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Domestic Tradable Quotas as an alternative to Carbon Taxation

While Feasta welcomes the government's intention to act to use market mechanisms to reduce Ireland's greenhouse gas emissions, it believes that Domestic Tradable Quotas (DTQs) are likely to be a more effective mechanism than the Carbon Tax arrangements envisaged. This is because|:

1. A carbon tax, however structured, cannot guarantee that any particular level of emissions will be achieved at any given date in the future whereas a quota can. A carbon tax rate which would bring about the required emissions reduction in a booming economy would have a depressing effect on a depressed one. As a result, for it to work well, the rate of carbon tax needs to be adjusted regularly to conform with the stages of the business cycle, thus making setting the rate a perennial source of conflict between the government, the consumer and business interests. The market, however, adjusts the price paid for the quota automatically and leaves no scope for debate.
2. A quota system is much more compatible with international emissions trading arrangements, particularly if long-run ones involving very deep cuts in emissions are devised for the post-Kyoto period. The profound cuts in fossil fuel use cannot be accomplished without profound social, political and economic turbulence unless individuals are able to fulfil their *own* designs and purposes most effectively by participating in actions that promote the *public* good. Conditions that achieve such a synthesis of private and collective advantage do not usually happen by accident. The connection needs to be explicitly made by an equitable system of rationing such as DTQs. Taxes, on the other hand, would set one group against another.

The DTQ concept presented in this paper was developed by Dr. David Fleming in the mid 1990s and is now the subject of a major feasibility study by Dr. Richard Starkey at the Tyndall Centre at the University of Manchester, which specialises in climate research.

Introduction

There are two main approaches to the task of reducing the demand for fossil fuels. Taxation is the most obvious and widely canvassed one, but there are problems with it. It causes a great deal of resentment, as Britain discovered when protestors against motor fuel tax brought the country virtually to a halt in September 2000. It is practically impossible to set a rate of tax that changes the behaviour of higher-income groups without causing unacceptable hardship for people on a lower income. And, if the price of oil and gas rises as a result of scarcity, taxation would only raise it higher still, making a bad situation worse.

The other solution is rationing, but in a form which is very different to the coupons-and-scissors memories of the past. In the fair and flexible rationing schemes of the future, a strict upper limit to the quantity of fossil fuels available for the economy as a whole over a specified period will be set and rations based on it distributed electronically among consumers who will then be free to trade their share.

Various tradable rationing schemes have been devised. Those which apply to companies (among whom it is the right to emit carbon dioxide, rather than the right to buy fuel itself that is rationed) have been developed a long way, and some are being applied in practice. Several "domestic" schemes, which would include consumers as well as firms in the rationing process, have also been suggested.ⁱ One such scheme, DTQs, has been developed.ⁱⁱ

DTQs are intended for use *within* an economy. They are complementary with international permits for trading between nations. It is accepted that the only fair framework for international action has to be one of "contraction and convergence", which would *both* reduce carbon dioxide emissions, *and* converge towards a point at which each nation's "right to pollute" is calculated on the basis of their populations.ⁱⁱⁱ DTQs make it possible for ambitious international targets to be carried out within nations, by giving governments control of the rate at which fossil fuel consumption is reduced, while sharing out the available supply of fossil fuels fairly, and maintaining flexibility in prices so that the market works efficiently. Feasta's proposal is that DTQs should be implemented in Ireland immediately

How Domestic Tradable Quotas work

A "Carbon Budget" which gives notice of gradual reductions in the upper limit for carbon emissions is at the heart of DTQs.. The "carbon units" making up this budget are issued to all citizens and to organisations. All citizens receive an equal and unconditional Entitlement of units; organisations buy the units they need through a tendering process similar to that used to issue of government debt. There would be a national market on which citizens could sell any unused part of their allocation and higher users could buy more. This would mean that if any user could not cope within his ration, he could top it up, and users who were successful in keeping their fuel consumption low could sell as much of their ration they could spare.

