

Monitoring and Verification of Long-Term Voluntary Approaches in the Industrial Sector: An Initial Survey

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ABSTRACT

This paper provides an overview of monitoring and verification requirements under several U.S. and international long-term voluntary agreements with industry. We review the reporting mechanisms, metrics, and level of detail used to report progress. We also examine the role of the monitoring and verification agency, be it the specific industry participant, a government participant, or an independent third party. We discuss issues related to data confidentiality and the trade-off between accuracy and reporting burden. We conclude with a preliminary list of key factors integral to a successful monitoring and verification program for long-term voluntary approaches.

Introduction

Voluntary approaches (VA) for environmental policy are gaining increased acceptance as a non-regulatory policy-shaping tool. It is estimated that there are over 300 negotiated agreements in European Union countries, about 30,000 local pollution control agreements in Japan, and more than 40 at the federal level in the United States (OECD 1998). Among the most prominent of these are voluntary long-term agreements with industry to reduce carbon dioxide (CO₂) and/or to improve energy efficiency. Central to the effectiveness and efficiency of voluntary approaches is the accurate monitoring and verification of information reporting and target attainment they require. While there is a growing literature on VA type and effectiveness, little is known about the methods used by industry and government to monitor progress towards environmental goals.

In general, monitoring and verification approaches should seek to maximize the probability that reported reductions are real and transparent. Since the administrative burden associated with monitoring and reporting could be substantial, monitoring and reporting design also should seek to minimize the associated transaction costs to industry and public agencies. In practice, there will be trade-offs between these objectives.

Given the growing number and scope of VAs, we discuss monitoring and verification requirements for a small sample of voluntary industry initiatives in Europe, the U.S., and Japan (Table 1). To better distinguish among monitoring and verification methods used we present the cases according to a VA typology developed by the Organization for Economic Cooperation and Development (OECD 1998).

Background

By monitoring, we refer to the measurement of greenhouse gas (GHG) emissions, reductions and/or other environmental and social impacts that occur as the result of a voluntary approach. Monitoring may be conducted at the project, process, plant, or company levels. Monitoring methods range in complexity and accuracy from engineering estimates, purchase receipts, and utility bills to metering at the facility level

or sub-metering at the project level. Whereas some VAs require the monitoring and reporting of specific carbon or energy intensity indicators such as total carbon emissions, or energy used per unit of production, others require only a progress report, or an update on projects being carried out. In general, the more ambitious the target, the more exacting the data standards. It is important to note that monitoring does not include the calculation of GHG reductions nor comparisons with previous baseline measurements. In contrast to monitoring, verification refers to determining whether or not the reported reductions actually occur. Verification may be performed either by government agencies or independent third parties. Independent third parties may include certified agents that conduct on-site audits to utilities that bill voluntary program participants for energy supplied. Thus, verification methods range from government or third party inspection of industry reports such as billing data to on-site inspections.

The expression “voluntary approaches” has been used to describe a variety of arrangements between the public and private sector. We define voluntary approaches as “schemes whereby firms make commitments to improve their environmental performance beyond legal requirements (OECD 1998).” OECD has identified three types of voluntary approaches that are distinguished by the level of public authority involvement in VA development and implementation:

- Public voluntary programs are initiatives between a public environmental agency and an industry. The public agency invites individual firms who are free to decide whether or not to participate.
- Negotiated agreements involve bargaining between a public authority and an industry. They frequently are signed at the national level between an industry sector and a public authority though agreements with individual firms also are possible.
- Unilateral commitments are set by industry without any public authority involvement.
- Each approach tends to have its own specified monitoring and reporting methodology. Within each of the aforementioned categories, the approaches vary in the goals being sought. Some VAs seek to provide self-regulation alternatives to legislation or taxation while others use non-binding approaches to improve public-image or set non-mandatory emissions goals.

