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Eleventh session

Bonn, 25 October - 5 November 1999

Item 8 (b) of the provisional agenda

**NATIONAL COMMUNICATIONS FROM PARTIES INCLUDED  
IN ANNEX I TO THE CONVENTION**

**"BEST PRACTICES" IN POLICIES AND MEASURES**

**Views of Parties on "best practices" in policies and measures**

**Note by the secretariat**

1. By its decision 8/CP.4, the Conference of the Parties invited Parties to submit to the secretariat by 15 August 1999 information on "best practices" in policies and measures (FCCC/CP/1998/16/Add.1). The secretariat has received submissions from five Parties, namely Australia, Finland on behalf of the European Community and its member States, Japan, Switzerland and the United States of America. In accordance with the procedure for miscellaneous documents these submissions are attached and reproduced in the language in which they were received without formal editing. Annex II to the submission of Finland contains national examples of best practices in policies and measures, comprising more than 100 pages. This annex was not available in electronic form and is thus not reproduced here. Interested Parties are kindly requested to contact the secretariat for a hard copy.

2. In addition, the secretariat has received a submission from the Institute for European Environmental Policy (IEEP). It is the practice of the secretariat not to reproduce documents from non-governmental organizations. However, interested Parties may wish to request copies of this submission directly from: IEEP London, Dean Bradley House, 52 Horseferry Road, London, SW1P 2AG, United Kingdom.

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\* In order to make these submissions available on electronic systems, including the World Wide Web, these contributions have been electronically scanned and/or imported. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

**FCCC/SBSTA/1999/MISC.10**

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PAPER NO. 1: AUSTRALIA

**Australian submission on "best practices" in policies and measures for combating climate change**

The Conference of the Parties (decision 8/CP.4, Annex II) tasked the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol to consider "ways to facilitate cooperation to enhance the individual and combined effectiveness of policies and measures under Article 2.1(b)".

In order to prepare for these considerations, the secretariat was requested to "prepare a report on "best practices" in policies and measures for consideration at SBSTA 11, based on Annex I Party national communications and their reviews and additional information submitted by Parties by 15 August 1999, as well as any other information, with a view to strengthen the sharing of experience and exchange of information".

Article 2 of the Kyoto Protocol requires Parties to implement policies and measures in line with their national circumstances with the aim of achieving their Kyoto Protocol targets. We note that in this context the Kyoto mechanisms of international Emissions Trading, Joint Implementation and the Clean Development Mechanism have an important role as vehicles for flexible and low-cost abatement.

Australia considers that there are some inherent difficulties in developing an internationally applicable concept of best practice for policies and measures to abate greenhouse gas emissions. This is because countries' national circumstances differ widely. This in turn influences countries' selection and implementation of policies and measures. In addition the effectiveness of a given policy or measure can only be considered in the broader context of the implementing country's national circumstances. Australia considers that there is little value therefore in examining a given policy or measure in isolation from the totality of a country's national action plan to abate greenhouse.

In practice, this means that a policy or measure with demonstrated effectiveness in one country may not be effective in another. Alternatively the measure may need to be implemented in a different way if it is to function effectively as part of another country's overall response to greenhouse.

A notion of best practice has the potential to establish a hierarchy of policies and measures with the attendant assumption that the implementation of these actions will be automatically effective irrespective of the implementing country's national circumstances, regional differences or the interaction of existing policy actions to address greenhouse.

Australia considers therefore that a concept of **good practice** which can be applied to the totality of countries' greenhouse response measures will have greater utility as a means of encouraging the sharing of experience and information on policies and measures. This will also allow for recognition of the fact that implementation of policies and measures must retain the flexibility to respond to differences in national circumstances.

Before the concept of good practice can be applied to policies and measures, Parties will need to consider the attributes that good practice policies and measures share. We suggest that initial consideration of this issue should take place at SBSTA 11.

Australia considers that good practice policies and measures must have the following attributes or characteristics:

- Policies and measures need to be part of a comprehensive and coherent national strategy aimed at achieving the emission target in a cost-effective manner

A comprehensive greenhouse response must establish a suite of actions relating to significant greenhouse gases sources and sinks, and to all sectors relevant to climate change. Policy development must recognise both the opportunities for, and constraints on, an effective response to climate change.

- Policies and measures need to be tailored to national interests and circumstances

A comprehensive greenhouse response must take into account each country's particular political, economic, environmental, social and cultural circumstances. Good practice in policy development also means recognition of regional diversity within a country.

- Greenhouse considerations need to be consistent with other government commitments

A comprehensive greenhouse response must be consistent with the principles of ecologically sustainable development and seek the integration of greenhouse policy with broader economic, environmental and social policies. Good practice in this context also means to promote the need for greenhouse goals and policies to be recognised in the development of other government policies.

- The pursuit of greenhouse action needs to be equitable and cost-effective and should have multiple benefits where appropriate

A comprehensive greenhouse response will focus on approaches which have financial, social and environmental benefits to the community. Good practice in policy development includes recognising the need for equity within and between countries in the development and implementation of policies and measures. It must also recognise the importance of cost-effectiveness and to minimise adverse effects on a country's competitiveness.

- Policies and measures are based on partnerships involving all levels of society

Good practice in policy development also needs to recognise the views and incorporate the needs of society as a whole. Successful policy development and implementation requires partnerships among key stakeholders, in particular between all levels of government, industry and the community.

- Action is to be informed by research

Good practice in policies and measures will ensure those policies and measures respond to and foster relevant scientific, technological and socio-economic research and support the development of innovative operating practices and technologies.

Under the UNFCCC, a framework for reporting on the effective implementation and monitoring of policies and measures is provided. The procedures for Annex I national communications and in-depth reviews of these national communications provide a vehicle for strengthening the sharing of experience and exchange of information among Annex I Parties, and the opportunity to share experience and information more broadly with non-Annex I Parties.

The Australian Government has utilised similar guiding principles in the development of Australia's National Greenhouse Strategy. These principles will also be taken into account in the implementation of individual actions encompassed in the National Greenhouse Strategy and in further development of the Strategy. The Australian Government believes that principles such as these enable the development of effective policies and measures and provide a strong basis for ensuring the application of good practice in policy development.

PAPER NO. 2: FINLAND

**SUBMISSION BY FINLAND ON BEHALF OF THE EUROPEAN COMMUNITY AND ITS MEMBER STATES ON "BEST PRACTICES" IN POLICIES AND MEASURES UNDER ARTICLE 2.1 (a) AND (b) OF THE KYOTO PROTOCOL**

Finland, on behalf of the European Community and its Member States submits information of examples on "best practices" in policies and measures to be considered by the SBSTA at its eleventh session in Bonn starting on 25 October 1999. The EU takes the view that the dissemination of "best practices" in relation to climate change can be an important step in developing coordination on policies and measures with a view to obtaining greater added value in climate change policy implementation at the global level.

**1. Introduction**

Careful examination of the potential of various policies and measures to reduce domestic greenhouse gas emissions is a fundamental building block for effective long-term implementation of responses to climate change. In most countries, such an assessment is essential in order to gain the political support needed, first for the ratification of the Kyoto Protocol, and later, for the support for further efforts to combat climate change. For the continuous success of the process it is equally important that the policies and measures do not conflict with the principles of sustainable development.

The EU takes the view that reporting on policies and measures by the Parties to the Kyoto Protocol should be developed with a view to enhancing the exchange of experiences and ensuring the credibility and trust amongst the Parties as well as towards other stakeholders and the public at large. Better exchange of experiences should also facilitate the efforts of developing countries to identify appropriate policies and technologies that are consistent with their own needs for sustainable development.

At present, policies and measures are mainly implemented at the national or (sub)regional (e.g. EU) level, but the prospect of developing internationally coordinated policies and measures should not be excluded, particularly considering the impacts that domestic action can have on firms' competitiveness in an increasingly globalized world economy. Furthermore, the cross-sectoral nature of climate issues calls for an approach that strives to integrate climate concerns into various policies - especially in the fields of energy, transport, agriculture and fiscal policies. To ensure that the various elements of the Kyoto Protocol serve efforts to combat climate change as effectively as possible, it will be necessary to establish an appropriate complementarity between policies and measures of the Parties themselves on the one hand, and the Kyoto mechanisms on the other. While ensuring that exchange of experiences promotes genuine policy learning among Parties, it is essential that the question of barriers to successful implementation of policies and measures be addressed.

The annexes to this paper provide a sample of the most successful policies and measures currently in use both at the level of the European Community and in the individual EU Member States.

## **2. “Best Practice”**

With a view to strengthening the sharing of experience and exchange of information on policies and measures, the COP-4 requested the UNFCCC secretariat to prepare a report on “Best Practices” in policies and measures on the basis of the submissions by the Parties. The report by the Secretariat would provide the basis for a Workshop to be held in Copenhagen in April 2000. The aim of this workshop could be, through case studies, best practice guides and reports that profile new and future best practices, to promote best practice by stimulating replication, to provide information on innovative measures for reducing GHG emissions, and to facilitate technology transfer initiatives.

The concept of the “best practice” can refer to several things, including

- the optimum use of proven technology and techniques for cost-effectively reducing greenhouse gas emissions;
- the best available technology/technique;
- optimal development of (a mix of) climate change policies and measures; or
- a combination of the above.

Far reaching emission reductions in a specific sector are often only realisable by applying a bundle of measures, which reinforce each other (e.g. regulation on standards, economic instruments, education programs).

In general, policies and measures should aim to:

- significantly reduce and minimise the net global greenhouse gas emissions;
- comply with sustainable development; and
- be transferable to other conditions.

The above criteria might be considered preliminary guidance at this stage in helping countries to identify the most useful practices to share with others. In addition, “best practice” examples could at least in the early stages be preferably “win-win” or “no regrets” policies.

## **3. Reporting on “best practices”**

In the short term, the main goal for developing the concept of “best practice” could be to improve the sharing of experience and exchange of information between Parties through enhanced and more structured voluntary reporting mechanisms, including the use of indicators. Improved reporting would not only facilitate mutual learning among Parties, but would also be essential for the credibility needed in order to gain sufficient political support for the efforts to combat climate change. It would seem useful to develop the general framework for “best practices” in close contact with the on-going work to develop guidelines for Annex I National Communications, within which guidelines for voluntary reporting on policies and measures are being drawn up.

An ancillary benefit from more structured reporting could be to provide Parties an incentive to develop mechanisms for assessing the effectiveness of their policies in reducing GHG

emissions and the consistency of these policies with sustainable development. Therefore, voluntary reporting could enhance policy learning not only between Parties to the Convention, but also domestically by helping countries to develop mechanisms for an integrated assessment of their policies and measures aimed at combatting climate change.

The following options for approaches are suggested for gathering the initial input of experiences on “best practices”:

- (i) Parties choose which policies and measures to share with the indicative criteria listed in section 2 as a guide; or
- (ii) Parties describe policies and measures on a sector-by-sector basis (e.g. transport industry), and/or by type of policy or measure (e.g. financial instrument, legislation) with the indicative criteria listed in section 2 as a guide.

Also, a combination of the above two approaches could be used.

**Annex I** shows examples of common and co-ordinated policies and measures and **Annex II** provides for examples of national experiences.

For Annex II each EU member state was requested to submit not more than five examples of national experiences on “best practice” policies and measures. **Annex II** is based on the contributions received. Many of the examples are in fact broad policy programmes containing a number of measures and affecting several sectors. The majority of “Best practice” policies and measures experiences are related to the energy sector, and half of the examples may be classified as enhancement of energy efficiency. Most of them are based on the use of economic instruments or environmental agreements. One fourth of the examples fall under the category of promotion of the use of renewable energy sources.



Common and Co-ordinated Policies and Measures having a direct or indirect impact on the Energy System<sup>1</sup>

N°	MEASURES	REF	PROGRESS AT COMMUNITY LEVEL	NEXT STEPS	IMPACT
1	A) Reducing CO <sub>2</sub> emissions from passenger cars  B) Reducing CO <sub>2</sub> emissions from freight transport by road	COM (95)689  COM(97)242 COM(97)243 COM(95)691	Environmental Agreement with ACEA. CO <sub>2</sub> emissions 140gm/ Km by 2008 for the average of new passenger cars  Trans-European Freight Freeway Intermodality and Intermodal Freight Transport Fair and Efficient Pricing	Monitoring System (COM(98) 348) Negotiation of agreements with Japan/Korea/and firms outside ACEA  Some freeways open  Implement information programmes, promote voluntary actions/best practice	+/- 15% of total emissions reduction under Kyoto 80-90 Mtonnes  reduce relative price of rail reduction in freight movements 10-40% equivalent decrease in CO <sub>2</sub> emission from freight
2	Taxation of aircraft fuel/kerosene		Commission review of exemption – proposed extension of excise duties to aviation kerosene – Art 13(1)c of COM(97)30  Detailed study of impact of taxing kerosene (finalisation: ....)	On the basis of this study the Commission will issue a Communication setting out instruments	Intra- EU aviation emissions not yet included in Kyoto target – impact would therefore be difficult to evaluate

<sup>1</sup> This was published in Annex 3 of the Commission Communication to the Council and Parliament "Preparing for Implementation of the Kyoto Protocol" COM(1999)230 of 19 May 1999.

N°	MEASURES	REF	PROGRESS AT COMMUNITY LEVEL	NEXT STEPS	IMPACT
3	Common action progressively to reduce/remove fossil fuel and other subsidies, tax schemes and regulations which counteract an efficient use of energy	Decision 36/32/93/ECSC Of 23.12.93	Schemes to subsidise fossil fuels are mainly at national level. The Commission guidelines for state aid (1994-2002) aim at viable coal production and degression of aids  Proposal for an energy products tax	31.07.99 ECSC expires.  State aids will be covered by EC regime  COM (97) 30	Reduced support for domestic solid fuels leading to decline in this sector and substitution by less carbon intensive fuels. Also reduction in CH <sub>4</sub> emissions Before Council for two years.
4	Promoting energy efficiency	Council Decision 96/737 (SAVE II)  COM(97)69  COM(98)246	Energy efficiency : - SAVE II Programme - pilot actions and studies for promoting energy efficiency, including measures to facilitate the implementation of legislation - Framework Directive on Energy labelling followed by daughter directive 94/2, 95/12, 95/13, 96/89, 97/17, 98/11  - Proposal for an Integrated rational planning techniques directive  - Energy Efficiency in the EU –Towards a Strategy for the Rational Use of Energy	- Work underway  - Discussion on amended proposal  -Action Plan requested by the Council in Resolution on EE to be presented in 1999	Reduce growth in energy intensity. Cost effective efficiency potential around 20% of total current energy consumption using current technologies  Economic potential 18% of 1995 final Energy cons in 2010 Target of 1% yearly improvement in energy efficiency above "business as usual" scenario

N°	MEASURES	REF	PROGRESS AT COMMUNITY LEVEL	NEXT STEPS	IMPACT
5	Improved technical performance and design of appliances and equipment	92/42/EC 96/57/EC	- Domestic Boiler Directive (92)  - Refrigerator Directive (96)  -Negotiated agreements on minimum energy efficiency standards for washing machines and TVs and VCRs	-energy efficiency standards for electric water heaters and air conditioners to be expanded to include other equipment	Electricity saving of 10% (220TWh/yr) with market transformation of all end use equipment
6	More widespread adoption of energy efficiency best practice taking into account IPPC-BAT	Council directive 96/61/EC	- Energy efficiency to be taken into account establishing BATS –implementation by MS	IPPC adopted by Council 9/96; enters into force 10/99 for new plants and by 10/07 for all existing plants	Implementation of BAT reference notes up to MS – this will determine impact on emissions.
7	Legislation on waste to take into account the latest research and best available technology for minimising greenhouse gas emissions	COM (98) 189	"Landfill Directive Applies to new and existing landfills" Step wise reduction in biodegradable waste. Commission proposal limits on biodegradable content of waste of 75%, 50% and 25% of production by 2002, 2005 and 2010.  Council common position 75% (2006), 50% (2009) 35%(2016). 4 year derogation for (UK.I.E)	- Council common position by unanimity. More stringent standards demanded by EP unlikely to be adopted  - Adoption of Directive end of first semester 1999	Landfill accounts for around a third of EU methane emissions – landfill currently accounts for around 160 Mtonnes of CO <sub>2</sub> equivalent – saving substantial