DTQs are a hands-off scheme, with virtually all transactions being carried out electronically, using the technologies and systems already in place for direct debit systems and credit cards. It has been designed to function efficiently not only for people who participate in it, but also for those who do not - e.g. for overseas visitors, for the infirm and for those who refuse to cooperate.

How the quota market works

The *numéraire* of the model is the "carbon unit", defined as one kilogram of carbon dioxide. Nitrous oxide, methane and other global warming gases would be rated in "CO₂-equivalents" - the number of kilograms of CO₂ that would produce the same amount of global warming as one kilogram of nitrous oxide, methane, etc). Estimates of the carbon units ratings of the main fuels and electricity are set out in Box 1

Box 1 Translating Emissions into Fuels^{iv}	
Estimates of the global warming potential (GWP) of gases released by the production and combustion of fuels. 1 kg carbon dioxide = 1 carbon unit. The GWP of methane and nitrous oxide is measured as carbon dioxide equivalents.	
Fuel	Carbon units
Natural gas	0.2 per kWh
Petrol	2.3 per litre
Diesel	2.4 per litre
Coal	2.9 per kg

Grid electricity (night)	0.6 per kWh
Grid electricity (day)	0.7 per kWh

The domestic market (figure 1) works as a sequence. At the start, there is the Register (called QuotaCo), a computer database that holds individual carbon accounts for all participants in the scheme, like the accounts that are held for credit cards and collective investments.

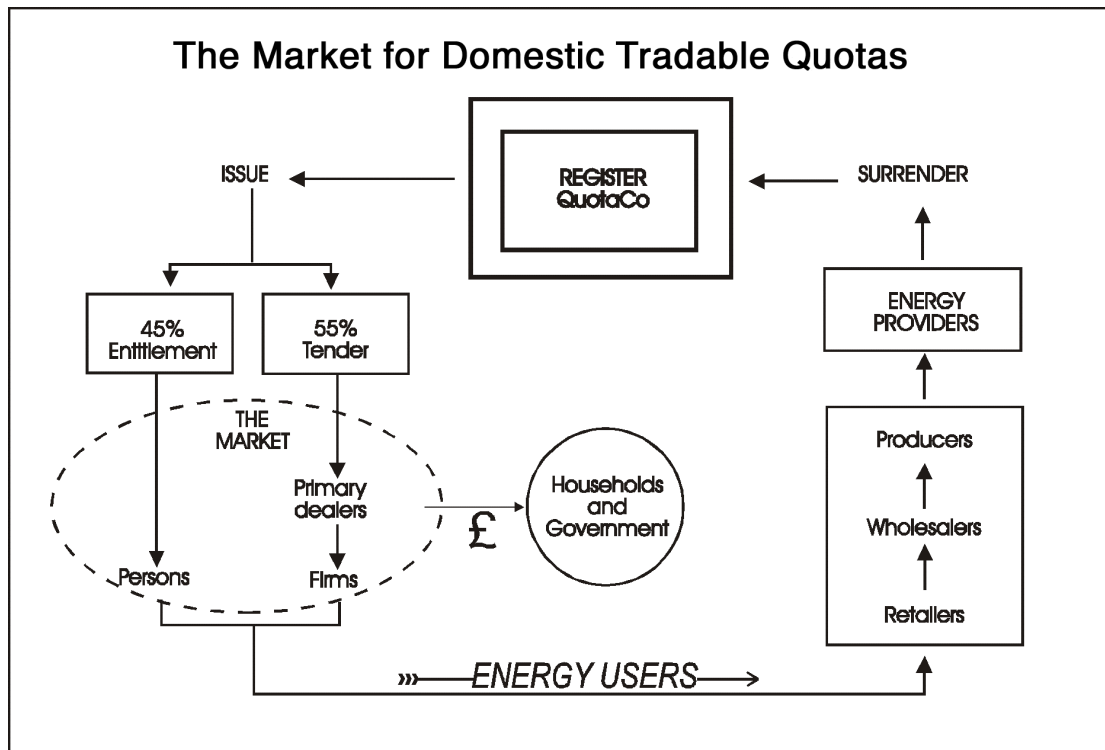


Figure 1.

