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Climate Change Threats, Opportunities, and the GCC Countries

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Contents

Climate Change	1
UN Climate Change Conference in Bali	5
Emissions Trading Market in GCC Countries	6
Institutional Developments	9
Civil Society	10
Renewable Energy and Climate Change	10
Conclusion	12

Executive Summary

This Policy Brief covers the issue of climate change in relation to the Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and UAE). It discusses the GCC status with regard to carbon emissions market projects and Clean Development Projects (CDM) in the Arabian Gulf region, as well as the institutional setup and civil society in the region and their potential role in CDM. Finally, the new green energy initiatives in the region are presented.

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Oil and gas revenues for GCC countries have enabled exceptional and accelerated development in all aspects of life. These countries have become a hub of intense activity in many spheres—geopolitical, military, economic, industrial, construction, and tourism, to name a few. However, the scale of oil and gas production and use has also led to severe environmental problems.

The GCC countries face a multitude of “traditional” environmental challenges, such as desertification, biodiversity loss, pollution in marine and coastal areas, air pollution, and water scarcity and quality. During the past few years, an additional set of environmental problems has arisen, especially those related to military conflicts and construction and demolition debris. Prominent among these emerging environmental problems faced by the region is climate change, the focus of this *Policy Brief*.

It is worth mentioning that traditional and emerging environmental threats are all interlinked. For instance, desertification leads to biodiversity loss; livestock increase and overgrazing leads to desertification; waste-dumping releases methane, which adds to the global warming problem, which in turn leads to desertification, water scarcity, and many other ecological disasters.

Ecological Footprint can be a good indicator for us to understand the severity of these problems. According to the WWF/Ecological Footprint report *Our Living Planet*, which covers 150 countries around the world, the UAE has the largest footprint in the world, i.e. people in the UAE are placing the most stress per capita on the planet. Compared to the world average Total Ecological Footprint (TEF) of 1.8 global ha/person, the TEF for the UAE was 11.9 global ha/person (hectares/person). Kuwait and the Kingdom of Saudi Arabia also have very large footprints — 7.6 and 4.6 global ha/person respectively. (The above-mentioned countries are the only GCC countries that figure in the report.)

Certainly, the report is just an indicator of the unsustainable patterns of development and living. Furthermore, criticism can be directed towards the report, as it is unfair to compare tropical countries with nations in arid zones because the climatic conditions and pressures on the environment are very different. In addition, the UAE has contributed to environmental projects in other parts of the world, such as Pakistan, Morocco, and Lebanon. Another point that is not considered in the report is the millions of dirhams that are sent out of the UAE by the large expatriate population who are supporting their families back home.

CLIMATE CHANGE

The UN Intergovernmental Panel on Climate Change (IPCC) published four reports in 2007 stating that global warming is an observable fact beyond all doubt. Anthropogenic activities are the main reason for climate change. The report stated that, because of global warming, in the last 12 years the earth has seen the warmest surface temperatures since 1850 and higher global average sea levels. Temperature rise is blamed for a wide range of natural incidents around the globe, such as rising sea levels, melting ice caps, and an increase in the number of severe storms. If temperature rise is not stopped, and particularly if it exceeds 2 to 3 degrees Celsius, IPCC warns that the world could face massive species extinctions, widespread starvation, declin-



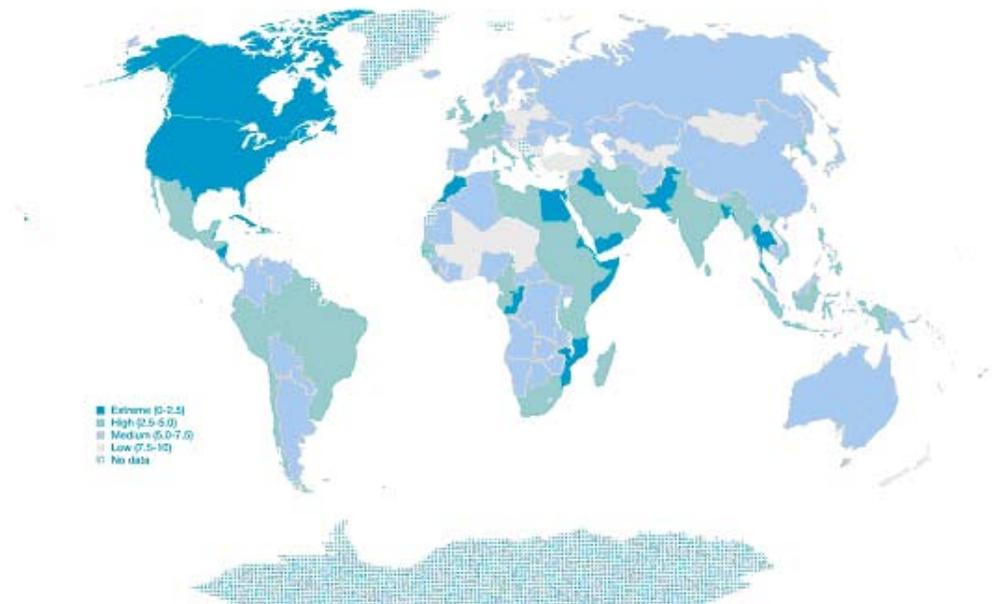
ing production of crops, and a persistent rise in sea levels that could drown perhaps major parts of the world’s coastal areas. As a result, climate change is considered by many security experts to be a greater threat than global terrorism.

