

**THE IMPACT OF EXPANDING POPULATION
AND ECONOMIC GROWTH ON FOOD,
ENERGY AND THE ENVIRONMENT
IN THE APEC REGION**

**REPORT TO APEC ECONOMIC LEADERS
BUILDING SUSTAINABLE PROSPERITY IN APEC:
OPTIONS FOR POSSIBLE JOINT ACTIONS**

**APEC Economic Committee
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FOREWORD

Since its establishment by APEC Ministers in Jakarta, November 1994, the Economic Committee has undertaken a broad range of research and analysis in support of APEC's work both on trade and investment liberalization and facilitation and on economic and technical cooperation.

One of the most important tasks that have been assigned to the Committee over its first four years is the APEC Economic Leaders' initiative on *The Impact of Expanding Population and Economic Growth on Food, Energy and the Environment* (FEEEP). At Osaka in 1995, Leaders agreed on the need to put this longer-term issue on APEC's long-term agenda and to consult further on ways to initiate joint action to ensure that the region's economic prosperity is sustainable.

The Committee has pursued its work on the FEEEP initiative in collaboration with a number of APEC fora and processes, including the Committee's Task Force on Food, the Energy Ministers process, the Environment Ministers process, the Fisheries Working Group, the Marine Resource Conservation Working Group, the Industrial Science and Technology Working Group and the other APEC fora whose work, from perspective or another, contributes to APEC's overall response to the issues raised within the FEEEP context. As well, the Committee engaged the broader public, including business, academia and non-governmental experts, as well as specialists from APEC member government bodies through the FEEEP Symposium held in September 1997 in Saskatoon, Canada. The positive experience that the Committee has had in approaching this crosscutting issue by including experts from many disciplines and representatives of all sectors of society underscores the importance of the broader APEC efforts to increase transparency and to broaden participation in its work.

As the work on FEEEP has progressed, the soundness of traditional thinking on some of the issues has been confirmed and reinforced. This is particularly the case with respect to the work on energy and the environment where active and comprehensive work programs have already been established within APEC. On other issues, thinking has evolved. Accordingly, as this report sets out, there are issues that warrant further consideration by APEC, in particular with respect to the longer-term issues concerning food and also some of the crosscutting aspects of FEEEP.

The food-related work on FEEEP has underscored the complex nature of the issue and the need for a finely balanced approach. The crosscutting aspects, meanwhile, highlight the uniqueness of this approach to issues that have long been a central part of

work on sustainable development. Seen through the prism of FEEEP, the inherent complexity of the processes guiding the evolution of the economy becomes apparent. The emphasis shifts, accordingly, from prediction to scenario building, from long-range planning to flexibility and responsiveness to change, from command/control to influencing evolutionary processes through positive and negative feedback. Governance issues move to the foreground, reinforcing the lessons learned from the economic and financial crisis that has affected the region since mid-1997. These are important and thought-provoking conclusions that warrant on-going discussion within APEC and beyond, particularly in the longer-term context of its pursuit of sustainable growth and equitable development.

This Report to APEC Ministers and Economic Leaders marks the completion of APEC's response to the mandate received from Economic Leaders at Osaka. I should like to acknowledge at this juncture the cooperation and support of the various APEC fora named above that have contributed to this work as well as the trust and contribution of the Economic Committee members in helping me to guide this work on behalf of the Committee over the past three years. Finally, I should like to thank in particular Dan Ciuriak and Julie Gould for their many and varied contributions in supporting me in my capacity as Chair of the Economic Committee in bringing this aspect of the Committee's work to a successful conclusion.

John M. Curtis

Chair
APEC Economic Committee
Ottawa, November 1998

EXECUTIVE SUMMARY AND OPTIONS FOR JOINT ACTION

In 1998, APEC's work on the Economic Leaders' initiative, "The Impact of Expanding Population and Economic Growth on Food, Energy and the Environment (FEEEP)", moved progressively from an analytical phase to a policy phase in a number of areas. Out of this activity, a number of options for possible joint actions have emerged.

In the area of *food*, the Economic Committee's Task Force on Food (TFF) concluded its consideration of the impact of population and economic growth on the demand and supply (production, trade flows and stocks) of food in the region; processing and distribution issues; and agriculture-related environmental issues. This work is reported in the Economic Committee's *Task Force on Food: Analytical Reports* (APEC, August 1998). The Task Force identified for APEC Ministers and Leaders a number of opportunities and challenges including:

- the need to sustain and expand investment in agricultural R&D, including the question of the respective contributions of private and public sources of investment;
- the importance of ensuring investment flows to rural infrastructure, particularly for irrigation and transport;
- the importance of ensuring a stable food supply;
- the role of trade;
- the impact of environmental change on agriculture; and
- the impact of agriculture on the environment and impact of economic growth on rural communities.

