VOLUNTARY AGREEMENTS WITH INDUSTRY

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The views presented in this paper are those of the authors and do not necessarily represent the views of their respective Organisations.

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1 INTRODUCTION[1]

Voluntary agreements have attracted considerable interest among policy makers as a flexible tool for achieving reductions in greenhouse gas (GHG) emissions from industry. Voluntary agreements vary considerably in their structure and approach. They may range from relatively informal statements of intent to legally binding agreements with clearly specified targets and monitoring procedures.

The objectives of this paper are threefold:

- To present a framework for assessing VAs, including definitional issues, and to discuss some of the issues to be addressed in evaluating the performance of VAs.

- To review a series of case studies of the experience of OECD countries with the implementation of VAs by energy intensive industries. Three principle case studies are reviewed for Germany, the Netherlands and the United States, with smaller studies presented for Canada and New Zealand. A description of the characteristics of the VA is provided, including information on how the programs are specified, the number of participants, the regulatory context in which the VA operates, and procedures for monitoring and reporting. To the extent possible information concerning costs and effectiveness is also provided.

- Drawing on the case studies, some of the main issues to be addressed if VAs are to be successfully implemented are discussed.

2 FRAMEWORK FOR ASSESSING VAs

2.1 Definition

Many different definitions of what constitutes a Voluntary Agreement (VA) exist. The term VA has been used to describe a wide variety of policy instruments and approaches including:

- Industry covenants
- Negotiated agreements
- Self regulation
- Codes of conduct
- Eco-contracts

For the purposes of this paper an environmental VA is defined as:

> *An agreement between government and industry to facilitate voluntary action with a desirable social outcome, which is encouraged by the government, to be undertaken by the participant based on the participant s self interest.*

The major concepts underlying the terms in the definition, e.g., *desirable social outcome*, *encouraged*, and *self interest*, help to define some of the issues that need to be addressed to assess the role of VAs for climate

[1] The information presented in this paper is a summary of a Working Paper prepared as one of a series of studies for the Annex I Expert Group on the United Nations Framework Convention on Climate Change (UN FCCC), see, Storey M (1996)"Demand Side Efficiency: Voluntary Agreements with Industry".

change policy. In the context of GHG issues, *desirable social outcome* may be seen as a reduction in GHG emissions in absolute or relative terms. Typically VAs *encourage* desirable outcomes in a variety of ways ranging from, for example, incentives to remove barriers to cost-effective investments, to an agreement by government to withhold regulatory measures in return for industry participation in a VA. *Self-interest* concerns industries' perception of what is best for them and this perception may vary by industry and by type of VA. For example, in the case of VAs based on negotiated targets that are legally-binding, the self interest of the participant may be to pre-empt some (presumably less desirable) regulations. On the other hand, in the case of VAs with little or no threat of regulation, the concept of self interest may be profit, or the benefits associated with public recognition for environmental achievements, or simply the desire to be a good environmental steward.

Definitional issues raised

What constitutes a VA can vary greatly. VAs typically incorporate a wide mix of mechanisms ranging from economic incentives, to public recognition to encourage or support industry participation. Many of these mechanisms may cross over into other policy areas. In practice, *thresholds* that can delineate overlap between VA and non-VA policy instruments are not defined, making it problematic to identify what a VA is and what it is not, and to know when VA incentive mechanisms cross the line into other types of policies.

In particular, an important definitional issue concerns the extent to which an agreement is "voluntary". In cases where the incentive for industry to participate may be to pre-empt some legally binding regulation several countries have preferred to use the term "negotiated agreement". This term, for example, is probably more precise to describe the Dutch Long Term Agreements (LTA). However, since the term Voluntary Agreement is commonly used to describe this type of negotiated agreement, these types of agreements are included within the definition used in this paper. An attempt to distinguish between these types of agreement in a general taxonomy follows.

It should be stressed that VAs and regulatory strategies are not necessarily either/or alternatives. They may be and often are, complementary strategies. Even with regulatory strategies in place VAs can enable participants to go beyond regulatory requirements and identify opportunities to reduce regulatory cost burdens.

2.2 Characteristics of VAs

One can identify several characteristics that differentiate VA policies. These include: the manner in which targets or goals are set; the nature of participant commitment; the degree of regulatory (or fiscal) threat; and the mix of VA participation incentives. Within each of these dimensions a range of options are possible:

Manner Of Target or Goal Setting

- a negotiated target (e.g., Dutch LTA)
- an overall program goal (e.g., U.S. Green Lights)
- a self-selected performance goal within an overall program goal (e.g., U.S. Climate Wise, and the Voluntary Aluminum Industry Partnership (VAIP))

Nature Of Participant Commitment

- legally binding under civil law
- not legally binding (e.g., a Memorandum of Understanding (MOU))
- an informal agreement

Degree Of Regulatory (or Fiscal) Threat

- an agreement by government to withhold regulatory or fiscal measures (e.g., an energy/CO_2 tax) in exchange for industry participation
- implicit threat of future regulation
- no regulatory threat

Type of Incentives to Participate

- a wide spectrum of incentive or support mechanisms are possible including: education and training services; technical assistance; demonstration and field tests, product or professional certification; and economic incentives (e.g., subsidies, grants, tax breaks).

2.3 Major Types of VAs

Four major types of VA policies or programmes may be defined, based on a taxonomy that recognises the above mentioned key characteristics of VAs:

- Target-Based VAs
- Performance-Based VAs
- Co-operative R&D VAs
- Monitoring and Reporting VAs.

Target-Based VAs

Target-based VAs comprise negotiated targets that may be legally binding or which aim to pre-empt future regulatory requirements, or which are tied to a *strong* regulatory threat. This type of VA is often referred to as a negotiated agreement. Key elements include:

- negotiated alternatives to enforcement action where there are strict enforcement provisions (backstop legislation) or a strong regulatory threat if the voluntary actions do not meet the agreement objectives

- setting of specific targets, with long-term commitments by industry to improve energy efficiency or reduce emissions per unit of output within a certain time-frame

- legally-binding agreements and contracts.

