavy Fuel Oil	1000kg	15	36	6	52	57	19	18	19	14	31	6	32	27	14	…	44	0	0	0	0
Nat. Gas	GJ gcv	0.3 a)	1.0	0.3	7.2	0.5	0	1.0	0	0	4.3	0	2.5	0	0	4.5	0	0	0	0	0
Coal coke	GJ gcv	0.3 a)	0	0	7.3	2.1	0	0	0	0	0	0	0.6	0	0	10	0	0	0	0	0
Electricity	MWh	1 b)	20	1.4	89	7.0	7.3	17.9	0	0	40	2.4	45	0	5.1	22	0	0	0	0	0.3

Notes : a) 0.15 euros for business use; b) 0.5 euros for business use; all taxes without sulphur tax and VAT, Source: Kohlhaas and others (2004)

There does not appear to be a sound rationale for the ETD as currently structured. The rates are not connected to any identifiable externality from energy use. The minimum rates in the ETD do not reflect the carbon content of taxed fuels. For example, if we translate the minimum rates into euros per tonne of CO_2, petrol is taxed at €159 per tonne, natural gas used as motor fuel at

[5] Table 1 is taken from Michael Kohlhaas and others, 'Economic, Environmental and International Trade Effects of the EU Directive on Energy Tax Harmonization' (2004) German Institute for Economic Research Discussion Papers 462 <http://www.diw.de/documents/publikationen/73/diw_01.c.42775.de/dp462.pdf> accessed 26 July 2011.

€46, natural gas in for heating at €5, and coal used for non-business heating at €3.[6] The rates are also not connected to the relative energy content of the fuels. Nor do the rates and base relate to other potential externalities from fuel use, such as congestion externalities, local pollutants, or national security problems.

The history of the ETD indicates that it was enacted at the behest of member states which, for domestic reasons, wished to impose high energy taxes but were worried about competition from states with low tax rates. The language used was "internal market coordination." Absent externalities that cross borders, however, it is not clear why this is needed. Suppose, for example, there is a local externality from energy use, such as the pollution of a local resource. A member state may, as a result, want to impose a Pigouvian tax on the externality. If the energy use shifts to a second member state, the pollution would now be within the boundaries of the second member state, and it is not clear why the first member state should care. If the pollution crosses borders or has other effects on the first member state, then it may make sense to impose a mandatory tax system. But as noted, the ETD cannot be tied to any identifiable cross-border externalities.

1.2 The Emissions Trading System

The EU eventually adopted an emissions trading system instead of a carbon tax, as the centerpiece of its emissions reduction strategy.[7] The ETS is a cap-and-trade system, imposed

[6] Commission, 'Impact Assessment, Accompanying document to the Proposal for a Council Directive amending Direction 2003/96/EC' (Impact Assessment) COM (2011) 169 final 9.

[7] COM (2008) 30 final (n 1). Available at <www.energy.eu/directives/com2008_0030en01.pdf>. The second "20" in the title refers to the goal of having 20 percent of energy come from renewable sources.

midstream on large emitters.[8] The emissions trading base is made up of four broad sectors: (1) iron and steel, (2) certain mineral industries (including cement), (3) energy production (including electric power and refining) and (4) pulp and paper. It is limited to combustion facilities with a thermal input of greater than 20MW. Across the EU, this comprises roughly 12,000 facilities.

The ETS covers about half of the EU's CO_2 emissions and about 40 percent of the EU's total greenhouse gas emissions. (CO_2 is about 80 percent of the EU emissions measured on a climate-forcing equivalence basis.) The remaining 60 percent of EU emissions are supposed to be controlled by other policies, which are largely traditional command-and-control regulations such as fuel economy standards and building codes. The major excluded sectors of CO_2 emissions are transport, agriculture, and residential and commercial use of fuels (such as for

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The EU emissions reductions under the Kyoto Protocol are technically separate from the ETS—the ETS was to be implemented regardless of whether the Kyoto Protocol was ratified, and it continues until 2020, which is after the Kyoto Protocol is set to expire. Nevertheless, the ETS is the main mechanism for complying with the Kyoto Protocol.

[8] Sources describing and evaluating the ETS include A. Denny Ellerman, Frank J. Convery and Christian De Perthuis (eds), *Pricing Carbon: The European Union Emissions Trading Scheme* (CUP 2010); A. Denny Ellerman and Barbara K. Buchner, 'The European Union Emissions Trading Scheme: Origins, Allocation, and Early Results' (2007) 1 Rev of Environmental Economics & Policy 66; Joseph Kruger, Wallace E. Oates and William A. Pizer, 'Decentralization in the EU Emissions Trading Scheme and Lessons for Global Policy' (2007) 1 Rev of Environmental Economics & Policy 112; Jon Birger Skjaerseth and Jorgen Wettestad, 'Fixing the EU Trading System? Understanding the Post-2012 Changes' (2010) 10 Global Environmental Politics 101; Frank J. Convery and Luke Redmond, 'Market and Price Developments in the European Union Emissions Trading Scheme' (2007) 1 Rev of Environmental Economics & Policy 88; A. Denny. Ellerman and Paul L. Joskow, 'The European Union's Emissions Trading System in perspective' (2008) Pew Center on Global Climate Change <http://www.pewclimate.org/docUploads/EU-ETS-In-Perspective-Report.pdf> accessed 26 July 2011.

home heating).