N°	MEASURES	REF	PROGRESS AT COMMUNITY LEVEL	NEXT STEPS	IMPACT
8	Plan of action for reducing methane emissions		Commission study on cost-effective options to reduce methane emissions completed	Communication setting out Action programme - 1999? Agenda 2000 See items 4 & 7	Reform of CAP under Agenda 2000 - proposal for a rural development regulation, - less intensive pasture systems - increase feed conversion efficiency
9	Solutions to the emissions of N <sub>2</sub> O, in particular from catalysts in motor vehicles, taking into account the impact on emissions of other gases		On-going research needed		
10	Maximise the contribution of RTD activities under the Fifth Framework Programme to meeting climate change objectives by bringing forward new technologies and techniques, notably regarding energy efficiency, renewable energies, and their dissemination to third countries		Adoption of the Fifth RTD programme - RTD to mitigate GHGs technology + socio-economic chapters - Technology innovation in Energy - Clean cities	Adoption of the Fifth Framework Programme - RTD support for scientific research on climate change, policies and technologies (including renewable energy and improvement of energy efficiency) to mitigate GHG emissions - TRD for sustainable urban management, building sector and transport systems	Medium to long-term impacts
11	Ensure promotion of environmental objectives in liberalised electricity and gas markets	SEC(99)470	Commission working paper on access of renewable electricity to grids	Proposal for a Directive on common rules for renewable electricity (1999)	Contributes to objective of increase use of renewable energy - see 12

N°	MEASURES	REF	PROGRESS AT COMMUNITY LEVEL	NEXT STEPS	IMPACT
12	Promote a substantially increased use of renewables in the EU	Decision 98/352 COM(97)599	-ALTENER II Programme  - Strategy and Action Plan on renewables – increase share of RES in EC primary gross inland energy consumption from 6% to 12% by 2010	First round of projects implemented, second call for proposals (2000 budget) in preparation  Implementation of action plan, including Campaign for Take Off for RES	400 Mtonnes of CO <sub>2</sub> saved per year by 2010
13	Measures to promote the increased use of combined heat and power (CHP) generation	COM(97)514 COM(98)415	Commission Communication on CHP  CHP introduced in proposal for a revision of the Directive on Large Combustion Plants (LCP)	pending	Double use of CHP in EC by 2010 (9% to 18%)
14	Promotion of environmental agreements	COM(96)561	Communication on Environmental Agreements.  Environmental Agreements on minimum efficiency standards (see 5 above)	Establish timetable. Discussion with industrial/electricity sectors on Long-Term Agreements in 1999. Conclude agreements in 2000	Substantial potential

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ANNEX I

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N°	MEASURES	REF	PROGRESS AT COMMUNITY LEVEL	NEXT STEPS	IMPACT
15	Transport policies to influence travel demand towards less damaging forms of transport and to manage overall transport demand, taking into account environmental constraints on transport volume	COM(97)243	Green Paper – "Citizens Network" Green Paper – "Fair and Efficient Pricing"	First phase of programme to apply the principle of charging for marginal social costs. Committee of MS to be set up to examine this issue.	
16	Standards for efficiency use in new and refurbished buildings		Buildings account for 40% of EC CO <sub>2</sub> emissions. Main actions at MS level  At EC level the review of Dir 93/76 EEC	In Action Plan for Energy Efficiency	
17	Policies to limit/reduce emissions of HFCs, PFCs and SF6		– data and scoping studies completed by Commission – policy response in development	Legislation/VA with respect to each of the three gases	+/- 41% increase projected by 2010 to +/- 80 Mtonnes CO <sub>2</sub> equivalent mainly due to HFCs. Potential for reduction large if HFCs regulated.

## ANNEX II

*Table. Some examples of national EU Member States policies and measures for reducing greenhouse gas emissions. Examples provided by Member States sometimes fall under more than one category, and they have been reported accordingly.*

	Energy general, energy efficiency	Power generation, energy market restructuring	Industry	Transport	Waste	Agriculture and forestry	Residential
<b>Austria</b>	Fuel consumption levy (Economic instruments)	Replacing fossil fuels by renewables		Fuel consumption levy (Economic instruments) Mandatory addition of "biodiesel" to the regular diesel and gasoil	Energy utilization of waste and landfill gas		Biomass-based heating systems
<b>Denmark</b>		Subsidies for electricity production based on renewables, etc.  CO <sub>2</sub> quotas for electricity producers (Economic instruments)  Small-scale CHP (Economic instruments)  Use of offshore wind turbines	Taxes on industrial use of energy (Economic instruments)  Programmes for cleaner technology/products (Financial support)	Green owner fee  Energy labelling of new cars	Waste management strategy	Reducing nitrogen loading from agricultural sources	Energy labelling of buildings
<b>Finland</b>	Energy taxation (Economic instruments)	Promotion of production and use of renewable energy (Economic instruments)	Promotion of energy efficiency		Reduction of the amount of landfill waste and recovery of landfill gas	Sustainable forest management in the National Forest Programme 2010	Promotion of energy efficiency in buildings

	Energy general, energy efficiency	Power generation, energy market restructuring	Industry	Transport	Waste	Agriculture and forestry	Residential
France	Energy efficiency and saving		Subsidies for energy efficiency audits	Planning for urban mobility	Collection of methane emitted by landfills	New law for forestry to promote more sustainable management of forests	Thermal regulation for buildings
Germany	Eco-tax (Economic instruments)	Supporting the development of photovoltaic  Market penetration of renewable energy (Economic instruments)	Eco-tax (Economic instruments)  Increasing energy efficiency in the industry				Improving energy efficiency of heating in buildings
Ireland	Annual Energy Awareness Week  Annual Self Audit and Statement of Energy Accounts Scheme		Annual Self Audit and Statement of Energy Accounts Scheme	Fiscal measures (Economic instruments)	Waste Strategy	Forestry Strategy - "Growing for the Future"	Annual Energy Awareness Week
Italy	Environment taxation (Economic instruments)	Promotion of production and use of renewable energy through setting binding % targets for their share		Expansion of the use of natural gas for vehicles (Economic instruments)			
Netherlands	Regulatory energy tax (Economic instruments)	Reducing CO <sub>2</sub> emission by voluntary agreements	Benchmark covenant with industry  Reducing the three new gases	Incentives for fuel efficiency for cars and motorcycles			
Spain		Promotion of renewable energy (Economic instruments)			Improvement of waste management		



Sweden	Carbon dioxide and energy tax (Economic instruments)	Promotion of renewable energy and central heating					
UK	Energy efficiency by Best Practice Programme	Energy market reform	Energy efficiency by Best Practice Programme	Increased fuel duty (Economic instruments)			

PAPER NO. 3: JAPAN

**1. Comprehensive Promotion of Measures to Prevent Global Warming**

- In October 1998, the Law Concerning the Promotion of the Measures to Cope with Global Warming was enacted. In April 1999, the law went into force, and a Cabinet Decision based on the law defined the basic guidelines containing the basic elements of measures which should be taken by every sector of the society, including the central government, local governments, businesses and citizens. In July 1999, the National Center for the Promotion of Activities to Cope with Global Warming was designated. The government will promote comprehensive measures to prevent global warming, including the establishment of action plans on the government's activities.

**2. Promotion of Measures to Reduce CO<sub>2</sub> Emissions, Focusing on Measures Related to Energy Supply and Demand**

**2.1 Promotion of Energy Demand Side Measures to Reduce CO<sub>2</sub> Emissions**

**(1) Drastic Improvement of Energy Efficiency by the Revised Law Concerning the Rational Use of Energy**

- The Revised Law Concerning the Rational Use of Energy went into force in April 1999. The law introduces the concept of the "Top Runner Approach" regarding efficiency standards for automobile and household electrical products and office appliances. Under this approach, efficiency standards are set with an aim of meeting or exceeding the highest energy efficiency levels that have been achieved among products currently commercialized. Future standards will aim at improvements of fuel efficiency of passenger automobiles using gasoline by about 23% between 1995 and 2010, and energy efficiency of household electrical products and office appliances by between 14% and 83%.

**(2) Strengthening Energy Efficiency Standards**

- The Revised Law Concerning the Rational Use of Energy also aims at proper and effective rationalization of energy use in factories and business sites. Large factories and business sites are now mandated to prepare plans to promote efforts to systematically rationalize energy consumption, in addition to existing obligations. Middle-sized factories and business sites, which did not have any obligations under the law now, have some obligations such as nomination of a person that manages energy consumption. In addition, "Evaluation Standards" were established which define conditions which business operators should observe and targets for rationalizing energy use. Next steps include, as necessary, providing guidance and advice on rational use of energy. For factories and business sites whose efforts are extremely inadequate, measures in the Law such as publicizing their names will be invoked.
- Inspections on compliance with the Law of 1,570 factories with large energy consumption have been conducted.

- Energy efficiency standards for housing and buildings were revised and strengthened (aiming for about a 20% reduction in energy consumption for heating and cooling of housing, and about 10% for buildings), based on the Law. A review of insulation standards of building materials was conducted. Next steps include, as necessary, providing guidance and advice on the rational use of energy, and encouragement of compliance with the standards.
- Technological development was promoted to achieve improvements in the energy efficiency of railways, ships and aircraft, and a Treasury Investment and Loan Program was implemented in order to promote the introduction of more efficient equipment.

**(3) Changing to a CO<sub>2</sub> Emission-Limiting Society by Infrastructure Development, etc.**

- Formulation of Urban and Regional Structure with Low CO<sub>2</sub> Emissions
  - The construction of fuel supply stations (Eco-Service Stations, etc.) such as EV quick chargers, natural gas quick refillers and methanol stations was promoted in order to promote greater use of clean-energy vehicles and low-emission vehicles.
  - “Telework” allows work to be done away from the office using information and communications technology so as to reduce energy used for commuting. Construction of “telework” centers was subsidized, wide area information/communications network model design projects were implemented, and a tax system to promote “telework” was introduced.
  - The building of a network of water-front and green spaces in urbanized areas was promoted through securing urban water surfaces and improving green spaces in parks. In addition, environment-friendly model housing and community projects were implemented including model projects using heat from treated wastewater. In addition, projects to improve facilities having rainwater storage and penetration functions were carried out. Also, rainwater storage and penetration sewerage projects were subsidized.
  - In order to promote houses and buildings with high efficiency, model projects and projects to promote the expansion of housing with less environmental impact were implemented. Next steps include implementing projects to promote the introduction of high-efficiency systems for housing and buildings, as well as spread of energy efficient houses and office buildings, in fiscal 1999.
  - Improvements in systems to use natural energy were made through projects for next-generation urban improvement projects. Also, systems to use urban energy were designed. In addition, research was conducted regarding an urban energy source network.
- Improving Efficiency of Distribution
  - A shift from own delivery to self-employed individuals and freight consolidating were promoted in order to increase truckload efficiency. In addition, bridges were reinforced to accommodate larger vehicle carriage sizes, forming a road network. Next steps include active promotion of policies relating to shifting own delivery to self-employed

individuals and freight consolidating, in order to raise overall truckload efficiency. In addition, efforts will be made to reinforce bridges to accommodate larger vehicle carriage sizes.

- The following were implemented: construction work to accommodate freight trains; improvements of domestic intermodal transport terminals; improvements of international container terminals; road improvements to make better access to airports and ports; and improvements of flexibility for Joint-Ownership Method by Corporation for Advanced Transport and Technology, relating to construction of Roll On/Roll Off Vessels. Future steps include aiming for improvement in the proportion of long-distance freight carried by rail and ocean to more than 50% by 2010, excluding primary industrial commodities. In addition, for domestic intermodal transport terminals, future steps include making improvements so that 90% of the population is covered within a half day round trip by ground transportation, and for international container terminals making improvements aiming for about a 30% reduction in the ground transport costs for export/import containers, assuming the current situation continues. Furthermore, based on the 5-Year Road Improvement Plan, future steps include promoting road improvements to make better access to airports and ports, and striving to achieve 44% accessibility for primary airports and ports by the end of fiscal 2002.
  
- The following were implemented: improvements in road network of airports/ports/high-grade main roads, wide area distribution center, and infrastructure for international exchanges that conduct improvement projects for information/communications infrastructure.
  
- Promoting Use of Public Transportation
  - In order to promote the utilization of railways the following were implemented: improvements on new bullet train projects; improvements on subways and 'new town' railways; better utilization of main rail lines by adapting freight lines to passenger use, etc.; and improvements of public spaces in front of stations.
  
  - Financial assistance was provided for improvements in barrier-free facilities including installation in train stations of elevators, escalators, and washrooms for handicapped persons, to promote the convenient use of trains, especially by older and handicapped persons.
  
  - The following were conducted: study/research towards the improvement of streetcars; studies relating to plans to introduce cars with low floors; and construction work on urban monorail/new transport systems, with partial commencement of services.
  
  - In order to promote use of buses, with the objective of realizing city designs based on bus traffic, the 'omnibus town' concept, and introduction of 'non-step buses' were promoted.
  
  - The Public Transportation Priority Systems (PTPS), a sub-system of the Universal Traffic Management Systems (UTMS) which are designed to ensure priority passage to buses using traffic signal controls, was improved.

- In order to improve the utility of buses, bus lanes were marked with colored pavement, and improvements were made to 'high-grade' bus stops.

#### D Reducing Traffic Congestion

- In order to achieve improvements in transport efficiency using Intelligent Transport Systems (ITS), with the collaboration of the relevant ministries, feasibility studies for social testing for full-scale introduction were implemented, as well as the establishment of standards for this work. In addition, improvements in the Vehicle Information and Communication System (VICS) were promoted to expand the information provision service area. With regards to the Electronic Toll Collection System (ETC) which allows drivers to pay tolls automatically without stopping has been moving ahead to actual deployment of conventional tollgate equipment, and tests were conducted to verify results.
- With regards to transportation demand management, the outline of comprehensive plans for smooth urban transportation has been prepared, and planning work has begun.
- In order to optimize traffic management, improvements were promoted in the Universal Traffic Management Systems (UTMS) mainly in traffic control centers. In addition, verification work was promoted towards the actual use of the traffic Environmental Protection Management Systems (EPMS), which includes signal controls to limit the number of unnecessary starts and stops by vehicles, and provides information from areas where the environment is worsening.
- The following were implemented to relieve/reduce traffic congestion: improvements in ring roads and construction work for continuous flow intersections using an overpass or underpass. In addition, improvements in urban parking lots and relief at key congestion points based on the Congestion Reduction Programme were conducted.

#### **(4) Review of Action Plans of Industry**

- Reviews of voluntary action plans already made by industries to save energy and curtail releases of CO<sub>2</sub> and CFC substitutes have been carried out, so as to ensure their effectiveness. These reviews encompassed sectors including manufacturing, energy, distribution, telecommunications, broadcasting and food. Transportation, construction, real estate and housing industries have also prepared voluntary action plans, and follow-up reviews of these sectors will be conducted.