Table 1 presents VA monitoring and verification by OECD’s VA typology. Whereas most long-term agreements for energy efficiency in European Union countries are negotiated between industry and public agencies, VAs in the United States are generally public voluntary programs between public authorities and individual companies. VA’s in the Netherlands and Denmark have the most comprehensive monitoring and verification requirements. For example, Dutch firms typically use metering to monitor performance. The data are verified by a public agency on the basis of spot checks of reported figures as opposed to on-site inspections. The basis for voluntary agreements in Denmark is an audit. Firms report annually on audit reports. In 1997, the Danish government made independent third-party verification of audit reports mandatory. In contrast, industry-initiated voluntary approaches in Japan and Germany have the least extensive monitoring and verification requirements. Monitoring methods among German firms are poorly understood. Methods likely range from metering to engineering estimates. Reporting coverage is poor. It is likely that some German firms fail to report

at all. However, the German monitoring data are verified by an independent third party whereas Japanese firms may opt to have government review monitoring reports as a way to improve the credibility of the reported data.

Table 1. Monitoring and verification by VA type

Country	Actors	Target	Legally Binding	Base/ Completion	Monitor	Verify
<i>Negotiated</i>						
Netherlands	Minister of Economic Affairs, Industry Groups	20% increase in energy efficiency	Yes	1989/2000	Firms	NOVEM
Germany	Industry	20% decrease in specific energy consumption.	No	1990/2005	Firms	RWI
Sweden	All businesses – STEM	Improved energy Efficiency	No		Firms	None
<i>Unilateral</i>						
Japan	Keidanren – industry	Industry-specific	No	Industry-specific	Firms	Optional – MITI
<i>Public voluntary</i>						
Denmark	DEA – industry	Improve Energy efficiency	Yes	3 year agreements	Firms	DEA selects Consultant
U.S.	Energy Star Buildings	Upgrade 90% lighting 50% Heating, Ventilation, Cooling	No	Within 7 years of signing	Firms	Utility bills
U.S.	1605(b) Monitor Report – any organization /individual	Monitor and report	No	Annual	Firms	None

Note(s): NOVEM, Netherlands Agency for energy and the environment; RWI, Rhein-Westphalia Institute for Economic Research; STEM, Swedish National Energy Association; DEA, Danish Energy Agency; and MITI, Japanese Ministry of International Trade and Industry.

Negotiated agreements

Netherlands: Binding – Avoid Regulation

The Dutch have entered into long-term agreements (LTAs) with industry since 1992 to improve energy efficiency beyond existing trends without resorting to new regulations. In contrast to the other VAs in our sample, LTAs are the principal policy instrument to improve energy efficiency in the Netherlands. As such, the agreements are formal and represent contracts under Dutch civil law (Nuijen 1998). In the National Environmental Policy Plan (NEPP, NEPP+) the Dutch government aims to stabilize the energy supply in the year 2000 to 1989 levels. After the year 2000, the national goal is to achieve energy efficiency improvements of 2% per year. LTAs with industry aim to improve energy efficiency by 20% over 1989 levels by the year 2000. As of 1996, LTAs covered 26 industries and involved approximately 100 firms, representing 90% of the Netherlands' primary energy consumption (Chidiak 1998). Dutch LTAs set quantified energy conservation targets for industrial sectors and detail long-range plans as to how the entire sector will meet the overall reduction goal. Under the Dutch system, a firm that participates in an LTA agrees to prepare and implement energy conservation plans and monitor and report energy consumption data. Failure on behalf of the firm to provide the government with either can result in termination of the LTA. Data reported include information on key parameters affecting energy use (e.g. building occupancy time); energy efficiency measures installed; and planned installation of energy efficiency measures.

Monitoring and Verification

To monitor energy data, Dutch firms primarily rely on meters. However, when they buy their own raw energy (for example coal or oil) the data are obtained from administrative purchases (Nuijen 1999). Based on these data, firms are required to annually report energy efficiency in terms of an Energy Efficiency Index (EEI). EEI is a physical indicator that represents the ratio of energy used in the year in question and the energy use that would have resulted had the same production occurred with the level of energy efficiency in the reference year (1989). All companies calculate an EEI using the same basic formula. However, the way in which the reference value is calculated can vary, depending on the type of process considered. When multiple processes are involved, they are calculated separately in company reports, which are treated by NOVEM as confidential. Monitoring costs are borne roughly equally between industry and government.