Carbon units are issued on an annual basis in two ways. One is via the citizen's Entitlement and since the public's consumption of fuel and energy in various forms accounts for about 45% of all emissions in Ireland, carbon units (rations) representing this share (45%) of all carbon emissions would therefore be issued on an equal *per capita* basis. The remaining share (55%) would be issued by Tender to commercial and industrial companies and to the public sector. It would be distributed by the banks to organisations using direct credit for the units and direct debit systems for the payments.

When anyone (consumers, firms or the government itself) purchased of fuel or energy, they would surrender quota to the energy retailer, accessing their quota account by (for instance) using their QuotaCard or direct debit. The retailer would then surrender carbon units when buying energy from the wholesaler. Finally, the primary energy provider would surrender units back to the Register (QuotaCo) when

the company pumped, mined or imported fuel. This would close the loop.

Some purchasers would not have any carbon units to offer at point of sale - for example, foreign visitors, people who had forgotten their card^v or who had used, or cashed-in, all their quota, and small firms and traders that had decided not to bother to make regular purchases of units through their banks. All these would have to buy quota at the time of purchase, in order to surrender it, but they would pay a cost penalty for this: they would have to buy them at the market's offer price and surrender them at the (lower) bid price: the difference between these two prices would be the cost of non-participation.

Carbon units would be bought and sold on the secondary market. People who used less than their entitlement could earn a revenue from the sale of their surplus, and people who used more would have to buy the extra. The government would receive revenue from the tender, and trading revenues would be earned by market-makers who quoted bid and offer prices. Purchases and sales of carbon units would be made on-line through home computers, through automatic teller machines (ATMs), over the counter of banks and post offices and energy retailers, and by direct debit with energy suppliers.

Setting a Carbon Budget.

The big advantage of a quota system is that it can give the business sector the security it requires to make long-term investment plans. Since the rate of a carbon tax can always be changed, it would not have the same effect. Figure 2 shows how a carbon budget could be established for a 20-year period.

The Carbon Budget

The 20-year Carbon Budget is defined over three periods. Period 1 is a 5-year binding Commitment, which cannot be revised; this is a requirement for an orderly market. Period 2, the 5-year Intention, is inflexible; the presumption is "no change", but it can be revised for stated reasons at an annual review. Period 3 is a 10-year Forecast, which is indicative only.

The Carbon Budget guarantees the targets for reductions in carbon emissions,

providing a long-term quantity signal. Intentional reductions in carbon emissions take time; people therefore need to take action *now* in the light of their knowledge of the quantity of carbon units that will be available in the future. There are automatic rewards (and penalties) in the form of lower (or higher) prices in response to how well (or badly) the economy does in reducing carbon emissions.