Exemption from existing or future fiscal regulation (e.g., taxes) is often a key motivation for industry to participate in this type of VA. The Dutch LTA and the German SVE could be said to fall into this category of VA.

Performance-Based VAs

Performance-based VAs comprise negotiated performance goals[2] that are not legally binding nor explicitly designed to pre-empt future regulatory requirements. Participation is primarily motivated by the direct economic benefits (i.e., profits) that they had not before investigated, and secondarily by the perceived market and corporate credibility benefits associated with being viewed as environmentally responsible. There are at least two identifiable forms of performance VAs. These being:

Program-Determined Goals

- Participants agree to adopt the specific performance goals determined by the VA program.

The Canada CIPEC and U.S. Green Lights, could be said to fall into this class of VA.

Participant-Determined Goals

- In this case the VA encourages or requires participant performance goals to be consistent with VA program goals but participants set their own performance improvement goals over a certain time frame

The U.S. Climate Wise and the Voluntary Aluminum Industry Partnership (VAIP) programs could be said to fall into this category.

Co-operative R&D VAs

Co-operative R&D VAs focus on spurring new technology development that advances the best practice frontier[3]. Best practice may include best, known technologies and management practices, as well as adoption of newly developed but demonstrated products not yet in widespread use in the industrial market. Advancing the best practice frontier involves the modification or development of new, higher performance products. An example of this class of VAs is the U.S. "Industries of the Future" Program.

Monitoring and reporting VAs

Monitoring and reporting can be done in tandem with VAs, or it can be in and of itself a form of VA. Alternatively it can be linked to a non-VA reporting mechanism (e.g., U.S. 1605b reporting program). Monitoring and reporting may be based on external audit or verification approaches.

While this taxonomy helps to differentiate between the range of types of VAs found in Annex I countries, it should be noted that some VAs fall into more than one of these categories. For example, monitoring and reporting activities in one form or another underlie all VAs.

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[2] Performance goals can have some similar elements to targets i.e., to meet some reduction goal in emissions or energy efficiency. Typically they include a broader set of actions. For example, the goal to adopt certain targeted technologies that are economically viable or simply to implement an upgrade/evaluation plan.

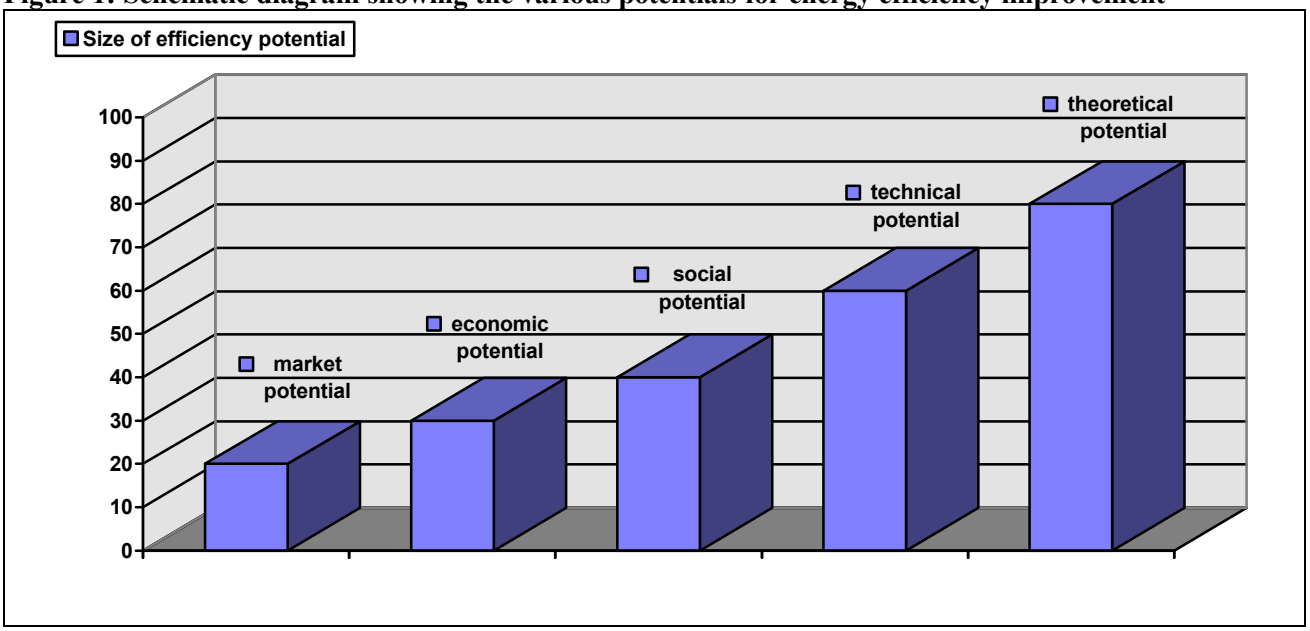
[3] The term "best practice" refers to both the use of the best commercially available technology as well as management practices that are proven to lower emissions in actual business operating environments.

2.4 The role and potential effectiveness of the different types of VA.

The following discussion relates the role and potential for effectiveness of the different types of VA to the different categories of *energy efficiency (or GHG reduction) potential*. This discussion suggests that the different types of VAs have different roles to play depending on the type and extent of energy efficiency (or GHG reduction) potential which exists.

Literature in the subject area of energy efficiency distinguishes between several different categories of energy efficiency potential (Carlsmith, Chandler, McMahon & Santino, 1990, Schipper & Meyers, 1992, Worrell, 1994). These definitions include *market, economic, economic with externality cost adjustment (referred to here as social), technical and theoretical* potential. Figure 1 illustrates these concepts schematically.

Figure 1: Schematic diagram showing the various potentials for energy efficiency improvement



Market potential is defined as the potential *savings that can be expected to be realised in practice* (Worrell, 1994). The market potential, therefore, reflects what is seen to be technically and financially viable by business.

