



‘Voluntary’ environmental agreements and climate policy: learning by comparison

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Abstract

Despite considerable academic and political debate on the merits of voluntary and negotiated environmental agreements in promoting greater corporate social responsibility, cross-national comparative studies of the conditions required to increase the environmental effectiveness of voluntary agreements remain relatively rare. This paper reviews three sets of voluntary agreements developed in Australia, Germany and the UK to regulate industrial greenhouse-gas emissions. It is argued that, contrary to much of the established literature, which posits that environmental agreements are generally only useful as supplements to legislation or market-based instruments, negotiated agreements can often act as a primary driver of abatement and changes in corporate competency and culture, especially when combined with the threat of market-based instruments. Conclusions are also drawn on the relative effectiveness of reporting requirements, monitoring, and legal and financial sanctions in making sure industry complies with the terms of negotiated agreements.

Key words: *Environmental policy, voluntary agreements, market-based instruments, climate policy, Australia, UK, Germany*



Introduction

Voluntary agreements have become an increasingly popular tool for implementing environmental policy in many European Union (EU) states and other Organisation for Economic Co-operation and Development (OECD) countries during the last decade (Ten Brink, 2002; OECD, 2003). International experience with voluntary agreements suggest that they can provide several advantages for both firms and public authorities by lowering transaction and administrative costs due to shorter negotiation processes and less intensive monitoring, increasing information sharing between government and industry, promoting more co-operative relations on the development of environmental policies, and by giving flexibility in how standards are met to reduce abatement costs (Segerson and Micelli, 1998; Bizer and Jülich, 1999).

These benefits are keenly contested by environmental groups, however, who argue that voluntary agreements often do little more than endorse 'business-as-usual' environmental strategies, and by many economists, who see voluntary agreements as environmentally and economically inferior to market-based instruments (eco-taxes and emissions trading) (OECD, 2000; 2003; de Muizon and Glachant, 2003). On this basis, many claim that although voluntary agreements can be usefully employed in a general framework of regulation, they are best utilised as supplements rather than alternatives to direct regulation or market-based instruments. Both sets of arguments are, however, based largely on *ex ante* theoretical comparisons of the effects of market-based instruments and voluntary agreements on polluter behaviour. This is partly because of the comparative novelty of both sets of policy instruments and the time required for them to exert their full effect on markets. It is widely accepted that greater *ex post* empirical evaluation of market-based and voluntary instruments is required to provide clearer indications of their strengths and weaknesses, and to pinpoint critical 'success and failure' factors that can assist in delivering sustained improvements in environmental performance and changes in corporate engagement with sustainability issues (Krarup, 2001; Folmer *et al.*, 2001).

The aim of this paper is to contribute to this agenda by addressing two key questions concerning the use of voluntary agreements in environmental policy. The first is whether voluntary agreements are really only useful as adjuncts to market or regulatory measures, or whether they can act as the main driving force behind pollution abatement policies. The second is whether it is possible to identify generic factors that allow voluntary agreements to achieve significantly more than 'business-as-usual' corporate environmental performance. A cross-national comparative approach contrasting the use of voluntary and other measures in different political jurisdictions to solve the same policy problem is used for the investigation. Such studies, by utilising comparison to analyse applied policy issues, provide a useful, though by no means unproblematic, avenue for understanding the effects of variations in instrument design and institutional setting on the effectiveness of voluntary agreements (Martin, 2001; Cummins, 2003; Bailey and Rupp, 2005).

The paper reviews the role of voluntary agreements in the implementation of climate policy in Australia, Germany, and the United Kingdom (UK), three countries where agreements have played a prominent role in the mix of instruments used to control industrial greenhouse-gas emissions. Voluntary agreements have been deployed extensively in climate policy because of the difficulties of applying direct regulation to greenhouse-gas emissions and the potential economic consequences of using market-



based instruments (Carraro and Egenhofer, 2003; Croci, 2003). These case studies were selected because of the contrasting ways the three governments have used agreements as stand-alone instruments or in conjunction with other measures to nurture 'spontaneous' action by industry. Thus, they provide a broad basis for exploring the possibility of developing general guidelines for the design of voluntary agreements. The paper concentrates mainly on factors influencing the environmental effectiveness of agreements; economic efficiency is considered in overview but the main concern is the ability of agreements to encourage additional efforts to improve energy efficiency and emissions intensity over and above 'business as usual.'¹

The rest of the article is divided into four parts. The next section gives a brief review of the three main forms of environmental agreement and theoretical debates concerning their effectiveness vis-à-vis market-based instrument. This is followed by a description of the three sets of national agreements and a critical analysis of the reasons for differences in their environmental impact. Finally, concluding thoughts are offered on principles for the design environmentally effective voluntary agreements.