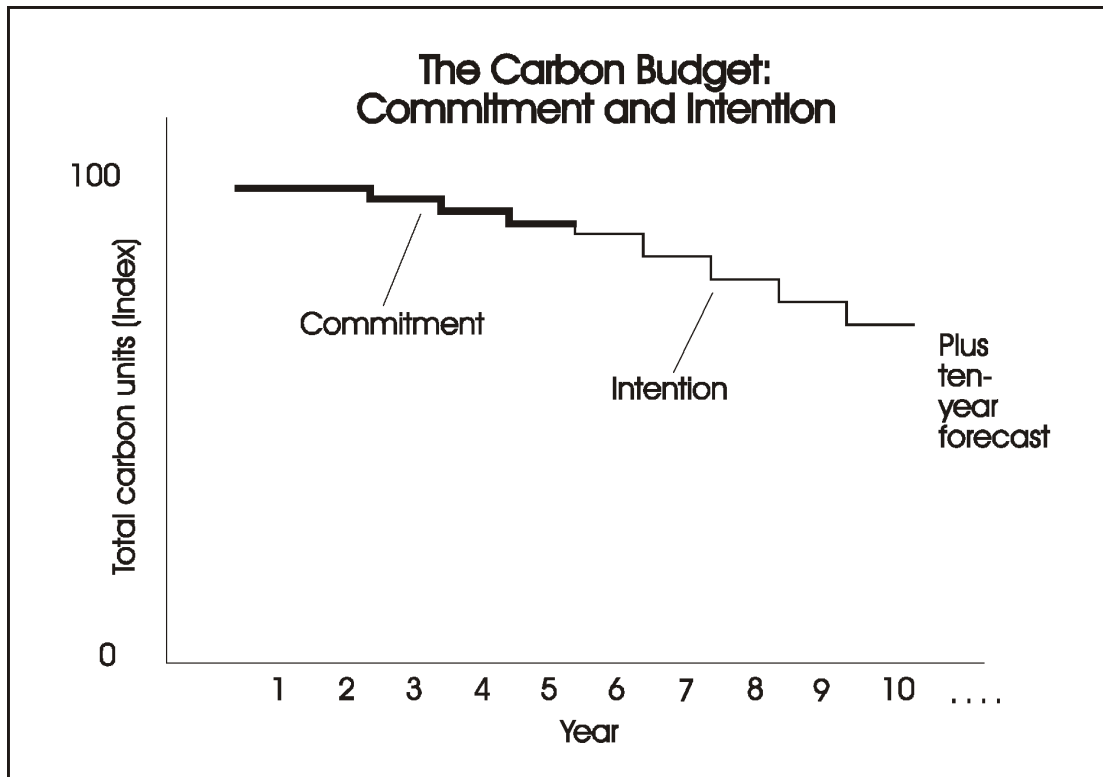


Figure 2

The Carbon Budget should be set, we suggest, by an independent body. This would relieve the government from having to defend the Budget itself, providing some protection from the political process, and it would allow government to concentrate on helping the economy to achieve the targets that the independent body had set.^{vi}

Carbon reduction as a collective programme

Ireland's withdrawal from its current heavy dependency on fossil fuels would be an extremely ambitious and difficult programme. It could be carried out only if it were carried out as a joint, cooperative task. The process would have to be designed in

such a way that it was in the individual's interests not only to reduce his or her own carbon-dependency but also to cooperate with others in encouraging, persuading and collaborating with them to reduce theirs. We believe that DTQs could provide the basis for this cooperation, or "collective purpose". That is to say:

1. It would be in individuals' interests to help others to reduce their carbon dependency

This works in three inter-related ways. First, the fixed quantity makes it obvious to everyone that high consumption by one person means that there is less for everyone else. Your carbon consumption becomes my business: people will want to try to influence each other's behaviour - for their mutual advantage.

Secondly, it would be in everyone's interests that the price of carbon units should be low. A high price would increase the cost of industry's purchases of energy, raising prices across the economy as a whole. However, the price of units would be to some degree under the control of the people who used them, since the more they were able to reduce their demand for units, the lower their price. If the public was confident that - by reducing its demand for carbon units - it could have an effect in keeping prices low, then there would be an incentive to cooperate with each other to make it happen.

Thirdly, carbon units lend themselves to local collective initiatives; they can be pooled as a fund, providing the basis for coordinated local action.

2. DTQs would provide the framework for establishing carbon reduction at the centre of public policy, aligning social values with individual responsibility.