The basis for verification at the company level is the energy savings plan that guides every participant's efforts. As long as reports remain in accordance with the plan, NOVEM makes no detailed checks on reported figures. NOVEM does not verify the data on a company basis. The agency simply screens the data to identify discontinuities. To verify sectoral data, NOVEM checks figures against data compiled by the National Bureau of Statistics (Nuijen 1999). Due to the potentially proprietary nature of process data reported at the company level, NOVEM does not release company reports to the public but publishes reports in which data are aggregated at the branch level.

Germany: Non-binding – Alternative to Legislation

Unlike the Dutch approach, which represents a formal, legally binding arrangement between firms and government, the federal German declaration on climate change is set unilaterally by industry. Under the Declaration of the German Industry for Climate Protection (Federation of German Industries (BDI) 1996), 14 industrial trade associations unilaterally pledged to reduce the specific energy consumption of member companies by 20% by the year 2005, with a base year of 1990. Specific reduction goals are set individually by industry sector. While unilateral, the agreement was developed in close consultation with government, thus observers categorize it as a negotiated agreement (OECD 1998). In essence, the government agrees not to pursue regulations as long as industries agree to pursue self-defined energy consumption goals that are in accordance with the 20% pledge. If the industrial associations fail to meet the targets agreed upon in the VAs, however, the government has threatened to impose regulations/taxes.

Monitoring and Verification

The declaration identified industry-specific reduction goals to be evaluated by industrial trade associations. The declaration also called for the establishment of a transparent and verifiable monitoring process and set a 1997 deadline for the publication of the first progress report (Eichhammer and Jochem 1998). The monitoring concept in the 1996 declaration contains forms for participants to report on total consumption of fossil fuels by fuel type (e.g. hard coal, lignite, coke, and natural gas) and net consumption of third-party energy. The concept calls for firms to provide data for the base year, the previous year, and the reporting year (BDI 1996). An independent third party, Rhein-Westphalia Institute for Economic Research (RWI) was appointed to conduct annual monitoring. RWI published the results of its first monitoring effort in 1997 (Hillebrand et al. 1997). The RWI report shows some industries met or were close to meeting targets as early as 1994 or 1995 – before the 1996 declaration.

RWI and others, however, have faulted the data provided by industrial sectors as incomplete and lacking in transparency (RWI 1997; Kristof and Ramesohl 1997). It is not known, for example, how many individual firms actually report on consumption to their respective industries. Among industries, there is wide variation in the stringency of monitoring. For example, some industries conduct no firm level monitoring. Others gather the majority of sector data from individual firms, such as the cement industry, in which all but one company in the sector reports. Moreover, whereas some companies in industry use federal statistics to estimate consumption, others like cement companies most likely use meters to collect real data (Ramesohl 1999).

While data to monitor progress under the declaration are uneven, they are supported by statistics collected on production and fuel consumption by the German government. In contrast to the monitoring and reporting requirements of the declaration, firms are legally obligated to report annually to the German government (Ramesohl 1999). Thus, the official statistics serve as a basis for monitoring and also as a countercheck to monitoring data collected by RWI. In some cases, RWI is able to

identify significant errors between branch reports under the declaration and the official statistics.

In addition to incomplete coverage and monitoring, the monitoring scheme has been criticized for its failure to take into account structural changes in German industry ushered in between 1990 and 1996 by the transformation of the East German industrial economy (Eichhammer and Jochem 1998). It has been demonstrated that structural changes have contributed in the past to more than 25% of the overall decrease of manufacturing energy intensities in Germany. Eichhammer and Jochem conclude that the high rates of target achievement – mostly completed before the agreements were concluded – suggest that the reduction targets be substantially tightened in the near future.

Sweden: Non-binding – Improve Energy Efficiency

Among negotiated VAs in our sample, the monitoring and verification requirements of the Swedish Eko Energy program are the least formal. The program's only monitoring and verification requirement is that participants report to authorities on planned or implemented measures (Helby 1999). Implemented in 1994, the Swedish voluntary program aims to decrease CO₂ emissions by improving industrial energy efficiency. Administered by the Swedish National Energy Association (STEM), participation in the Eko Energy program is open to all energy-using business firms.