#### **(5) Development and Diffusion of New Energy Saving Technologies, etc.**

- Promotion of Development and Diffusion of New Energy Saving Technologies, etc.
- Development of high performance industrial furnaces was carried out aiming for more than 30% improvements in energy efficiency compared to conventional types, and field tests were started to verify their actual performance and reliability. In addition, corroborative work was conducted for essential technologies relating to next generation high performance boilers (with improved boiler efficiency of about 17%). Furthermore, plans exist for comprehensive assessment of pilot boiler plants.

- Development work was commenced on high-efficiency lighting using light emitting diodes, aiming at increase in energy efficiency by 50% above fluorescent lighting.
- Research and development of technologies to reduce standby energy consumption of household and office appliances were started.
- Research and development was implemented for super low electrical consumption liquid crystal displays, and a mid-term assessment was conducted during fiscal 1998.
- Promotion of the Diffusion of Clean-Energy Vehicles, Low-Emission Vehicles and High Fuel Efficiency Vehicles
  - For tax revisions in fiscal 1999, an expansion of special tax measures was conducted relating to automobile acquisition tax, with the creation of special taxation criteria for high fuel efficiency vehicles (low fuel consumption vehicles) and lower special tax rates on low emission vehicles.
  - Technological development and subsidies for vehicle acquisition were conducted for clean-energy vehicles, low-emission vehicles and high fuel efficiency vehicles. With regards to the fuel consumption standards for automobiles under the Revised Law on the Rational Use of Energy, in March 1999 a Notification was issued for energy-efficiency standards which adopt the Top Runner Method. These efforts aim for spreading and promoting clean-energy vehicles, low-emission vehicles and high fuel efficiency vehicles. We also continue to consider every effective policy measure, including tax systems on vehicles, to promote high fuel efficiency vehicles.
  - In order to make progress with procurement by public bodies, clean-energy vehicles and low-emission vehicles were introduced in bus and garbage collection operations, etc., implemented by local governments. In addition, clean-energy vehicles/low emission vehicles (electric, natural gas vehicles) were under trial operation by post offices nationwide.
  - Subsidies were provided for the introduction of clean-energy vehicles and low-emission vehicles, including the private sector. The target for the introduction of clean-energy vehicles and low-emission vehicles in fiscal 2010 is 3.65 million vehicles.

## **2.2 Promotion of Energy Supply-Side Measures to Reduce CO<sub>2</sub> Emissions**

### **(1) Promoting Construction of Nuclear Power Plants**

- In order to build the understanding and to obtain cooperation of the public for nuclear power plant construction, various measures were implemented to provide correct knowledge and precise information, including the organizing of 'the Round-Table Conferences on Nuclear Policy'.
- Financial support was provided for local governments in areas where nuclear power plants are located or being considered, to be used for projects, including public investments, and to promote industries.

- The Electric Power Development Coordination Council strengthened its activities in discussing regional development plans of regions which have large scale nuclear power generation facilities.

**(2) Accelerating the Introduction of New Energy**

- Generation capacity by photovoltaic power generation reached about 90,000 kW by fiscal 1997. In order to achieve market viability of photovoltaic power generation a subsidy system has been operated for home photovoltaic systems. 8,200 applications for such subsidies were received in fiscal 1998. By fiscal 1997, about 20,000 kW of wind powered generation and 950,000 kW of waste powered generation had been introduced.
- 20 sewerage treatment facilities generated electricity using gas from sewerage sludge digestion.

**(3) Promotion of Measures for Electrical Load Leveling**

- In 1998, MITI established a new subsidy program targeting machines/systems that would demonstrate significant policy effects. By using this program, more thermal storage air conditioning systems which use ice to store cold heat, and air conditioning using gas, were promoted. Also, activities to win public approval of load leveling and measures to develop technology, which will contribute to load leveling, were implemented.

**2.3 Promotion of Other Measures to Limit CO<sub>2</sub> Emissions**

**(1) Promotion of Measures to Limit CO<sub>2</sub> Emissions from Industrial Processes**

- The use of mixed cement which emits less CO<sub>2</sub> than ordinary cement was expanded.

**(2) Promotion of Measures to Limit CO<sub>2</sub> Emissions from Waste Treatment**

- Waste recycling/re-using facilities were promoted in order to suppress the volume of waste incinerated and emissions of CO<sub>2</sub>. The target is to raise the recycling rate of general waste to 15% by fiscal 2002.

**(3) Promotion of Efficient Use of Wood Resources**

- The following activities have been conducted:
  - research and development in producing high-quality wood products at low-costs;
  - research and development that allows utilization timber derived from thinning;
  - exploration of new markets for timber resources;
  - exploration of new use of timber products;
  - public relations to promote long-term use of timber products.

### **3. Promotion of Measures to Limit Emissions of Other Greenhouse Gases**

#### **(1) Promotion of Measures to Limit Emissions of CFC Alternatives (HFC, PFC, and SF6)**

- Promotion of Systematic Efforts by the Industrial Sector
  - In February 1998, a public notice was issued containing guidelines for the preparation of industry action plans which include measures to control HFC and other emissions as well as numerical targets. Based on this, the preparation of action plans by relevant industries was requested. In response, industries prepared action plans in April 1998. A review of the action plans was conducted and the results were announced in May of the same year. In May 1999 the progress made with the action plans by the industries was reviewed. Next steps include efforts to achieve the promotion, improvement and day-to-day application of countermeasures for leakage from production plants, as well as to get early results of medium and long term initiatives such as full recovery of refrigerants. In particular, with regards to the semiconductor production business, revision of the action plan is aimed for by the end of 1999, based on the agreement by Japan, the United States, Europe and Korea to reduce total emissions of HFCs and other gases by 10% from 1995 levels by 2010. In addition, reviews will be promoted relating to industries which prepare new plans, and industries which have not yet prepared plans will be urged to prepare and publicize them.
  
- Development of Substitute Substances, etc.
  - With regards to the development of new alternative substances for refrigerants, cleaners and foaming agents, assessments were started for candidate substances which have possible uses. In addition, development was begun for alternative gases and systems for SF6, etc., used in cleaning processes for the production of electronic devices, and technological development was started to continuously recover, destroy, and render harmless HFC-23, a by-product of the manufacture of HCFC-22 in industrial processes. In addition, the following will be implemented: development of alternative gases/systems and alternative processes for etching gases (PFCs) which are used in electronic device production processes, based on feasibility studies to date; testing of technologies for safe and effective HFC, PFC and SF6 destruction and disposal utilizing destruction technology for CFCs and other gases; and technological development relating to building materials that have high insulating ability and which do not use HFCs, etc.
  
  - Recovery and destruction tests were conducted, aiming to obtain basic information for a full-scale system for CFC destruction and recovery. Based on these results, discussions were held about HFC recovery, destruction and disposal.

#### **(2) Promotion of Measures to Reduce Methane Emissions**

- In order to reduce methane emissions, efforts are being made to reduce the volume of garbage going directly into landfills, and in fiscal 1996 the ratio of landfill versus total garbage was about 10%. In addition, in order to achieve reductions in methane emissions from agriculture and livestock industries, measurement methods on methane emissions from paddy fields have been investigated, and research and studies were implemented into livestock management technology. Next steps include reducing the



landfill rate to 9% in fiscal 2002. In addition, more work will be done to promote establishment of livestock management technology.

**(3) Promotion of Measures to Reduce Nitrous Oxide Emissions**

- With regards to nitrous oxide emissions from adipic acid production processes, with the installation of removal equipment, emissions have been significantly reduced since March 1999.
- Since nitrous oxide emissions are reduced by incineration of sewage sludge, a manual on this topic is being prepared. The “Manual for the Preparation of for Implementation Plans for Sewerage Systems for the Prevention of Global Warming” (provisional title) is expected to be completed during fiscal 1999.

**4. Promotion of Measures Involving CO<sub>2</sub> Sinks Such as Afforestation, etc.**

**(1) Promotion of Forest Management**

- In order to promote appropriate Forest Management practices, various types of programmes have been implemented in both private and national forests, for example:
  - Erosion Control and Watershed Management;
  - Afforestation and Reforestation;
  - Forests for Human Welfare, and so on.Such projects upgraded the capacities of the forests as CO<sub>2</sub> sequestration resources and as carbon reservoirs.
- Partnership development has been emphasized with local and urban inhabitants.

**(2) Promotion of Urban Greenery**

- The following were implemented: promotion of greening based on the “Green Plan 2000”; and work projects with improvements of the designated priority green zones based on the priority areas identified in “The master plans of parks and open spaces” prepared by local governments. Next steps include expanding the Priority Greening Area Improvement Projects starting in fiscal 1999 to include the category “Areas for Greening to Mitigate the Urban Heat Island Effect – From the Perspective of Global Warming Prevention” as stipulated in “The master plans of parks and open spaces”.
- Construction and transfer programs of green space were implemented in order to prevent pollution. As next steps, the construction and transfer program “green space to abate global warming” will be established, and efforts will be made to improve green spaces on former final waste disposal sites, etc.
- Promotion was made of improvements in urban parks, etc., as well as greening along roadways. In addition, green areas and related facilities were constructed in port and harbors. In addition, with regards to implementation of projects to prevent landslides on steep slopes, slope management work to guarantee safety was implemented, keeping the natural environment in mind by leaving existing trees in place, etc. As a next step, with regards to urban parks, etc., improvements will be promoted based on the 6<sup>th</sup>

Seven year Program for Developing Urban Parks. With regards to roadside greenery, through promoting improvements based on the Road Improvement 5-Year Plan, efforts will be made to achieve 51% greening along roadsides in cities. In addition, by the beginning of the 21<sup>st</sup> century, improvements will be made aiming for 5% of land area near ports and harbors to be green spaces. In addition, safe and environment friendly slope management will be promoted through the Fourth Steep Slope Landslide Prevention Project 5 Year Plan by actively introducing green slope treatment methods.

#### **5. □ *Strengthening Research and Development of Advanced and Innovative Environmental and Energy Technologies***

- In order to improve the current 13% conversion efficiency of photovoltaics, technological development was conducted for super-efficient photovoltaic power generation. On the utilization technology of supercritical fluids, research and development was conducted at the fundamental level. In addition, technological development was promoted for new steel production processes, next-generation coke production technology, and research and development was promoted for ultra-steel, high-temperature materials, and production technology for coal gas for fuel cells, etc. For the next step, efforts will be made to achieve 30% or greater conversion efficiency in super high-efficiency solar cells.
- With regards to technological development relating to CO<sub>2</sub> ocean sequestration, which is implemented for CO<sub>2</sub> sequestration technology, during fiscal 1998 assessments were conducted of releasing CO<sub>2</sub> into the ocean and the deep seabed storage marine methods. Next steps include establishment of techniques to assess impacts on the environment by releasing CO<sub>2</sub> into the oceans or deep seabed storage.
- The follow-up of The Basic Plan for Research and Development on Earth Science and Technology was implemented.
- Research was implemented relating to development and assessments of the technologies dealing with methane and nitrous oxides.

#### **6. *Strengthening Earth Observation Systems, etc.***

- Research projects concerning global warming, such as Quantitative Evaluation of Climate Change Using Climate and Mass-Transportation Models, and Assessment and Prediction of the Dynamics of Carbon Dioxide in Terrestrial Ecosystems, have been implemented. A Study on Advancement in Prediction Technology for Global Warming and other basic scientific research activities relating to the global change predictions were also carried out.
- Development of the Advanced Earth Observing Satellite-II (ADEOS-II) aiming to observe global changes from space and space-borne remote sensors for measuring atmospheric greenhouse gases were carried out. The ADEOS-II is to be launched in

fiscal 2000. Development of the space-borne remote sensors to measure atmospheric greenhouse gases is to be continued.

- Atmospheric and oceanographic observations including observations of concentrations of greenhouse gases, climate, upper-air and sea-level have been implemented. In addition, through the promotion of services related to collection, management and provision of oceanographic data, and the activities of the WMO World Data Centre for Greenhouse Gases, atmospheric and oceanographic data have been provided to relevant institutions all over the world after collection and quality control/assurance. The Frontier Observational Research System for Global Change was also inaugurated in August 1999.
- In order to obtain the precise CO<sub>2</sub>-sink/source function of forest ecosystems, five monitoring towers were built in different type forests, nation-wide. A study concerning evaluation of CO<sub>2</sub> fixation capacity of forests was also carried out.
- The Global Map Project is proceeding through international cooperation/collaboration in order to contribute to global change issues such as assessment of forest distribution and risk prediction in case of sea level rise. In line with this, development of advanced technologies for utilizing the Global Map is under way. Next steps include preparation of the first edition of the Global Map in fiscal 2000, and an improvement of the distribution system for the Global Map during fiscal 1999.
- In order to promote research activities in the Asia-Pacific Region about global environmental problems including global warming, the Asia-Pacific Network for Global Change Research (APN) Center was newly established in August 1999 as the core institution for APN activities. The APN Strategic Plan was also approved at the intergovernmental meeting in March 1999.
- In order to contribute to the elucidation of the global warming phenomena and depletion of the ozone layer, etc., research and development were carried out for the global environment observing technologies utilizing electromagnetic waves (light and radio waves), and for establishing the “Network for Global Environmental Observation and Research Network”. Next steps include improvements in the global environment observing technologies and the data processing/utilizing technologies.

## **7. Promotion of International Cooperation**

### **(1) Realizing the Kyoto Initiative**

- The Government of Japan announced the “Kyoto Initiative” in November 1997, focusing on assisting developing countries in their combat against global warming.
- The first part of the program is human resource development. In 1998, the Government of Japan started a five-year plan to train as many as 3,000 experts in fields relating to global warming, and by this plan about 1,100 experts had been trained by the end of fiscal 1998.

- The second part of the program is Official Development Assistance Loans (Yen Loans) on the most concessional terms (the interest rate of 0.75% and the repayment period of 40 years). Japan has already committed to 22 projects whose total amount is more than two billion dollars.
- The third part of the program is the transfer of Japanese technology and know-how.

**(2) Technological Contribution by the Climate Technology Initiative**

- Through climate-change technology initiatives (CTI), international cooperation was carried out in order to develop and diffuse technologies to deal with global warming. In the future, in addition to the development of technology diffusion programs in different regions, such as Asia, Eastern Europe, Central and South America, and Africa, exchanges of R&D will be sought with those countries in the area of technology development.

**(3) Finding Possible Joint Projects through Dialogue with Related Countries**

- In anticipation of joint implementation by developed countries, and in anticipation of the active utilization of Clean Development Mechanisms (CDM) with developing countries, feasibility studies were carried out in some developing countries and Russia, etc. These concerned the possibility of turning projects introducing energy conservation into business enterprises. During fiscal 1998, a total of 63 feasibility studies were carried out, including 20 in Russia and 15 in China.

**8. Reviewing of lifestyle**

**(1) Stimulating Public Discussion about the Introduction of Daylight Saving Time**

- In September 1998, the Citizens' Conference to Think about the Global Environment and Daylight Saving Time was established; and a public consultation was carried out concerning the introduction of daylight saving time and an earth-friendly lifestyle. In May 1999, a report was presented, taking into account consultative meetings and public comments. Based on this report, the Government is going to make the citizens thoroughly familiar with the system. With regard to future legislation, a "federation of House of Councilors members making a study of daylight saving time" is reviewing and preparing for it.

**(2) Securing Social Conditions Leading to Promotion of Safe and Appropriate Use of Bicycles**

- A model business proposal to permit bicycles to be brought into railroad cars has been implemented; and problems areas, solution methods, including ticket fees, rates, safety and operational aspects, etc., have been reviewed. A review will be made of problematic points in the places on the rail line where there would be the most use and of the possibility of establishing a system for the entire area.
- The basic direction involves the building of wide walkways, etc. for bicycles and pedestrians, the establishment of bike parking areas at traffic junctions, and the

construction of bicycle path networks, all for the safe and smooth utilization of bicycles.