The DTQ model places everyone in the same boat; households, industry and the government itself have to work together, facing the same Carbon Budget, trading on the same market for carbon units (and all loving to hate the Carbon Policy Committee which sets the budget to which they all have to adapt). Everyone would be given a literal stake, in the form of property rights, in the system. There would be a sense that one's own efforts at conservation would not be wasted by the energy profligacy of others, and that the system was founded on justice. In all these ways, the proposal connects with theoretical studies that have explored the evolution of systems of collective interaction, in which incentives and institutions are mutually reinforcing and self-policing.^{vii}

Advantages of DTQs

1. Effectiveness

DTQs would be effective. They would integrate private preferences with public policy. They would give the long-term signal that is indispensable for profound change. They would build a framework in which the business sector could take effective action.

2. Equity

Equity is necessary for political acceptability. DTQs would give consumers themselves a central role in the reduction of fossil fuel dependency. There would be no sense that there was some government body manipulating the prices and taxes; it would be the citizens' own scheme.

3. Efficiency:

If the claim that DTQs effectively stimulate collective motivation is true, then, at any given quantity of carbon emissions, the fuel price (that is, fuel + quota/tax/other) would be lower under a DTQ regime than under alternatives. This cost-efficiency would have economic advantages for incomes and employment. It would increase Ireland's international competitiveness.

Potential objections to DTQs

1. Effectiveness

Suppose that households and industry just gave up and made no effort to reduce their demand for fossil fuels: the prices of carbon units would rise rapidly; hardship stories and the political fall-out could be so awful that the government's nerve could crack and the scheme itself could be abandoned. But all policy instruments, carbon taxes included, are vulnerable to a concerted failure of will. We think DTQs stand the best chance of avoiding such a situation because they place the responsibility for action where it belongs: on the whole population.

DTQs would cost money to set up but most of the technology and infrastructure already exist and are in place; the principle is much simpler than the paper rationing systems that were used in wartime Europe, and feasibility studies into DTQs are currently being undertaken at the Tyndall Centre at the University of Manchester.

2. Equity

No instrument can claim to be entirely equitable. For example, people who live in remote areas would (relative to city-dwellers) have the disadvantage of having further to travel to work, and people with low incomes would have the disadvantage of being less able to buy top-up carbon units on the market than those on high incomes. And yet, there are compensations: people in rural areas would be able to burn wood or generate much of their electricity; conversely (in a scheme in which collective motivation had been highly developed) heavy users would have the disadvantage that their conspicuous consumption exposes them to public rebuke and ridicule. There may be equity anomalies in the scheme, but not insoluble ones.

3. Efficiency

If DTQs caused prices to be volatile, that would be inefficient,^{viii} but there is no reason why prices should be more volatile under DTQs than with any other instrument. For instance, high fuel prices would reduce the demand for quota, tending to reduce its price, so that there would be a stabilising effect.

Conclusion

DTQs are a practical instrument designed for reducing carbon emissions within a market economy, and/or for smoothing the transition from the fuel-rich market economy to its fuel-efficient successor. Ireland could benefit from being the pioneer in introducing them as it would be able to sell the software for the system around the world.

Further Information:

Feasta would be happy to arrange for David Fleming and Richard Starkey to come to Ireland to discuss DTQs with the Department of Finance. Alternatively, David Fleming can be contacted directly at the following address:

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Endnotes

- i. The literature on domestic trading in carbon emissions rights at the level of the individual or household does not include a description of the model of domestic tradable quotas set out here (see note at title of this section); it is sparse, and it discusses - in outline form only - a variety of instruments that have little in common with each other. It includes: Simon Fairlie (1991), "Quotas Against the Great Car Economy", *The Ecologist*, Nov/Dec, pp 234-235; Mayer Hillman (1991), "Towards the Next Environment White Paper", *Policy Studies*, vol 12, 1, pp 36-51; Douthwaite (1992), *The Growth Illusion*, Hartland: Green Books, pp 211-212; Robert U. Ayres (1997) "Environmental Market Failures": *Mitigation and Adaptation Strategies for Global Change*, I, pp 289-309; Paul Koutstaal (1997), *Economic Policy and Climate Change: Tradable Permits for Reducing Carbon Emissions*, Cheltenham, UK: Edward Elgar; H.R.J. Vollebergh, J.L. de Fries and P.R. Koutstaal (1997), "Hybrid Carbon Incentive Mechanisms and Political Acceptability", *Environmental and Resource Economics*, 9, 43-46; Mark Whitby (1997), "Edge Debate on Transport Hears Call for Major Changes", *Architects Journal*, 29 May, p 16; and Robert U. Ayres, (1998), *Turning Point*, London: Earthscan.
- ii. The model of Domestic Tradable Quotas was described in David Fleming (1996), "Stopping the Traffic", *Country Life*, vol 140, 19, 9 May, pp 62-65; David Fleming (1996 and 1997), *Tradable Quotas: Setting Limits to Carbon Emissions*, discussion papers, London: The Lean Economy Initiative; David Fleming (1997), "Tradable Quotas: Using Information Technology to Cap National Carbon Emissions", *European Environment*, 7, 5, Sept-Oct, pp 139-148; David Fleming (1998), "Your Climate Needs You", *Town & Country Planning*, 67, 9, October, pp 302-304; David Fleming, ed (1998), "Domestic Tradable Quotas as an Instrument to Reduce Carbon Dioxide Emissions", *European Commission, Proceedings, Workshop 1-2 July*, EUR 18451. See also www.dtqs.org.
- iii. The Royal Commission on Environmental Pollution acknowledges the central role of the concept of contraction and convergence. (2000), *Energy: The Changing Climate*, London: HMSO, Cmnd 4749, p 57-58. Aubrey Meyer (2000), *Contraction and Convergence: A Global Solution to Climate Change*, Schumacher Briefing No. 5, Dartington: Green Books. Tom Spencer (1998), "Contraction and Convergence", *Town and Country Planning*. Vol 45, 4.
- iv. Sources: Petrol and diesel: derived from ETSU (1996), *Alternative Road Transport Fuels - A Preliminary Life-Cycle Study for the UK*, London: HMSO; Table 3.10; and Commission of the European Community (1993), Corinair Working Group on Emission Factors for Calculating 1990 Emissions from Road Traffic. Gas: derived from ETSU (1995), *Full Fuel Cycle Atmospheric Emissions and Global Warming Impacts from UK Electricity Generation*, London: HMSO; Table B2. Coal: derived from ETSU (1995); Table B1. Electricity: ETSU (1995); Table 5.3. Carbon-equivalent indices, on a time-horizon of 100 years, for methane and N₂O are, respectively, 21 and 310 times the GWP of CO₂. (IPCC, 1996, *Climate Change 1995*; Table 4). The assistance of Simon Collings, John Lanchbery and Peter Taylor with this table is acknowledged with thanks.
- v. But forgetting a credit card will probably be no barrier to electronic transactions in the future. As other forms of electronic recognition develop, plastic cards are beginning to become obsolete.
- vi. "Concentration" is one of the key themes of the instrument: it focuses totally on the problem of fuel; other sources of carbon dioxide, such as waste tips and agriculture would come within the remit of different programmes and instruments.
- vii. Alan Carling (1991) *Social Division* (London: Verso). Alan Carling (1997) 'Rational Vervet: Social Evolution and the Origins of Human Norms and Institutions', *Imprints*, 2:2, 157-73. Alan Carling (1998) 'Social Selection and Design' *Proceedings of the Warwick/LSE*

Complexity Conference, 112-23. Brian Skyrms (1996) *Evolution of the Social Contract* (Cambridge: CUP).

- viii. The adverse consequences of price instability are discussed in Martin Weitzman (1974), "Prices vs. Quantities", *Review of Economic Studies*, 41, 4, pp 477-7491; and in William A. Pizer (1998), "Prices vs. Quantities Revisited: The Case of Climate Change", Washington: Resources for the Future, Discussion Paper 98-02.