Against this background, and taking care to avoid duplication of effort within APEC and with other international organizations, the TFF identified options for possible joint actions in four broad areas: R&D; infrastructure investment; trade and other matters; and environmental issues. These options include both shorter- and longer-term projects, and address the crosscutting aspects of this issue.

In the area of *energy*, Energy Ministers, at their meeting in Edmonton in September 1997, concluded that their multi-year work program addressed the longer-term energy-related aspects of FEEEP. At their most recent meeting in Okinawa, in October 1998, Energy Ministers advanced their work program in a number of areas of importance to FEEEP. FEEEP concerns continue to be taken up within the core initiatives of the Energy Ministers' process, which include:

- implementing the 14 non-binding energy policy principles to address the current economic difficulties as well as to achieve the goals of sustainable economic growth, stable energy supply and environmental protection;
- addressing sustainability issues to mitigate negative local, regional and global environmental and social impacts of energy production, delivery and use;

- using the energy outlook prepared by the Asia Pacific Energy Research Centre as an important basis for policy discussion and agreeing that the Centre should continue its work to better understand the energy supply and demand issues confronting the Asia Pacific region;
- strengthening policy dialogue among member economies on important issues such as energy security, energy infrastructure, energy efficiency and energy and environment;
- developing the region's energy infrastructure, including through the natural gas initiative; and
- carrying out the "Recommended Work Program on Environmentally Sound Energy Infrastructure in APEC Member Economies" to provide impetus to the application of environmental policy practices that are predictable, transparent and consistent.
- improving energy efficiency including through implementation of a voluntary pledge and review program

In the area of **environment**, Environment Ministers, at their meeting on sustainable development in Toronto in June 1997, agreed that APEC's wide-ranging work on environmental issues was relevant to the FEEEP initiative. At Toronto, Ministers launched three major environmental initiatives, namely:

- Sustainability of the Marine Environment,
- Cleaner Production Strategy, and
- Program of Action on Sustainable Cities.

Sustainability of the Marine Environment has been advanced by the Marine Resources Conservation Working Group. The Cleaner Production initiative has been advanced by the Industrial Science and Technology Working Group. Science and Technology Ministers, at their meeting in Mexico City in October 1998, called for increased efforts to establish partnerships and networks that promote cleaner production both to preserve the environment and to stimulate economic growth. Finally, the Sustainable Cities initiative is being advanced by a number of groups. Accordingly, in the area of environment as well, with the central FEEEP issues already identified and initiatives launched to address them, no further initiatives uniquely focussed on FEEEP are proposed.

In view of the above, the following possible joint actions are suggested for review and discussion by APEC Economic Leaders.

- *A program of cooperation to promote private and public sector R&D in relation to food and agriculture, including through exchange of information on policies, identifying effective approaches for ensuring investment on R &D, promoting joint research projects, and establishing a network to improve information sharing.*
- *A program of cooperation on food and rural-related infrastructure, with a view to identifying the most desirable and practicable means for expanding both public and private investment in such infrastructure.*

- *A continued effort aimed at reducing import and export barriers to trade in food within the region. A program of sharing or disseminating results of work on the costs and benefits of trade liberalization and of agricultural reform policies; exchanging information on agricultural production, and any factors that can affect it, food consumption, trade, stock levels, and related policies of member economies; and intensified cooperation and information exchange on food standards issues.*
- *A program of cooperation to foster environmentally sound practices, including exchange of information on best practices; to improve availability of, and access by, farmers to meteorological information, including on adverse climatic events and trends; and to exchange information to identify various issues of importance to rural communities in member economies.*
- *An Interdisciplinary Network of Research Institutions. This “virtual” network of existing institutions would include academic, non-governmental and business think tanks undertaking research and development work in various FEEEP-related areas. The virtual network would draw on existing mechanisms such as the APEC Study Centre Network to apply the analysis of complex systems to FEEEP-related concerns and issues to gain insights into how these issues might best be addressed and how might trends be influenced in the context of a dynamic, technologically evolving, international economy, through available tools such as governance, economic incentive systems and framework policies, and education.*

In summary, it has come to be widely recognized that the FEEEP initiative, by examining and highlighting the key potential constraints to, and opportunities for, sustained growth and equitable development in the region, is in effect providing a focused, forward-looking approach to sustainable development issues more generally. By acting on some or all of the above options, APEC can help to ensure that future development of the region is on a basis that will ensure that prosperity is indeed sustainable.

REPORT TO APEC ECONOMIC LEADERS

Background and Process

At Osaka in 1995, APEC Economic Leaders agreed on the need to put the impact of fast-expanding population and rapid economic growth on food, energy and the environment (FEEEP) on APEC's long-term agenda, and to consult further on ways to initiate joint action to ensure that the region's future economic development is sustainable. APEC has responded to this initiative through the collaborative work of the Economic Committee together with the Economic Committee's Task Force on Food, the APEC Energy Ministers and the Energy Working Group, and APEC Environment Ministers and Senior Environment Officials. The Fisheries Working Group with respect to the fisheries aspects of food, the Marine Resource Conservation Working Group with respect to the marine-related environmental issues and the Industrial Science and Technology Working Group with regard to the Cleaner Production Strategy are also contributing to FEEEP solutions.