- An awareness/intention survey was conducted concerning bike usage. The conditions for promotion of the safe and proper use of bicycles were identified. In the future, the effect of policies and actions, etc. for the promotion of the safe and proper use of bicycles, along with the prospects for actual execution, will be clarified.

**(3) Improvement of Structures for Education/Awareness Raising and Information Dissemination**

- Enhancement of education concerning the environment and energy
  - a. Enhancement of environment and energy education in the schools
    - By holding seminar meetings for the teachers responsible for environmental education, improvements are sought in their leadership capabilities concerning environment and energy education. Also, the publication and distribution of teaching materials concerning the environment and energy has been carried out in some schools.
    - A pilot model business was implemented for schools (Eco-schools) which give consideration to environmental subjects such as the use of photovoltaic power generation, tree planting and energy conservation, etc.
  - Action to use recycled paper for textbooks is being promoted.
  - b. Enhancement of education concerning the environment and energy, in diverse locations
    - The projects for “Junior Eco-Club”, with a nationwide membership of 70,000 elementary and junior high school students and supporting adults, was promoted. This year the Club received the United Nations Environment Programme Global 500 Award.
    - Training of registered members in the Environmental Counselor Register System has been carried out. Furthermore, the nurturing of the Forest Instructors was promoted.
    - Tours of energy-related facilities, for elementary and junior high school students, were conducted.
- Strengthening of Public Relations
  - a. Improving Public Relations Structure
    - In November 1998, a logo mark relating to global warming prevention was solicited and decided upon. This is to be used by national and local public organizations, etc.
    - As an important aspect of public relations, the government, in its publications, has placed emphasis on global warming prevention actions, and has developed PR activities through a wide spectrum of the media such as newspapers, magazines, and television, etc., mainly during Global Warming Prevention Month.
  - b. Establishing of “Global Warming Prevention Month”

- In December 1998, the first Global Warming Prevention Month was celebrated. Centering around an international symposium, held in Kyoto on the first anniversary of COP3, PR activities were promoted on a nationwide basis.
- c. Commendation of Efforts of Businesses and Local Authorities
  - In December 1998, the Minister of the Environment Agency staged an award ceremony in recognition of global warming prevention activities.
  - In addition to these PR activities for the local and municipal governments and various organizations, which are involved in energy conservation, the Minister of International Trade and Industry Award was given in recognition of particularly excellent contributions.
- Promotion of Information Dissemination
  - a. Promotion of Information Dissemination Relating to Housing and Buildings
    - By setting forth common rules to establish the description of "performance" for homes (energy conservation performance, etc.), the Law Concerning Promotion of Quality Assurance for Houses, including the establishment of a housing performance description system which enables comparison by consumers, etc., was passed in June 1999. As a next step, appropriate execution of the housing performance description system will be carried out based on that law.
    - As for structures other than houses, starting in March 1999 the "Environment and Energy Friendly Building Mark" system, which indicates the level of energy conservation performance above a certain standard, was set in place.
  - b. Promotion of Information Provision in Consumer Products and Automobiles
    - CHoCO<sub>2</sub>, which ranks electrical appliances and vehicles in the order of carbon dioxide emissions, has been prepared and distributed.
    - A booklet called Comparison Catalog for Energy Conservation-Type Electrical Appliances, which describes the energy consumption efficiency of and the efficient use of each type of civilian-use equipment, has been prepared and distributed through volume discount stores, etc. as well as via the Internet.
    - "Fuel Efficiency Ranking for Motor Vehicles", which summarizes the emission levels of carbon dioxide and fuel efficiency for automobiles, has been prepared and distributed, including via the Internet, in order to provide up-to-date information and to promote the wider use of lower fuel consumption vehicles.
  - c. Promotion of Provision of Environmental Information Relating to Manufactured Products, etc.
    - In the early part of the fiscal 1999 improvements were made, including to the Eco-mark system itself as well as to the incorporation of environmental information, etc.
    - With the objective of controlling standby electrical consumption for office automation equipment, the International Energy Star program was set in motion.

- Reviews of labeling systems as a means to provide energy conservation information and reviews of new environmental labels to describe comprehensive environmental impact were initiated. With the high volume of energy consumption in mind, a review should be conducted concerning the introduction of this system to electrical appliances; and preparation of a manual to introduce environmental labels should be planned.
- d. Promotion of Provision of Information about CFC Alternatives, etc. (HFC, PFC, and SF6).
  - During Ozone Layer Protection Promotion Month, in September, public awareness raising was carried out with respect to the need for action to control the emissions of HFC, etc., along with the protection of the ozone layer. In addition, information concerning CFC recovery systems was widely disseminated.
- Upgrading Awareness Raising of Public Participation Styles
  - In June 1998, the National Convention for the Promotion of Environmental Household Accounting was held, and actual examples of environmental household accounting were introduced. Discussions were held concerning how to practice environment-friendly lifestyles.
  - In order to promote the "Stop Idling Campaign" and "Eco Drive Campaign", the distribution of pamphlets and stickers, presentation of a Minister of Transport Award, promotion at the Low-emission Vehicle Fair, and PR activities in the Air Pollution Control Promotion Month, were performed.
  - In February 1999, in order to establish new energy conserving lifestyles (with the slogan "smart life"), ideas for "smart fashion" designs were solicited from the general public, and these were exhibited along with a contest named "Smart Collection 1999". In the future, in addition to the apparel sector, the establishment of "smart life" will be promoted in the food, housing, and educational fields.

**(4) Exemplary Actions by Government**

- In addition to the launching of environment-friendly government buildings and facilities (with the slogan "Green Government Buildings"), the government has introduced solar energy generation systems to some government buildings.
- A natural gas filling station for vehicles has been set up in the Kasumigaseki area (central Government district), both for greater convenience for government-owned cars and in order to introduce the use of low-emission cars for government vehicles.
- A lighter dress code has been introduced for July and August each year.
- The first Monday of each month has been designated as "no car day," in order to decrease the use of government vehicles.
- A refrigerator/freezer which uses non-CFC refrigerant and insulation has been introduced. At the time of contracting for the construction of public buildings and facilities, including government buildings, estimates are to include the costs of

recovering CFC refrigerants from air conditioning equipment, in order to make sure that the refrigerant is retrieved when equipment is discarded. Recovery of CFC refrigerants will be further enforced. When equipment is newly installed or to be replaced, equipment having less of an impact on global warming will be sought. Further, concerning aerosol-type products, including “dust blowers”, the procurement of non-CFC products will be enforced.

**(5) Expansion of Greening Activities as Measures to Prevent Global Warming**

- As part of the national land greening campaign, centering mainly around Green Week (from April 23 to 29), greening activities were introduced in order to diffuse the concept of participating in the creation of forests, woodlands, and green spaces. A radio campaign celebrating the third anniversary of the enactment of the Contribution to Greening Law solicited, 2.24 billion-yen. In addition to diffusing greening techniques, including the use of tree doctors, forest and woodland creation activities involving the citizenry, such as the use of “greenery youth groups”, were promoted.
- In order to raise awareness for greening, A spring urban-greenery promotion campaign was held from April to June; and an Urban Greenery Month was held in October.
- Nearby natural spaces (biotopes) which a variety of living creatures can inhabit were created. Also, the “Kodomo Happa Hanteishi” (Children’s Leaf Judge) activity has been carried out by elementary and junior high school students. The aim of this activity is to raise children’s interest in air quality or global warming, through studying the absorption level of carbon dioxide by trees.

**(6) Implementation of Model Projects which lead to Innovation in Social Systems**

- The following model projects were implemented during fiscal 1998;
  - Regional promotional model projects for preventing global warming
  - Subsidy projects, including the introduction of the large-scale and concentrated use of new energies
  - Model projects for promoting the use of bicycles, through improving bicycle networks
  - Model projects to promote town-building planning involving the use of bicycles
  - Model projects for “telework” utilizing telecommunications and information
  - Model projects for designing regional illumination environment plans to rationalize nighttime lighting
  - Establishment of model planning using woodlands belonging to schools as fields of greening activities for young people
  - Model enterprises using forest and woodland regeneration systems
  - Societal experimentation with flex-time



PAPER NO. 4: SWITZERLAND

**Best practices in policies and measures**

In response to the invitation to Parties by SBSTA 9 to submit additional information on "best practices" in policies and measures Switzerland wishes to make a number of fact sheets available to the secretariat for incorporation in its report to SBSTA 11. Further information and documentation on individual measures can be obtained from the contact points indicated in the respective fact sheets.

**"Best practices" in policies and measures – Fact Sheet No. 1**

<p>Name of measure or policy:  <b>Energy 2000 Action Programme          Public Authorities Section</b></p>	<p>Sector: <b>Energy (Commercial/Institutional)</b>           GHGs mainly affected: <b>CO2</b></p>
<p>Relevant Federal Authority:</p> <p>Swiss Federal Office of Energy          Monbijoustrasse 74          3003 Berne          phone: ++41-31-322'56'11</p> <p>Level of implementation: local (cities)</p>	
<p>Brief description of measure or policy:</p> <p>Energy Town Label</p> <p>Comprehensive action plan including all types and levels of implementation. Cities may choose from a wide selection of measures affecting energy consumption. If an audit reveals that a specific threshold of effective policies or measures is met, a label is awarded. Standards for renewal of the label are upgraded/tightened over time to maintain the momentum for improvements.</p> <p>Type of instrument: voluntary, information</p>	
<p>Objective(s):</p> <p>Contributing to overall objectives of Energy 2000 Action Programme (Stabilising energy consumption; renewable energies contribute +0,5% to electricity production and +3% to heat generation).</p> <p>Specific goals for public authorities section of Energy 2000: 7460 TJ pa heating oil savings, 3780 TJ pa electricity savings.</p>	
<p>Schedule and status of implementation:</p> <p>Programme covers the period 1990-2000; follow-up programme after 2000</p>	
<p>Indicator(s) of success or estimate of impact:</p> <p>Growing number of cities and towns meeting label standards.          Reduced energy consumption as of 1998: heating oil savings of 1940 TJ pa, electricity savings of 1170 TJ pa</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <p>Annual Report on the Energy 2000 Action Programme          Energy 2000. The program with a punch          Energie 2000 – Nous avons tous à y gagner!          Repenser la rue. Vers une nouvelle culture communale de la voie publique          Energie extra 2/99</p>	

## "Best practices" in policies and measures – Fact Sheet No. 2

Name of measure or policy: <b>Energy 2000 Action Programme Hospitals Section</b>	Sector: <b>Energy (Commercial/Institutional)</b>  GHGs mainly affected: <b>CO2</b>
Relevant Federal Authority:  Swiss Federal Office of Energy Monbijoustrasse 74 3003 Berne phone: ++41-31-322'56'11	
Level of implementation: local authorities, individual institutions	
Brief description of measure or policy:  Energy management in hospitals:  1) Operational optimisation in existing buildings 2) Efforts to interest management in renovation for further energy savings 3) Energy efficiency in new buildings  Type of instrument: voluntary, information	
Objective(s):  Contributing to overall objectives of Energy 2000 Action Programme (Stabilising energy consumption; renewable energies contribute +0,5% to electricity production and +3% to heat generation).  Specific goals for Energy2000 hospital section: heating oil savings: 1440 TJ pa; electricity savings: 290 TJ pa.	
Schedule and status of implementation:  Programme covers the period 1990-2000; follow-up programme after 2000.	
Indicator(s) of success or estimate of impact:  Reduced energy consumption as of 1998: heating oil savings of 690 TJ pa; electricity savings of 140 TJ pa.	
Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):  Energie Innovation, „Gérer l'énergie pour la vie“ Annual Report on the Energy 2000 Action Programme Energy 2000. The program with a punch Energie 2000 – Nous avons tous à y gagner!	

**"Best practices" in policies and measures – Fact Sheet No. 3**

Name of measure or policy: <b>Energy 2000 Action Programme Trade and Services Section</b>	Sector: <b>Energy (Commercial/Institutional)</b>  GHGs mainly affected: <b>CO2</b>
Relevant Federal Authority:  Swiss Federal Office of Energy Monbijoustrasse 74 3003 Berne phone: ++41-31-322'56'11  Level of implementation: national (individual firms)	
Brief description of measure or policy:  Energy 2000 Label: Energy efficiency labels to promote use of energy efficient appliances  Energy Audit: Encouragement of firms to adopt „energy audit“ methods which pinpoint areas where firms can significantly reduce energy-related costs.  Type of instrument: voluntary, information	
Objective(s):  Contributing to overall objectives of Energy 2000 (Stabilising energy consumption; renewable energies contribute +0,5% to electricity production and +3% to heat generation).  Specific goals for Energy2000 trade/services section: heating oil savings: 180 TJ pa; electricity savings: 1600 TJ pa	
Schedule and status of implementation:  Programme covers the period 1990-2000; follow-up programme after 2000.	
Indicator(s) of success or estimate of impact:  Reduced energy consumption as of 1998: heating oil savings of 100 TJ pa; electricity savings of 840 TJ pa.	
Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):  Annual Report on the Energy 2000 Action Programme Energy 2000. The program with a punch Energie 2000 – Nous avons tous à y gagner!	

