



**Environment and Development in Arab Countries:  
Economic Impacts of Climate Change  
Policies in the GCC Region**

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## 1. Background

Since early 1970s, the GCC economies have made continuous efforts to reduce their relative dependence on the oil sector through the development of manufacturing and services sectors. The scope as well as the success of these diversification efforts, however, varied widely across the GCC region. For example, during the period 1990-1997, non-oil exports account for 30% of total export proceeds in Bahrain, 18% in Oman and Qatar and only around 10% in the oil rich members of Kuwait, Saudi Arabia and United Arab Emirates. Thus after three decades of diversification efforts, the contribution of oil exports in GCC economies remains quite high. This pattern of dependence is further reflected on the structure of budget revenues in these countries with oil revenues on average accounting for 87% in Kuwait, 78% in Oman 74% in Saudi Arabia, and 77% in United Arab Emirates during the period 1990-1997.

This large dependence on the oil sector coupled with large degrees of openness explains the vulnerability of these economies to international price shocks. Perhaps this vulnerability is best illustrated by the impact of the decline in oil prices during 1998 on these economies. Real growth rates dropped, export proceeds declined and budget deficits soared to a level of about US\$20 billions in 1998.

Apart from the short-run fluctuations in oil prices that may be apt to coordination problems among the members of the OPEC cartel, the three major forces that may shape the oil market over the next two decades are climate change, competition from renewables, and technology. The International Energy Agency (IEA) estimates indicate that renewable constitute 13.8% of total world primary energy supply in 2000 with biomass representing 80% of renewable. In OECD the estimates show that the supply of new renewable (Wind, Solar, Geothermal) had grown by 9.4% over the period 1971-2000 and projected to grow annually by 2.7% over the period 2000-2030. Yet, due to expected shifts from biomass to modern energy in developing countries, the total contribution of renewables to world energy supply is projected by IEA to drop to 12.5% in 2030. Steady technological improvements in exploration techniques are expected to stabilize oil supplies and bring down extraction costs. Technological advances in fuel efficiency in developed countries are expected to weaken the growth of fossil fuel demand and thus along with the supply conditions are expected to exert a downward pressure on oil prices. Nonetheless, the climate change issue may prove to be the most important factor affecting the international demands and prices of oil as well as of other fossil fuels over the next 20 years.

## **2. An Overview of the Climate Change Policy Regime**

Increasing risks of potentially irreversible changes in the global climate due to human influences have generated international responses to limit the emissions of anthropogenic Greenhouse Gases (GHG). These efforts, starting with the Framework Convention on Climate Change (FCCC) in 1992, had culminated in the Kyoto Agreement in 1997, which obliges developed industrial countries (Annex B) to reduce their GHG emission by about 5% from their 1990 levels by the time frame 2008-2012. The meetings of the conference parties (COP) in Bonn and Marrakech, in 2000 and 2001 respectively, have settled on the implementation issues and thus paved the way for the Kyoto Protocol to enter into force. Yet important issues and concerns to developing countries, such as adaptation, funding, and technology transfer remain to be worked out through the conference Subsidiary Bodies for Scientific and Technological Advice (SBSTA) and for Implementation (SBI). To this concern, the November 2002 meeting of conference parties in New Delhi (COP8) had reflected developing countries issues such as adaptation and sustainable development without reaching any substantial progress on this front. In particular, in this recent COP developing countries represented by the G77 group have emphasized the need for technology transfer and financial assistance to cope with the adverse economic effects of the climate change and as well the effects of the response measures to be taken by the developed countries to reduce their GHG emissions under the Kyoto Protocol.

To enter into force, the protocol needs the ratification of 55 nations accounting for at least 55% of developed countries carbon dioxide emissions in 1990. By the time of writing, 96 nations have ratified the protocol, yet to satisfy the 55% emissions requirement the ratification by Russia is a must given the withdrawal of the United States.

## **3. The Economic Impacts of Response Measures**

International trade links among countries will transmit effects of greenhouse-gas control measures adopted by one set of nations to countries that may not have agreed to share the burden of control. For example, emissions restrictions under the Kyoto Protocol will increase the cost to Annex B regions of using carbon-emitting fuels, thereby raising manufacturing costs of their energy-intensive goods, some of which may be exported to developing countries. The restrictions also will lower global demand for carbon-emitting fuels, reducing their international prices. In

addition, emissions control may depress economic activity in countries subject to emissions restrictions, lowering these countries' demand for imports, some of which come from developing countries. In combination these changes in trade volumes and prices can have complex consequences, harming some developing countries while benefiting others.