Environmental agreements: theoretical and policy issues

The phrase *voluntary agreement* is frequently used as a catch-all term to describe all forms of environmental agreement between industry and public authorities (Jordan *et al.*, 2005). However, this masks important variations in the functional characteristics of voluntary agreements and as an analytical starting point it is helpful to employ Börkey and Lévêque's (2000) typology of the main forms of agreement:

- *Unilateral commitments*: unilateral statements and pledges by individual companies and/or associations to address a prominent policy issues and/or to demonstrate their general commitment to corporate social responsibility;
- *Public voluntary schemes*: initiatives set up by governments, which define performance criteria and membership conditions, but where participation is voluntary. Major examples of public voluntary schemes include ISO-accredited environmental management schemes and EU and national eco-labels;
- *Negotiated agreements* – formal contracts between industry and public bodies to address specific environmental problems. Such agreements may or may not be legally binding depending on the constitutional rules of the state but, in most instances, they are negotiated to avoid direct regulation or market-based instruments. Under joint liability agreements, all companies in affected sectors are penalised if environmental objectives are not met, whereas individual liability agreements impose sanctions against individual non-compliers. In practice, many agreements employ both penalties (Bailey and Rupp, 2005).

This typology identifies a clear spectrum between voluntarism and compulsion. Unilateral commitments involve no external mandating of participation, goals or implementation strategies; public voluntary schemes only generally specify goals and some procedures; with negotiated agreements, voluntarism is restricted primarily to whether industry offers an agreement or accepts regulation and the means used to

¹ Environmental effectiveness is itself a problematic concept to evaluate and can be interpreted in several ways: whether policies solve a problem, whether they achieve stated policy goals (ambitious or otherwise) and in a comparative sense. Causality between policies and outcomes is also often unclear, especially where a mix of instruments is used (Sullivan and Wyndham, 2001).



achieve agreed outcomes (Ten Brink, 2002). Similarly, it is the only type of agreement where sanctions, other than de-registration from the scheme, is applied for non-compliance. Although useful in probing general distinctions between different forms of agreement, Börkey and Lévêque's classification remains a relatively crude one in the sense that it provides little detail on how differences in the calibration of agreements, institutional settings, and their interaction with other policy instruments can influence their environmental effectiveness.

The popularity of voluntary and negotiated agreements stems principally from the perception that they provide flexible and inexpensive management of environmental problems. Much of the economics literature is, however, highly cautionary about the pre-conditions agreements must fulfil to be regarded as environmentally effective. Leading this critique are several reports by the OECD examining the characteristics and country case studies of voluntary agreements (OECD, 2000; 2003). The 2003 report concludes that even though many agreements have met their environmental targets, only a few have achieved more than could have been accomplished without the agreement. It also argues that agreements provide low economy-wide efficiency, since they seldom equalise marginal abatement costs across the whole economy (as is argued to be the case with emissions permit schemes), and tend instead to concentrate costs and benefits on individual firms or sectors. At the same time, the report concedes that similar criticisms apply to direct regulation, which does not offer the same flexibility as voluntary agreements.

Further insights on the strengths and weaknesses of environmental agreements can be gained by analysing their key stages. The first stage involves the motives behind policy-makers' *decision to use agreements*. This may be a belief that agreements can achieve higher environmental standards than other instruments or more pragmatic considerations, such as the greater acceptability of voluntary regulation to industry (Hansen and Larsen, 1999; Lyon and Maxwell, 2003). The positive outcomes of adopting agreements can be the early instigation of policy and the engagement of industry in a process of cultural and procedural change that becomes difficult for it to renounce later on. Conversely, it also has the potential to 'lock-in' voluntarism as an accepted strategy and legitimate industry arguments that it would experience 'first-mover disadvantages' – the costs of voluntary initiatives plus those of other measures if they are introduced at a later stage.

The second stage is the *negotiation of the agreement*. Here, environmental efficacy depends, *inter alia*, on: (i) the urgency of action and its impact on government's willingness to compromise on standards; (ii) actions taken by other countries and possible effects on international competitiveness; (iii) the closeness of negotiations and the extent to which industry utilises this to weaken requirements; (iv) the amount of information needed to define standards; (v) and the asymmetry of information between industry and government negotiators (Hansen and Larsen, 1999). Effective agreements require minimal distortion of objectives through information asymmetry or time constraints, though this applies to an extent to all instruments. However, Glachant *et al.* (2002) argue that less information and negotiation over objectives is generally required to define efficient economic instruments than environmental agreements, leading to lower administration costs at the design phase.



The final stage is the *implementation of the agreement*. Although agreements theoretically require less monitoring than direct regulation because standards are agreed rather than imposed, enforcement must be rigorous enough to discourage companies from reaping the benefits of deferred regulation without incurring the cost of implementing the agreement (free-riding). High incentives to comply are therefore a pre-requisite of environmentally effective agreements. These may include flexible but compulsory and highly visible reporting, strong penalties for non-compliance, and intensive monitoring procedures, each of which may constitute significant hidden costs compared with market-based instruments (Walton, 2000; Krarup, 2001).

