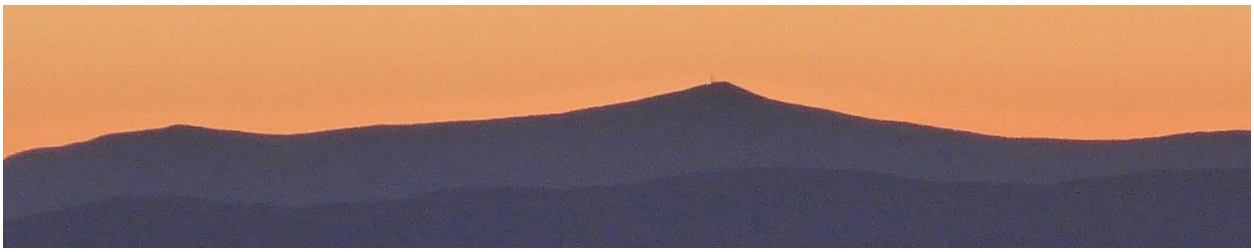

An Introductory Note on Carbon Taxation in Europe
A Vermont Briefing

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Carbon taxes are in place in 14 countries in Europe, complementing emissions trading schemes for power plants and large industrial installations. Nordic countries pioneered carbon taxes 25 years ago, while France and Portugal most recently did so. Carbon taxes have been leveraged by linking their introduction to other issues and often through a 'roundtable' method of policy-making enabling agreement on exemptions and compensations. Distributional questions are key to the introduction of carbon taxes, although they are less regressive than many other taxes. Carbon taxes have proven effective in curbing emissions and with excise taxes on fuels provide a long-term signal capable of transforming energy and transport systems. Carbon tax schemes have been designed to reinforce employment and economic activity and to avoid damaging economic growth. With the large reserves of carbon allowances in Europe's emissions trading market, allowances continue to be traded at a modest carbon price, whereas carbon taxation is providing a more firm price signal to investors.

Description of design and scope

With the power sector and large industrial installations[1] covered by the emissions trading system (ETS[2]) for carbon allowances, the scope for carbon taxes in European countries concerns non-ETS emissions from motor fuels, the residential sector and smaller industrial installations (55% of total CO2-emissions). There is no explicit legal framework mandating how carbon taxes should be designed, except from general provisions following from EU Treaty provisions on state aid, which reflect general non-discrimination principles. European countries tend to levy a standard tax rate per ton of CO2, measured according to official emission factors for the various fuels rather than actual emissions. The carbon tax

[1] Oil refineries, steel works and production of iron, aluminum, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals, European Commission, The EU Emissions Trading System, http://ec.europa.eu/clima/policies/ets/index_en.htm.
[2] European Commission, The EU Emissions Trading System, https://ec.europa.eu/clima/sites/clima/files/factsheet_ets_en.pdf.

may have different rates for motor fuels, residential and manufacturing purposes. Sectors that sometimes benefit from reduced rates for other excise taxes, e.g. agriculture and forestry, remain liable to carbon taxation in most countries. Aviation within the European Economic Area is under ETS and not subject to carbon taxes.

Carbon tax rates per se differ considerably by country, from a rate aligned with ETS-prices in Portugal (€4-6/tCO2) to about €130 per metric ton of CO2 in Sweden (residential). Nominal rates of about €15-20 per metric ton of CO2 appear to provide an approximate median for the various approaches.

Drivers and barriers

A first wave of carbon taxes, enacted in Nordic countries (Finland, Sweden, Norway, Denmark) around 1990 was triggered by unilateral commitments under the Toronto Declaration (1988) and coincided with policies to lower payroll taxes to improve economic performance. Carbon taxes were part of more comprehensive tax shifting programs, maintaining revenue neutrality. With motor fuels being taxed more heavily than heating fuels under preexisting excise taxes, carbon taxes for diesel and gasoline were allowed to offset some of that taxation.

A second wave of carbon taxes, enacted in Eastern transition countries (Latvia, Slovenia, Estonia, Croatia) around 2000, reflected a need to curb increasing CO2 emissions as well as a desire to prepare for membership of the European Union. Carbon taxes were part of more comprehensive recovery packages in search for additional revenues, with former tax bases being eroded by inflation. Excise taxes with ad-valorem tax bases were replaced with fuel taxes in line with the EU's Energy Taxation Directive, complemented by a carbon tax.

A third wave of carbon taxes, enacted in Western European countries with budgetary challenges (Ireland, Portugal, France) around 2010, reflected as well climate policy ambitions, as interest grew in broadening governments' tax bases beyond traditional revenue sources. With carbon tax revenues being relatively modest in view of budget deficits, their experimental feature tends to prevail over the fiscal. The participation of green parties in government (Ireland) or competition over green voters (Portugal, France) partly conditioned acceptance of these carbon taxes, perceived as less illegitimate than other revenue sources.