**"Best practices" in policies and measures – Fact Sheet No. 4**

<p>Name of measure or policy: <b>Energy 2000 Action Programme Industry Section</b></p>	<p>Sector: <b>Energy (Manufacturing Industries)</b>  GHGs mainly affected: <b>CO2</b></p>
<p>Relevant Federal Authority:</p> <p>Swiss Federal Office of Energy Monbijoustrasse 74 3003 Berne phone: ++41-31-322'56'11</p> <p>Level of implementation: Regional or sectorial (working groups), individual companies</p>	
<p>Brief description of measure or policy:</p> <p>Energy Model Switzerland</p> <p>The model involves working groups made up of company representatives to establish mutually agreed upon goals for reducing the amount of energy consumed, annual reports on the status of projects and the exchange of know-how, and individual measures to achieve the objectives.</p> <p>Type of instrument: voluntary, information</p>	
<p>Objective(s):</p> <p>Contributing to overall objectives of Energy 2000 Action Programme (Stabilising energy consumption; renewable energies contribute +0,5% to electricity production and +3% to heat generation).</p> <p>Specific goals for Energy2000 industry section: 5900 TJ pa fossil fuel savings, 1110 TJ pa electricity savings, 1600 TJ pa increased heating from renewables (part of fossil fuel savings).</p>	
<p>Schedule and status of implementation:</p> <p>Programme covers the period 1990-2000; follow-up programme after 2000.</p>	
<p>Indicator(s) of success or estimate of impact:</p> <p>Reduced energy consumption as of 1998: fossil fuel consumption reduced by 1710 TJ pa; electricity consumption reduced by 380 TJ pa; increased heat production using renewables by 1160 TJ pa.</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <p>Le modèle énergétique Suisse Annual Report on the Energy 2000 Action Programme Energy 2000. The program with a punch Energie 2000 – Nous avons tous à y gagner!</p>	

**"Best practices" in policies and measures – Fact Sheet No. 5**

<p>Name of measure or policy:  <b>Energy 2000 Action Programme          Motor Fuels Section</b></p>	<p>Sector: <b>Transport</b>           GHGs mainly affected: <b>CO2, precursors</b></p>
<p>Relevant Federal Authority:           Swiss Federal Office of Energy          Monbijoustrasse 74          3003 Berne          phone: ++41-31-322'56'11</p> <p>Level of implementation: national/regional (automobile associations, service suppliers, private individuals)</p>	
<p>Brief description of measure or policy:</p> <p>Eco-driving course:          Professional drivers are taught to use high gears. Driving instructors, garage owners and fleet operators employ and promote a gentler method of driving which means fuel savings up to 15%, as well as less accidents and greater protection of the environment.</p> <p>Car sharing program:          Mobility Car Sharing Switzerland offers participants the shared use of 900 vehicles at 600 locations in 300 towns (1998).</p> <p>Type of instrument: voluntary, education</p>	
<p>Objective(s):</p> <p>Contributing to overall objectives of Energy 2000 Action Programme (Stabilising energy consumption; renewable energies contribute +0,5% to electricity production and +3% to heat generation).</p> <p>Specific goals of Energy2000 motor fuels section: total savings of 3200 TJ pa; motor fuel savings of 2%; halving of 1980's increasing trend in motor fuel consumption from 38% to 19%.</p>	
<p>Schedule and status of implementation:</p> <p>Programme covers the period 1990-2000; follow-up programme after 2000.</p>	
<p>Indicator(s) of success or estimate of impact:</p> <p>Increased number of participants in the programs;          Motor fuels economised as of 1998: 1630 TJ pa.</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <p>Pour une mobilité intelligente          Car Sharing: The key to combined mobility          Accelerez intelligemment          Conduire ou conduire, il faut choisir!          Annual Report on the Energy 2000 Action Programme          Energy 2000. The program with a punch          Energie 2000 – Nous avons tous à y gagner!</p>	

**"Best practices" in policies and measures – Fact Sheet No. 6**

<p>Name of measure or policy:  <b>Energy 2000 Action Programme  Renewables Section</b></p>	<p>Sector: <b>Energy</b>   GHGs mainly affected: <b>CO2</b></p>
<p>Relevant Federal Authority:   Swiss Federal Office of Energy  Monbijoustrasse 74  3003 Berne  phone: ++41-31-322'56'11</p> <p>Level of implementation: National Associations (Swiss Association for the Promotion of Heat Pumps, Swiss Association for Wood Energy, SWISSOLAR)</p>	
<p>Brief description of measure or policy:   Promotion of biomass, ambient heat and solar energy in collaboration with networks in these fields, using „acceleration measures“ to improve market penetration of the renewables section's products.</p> <p>For example, the Ambient Heat Programme:  The Energy 2000 network in the area of ambient heat is the Swiss Association for the Promotion of Heat Pumps (FWS).</p> <p>Type of instrument: voluntary, information</p>	
<p>Objective(s):   Contributing to overall objectives of Energy 2000 Action Programme (Stabilising energy consumption; renewable energies contribute +0,5% to electricity production and +3% to heat generation).</p> <p>Specific goals for the Energy2000 renewables section: increase in heating from renewables of 3000 GWh (10'800 TJ pa), increase in electricity from renewables of 300 Wh (1'080 TJ pa).</p>	
<p>Schedule and status of implementation:   Programme covers the period 1990-2000; follow-up programme after 2000.</p>	
<p>Indicator(s) of success or estimate of impact:   Increased use of renewable energy as of 1998: 5947 TJ pa for heating; 833 TJ pa for electricity.  About a third of all new single-family homes built in Switzerland are now equipped with heat pumps.</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):   Energie Innovation, „Propositions pour améliorer votre chauffage“  Annual Report on the Energy 2000 Action Programme  Energy 2000. The program with a punch  Energie 2000 – Nous avons tous à y gagner!</p>	

**"Best practices" in policies and measures – Fact Sheet No. 7**

<p>Name of measure or policy:  <b>Energy 2000 Action Programme          Investment Programme</b></p>	<p>Sector: <b>Energy (Other Sectors)</b>           GHGs mainly affected: <b>CO2</b></p>
<p>Relevant Federal Authority:           Swiss Federal Office of Energy          Monbijoustrasse 74          3003 Berne          phone: ++41-31-322'56'11</p> <p>Level of implementation: national</p>	
<p>Brief description of measure or policy:           Energy 2000 Investment programme:           The federal mandate of 30.04.97 made a total of SFr 64 million available for exemplary projects in the private sector. Eligible projects receive on average 10 per cent of the total cost. Four types of renovation are eligible for subsidies: building shells (insulation), heat recovery (optimizing or retrofitting installations), replacement of conventional heating installations with solar heating or with renewable energy heating.</p> <p>Type of instrument: voluntary (subsidy scheme)</p>	
<p>Objective(s):           Contributing to overall objectives of Energy 2000 Action Programme (Stabilising energy consumption; renewable energies contribute +0,5% to electricity production and +3% to heat generation).           Specific objectives of Energy 2000 Investment Programme: stimulate a total investment volume of Sfr 600mio and reduce CO2 emissions by 150'000 tons pa.</p>	
<p>Schedule and status of implementation:           Programme covers the period 1990-2000; follow-up programme after 2000.</p>	
<p>Indicator(s) of success or estimate of impact:           As of April 1998:          Of the 2745 applications received, 2113 were approved. A total investment volume of Sfr.550mio has been stimulated. Expected reduction of CO2 emissions of 60'000 tons pa.</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):           énergie extra 1/98: Le programme d'investissement Energie2000: un succès          „Jackpot 64 millions“          Annual Report on the Energy 2000 Action Programme          Energy 2000. The program with a punch          Energie 2000 – Nous avons tous à y gagner!</p>	



**"Best practices" in policies and measures – Fact Sheet No. 8**

<p>Name of measure or policy: <b>Rail 2000</b></p>	<p>Sector: <b>Transport</b>  GHGs mainly affected: <b>CO2, precursors</b></p>
<p>Relevant Federal Authority:  Federal Office of Transport 3003 Berne phone: ++41-31-322'57'11  Level of implementation: Swiss Federal Railways</p>	
<p>Brief description of measure or policy:  The basic idea of Rail 2000 is a network of simultaneously served traffic hubs throughout the country, with good connections in long distance and local traffic. The Rail 2000 concept is implemented in stages. The first phase optimizes connections in all the large stations. Later phases will be implemented according to the demand and type of transport, and to applicable environmental and financial policy conditions. The measure is to be seen in the context of a broad range of elements contributing to the enhancement of the attractiveness and convenience of public transport use.  Type of instrument: voluntary (providing incentives to use public transport)</p>	
<p>Objective(s):  Shifting at least part of the expected traffic growth in the private sector to the rail, thereby avoiding additional emissions of greenhouse gases.</p>	
<p>Schedule and status of implementation:  Entry into force in 1987, first phase in progress.  Later phases will be implemented according to the demand and type of transport, and to applicable environmental and financial policy conditions.</p>	
<p>Indicator(s) of success or estimate of impact:  Although no detailed data are available, the modal split between road and rail shows intensive use of the train system. On a global scale, Switzerland together with Japan, is leading in per capita travel by trains.</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <ul style="list-style-type: none"> <li>- Rapport sur la première étape de RAIL 2000 du 11 mai 1994 (FF 1994 III 680)</li> <li>- Transportation: Yesterday, Today, Tomorrow, Federal Department of the Environment, Transport, Energy and Communications, Bern, 1998</li> <li>- Mobilité en Suisse, Département fédéral des transports, des communications et de l'énergie, 1994</li> <li>- Perspectives d'évolution du trafic en Suisse – Scenarios pour le trafic voyageurs et le trafic marchandises jusqu'en 2015, Département fédéral des transports, des communications et de l'énergie, 1995.</li> </ul>	

**"Best practices" in policies and measures – Fact Sheet No. 9**

<p>Name of measure or policy: <b>New Transalpine Rail Links (NEAT)</b></p>	<p>Sector: <b>Transport</b>  GHGs mainly affected: <b>CO2, precursors</b></p>
<p>Relevant Federal Authority:  Federal Office of Transport 3003 Berne phone: ++41-31-322'57'11  Level of implementation: Swiss Federal Railroads and Bern-Lötschberg-Simplon Rail Company</p>	
<p>Brief description of measure or policy:  Construction of rail infrastructure including new transalpine base tunnels (NEAT), approach routes to NEAT and connection to the European high speed network.  Type of instrument: voluntary (providing incentives to use public transport)</p>	
<p>Objective(s):  NEAT increases rail capacity for an environmentally acceptable solution to the rapidly growing north-south transit freight traffic. Thanks to NEAT, decreased travel time renders rail passenger service more attractive, too.  Thanks at least in part to NEAT, some of the assumed traffic growth can be shifted to the rail. Additional emissions can thus be avoided and air pollution levels will remain within the limits prescribed by law.</p>	
<p>Schedule and status of implementation:  Preparatory work since September 1992, when the electorate approved the construction of the New Transalpine Rail Links (NEAT).  Construction schedule: Lötschberg base tunnel: beginning in autumn 1999, completion in 2007 Gotthard base tunnel: beginning in middle of year 2000, completion in 2013</p>	
<p>Indicator(s) of success or estimate of impact:  By 2020 freight volume is expected to shift from road to rail in the order of magnitude of 8-10%. Overall freight volume transported by rail is expected to grow by 17%.</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <ul style="list-style-type: none"> <li>- Message sur la construction de la ligne ferroviaire suisse à travers les Alpes (Arrêté sur le transit alpin) du 23 mai 1990 (FF 1990 II 1015)</li> <li>- Transportation: Yesterday, Today, Tomorrow, Federal Department of the Environment, Transport, Energy and Communications, Bern, 1998</li> <li>- Through the Alps, Federal Department of Transport, Communications and Energy, Bern, 1996</li> <li>- Mobilité en Suisse, Département fédéral des transports, des communications et de l'énergie, 1994</li> <li>- Perspectives d'évolution du trafic en Suisse – Scenarios pour le trafic voyageurs et le trafic marchandises jusqu'en 2015, Département fédéral des transports, des communications et de l'énergie, 1995.</li> </ul> <p>The Incorporation of the Environmental Dimension in Freight Transport Policy, Case Study Switzerland, Bureau of Transport Studies, 1996.</p>	

**"Best practices" in policies and measures – Fact Sheet No. 10**

<p>Name of measure or policy:  <b>Distance- and Weight-Dependent Heavy Vehicle Fee (HVF)</b></p>	<p>Sector: <b>Transport</b>                   GHGs mainly affected: <b>CO2, precursors</b></p>
<p>Relevant Federal Authority:</p> <p>Federal Department of the Environment, Transport, Energy and Communications                  Bureau of Transport Studies                  3003 Berne                  phone: ++ 41-31-322'75'61</p> <p>Level of implementation: Swiss Customs Authority</p>	
<p>Brief description of measure or policy:</p> <p>The distance-related heavy vehicles fee is calculated on the basis of</p> <ul style="list-style-type: none"> <li>- the kilometres driven</li> <li>- the maximum weight of the vehicle permitted</li> <li>- the emission class of the vehicle.</li> </ul> <p>By the year 2001, the distance related fee will replace the existing flat fee, which does not comply with the polluter-pays principle.</p> <p>Type of instrument: fiscal</p>	
<p>Objective(s):</p> <p>True cost for heavy vehicles and a resulting reduction of greenhouse gas emissions from heavy vehicles.</p>	
<p>Schedule and status of implementation:</p> <p>The HVF will be introduced in January 2001.</p>	
<p>Indicator(s) of success or estimate of impact:</p> <p>The HVF will lead to a reduction of the CO2 emissions from heavy vehicles by about 10% (compared to the trend). In combination with the higher weight limit (40 instead of 28 tons), with its more efficient use of capacity, the expected reduction increases to about 40 – 50%.                  The full impact of the HVF is best appreciated in combination with the NEAT project (see Fact Sheet no. 9).</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <ul style="list-style-type: none"> <li>- HVF – in concrete terms.</li> <li>- Europe-Switzerland: To relieve the roads and save the environment</li> <li>- Message relatif à une loi fédérale concernant la redevance sur le trafic des poids lourds liée aux prestations, 1996.</li> <li>- Résumé sur l'accord bilatéral (Ecoplan) (Effets sur le trafic de la (RPLP) redevance sur le trafic des poids lourds liée aux prestations), Federal Department of the Environment, Transport, Energy and Communications, June 1999.</li> <li>- Transportation: Yesterday, Today, Tomorrow, Federal Department of the Environment, Transport, Energy and Communications, Bern, 1998.</li> <li>- Mobilité en Suisse, Département fédéral des transports, des communications et de l'énergie, 1994</li> <li>- Perspectives d'évolution du trafic en Suisse – Scenarios pour le trafic voyageurs et le trafic marchandises jusqu'en 2015, Département fédéral des transports, des communications et de l'énergie, 1995.</li> <li>- The Incorporation of the Environmental Dimension in Freight Transport Policy, Case Study Switzerland, Bureau of Transport Studies, 1996.</li> </ul>	

**"Best practices" in policies and measures – Fact Sheet No. 11**

<b>Name of measure or policy:</b> <b>Aircraft Engine Emission Charge</b>	Sector: <b>Transport (Aviation)</b>  GHGs mainly affected: <b>precursors</b>
<b>Relevant Federal Authority:</b>  Federal Office for Civil Aviation 3003 Berne phone: ++41-31-322'21'11  Level of implementation: Zurich and Geneva Airport Authorities	
<b>Brief description of measure or policy:</b>  Landing charges that vary depending on exhaust emissions. Incentive for airline operators to use aircraft with low emission engines.  Type of instrument: economic	
<b>Objective(s):</b>  Reduction of VOC and NOx emissions in the airport vicinity	
<b>Schedule and status of implementation:</b>  Introduced at Zurich Airport in September 1997, at Geneva Airport in November 1998	
<b>Indicator(s) of success or estimate of impact:</b>  (not yet available, will be provided in airport emission inventories)	
<b>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</b>  Zurich Airport: 'Aircraft Engine Emission Charge', Status Report, May 1999	

**"Best practices" in policies and measures – Fact Sheet No. 12**

Name of measure or policy: <b>Disposal of Wastes in Cement Plants</b>	Sector: <b>Waste</b> GHGs mainly affected: <b>CO2</b>
Relevant Federal Authority:  SAEFL Waste Management Division Swiss Agency for the Environment, Forests and Landscape 3003 Berne phone: ++41-31-322'93'11  Level of implementation: Cantonal authorities	
Brief description of measure or policy:  Guidelines regarding the type of waste that is allowed to be used in cement production:  Depending on the composition and properties of the waste, it may be used as a fuel, as an alternative raw material, at the grinding stage in Portland cement production, or as a process material (for example aqueous waste can be used for flame cooling to reduce NOX).  Type of instrument: regulatory	
Objective(s):  Decreased emissions by substituting primary energy sources with combustible waste, by substituting raw material, and by economizing on energy and raw material transports.	
Schedule and status of implementation:  Guidelines issued in April 1998	
Indicator(s) of success or estimate of impact:  (not yet available)	
Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):  Guidelines: Disposal of Wastes in Cement Plants (SAEFL)	

**"Best practices" in policies and measures – Fact Sheet No. 13**

Name of measure or policy: <b>Waste Disposal Prohibition</b>	Sector: <b>Waste</b>  GHGs mainly affected: <b>CH4</b>
Relevant Federal Authority:  SAEFL Waste Management Division Swiss Agency for the Environment, Forests and Landscape 3003 Berne phone: ++41-31-322'93'11  Level of implementation: Cantonal authorities	
Brief description of measure or policy:  Technical Ordinance on Waste, Articles 11, 32, 53a  Cantons ensure that municipal waste, sewage sludge, combustible fractions of construction waste and other combustible waste are incinerated in suitable plants, provided they cannot be recovered.  Type of instrument: regulatory	
Objective(s):  Reduced volume of landfilled waste; reduced emissions of landfill gases	
Schedule and status of implementation:  Entry into force: 1.1.2000	
Indicator(s) of success or estimate of impact:  Already by the end of 1998, 80 to 85 percent of combustible waste was burned in waste incineration plants. CH4 (GWP=21) emissions from landfills decreased by approximately 9 percent between 1990 and 1998 while CO2 (GWP=1) emissions from waste incineration went up by approximately 6 percent.	
Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):  Technical Ordinance on Waste (TOW) Federal Law relating to the Protection of the Environment	