The trading period for the current phase of the ETS is five years, running from 2008 until 2013. The length of the trading period is important because permits issued in the trading period can be used at any time within the trading period. Because permits are issued in February of each year but need not be submitted for the prior year until April, permits can effectively be borrowed one year in advance. They can also be banked from the time they are issued until the end of the trading period, creating a variable banking period depending on when within a trading period a permit issued. Banking and borrowing of permits is important because it allows users to allocate more permits to periods when they are more in demand and fewer to periods when they are less in demand.[9]

The ETS was designed with distributive goals in mind. The distributive effects are a result of the interaction between the member states' emissions targets and the design of the ETS. The EU members agreed on an overall cap on emissions.[10] Each member state then agreed to its own national emissions target under the EU burden-sharing agreement so that the total met the overall EU goal. The member-state targets were set with explicit distributive goals, on the theory that wealthier states should reduce emissions more than less wealthy states. Given this target, each

[9] The longer the banking and borrowing periods, the more permits look like standard property. An owner of property can decide when to use the property. This leads to efficient utilization of property across time. Short permit periods artificially constrain the choice of when to use them, creating government-mandated and likely inefficient time allocations of permit use.

[10] Although the ETS is a central component of the EU's compliance with the Kyoto Protocol, it operates independently of the Kyoto Protocol. The member states that are part of the ETS are not the same as those subject to the Kyoto Protocol, and the time periods of the ETS and the Kyoto Protocol are different.

member state developed a National Allocation Plan or NAP which allocated the state's total emissions reduction target between the trading sector and non-trading sectors. Each member state then allocated permits within the trading sector to individual sources of emissions. Allocations in the first two phases of the ETS were given away freely rather than auctioned. Permit trading is done on member-state registries, and member states also enforce compliance. The member-state systems are coordinated through the emissions trading directive and linked because permits from one country can be used by emitters in other countries. Linking ensures that a single, unified price for carbon dioxide emerges.

To illustrate the effects of this arrangement in a simple setting, imagine that there are only two countries, Rich and Poor, each with equal emissions and equal marginal abatement costs. For example, suppose that each emits 100 units of greenhouse gases. Suppose that the joint target is to reduce emissions by half, but that because of distributive concerns, they decide that Rich should reduce emissions by 70 units and Poor should reduce emissions by 30 units. If they adopt a cap-and-trade system to do this, Rich would get 30 permits (because this is how much it is allowed to emit) and Poor would get 70. If the cap-and-trade system covers the entire economy and trading is allowed freely across countries, the market will equilibrate so that each country actually reduces emissions by 50 because emitters in Rich will find it profitable to purchase permits from Poor until marginal abatement costs equalize. The effect is simply a transfer of the value of 20 permits from Rich to Poor. Note that Rich will not meet its emissions targets if measured purely on a production basis—it will emit 20 too much—while Poor will exceed its targets by 20. The overall target will be met, however, as will the distributive goals so that failure to meet individual member-state goals should not matter in this simple setting. The Kyoto Protocol, recognizing this, allows these sorts of transfers of permits in determining whether a

country has met its targets.

Now suppose that only part of each country's emissions is covered by the cap-and-trade system and the rest is covered by regulation. Permits will trade in the covered sectors, as above, and marginal abatement costs will be equalized across countries for those sectors. Rich, however, will have to regulate its non-covered sectors more stringently to meet its higher goals, resulting in higher marginal abatement costs for these sectors. Similarly, Poor can regulate its non-covered sectors less stringently, resulting in lower marginal abatement costs in those sectors.

To illustrate, suppose in the example that half of each economy is covered by a trading regime and half of each country's reductions are to be achieved within the trading sector. Rich would have a target reduction of 35 in the trading sector and Poor would have a target reduction of 15. Due to trading, industries in Rich would purchase 10 of permits from Poor, resulting in 25 of reductions in each country's trading sectors. Rich would then have to find another 35 of reductions in its non-trading sectors, so the marginal abatement costs would be higher in those sectors than in the trading sectors (which only have to find 25 of reductions due to trading). Poor would have to find only 15 of reductions in its non-trading sectors, so the marginal abatement costs would be lower there.[11] The result is a partial transfer from Rich to Poor through emissions trading and inefficiency due to differing marginal abatement costs. With only part of the economy in the cap-and-trade system, we get less redistribution from Rich to Poor and a less efficient set of abatement policies.

Some of this structure will change in 2013 for the third phase of the ETS, which runs from

[11] Note also that if the countries can allocate reductions between the trading and non-trading sectors, they have an incentive to minimize these inefficiencies through the allocation. This, however, may also distort where reductions take place.

2013 until 2020.[12] In particular, for the period from 2013 until 2020, there will be a single, EU-wide cap, and allowances will be allocated on a fully harmonized basis, eliminating the National Allocation Plans. The third phase will also feature more auctioning of permits. With some exceptions for large facilities in poorer countries, the power sector will need to purchase all of its permits in 2013 while other industries will need to buy a minimum of 20 percent of their permits in 2013, increasing to 70 percent by 2020. Industries subject to global competition, however, will be allowed to get free allowances; these industries account for about a quarter of total emissions covered by the ETS and about 80 percent of emissions from manufacturing.

The ETS has been studied extensively and been subject to a number of criticisms.[13] Permit prices collapsed during the trial phase. The decentralized cap setting process creates inefficiencies because nations have to set their NAPs in anticipation of other nations simultaneously setting their NAPs.[14] The current phase, Phase II, has had serious problems with permit theft in large part due to the use of member states for local enforcement and trading. Many of these criticisms have been the focus of changes for Phase III. Nevertheless, Phase III will continue to cover only 40 percent emissions, creating pressure for a more robust carbon pricing system.

2. The proposed revision to the ETD

2.1 Problems highlighted by the Commission

[13] See sources in n 8.

[13] See sources in n 8.

[14] Kruger, Oates and Pizer (n 8).