Most of the program's 24 industrial participants are manufacturing industries, including a few major corporations and several smaller firms. Agreements can be concluded with a plant or with a firm. Participation is formalized by a 235-word boilerplate agreement that is non-binding, not subject to negotiation or to sanction. The only consequence of a firm's failure to implement actions is loss of goodwill. Participants agree to submit to an independent energy audit and commit to a series of measures to improve energy efficiency.

STEM collects company data and provides feedback on production, energy consumption, material flow and the degree to which company performance corresponds with international management practice standards such as ISO 14000.¹ STEM also provides participants with benchmarking data. Benchmarking is not a requirement but is sometimes used voluntarily by companies/plants in their reporting, particularly if the firm is engaged in an industry-specific network that engages in information exchange (Helby 1999). STEM encourages participants to issue a public report on targets and progress (Chidiak 1998). STEM does not require specific frequency or units of reporting (Kagstrom and Helby 1998).

Unilateral Approaches

Keidanren Voluntary Action Plan on the Environment: Non-binding

In 1997, Japan's Federation of Economic Organizations (Keidanren) pledged to restrict greenhouse gas emissions. Keidanren is composed of 37 industry associations that

¹ ISO 14000 is a set of generic standards being developed by the International Organization for Standardization (ISO) which provides any company, regardless of size or type, with a structure for managing environmental impacts.

represent 1,011 Japanese corporations. Keidanren mostly is comprised of large companies, accounting for between 80-90 percent of total Japanese industrial energy consumption. The Keidanren Voluntary Action Plan targets a wide range of industries including construction, foreign trade, and non-life insurance, among others. Each industry establishes its own goals, some of which are quantitative. For example, steel seeks to reduce energy consumption in production 10% by 2010 (Shoichiro 1997). Agreements are non-binding with no explicit penalty for failure to achieve stated targets save for loss of goodwill. Although the plans have no legal basis, the Japanese Ministry of International Trade and Industry (MITI) may provide administrative guidance by requiring industries to report on implementation progress (Imura 1998).

Industry-wide plans are based on group decisions with involvement from trade associations (e.g. Japan Iron and Steel Federation). Many industries have placed their primary emphasis on improving the efficiency of energy use. Energy efficiency measures include the formulation of innovations related to operations control, including energy conservation in offices; capital and manufacturing equipment upgrades; and technological research.

Monitoring and Verification

Progress is self-monitored by individual firms and reported annually to their respective trade associations. It is unclear what methods and metrics individual companies use to measure energy consumption. While the data required under the Keidanren agreement are not specified, the wording of the individual agreements implies that physical production, energy consumption, and carbon dioxide emissions are to be inventoried. Trade associations aggregate company data and transmit these data to Keidanren. Keidanren reports total energy consumed or the specific energy consumption per unit of production for the industry sector (Imura 1998). Keidanren uses the data to review efficiency plan implementation and results, as well as to report on progress to the public. Industrial trade associations and corporations often supplement Keidanren's public reports with their own environmental reports. Information in supplementary corporate and trade association reports include general policy statements, while detailed technical data explain program achievements (ibid).

While progress is self-monitored, some industries opt to have MITI's Industrial Structure Committee review reports on energy conservation and CO₂ emissions (Imura 1998). As a rule, public or non-governmental organization scrutiny of business activity is discouraged by Japanese industry. One consequence is that: "it is difficult to determine whether the voluntary plans simply ratify existing technologies or foreseeable achievements that would have occurred anyway in a "business as usual" scenario (Imura 1998 p. 17)." Lack of transparency is a central critique levied by Japanese non-governmental organizations against the Keidanren voluntary plans.

Public Voluntary Approaches

Denmark: Binding – Avoid Taxation

In 1995, the Danish government imposed a 'green tax' on energy consumption and production of CO₂ and sulfur dioxide (SO₂). The Danish government, through the

Energy Agency (DEA), has entered into a number of binding agreements with industry to offset the taxes. Once an agreement is reached, the company is eligible for reduced taxes. The company must report annually on the progress of the agreement, whether the VA-specified energy efficiency measures are being performed. If the agreement is not respected, authorities are entitled to demand payment of the rebate. Thus, the sanction for failure to achieve the target is a loss of the tax offset.