The *economic* potential is defined *as the potential savings that can be achieved by completely optimising costs, relative to best practice.*

Social potential is defined as the potential *savings that can be achieved at a net positive economic effect*. In this context, the economic effect is taken to mean the net economic effect to society. This represents internalising the social costs of energy use.

The *technical* potential is defined as the *achievable savings resulting from the maximum energy efficiency improvement available in the period under investigation, regardless of cost considerations*. This represents the best that can be achieved under current technology knowledge and is an upper bound for energy savings in the period under investigation.

The *theoretical* potential of energy efficiency improvement for a certain process is determined by thermodynamic laws and is defined as *the difference between the current energy consumption and the thermodynamic minimum energy consumption*.

The difference between the level of energy efficiency that can be expected to be realised in practice (the market potential) and the level judged to be cost effective at prevailing prices (i.e., the economic potential) is often referred to as the "efficiency gap" (Howarth and Andersson, 1993). The presence of such an "efficiency gap" is sometimes also described as representing a *no-regrets* potential: that is measures which are worth undertaking whether or not there are climate related reasons for doing so[4] (IPCC, 1996). The reasons why a "no regrets" potential may exist (i.e., why energy savings investments which would appear to be profitable are not undertaken) have been explained mostly in terms of market barriers to energy efficiency, such as; lack of awareness of energy efficiency opportunities; distortions in fuel prices; supply infrastructure limitations and limited access to capital. A considerable amount of literature discusses these barriers and the extent to which they are significant or not (Carlsmith et al. 1990, Sutherland 1991).

The role and effectiveness of the different types of VAs identified in section 2.3 will depend in part on the type of energy efficiency (or GHG reduction) potential that is being targeted. For example, *performance based VAs* typically target "no regrets" options, that is they attempt to encourage the more widespread adoption of technology and practices to the extent it is economically profitable for the participant to do so. In relation to the discussion above, this suggests the potential for these types of VAs to improve energy efficiency is represented by the gap between the *market potential* and the *economic* potential.

In other cases, however, it may be the objectives of policy makers and industry to raise the level of current practice closer to the *social* potential. By definition such an objective may require participants to go beyond "no regrets" measures and is therefore more likely to be achieved through *target based VA* programs such as those described above[5]. These measures may be justified in economic terms if external environmental costs are taken into account in order to arrive at the economically efficient level.

Therefore, the type and degree of potential energy improvement which exists within the participating industry will influence (along with other social and economic factors) the relative effectiveness and merits of the different types of VA. *Performance based VAs* may have a significant role to play when significant cost effective opportunities for energy efficiency (or GHG reduction) exist. When these opportunities are limited, *target based VAs* may be the more effective tool to go beyond "no-regrets" options to achieve GHG reduction or stabilisation targets. *Co-operative R&D VAs* have a different role again. They aim to directly advance all of these potentials closer to the theoretical potential through technology innovation.

2.5 Performance evaluation of VAs

The performance evaluation of VAs is a complex task. There are several reasons for this: in many countries VAs have only recently been introduced and it is too early to assess the results of these programs; VAs

[4] Economists often refer to the need to account for the positive side effects of mitigation strategies. For example the introduction of a technology to reduce GHG emissions may at the same time reduce the net energy costs of the firm. To the extent that such positive side effects may totally offset the gross costs of a mitigation strategy they represent what is called a "no regrets" potential. More detailed discussion of these concepts is available in the Working Group III contribution to the IPCC Second Assessment Report (IPCC, 1996).

[5] It should be noted in this context that definitions of "no-regrets" measures vary, and in the opinion of some governments "no-regrets" measures may correspond to the "social potential".

rarely operate in isolation from other policy instruments, such as financial incentives and regulations, making it difficult to isolate the influence of VAs from these other factors; VAs often have multiple objectives; and the effectiveness of different types of VAs is influenced by a range of factors including the political and economic context in which they are designed to operate. Nevertheless, as countries increasingly look towards VAs as an alternative policy instrument it is necessary to be able to evaluate their performance in relation to a set of well defined criteria.

Criteria for evaluation of VAs

An evaluation of any policy instrument must be done with reference to a set of well defined criteria. Such a set of criteria is outlined below (OECD 1997):

- **environmental effectiveness**; relates to the environmental impact and performance of the VA, i.e. how much the instrument contributes to the achievement of the objective
- **economic efficiency**; refers to the extent to which the instrument has enabled a cost effective achievement of policy objectives
- **administration and compliance costs**
- **wider economic effects** including impacts on the price level, employment and trade
- **dynamic effects and innovation**
- **Soft effects** which refer to effects that are difficult to quantify but often important such as changes in attitude and awareness and the generation and diffusion of information.

Developing more specific guidelines on how to evaluate VAs against these broad criteria is a difficult challenge for policy makers. This task is further complicated by the different types of VAs as discussed above. Some methods of evaluation in relation to these criteria are discussed below:

Environmental effectiveness

For many VAs, a common measure of performance is to monitor the extent to which the targets are being met. However, for this to have meaning it is necessary to establish the significance of the targets compared to previous behaviour and their likely environmental impacts. One methodology to do so is to compare the targets or commitments of a VA with a *Business as Usual (BAU)* baseline scenario.

To compare VA targets with a BAU baseline scenario is to ask the question, to what extent do the reduction targets or commitments of a VA differ from what would be expected to happen in the absence of the VA? A BAU forecast allows for economic growth effects, structural changes resulting in different consumption and production patterns and improvements due to technical progress (Ramesohl 1996). Conceptually defining a "Business as Usual" scenario and evaluating the performance of a VA against it, is difficult and somewhat contentious. Nevertheless, performing this exercise can help to evaluate the extent to which VAs lead to any real change in the business behaviour of industrial participants.

In the absence of this type of information, it may be appropriate to compare the commitments and reduction targets of the VA with *historical trends*. Targets for energy efficiency for example, may be compared with trends in energy efficiency improvement in recent decades. Care needs to be taken in performing this sort of comparison to stress the different conditions which industry may have been facing in different time periods.