An ideal carbon price system would impose the same price on all emissions of greenhouse gases regardless of the source. The current combination of the ETD and ETS does not achieve this. The primary problem is that the carbon pricing base is too narrow. The ETS covers only 50 percent of CO_2 emissions and 40 percent of all greenhouse gas emissions. While the ETD imposes a tax on other sectors, given lack of connection to carbon content, it might be best to think of these other sectors as not having a CO_2 price at all. Even if we think of the ETD as imposing a carbon price because it increases the price of using certain fossil fuels, the system would be inefficient. The price is not coordinated with the price in the sectors covered by the ETS, it is unrelated to carbon content, and in many sectors it is far too low. Moreover, there are sectors such as small combustion installations and agriculture that are not covered under either system.

A second important problem highlighted by the Commission is that the two systems overlap. In particular, both the ETD and the ETS apply to paper and pulp production and parts of the chemical industry. This is likely inefficient. If the overall cap is binding, adding a carbon tax to a set of industries within the cap merely shifts how much various industries reduce emissions so that marginal abatement costs are no longer equalized across industries without reducing emissions further.

Finally, the details of the systems differ, so that even if the prices were the same and coverage complete, the effective price would differ. For example, the ETS, at least until the auction in the third phase, had free allocation of permits. The ETD had no equivalent grandfathering provision for current emissions. The ETS has special provisions for sectors subject to carbon leakage while the ETD does not. And the ETS includes a carbon offset system, the Clean Development Mechanism, while the ETD does not. These implementation details can greatly affect the true carbon price placed on emitters and cause systems that on the surface level

seem to impose a uniform price to differ.

The Commission argued that in light of the stringent emissions reduction goals that have been adopted, these inefficiencies are no longer tolerable. Reaching the goals will be difficult even with the best designed system. A system with substantial inefficiencies may make reaching the goals impossible.

2.2 Description of Proposed Revision

The proposed revision of the Energy Taxation Directive is designed to address these problems. It would attempt to eliminate the overlap with, and gaps between, the ETS and the ETD, and to impose a coherent carbon price on the sectors covered by the ETD. It would also coordinate the prices in the two sectors and provide similar operating rules.[15]

To do this, the taxation of energy products would be divided into two components. One component would be based on the CO_2 emissions from the use of the product. Most uses of energy, other than those subject to the ETS, would be subject to a CO_2 taxation based on carbon content. This means that the ETD base would be expanded to include the use of fuels in agriculture, and small combustion installations excluded from the ETS because of their size.

The initial tax rate would be €20/tonne of CO_2 and, subject to exceptions discussed below, would be uniform across all fuels. The rate was set to be close to the projected price of permits in the ETS. To minimize deviations from the carbon price in the ETS, the rate is to be monitored in

[15] The proposal would also include a separate tax on the energy content of fuels. These provisions are not the subject of the present investigation.

the five-yearly review of the Directive.[16]

There are a number of exceptions to the tax. In particular, the proposal would require tax credits for industries subject to leakage, analogous to the free allocation of permits in ETS. In addition, it includes rules allowing for lower rates in specified circumstances. Member states would also be able to impose additional taxes—the proposal retains the approach taken in the ETD of imposing only a minimum tax rate.

2.3 Evaluation of the proposed system

The proposed system addresses the main problems with the existing tax system listed above. It expands the carbon price to include almost all uses of fossil fuels, eliminates double coverage, and to some extent coordinates the prices and other provisions in the two sectors. The revision, therefore, is a clear improvement over the current system. Most centrally, by expanding the base, it should lower the cost of reaching the EU's emissions reduction goals.

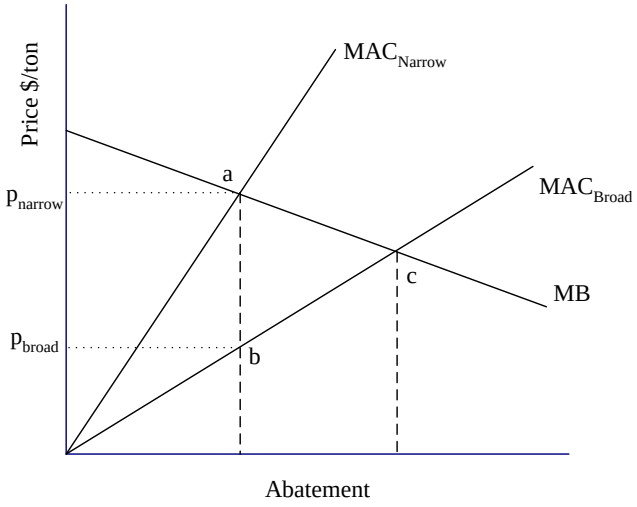
The Impact Assessment by the Commission Staff did not try to quantify the benefit of expanding the carbon pricing base because of lower abatement costs. To illustrate the issue, consider Figure 1.[17] It shows an initial marginal abatement cost curve (MAC_{Narrow}) and a marginal benefit curve. The optimal abatement is at point *a*, where the marginal benefit curve

[16] The Commission considered whether a lower tax rate should be used in light of the decision to divide the economy into ETS and non-ETS sectors and the subsequent national targets which took into account relative income differences across member states. As a result of this division, the average price of emissions reductions in the non-ETS sectors differed from the price within the ETS and in a 2010 study was found to be only €4-5/t.

[17] Figure 1 is taken from Gilbert E. Metcalf and David A. Weisbach, 'The Design of a Carbon Tax' (2009) 33 Harvard Environmental L Rev 499.

equals the marginal cost curve. The cost is p_{narrow}. If the base is broadened so that the marginal abatement cost curve is MAC_{Broad}, the optimal abatement is now at point *c*. Moreover, even if we do not increase the abatement target, the cost of abatement at the initial level goes down to p_{broad}.