In contrast to several of the previously discussed negotiated agreements, the Danish agreements emphasize management goals rather than reduction targets. The firm commits only to undertake one or more energy efficiency projects, not to reduce actual emissions. The basis of the agreement is the energy audit, which is carried out or endorsed by a certified energy consultant. The audit identifies the energy efficiency and energy saving measures to be undertaken. When the energy audit identifies no profitable energy savings, companies are considered energy efficient and are not required to make additional investments in energy efficiency to obtain a reduced tax rate (Johannsen and Togeby 1998).

Monitoring and Verification

The monitoring requirements of the Danish system have been characterized as among the most comprehensive employed by voluntary approaches (Johannsen and Togeby 1998). DEA requires companies to submit annual progress reports. The reports describe the results of investigations to identify profitable energy efficiency projects and the level of investment in projects that have been carried out. Companies also report on energy efficiency educational efforts; development of energy accounting systems; and the implementation of procedures for energy efficiency investments (Johannsen 1999). If companies fail to carry out the projects identified in the agreements, the agreements can be renegotiated, or forfeiture of rebate required. The reports are not published by DEA for public consumption. However, companies typically are not reluctant to provide the reports to those who request them (Johannsen 1999).

During the initiative's first year of implementation, approved consultants and DEA officials judged whether the data contained in audit reports were satisfactory. However, in 1997 DEA made verification of audit reports an obligatory requirement for all companies (Johannsen and Togeby 1998). The company chooses both the auditing consultant and a verification agent from a DEA-approved list. The verification agent then chooses a technical expert, typically a consultant who specializes in the industrial processes of the company in question, from a list of DEA-approved experts.

Companies are required to pay for the cost of verification. However, they can apply to the government to obtain a subsidy up to 50% of the verification cost. While companies have complained of the verification requirements, Johannsen and Togeby (1998) report that it serves as an effective check on the quality of audits. In 1997, the DEA placed eight consultants on probation for unsatisfactory audits that could eventually result in suspension of their right to perform audits if future work is of low quality.

Energy Star Buildings/Green Lights: Non-binding – Technology Adoption

Some public voluntary programs are designed to reduce greenhouse gases by encouraging industry to adopt energy efficient technologies. The U.S. Environmental Protection Agency's (U.S. EPA) Energy Star Buildings/Green Lights Program recruits partners to invest in energy efficient building technologies where profitable. By installing energy-efficient lighting, ventilation, and heating and cooling technologies in existing buildings, companies can reduce total energy bills. Green Lights, a program in which firms install energy-efficient lighting, is the first stage of the program. EPA expects partners to complete the program upgrades in 7 years. In exchange EPA provides technical assistance and public recognition. The only sanction for non-participation is loss of goodwill and/or public recognition.

Monitoring and Verification

Under the Energy Star program, progress is recorded by facility per meter. EPA encourages partners to sub-meter individual buildings (e.g. universities have one meter for an entire building). However, the agency recognizes that installing individual meters is expensive and sub-metering is not a program requirement. To calculate savings, EPA asks partners for three years of actual billing data and then the agency calculates a baseline average.

The accuracy associated with the monitoring method is high. However, it is possible that the reports may understate savings because the data are not normalized for factors that affect energy use. For example, the agency does not ask participants to report on factors that affect energy use such as plug load per building. Therefore, if a building owner or occupants adds more computers and printers, the plug load goes up and the bills increase and the energy savings are underestimated. There are no third-party verification requirements for the Energy Star/Green Lights programs.

Voluntary Reporting of Greenhouse Gases Program: Monitoring and reporting

The "Voluntary Reporting of Greenhouse Gases Program" is an anomaly among cases in our sample in that it is not a voluntary program but merely a reporting system. The program is designed to record voluntary emissions reductions and energy saving self-reported by industry, organizations, and individuals. Created under Section 1605(b) of the Energy Policy Act of 1992 (EPACT), the registry currently has 155 participants. Commonly known as "1605(b)," the reporting system allows participants to document both complex and simple emissions reporting at the corporate and project level. Most data are recorded at the project level. Projects range from fuel-switching, end-use energy efficiency improvements to carbon sink improvements. Thus, participants use an array of monitoring methods to measure or estimate savings and/or emissions reduction.