From this, Bizer and Jülich (1999) contend that while agreements can be usefully applied in a general framework of regulation, their questionable stringency means they require regular independent monitoring, verification and public reporting of performance, making them best deployed as supplements, not alternatives, to regulation or market-based instruments. However, taxes can be used as a means of affecting negotiated abatement levels by changing bargaining incentives (Manzini and Mariotti, 2003). In summary, the balance of literature concludes that environmental agreements offer more flexible policy than direct regulation but are generally less effective and efficient than market-based instruments (Segerson and Micelli, 1998). The remainder of the paper now examines how the three case-study countries addressed these issues in the design of voluntary agreements to control industrial greenhouse-gas emissions.

Description of the programmes

The Australian Greenhouse Challenge

The Greenhouse Challenge (the Challenge) was launched in 1995 as a joint voluntary initiative between the Australian national government and industry as one several 'no regrets' measures introduced under the Australian National Greenhouse Response Strategy (NGRS)². The guiding principle of the Challenge was to create a framework for voluntary, non-discriminatory and cost-effective action that reflected the energy-intensive, resource-dependent and trade-exposed nature of Australian industry (Australian Industry Greenhouse Network (AIGN), 2002). Australian Greenhouse Office (AGO) was established in 1998 as an executive agency of the Department of the Environment and Heritage to co-ordinate the administration of the National Greenhouse Strategy (NGS), the successor to the NGRS, including the Challenge.

Under the Challenge, participating organisations signed voluntary agreements with the government to undertake and report on emissions inventories and action plans (Australian Greenhouse Office (AGO), 1999). The Challenge targeted all sectors of Australian industry, including manufacturing, mining, energy production and use, agriculture, tourism and forestry. However, the majority of early Challengers came from the energy-intensive manufacturing and energy sectors, and from Tier 1 organisations emitting greater than 0.1 million tonnes (Mt) of carbon dioxide equivalent (CO₂-e) per annum (AGO, 1999). Complete coverage was achieved in energy-intensive

² Other elements include: the *National Greenhouse Gas Inventory* (NGGI); the *Greenhouse Gas Abatement Programme* (GGAP) offering financial assistance to large-scale emissions-saving or sink-enhancement activities; *Generator Efficiency Standards* (GES) to assist power generators to achieve technologically feasible and affordable best practice; *Greenhouse Friendly* certification of carbon-offset activities; *Mandatory Renewable Energy Targets* (MRET) for generators to take two per cent of marketed electricity from renewable sources; and legislation to curb bush clearance, particularly in Queensland (Commonwealth of Australia, 2000; Hunt, 2004).



industries like aluminium refining and smelting, but participation remained low among agricultural, government and transport organisations.

The Challenge was re-designed and re-launched as Greenhouse Challenge Plus (Challenge Plus) in June 2005 following extensive consultations with industry, state governments, and other stakeholder groups (AIGN, 2004). Challenge Plus largely continues the voluntary approach of its predecessor while consolidating other aspects of the NGS into Challenge Plus, notably Generator Efficiency Standards (GES) and Greenhouse Friendly (Department of the Environment and Heritage (DEH), 2005). Membership of Challenge Plus also became mandatory for proponents of large-scale energy projects and organisations receiving in excess of Australian (A)\$3 million per year in business fuel credits from July 2006. Similarly, energy generators that meet the requirements of GES are required to sign five-year legally binding *Deeds of Agreement* to assess their operations against best practice bands for their technology classes and fuel types set out in the AGO's GES technical guidelines (DEH, 2005).

Membership of Challenge Plus is presently around 780 organisations, covering approximately 1400 operating sites (Sullivan, 2005). The programme has three tiers of membership with varying obligations:

- *Associates*: companies that require additional assistance or time to meet reporting requirements, as well as GES and Greenhouse Friendly providers that were not previously Challenge members. Associate members are expected to work towards full membership, normally within 24 months.
- *Members* comprise the bulk of Challenge Plus organisations and are required to report their aggregate emissions, action plans, and progress against targets annually to the AGO. All reports must be open to independent verification and disclosed in public statements. Around 25 companies from Challenge Plus and three from GES are scheduled for verification in 2006. In return, members gain access to technical expertise (including on-line advice packs, reporting tools and an AGO advisor), listing in the Challenge members' directory, the right to use the Challenge Plus logo, and eligibility to nominate for the National Challenge Plus Awards.
- *Leaders* gain further recognition and technical support for publicly reporting facility-level emissions inventories and greenhouse strategies, and encouraging suppliers to take greenhouse actions. However, only Challenge leaders are required to quantify their emissions targets and no penalties are applied if forecast emissions reductions are not achieved (DEH, 2005). Organisations may also withdraw from the programme at any time without sanction (Parker, 1999).