Figure 1: Benefits to Broadening the Base



The size of the reduction in costs depends on how much the MAC curve rotates outward when this base is broadened. This in turn depends on the extent to which there are low-cost abatement options outside the current pricing base. Therefore, to determine whether it is desirable to add any particular item to the tax base, it is necessary to know the marginal abatement costs for the activity generating the emissions and the administrative costs of including them in the pricing base. The sectors excluded from the current carbon pricing system are transportation, residential and commercial fuel use, and agriculture. We need to know whether there are low-cost abatement opportunities in these sectors in the EU.

A preliminary issue in analyzing mitigation opportunities in building, transportation, and agricultural use of fuels is that these sectors, particularly buildings and transportation, are already

highly regulated. Easily identified, low-cost mitigation strategies are already likely being pursued through regulation. The advantage of a pricing system over regulation is that a pricing system allows individuals to choose their mitigation strategies. Strategies that regulators do not identify may be best and those chosen by regulators may be dominated by alternatives. Studies attempting to find mitigation opportunities in a regulated market, however, are subject to precisely the same information problems as the regulators are, so we should not expect studies to find a large number of opportunities.

With this in mind, estimates of mitigation costs for individual sectors are available, but there are not a large number of them. For transportation in the EU, the two major studies are a "well-to-wheels" analysis by the Commissioner Joint Research Centre Institute for Environment and Sustainability and a study by the IEA of mitigation potential of the OECD transport sector.[18] The wells-to-wheels analysis report concludes that switching fuels to reduce emissions is likely costly, with a wide variation across fuels. The IEA study considers more general transportation policies including additional use of public transport, improvements in conventional engines, and fuel switching. It finds that a $95/ton tax on carbon (equivalent to about a $26/ton tax on carbon dioxide) would produce a reduction in energy demand of about six percent in 2020. Overall, the potential for mitigation in the EU in the transport sector appears to be modest, which is likely a

[18] Commission, *Well-to-Wheels Report* (2007) version 2c <http://ies.jrc.ec.europa.eu/uploads/media/WTW_Report_010307.pdf> accessed 26 July 2011; Michael Landwehr and Céline Marie-Lilliu, 'Transportation Projections in the OECD Regions: Detailed Report' (2002) Intl Energy Agency <http://s3.amazonaws.com/zanran_storage/www.iea.org/ContentPages/26167064.pdf> accessed 26 July 2011. See also Bert Metz and others (eds), *Climate Change 2007: Mitigation of Climate Change—Contribution of Working Group III to the Fourth Assessment Report of the IPCC* (CUP 2007). Working Group III, Chapter 5 summarizes the two studies.

result of the large number of existing transport policies already in place.

For buildings, the IPCC summarized mitigation potential at various cost levels. They find a significant number of very low-cost (in fact, negative-cost) mitigation opportunities in buildings, even in the EU, which already has a number of building efficiency policies. For the EU-15, the IPCC estimates that an almost 20 percent decline in emissions relative to the baseline is possible at a price of $40/ton CO_2.[19] Nevertheless, studies of mitigation potential in buildings are fraught with difficulties because of the complexities surrounding alterations to the building stock, such as local zoning rules and complex market interactions between landlords and tenants.

An additional source of gains from expanding the carbon pricing base, one which would not show up in bottom-up studies, is that some command-and-control regulations could be eliminated. As noted, the EU adopted a portfolio of policies to comply with its climate goals and its Kyoto obligations. Only 40 percent of emissions are controlled through the ETS. Most of the remaining emissions, to the extent they are covered, are under command-and-control regulations. While it would take a separate, detailed study to determine the efficiency of the various command-and-control regulations, it is possible that many are less efficient than a pricing system.[20] By broadening the pricing base and eliminating these command-and-control

[19] Metz and others (n 19) 415.

[20] There is a substantial literature comparing command and control regulations to pricing systems. See Richard F. Kosobud (ed), *Emissions Trading, Environmental Policy's New Approach* (John Wiley & Sons 2000) and Jody Freeman and Charles Kolstad (eds), *Moving to Markets in Environmental Regulation* (OUP 2007). Most, but not all, studies find cost savings, sometimes substantial cost savings, from the adoption of flexible pricing mechanisms instead of command and control regulations. The precise level of savings and even whether there are savings at all, however, depends on a host of assumptions, including the type of command and control regulation that is being

regulations, costs can likely be reduced, possibly significantly.

The detailed, bottom-up studies of mitigation potential in the sectors omitted from the ETS, therefore, are mixed, showing some potential for mitigation but also showing substantial difficulties. Top-down studies show greater potential. I am not aware of studies estimating the benefits of replacing command-and-control regulations with pricing in the 60 percent of the EU not covered by the ETS, so we cannot be sure of the size of the gains. At a minimum, it would seem that covering only 40 percent of emissions is very likely too narrow a base.

3. A single system as a better alternative

3.1 Problems with the proposed revision

While the proposed revision to the ETD has many merits, it also has a number of problems. There are two distinct types of problems. The first is that a carbon tax can offset the distributive effects of the ETS. Depending on the level of the tax relative to the abatement costs in different countries, it has the potential to reduce the burden of meeting emissions targets in wealthy countries while increasing costs to poorer countries.

To see this, go back to the example of Rich and Poor where only part of each country's economy was subject to trading. Recall that in that case, Rich had to more heavily regulate its industry to meet its target so that the marginal abatement cost would be higher in Rich than in Poor. Now suppose that a uniform tax is imposed across both countries, as proposed by the Commission. There are three possibilities. First, the tax is set below the marginal abatement

compared to pricing mechanisms and the design of the pricing mechanism. Moreover, the advantages of price mechanisms will vary by market.

costs (set implicitly by regulation) in either country. In this case, the tax would have no overall effect on emissions but would allow countries to replace some of their command-and-control regulations with a carbon price. Both countries would be better off.

Second, the tax could be above the marginal abatement cost in Poor and below it for Rich. In this case, the effective carbon price is increased in Poor, imposing costs, but is unchanged for Rich, altering the distributive effects of the prior system. Poor would be made relatively worse off.