Beginning with the framework convention on climate change, the parties have agreed that implementation of any agreement should give special attention to the concerns of vulnerable economies. Article 4.8 of the convention states:

In the implementation of commitments ... the parties shall give full consideration to what action are necessary... to meet the specific needs and concerns of developing country parties arising from adverse effects of climate change and/or the implementation of response measures...

Among a list of nine specific points of focus for this concern is the following:

(h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on consumption of fossil fuels and associated energy-intensive products.

Article 4.9 of the convention calls for special attention to the least developed countries "with regard to funding and transfer of technology".

The Kyoto Protocol restates this obligation, using somewhat stronger language. In particular its Article 2.3 holds that:

The parties in Annex I (which refers with slight difference to the same group as Annex B) shall strive to implement policies and measures ... in such a way as to minimize adverse effects, including ... effects on international trade, and social, environmental and economic impacts on other parties, especially developing country parties and in particular those identified in Article 4, paragraphs 8 and 9 of the convention, which consist mainly of energy exporting and small island countries.

Article 3.14 goes on to call for early consideration by the parties of “what actions are necessary to minimize the adverse effects,” and expands the list of mechanisms to be considered to include “the establishment of funding, insurance and transfer of technology”.

The relevance of these provisions for the GCC countries is obvious. On one hand, given their fragile ecosystems, the GCC countries would likely be victims of the adverse effects arising from climate change. In particular climate change may add to existing problems of desertification, water scarcity and food production. On the other hand, and most important, the GCC economies would be harmed by the implementation of response measures given their degree of openness and their high rate of dependence on the oil wealth.

The objective of this note is to provide an assessment of the magnitudes and mechanisms through which implementation of Annex B commitments in the Kyoto Protocol may affect these economies, and in view of the above provisions, how then these effects might be mitigated.

#### **4. The Magnitudes and Distribution of the Kyoto Burdens**

The Energy Journal produced a special issue in 1999 that focused on quantifying the economic costs of implementing the Kyoto Protocol. The issue included results from economic models that are widely used in assessing the economic impacts of climate change policies. Though these models differ widely in their structures, assumptions and regional coverage, they agree that the burden of implementation will unevenly fall on energy exporting countries. The magnitudes of costs on oil exporters for the emission trading case in these models are reported to range between 0.5% and 4% loss of GDP in 2010. In spite of the caveats raised about these models, these results are indicative of the large distributional aspects of the Kyoto Agreement that the flexibility mechanisms and the provisions of Articles 2.3 and 3.14 of the protocol need to be invoked to mitigate these effects. With emissions trading in CO<sub>2</sub> permits among Annex B parties, these models showed that the GDP loss would be reduced by about 40%. If in addition the other greenhouse gases are included, Reilly et al (1999) showed that the losses would be reduced by about 60% in 2010. Nonetheless, these latter results may only be regarded as lower bounds since these models typically assume that trading and flexibility mechanisms are implemented in cost-effective ways whereas in reality there are various impediment and obstacles that preclude the efficient working of these mechanisms.

To explore the magnitudes and the transmission mechanism along with the possible ways to reduce the impacts of Annex B response measures on the GCC region, I report the results from Babiker et al (2000) study on Kyoto Protocol and developing countries.

#### 4.1 Magnitudes and Transmission Mechanism

Table (1) shows the Decomposition of the Impacts of the Kyoto Protocol in 2010 for a non-emission trading case. A first indication is that the losses experienced by the GCC region, whether in GDP or welfare terms, are higher when compared to an Annex B country like Japan or even when compared to the other energy exporting regions like Venezuela or North Africa. The transmission mechanism through which such large losses take place are a fall in the international price of oil (by 15% in this case) and an increase in the import prices of energy-intensive goods in the GCC region. Thus as reflected in the table the terms of trade for this region deteriorate by about 9% whereas those of Annex B and other energy importers such as South Korea and India witness an improvement. Yet a further channel (not included in the model) through which the losses experienced by GCC countries could be transmitted to other developing countries is expatriate remittances. The labor market statistics during the period 1990-1998 indicate that the expatriate labor force represents 63% for Bahrain, 83% for Kuwait, 61% for Oman, 86% for Qatar and 65% for Saudi Arabia (Zind, 2002). Hence the income losses inflicted by the response measures on the GCC countries would also be shared by some of the poorest nations in Africa and Asia.