In 1996, the Economic Committee made a brief preliminary report on FEEEP-related work, setting out the process that had been established within APEC to address this issue. In 1997, the Committee reviewed the results of the work underway within APEC in terms of identifying, analyzing and responding to FEEEP-related issues. The report noted that, especially as regards energy and environment, FEEEP-related issues were at the core of the work programs endorsed by the Energy and Environment Ministers' processes. As well, considerable progress had been made in deepening the understanding of the food-related issues, although there remained a wide range of views in this latter regard. Finally, in respect of the crosscutting aspects of FEEEP, considerable advances were also made in furthering understanding of this complex issue, with a particularly strong impetus from a symposium held in September 1997 in Saskatoon, Canada, to consider the inter-relationships between and amongst the FEEEP issues. The symposium drew on the expertise of a broad range of representatives from each APEC economy – business, academia and non-governmental experts, as well as specialists from APEC member government bodies. The results are reported in the Economic Committee's *The Impact of Fast-Expanding Population and Rapid Economic Growth on Food, Energy and the Environment: Symposium Proceedings* (APEC, November 1998).

This work has, in turn, served as the basis for the policy-oriented work undertaken by the Economic Committee, in cooperation with other APEC fora, over the past year.

Developments in 1998

The recent, unprecedented economic and financial crisis in much of the region has drawn attention away from issues of longer-run sustainability and towards the more immediate issues of restoring stability and growth. This past year has also witnessed sharp, primarily downward movements in commodity prices and demand, including of important foodstuffs and energy products, reminding everyone of the difficulties of anticipating future developments. Moreover, the weather extremes caused by an unusually strong El Nino effect served to remind of our dependence on the stability of an environment which science tells us is now increasingly affected by human activity, but not in fully knowable ways.

However, there are also deeper lessons to be drawn from this year's developments. Analysis of FEEEP-related issues highlights the importance of economies being adaptable in order to cope with changing circumstances and emerging constraints and opportunities. It also points to the significance of education, accessibility to technology and accommodation of technological change, and institutional flexibility as keys to sustaining growth and development. Indeed, the crisis has underscored the importance of adaptability of economies and flexibility of institutions with an immediacy that could not have been anticipated. Further, as shown by the impacts on growth, the point has been driven home that none of the elements of FEEEP can be taken for granted.

Food

The Task Force on Food (TFF), under the co-chairmanship of Australia and Japan, concluded its work under the Leaders' mandate to examine the food-related aspects of the FEEEP initiative, with a view to identifying possible options for joint actions to deal with regional food challenges that could arise in the future. The work program looked at the impact of population and rapid economic growth on the demand and supply (production, trade flows and stocks) of food in the region; processing and distribution issues; and agriculture-related environmental issues. This work is set out in the Economic Committee's *Task Force on Food: Analytical Reports* (APEC, August 1998).

A number of opportunities and challenges were identified in the analytical work and discussion within the TFF including:

- the need to sustain and expand investment in agricultural R&D, including the question of the respective contributions of private and public sources of investment;
- the importance of ensuring investment flows to rural infrastructure, particularly for irrigation and transport;
- the importance of ensuring a stable food supply;
- the role of trade;
- the impact of environmental change on agriculture; and
- the impact of agriculture on the environment and impact of economic growth on rural communities.

Other APEC fora are also contributing to APEC's work on food-related aspects of FEEEP. The Agricultural Technical Co-operation Experts Group (ATC) is addressing R&D and extension of agricultural biotechnology, agricultural technology transfer and training, and sustainable agriculture through plant and animal quarantine and pest management. The ATC has developed a plan of action, which includes the preparation of a directory of experts and institutional networks on sustainable agriculture and the preparation of a questionnaire. A seminar/workshop on sustainable agriculture will be held in Davao City, the Philippines in May 1999.

The Fisheries Working Group (FWG), meanwhile, is contributing to the fisheries-related aspects of the food dimension within FEEEP through a study on *Supply and Demand Projections for Fish Products* that is being developed on behalf of the FWG by Japan. This initiative is intended to include recommendations on how the issues that are identified might be addressed. In addition, the FWG is undertaking activities that are of broad relevance to the food aspects of APEC's FEEEP initiative. These activities include the following:

- The *APEC Aquaculture Forum*, which was held on 8 June 1998, contributed to establishing the necessary linkages between governments, the private sector and non-governmental experts in relation to improving transfer of technology, research and expertise that will assist in the development of an emergency preparedness framework for fish and shrimp diseases management.
- A *Collaborative APEC Grouper Research and Development Network* project aims to facilitate greater involvement in cooperative regional R&D with respect to grouper aquaculture, leading to the viable culture of reef fish.
- A *Collaborative Aquaculture Education Program* has the long-term objective of adequately training a critical mass of middle-level managers and technicians in the science of aquaculture to meet the challenges of growth, long-term sustainability and environmental integrity.
- A project on *Women in Aquaculture* aims to identify opportunities for women in aquaculture and to develop education, training and extension strategies to assist women's engagement in fish farming and to facilitate their contribution to food security.