**"Best practices" in policies and measures – Fact Sheet No. 14**

<p>Name of measure or policy: <b>Recovery of heat from waste incineration</b></p>	<p>Sector: <b>Waste</b> GHGs mainly affected: <b>CO2</b></p>
<p>Relevant Federal Authority:</p> <p>SAEFL Waste Management Division Swiss Agency for the Environment, Forests and Landscape 3003 Berne phone: ++41-31-322'93'11</p> <p>Level of implementation: Cantonal authorities</p>	
<p>Brief description of measure or policy:</p> <p>Technical Ordinance on Waste, Article 38</p> <p>Incineration plants must be planned and operated in a manner that ensures the recovery and use of heat from waste incineration.</p> <p>Type of instrument: regulatory</p>	
<p>Objective(s):</p> <p>Use of heat from incineration plants for district heating and electricity generation. Substitution of primary energy sources by combustible waste.</p>	
<p>Schedule and status of implementation:</p> <p>Entry into force: 1991</p>	
<p>Indicator(s) of success or estimate of impact:</p> <p>By the end of 1998, 80 to 85 percent of combustible waste was burned in waste incineration plants. 40 percent of the energy produced was used for district heating or served to generate electricity.</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <p>Technical Ordinance on Waste (TOW) Statistique des déchets 1996 (documents environnement no90, OFEFP), tableau 11</p>	

**"Best practices" in policies and measures – Fact Sheet No. 15**

<p>Name of measure or policy: <b>Greenhouse gases in agriculture</b></p>	<p>Sector: <b>Agriculture</b>  GHGs mainly affected: <b>CH<sub>4</sub>, N<sub>2</sub>O</b></p>
<p>Relevant Federal Authority:</p> <p>Swiss Agency for the Environment, Forests and Landscape (SAEFL) CH-3003 Berne phone: ++ 41-31-322'93'46</p> <p>Level of implementation: regional (cantonal authorities)</p>	
<p>Brief description of measure or policy:</p> <p>Incentives in agricultural ecology and policy making (direct payments) to reach environmental aims by voluntary means;</p> <p>Water pollution prevention measures in agriculture to curb nitrogen and phosphorus fluxes in animal husbandry and soil management (limits on animal manure application).</p> <p>Type of instrument: fiscal, regulatory</p>	
<p>Objective(s):</p> <p>Reduce methane and nitrous oxide emissions</p> <p>Water protection by limiting animal numbers to the land available for manuring. Direct payments in agriculture to promote voluntary ecological practices on farms and to reach set aims in agricultural ecology.</p>	
<p>Schedule and status of implementation:</p> <p>Water protection aims to be met by 2007 at the latest.</p>	
<p>Indicator(s) of success or estimate of impact:</p> <p>Reduced nitrogen and methane fluxes in agriculture; Reduced phosphorus load/reserves in agricultural soils in the catchment basins of Swiss lakes (prevention). (Extent of reduction of such fluxes/reserves is not yet available.)</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <p>Guidelines of July 1994 for Water Protection in Agriculture (Federal Offices for Agriculture and Swiss Agency for the Environment, Forests and Landscape)</p> <p>Report on „Methane Emissions in Swiss Agriculture“ (Methanemissionen der schweizerischen Landwirtschaft: see English summary on pp. 35-42; and annex 3, tables 31-36: Methane emissions per animal category.)</p>	



**"Best practices" in policies and measures – Fact Sheet No. 16**

<p>Name of measure or policy:  <b>Increase and protection of forest area;  Sustainability in forest management</b></p>	<p>Sector: <b>Forestry</b>  GHGs mainly affected: <b>CO2</b></p>
<p>Relevant Federal Authority:</p> <p>Swiss Forest Agency  Swiss Agency for the Environment, Forests and Landscape  3003 Bern  phone: ++ 41-31-324'77'86</p> <p>Level of implementation: national</p>	
<p>Brief description of measure or policy:</p> <p>Any surface covered by trees or sylvan shrubs, regardless of their use or origin, is defined as forest. New, naturally established tree or shrub cover on abandoned land is legally treated as forest after twenty years of growth.  The forested area must not be reduced. Deforestation is prohibited. In the case of exceptions, equal area compensation located in the same region is compulsory.  Forests must be managed in a sustainable manner. Their ability to perform their protective, economic and social functions must be ensured. For adaptation and biodiversity reasons, natural regeneration has first priority in forest management, afforestation and reforestation.</p> <p>Type of instrument: regulatory, education</p>	
<p>Objective(s):</p> <p>Increase or at least conservation of forested area, thereby increasing or conserving carbon stocks.</p>	
<p>Schedule and status of implementation:</p> <p>1878: 1<sup>st</sup> forest law for mountainous regions protecting the forest area, sustainability principle in timber use. Beginning of large afforestations.  1902: 2<sup>nd</sup> forest law for the whole country protecting the forest area, principle of sustainability in timber use. Pursuit of afforestations.  1993: Entry into force of new federal law on forests; sustainability is extended to all forest functions. Funds were made available for subsidies according to the new principles.</p>	
<p>Indicator(s) of success or estimate of impact:</p> <p>Increase in forest area between 1890 and 1990: 369'000 ha. (1890: 825'000 ha; 1990: 1'194'000 ha.)  Increase in growing stock (volume of live trees): ca. 235mio. m<sup>3</sup>. (1890: ca. 130mio. m<sup>3</sup>; 1990: ca. 365mio m<sup>3</sup>)</p>	
<p>Documentation available at SAEFL, Climate Change Unit, 3003 Berne (phone: ++41-31-324'42'80):</p> <ul style="list-style-type: none"> <li>- Sustainable development of Switzerland's forests. Swiss Agency for the Environment, Forests and Landscape. Bern 1995; pp 37</li> <li>- Criteria and Indicators for Sustainable Forest Management in Switzerland. Swiss Agency for the Environment, Forests and Landscape. Bern 1997; pp 80</li> <li>- Forest and Hunting Legislation in Switzerland as of 1 August 1996</li> <li>- Mahrer, F. et al., 1990: Inventaire forestier national suisse. Résultat du premier inventaire 1982-1986. Institut fédéral de recherches forestières, Berichte N° 305; Birmensdorf 375 pp.</li> <li>- Brassel, P. and U.-B. Brändli (ed.), 1999: Inventaire forestier national suisse. Résultat du deuxième inventaire 1993-1995. Bern, Stuttgart, Vienne, Haupt 442 p.</li> </ul>	

PAPER NO. 5: UNITED STATES OF AMERICA

**United States Submission on "Best Practices" in Policies and Measures  
August 15, 1999**

The United States believes that the clearest way to illustrate the breadth and scope of “best practices” in policies and measures is by example. Accordingly, this submission describes a number of examples of specific policies and measures managed by the US Environmental Protection Agency and the US Department of Energy.

In reviewing these policies and measures, we believe it is important to consider the elements and circumstances that most account for the success of individual policies and measures. These circumstances may well differ as national circumstances differ. We have generally found that policies are most successful when they are “best fits” in six basic ways:

**Flexibility over time and space:** Markets, social preferences, and technologies change over time, often in ways that are not easily predicted. Policies can remain best practices for the long haul if they provide for flexible responses to changing circumstances. Policies can provide this flexibility by relying on evolving private sector choices, or by having built in up-dating or redesign features. Where technology, economic, or cultural characteristics vary among regions, policies that are inherently flexible in their application can do a better job of targeting (or fitting) local opportunities. If builders in the US southwest use different construction materials than those in the northeast, for example, they may respond differently to the same policy incentives.

**Public policy fit:** Citizens everywhere care about a broad range of social and economic issues. Policies tend to be most successful when they are designed to provide multiple public benefits, and least successful when they work at cross-purposes to other important policy objectives. For example, many carbon reduction strategies also enhance local air and water quality. The selection of policy approaches with multiple public benefits not only leverages additional resources, but avoids policies that work at cross-purposes. Equity (income and regional), other environmental goals, and employment are among the policy concerns that most often affect options for reducing GHG emissions.

**Cultural [and institutional] fit:** Energy use and associated greenhouse gas (GHG) emissions are shaped by cultural expectations and values as well as by economics. Those policies that promote technologies and practices consistent with these social features will be most successful. Part of any country’s culture is the respective roles that it assigns corporations, not-for-profits, individuals, and federal, state and local governments. (In the United States, federal and state assigned roles are partially prescribed by the Constitution.) Each of these groups or institutions has a role to play in emissions reductions, but these roles will vary pursuant to cultural expectations. Policies that recognize and work within these institutional frameworks are more likely to succeed than those that try to circumvent these established processes. The process by which policies are developed and implemented is also critical to their acceptability. Transparency, public participation, and the common practice of reaching consensus within the legislative process may appear to slow-down policy development, but they may be essential to the policies’ long-term viability.

**Economic fit:** Cost-effectiveness is simply the application of the basic environmental principle of using scarce resources as wisely as possible. Most often, this is accomplished by allowing individual businesses, families and other decision-makers to select the energy and carbon-saving strategies they find to be least expensive. This is especially true where prices or preferences differ significantly among regions or market segments. At times, policies directed towards individual technologies or market segments can facilitate market choices and further lower costs—a clear “win-win” opportunity. It is important to note that a least-cost mix of emissions reductions is unlikely to be the same for all energy end use sectors, types of customers, or regions.

**Technology fit:** Technologies are not widgets. Carbon reduction policies will be most successful if they are selected to match key attributes of the technologies they target. Two attributes appear to matter most in the success of targeted policies and measures: First, technologies that require a custom application for individual users will often require different policy approaches than more generic ones. Second, emerging technologies with relatively limited market and performance experience are often best addressed by different policies than those designed for mature technologies, and vice versa.

**Accountability:** Lastly, policies and measures should be implemented through a clear set of guidelines, contain appropriate enforcement measures, and ensure accountability of emitters or intermediaries that participate. Clear guidelines and effective emissions measurement reduce uncertainty for those affected and lead to greater accountability. Greater accountability builds public support for policies through its linkage to popular notions of justness and fairness.

The following examples describe how and to what extent US policies and measures embody these characteristics. The examples are of two basic types. The first case describes the US experience with market mechanisms to reduce emissions of sulfur dioxide and nitrogen oxides. While it does not focus on greenhouse gas emissions *per se*, the first case is illustrative of policies and measures that are relevant to controlling such emissions. The remaining six cases are explicitly focused on policies and measures designed to address greenhouse gases: ENERGY STAR Programs; Motor Challenge Program; Electricity Restructuring; Federal Energy Management Programs; Methane Programs; and the Prototype New Generation Vehicle Program.

## 1. SO<sub>2</sub> Trading and Over-the-Counter NO<sub>x</sub> Trading Programs

*SO<sub>2</sub> Emissions Trading.* The United States has successfully used a “cap-and-trade” emissions trading program as a tool to reduce sulfur dioxide (SO<sub>2</sub>) emissions which cause acid rain. This program has met the stated environmental goal at substantially lower compliance costs than other approaches. Ten northeastern States are now using a similar emissions trading approach to reduce emissions of nitrogen oxides (NO<sub>x</sub>) which contribute to the formation of ground-level ozone or smog. As described in the following sections, the sulfur emissions trading program provides emitters maximum flexibility over both time and space, it yields both health and ecological benefits, it is highly cost-effective, it encourages technological innovation, and has strong accountability and enforcement elements. Although less mature, similar claims can be made for the NO<sub>x</sub> trading program. Based on the success of these programs, the United States supports both international and domestic emissions trading programs as practical and cost-effective mechanisms to achieve reductions in the emissions of greenhouse gases.

The SO<sub>2</sub> trading program, established under the 1990 Clean Air Act Amendments, calls for major reductions of sulfur dioxide through the use of market incentives. The ultimate goal of the program is to reduce the emissions that cause acid rain which, in turn, leads to acidification of lakes and streams, damages building materials, contributes to visibility degradation, and impacts public health. The program sets a permanent cap on the total amount of SO<sub>2</sub> that may be emitted by electric utilities nationwide at about one half of the amount emitted in 1980, and allows flexibility for individual utility units to select their own methods of compliance.

The SO<sub>2</sub> trading program represents a dramatic departure from traditional policy and measure regulatory methods that establish source-specific emissions limitations. Instead, the program introduces a trading system for SO<sub>2</sub> that facilitates lowest-cost emissions reductions and an overall emissions cap that ensures the maintenance of the environmental goal. This allows the United States to put its market-based culture to work for the environment. The program features tradable SO<sub>2</sub> emissions allowances, where one allowance is a limited authorization to emit one ton of SO<sub>2</sub>. Allowances may be bought, sold, or banked by utilities, brokers, or anyone else interested in holding them. Existing utility units were allocated allowances for each future compliance year and all participants of the program are obliged to surrender to EPA the number of allowances that correspond to their annual emissions starting either in Phase I or Phase II of the program.

Sources determine their own compliance strategy, measure and report emissions, and conduct trades. Some utilities installed “scrubbers,” post-combustion technology installed before the stack to capture and essentially eliminate sulfur from the emissions into the atmosphere. Under the SO<sub>2</sub> trading program, scrubbers have become more efficient at removing sulfur and also more cost-effective. Other utilities have switched to lower sulfur fuels, for example by switching to lower sulfur coal or from coal to natural gas, or by blending coals to produce a lower average sulfur fuel. Low sulfur coal has turned out to be less expensive than predicted at the beginning of the program, largely because transportation costs dropped under deregulation of the railroads. Overall, the innovation in compliance

strategies and lower costs can be attributed to the flexibility sources are accorded in choosing their own emission reduction strategies.

Sources are also required to install and maintain continuous emission monitors (CEMs), or alternative emission measurement equipment at each source. Sources are responsible for conducting quality assurance testing on the monitors, according to daily, quarterly, and annual testing procedures, and to report both the quality assurance data and the emissions data to EPA quarterly. One of the most important features of the monitoring system for this program is the automated data collection and reporting -- computer systems were installed along with the measurement equipment to capture the emissions data and to provide electronic reports in a standard format. The standard electronic format allows EPA to conduct computerized quality assurance testing on every report, in addition to more detailed audits for some reports, to ensure environmental accountability.

At the end of each year, utilities must demonstrate compliance with the provisions of the SO<sub>2</sub> trading program. Utilities are granted a 60-day grace period during which additional SO<sub>2</sub> allowances may be purchased, if necessary, to cover each unit's emissions for the year. At the end of the grace period (the Allowance Transfer Deadline), the allowances a unit holds in its Allowance Tracking System (ATS) account must equal or exceed the unit's annual SO<sub>2</sub> emissions. In addition, in 1995-1999 (Phase I of the program), units must have sufficient allowances to cover certain other deductions as well. Any remaining SO<sub>2</sub> allowances may be sold or banked for use in future years. Computer technology also provides another mechanism for accountability: the daily status of allowance holdings and all of the emissions data are published by EPA on the World Wide Web, allowing the public to assess directly the effectiveness of the program. During the first four years of the program, there has been 100% compliance by the utilities required to hold enough allowances to cover their emissions.