European countries outside the European Union with carbon taxes include Switzerland, Iceland and Norway. Switzerland enacted a carbon tax framework whereby the tax was conditional on whether Switzerland's Kyoto climate targets would be met – which it proved to be, requiring upward tax rate adjustments. UK, still a member of the European Union, in 1998 enacted its own climate change levy (CCL) after having vetoed a harmonized carbon tax arrangement at the European level, but subject to far-reaching exemptions.[3]

Revenue collection and use

Carbon taxes are collected by the internal revenue services and according to their standard procedures of compliance. Two countries, UK and Denmark, in the initial years earmarked a small share of carbon tax

[3] For detailed overview, see State and Trends of Carbon Pricing (World Bank Group and ECOFYS 2015), http://www.worldbank.org/content/dam/Worldbank/document/Climate/State-and-Trend-Report-2015.pdf.

revenues (5-20%) for programs that promote uptake and development of energy transition technologies, based on co-funding from enterprises and housing companies. Most other countries rely solely on carbon tax price signals for incentives towards low-carbon development.

Impacts and effectiveness

Carbon taxes help reduce emissions in two different ways; 1) by increasing costs of energy they help to curb overall demand for energy, while 2) by increasing costs of carbon-intensive fuels (coal, oil) relatively more than of low-carbon fuels (gas; renewables) they help switch demand towards low-carbon fuels. When a carbon tax is levied strictly according to the properties of fuels, renewables will gain a proportional competitive advantage.

A European Union-funded research project surveyed impacts of carbon taxes introduced with revenue-neutral tax reforms in six European countries and found reductions of up to 6% in emissions of greenhouse gases over a period from the mid-1990's to 2004 (Andersen and Ekins, 2009).[4] Carbon tax rate reductions for energy-intensive industries and certain fuels to safeguard competitiveness softened the schemes, while the relative success of carbon taxes in some countries (Sweden, Finland, Denmark) as compared to others reveal properties of the most successful exemption arrangements relative to the least.

The rate of improvement in industry's energy intensity was twice as high in Denmark as in comparable countries. Enevoldsen[5] explains this outcome with the earmarking of 20% of revenues for energy efficiency programs targeting industry in Denmark. For a range of energy-intensive sectors, Danish industries gained a competitive advantage in having the lowest unit energy costs per value added, which were reduced by 30% in average over the first five years with carbon taxes.

Carbon taxes reinforce price signals from pre-existing excise taxes on fuels. Comparing residential energy demand for heating in US state of Vermont with Denmark, it can be observed that Denmark's per capita heat consumption is only half (53%) of that in Vermont – even if correcting for the slightly colder climate in Vermont (8%, using the metric of heat degree days). Three decades with taxation of residential energy demand have had significant long-term impacts, well before introduction of a carbon tax component. Over time district heating[6] has been expanded to reach 2/3 of all households, and homes have been profoundly insulated and retrofitted with double-glassed windows of energy glass, etc., as part of refurbishments.[7]

Long-term impacts of carbon taxes are not always well appreciated in economic modelling, which tend to underestimate price dynamics. Similar to a small increase in temperature driving global warming, a modest carbon tax drives a wedge into market prices and gradually transforms energy and transport systems.

[4] M Andersen (2010) Europe's experience with carbon-energy taxation. In: SAPIENS 3:2(2010), http://sapiens.revues.org/index1072.html.
[5] M Enevoldsen (2005) The Theory of Environmental Agreements and Taxes: CO2 Policy Performance in Comparative Perspective, https://books.google.se/books?id=uMqg80aRfhMC.
[6] Wikipedia, District Heating https://en.wikipedia.org/wiki/District_heating.
[7] J Tornbjerg (2015) Green Energy For All, http://greenenergyforall.dk/in-english/ provides a concise popular account.

Socio-economic impacts

Distributional implications from a carbon tax will depend on initial income distribution and design features of the tax, including the mechanisms for recycling of revenues. In the absence of any recycling, it has been found that taxes related to electricity and heating tend to be regressive, whereas taxes related to transport in Europe tend to be progressive (affecting the better-off more).[8] Detailed analysis suggests that distributional issues with a carbon tax should not be exaggerated.[9] When implications are measured with a gini-coefficent, findings show that VAT (value-added tax) is three to four times more regressive than environmentally-related taxes. Several European countries have nevertheless mitigated distributional impacts with a "green check" to low-income households.

A carbon tax will in the short term promote uptake of existing low-carbon technologies, while in the longer run provide a basis for innovations in energy and transport technologies, enabling transitions to new systemic modes. Nordic countries have over the past ten years obtained a higher number of patents in green technology, especially related to energy use, than the OECD average (and USA), when measured per million capita.[10]

Carbon leakage and impacts for competitiveness has been a major topic in debate over carbon taxes around the world. Still, many of the European countries having enacted carbon taxes are relatively small and their businesses relatively more exposed to forces of international competition. With EU-ETS covering most of the energy-intensive industries, carbon taxation remain a suitable policy instrument for sectors of manufacturing that are less trade-intensive. The above mentioned EU study of six European countries could not identify negative impacts on GDP from carbon taxation.