Finally, the tax might be above the marginal abatement costs in either country, reducing emissions in both countries but by more in Poor because the increase in the effective carbon price is greater for Poor. Once again, the tax would disturb the distributive effects of the prior system making Poor relatively worse off.

If the tax rate is set to match the trading price of carbon in the ETS, then the second scenario is most likely because the marginal abatement cost will be higher than the trading price in the rich country and lower than the trading price in the poor country. Therefore, the tax has the potential to increase costs (and abatement) in poor countries and reduce costs in rich countries.[21]

The second set of problems stem from the retention of two separate systems for carbon

[21] Note that a non-uniform tax set equal to the marginal abatement cost in the non-trading sector of each country would preserve distributional effects of the existing system but would do less to improve efficiency. The efficiency advantages of such a system would arise solely from replacing command and control regulations with a tax, not through equalizing marginal abatement costs across sectors and countries. A unified cap and trade system with appropriate targets could achieve both the efficiency and distributional goals. Similarly, a uniform tax with the appropriate use of tax credits or similar mechanisms would achieve both goals.

emissions from different sectors of the economy. Under the proposal, the ETS sector would continue to use a cap-and-trade system while the non-ETS sector would use a tax. It is not clear why one would want to combine taxes and permits this way and, conditional on having separate systems, why the dividing lines are drawn where they are.

With two different carbon pricing systems, carbon prices can diverge in the two sectors. The systems are not linked in any manner.[22] The ETS price is determined by the overall cap and the demand for permits. It is highly volatile. The ETD tax rate is fixed except for the possibility of review every five years. This means that the two will be the same only by happenstance and will most often diverge.

If prices diverge, energy users will have incentives to seek abatement opportunities in the sectors with the higher price even if lower-cost opportunities are available elsewhere. If the

[22] Linking in general is any method of allowing different pricing systems to interact so as to minimize differences in the systems. The simplest form of linkage is to allow permits in one cap-and-trade system to be used to satisfy permit requirements in a different system. Taxes and cap-and-trade systems can also be linked. For a discussion, see Jane Ellis and Dennis Tirpak, 'Linking GHG Emission Trading Schemes and Markets' (2006) OECD/IEA <http://www.oecd.org/dataoecd/45/35/37672298.pdf> accessed 26 July 2011; Judson Jaffe, Matthew Ranson and Robert N. Stavins, 'Linking Tradable Permit Systems: A Key Element of Emerging International Climate Policy Architecture' (2009) 36 Ecology LQ 789; Christian Flachsland and others, 'Developing the International Carbon Market. Linking Options for the EU ETS' (2008) Potsdam Intitute for Climate Impact Research <http://www.pik-potsdam.de/members/edenh/publications-1/carbon-market-08> accessed 26 July 2011; Gilbert Metcalf and David A. Weisbach, 'Linking Policies When Tastes Differ: Global Climate Policy in a Heterogeneous World' (2010) Harvard Project on International Climate Agreements Discussion Paper 10-38 <http://belfercenter.ksg.harvard.edu/files/
MetcalfWeisbachFinal.pdf> accessed 26 July 2011.

divergence is significant and long-standing, the resulting efficiency losses might be large. Moreover, divergent prices can affect business choices because the carbon price will be different in different sectors of the economy. For example, combustion installations may choose to stay below or go above the threshold size in order to get into the regime with the lower carbon price. Similarly, capital will tend to flow to the sectors with the lower price.

In addition to efficiency problems, having two systems raises administrative and compliance costs. There are two systems with different sets of rules, each of which has to be designed and enforced. The two systems will have separate administrative agencies in each of the member states. Regulated entities may be subject to both systems for different types of activities and, therefore, have to comply with both. Advisors, such as accountants and lawyers, will have to know the details of both systems.

Finally, having two systems forces the price to be imposed midstream in the production process. This will be discussed in more detail below, but the basic idea is as follows. Fossil fuels enter the economy at a limited number of points, such as well-heads or places of import. They spread through the economy, touching a greater number of points at each stage in production. For example, crude oil enters the economy at a limited number of spots, is refined and then used for, say, transportation at a very large number of spots. We can think of the process like the roots of a tree, starting out at a single point upstream and spreading out into a large number of tendrils. For this reason, imposing a price upstream is administratively simpler—fewer entities need to be regulated. For example, one study showed that an upstream carbon tax could cover all of the fossil fuel emissions in the United States by taxing fewer than 3,000 entities.[23] A downstream tax

[23] Metcalf and Weisbach, 'The Design of a Carbon Tax' (n 17).

just on transportation emissions would require taxing around 250 million vehicles.

If we impose a carbon price upstream, when fuels first enter the economy, the price is embedded in the price of the fuels as they are used downstream. If we want to divide the economy into two sectors and impose a different pricing regime in the two sectors, upstream pricing does not work because it automatically covers the whole economy. Instead, to have two separate pricing systems, we have to impose the price midstream or downstream so that we can divide the economy into the two sectors. This increases the number of regulated points and increases administrative costs. [24]

3.2 Alternative: A single system imposed midstream

The problems with having dual systems—the distributive effects, divergent prices, and added administrative costs—can all be solved by having a single system. At the most basic level, we should ask why the Commission prefers to have two separate carbon pricing systems rather than to expand the ETS. The sectors newly subject to carbon taxation under the expanded ETD could equally well be part of the ETS.