The Challenge strategy has been strongly criticised by the Australia Institute, some Australian state governments and the Australian Senate Environment, Communications, Information Technology and the Arts Committee (SECITAC) for failing to create incentives for more than business-as-usual abatement (SECITAC, 2000; Hamilton, 2002; 2004). However, the federal government maintains that the Challenge has been pivotal to Australia's progress towards its Kyoto targets.³ Some state governments have grown impatient with the lack of policy lead from Canberra and have sought to gather

³ Australia claims to be on course to meet its Kyoto commitments despite not ratifying the Protocol, although a significant portion of Australia's emissions reductions are attributed to the ending of land clearance in Queensland rather than the Challenge (Hunt, 2004)



support for a national emissions trading scheme (AGO, 2002). Others have introduced state-level regulation, the most prominent being the New South Wales Greenhouse Gas Benchmarking Scheme and the Victorian Environmental Protection Agency's licensing requirement for facilities to undertake energy audits and develop action plans to reduce emissions with a two-year payback (Hamilton and Turton, 1999a; Environmental Protection Agency Victoria, 2006). However, the government ruled out emissions trading in the near term in its 2004 White Paper, *Securing Australia's Energy Future*, arguing that it would impose significant new economy-wide costs in the absence of effective global policies on climate change (Australian Government, 2004). At present, the only financial incentives to control emissions come from government pledges to spend A\$1 billion by 2005 on its NGS, principally through the GGAP, though some independent assessments calculate that only A\$265 million of the anticipated spending of A\$797 million by 2003-4 was achieved (Pollard, 2003)⁴.

German climate policy and self commitments

Germany has the highest number and broadest range of negotiated agreements of any EU member state and has made use of legally non-binding *Selbstverpflichtungen* (Self Commitments) since the 1970s (European Environment Agency, 1997). The system of environmental governance in Germany is often referred to as *regulated self-regulation* (Wurzel *et al.*, 2003), where governments use the threat of regulation to force industry to negotiate 'voluntary' agreements 'in the shadow of the law.' By agreeing to regulate its activities, industry nevertheless avoids or dilutes regulation and gains greater involvement in standard setting and the methods used to implement policies (Bailey and Rupp, 2005).

Early German climate policy followed this customary pattern with the signing of the first Climate Change *Selbstverpflichtung* by the *Bundesverband der Deutschen Industrie* (BDI: German Industry Federation) in 1995 following threats by the federal government to introduce a mandatory waste heat ordinance. In fact, negotiations had been ongoing since 1990 but the BDI refused to sign until the government abandoned discussions on national carbon taxes. The First Conference of the Parties to the Framework Convention on Climate Change in Berlin in 1995 provided the opportunity to break the deadlock, when the German government offered to drop energy taxes if industry signed a voluntary declaration. The 1995 Commitment was widely regarded as unambitious and vague and was replaced in 1996 by a more ambitious agreement that included independent monitoring and a commitment by 14 energy-intensive sectors and four energy-sector associations to reduce carbon emissions by 20% by 2005. A further bilateral agreement was signed in 2000 between 19 associations and the federal government, setting a new carbon reduction target of 28% by 2010, again in response to the threat of a mandatory energy audit ordinance.

The election of the Social-Democrat/Green Party coalition in 1998 and events in the EU have cast doubt over the future of the *Selbstverpflichtung*. The Greens were highly critical of Self Commitments and argued for greater pressure to be applied on industry via a widespread ecological tax reform (ETR) including energy taxes (Sattler *et al.*, 2001). The ETR act was introduced in 1999 despite strong industry opposition, and was

⁴ In 2005, the government introduced a new A\$500 million Low Emissions Technology Demonstration Fund. This will operate from 2005-2020 to support new low-emission technologies with significant long-term greenhouse abatement potential and aims to leverage a further A\$1 billion from the corporate sector.



followed by the Continuation of the ETR in 2000 and the Further Development of the ETR in 2003. Its energy-tax component, the *Ökosteu*er, contains five annual increments on electricity, motor-fuel, gas and heating oil levies spanning 1999-2003. Coal was not taxed initially because of political sensitivities surrounding the German coal industry, though excise on coal became payable from 2004 under the EU Energy Products Directive (*Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit* (BMU: Federal Environment Ministry, 2003). Although a system of net-burden caps and social security rebates reduces the cost of the *Ökosteu*er for most energy-intensive industries (BMU, 2003), it has remained controversial with the BDI accusing the government of renegeing on pledges not to introduce measures that might disadvantage German industrial competitiveness.

Similar controversy beset the EU emissions trading scheme (EU ETS) launched in 2005. The emissions-trading directive requires each member state to develop national allocation plans of carbon allowances for specified industries, with allowance trading between sectors and states being used to concentrate abatement where it is cheapest, reducing overall compliance costs (Michaelowa and Butzengeiger, 2005). At the end of each trading year, facilities are required to cancel allowances corresponding to their actual emissions and any that fail are fined and must make good the shortfall in future years⁵. The German government has supported the ETS and tendered its allocation plan in March 2004. However, the BDI has repeatedly argued that the *Selbstverpflichtung* made emissions trading irrelevant and initially threatened non-cooperation unless opt outs for energy-intensive sectors were agreed by the European Parliament (BDI, 2002; BDI, 2003; Sijm, 2005). Both economic instruments operate independently of the *Selbstverpflichtung*.