When the Clean Air Act legislation was developed in 1990, a typical "command and control" program, which would have required each electric utility boiler to install standard pollution control technology, was estimated to cost about \$5 billion annually. To achieve the same level of emissions reductions using a "cap-and-trade" emissions trading program (which would allow electric utilities to choose the most cost-effective approach for each boiler) was estimated in 1990 to cost about \$4 billion annually. Once the program actually became effective, pollution control costs dropped dramatically, and with trading, the U.S. Government Accounting Office has since estimated that the SO<sub>2</sub> program will cost about \$2 billion annually.

This dramatic drop in the nationwide cost of compliance is reflected in the allowance price. In 1990, the industry estimated that allowances would cost \$600-\$1,000, while the government estimated that the allowance price would fall in the range of \$400-\$600. Prices fell to a low of approximately \$70 in March of 1996, as the dramatic emission reductions of the first year of control became widely known. Since then, prices have climbed back to the current level of approximately \$200. Activity in the allowance market continued to increase in 1998. The volume of allowances transferred between companies in economically significant trades increased from 7.9 million in 1997 to 9.5 million in 1998. It is believed that the current trend in price and volume reflects the approach of Phase 2, which requires a full 50% reduction from all 2,000 utility sources beginning in the year 2000.

The U.S. has already experienced significant emission reductions under the first phase of the control program: by 1995, the U.S. experienced a 30 percent drop in national SO<sub>2</sub> emissions from 1980. In fact, emissions from Phase I units have remained significantly below the required reductions for each of the first 4 years of the program.

In addition to the significant reduction in emissions, the U.S. has experienced dramatic drops in acidic deposition in some of the most sensitive regions of the country, which should eventually lead to fewer acidic lakes and streams. EPA has quantified the significant health benefits of the program at \$12-40 billion by the year 2010. The visibility benefits are estimated to be \$3.5 billion by 2010, and although not quantified, less damage to buildings and monuments is also expected. EPA will continue to study the environmental impacts of the program.

*NOx Emissions Trading.* Ten northeastern States are now using this approach to reduce emissions of nitrogen oxides (NO<sub>x</sub>) which contribute to the formation of ground-level ozone or smog. This program essentially shares most of the major features described above for the SO<sub>2</sub> trading program: affected sources must record and report their emissions to EPA, and hold enough NO<sub>x</sub> allowances at the end of the ozone-season to cover their emissions. This NO<sub>x</sub> program also affects approximately 300 sources that participate in the SO<sub>2</sub> trading program. There are approximately 600 additional sources participating in the NO<sub>x</sub> program which are not affected by the SO<sub>2</sub> trading program (the additional units are primarily the electric utility units too small to have been required to participate in the SO<sub>2</sub> program). NO<sub>x</sub> sources have begun reporting their emissions, and NO<sub>x</sub> allowance trading activity has also started. However, the first affected ozone-season will end in September 1999, and this first compliance period will be assessed after the 3-month grace period.

## **2. ENERGY STAR Programs**

ENERGY STAR, based on voluntary agreements and public education, is a U.S. federal government program designed to remove market barriers to the purchase of energy efficient products and services in residential, commercial, and industrial markets. Studies show that many homes and businesses could reduce their energy use by about 30% by using proven, cost-effective products and investing in simple, profitable building upgrades. However, many businesses and consumers fail to take advantage of these opportunities because of informational, financial and technical market barriers. In essence the transaction costs and perceptions of risk are higher for more efficient technologies than for their less efficient counterparts.

The ENERGY STAR Programs are designed to reduce these transaction costs and to help consumers and businesses overcome these market barriers. The programs address three market failures that have resulted in under-investment in energy efficiency: (1) lack of objective information; (2) definition of efficiency and comparability of competing products; (3) and higher purchase prices for many efficient products. The ENERGY STAR program addresses these market barriers with the following innovations designed to build incentives for investment in energy efficiency.

*Labeling.* The ENERGY STAR label is a simple, objective icon that identifies products that reduce energy waste, prevent pollution and reduce utility bills while offering the same or better product performance. It provides a common definition of energy efficiency for manufacturers, retailers and energy efficiency advocacy groups nationwide, and eliminates the need for consumers to be familiar with complex measures of energy efficiency.

*Consumer Education.* The ENERGY STAR Program produces public service advertisements, media events, brochures, and other outreach materials to educate consumers about the economic and environmental benefits of energy efficient products.

*Support Tools.* The ENERGY STAR Programs invest in tools including retail sales training modules, efficiency “calculators,” store locators, software, reduced cost loans for efficient products, and toll free hotlines to answer consumer questions. These tools are used by manufacturers, retailers, and utility efficiency programs nationwide.

ENERGY STAR is now eight years old. Through the ENERGY STAR effort, an extensive energy efficiency deployment infrastructure has been and continues to be developed across the country. Key successes include:

A clear national label that defines energy efficiency has been established – the ENERGY STAR label, supported by the U.S. Environmental Protection Agency and the U.S. Department of Energy.

- Over 1,200 manufacturers offer ENERGY STAR products in over 29 product commercial and residential product categories.
- ENERGY STAR Residential Products are now featured in over 4,000 retail storefronts nationwide.
- Consumer Awareness of the ENERGY STAR label is up to about 40% in some regions of the country -- a tremendous accomplishment in today's brand-dominated market place.
- About 50 utilities representing over 30% of US households now promote ENERGY STAR labeled products to their customers as an integral part of their efficiency services.
- A brand new development is the ENERGY STAR Building Label, which serves as the mark of energy performance excellence for commercial buildings. It builds upon a new benchmarking tool that ranks the energy performance of office buildings.
- Over 13% of commercial building square footage across the country signed into the ENERGY STAR Buildings Program.

ENERGY STAR has tremendous potential to direct investments in the United States over the next decades in a manner that reduces greenhouse gas emissions while saving businesses and consumers money. For example, analyses show

- Over the next 15 years, if all consumers chose only ENERGY STAR products for their purchases, the nation's energy bill would be reduced by about \$100 billion with 380 million metric tons of greenhouse gases (MMTCE) reduced at the same time.
- If all commercial buildings owners and managers took advantage of cost-effective whole building improvement opportunities by 2010, the nation's energy bill could be reduced by another \$130 billion and greenhouse gas emissions would be reduced by an additional 350 million metric tons of carbon equivalent (MMTCE).

Based on investments in energy efficient technologies and services that ENERGY STAR has helped direct through 1998, the US will reduce carbon dioxide emissions by about 40 million metric tons of carbon equivalent over the next decade or so. If ENERGY STAR is funded at levels requested by the President, ENERGY STAR is expected to reduce greenhouse gas emissions by more than 350 mmtce over the next decade.

The ENERGY STAR programs reduce emissions of conventional air pollutants, in addition to emissions of greenhouse gases. They have produced sizable reductions in emissions of sulfur dioxide and nitrogen oxides.

The ENERGY STAR program is projected to have a significant economic impact. Investments in technologies and practices spurred by the ENERGY STAR programs through the end of 1998 is projected to yield more than \$13 billion in energy bill savings over the next decade. If ENERGY STAR is funded at levels requested by the President, ENERGY STAR is expected to yield over \$125 billion in energy bill savings over the next decade. ENERGY STAR is a low cost program to implement at the federal level.

One of the benefits of the ENERGY STAR approach is that it sets a uniform set of energy efficiency qualifications for product and building categories across the nation without requiring one-size-fits-all solutions. While product specifications are consistent across the nation (with the exception of windows, which have specific regional characteristics), the supporting activities are highly customized to local challenges and interests. For example, regions with high levels of consumer interest in environmental causes may highlight ENERGY STAR's greenhouse gas emission reductions in promotional activities. Other regions may capture improved quality or comfort of ENERGY STAR qualified products and buildings, while others may tout the reduced water use, for example, of ENERGY STAR qualified clothes washers.

The national platform offers some national harmonization, with a great deal of local flexibility and customization in order to achieve real changes in consumer understanding of energy efficiency and purchasing decisions. Some internationally-traded products, e.g., computers and televisions, may share common specifications in different countries, but support and implementation of the labeling approach would need to be customized to local conditions, including emissions levels from electricity generation, energy prices, economic and environmental value for purchasers, and approaches to changing market practices. In most cases, particularly for building systems and large appliances (such as washers or heating and cooling systems), there are such differences among nations that it would be impractical to implement a program that could be internationally consistent.



Examples of ENERGY STAR Partnerships include:

*ENERGY STAR TVs and VCRs.* Each year, Americans use \$1 billion to power their TVs and VCRs while they are switched off. Today, due to the ENERGY STAR program, every major manufacturer is producing TVs and VCRs that can cut the energy use of conventional models in their standby modes by 75%, without any change in performance, and typically without a price increase. The ENERGY STAR label is the way the average consumer can find the TVs and VCRs that consume less energy when switched off, improving performance and saving consumers money.

*ENERGY STAR Exit Signs.* Businesses spent in excess of \$1 billion to operate exit signs in 1997; using energy-efficient exit signs can reduce this expenditure by \$700 million. ENERGY STAR added exit signs to its list of labeled products in 1996. Since then, 35 manufacturers representing 90% of the industry have introduced efficient exit sign models into the market. To date, more than 240 products, operating on up to 75% less energy than conventional models with higher luminance and visibility characteristics, have been reported to EPA as meeting the ENERGY STAR criteria for energy efficiency. The ENERGY STAR label has successfully helped move the exit sign market away from cheap, incandescent signs to more efficient, reliable, and visible exit signs (primarily with LED, or light emitting diode, light sources). The market itself has forced down the cost of improved technology so that even on a first cost basis it rivals that of inefficient signs.

### **3. Motor Challenge Program**

This voluntary program is directed at encouraging industrial companies and other stakeholders to undertake motor efficiency upgrades and adopt system-level efficiency improvement practices. The program was launched in 1993 to promote the adoption of the “systems approach” to developing, purchasing, and managing motors, drives, and motor-driven equipment. The “systems approach” seeks to optimize performance in the entire process system, rather than selecting motor or component efficiency upgrades without consideration of the overall system-level performance. The success of the Motor Challenge program has spurred the development of several new “Challenge” programs – the Steam Challenge, Compressed Air Challenge programs, and the Combined Heat and Power Challenge program.

The Motor Challenge program has three main components:

- *Information Dissemination and Technical Assistance* – The program has a national information clearinghouse. It also offers its partners a broad array of information support tools, such as -- the MotorMaster+3 and ASDMaster decision support software tools, the Pump Systems and the Pump Systems Assessment Tool, regional conferences and technical/management training events, audit services or assistance, and help in developing measurement standards. The recently completed U.S. Industrial Electric Motor Systems Market Opportunities Assessment provides a road map for industry to help them identify motor system energy savings opportunities in their facilities and compare current motor system purchase and management procedures against best practice benchmarks.

- *Allied Partners* – More than 200 Allied Partners (non end-users, such as original equipment manufacturers, distributors, utilities, State energy agencies, and engineering firms) actively support the program. They have disseminated program information and offered related motor system initiatives to well over 1,000 customers.
- *Showcase Demonstration case studies* – Some 20 companies have agreed to provide detailed case studies of how they have undertaken improvements in their electric motor systems and verified the energy savings and associated waste reduction and productivity improvements. These case studies are widely disseminated and provide direct examples of the range and scope of benefits that can be captured from efficiency updates and application of motor system optimization concepts.

With more than 2000 participating companies and over 200 allied partners, the Motor Challenge program is expected to achieve 2 billion kWh/year estimated by the year 2000 and 9 billion kWh/year estimated by the year 2010. A small number of showcase plants have shown on average a 33% energy savings due to overall system optimization.

A key element in the Motor Challenge strategy is to work in close partnership with industry to attack the identified market barriers. Early on, the program engaged in dialogue and sought the input of motor system users, product manufactures, and service providers to identify market barriers. The program focuses much of its resources on several key industrial sectors, such as Forest Products, Steel, Aluminum, Metal Castings, Chemicals, Glass, Mining, and Agriculture.

DOE projects the U.S. industry could save between \$3 and \$6 billion per year on motor system efficiency opportunities. The program recognizes that the application of cost-effectiveness for individual businesses needs to consider the co-benefits associated with the opportunities to save energy – that is, concurrent improvements in operations that also result in waste reduction and increased productivity.

Seventy percent of all industrial electricity goes to motor systems and therefore relates to multiple equipment markets and every industrial plant. As such, Motor Challenge has worked with a broad base of participants, aiming to bring together multiple organizations ranging from market players (end-users, product manufacturers, suppliers, distributors, and consulting engineers) to supporting organizations (e.g., utility consortiums, state and local governments, industry and professional trade associations, and NGOS). The program design seeks to provide multiple public benefits opportunities – “win-win outcomes” – for all of its partner organizations.

The Motor Challenge program does not merely focus on the motor technology. Recognizing that only about 20% of potential savings opportunities could be obtained from motor efficiency improvements (e.g., motor efficiency upgrades), the Motor Challenge program fosters a broad “systems optimization” approach. At the same time, it establishes mechanisms to encourage more widespread use of system-oriented products/services of manufacturers and other market intermediaries. This approach to looking at *technology, practices, and markets in an integrated fashion*, as well as its *voluntary* character, makes the Motor Challenge program unique among policy approaches targeted at specific technologies.

Operating independently, but in parallel with the Motor Challenge program are the Energy Policy Act of 1992 regulations and standards for electric motor efficiency and test procedures (1-200 horsepower).

Motor Challenge's market assessment determined that the energy savings opportunities are significant in all industries, but they vary dramatically from industry to industry sector. Industry utilizes a flexibility approach when making investments targeted motor system savings opportunities. Accordingly, Motor Challenge adapts to companies' need for flexibility in making investment decisions and to regional differences in end-user markets. It does so by providing well-focused support services to address identified market barriers and to encourage changes in users' investment behavior and in the structure of product/services markets -- within a voluntary participation framework.

The MotorMaster+3 decision support software, available to program participants, contains a Savings Tracker designed to help companies document energy savings and illustrate the energy, dollar and environmental benefits due to conducting an in-plant motor and motor-driven equipment energy management program. In addition, the program now has a statistical basis for characterizing national motor systems baseline conditions and for providing the information needed to model the change in the motor systems inventory and purchase and maintenance practices over time. Its Industrial Electric Motor Systems Market Opportunities Assessment provides a detailed and highly differentiated portrait for baseline motor inventory, energy use, and operating practices in the industrial end-user markets.

#### **4. Electricity Restructuring**

The United States is moving toward a new era in the electric sector, where electricity production will be driven by market forces. Electricity restructuring would allow competition to replace regulation as the primary mechanism to determine the price of electricity at the generation plant. Retail customers would be allowed to choose their own electricity supplier, and utilities would be required to open their distribution and transmission wires to all qualified sellers.

Already, twenty-four States in the U.S. have restructured their electricity markets, and the Federal government is considering legislation to encourage other States to move forward. The Administration has proposed legislation at the Federal level, the Comprehensive Electricity Competition Act (CECA), to facilitate retail competition.

Competition in the electricity sector will lead to increased efficiency, benefiting both the economy and the environment – a “win-win” policy. The market will reward a generator that wrings as much energy as it can from every unit of fuel. Competition also provides opportunities for consumers to choose renewable and low-emitting sources of power, and facilitates the marketing of energy-efficiency services. Furthermore, CECA contains a number of proposals that promote investments in energy efficiency, renewable energy, distributed power and combined heat and power technologies. The Administration's plan is expected to reduce carbon emissions from the electric sector by 40 to 60 million metric tons by 2010.