In addition to the work of these groups, which focuses on technical cooperation in specialized fields, many APEC bodies are working on issues that have important implications for policies affecting the food sector. For example, the Economic Committee's Infrastructure Workshop is advancing an initiative on rural infrastructure that will include a major symposium to be held in conjunction with the World Agriculture Congress that will be held 23-26 May 1999 in St Louis, USA; this initiative will result in a pilot project on infrastructure for integration and diversification of rural economies. The Committee on Trade and Investment (CTI) is working on the reduction of impediments to business activity in 15 specific areas as outlined in Part 1 of the Osaka Action Agenda. Of particular note in this regard is the work of the CTI Sub-Committee on Standards and Conformance in encouraging alignment of APEC member economies' standards in the food area through the APEC Food Mutual Recognition Agreement (MRA).

Against this background, and taking care to avoid duplication of effort within APEC and with other international organizations, the TFF identified options in four broad areas: R&D; infrastructure investment; trade and other matters; and environmental issues. These options include both shorter- and longer-term projects.

Research and Development

Creating new production technologies and tapping the full potential of existing technologies will be important to ensure increased food supplies to meet projected demand and to improve food standards in the APEC region. In this regard, there are concerns with recent investment trends in food-related R&D, and recognition of the importance of continuing investment, both public and private in food R&D.

Possible Actions: APEC member economies could be encouraged to:

- 1) Exchange information on their current policies and programs relating to private and public sector R&D in relation to food and agriculture.
- 2) Cooperate in identifying the most effective means of ensuring sustained and adequate levels of private and public investment in food-related technological R&D in order to increase production and quality of food, including biotechnology, conservation of plant and animal genetic resources, organic farming, and policies for further development of food processing; this could include promoting joint research projects between member economies, particularly between developing and developed economies.
- 3) Establish a network to share information about relevant R&D by member economies as well as information on R&D being carried out in other organizations.

Investment in Infrastructure

Continued improvement of, and investment in, infrastructure will be important to ensure that food is produced, stored, processed and transported as efficiently as possible. Investment in rural infrastructure is also essential to maintaining and enhancing the viability of rural areas. Economic and demographic trends, such as the aging of farm populations, rapid urbanization, and evolving dietary patterns, underline the need for appropriate and flexible infrastructure investment policies. Infrastructure investment is necessary not only to create new facilities but also to rehabilitate existing infrastructure.

Possible actions: APEC member economies could be encouraged to:

- 1) Exchange information on current policies and programs for developing infrastructure, with a view to identifying the most desirable and practicable means for expanding both public and private investment in such infrastructure. This could include exchanging information on the impact of recent economic developments on member economies' policies. Exchange of information could also cover:
 - a) policies aimed at alleviating rural poverty and sustaining development in rural areas;
 - b) the role of SMEs and multinational enterprises in the food sector;
 - c) measures to encourage investment in facilities to ensure food safety; and
 - d) measures for decreasing the loss of food during distribution
- 2) Where appropriate, coordinate and combine related projects pursued by different economies or entities in order to maximize potential benefits.

Trade and other Matters

The overall benefits of trade liberalization have been recognized by Leaders in framing the 2010/2020 Bogor undertaking in 1994. Trade is playing an increasingly important role in helping the region to meet its food requirements and the mutual reliance on food in the region has been strengthened. Increased trade flows will further change the geographical distribution of production. This can lead to more efficient patterns of resource allocation within the region. In turn, this can help to sustain high rates of economic growth and generate income needed to raise nutritional levels. Additionally, more smoothly-operating markets may be better able to adjust to unexpected short-term fluctuations in supply; and product mix is also likely to be more diversified, thereby spreading the risks of supply variability.

There are concerns, however, from some net-food-importing economies about the future instability of food supplies in terms of price/quantity due to climatic changes, policy changes and so on, under circumstances where production of food for export becomes increasingly concentrated in a smaller number of economies. Also, the full effect of trade expansion, including external economies and diseconomies in agriculture and structural adjustment in rural communities, have to be considered.

Finally, in view of expected increased levels of trade in food, including processed food, to meet the region's expanded food requirements, food quality and standards will become a high priority.