The 1605(b) form allows firms to use historic or estimated baselines to calculate CO₂ reductions. In most cases, participants estimate what reductions would have been in the absence of voluntary actions. Thus, it is impossible to state with certainty whether emissions declines were the result of deliberate actions or other factors such as declining output. Though program managers review claims submitted to 1605(b) for arithmetic

accuracy, there is no verification of supporting documentation or determination that the emissions reductions actually occurred (U.S. GAO 1998).

Reporting Mechanisms, Level, and Burden

The preceding sections illustrate how reporting mechanisms are heterogeneous with respect to what information firms report and in how firms monitor progress. Some VAs call for firms to report exact physical amounts of pollutant emissions while other approaches simply ask companies to provide an overview of progress on energy efficiency projects. For example, Dutch firms may use metering to collect data to develop an energy efficiency index, while U.S. firms supply fuel use billing data and estimates of kilowatt hour savings under Energy Star Buildings/Green Lights. Most reporting schemes are at the company or industry level. One exception is 1605(b), which records data at the project, plant, and company level. For all the VAs in our sample, the firm monitors and reports data.

In three cases, the data are subject to third-party verification. In the Dutch, German, and Danish cases, the government (NOVEM) or a third party (RWI, consultants) respectively, verify data and determine whether participants are making appropriate progress. With the exception of Denmark, administering agencies typically do not verify progress at the company level but simply inspect company reports for irregularities. Under Keidanren, some industries opt to have MITI verify data. As the German case demonstrates, verification may do little to improve data accuracy and may merely increase the administrative burden of the monitoring and verification process when the underlying monitoring methods and industrial coverage are incomplete.

In most cases, the implementing agency or trade association merely collects the data, or reviews overall project progress, as opposed to actually verifying the data. Because few voluntary long-term agreements with industry impose sanction for non-compliance or inaccurate reporting, the government/trade association partners to agreements focus more on providing assistance than policing industry participants. Most public agencies are more concerned with disseminating technical information and making sure that firms file reports than verifying the accuracy of the data contained in the reports.

Among the cases in our sample, it is likely that the monitoring requirements for the Energy Star, 1605(b), and Eko-Energy programs are among the least time and resource-intensive for both firms and administering agencies. The Dutch and Danish schemes appear to impose the greatest burden in terms of monitoring and verification. However, firms under the Danish scheme are able to obtain from the government a subsidy to offset up to 50% of verification costs. The administrative burden in Denmark is borne equally between the firm and the public agency.

Confidentiality and Reporting Burden:

As the aforementioned cases make clear, confidentiality is an issue usually when process level data are involved. In most cases, sensitive data are reported to the public by industry associations or government agencies in aggregate form. In theory, third party verification can serve to address company confidentiality concerns. However, none of the verification schemes in our cases explicitly serve this function.

Summary of Key Factors

Small sample size and limited data availability preclude our making definitive conclusions about what factors determine successful monitoring and verification. Nonetheless, the preliminary monitoring and verification data presented in the aforementioned case studies suggest that information requirements primarily are a function of VA scope and objective. Monitoring and verification requirements appear proportional to the degree to which VAs serve as a central instrument for energy efficiency, as the cases of the Netherlands and Denmark illustrate.

Perhaps not coincidentally, the degree of accuracy and amount of information required for monitoring and verification are greatest for VAs that are legally binding (Denmark and the Netherlands). The type of target appears less important than the level of political commitment to target achievement. For example, whereas targets in the Netherlands are quantitative, the objective in Denmark simply is to improve energy efficiency. If public agency involvement is used as a proxy to measure the political priority of achieving real energy efficiency and CO₂ reductions – as opposed to enhancing industry’s public image – then the German and Japanese cases would underscore our working hypothesis. Perhaps not coincidentally, both VAs have the least rigorous and transparent monitoring and verification systems. Moreover, the German case shows that verification is only as sound as the underlying data that are reported. The German data are partial, incomplete, and compiled with monitoring methods that range from metering to estimates derived from government statistics.