UK Climate Change Agreements

British Climate Change Agreements (CCAs) differ from their Australian and German counterparts in two important respects: (i) they are legally binding on sector associations and companies that sign up; and (ii) they are directly linked to market-based instruments. Discussions on the policy began in March 1998 when the Treasury commissioned Lord Marshall to investigate the use of economic instruments to improve business energy efficiency. Consultations with industry brought broad acceptance that energy taxes were inevitable but concerns about their effect on competitiveness. Reflecting these points, the *Marshall Report* concluded that measures were needed to mitigate the effects of energy taxes on energy-dependent businesses and to provide clear signals on the long-term direction of UK climate policy to allow businesses to plan investments and maximise the environmental impact of the tax (Lord Marshall, 1998).

Accepting Lord Marshall's conclusions, the government introduced the Climate Change Levy (CCL) in April 2001 as a downstream tax on energy usage. The CCL covers a range of energy products (natural gas, coal, liquid petroleum gas, oil, and electricity, excluding certain renewable energy sources), with tax rates based on estimates of each fuel source's carbon intensity, and raises around £1 billion of revenue per annum (Department of the Environment, Food and Rural Affairs (DEFRA), 2005). Most of this is recycled to industry as reduced employer's national insurance contributions, though £120million is retained annually to support efficiency and renewable energy

⁵ The main sectors affected by EU emissions trading are energy, minerals and ferrous metals. The minimum penalty for not surrendering adequate permits in the first phase (2005-7) is €40 per tonne CO₂e; this increases to €100 per tonne from 2008.



projects administered by the Carbon Trust (Environmental Data Services (ENDS), 2003).

To mitigate the commercial impact of the CCL, the government simultaneously concluded Climate Change Agreements (CCAs) with 44 energy-intensive sectors, allowing them an 80% discount in the levy in exchange for legally binding commitments to reduce emissions and/or improve energy efficiency. Only facilities covered by Integrated Pollution Prevention and Control (IPPC) regulations were initially eligible for CCAs, though these criteria have since been broadened to include all industrial units that meet a 12% threshold of energy intensity, or fall between 3-12% if they meet an import-penetration ratio of 50% or an export-production ratio of 30%. (DEFRA, 2005). CCAs were negotiated on a sectoral basis using energy-savings assessments by the Energy Technology Support Unit (ETSU, now Future Energy Solutions). Most associations then agreed underlying emissions targets with their members, with progress measured at two-yearly milestones. The penalty for non-compliance with any milestone is withdrawal of the CCL discount for at least two years. Monitoring is normally at sector level to minimise administrative burdens, though DEFRA will investigate individual facilities if a sector fails to meet its milestone to avoid penalising the whole sector.

The final element of this policy is the UK emissions-trading scheme (UK ETS), a voluntary scheme that runs from 2002-7 and includes two categories of participant:

Direct participants: facilities ineligible for CCAs were invited to offer emissions-reduction targets in exchange for a share of a £215 million fund established by government to offset the costs of abatement projects (ENDS, 2003).

Indirect participants: companies in CCAs may also use the scheme as a risk management device by buying permits to comply with milestone targets and avoid losing the CCL discount or by selling or retaining excess permits (once verified by DEFRA) as insurance for future milestones (DEFRA, 2003).

Comparison of the agreements

Full comparisons of the environmental impacts of the Challenge/Challenge Plus, Self Commitment, and CCAs are hampered by a number of differences in the design of the agreements in terms of:

- Methods used to measure abatement (absolute emissions reductions or relative emissions per unit of production);
- Industrial and stationary energy processes covered by national agreements;
- Structure and relative contribution of industry and energy production to national emissions;
- Duration of the agreements and their resultant capacity to influence corporate investment;
- Mixes of instrument deployed alongside agreements, which prevents isolation of the impact of each instrument;

A broad overview can nevertheless be gained by reviewing industrial emissions trends in the three countries. Table 1 summarises changes in net emissions from the Australian industrial and energy sectors between 1990 and 2003 and reveals an overall increase in



emissions of 15% from industry and 31% from energy production. The AGO reports, however, that these are the result of strong economic growth and rising population, and that the Challenge produced an annual fall in CO₂e of 21 million tonnes in 2002 compared with business as usual (DEH, 2003). The AGO predicts that Challenge Plus will yield further annual reductions of 15.8m tonnes CO₂e by 2010 (DEH, 2005) even though the majority of historic reductions came from changes in land use and forestation policy.