The second feature reflected in the table is the uneven distribution of burdens from Kyoto with the GCC region experiencing the most costs and with leading developing countries such as south Korea gaining from the implementation of the Protocol.

The third aspect of the results indicates how misleading GNP can be as a measure of the burdens of an emission-control program compared to welfare. In particular, the relatively higher GNP losses in Annex B are mitigated by favorable movements in these nations' terms of trade, whereas the relatively lower GNP losses for oil exporters are aggravated by the deterioration in their terms of trade. Thus the high welfare loss for the GCC region is both due to a fall in income (GNP) and an increased cost of consumption caused by the rise in the price of the imported consumer goods.

**Table (1) Decomposition of Impacts of the Kyoto Protocol  
(2010) for Selected Regions**

	Percentage Change with Kyoto Protocol		
	Welfare	GNP	Terms of Trade
Japan	-0.75	-1.84	1.4
South Korea	0.04	0.19	0.5
India	0.29	0.55	1.1
Venezuela	-2.92	-2.56	-8.8
GCC	-3.81	-3.12	-8.7
North Africa	-2.40	-2.77	-6.8

Source: Babiker et al (2000).

#### 4.2 Implementation Measures to Reduce the Effects

In the spirit of the provisions in Articles 4.8 and 4.9 of the Framework Convention and Articles 2.3 and 3.14 of the Kyoto Protocol, Babiker et al Study considered two sets of actions that Annex B countries could take to limit negative impacts on Non-Annex B countries. The first is a set of policy measures that could accompany implementation of Annex B controls. This set includes revision of fuel taxation policies, removal of coal subsidies, and trading of emission permits. The second set of policy measures includes actions that Annex B countries might consider to meet the needs of particular developing countries.

##### ***4.2(a) Revision of Fuel Taxation, Removal of Subsidies and Emission Trading***

In many Annex B countries a variety of fuel taxes are in place for decades. Taxes on oil products are specially important and for some European countries these taxes represent more than 70% of the price paid by consumers.

The original justification for these taxes were many and varied, depending on the country. For some, the taxes were meant to limit foreign exchange drain or dependence on foreign suppliers. In other cases taxes were a source of general revenues or a source of funding construction and maintenance of highways. More recently, relief of road congestion and reduction of urban air pollution have offered additional justifications.

However, in the latter cases, fuel taxes may serve as highly inefficient mechanisms for achieving the stated objective. If these taxes are not efficient responses to external effects of fuel use then they distort economic decisions and thus removing them may improve economic efficiency and welfare. For example, if fuel taxes are meant mainly to collect revenues, then carbon permit sales or carbon taxes could replace this source of revenue without jeopardizing economic efficiency with such separate fuel taxes. For the climate change reason, replacing fuel taxes with a uniform tax on the carbon content of the fuel would achieve more carbon reductions than levying the carbon tax on the top of the existing fuel tax for the same level of revenue collected. Yet this would shift the tax burden from oil to coal, because coal has more carbon content, and would thus result in smaller decline in oil prices and smaller losses of oil exporters.

On the other hand, coal subsidies are clearly unjustifiable in any efficient response to the threat of climate change. These subsidies encourage coal usage at the expense of oil and natural gas and are estimated by IEA to be 5.5% in 1998, primarily in Japan, Germany, Spain and France. Removing these subsidies from Annex B nations would both reduce the implementation costs in Annex B and the adverse effects on developing-country energy exporters.

The provisions for flexibility mechanisms including emissions trading are covered by Article 17 of the Kyoto Protocol, the details of which were agreed upon in the conference parties meeting in Marrakech (COP7).

In spite of the complexities of alternative implementation schemes that may prevent attainment of the cost savings of an ideal emissions trading regime (Hahn and Stavins, 1999), as noted before, many studies have indicated the great potential for cost reductions in Annex B and accordingly the reduction of losses for energy exporters that could be achieved through trading.