All of the policy goals of the two systems could be met with a single system. The base of the single system could be identical to the proposed base of the two systems. It could be imposed on exactly the same entities. Exceptions and special provisions, such as for industries subject to leakage, could be the same. Economic concerns such as whether it makes sense to expand the carbon pricing base to new sectors would be the same, as would hurdles to enactment, such as

[24] It might be possible to have an upstream dual system by imposing taxes on one set of fuels and cap and trade on the rest, such as a carbon tax on petroleum and cap and trade on coal and natural gas. This approach, however, would require substantial revision of the ETS, which works on industry sectors, not fuels.

objections by the newly taxed sectors.

The revenue raised by the two systems would be the same as long as the design choices are made consistently. Auctioning and tax payments are substitutes; if the ETD is intended to raise money through tax payments, the same money can be raised in the same member states and paid by the same entities by auctioning permits. Distributional effects on particular industries could be matched because the revenues and the sources of those revenues would be the same. Each and every design choice of having two systems could be met with a single system.

A single system, however, would be more efficient because it would impose a uniform price on all emissions. It would be less expensive to administer because there would be only one set of rules and no coordination problems. Moreover, the distributive effects of the burden-sharing agreement would be enhanced with a single system rather than reduced. With a single system, we are back to the base case considered above where Rich and Poor have different targets and the entire economy is subject to a cap-and-trade system. In that case, unequal allocation of permits has no effect on efficiency but redistributes from Rich to Poor. That is, a single system better implements the distributive choices made in the Burden Sharing Agreement than either the current system or the Commission's proposed revision.

A single system is more efficient, is cheaper to administer, and better achieves the EU's distributive goals. It is, in short, hard to see the logic behind having both a tax and a permit system operating side-by-side instead of having a single system.

Note also that there is nothing special about expanding emissions trading. If the proposed revision to the ETD is because of a perceived advantage of taxes, the tax could be made economy-wide and the ETS eliminated. Once again, the core economic issues, such as whether it

is appropriate to expand the carbon pricing base, remain the same; but the single system, an economy-wide carbon tax, would be more efficient and less expensive to run than a dual system.[25]

The possibility of having a single carbon pricing system appears not to have been considered as part of the proposed revision of the ETD. The Commission considered six proposals, but none involved the ETS; they were all modifications to the existing tax system that retained the ETS.[26] Because the idea of having a single system is not mentioned in the relevant documents describing the revision of the ETD, we cannot know why it was not considered. A single system would have all of the advantages of the proposed revision, introduce no new disadvantages, and be more efficient and cheaper to administer.

4. Moving the system upstream

The system discussed in part 3 was a midstream tax or trading system imposed on the same entities as the ETS and proposed ETD would cover. If the EU were to move to a single system, however, it can do even better by shifting the system upstream. This section discusses the issues related to shifting to an upstream system. As noted, the core idea is that an upstream system would be simpler to administer because fewer entities would be regulated, lowering administrative and compliance costs. A dual system cannot be imposed upstream because of the

[25] Note that to achieve the same distributive effects with a tax, a system equivalent to the allocation of reductions in a cap and trade system would have to be included. This might include tax credits for industries in poorer countries which could be sold to industries in richer countries similar to how permits can be sold from poorer countries to richer countries.

[26] COM (2011) 169 final (n 6).

need to divide the economy into sectors. Once we have a single system, however, an upstream shift is worth considering.

4.1 Administrative benefits

The use of fossil fuels spread through the economy in a tree-like structure with the number of branches expanding as we move down. At the top are the relatively small number of fossil fuel sources, places where fuels enter the economy. These can be either extraction sites or places of importation, or, moving one step downstream, refineries and processors. Midstream, there are a large number of places where fuel is combusted, such as industrial facilities, power plants, vehicles, and buildings. Finally, all the way downstream, we can think of consumption of a good that was produced using energy as the ultimate source of emissions.

An upstream price can be administered at a much lower cost than a downstream price. As noted, one study of carbon taxation in the US estimated that an upstream carbon tax could capture all fossil fuel emissions by taxing less than 3,000 entities.[27] A downstream tax would require taxing all 300 million consumers in the U.S., a five-order increase in magnitude in the number of taxpayers. The number of regulated entities under a midstream system would depend on the precise details of the system, but the EU ETS already includes about 12,000 entities.

In the EU context, broadening the base while retaining midstream imposition would likely increase the number of covered entities, possibly by a large margin. If the EU instead shifted the system upstream, it could greatly reduce the number of entities that had to comply with the system. For example, there are only 104 oil refineries in the EU.[28] Taxing these refineries plus

[27] Metcalf and Weisbach, 'The Design of a Carbon Tax' (n 17).

[28] Commission, 'Market Observatory—Oil—Refining & Processing' <http://ec.europa.eu/energy/

the import of refined products would capture all of the emissions from petroleum. I have been unable to find the number of natural gas operators or processors in the EU. In the US, which is of comparable size, there were only 530 natural gas processors, and the vast majority of natural gas has to be processed before entering the supply.[29] Imposing a price at the processor level would capture most of the natural gas in the system. Alternatively, the top 500 gas operators in the US had 95 percent of the proven reserves and 93 percent of production in 2006, so these operators could be an alternative place to impose a carbon price on natural gas. The EU system is likely similar, although imports of gas are a much larger component of the EU system than the US system.[30]

I have similarly been unable to find the number of coal mines in Europe. In the US there were 1,438 mines in 2006 which supplied essentially 100 percent of the coal in the US, and the mines are a logical place to impose the carbon tax on coal. Unlike the US, however, the EU imports 42 percent of its coal.[31] If the tax on coal is imposed on mines, the carbon price would then also have to be imposed on these imports.

4.2 The prior reasons for rejection of upstream system are no longer applicable

Although there were substantial changes made for the upcoming third phase of to the ETS, expanding the base and moving it upstream appears not to have been considered. It is not clear

observatory/oil/refining_processing_en.htm> accessed 8 March 2011.

[29] Metcalf and Weisbach, 'The Design of a Carbon Tax' (n 17).