Table 1: Australian greenhouse gas emissions, 1990-2003 (m tonnes CO₂e)

	Total 2003 emissions	Change from	
		2002	1990
Net Total Emissions	550.0	-1.4	+1.1
Total Industry (<i>of which</i>)	32.3	+8.0	+15.0
<i>Metal production</i>	15	-18.0	+15.0
<i>Minerals</i>	5	N/A	+12.0
Total Energy (<i>of which</i>)	374.3	+1.0	+31.0
<i>Stationary energy</i>	268.1	+2.0	+37.0
<i>Fugitive emissions</i>	26.4	-9.0	-8.0
Transport	79.8	+1.0	+28.8
Agriculture	97.3	-1.0	+4.0
Land use, land use change and forestry	34.8	N/A	-72.4
Waste	11.4	-3.0	+11.1

DEH (2003: various pages)

Tables 2 and 3 summarise progress towards Kyoto commitments across the German economy. Although Table 2 confirms that the industrial and energy sectors are close to achieving their combined 2008-12 target, further analysis reveals that most of these savings were achieved before the first *Selbstverpflichtung* in 1995 from industrial decline in the former East Germany following reunification (Table 3) (Michaelowa, 2003). These data report absolute emissions, however, rather than relative savings against business as usual. Finally, Tables 4 and 5 review savings attributed to UK CCAs between 2001 and 2004, and show that CCAs have achieved the greatest and swiftest reductions of the case studies. Although relative net reductions from the Challenge outweigh relative or absolute reductions from CCAs in pure numbers, CCA figures do not include energy production, which accounts for the majority of Challenge savings, or relative savings from the British steel sector, the major contributor to CCA performance (Table 5). Equally, the CCAs' achievements are heavily concentrated in the steel, aluminium, cement, and chemicals sectors, which contributed 96.8% and 92.4% respectively to total absolute reductions in the first and second target periods (Future Energy Solutions, 2005). Whether these are attributable to CCAs or simply a by-product of structural adjustments is more debatable, though assessments by DEFRA's Global Atmosphere Division (GAD) in 1999 projected that CCA targets could save 2.5Mt CO₂e annually compared with business as usual if all feasible cost-effective measures were implemented by 2010. The scale of over-achievement suggests that structural factors are significant but also that CCAs are an important driver of



abatement. The same GAD assessment estimated that the price effect of the CCL without CCAs would lead to savings of just 0.25Mt CO₂e per annum (ETSU, 2001).

Table 2: Baseline compliance for compliance with Kyoto Protocol, Germany

Sector (m tonnes)	1990	2003	Target 2008/12	Gap 2003-2008/12
CO ₂ equivalents	1248	1017	986	-31
CO ₂	1015	865	844	-21
Other greenhouse gases	233	152	142	-10
Private households	129	122	120	-2
Transport	158	167	171	+4
Trade/business/services	91	60	58	-2
Industry	195	131		
Energy	442	385		
Energy + industry	637	516	495	-21

BMU (2005: 2)

Table 3: Profile of German CO₂ emissions by sector, 1990-2003 (m tonnes CO₂)

	1990	1995	1998	2000	2002	2003
Energy	441.6	379.2	366.8	364.0	378.1	385.1
Industry	195.5	152.9	143.1	141.8	134.0	130.9
Transport	158.1	172.5	176.4	178.3	172.5	166.5
Households	129.3	129.2	132.0	116.8	120.1	122.4
Trade/business services	90.6	68.5	66.8	59.2	59.1	60.3
Total Emissions	1015.0	902.2	885.2	860.0	863.8	865.3

BMU (2005: 1)

While these data provide only crude approximations of the impacts of the Challenge, *Selbstverpflichtung* and CCAs, they imply strongly that differences in the design of the agreements and their interaction with other instruments have materially affected their capacity to deliver emissions reductions. The main elements of each agreement are summarised in Table 6. The first distinction arises in the coverage of the agreements, where the inclusion of energy producers, all industry sectors and tiered membership levels in the Challenge produces a high participation rate compared with the UK. This is, however, offset by its 'opt-in' approach for most sectors. Although the *Selbstverpflichtung* and CCAs are also notionally voluntary, both use sector agreements to create *de facto* 'opt-out' conditions once associations signed up. Quantification of coverage in terms of total industrial emissions is hampered by incomparable data. However, government sources suggest that Challenge Plus covers approximately 50% of Australian industrial emissions (275Mt CO₂e) (DEH, 2003); the 2000



Selbstverpflichtung accounts for 80% of industrial emissions (113.5Mt CO₂e, excluding energy production); and CCAs cover around 75Mt CO₂e (de Muizon and Glachant, 2003), or 44% of UK industrial emissions. While benefits can accrue from including energy producers in agreements, these depend on the likelihood of voluntary measures producing major improvements in generator emissions, which are strongly prescribed by ‘sunk’ investments in power stations and supply lines, the availability (and price) of low-emissions fuels, and the need to respond rapidly to short-term demand fluctuations. Given these limitations, most gains in stationary energy efficiency have come from normal business factors rather than the effects of voluntary agreements (personal communication).