Economic Efficiency

An extremely important criteria for the evaluation of VAs is the extent to which they achieve climate change or other objectives in a cost-effective manner. Due to the above mentioned difficulties in measuring the

performance of VAs it is difficult to determine the cost-effectiveness of these programs. However, to the extent possible this paper has tried to collect information concerning the costs both to industry and government of participating in VA programs. The challenge for policy makers is to link this type of information with recognised measures of performance in order to determine cost-effectiveness.

Soft Effects

For many VAs, less emphasis is placed on target setting and more emphasis is placed on raising the profile of the environment in managerial decisions or the public opinion, or on maximising participation in VAs. For others, the diffusion of information is an important objective. While often difficult to quantify, these so-called "soft-effects" of VAs that change attitudes and raise awareness are likely to be very significant in many cases and need to recognised and measured.

3. SUMMARY OF CASE STUDIES AND IMPLEMENTATION ISSUES[6]

Five case studies provided a wide range of different approaches to voluntary agreements. A brief summary of the main details of these case studies is presented below followed by an analysis of some of the main points which arose. In presenting the case studies, VAs within energy-intensive industrial sectors were chosen for review, although in some cases the description of VAs considered go beyond these sectors. The three principal case studies for Germany, the Netherlands and the United States are presented first.

3.1 Summary of the respective programs

Germany

Germany's VA with industry on climate protection measures (SVE) is an example of a target based VA. In March 1995, The Federal Association of German Industries (BDI) published a "Joint Declaration of the German Industry on Climate Protection" together with five other trade and industry associations, stating their intention to reduce specific CO_2 emissions or their specific energy consumption by up to 20% in the period up to the year 2005 (base year 1987)". This first declaration was agreed to by 15 industrial associations including the steel and non-ferrous metals industries.

In March 1996, the German business community presented an updated and extended version of this declaration. The most significant changes to the original declaration include:

- A change in the base year from 1987 to 1990.
- The declarations of the individual sectors specify *absolute* emission targets as well as s*pecific* (per unit output) targets (although this may not be the case for all sectors).
- A monitoring process was established.
- The declaration *to reduce emissions by up to 20% in the period up to the year 2005* was changed to read *to reduce emissions by 20% in the period up to the year 2005.*

[6] For more detailed information on the information reviewed in these case studies see , Storey (1996) "Demand Side Efficiency: Voluntary Agreements with Industry".

Furthermore, since the original agreement, another four associations have joined this initiative, now representing over 71% of industrial energy consumption in Germany and more than 99% of public power generation (BDI, 1996).

The Netherlands

In the Netherlands, the Second National Environmental Policy Plan formulates the national policy for the reduction of GHG emissions. The national target is a reduction of CO_2 emissions by 3% by the year 2000, compared to the 1989 level. One of the means to achieve this goal are the *Long Term Agreements on Energy (LTAs).* As by far the largest part of the Netherlands energy supply is based on fossil fuels, reducing energy consumption is seen to be largely congruent with reducing CO_2 emissions.

The first LTAs were signed in 1992, and as of September 1996 there were:

- 31 LTAs with industry associations
- about 1000 industrial companies participating within these LTA.

These agreements currently cover more than 90% of industrial primary energy consumption.

The average target of the LTAs in the industrial sectors is a 20% increase in energy efficiency by the year 2000, from 1989 levels. As part of the LTAs, broad areas of action to improve energy efficiency are noted, with indicative contributions to be made from measures such as energy management, combined heat and power, improvement in power generation, heat integration, and modernisation of processes. Some LTAs also specify that the effect of energy efficiency improvements should be translated into future CO_2 emissions, to be compared with 1989 levels, according to agreed formulae.

The government for its part assures some consistency and protection from new regulations aimed to reduce energy efficiency, and also provides financial and technical support in exchange for voluntary participation. Each LTA is a contract under civil law.

The United States

The United States employs a broad portfolio of voluntary actions in the industrial sector. In general, current and past US programs may be loosely categorised into three of the four major types of VAs discussed in section 2 of this paper:

- Performance-Based VAs
- Co-operative R&D VAs
- Monitoring and Reporting VAs.

Target-based VAs that rely on legally binding targets or that are tied to a *strong* regulatory threat are not employed in the U.S.

<u>Performance-Based VAs</u>

These VA programs encourage a specific action by industry based on some agreed upon criteria. Examples include *Green Lights*, *Climate Wise*, and the *Voluntary Aluminum Industry Partnerships (VAIP)*. The

actions are typically to implement cost-effective technologies from some well defined set of feasible technologies.

Climate Wise, a joint program run by U.S. Environmental Protection Agency (EPA) and the Department of Energy (DOE), encourages participants to identify and implement actions to reduce GHG emissions. Participants in *Climate Wise* are given recognition, technical assistance, and financial assistance. *Climate Wise* companies undertake specific actions that they identify (such as process changes, fuel switching, and new product designs). Participants are also encouraged to participate in various end-use specific GHG related programs, e.g., *Green Lights*.

Green lights is a voluntary program that encourages participating companies to make cost effective, energy efficient changes in lighting systems for commercial buildings or industrial facilities. Green Lights participants sign a memorandum of understanding (MOU) with EPA that requires participants to assess and undertake lighting system upgrades (investments) within five years that have economic energy efficiency benefits. Economic is defined in the MOU as an internal rate of return (IRR) greater than 20%.

The EPA *Voluntary Aluminum Industry Partnership (VAIP)* is a program to engage the aluminum industry in voluntary reductions of PFCs. The program has two elements. The first is the voluntary commitments, the second is an information collection and measurement program. The program aims to accelerate some of the replacement of equipment and practices that directly impact anode effects. The program goal is a 45% reduction in national PFC emissions by the year 2000, but the targets are set by the industry participants on a plant by plant basis. The program currently has support from 12 of the 13 primary aluminium smelter companies in the US.