[30] See Commission, *EU energy and transport in figures: Statistical Pocketbook 2010.*

[31] See Commission, 'The Market for Solid Fuels in the Community in 2008 and Estimates for 2009' (Staff Working Paper) SEC (2010) 996 final.

why the EU opted for a narrow base with midstream coverage in the first place and has not considered changing it. The Green Paper on emissions trading does not discuss the issue and instead simply proposed midstream coverage.[32] One of the background documents to the Green Paper notes that upstream imposition would have been more effective but states that an upstream approach was abandoned because of "vested interests and institutional and political obstacles," but doesn't name names.[33]

Although it is difficult to reconstruct from the available documents, there are three plausible reasons for imposing the ETS midstream. None of these reasons continue to apply when considering an EU carbon price.

The first reason for a narrow base and midstream imposition was a decision not to cover motor fuels, residential and commercial use of fuels, or agriculture in the ETS. Apparently, some believed that existing taxes on motor fuels were sufficient and that including these fuels in the ETS would have effectively double taxed them. It would have been difficult to exclude these sectors with an upstream system.[34] Moreover, finance ministers in individual member states feared that upstream coverage would create pressure for member states to eliminate local taxes on fuels.[35] The Commission proposal, however, would include these sectors in the carbon pricing

[32] Commission, 'Green Paper on greenhouse gas emissions trading within the European Union' COM (2000) 87 final.

[33] FIELD, 'Designing Options for Implementing an Emissions Trading Regime for Greenhouse Gases in the EC' (2000) 5 <http://ec.europa.eu/environment/docum/pdf/0087_field.pdf> accessed 26 July 2011.

[34] Metcalf and Weisbach, 'The Design of a Carbon Tax' (n 17).

[35] Ellerman, Convery and De Perthuis (n 8) 23, claim that "the predominant view was that the additional fuel price raise that would be engendered by an allowance price in the order of €15-30 would have modest effects on

base in any event, so this reason is moot.

A second reason for midstream imposition is that the Framework Convention, the Kyoto Protocol, and the Burden Sharing Agreement all measure emissions at the place of combustion. For example, if fuel which is extracted in one country and processed or refined in a second is burned to create power for production of a good in a third, and the good is consumed in a fourth, we could allocate the emissions to any of the four countries (or among them). The Framework Convention, the Kyoto Protocol, and the Burden Sharing Agreement allocate the emission to the place where the fuel was burned, which is essentially arbitrary. The EU ETS midstream system follows this allocation. Because each country determines its own ETS targets, only a midstream trading system can allow each country to control its compliance with the Kyoto Protocol. For example, suppose that France imported and used gasoline that was refined in Germany. If the regulatory system is imposed upstream at the refinery level, Germany's regulatory decisions would determine (in part) France's emissions as calculated under the Kyoto Protocol and the Framework Convention.

This reason is also no longer applicable. The third phase of the ETS eliminates the National Allocation Plans so that countries no longer have local control of how the ETS applies to them. Moreover, if mandatory carbon pricing covers all or almost all uses of fossil fuels, discretion over the regulation of non-covered sectors is reduced.

A final reason is that an upstream cap-and-trade system might have been seen as resembling a tax, potentially triggering the unanimity rule for taxes in the EU. A midstream cap-and-trade

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consumption and therefore emissions." It is hard (in fact, impossible) to make sense of this statement, as the change in prices would be identical regardless of where in the production process the system is imposed.

system would not need unanimity to pass and therefore was seen as the safer option in terms of avoiding potential legal challenges.[36] An EU-wide carbon tax such as that proposed by the Commission, however, will have to overcome these obstacles.

4.3 Distributional issues, in general

Within a closed economy, an upstream price and a comprehensive mid- or downstream price cover the same emissions, but, as noted, the upstream price is far simpler to administer. If there is more than one jurisdiction, however, substantive differences between upstream and downstream taxation can arise. Consider two jurisdictions, each of which has producers and consumers. Producers in each jurisdiction sell to consumers in both jurisdictions.

Consider an upstream tax on producers. (For simplicity, I will use a tax as an example; the analysis should be the same for a trading system that has auctioned permits) Each jurisdiction would receive the tax revenue from production in that region. If the tax rates in the countries differ, the tax rates on different types of goods available to the consumers will differ but the rates on consumers in the two countries for a given type of good will be the same.

Compare that to a downstream tax on consumption. In this case, the country where

[36] Another important component of the ETS which does not play a role in the discussion here is the Clean Development Mechanism. The CDM allows regulated entities to receive credits for reducing emissions in developing countries. The CDM has been troubled because of the problem of measuring emissions reductions against the hypothetical business-as-usual baseline. Michael Wara, 'Measuring the Clean Development Mechanism's Performance and Potential' (2008) 55 UCLA L Rev 1759. The CDM can be retained under any of the proposals considered here. Modifications to the CDM to address the problems it has encountered also can likely be incorporated into any of the systems considered here.

consumption takes place will receive the revenue. In addition, consumers in a given country will face the same tax on all goods but the tax rate may vary from the taxes faced by consumers in the other country.

If a country imposes border tax adjustments, which means that it taxes production but imposes a tax on imports equal to the carbon footprint of a good and rebates taxes previously on export, it will have converted the production tax into a consumption tax. Production in the home country will be taxed only to the extent the goods are consumed at home. Production in the foreign country will also be taxed to the extent the goods are consumed in the home country. Tax revenues will be received by the consuming country.

If border taxes were feasible, therefore, we could obtain the administrative benefits of an upstream tax on production while replicating the revenue effects of the current mid-stream system. Border taxes of this sort, however, would be difficult to calculate. Border tax adjustments are equal to the tax that would have been imposed in a production tax if the good had been produced locally, which means that we have to know the carbon footprint of imported and exported goods. Knowing the carbon footprint of imported goods will be particularly difficult and in many cases impossible.