Stakeholder engagement

Extensive consultations between decision makers and national associations of employers and employees, according to established traditions of policy making in European countries, have preceded carbon taxation. In smaller European countries macro-economic policies tend to be coordinated between the government, labor unions and employers to contain wage pressure. Where carbon taxes have been enacted as part of more encompassing tax package deals, their potential negative impacts have been mitigated through compensating arrangements for energy intensive industries. Designated tax commissions have prepared for carbon taxes - most recently the Green Tax Reform Committee in Portugal - providing a round-table structure for negotiations among affected parties and involving relevant expertise. While opposition to carbon taxation has persisted beyond conclusions of such tax reform commissions, they have nevertheless in a significant way levelled the ground and provided legitimacy to decision makers.

The downside of such negotiations is that concessions on reductions and exemptions from standard carbon tax rates will impair full cost-effectiveness of carbon tax schemes. European Union rules do however provide legal constraints, as reductions are mostly required to be time limited and to be removed

[8] Katri Kosonen, Regressivity of environmental taxation: myth or reality?, http://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/gen_info/economic_analysis/tax_papers/taxation_paper_32_en.pdf; Florens Flues & Alastair Thomas, The distributional effects of energy taxes, http://www.oecd-ilibrary.org/taxation/the-distributional-effects-of-energy-taxes_5js1qwkqqrbv-en.
[9] EEA, Using the market for cost-effective environmental policy, eea.europa.eu/publications/eea_report_2006_1.
[10] OECD, Green patents, http://www.oecd.org/environment/indicators-modelling-outlooks/green-patents.htm.

gradually. Requirements follow from EU state aid rules, as tax rate reductions can be considered state aid regulated by the European Commission.

Windows of opportunity

Windows of opportunity for carbon taxes have differed, as reflected in the "waves" of introduction in different regions of Europe. Successful issue linkage has been a significant vehicle for adoption, as carbon taxes have only rarely been introduced if not contributing to solve some other challenges than climate change per se – either contributing to a lowering of payroll taxes, to accommodate EU membership or to raise money for fiscal deficits in a more legitimate way. Cynics often claim that carbon taxes have not been introduced to save the climate but only to raise money, but such claims are a misrepresentation of what issue linkage implies. More careful inspection of policy developments in individual countries shows how the starting point has been a need to curb emissions rising or short of targets, while issue linkage has secured political leverage by addressing some other challenges simultaneously. Such challenges have often been highly country-specific, leaving the exact formulae to conditions and specifics of context.

Insights into future potential/reform

The next phase of EU-ETS is currently being negotiated in the European Parliament and in the Council of Ministers. Although EU-ETS has moved towards full auctioning of carbon allowances in the power sector, it is highly uncertain the extent to which it will also prevail with industrial installations. In the absence of auctioning and with the huge reserve of allowances available in the market, it is unlikely that Europe's carbon price will increase much in the foreseeable future. Some governments perceive EU-ETS as insufficient to provide stimulus for de-carbonisation and are considering a price floor for carbon, establishing a minimum price which can provide certainty to investors in energy markets. UK has introduced a carbon price floor at £18 ($22) per ton of CO2, while the government in France has announced a formal proposal to be released soon. Germany has been considering a price floor too, but in the end has opted for a subsidy-based approach.

The European Parliament in a resolution on protecting Europe's steel industry has highlighted the possibility of introducing a border-tax arrangement for steel from non-carbon price regions.[11] A border-tax arrangement would place a penalty on imports to EU, while providing a rebate on exports out of EU matching the carbon price paid (similar to the arrangement of the tax on ozone-depleting substances in US). More careful research into the legal, economic and practical implications of border-tax arrangements has been done since the 2007 French proposal to penalize imports into Europe from non-carbon pricing countries and regions.[12]

[11] European Parliament resolution of 17 Dec. 2014 on the steel sector in the EU: protecting workers and industries (2976(RSP)), Texts adopted P8_TA(2014)0104, http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2014-0104+0+DOC+PDF+V0//EN.

[12] S Monjon and P Quirion, A border adjustment for the EU ETS: Reconciling WTO rules and capacity to tackle carbon leakage (2011) 11(5) Climate Policy, https://www.gtap.agecon.purdue.edu/resources/download/5558.pdf.

The announcement of China to expand its ETS to the whole country as well as to introduce a carbon tax has to some extent shifted focus towards how it would be possible in the future to establish linking of emissions trading with carbon allowances in Europe with China and others with trading schemes.[13]

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December 1st 2016

[13] A Lo, Too big to fail: China pledges to set up landmark emissions trading scheme, The Conversation Sept 26 2015, http://theconversation.com/too-big-to-fail-china-pledges-to-set-up-landmark-emissions-trading-scheme-48214.

[*] The author thanks the Lintilhac Foundation for its support of this project.