The separate and combined effects of these three policy measures on the GCC and the other oil exporters are shown in Table (2). Among the three measures the removal of coal subsidies has very minimal effect whereas removal of existing fuel taxes account for almost the same welfare gain as that from an ideal emissions trading regime for the GCC region. More interestingly and contrary to what might be expected, the separate effects of these three measures are not additive. Indeed, for Venezuela and the North Africa region, the combined effect is twice the sum of the separate effects and for the GCC region the combined effect is about 50% higher than



the sum of the separate effects. In particular, for the GCC the welfare cost is reduced from -3.18% to -0.55% by combining these measures together, which is mainly the result of reducing the collapse in the international oil price from 15% to only 2.5%. On the other hand (not shown in the table) none of the Annex B parties is adversely affected and many have achieved considerable reductions in welfare costs as a result of combining these three measures.

Thus combining removal of existing fuel taxes along with emissions trading in Annex B almost offsets the welfare costs inflicted on energy exporters by the Kyoto response measure without resulting in additional costs to Annex B region.

**Table (2) Reference Welfare Loss Under Kyoto Implementation and the Change in Loss Under Alternative Policy Measures**

	Venezuela	GCC	North Africa
Reference Welfare Loss	-2.92%	-3.81%	-2.40%
Change in Welfare Loss with:			
Removal of Existing Fuel Taxes	+0.16%	+0.96%	+0.37%
Removal of Coal Subsidies	+0.0%	+0.01%	+0.0%
Emission Trading	+0.81%	+1.03%	+0.5%
Combining the Three Measures Above	+2.47%	+3.26%	+1.80%

Source: Babiker et al (2000).

#### ***4.2(b) Direct Measures to Reduce the Effects of the Kyoto Response Measures***

The ways in which emissions constraints are implemented can substantially alter magnitudes and distribution of costs, yet as long as such policies lead to reductions in fossil fuel use, fuel exporters will experience adverse consequences. To meet the needs of developing countries adversely affected by climate change or the response measures of Annex B, the protocol called for the establishment of a special fund for these purposes. At COP7 in Marrakech the parties agreed to establish a new funding mechanism that includes: the special climate change fund, the adaptation fund, and the least developed countries fund, and a total sum of \$400 million was pledged by developed countries to these funds. Yet how these funds may be used to alleviate the effects of response measures beyond technology transfers is unclear.

Babiker et al considered two options that might assist affected developing countries beyond the general implementation measures considered above. These are tariff concessions and direct compensations.

Unfortunately, non-energy tariff concessions were found to benefit only developing countries with diversified economies which already are predicted to benefit from the implementation measures, but adversely affected economies like the GCC region would not benefit from these concessions due to their heavy reliance on the single energy export sector.

The calculation of the level of financial transfers that would be required to compensate losses to Non-Annex B regions, is of interest even if such a direct transfer mechanism is unlikely to be established. In particular such calculations offer some indication of the attention that should be given to other mitigation measures including technology transfer. Naturally, the amount of compensation required to “minimize” Kyoto effects would depend on the stringency of the emissions control measures taken, how the measures are implemented and other uncertain economic developments between now and 2010.

Babiker et al devised a financing mechanism that involved a redistribution of carbon permits from Annex B to Non-Annex B with the objective of meeting the welfare criterion stated in the transfer scenario. The results for selected oil exporting countries are shown in Table (3).

With no Annex B trading in emissions permits, Table (3) indicates the “minimization” of adverse impacts to energy exporters in Non-Annex B region (noted welfare change = 0) would require an overall annual financial transfer of \$27.6 billion in 2010. Over half of this amount would constitute the required transfers to compensate the losses of the GCC region. Alternatively, if the objective were to mitigate these effects but not necessarily eliminate them, the overall transfer required would be greatly reduced. For example, if welfare loss for Non-Annex B were to be limited to 1% in 2010, the overall transfer is reduced to \$14.5 billion of which \$11.5 billion to compensate the GCC region. In contrast, the overall amount of transfer needed to hold the welfare change in Non-Annex B to zero with emissions trading among Annex B would be reduced to \$20 billion of which more than 50% would accrue to the GCC region. Though the level of transfer would further be reduced if all GHG gases were included in the trading regime, yet even just 5% of the level indicated above would be significantly higher than the \$400 million pledged by Annex

B parties at Marrakech. None the less, despite their political infeasibility, the magnitudes of such transfers would represent a good bargaining benchmark in the ongoing negotiation process.