There is, however, a relatively simple solution, which is to impose a production tax without border tax adjustments, impose virtual border taxes: calculate what the border tax adjustments would have been at a national level (rather than for each product as it crosses the border), and make the appropriate transfers. There is a substantial literature on making these estimates at the national level and the methodology is relatively straightforward.[37] It involves tracing goods

[37] Glen P. Peters, 'From production-based to consumption-based national emission inventories' (2008) 65

through the production process using input-output tables. The carbon produced at any given stage of production essentially moves with the good through the production process, establishing an overall footprint for a given product. By making the appropriate adjustments at the national level, we can have an upstream tax on production that replicates the revenue effects of a mid-stream or downstream tax.

To illustrate, suppose that all fossil fuel combustion occurs in Country A and all services are produced in Country B. The two trade so that consumers in both countries consume equal amounts of services and energy-intensive goods. Under a production tax, Country A gets all of the revenue. Under a consumption tax, the two countries split the revenue equally as consumers in the two countries consume equal amounts of the energy-intensive good. In a production tax with border adjustments, when energy-intensive goods are exported from Country A, it would get a rebate of the tax. When border adjustments are imposed to Country B, it must pay the tax. If the taxes are at the same rate, the effect is as if Country A simply paid Country B the tax it collected on the production of those goods. If we impose virtual border taxes, so that countries make net payments that mimic the results of actual border taxes, we get the same result. While actual border taxes would be complex, virtual border taxes would be relatively straightforward.

Note, finally, that if a cap-and-trade system is used and permits are given away, the entity receiving the permit often receives a windfall. Estimates show that free allocation of permits

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Ecological Economics 13 provides a recent summary. See also Steven J. Davis and Ken Caldeira, 'Consumption-based accounting of CO2 emissions' (2010) 107 Proceedings of the National Academy of Sciences 5687; Joshua Elliott and others, 'CIM-EARTH: Framework and Case Study' (2010) 10/2 Berkeley Electronic J of Economics Analysis & Policy 11 <http://www.bepress.com/bejeap/vol10/iss2/art11/> accessed 26 July 2011.

greatly overcompensates industry for their costs of compliance with a cap-and-trade system.[38] The choice of an upstream or downstream cap-and-trade system will determine which industries and countries receive these windfalls. Countries can be expected to want the industries in their jurisdiction to receive windfalls and, hence, will want the imposition of the cap-and-trade system to fall within their borders.

4.4 Distributive issues: Blocking industries and implicit subsidies

A final concern about shifting the system upstream is that it might not be as easy to give implicit subsidies to regulated industries. In particular, the National Allocation Plan allows countries to choose the extent of reductions in the ETS sector. Moreover, free allowance allocation can provide a very substantial subsidy to the industry receiving the allocation. By providing implicit subsidies, industries or member states that might have blocked enactment can be bought out. To some extent this last rationale will be eliminated in the third phase of the ETS because the third phase will have an EU-wide cap rather than the National Allocation Plans and because the third phase will require auctioning of permits. Derogations for some Central and Eastern European member states, however, allow some of these subsidies to be retained.

Moving the system upstream would not change these calculations to the extent that it would not shift the regulated entity. For example, if the relevant blocking entity is a power producer, upstream imposition may not change the point of regulation upstream.

If shifting the system upstream does move the point of regulation away from a blocking

[38] For example, see Lawrence H. Goulder, Marc A. C. Hafstead and Michael Dworsky, 'Impacts of alternative emissions allowance allocation methods under a federal cap-and-trade program' (2010) 60 J of Environmental Economics and Management 161.

industry, there are ways within an upstream system to maintain the same subsidies to that industry. Suppose that there is an important industry in a country, that the industry is currently subject to the ETS, and that the industry is given free permits or some other benefit in order to gain its assent. Now suppose that the point of regulation is shifted to the fossil fuel supplier for that industry so that the price of fuels goes up and, moreover, the industry is no longer directly regulated. The industry would face higher costs which would not automatically be offset by the regulatory structure and, therefore, might threaten to block enactment.

There are a number of ways to retain the prior subsidy. Even though it is not itself subject to carbon pricing, the industry could still be given a quota of permits (or tax credits) that it could sell to offset the increased cost of its fuel. Alternatively, if the upstream supplier of fossil fuels is given free permits, it could be required to pass on the benefit for a given quantity of fuels purchased by the industry (but not for marginal purchases). Finally, the industry could simply be compensated explicitly. The EU has a number of explicit transfers to poor regions or industries, such as the European Regional Development Fund, the Cohesion Fund, and the European Social Fund.[39]

5. Conclusion

The conclusions are straightforward. It makes sense to expand the carbon pricing base in the EU. The existing Energy Tax Directive is not well-designed. The Commission's proposal is a good start.

Nevertheless, it is clear that the EU can do better. The Commission's proposal has the

[39] For a summary of these funds, see Commission, 'Regional Policy: The Funds' <http://ec.europa.eu/regional_policy/thefunds/index_en.cfm> accessed 27 July 2011.

potential to offset the distributive goals of the ETS. It will likely impose different carbon prices on different sectors, and it will be complex to administer. A unified system, such as adding the newly-taxed sectors to the ETS, will be more efficient, be more simple to administer, and better achieve the distributive goals of the ETS. Moreover, a unified system can be moved upstream, achieving administrative and compliance benefits beyond those achieved from merely having a unified midstream system.

Moving to a single system would be a big change, particularly given that substantial changes were made to the ETS for its third phase. Nevertheless, the gains may be large. The fourth phase of the ETS will begin in 2020, and perhaps the best way to think about a shift to a unified system is as part of the fourth phase of the ETS.

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