CECA reflects virtually all of the elements essential to successful policies, or “best practices”. The proposal encourages States to implement retail competition and pursue environmental programs while providing them with considerable flexibility to meet their unique, local needs. The policy builds upon a history of deregulation in the U.S., and relies on market forces to improve efficiency, thereby delivering environmental benefits. A renewable energy program will be pursued through a tradable credits system that ensures renewable energy goals will be met at least-cost. Finally, the plan encourages penetration of more efficient technologies by removing other regulatory barriers.

### ***Highlights of the Comprehensive Electricity Competition Act***

*Encourage States to Implement Retail Competition.* CECA would require States to implement retail choice by 2003, but would give States considerable flexibility to address their unique needs. States would also be allowed to opt out of the requirement if they determine consumers in their State would be better served by an alternative system.

States have historically been responsible for regulating retail electricity markets in the U.S. CECA is designed to strike a balance between the need for Federal policy to support competition and the tradition of State determination of retail electricity policy. It also avoids a “one-size-fits all” approach to retail competition that could lead to increased costs in some states. Finally, the plan builds upon State restructuring plans that have been implemented to date.

*Consumer Information.* All electricity suppliers would be required to disclose in a uniform, easy to read label, basic information on prices; terms and conditions of service; fuel sources used; and generation emissions characteristics.

Consumers will need reliable information to make informed choices regarding their power purchases. Many customers may wish to choose their electricity suppliers based on consideration of environmental factors and generation mix. These customers will need assurances that representations as to generation source and environmental characteristics are true, since it may be particularly difficult to detect fraudulent claims in this area. Information disclosure requirements coupled with other policies to lower the cost of renewable energy could lead to significant penetration of low-carbon technologies in the electric sector.

*Public Benefits Fund.* A public benefits fund of up to \$3 billion would be established to provide matching funds to States to fund low-income assistance, consumer education, energy efficiency programs, and development and demonstration of emerging technologies.

The Federal public benefits fund would both encourage and support renewable and energy efficiency programs at the State level, and would build upon State experience in energy and demand-side management programs. States would have the flexibility to decide whether to seek funds and could allocate funds among public purposes in a manner that addresses unique State or local needs. State preferences would set the level and mix of eligible programs to be pursued.

*Renewable Portfolio Standard.* A Federal Renewable Portfolio Standard (RPS) would be adopted to guarantee that a minimum level of additional renewable generation is

developed in the U.S. All electricity sellers would be required to cover a percentage of their electricity sales with generation from non-hydroelectric renewable technologies such as wind, solar, geothermal, or biomass generation. The level of the RPS would initially be set close to the current level of qualified renewable generation in the U.S. and would rise to 7.5% of electricity sales by 2010.

The RPS requirement would be implemented through a system of tradable renewable electricity credits (RECs). Retail electricity sellers could meet the requirement by generating renewable electricity themselves, or by purchasing RECs from other generators. The trading program would ensure that the RPS requirement is met at least-cost by allowing renewable energy systems to be installed in areas of the country where they are most cost-effective.

*Distributed Power and Combined Heat and Power.* CECA includes a number of provisions to encourage penetration of small-scale power generation—distributed generation—and efficient combined heat and power (CHP) systems. These proposals include tax credits for CHP, changes in depreciation schedules, and removal of regulatory barriers.

Both distributed power and CHP can provide substantial environmental benefits through the introduction of cleaner, more efficient technologies. However, a number of regulatory barriers are hampering increased deployment of these technologies. These barriers include the environmental permitting process, and inconsistent standards for connecting new generators to the transmission grid. Under CECA, the Federal government would assist States in streamlining permitting procedures for these technologies and clarify air permitting rules, thereby reducing administrative costs for CHP and distributed power projects. CECA would also establish uniform safety and power quality standards for interconnection to the transmission and distribution system.

## **5. Federal Energy Management Programs**

This program, begun in 1975, has a substantial track record of reducing energy use and associated carbon emissions in the U.S. Federal Government, as well helping to develop new opportunities in energy services markets. A series of Executive Orders issued in 1991, 1994 and 1999 have expanded and increased the stringency of the energy savings goals for this program. Executive Order 13123, signed in June of 1999, added the first greenhouse gas reduction program goal of a 30% reduction from 1990 levels by 2010.

This multi-faceted program addresses all federal energy uses from buildings to vehicles to generating plants. The program has three main components:

- *Financing:* Agencies may choose among traditional direct appropriations, energy service performance contracts (ESPC), or utility energy service programs to fund energy saving improvements. The latter two options required changes in federal procurement rules. The program went further, however, by developing standard means of measuring energy savings and pre-approved energy service performance contracts (Super ESPC) to reduce the out-of-pocket and transaction costs associated with using these types of financing.

- *Procurement:* This program helps federal agencies comply with the energy efficient purchasing requirements of Executive Order 13123. The program develops *Product Energy Efficiency Recommendations* that identify the top 25 percent of energy efficiency for all similar products. The program also promotes the purchase of ENERGY STAR<sup>7</sup> labeled products. The program covers approximately 45 products including commercial equipment (i.e., chillers, motors, transformers), residential appliances and equipment, and office equipment.
- *Training and demonstration:* An extensive training program, including an annual National Conference and Exhibition, provides agencies with the tools to select and implement the best energy-saving strategies for their applications. Training covers everything from product identification to integrated building design to financing. Individual buildings featuring either new technologies or new energy-saving strategies can serve as demonstration or showcase buildings to challenge both the federal and the private sectors to adopt new or improved approaches.

Program energy and carbon savings are measured from a base year of 1985. Through 1996, overall federal energy use fell by about 23% (13% in terms of primary energy use). At a time when commercial building energy use (on a per square meter basis) has been rising slightly due to increased equipment use, federal building energy use has been falling.

The program exceeded its initial goal of a 10% energy savings by 1995 and is on course to exceed its current goals of a 20% reduction by 2000 and a 30% reduction by 2005. The program's next challenge, just released several weeks ago, is a 35% reduction by 2010. This same Executive Order added, for the first time, an explicit greenhouse gas (GHG) reduction goal of a 30% reduction by 2010 from 1990 levels.

The FEMP program works within the existing government structure, making each agency responsible for improving its own energy usage, but provides coordinated expert support. The emphasis on efficient government is strengthened by tying this program, where practical, to other broad energy-savings strategies such as the Energy Star program. It seeks to influence private sector markets through example, improvement of market share for energy efficient products, and development of improved private sector financial mechanisms for supporting these improvements.

Investments under the program are based on life-cycle cost-effectiveness. This has not only helped to lower overall costs within the federal sector, but has also helped ensure that program investments provide examples to the private sector of doable and economically attractive savings opportunities. By utilizing Energy Savings Performance Contracts and Utility Energy Services Contracts, the program has helped nurture the development of a private market in the financing and implementation of building energy savings investments and reduced transaction costs.

Because this program helps reduce the costs of many other programs, it is largely viewed as benefiting the broad array of public policy objectives. Its integrated approach of looking for potentials for oil, energy, associated carbon dioxide emissions, renewable energy applications, and water savings has helped foster a relatively broad energy and environmental outlook in federal operations.

This program utilizes somewhat different approaches for mature and emerging technologies, and for turn-key and custom applications. It emphasizes, for example, recommended performance levels for mature, turn-key applications. Mature, but custom, applications such as whole building energy improvements, are handled through energy service performance contracts allowing the use of expert advice in selecting among improvement options. Emerging technologies are addressed through the showcase and demonstration aspects of the program.

The legislative and executive changes in this program have been key to its success over the last decade. Without these changes, for example, federal agencies could not have tapped the ESPC and Utility Financing programs sources of financing. Further, successive executive orders have both expanded the scope of the energy-savings efforts and extended the savings targets. The use of the Super ESPC has helped the program adapt to regional differences in buildings markets and helped agencies identify qualified providers of energy services in their area. Energy successes--and failures--are tracked and reported in detail on an annual basis. In addition to reporting how each agency is doing, the program provides detailed results from individual energy savings investments.

Petroleum-based fuels represent a specific area of concern to the federal energy management program. As shown in the attached figure, the US government consumed almost one-third less petroleum-based fuel in FY 1996 than in FY 1985.

## **6. Methane Programs**

The federal methane programs are a set of voluntary and outreach activities designed to remove market barriers and encourage the profitable recovery of methane gas currently emitted to the atmosphere. Numerous industrial and agricultural practices emit methane. In many cases, technologies are readily available to collect and use the wasted hydrocarbons, and they are frequently profitable given the market value of the collected methane as fuel. A number of informational, financial and market barriers increase costs for the individual entities responsible for the methane emissions, however, and have precluded the full deployment of these options.

Four major sectors are targeted by the U.S. methane programs: landfills, coal mines, natural gas systems, and agriculture. In each sector, unique programs that address the specific barriers have been implemented in order to encourage the widespread deployment of profitable methane recovery and use technologies.

*Landfills:* The major barriers to increased methane recovery at landfills include informational issues related to site potential, permitting issues, financing issues, and difficulties in finding energy customers. EPA has taken two actions to address landfill methane emissions. First, the largest US landfills are subject to a regulation under the Clean Air Act that requires them to collect and combust their landfill gas in order to reduce emissions of ozone precursors. Second, EPA has implemented a voluntary program -- the Landfill Methane Outreach Program (LMOP) -- to encourage project development at US landfills not affected by the Landfill Rule and encourage energy recovery projects at those landfills that are affected by the Rule. The LMOP works with

landfills, utilities, state agencies, and landfill service companies to address the barriers to energy projects at landfills and create partnerships that can lead to project development. The program publishes technical information on candidate projects and common technical challenges in project development, and organizes state workshops to facilitate state policies that favor landfill gas development. The program also works directly with candidate landfill sites to educate them about project potential and help them find project developers.

Currently there are more than 275 landfill gas utilization projects in the United States, which is more than double the number in 1994, when EPA's landfill program was launched. Almost half of the new projects in the US since 1994 have been developed at landfills that are not regulated under the Landfill Rule. An assessment of projects attributable to the efforts of the Landfill program indicates that emissions have been reduced by almost 4 mmtce since the program started.

*Coal Mines:* Key barriers to methane utilization at coal mines include informational, financial, and market barriers. Coal mines release large quantities of methane to the atmosphere through the ventilation and degasification systems required to mine coal safely. Limited gas recovery has occurred historically, however, because most mine owners do not view methane as a recoverable resource, lack information about project potential, have difficulty finding project partners, and prefer to invest capital in coal production. EPA's Coalbed Methane Outreach Program works directly with coal mines to assist them identifying attractive projects and finding partners. The program is also working to demonstrate new and innovative uses for the methane released by mining, including the use of ventilation air and the flaring of unusable degasification system methane.

Since initiating the Coalbed Methane Outreach Program, utilization of coal mine methane in the United States has tripled. Since 1995, the program has reduced emissions by over 8 mmtce.

*Natural Gas Systems:* EPA's Natural Gas STAR program works with natural gas producers, processors, and transmission and distribution companies to reduce the leaks and losses of natural gas that occur throughout the system. The program has identified a set of core Best Management Practices that companies can use to evaluate their systems, as well as more than 50 Partner Reported Opportunities (additional technical options for reducing methane emissions). The program provides technical information, economic analyses, and public recognition for the methane reduction efforts of the gas industry.

Currently more than 70 natural gas companies belong to the program, representing almost 40 percent of U.S. gas production, 70 percent of transmission pipelines, and 45 percent of distribution service connections. The program has reduced emissions by 8 mmtce since 1990.

*Agriculture:* EPA and the U.S. Department of Agriculture work jointly with the agriculture sector to reduce methane emissions from manure management systems through the AgSTAR program and from the enteric fermentation of livestock through the Ruminant Livestock Efficiency Program. The AgSTAR program overcomes informational and



technical barriers to methane recovery from manure systems by providing information and assistance to livestock producers. The Ruminant program focuses primarily on the beef industry and promotes a variety of efficiency improvements in grazing management, feeding practices, and animal management that can simultaneously improve animal health and productivity and reduce methane emissions per unit of product.

Together these programs have reduced methane emissions by a small amount since 1993. Significant emissions reductions are anticipated through 2010 as these approaches are more fully adopted by the livestock industry.

Overall, the methane programs have reduced US methane emissions by over 20 mmtce since 1990, and are projected to reduce emissions by more than 11 mmtce in the year 2000 alone. As a result, U.S. methane emissions are expected to remain stable at 1990 levels in 2000. In addition, the U.S. methane programs are expected to offset future growth and result in stabilized methane emissions at 1990 levels through 2010, at a profit to the developers.

The methane programs have additional benefits beyond those associated with reducing greenhouse gas emissions. Use of wasted methane displaces fossil fuel consumption. Combustion of landfill gas reduces emissions of other non-methane volatile organic compounds (VOCs) that contribute to tropospheric ozone formation, as well as reducing odor and gas migration problems at landfills. Methane recovery from manure management can improve the quality of the manure management system, thereby reducing odor and water quality problems associated with animal waste. And methane recovery at coal mines can improve mine safety by reducing explosive hazards.

The methane programs are having a substantial economic impact. Several hundred million dollars in methane recovery investments have been leveraged from the private sector by the program, for a small federal financial outlay. Comparison of the Federal investment against the resultant environmental benefits indicates that the cost of the reductions is substantially lower than \$1/ton CO<sub>2</sub>.

The methane programs are being applied throughout the United States. Care has been taken to identify uniquely regional barriers to methane recovery projects where they exist and ensure that appropriate programmatic responses are developed. Each program is customized to the specific needs of its industry. In addition, the barriers to methane recovery projects are reassessed annually, so that any necessary modifications in program strategy can be promptly identified and implemented. In this way, the programs continue to provide state-of-the-art information to their industrial partners.

## **7. Prototype New Generation Vehicle Program**

Government and industry have jointly funded (approximately 50/50) research and development on a very high efficiency passenger automobile design. Research includes engine and driveline efficiency improvements and lightweight body parts. The goal of program is to produce multiple (each of 3 manufacturers involved) production-ready prototypes by 2004. The program's origins can be found in the view held by some in early 1990s that a paradigm shift in technology and government/industry relations was needed. The early focus was on fuel cells, but that has changed to more evolutionary technologies.

Estimated GHG reductions, for a fully successful program, are 12 mmt C in 2010 and 30 mmt C in 2020. Expectations vary and depend on attribution of efficiency gains that happen outside obvious PNGV type vehicles.

PNGV fits very well into existing vehicle manufacturers preferences for cooperative R&D. It also focuses on specific technology (equal performance/attribute mid-sized car) that consumers currently are purchasing.

PNGV has goal of very high efficiency that does not appear economic at expected energy prices but it has a vehicle purchase cost goal that is consistent with market economics.

PNGV serves other public policy goals of energy security and consumer mobility. It also is consistent with criteria pollutant goals by meeting expected vehicle emission standards.

As originally conceived, PNGV considered a broad range of technologies, ranging from radical to evolutionary. After 4 years, R&D efforts were focused on the "most promising" technologies for achieving the 2004 goals. Not surprisingly, the technologies judged most promising are the more mature, more evolutionary technologies that are a better fit for mass production during the first decade of the next century. As technologies approach market readiness, policy shifts or enhancements may be needed.

Currently, PNGV is still focused on passenger sedans, while sport utilities have captured nearly 50% of annual sales. The Clinton Administration is engaged in discussions with the automakers regarding the addition of sport utilities to PNGV. With the low price of oil, some incentives may be needed to move advanced technologies into the marketplace. As part of the Fiscal Year 2000 budget, the Administration has proposed tax incentives for advanced vehicles.

In terms of accountability, the PNGV programs has established clear goals, clear funding and cost-sharing rules. Significant outside oversight has also been established through the National Academy of Sciences.

## Federal Consumption of Petroleum-Based Fuels FY 1985 through FY1996