Possible actions: APEC member economies could be encouraged to:

- 1) Continue efforts aimed at reducing import and export barriers to trade in food within the region.
- 2) Share or disseminate results of work on the costs and benefits of trade liberalization and of agricultural reform policies.
- 3) Exchange information on agricultural production and any factors that can affect it, food consumption, trade, stock levels, and related policies of member economies, as well as the effect of economic development on the agricultural sectors of APEC member economies.
- 4) Intensify cooperation and information exchange on food standards issues. This could be facilitated by workshops on the preparation, adoption and review of technical regulations.

Sustainable agricultural productivity, rural development and the environmental impacts of food production are affected by many factors including original natural endowments, agricultural practices and environmental policies, and trends in land use. Appropriate agricultural policies and practices can make a positive contribution to both environmental and rural development goals. Cyclical weather patterns, such as El Nino, and global environmental change, such as global warming, may have varying impacts (both positive and negative) on member economies. Sustainable agricultural production is also important in maintaining and enhancing the viability of rural communities, reducing rural poverty, and ensuring adequate development of rural areas.

Possible actions: APEC member economies could be encouraged to:

- 1) Share information and expertise aimed at fostering environmentally sound agricultural practices, including:
 - a) exchange of information on best-practice guidelines for achieving their various environmental goals as they relate to the food sector; and
 - b) exchange of information on adverse climatic events and/or general climatic trends, development of meteorological cooperation to assist in predicting such events or trends, and facilitation of distribution of meteorological information to food producers.
- 2) Exchange information on policies and measures for this purpose, particularly in relation to small and medium-scale farmers and processors, including examination of policy responses to:
 - a) abnormal weather patterns; as well as
 - b) changing demographics and economic growth.
- 3) Exchange information or hold workshops/symposia to identify various rural issues facing member economies, taking into account demographic and economic growth patterns, in order to find appropriate means to revitalize rural communities.

Energy

Energy Ministers, at their meeting in Edmonton in September 1997, reviewed APEC's energy-related work in light of the FEEEP initiative and concluded that the Energy Working Group's work program addressed the longer-term energy-related aspects of FEEEP. At their meeting in Okinawa, in October 1998, Ministers emphasized the importance of implementing the 14 non-binding energy policy principles to address the current economic difficulties as well as to achieve the goals of sustainable economic growth, stable energy supply and environmental protection. They reiterated the important role that the energy sector could play in stimulating regional economic activity. They also noted the importance of improving living standards and of sustainability and, in this context, the importance of mitigating negative local, regional and global environmental and social impacts of energy production, delivery and use. Ministers agreed that the energy outlook prepared by the Asia Pacific Energy Research Centre should be used by the Energy Working Group as an important basis for policy discussion and that the Centre should continue its work to better understand the energy supply and demand issues confronting the Asia Pacific region. Ministers also welcomed the decision of the Energy Working Group to further strengthen policy dialogue among member economies on important issues such as energy security, energy infrastructure, energy efficiency and energy and environment.

Energy Security

At Okinawa, Ministers discussed the issue of longer-term energy security, which is one of the central energy-related issues under the FEEEP rubric. In particular, they discussed the results of the regional energy outlook prepared by the Asia Pacific Energy Research Centre and noted that, in spite of the current economic downturn in Asia and projected slower growth in demand, the region's demand for energy is expected to outpace its energy production by a wide margin, underscoring the APEC region's growing energy import dependence. Total primary energy demand in the region is projected to increase by 41 percent, while indigenous energy production will increase by 31 percent over the period from 1995 to 2010, with total imports to be doubled as a consequence. Considering the strong forecast growth in demand and increasing dependence on oil from outside the region, Ministers recognized the need to promote diversification of energy supply, including where appropriate natural gas, renewables and nuclear energy, and to promote market-driven energy infrastructure development. Ministers also recognized that well-functioning markets, market-based pricing, greater energy efficiency and information flows among market participants are important for enhanced energy security.

Ministers welcomed the initiation of information sharing on oil markets, and endorsed the decision by the Energy Working Group to discuss oil supply and demand security issues.

Energy Infrastructure

From a FEEEP perspective, the availability of adequate infrastructure in meeting energy requirements in a way that is efficient, economically viable and protective of the environment is critical. Adequacy of distribution networks is also of particular importance from the perspective of equitable development, one of the key “sustainability” objectives. In this regard, Energy Ministers at Okinawa recognized that continuous development of adequate energy infrastructure is essential as a stimulus for economic recovery as well as for sustainable development in the region. Estimates are that hundreds of billions of dollars will be required for energy power infrastructure alone in APEC economies over the next decade. Ministers stressed the importance of the availability of funds and investments towards the development of such infrastructure in the developing economies

In this regard, Ministers:

- stressed the importance of promoting private sector participation in infrastructure development in those areas permitted by their respective legal frameworks, and re-emphasized the need for a predictable and transparent institutional and regulatory framework to enhance the investment climate;
- instructed the Energy Working Group (EWG), working with the newly established EWG Business Network, as well as the Energy Regulators' Forum, to hold a business/government workshop to develop recommendations for early action aimed at improving investor confidence and mobilizing capital; and
- directed the Energy Working Group to effectively follow up the implementation of best practice principles for independent power producers that were agreed at the second meeting of APEC Energy Ministers in close communication with the private sector.
- endorsed the "Recommended Work Program on Environmentally Sound Energy Infrastructure in APEC Member Economies" and agreed that the work program would provide impetus to the application of environmental policy practices that are predictable, transparent and consistent.