Co-operative R&D VAs

The DOE *Industry of the Future* program is an example of a co-operative R&D VA. Under this program the DOE is working with seven industries to develop and implement a common research agenda aimed at addressing industries' vision of their future markets and research needs.

Monitoring and Reporting VAs

The Energy Policy Act of 1992 (EPact) established a mechanism for the voluntary reporting of achievements towards GHG reductions through the 1605b Voluntary Reporting program. Any entity (company, plant, or individual) in any sector can report emission reductions to DOE through the 1605b) reporting system. The 1605b) program *is not a voluntary agreement program*, since no formal agreements to take GHG reduction are required to voluntarily report to 1605b). However, 1605b) can become a vehicle for monitoring and reporting, if the voluntary agreements use the 1605b) as a reporting mechanism.

Canada

The Canadian Industry Program for Energy Conservation (CIPEC) is a voluntary agreement with Canadian industrial producers which is run as part of the Industrial Energy Efficiency Initiative (IEE) of Natural Resources Canada. CIPEC was set up in 1975 in response to energy security issues and refocused in 1992 following the Rio accord with a greater emphasis on environmental issues. The program provides a sector-level focus to help industry identify energy efficiency barriers and opportunities, to forecast and set cost-effective energy efficiency targets, and to develop and implement action plans to realise the targets. At present 30 associations and company groups representing more than 3,000 companies and over 85% of secondary industrial energy end-use are involved in the CIPEC program.

New Zealand

In July 1994, the New Zealand Government announced that in addition to other policies relating to energy efficiency and energy sector reform, it would seek VAs with industry to reduce CO_2 emissions. In August 1995, nine VAs with industry were completed and signed (as of March 1996, 17 VAs have been signed). The agreements included undertakings with the New Zealand steel and aluminium industries. All but one of the nine agreements are with a single company (this reflects the case that for most of these industries there is only one company in New Zealand in that field of activity). The agreements are signed by the companies and the Minister of Energy representing the New Zealand Government.

Targets are specified as *Savings* achieved or planned over the period 1990-2000 to coincide with the Government national stabilisation objective. Within this framework the actual texts of the agreements vary widely reflecting different company and sector processes and technologies, widely varied opportunities for achieving CO_2 savings, views about the agreements themselves and the relationship of CO_2 savings activities to the company objectives.

The agreements are specifically not legally binding, and avoid penalty for under achievement. There is an expectation that they will be re-negotiated if annual reporting shows a major variation from what was expected to be achieved.

3.2 Commitments/Targets

The specification of commitments and targets used by the various types of VA reviewed in the Working Paper vary widely. Some types of VAs do not have targets as such but rather commitments to monitor and report information. For some types of VA, targets and goals are expressed only in very general terms and participants are encouraged to set their own targets. For other types of VAs, participation involves the commitment to meet an agreed target set at the sector level.

In cases where targets are used they often vary according to whether they are specified:

- in terms of *energy consumption (efficiency)* or *emission reduction* targets
- in *specific* (e.g., per unit output) *or absolute* terms (e.g., tonnes CO_2, MJ energy*).*

From the perspective of climate policy, there is an argument that targets should preferably be expressed in absolute terms of GHG emissions (Ramesohl, 1996). However, absolute reduction targets raises the problem of how to deal with the dynamics of business cycles and economic growth. For example, reductions in the absolute level of emissions due to reduced production as a result of an economic recession may not represent a sustainable improvement in the practices of industry. On the other hand, it will be difficult for industries to fulfil their obligations in times of an economic boom.

Specific reduction targets in relation to units of output exclude the dilemma of economic growth but they incorporate the danger, that specific efficiency and reduction gains may be offset by the growth of total production. Further, specific reduction targets may be based on *physical units* or on *monetary units*. In the case of specific figures based on monetary terms, it is preferable for a VA to specify how to deal with the following variables: inflation; changes in the product mix leading to new price structures and possibly new energy intensity profiles; and price increases due to quality improvements (Ramesohl, 1996).

Some examples, taken from the case studies, of the different types of commitments and targets follow.

Participants in **Canada s** CIPEC have a commitment to seek an annual average improvement in *energy efficiency* of 1 % (this is subject to natural industrial growth not exceeding 2% per year). Underneath this broad commitment industrial participants can specify further targets if they wish. For the **Dutch** LTAs, targets are also specified as an improvement in energy efficiency. The average targets of the LTAs is a 20% improvement in energy efficiency by the year 2000, (from 1989 levels) or approximately 2% yearly. The improvement in energy efficiency is measured by "the ratio of energy consumption and industrial production for the year in question, divided by the same ratio for the year in reference".

In **Germany,** commitments and objectives of the different sectors within the SVE vary according to whether:

- they specify reduction in CO_2 emissions or energy consumption
- whether emission reduction targets are to be achieved through changes to final products or changes to production processes
- whether reduction targets are specified in *absolute* or *specific* terms.

In **the United States**, for the most part, the commitments and targets sought from industry participants in the various US VA programs are based on the overall goals of the US *Climate Change Action Plan*. U.S. VAs offer a variety of ways for participants to establish commitments and targets. Specific performance goals or targets are not always required for the individual participants in the programs. For example, participants in *Climate Wise* are encouraged to establish their own goals within the action plans they develop. Some programs such as the *VAIP* have an industry wide goal, e.g., *VAIP* seeks a 45% reduction in PFCs, although companies have flexibility in choosing the specific commitments and actions to achieve the goal. On the other hand, the *Green Lights* program sets a goal that is very specific to individual *Green Lights* partners

In **New Zealand** targets are specified as *CO_2 savings* over the period 1990-2000 and may be further specified either as:

- CO_2 emissions *per unit of production*, calculating a percentage reduction target between 1990 and 2000.
- CO_2 emissions *per unit of production*, calculated in relation to a 2000 base year equivalent.
- An *absolute* reduction in CO_2 emissions.