By our reasoning, then, it is likely that monitoring and reporting of voluntary approaches under the two U.S. approaches are adequate to meet the policy objectives of current voluntary programs to reduce greenhouse gas emissions. It also is likely that additional information would need to be collected from companies under a system designed to promote even greater greenhouse gas reductions. For example, assuming that reporters use current baseline estimation methods, it is unlikely that the data reported under the 1605(b) program are sufficient to measure progress under a scheme that would, for example, award emissions trading credits to companies that make early reductions in greenhouse gases (U.S. GAO 1998). It follows that monitoring and administrative burden also is a function of the policy objective.

Thus, a successful voluntary agreement system would possess the following characteristics:

- Clear policy objectives, with clear targets, whether qualitative or quantitative.
- Information requirements that are commensurate with policy objectives.
- Monitoring requirements commensurate with policy objectives.
- Verification that is consistent with public policy goals, but only when underlying monitoring data are sound.

References

[BDI] Federation of German Industries. 1996. Updated and Extended Declaration by

- German Industry and Trade on Global Warming Prevention. BDI: Cologne, Germany.
- Chidiak, Martina. 1998. Same Name, but Different Policy Instruments: Voluntary Agreements for Energy Efficiency in five EU Countries. Proceedings, European Research Network on Voluntary Approaches (CAVA) workshop on the worldwide use of voluntary approaches: State of the art and national patterns [hereinafter CAVA workshop], Gent, Belgium. November 26-27.
- Eichhammer, Wolfgang and Eberhard Jochem. 1998. Voluntary agreements for the reduction of CO₂ greenhouse gas emissions in Germany and their recent first evaluation. Proceedings, CAVA workshop, Gent, Belgium. November 26-27.
- Helby, Peter. Personal electronic mail correspondence. Lund, Sweden: Lund University.
- Hillebrand, Bernhard, Hans Georg Buttermann and Andreas Oberheitmann. 1997. First Monitoring Report: CO₂-Emissions in German Industry 1995-1996. RWI Paper Number 50. RWI: Essen, Germany.
- Imura, Hidefumi. 1998. The Use of Unilateral Agreements in Japan: Voluntary Action Plans of Industries Against Global Warming. OECD Environment Directorate. May 28. Paris, France: OECD.
- Johannsen, Katja. 1999. Personal electronic mail correspondence. Copenhagen, Denmark: AKF, Institute of Local Government Studies.
- Johannsen, Katja and Mikael Togeby. 1998. Evaluations of the Danish Agreement Scheme. AKF, Institute of Local Government Studies – Denmark. Proceedings, CAVA workshop, Gent, Belgium. November 26-27.
- Kagstrom, Jonas and Peter Helby. 1998. Principles and practice in the Swedish EKO-ENERGI programme. Lund University Department of Environmental and Energy System Studies. Proceedings, CAVA workshop, Gent, Belgium. November 26-27.
- Nuijen, Wil C. 1998. Long Term Agreements on Energy Efficiency, In Industry. Proceedings, International Workshop on Industrial Energy Efficiency Policies: Understanding Success and Failure, June 11-12, Utrecht, The Netherlands.
- _____. 1999. Personal electronic mail correspondence. NOVEM: Utrecht, The Netherlands.
- [OECD] Organization for Economic Cooperation and Development. 1998. Voluntary Approaches for Environmental Policy in OECD Countries. ENV/EPOC/GEEI(98)30. Paris, France: OECD.
- Ramesohl, Stephan. 1998. The “Declaration of German Industry on Global Warming Prevention” A model for effective and self-improving climate policy processes? Proceedings, CAVA workshop, Gent, Belgium. November 26-27.
- _____. 1999. Personal communication. Wuppertal Institute: Wuppertal, Germany.
- Shoichiro, Toyoda, June 17, 1997, Keidanren Voluntary Action Plan on the Environment (tentative translation), Tokyo, Japan: Japanese Federation of Economic Organizations (Keidanren).
- [U.S. GAO] U.S. General Accounting Office. 1998. Climate Change: Basic Issues in Considering a Credit for Early Action Program. November. Washington D.C.: U.S. GAO.