Natural Gas Initiative

An important contribution to meeting many of the energy-related concerns within the FEEEP nexus of issues can come from increased use of natural gas as a primary energy source. As Energy Ministers noted at Okinawa, demand for natural gas in APEC is expected to grow significantly over the next 20 years, driven by the goals of promoting economic development, increasing energy security, and improving the environment. Meeting this demand will require increased natural gas production and significant new infrastructure development. The Asian Development Bank (ADB) estimates that as much as \$70 billion in investment will be required for natural gas infrastructure in Asia over the next 15 years. In addition, it is estimated that hundreds of billions of dollars in investment will be required in other APEC economies over the next 15 years. Meeting increased demand for natural gas in the APEC region will also require increased trade in natural gas and natural gas-related products and services among APEC member economies, which will have a powerful multiplier effect on APEC economic growth prospects.

In this regard, Ministers:

- endorsed the recommendations contained in the report of the initiative *Accelerating Investment in Natural Gas Supplies, Infrastructure and Trading Networks in the APEC Region*;
- noted that the APEC natural gas initiative will promote the acceleration of investment in natural gas supplies, infrastructure and trading networks in the region, that natural gas trading networks comprised of internal and cross-border pipelines, LNG terminals and distribution systems would promote economic development within economies and further cooperation and trade between APEC member economies; and
- agreed that feasibility studies on pipeline projects in this region should be conducted.

Energy Efficiency

From a FEEEP perspective, increasing the efficiency of production, delivery and use of energy is critical in reducing environmental impacts as the amount of energy required to produce a given level of goods and services is reduced.

In this regard, Ministers:

- agreed to implement a voluntary pledge and review program comprising: the development and implementation of programs to achieve efficiency gains where economic to do so; reporting on the programs developed, their specific objectives and the results achieved; sharing information and experience in achieving improved energy efficiency; and developing indicators and databases that will enable the measurement of performance over time.
- instructed the Energy Working Group to develop a program to exchange information on policies, technologies and practices to improve the efficient production, transportation and consumption of energy;
- endorsed the recommendations on improving energy efficiency in the *Report of Guidelines for Improving Energy Efficiency*, agreed that energy efficiency should continue to be a priority of the Asia Pacific Energy Research Centre, and encouraged the Centre to advance its work on energy efficiency indicators;
- welcomed the progress made in implementing cooperation on energy efficiency standards testing, endorsed the Standards Notification Procedure, and noted that this is an immediate step that will not only increase transparency to business and facilitate trade, but also will help to minimize the proliferation of differing test procedures in the region;
- emphasized the importance of regional cooperation to promote the development and deployment of energy technologies to reduce the growth of greenhouse gas emissions, and noted the importance of progress in improving energy efficiency and the increased use of low or non-carbon emitting energy systems;
- encouraged greater efforts to attract private investment in advanced energy technologies as a way to produce vigorous economic growth while limiting emissions and noted that mechanisms to address this issue are being discussed within the context of the United Nations Framework Convention on Climate Change;

- stressed the importance of promoting energy research and development, commercial and economic transfer of environmentally sound technologies, and continuing cost-reduction in the introduction of these new technologies, with the direct participation of the business sector; and
- welcomed progress made in promoting environmentally sound and efficient measures in the area of minerals and energy exploration and development.

Environment

Environment Ministers, at their meeting on sustainable development in Toronto in June 1997, agreed that APEC's wide-ranging work on environmental issues was relevant to the FEEEP initiative. At Toronto, Ministers launched three major environmental initiatives, namely:

- Sustainability of the Marine Environment,
- Cleaner Production Strategy, and
- Program of Action on Sustainable Cities.

Sustainability of the Marine Environment has been advanced by the Marine Resources Conservation Working Group. The Cleaner Production initiative has been advanced by the Industrial Science and Technology Working Group. A number of APEC fora have been involved in the Sustainable Cities initiative, including in particular the Economic Committee's Infrastructure Workshop in respect of infrastructure for sustainable cities.