Table 4: Absolute emissions savings of CCAs from baseline, 2001-4

	Actual (mtCO ₂ pa)	All Sectors Target (mtCO ₂ pa)	Actual minus Target (mtCO ₂ pa)
Period 1	15.8	6.0	9.8
Period 2	14.4	9.3	8.9
excluding Steel			
Period 1	6.4	4.6	1.8
Period 2	6.9	3.1	3.8

Future Energy Solutions (2005: 7)

All the agreements stipulate reporting at sector, company, or facility level. However, clearer distinctions arise in the existence and legal status of emissions targets and sanctions for non-compliance. Although Challenge Plus requires generators to evaluate operations against industry best practice, firms can argue that achieving best practice would require them to go beyond the AGO’s own affordability criteria (AGO, 2005), while other sectors can evade targets simply by electing not to become Challenge Plus leaders. Moreover, only organisations that receive business credits in excess of A\$3 million can be penalised for non-achievement of targets. Regulation has been the main tool used to enforce the *Selbstverpflichtungen*; however, this threat has diminished since the introduction of EU emissions trading since firms could claim that they were suffering double regulation if legislation were to be introduced. CCAs are the only of the three agreements to combine legal enforceability, quantified emissions targets and financial penalties for non-compliance. This combination provides CCA participants with high incentives to accept and achieve more stringent emissions targets, while the system of biennial assessments acts as a deterrent to free-riding.

Finally, while all the programmes offer either informational or financial assistance, their limited scale suggests that they are largely sweeteners to make the main elements of climate policy more palatable to industry. The Carbon Trust’s total annual budget from the CCL remains around £130 million per annum, while the Australian government has not fulfilled its commitment to spend A\$1 billion promoting abatement activities in 10 years, and the revenues and tax breaks for abatement in Germany remain marginal compared with the scale of investments required to secure major emissions reduction.



Table 5: CCA emissions savings, 2001-4 by sector (ktCO₂ pa)

	Target Period 1		Target Period 2	
	Absolute Saving	Relative Saving	Absolute Saving	Relative Saving
Aerospace	15	N/A	27	N/A
Aluminium	2,000	2,600	2,227	3,409
Craft baking	-9	27	-29	52
Brewing	37	44	98	91
Cement	1,900	880	2,030	1,136
Ceramics	188	112	306	159
Chemicals	2,000	2,500	1,520	3,524
Cathode ray tubes	21	117	7	36
Dairy	58	190	20	186
Egg processing	2	8	0	4
NFU – eggs	10	15	4	27
Mineral wood	9	24	-9	63
Food and drink	160	620	161	732
Foundries	139	16	114	7
Glass	39	251	-49	250
Gypsum products	-21	6	-50	1
Leather	6	3	6	0
Lime	173	51	125	91
Malting	8	22	0	36
Poultry processing/feed	-30	38	-40	26
British Meat Federation	27	12	-16	2
Metal forming	23	46	26	92
Metal packaging	18	28	21	39
Motor manufacturers	36	185	11	398
NFU – pigs	14	11	13	13
Non-ferrous metals	130	140	78	78
Paper	-510	2,600	-248	2,758
NFU – poultry meat	10	28	17	40
Poultry meat rearing	72	82	65	77
Printing	-22	-5	-31	52
Rendering	14	-1	-15	28
Rubber	171	49	192	131
Semiconductors	60	41	29	324
Slag grinders	4	6	-9	12
Spirits	45	17	94	64
Steel	9,400	N/A	7,553	N/A
Supermarkets	15	1	-1	N/A
Surface engineering	29	75	42	119
Textiles	114	50	115	107
Agricultural supply	23	46	1	74
Wallcoverings	28	N/A	19	N/A
Wood panel	-22	-6	-15	68

Future Energy Solutions (2005: 12)



Table 6: Features of national climate agreements

	Greenhouse Challenge Plus	Climate Change <i>Selbstverpflichtung</i>	Climate Change Agreements
Participate	All industry sectors and energy generators	Manufacturing, agriculture, silviculture, and energy sectors	Energy-intensive and trade-exposed sectors
Recruitment	Voluntary except for large-scale energy projects: decision by individual company	By sector association co-ordinated by <i>BDI</i>	All member companies of eligible sector associations; opt outs possible
Legally binding	No, except GES Deeds of Agreement	No	Yes
Emissions targets	Optional dependent on membership status; some links to affordable industry best practice	Yes, overall targets	Yes, defined by sector in absolute or relative terms
Reporting	By company or association	Annually	By sector at biennial milestones
Regulatory threat	Undefined	Introduction of ordinances	No
Financial penalties	Payment of excise credits over A\$3m contingent on joining Challenge Plus	No performance-related concessions to <i>Ökosteuer</i>	Removal of 80% CCL discount
Capital/cost assistance	Greenhouse Gas Abatement Programme	Some hypothecation	Carbon trust, emissions trading
Recognition	AGO directory, annual awards	Undefined, except through reports	Undefined, except through reports