**Table (3) Financial Transfer from OECD Countries Required to Reduce Oil Exporters' Welfare Losses in 2010 to Zero, or to a Maximum of 1% (1995 \$US billion)**

	Without Emission Trading		With Emission Trading
	Welfare Change=0	Welfare Change <1%	Welfare Change=0
Indonesia	1.59	0	1.16
Mexico	1.75	0	1.16
Venezuela	1.97	1.29	1.44
GCC	15.60	11.50	11.50
North Africa	2.96	1.72	2.26
<b>Total (Non-Annex B)</b>	<b>27.6</b>	<b>14.5</b>	<b>20.0</b>

Source: Babiker et al (2000).

## 5. Concluding Remarks

Climate change response measures may pose a real threat to the economic wellbeing in the GCC region. This note has focused on aspects of implementation measures in Annex B and other mechanisms available under the FCCC and the Kyoto Protocol that may be used to mitigate the adverse effects of such response measures on developing countries. Though some sort of international response to ameliorate the adverse effects is necessary, at least in the short run, the real challenge for GCC economies to cope with the climate change issue in the long run lies in their ability to reduce their dependence on the oil sector. This requires continuous and sustained efforts to diversify their economic structures and promote new exports. Yet the active role of governments to promote diversification in the GCC through export and investment measures would be limited by their commitment, under the WTO which precludes the use of export subsidies and certain investment measures. Nevertheless, some of the industries in which the GCC countries have natural comparative advantage and whose competitiveness would be further enhanced under the climate change treaty are energy-intensive industries such as petrochemicals, fertilizers, steel

and aluminum. Hence a viable diversification strategy in GCC countries may focus on these industries with the objective to compensate their loss of oil exports with increased exports of these products. Yet, such a strategy itself might face problems in the long run when GCC would undertake some emissions reduction commitments or if Annex B would take possible protective measures to safeguard the competitiveness of its energy-intensive industry, which necessitates the continuity of the diversification efforts in the GCC region.

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# **Environment and Development in Arab Countries: Economic Impacts of Climate Change Policies in the GCC Region**

## **Abstract**

The high rate of dependence of the GCC economies on the oil wealth makes them vulnerable to international oil-price shocks. One of the important threats to the oil markets in the next two decades is seen by many observers to lie behind the international efforts to curb human sources of greenhouse gas emissions. If serious measures to reduce emissions from such sources are implemented they would have significant impacts on oil exporters through their adverse effects on oil prices and these economies terms of trade. Thus some sort of international as well as domestic responses to ameliorate such adverse effects are necessary to help these affected economies to cope with the climate change policy regime. This paper discusses the scale of these adverse effects for the GCC economies and the possible provisions under the Framework Convention on Climate Change (FCCC) and the Kyoto Protocol that may be invoked to mitigate these effects.

## البيئة والتنمية في الدول العربية: الآثار الاقتصادية لاتفاقيات تغير المناخ على دول مجلس التعاون الخليجي

### ملخص

إن درجة الاعتماد العالية على الثروة النفطية تجعل اقتصاديات مجلس التعاون الخليجي عرضة لصددمات أسعار النفط العالمية. ويرى العديد من المراقبين أن أحد أهم التهديدات التي تواجه أسواق النفط خلال الحقتين القادمتين تكمن وراء الجهود العالمية لكبح المصادر البشرية لانبعاثات غازات الدفيئة، حيث إذا ما تم تطبيق إجراءات صارمة لتخفيض الانبعاثات من هذه المصادر فإنه سيكون لها آثار هامة على مصدري النفط من خلال تأثيراتها السلبية على أسعار النفط العالمية وعلى شروط التبادل التجاري لهذه الاقتصاديات. لذلك فإنه من الضروري إيجاد آليات على المستوى الدولي والمحلي لتخفيف هذه التأثيرات السلبية ومساعدة الاقتصاديات المتأثرة على التأقلم مع الوضع الناتج من سياسة تغيير المناخ. وفي هذا الإطار تناقش هذه الورقة حجم هذه التأثيرات السلبية على اقتصاديات مجلس التعاون الخليجي والآليات المتاحة في ظل اتفاقية الأمم المتحدة الإطارية حول تغيير المناخ (FCCC) وبروتوكول كيوتو والتي يمكن تنشيطها لتقليل هذه الآثار.