In addition to these core initiatives, there is a broad range of environment-related work within APEC that contributes to the region's FEEEP response. For example, in addition to the Cleaner Production Strategy, the IST is also advancing a number of initiatives of broad relevance to FEEEP, including the establishment of the APEC Coordinating Centre for Good Clinical Practices and the International Molecular Biology Network; advancing the APEC Emerging Infectious Diseases Action Plan; conducting joint research on acid rain and biodiversity; and, through the APEC Center for Technology Foresight, conducting two studies, one on water supply and management and another on megacities and technology. Meanwhile, a number of other groups are contributing to improving the environment in the APEC region, in particular the Human Resources Development Working Group in its program of training related to sustainable development and the Energy Working Group's programs related to cleaner energy which were described above. In 1998, progress was made on a number of the fronts mentioned above.

Sustainability of the Marine Environment

The quality of the marine environment is closely linked to the food supply and economic and social well-being in the Asia Pacific region. At the same time, the marine environment is affected by traditional and commercial activities including

fisheries, shipping, tourism, recreation, aquaculture, and offshore gas, oil and mineral extraction.

Considerable progress was made in 1997 and 1998 with respect to the marine environment that contributes to positive outcomes on FEEEP-related concerns. The Marine Resource Conservation Working Group (MRC) has implemented a number of workshops to create awareness among, and obtain commitment from, various stakeholders, including government agencies, scientists, the private sector, and non-governmental organizations. Goals and actions include:

- implementation of the Global Program of Action (GPA) for the prevention of marine pollution from land-based activities;
- development of a strategy and action plan to enhance protection of the marine environment from ships; and
- formulation of recommendations on how to avoid the impact on the marine environment of destructive fishing practices.

Task teams have been formed on Analytical Methods and Standards for Marine Algal Toxins as well as on Algal Biotxin Regulations as part of the scientific and regulatory infrastructure to certify and safeguard seafood safety with respect to algal toxins.

Furthermore, applying the innovative technologies now available for exchanging information, web pages and mirror sites have been established for the Ocean Model and Information System for the APEC region. These provide satellite images and *in situ* data and allow the forecasting and monitoring of marine environmental disorders and disasters. Through the Ocean Research Network for the Pacific, member economies share and exchange ocean and coastal research data and related technologies for sustainability initiatives under APEC.

Notwithstanding all this progress, much remains to be done, in particular to promote more widespread compliance with the recommendations and action plans set in place within APEC in pursuit of sustainability of the marine environment. Given a lack of major land barriers throughout the Pacific and a complex pattern of trans-oceanic currents, the Pacific Ocean is perhaps the most highly connected and continuous ocean on the planet in terms of water movement. This also demonstrates the need for APEC to continue to take into account activities in other relevant international and regional organizations that share with APEC similar interests and objectives in this area.

In the recent Oceans Declaration, concluded at Honolulu on October 16 1998, APEC economies pledged to undertake a series of actions in regard to oceans. They recognized the importance of the oceans and seas to the APEC region and committed to a plan of action:

- to protect the marine environment and
- to collaborate to better understand the oceans.

They also recognized the need to apply the United Nations Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fisheries and acknowledged the importance of bringing into force in a timely fashion the United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks and the FAO Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. The Declaration also noted the potential benefits of establishing a representative series of marine protected areas and the need to take an integrated approach to ocean-related activities.

Cleaner Production Strategy

The magnitude of new investment in industrial capacity in the Asia Pacific region, combined with the increasing use of more flexible and cost-effective environmental management techniques, creates an opportunity to achieve cleaner production and thus more sustainable industrial development in the APEC region. This is of central importance in the FEEEP nexus of issues.

APEC is actively promoting cleaner production by helping to identify best practices and establishing a strategic agenda for technical cooperation in partnership with the private sector. The APEC Cleaner Production Strategy, which pulls together this work, has two broad goals:

- to achieve dramatic progress in reducing environmental impacts in various industry sectors through promotion of appropriate cleaner production technologies, policies and practices; and,
- to achieve broader adoption of crosscutting policies and methods for cleaner production through institutional, professional and private sector partnerships.

APEC has made substantial progress in 1998 towards implementing the APEC Cleaner Production Strategy. The Industrial Science and Technology Working Group (IST) and other APEC fora have initiated and/or completed eleven projects. Additional projects are planned as well as a workshop to discuss effective implementation of this Strategy.

Projects already initiated include:

- Cleaner Production Initiative in the Electronics and Computer Sector
- Training Course on Cleaner Production for Textiles Dyeing and Finishing Industry, held in Chinese Taipei
- Development of APEC Industrial Environmental Performance Indicators; including the hosting by the USA in November 1998 of an APEC Symposium to highlight world class approaches in this area
- Methods for Evaluating New Technologies
- Innovation and Apprenticeship in Pollution Prevention
- Cleaner Production Policies and Practices Stock-take
- Cleaner Production Needs in the Food Industry
- Training Course on Cleaner Production in the Metal Finishing Industry, held in Chinese Taipei in November 1998

- Adoption and Development of a Multilingual Environmental Thesaurus System
- Enhanced implementation of ISO 14000 for APEC Economies
- APEC Virtual Centre for Environmental Technology Exchange

At their meeting in Mexico City in October 1998, APEC Ministers responsible for Science and Technology reaffirmed their commitment to this program.