Accounting for different types of energy inputs

Related to the specification of targets, is the question of how production processes are covered in Voluntary Agreements. An example of this arises with the Dutch LTA with the steel industry. In this case, energy which is used in the blast furnace stage of steel production as feedstock is not included in the calculations of energy efficiency improvement[7]. This raises some issues since using a higher amount of recycled metal in the blast furnace stage, which will contribute to an energy efficiency improvement, will not be accounted for in the energy efficiency targets. A more general point arising from this example is the need for detailed knowledge of how these type of production processes are accounted for in setting targets, especially if there is to be any comparability of these targets with past trends, or with the targets of other countries.

[7] In the integrated steel making process carbon is introduced into the blast furnace in the form of metallurgical coke to reduce iron ore to molten iron. Energy which is consumed in this process is said to be related to metallurgical purposes rather than "energy related" purposes.

3.3 Regulatory Context

VAs rarely operate in isolation as a policy instrument. They are sometimes expressly combined with other measures, such as regulatory mechanisms or financial incentives (Solsbery & Wiederkehr, 1995). At other times, the presence of a regulatory mechanism may be less explicit but still influential as a potential threat if VAs are not successful in achieving significant goals.

Three clear examples of VAs operating within the context of potential regulatory instruments appear in the case studies for Germany, the Netherlands and New Zealand. In **Germany**, in return for industry's offer of voluntary special efforts, the industry expressed their expectation, that the federal government would defer to their private initiative before resorting to regulatory and fiscal measures. These expectations were referring to two potential policy measures in particular:

(i) an energy/CO_2 tax
(ii) a regulation on waste heat use.

In **the Netherlands** the government assures some consistency and protection from new regulations aimed to improve energy efficiency or reduce GHG emissions in return for industry's participation in the LTAs. In **New Zealand**, although not directly linked to the performance of VAs, the New Zealand Government threatened to introduce a carbon charge in late 1997 if by mid 1997 it did not appear that emissions were on track to achieve the target of stabilising net CO_2 emissions at 1990 levels by 2000.

3.4 Monitoring procedures

In many of the case studies, monitoring procedures are a critical component of the VA. The political acceptance of VAs depends on public confidence in the effectiveness of VAs. To satisfy public expectations for access to information and for transparency, and in order to enable a control of the pursuit of reduction targets, a detailed monitoring system is needed. The questions of type, degree of details and other features of a monitoring system also need to be established. In the **United States**, monitoring and reporting requirements were identified as one of the primary costs faced by industry in participating in voluntary agreements (see section 3.5).

Confidentiality concerns and the role of a third party organisation

A VA needs to address the confidentiality concerns of participating companies. The case studies illustrate that these concerns can be addressed by the use of an independent agency responsible for receiving and monitoring company information. In practice, the appropriate balance between protecting commercial interests of the company and the need for publicly available information for verification and support, appears to be a critical issue to be resolved in the design of VAs. An independent third party can also play an important role in providing an independent assessment of VA commitments. Such an assessment can help to provide credibility for VAs.

In **the Netherlands**, LTAs involve three principal parties, the industrial association representing the individual companies, a Government Agency (Novem) and the Government (The Ministry of Economic Affairs). Novem has an important role in negotiating the targets for energy efficiency and in monitoring the progress of participants. An energy saving plan and annual monitoring reports are mandatory for each company. Failure to provide one or the other is a valid reason to terminate the LTA with that company.

In **Germany** the importance of independent third party organisation has also been recognised. The revised declaration by German Industry of March 1996 announced the introduction of a CO_2 monitoring process. Monitoring reports will be collected and reviewed by an independent scientific institute (BDI 1996). The institute in turn will produce a summary report for public information detailing what progress has been made and how this has been achieved.

In the **United States**, monitoring and reporting is an essential component of all types of VAs. Reporting is done by individual VAs (e.g., *Green Lights* and *VAIP* have their own built-in reporting functions). Monitoring and reporting may also be linked to the *U.S. 1605b reporting program*. The 1605b program also allows for confidentiality through third party reporting, e.g., trade associations. This helps satisfy the concerns of industry but at the same time may dilute the public recognition element of VAs (Boyd 1996).

3.5 Evaluation

Section 2.5 introduced some of the analytical issues which arise in attempting to evaluate the performance of VAs. In the case studies presented in the Working Paper, only limited critical evaluation of the VAs was possible. This in many cases is due to the relatively recent introduction of many of these measures. It also highlights some of the difficulties which arise in assessing the performance of VAs and reinforces the need for further work to be done on criteria for evaluation. The evaluation which has been undertaken in the German, Dutch and US case studies and results are highlighted below

Comparison of target/results with a Business as usual scenario

Two of the case studies present an evaluation of VA targets and results compared to a " business as usual" scenario. In **Germany** the industry targets of a 20% reduction (1990 base year) in specific energy consumption (SEC) by 2005 was compared to a "business as usual" reference scenario which projected SEC to fall by more than 30% during this period. These estimates suggest, that the proposal incorporated in the SVE is likely to contribute less to the national CO_2 abatement policy than can be expected by the Business-as-Usual case. This conclusion is supported by the findings of other authors (Jochem & Eichhammer 1996, Kohlhaas,M. Praetorius, B. & Ziesing,H.J., 1996) who found that in most cases the targets formulated in 1995 and 1996 do not reflect any extra efforts by industry beyond business as usual.

In **the Netherlands**, as of July 1994, results based on monitoring reports from 18 LTAs (representing 70% of industrial energy consumption) show that these industries had increased energy efficiency by 9% compared to the 1989 baseline and are well on course to meet their final target of a 20% improvement in energy efficiency by the year 2000 (Ministry of Economic Affairs). It is difficult to compare these results with a "business as usual" scenario because of how the energy efficiency index for the LTAs is specified. Nevertheless, in the Dutch case, both Government and industry estimate that at least half of the 20% efficiency improvement would have taken place in the absence of the agreements.