In the final analysis, the rapid emissions reductions achieved during the first four years of CCAs cannot be attributed to any single factor but, rather, stems from a combination of legal enforceability, clear (though possibly unambitious) targets, financial incentives (both negative and positive), regular monitoring, the interaction of voluntary agreements with economic instruments, and some measure of ‘luck.’ Even though the German and Australian agreements incorporate some of these elements, neither links target non-achievement openly with financial incentives. Equally, whether agreements or economic instruments were the real driver of the CCL-CCA package, the British government used the threat of taxes, rather than the price signal itself, to force industry to accept and meet more ambitious targets. But even taking this into account, a significant proportion of UK emissions reductions cannot be credited to CCAs. Future Energy Solutions (2005) reports that the UK steel sector, which accounts for 25% of primary energy covered by CCAs, experienced severe operational adjustments in 2002, although production increased by 28% in the second target period with just 10% increase in emissions. Similarly, other major energy users like aluminium, chemicals and cement improved relative emissions but also contracted because of competition from countries with less stringent emissions regulation (House of Lords, 2005). The Select Committee concluded that some of the reductions in domestic emissions may be contributing to increased global emissions, though it also noted that major improvements in energy efficiency had been made as a result of the policy mix.

Conclusions

This paper has sought to contribute to debates on the use of voluntary agreements in environmental policy by examining the climate policies of Australia, Germany and the UK, three countries where agreements have been used extensively alongside other instruments to reduce industrial greenhouse-gas emissions. Returning to the first question raised in the introduction, the majority view in the literature is that although agreements can be useful supplements to direct regulation and market-based instruments, their usefulness is restricted by their inability to achieve more than ‘business-as-usual’ improvements in corporate environmental performance (as well as by their economic inefficiency) (Segerson and Micelli, 1998; Bizer and Jülich, 1999; OECD, 2000; 2003; Croci, 2003; de Muizon and Glachant, 2003).

Environmental effectiveness remains a difficult concept to assess because of unclear definitions and problems in establishing data on corporate performance, baseline scenarios, and the effects of individual instruments where policy mixes are used. However, the evidence from this investigation indicates that environmental agreements have contributed to significant reductions in industrial emissions in some, but not all, of the case-study countries. The most rapid and marked decreases have occurred in the UK, whereas the impact of the Australian Challenge/Challenge Plus and German *Selbstverpflichtungen* is less clear. Differences between the performance of the Challenge and the German and British agreements can be explained mostly by the fact that the Challenge is more of a public voluntary agreement (though this is changing somewhat with Challenge Plus), whereas the latter two are clearly identifiable as negotiated agreements.

However, this typology fails to explain variations between the performance of the *Selbstverpflichtungen* and CCAs, leading to the second question concerning the key design factors influencing the environmental effectiveness of voluntary agreements.



From these preliminary results, the main contributors to the success of CCAs have been: their legal enforceability, the use of independent assessments leading to quantified performance targets, stringent monitoring, and the linking of agreements to economic instruments. Where these pre-conditions are met, the evidence indicates that agreements can become a primary driver of abatement rather than being simply an adjunct to regulation or market-based measures (Bizer and Jülich, 1999). How far these elevate CCAs beyond ‘business as usual’ remains a matter of speculation, however, while high administration costs have undermined their economic efficiency. One could also contend that the impact of CCAs is more to do with energy taxes than the agreements themselves. This is true in part but is not wholly supported by predictions of the CCL’s impact with and without CCAs (ETSU, 2001). Moreover, the government used economic instruments in an unconventional way, using the threat of taxes and only a ‘nominal’ price signal in the first instance to balance environmental and economic priorities, rather than determining a carbon price using standard economic principles.

In contrast, there is limited evidence that wide participation, mandatory reporting, independent verification (although all clearly necessary), or threats of direct regulation add substantially to business as usual without financial incentives. In fairness, this was never the aim of the Challenge, though it clearly drove the *Selbstverpflichtungen*. One can add that onerous reporting and the threat of regulation can undermine agreements by discouraging participation or encouraging industry to press for lower standards (Sullivan, 2005). Similarly, over-reliance on regulatory threats and strict monitoring can make agreements indistinguishable from the static controls used to enforce direct regulation. Although subsidies, grants and other enabling measures can encourage additional abatement, governments are constrained in how far they can underwrite industry investments.

An ancillary but important lesson emerging from the study concerns the timing of agreements relative to market-based instruments. Whereas agreements can encourage early action and generate longer-term momentum, the German and Australian cases suggest that they also increase resistance to alternative instruments by legitimating voluntarism as *the* appropriate policy response. Again, the evidence suggests that the precedents created by the Challenge and *Selbstverpflichtungen* reinforced industry’s claims that further regulation would create ‘first-mover disadvantages’ for early ‘voluntary’ actions (AIGN, 2002; BDI, 2003). Although early movers can equally gain competitive advantages from improving their energy efficiency and reducing production costs, the more defensive argument has been used skilfully by Australian industry to oppose mandatory or market-based measures (Hamilton and Turton, 1999b; Conrad, 2001). Thus, whatever their other merits, the timing of voluntary agreements vis-à-vis other instruments can be an important determinant of the long-term effectiveness of environmental policy.

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