Sustainable Cities

A number of contributions have been made to advancing the APEC Sustainable Cities agenda in 1998.

- *Seminar on use of Economic Instruments to enhance the Sustainability of Cities:* This seminar, which was endorsed by APEC Environment Ministers in June 1997, was held in cooperation with the Economic Committee in Taipei, Chinese Taipei in December 1997. The seminar provided an opportunity to discuss best practices and exchange information on economic instruments being used in APEC member economies to enhance environmental protection of cities. The Economic Committee study, *Survey Results on the Use of Economic Instruments in APEC*, contributed to the discussions. This study was undertaken as a means of sharing individual member economies' experiences with the use of economic instruments for environmental protection. The instruments included in the survey were environmental user charges, deposit/refund systems, tradable permits/quotas, and financial incentives/ environment liability. The section on 'lessons learned' indicates what works and what does not and thus assists members in designing and implementing measures that are suitable for their own particular circumstances. This study was published by the APEC Secretariat, in January 1998.
- *APEC Symposium on Environmental Education towards Sustainable Cities:* This symposium, which was endorsed by APEC Environment Ministers in June 1997, took place in Sendai City, Japan on 20-21 September 1998. The Symposium addressed the role of education in realizing sustainable cities, discussed the issues and measures involved in promoting such environmental education and clarified the way forward in this process. Experts and practitioners from member economies, international organizations, universities and research institutes, and non-governmental organizations in the Asia Pacific region were brought together to share their experience and knowledge and to create momentum towards promoting environmental education for Sustainable Cities.
- *Infrastructure for Sustainable Cities:* The Economic Committee's Infrastructure Workshop, at its meeting in Taipei in May 1998, accepted Canada's offer to work jointly with the APEC Secretariat and Malaysia to develop the action program on infrastructure for sustainable cities focusing on a decision support system which would include: (i) a proposal for a "virtual policy studio"; (ii) the use/improvement of existing infrastructure information systems; (iii) an inventory/map of Urban Centers of Excellence; and (iv) computer "future scenario" building tools. The end result envisaged is an Urban Network to support, through improved infrastructure

design, development and management, the implementation of the Agenda 21 Action Plan for Cities. A workshop has been planned for January 1999 in Bangkok which is expected to lead to a pilot project, demonstrating how the virtual policy studio can be applied.

Human Resources Development for Sustainable Development

The Human Resources Development Working Group (HRD) is working on a number of projects that complement other FEEEP-related activities within APEC. In particular, a project that seeks to promote awareness of the human resource management skills and knowledge required to implement cleaner production principles, specifically in the food industry, has been substantially advanced in 1998. An ongoing self-funded project is the APEC Sustainable Development Training and Information Network which is designed to promote capacity building for sustainable development.

Cross-cutting and Integrative Aspects of FEEEP

The Economic Committee, based on its analytical work in 1997, and particularly on the results of the FEEEP Symposium held in Saskatoon in September 1997, considered the question of joint actions in its deliberations during 1998. The Committee noted that, while FEEEP is by its nature a crosscutting, integrative initiative, specific actions to address FEEEP-related issues will tend to fall into the responsibility areas of particular fora. In this regard, many of the specific issues that the FEEEP discussions had highlighted as important were already addressed in the work programs in the areas of food, energy and the environment.

The Committee further noted that analysis of FEEEP is distinguished by the fact that it brings together various scientific disciplines, integrates various economic sectors, and involves people from various groups in society (including government, academia, business and non-governmental organizations). Indeed, this mix of disciplines, sectors and societal groups contributed in no small part to the success of the 1997 FEEEP Symposium which, in the view of the participants, warranted a continuation of the process, including a further FEEEP Symposium.

While the benefits of this type of cross-pollinating, integrative activity is almost universally acknowledged, it is also difficult to maintain momentum on such initiatives precisely because specialization tends to promote “stove-piping” of thinking and action. Accordingly, one very important contribution that APEC could make would be to encourage the formation of an institutional framework to support cross-disciplinary, multi-sectoral approaches to ongoing research and analysis of FEEEP.

Possible actions: Interdisciplinary Network of Research Institutions

Taking advantage of modern communications technology, a “virtual” network of existing institutions could be established including academic, non-governmental and business think tanks undertaking research and development work in various FEEEP-related areas.

The development of such a Network could be considered using existing mechanisms such as the APEC Study Centre Network. The results of the work of the Network could be channeled into APEC policy consideration through the Economic Committee.



ASIA-PACIFIC ECONOMIC COOPERATION

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