Comparison of targets with historical trends

When compared to historical trends in specific energy consumption, the current targets of the German SVE do not look ambitious. The current targets, a 20% cut in specific energy consumption (or specific CO_2 emissions) by the year 2005, (compared to 1990) equate to an annual reduction of approximately 1.3%. In comparison, between 1970 and 1993 specific energy consumption by west German industry fell by 42%, an annual average of 2.3% (Kohlhaas et al., 1996). However, some care should be taken in comparing German

targets with trends during the reunification period in Germany as this was a period of considerable restructuring within industry. For example, between 1987 and 1993, absolute CO_2 emissions fell by approximately 22.5%, half of which is attributed to restructuring, modernisation and the drop in steel production in the former East Germany (new Federal States) (BDI, 1996).

In the case of **the Netherlands** for the basic metal industries, past trends show low annual efficiency improvements, less than 0.5% yearly. However, this reflects the specific fixed ratio of energy and physical output mentioned above. Adjusting for the definition of energy consumption used in this agreement would show an annual average energy efficiency increase of more than 1% yearly. This analysis would support the argument made above that the Dutch LTAs have been successful in achieving targets for energy efficiency which represent a significant improvement over baseline trends.

Costs

Due to some of the difficulties mentioned above in evaluating the performance of VAs there is limited information available to assess cost-effectiveness available in the case studies. As a first step towards this however, information on costs both to government and the participating industries was sought and in some cases estimates of returns have also been made.

In **the United States** VAs tend to be targeted towards "no-regrets" actions. In other words the VAs are only undertaken if they provide financial benefits, typically energy savings, which provide an economic internal rate of return (IRR). Under a VA in the US the measures of cost effectiveness are usually industry defined but this is not always the case. For example, Green Lights requires lighting projects with a 20% or greater IRR to be undertaken. This is considered an adequate return to be a no-regrets approach.

Since US VAs are assumed to be (at least) cost neutral, it is relevant to ask what other costs may be imposed by participating in a VA? The US case study finds that the primary cost for short term - energy efficiency oriented programs is reporting. Reporting GHG emission reductions are a cost that the industry would not undertake in the absence of the voluntary agreement.

US programs use information and recognition as the main "carrots" to offset the costs of participation in VA programs. This is apart from the profit opportunities that the programs seek to encourage. If the action is at least cost neutral (i.e. no net cost or profitable), then the participation cost (reporting) must be less than the perceived benefit of the recognition and regulatory good will. The US study (Boyd, 1996) found that it is not possible to value these intangibles, even though the companies must consider these intangibles in their decision to participate. In fact, it is the valuation of these intangibles that is likely to be the primary determinant of program participation, while the economics of the GHG reduction is the primary determinant of undertaking the action.

3.6. Further Issues concerning the Implementation of VAs

The Free rider problem

The problem of "free riding" is often raised in relation to VAs although the extent to which it creates problems for the operation of a VA is somewhat contentious. "Free-riding" is said to occur when one or more companies are able to benefit from a voluntary agreement (e.g., in terms of the good publicity which

the whole industry may benefit from) without making any real contribution themselves. For example a single company may do little to contribute to the meeting of a particular GHG reduction target, but may benefit from the positive publicity benefits the program generates. A counter argument however, is that for those VAs which emphasise "no regrets" actions, e.g., actions which reduce GHG emissions, and also directly benefit the enterprise concerned through energy savings - the free rider issue is not of particular concern. Companies that do not take up "no-regrets" actions may be doing a disservice to themselves rather than "free-riding".

Co-ordination with other regulatory measures

There is a need for VAs to be co-ordinated with other regulatory measures including permitting requirements, and energy taxes. At the international level, such as the EU the question arises as to whether VAs are acceptable as valid policy instruments in the place of regulatory measures. For example, the Dutch Government has maintained that Dutch companies that are at a competitive disadvantage because of their participation in LTAs should not pay the levies proposed by the EC in 1991.

The European Union Commissioner on the Environment has *suggested* some conditions for voluntary agreements to be used to comply with EU environmental legislation. These shed some lights on the political acceptability of such tools in Europe:

- the objectives should be clearly defined, and quantified whenever possible;
- there should be a timetable for the implementation of objectives;
- the implementation should be monitored and reported;
- there should be a means to discourage free-riders;
- the agreements, and reports on their implementation should be published and open to public scrutiny.

Adequate time frame

One of the principal advantages of VAs is that they provide companies with the flexibility to introduce measures to make investment decision in a manner most suitable to their economic circumstances. While some management practises can be implemented instantly, major investment decisions such as the switching to alternative processes and replacement of capital goods are often made within a ten year horizon. If industry is to be encouraged to take investment decisions beyond "business as usual" they should be given a suitable planning time in which to do so. Agreements which specify structural measures, therefore, should match industries' time horizons.

4. SUMMARY

Voluntary Agreements (VAs) are becoming increasingly prominent in many OECD countries as a policy instrument for achieving improvements in energy efficiency and reductions in greenhouse gas (GHG) emissions. However, VAs vary considerably in their structure and approach which makes evaluation of their performance as a policy instrument difficult. One can identify several characteristics that differentiate VA policies. These include: the manner in which targets or goals are set; the nature of participant commitment; the degree of regulatory (or fiscal) threat; and the mix of VA participation incentives. Based on these key characteristics four major types of VA programs can be identified:

- *Target-Based VAs*: comprise negotiated targets that may be legally binding and which pre-empt future regulatory requirements, or which are tied to a *strong* regulatory threat.
- *Performance-Based VAs*: comprise negotiated performance goals that are not legally binding nor explicitly designed to pre-empt future regulatory requirements.
- *Co-operative R&D VAs*: focus on spurring new technology development that advance the best practice frontier
- *Monitoring and Reporting VAs.*

In general, VAs aim to encourage industry led initiatives to set and meet environmental goals, and to give participating industries the flexibility to achieve these goals in the manner which best meet their particular economic, social and political circumstances. The role and effectiveness of the different types of VA will depend on the specific economic circumstances of the industry and the type of regulatory environment in which they are designed to operate. For those VAs which aim to improve energy efficiency in industry the distinction between the different types of *energy efficiency potential* (i.e., market, economic, and social) is an important consideration in assessing the role of different types of VAs. *Performance based VAs* may have a significant role to play when significant cost effective opportunities for energy efficiency (or GHG reduction) exist. When these opportunities are limited, *target based VAs* may be the more effective tool to go beyond "no-regrets" options to achieve GHG reduction or stabilisation targets. *Co-operative R&D VAs* have a different role again. They aim to directly advance all of these potentials closer to the theoretical potential through technology innovation.

The five case studies summarised in this paper covered a wide range of different approaches to VAs. The major implementation issues arising from these case studies include:

The need for clarity on how targets/commitments are specified. The VAs reviewed varied considerably in the nature of target setting. For example, those VA with targets to improve energy efficiency or reduce GHG emissions targets often varied as to whether they were specified in absolute or specific (e.g., per unit output) terms. The need for clarity on which production processes and energy inputs are to be covered by the VAs also arose, e.g., should feedstock use be calculated within an energy efficiency index.

The importance of clearly established monitoring procedures. In nearly all the case studies reviewed the importance of monitoring procedures was highlighted. In some cases, industries are encouraged to develop their own reporting programs. In others, the role of a third party organisation responsible for monitoring and reporting functions is stressed. The advantages of a third party organisation are that they can provide some confidentiality of information for participating industries, while at the same time contribute to the credibility of the VA. The costs of monitoring and reporting have been identified as one of the primary costs to industry of participating in VAs.

The need for further development of criteria and methods for performance evaluation of VAs. One of the main conclusions of this paper is that there is a lack of clear and established methodologies for evaluating the performance of VAs. One particular difficulty is that VAs rarely operate in isolation from other policy instruments, such as financial incentives or regulations making it difficult to isolate the influence of VAs from these other factors. A significant part of this study, therefore, has focused on some of these evaluation issues, such as how to compare performance of VAs against a "business as usual" baseline scenario or with historical trends. When such analysis has been used in this paper however, the difficulties and limitations of these methods are noted. Information on the cost effectiveness of the programs reviewed was also limited. In addition, VAs often result in benefits which are difficult to quantify but nonetheless relevant such as, changing attitudes and awareness, and generating and diffusing information. Performance criteria need to be developed, therefore, which take account of these varied objectives.

Finally, competitiveness concerns, the presence of “free-riders”, and how to ensure co-ordination with other regulatory measures are further issues which need to be addressed in considering VAs as policy instruments to meet environmental objectives.

REFERENCES

Boyd, G (1996) *The Use of Voluntary Agreements with Industry to Mitigate Greenhouse Gas Emissions in the US: Case study of Steel, Aluminum and Nylon Production*. Paper prepared for the OECD.

Bundesverband der Deutschen Industrie (BDI)(1996) *Updated and Extended Declaration by German Industry and Trade on Global Warming Prevention.*

Bundesverband der Deutschen Industrie (BDI) (1995) *Declaration by German Industry and Trade on Global Warming Prevention.* Köln 1995

Carlsmith, R.W., Chandler,J., McMahon & Santino,D. (1990) "Energy Efficiency: How Far Can We Go?" *The Energy Journal*, Volume 12,No.3.

Department of Energy (US)(1994), *Cost and Benefits of Industrial Reporting and Voluntary Targets for Energy Efficiency, Vol 1: Main Report*, February 1994, DOE/PO-0013

Howarth & Anderson (1993) "Market barriers to Energy Efficiency" in *Energy Economics* October 1993.

International Energy Agency (forthcoming), *Voluntary Actions for Energy-Related CO_2 Abatement*.

Intergovernmental Panel on Climate Change IPCC (1996), *Climate Change 1995. Economics and Social Dimensions of Climate Change: Contribution of Working Group III to the Second Assessment Report of the IPCC* Eds., Bruce J. Hoesung Le and E. Haites. Cambridge University Press.

Jochem, E. & Eichhammer, W. (1996), *Voluntary Agreement on CO2-Emission Reduction of Seven Associations of the German Economy*. Paper presented to Workshop on Voluntary Approaches in the Field of the Environment, June 1996, Paris.

Kohlhaas,M. Praetorius, B. & Ziesing,H.J. (1996), *German Industry s Voluntary Commitment to Reduce CO_2 Emissions - No Substitute for an Active Policy Against Climate Change.*

Ministry of Commerce (NZ) *Technical Guidelines for Establishing and Reporting Voluntary Agreements to reduce carbon Dioxide Emissions In New Zealand*. Ministry Of Commerce, Wellington, New Zealand.

Nash,J. & Ehrenfeld, J. (1996), "Code Green: Business adopts Voluntary Environmental Standards". In: *Environment*, Vol. 38.No.1 January/February 1996.

Netherlands (1996) *Third White Paper on Energy Policy*, Ministry of Economic Affairs, The Hague February 1996

Netherlands (1996), Personal Communication from the Ministry of Economic Affairs.

OECD (1997), *Evaluating the Efficiency and Effectiveness of Economic Instruments in Environmental Policy*

Ramesohl, S. (1996), *Voluntary Agreements as instruments of CO2-mitigation policies - Breakthrough to political efficiency or horse-trading?* Paper prepared for the OECD March 1996

Schipper, L. & Meyers, S. (1992), Energy Efficiency and Human Activity: Past Trends, Future Prospects. Cambridge University Press.

Solsbery, L. & Wiederkehr, P. (1995), "Voluntary Approaches for Energy-related CO_2 abatement". *OECD Observer* No. 196 October/November 1995.

Sutherland, R.J (1991), "Market Barriers to Energy Efficiency Investments", *Energy Journal* 12 (3) pp. 15-34.

Van Dril, T (1996) *Government-Industry Agreements on Greenhouse gas reductions*. Paper prepared for the OECD.

Worrell, E. (1994) *Potentials for Improved Use of Industrial Energy and Materials* CIP-Gegevens Koninklijke Bibliotheek, The Hague.