The GCC countries will be directly impacted by such developments. If sea levels rise, natural and especially man-made islands in the region and elsewhere will disappear, with Bahrain potentially losing up to 15 kilometers of coastline. In addition, underground water salinity will increase, more land degradation will occur in the region, and biodiversity on land and in the Gulf will be affected. As one expert has stated: “There are two major and immediate consequences: first, rising sea levels will affect coastlines and marine life severely and could impact on desalination plants that are the source of water for the region. Second, rising temperatures means increasing water demand and with falling freshwater levels and increasing salinity in sea water (which affects the efficiency of desalination plants), water scarcity is a fearsome prospect.”¹

The social impact will be severe, as many workers will lose their jobs in agriculture, fishing, and some traditional oil industries as a result of a world shift toward renewable energy sources. In short, climate change threatens to seriously undermine efforts to eliminate poverty and reach the Millennium Development Goals (MDGs).

The *ecological* changes in the Gulf region are small compared to catastrophic disasters like hurricanes, tsunamis, and floods in other parts of the world. But, the *economic* impact in the Gulf countries will be more severe, as they mainly depend on revenues from oil and gas exports. If the world shifts soon to other renewable sources of energy, the Gulf region will suffer seriously. Figure 1, for example, shows that the Gulf region falls in the “high” category on the global map of vulnerability to climate change issued by the World Economic Forum (see Appendix for GCC countries’ per capita emissions ranking).

Figure 1



Source: World Economic Forum, 2007. Slight amendment by the author.

1. Meena Janardhan, “Climate Change-MIDEAST: Producers and Victims of Fossil Fuels,” *IPS*, December 13, 2007.



The Gulf countries face a difficult situation as they depend mainly on fossil fuels — the main cause of carbon dioxide (CO₂) emissions — and their economies are dependent on the oil, gas, and petrochemical industries. Though the rate of development is high, the lack of arable land and water resources prevents the development of carbon sinks, forests, and green areas.

Besides being the world's main petroleum exporters, Gulf countries have been under fire for carbon emissions from the large-scale use of fossil fuels. The UAE, Saudi Arabia, and Iran figure among the world's top 50 CO₂ emitters. Iran ranks 18th, Saudi Arabia 22nd, and the UAE 43rd, according to the World Resources Institute. Even though the region's total carbon emissions are very low (only 2.4%) compared to other regions, per capita emissions are very high. There is thus no doubt that the Gulf countries share responsibility with the rest of the world for climate change and hence must work to diversify the energy pie and look for more environment-friendly energy sources. Yet, while it is a common responsibility, different obligations must be charted out for different countries.² Giant emitters, for example, should shoulder more burdens. Gulf countries do recognize the problem and are trying to come up with innovative solutions in the renewable energy field to offset this. This is very clear in recent initiatives such as Abu Dhabi's Masdar, a carbon-neutral city due for completion in 2009.

Another option is for the GCC to base its stand on climate change and emission reduction issues upon the User Pays Principle (UPP). This is one of the basic principles of environmental economics, which is based on the premise that the countries which use fossil fuels instead of the producers should shoulder the burden of this carbon emitting source of energy. As such, oil prices have in fact been underpriced because the carbon emissions of the users have not been factored in. This is referred to as market failure, since the price produced by freely functioning markets does not reflect the true social costs or benefits of an action. In economic terminology, the environmental damage or benefit is an external effect or externality. Raising prices or providing subsidies to include these environmental costs and benefits can be made an integral part of the price mechanism. As a result, from the environmental point of view and leaving aside economic issues such as nominal prices of oil in the 1970s, inflation rates, and GCC currencies pegging to the US dollar, the GCC and oil-exporting countries have charged uneven oil prices in the past four to five decades because they have not added the margin for the external cost of climate change.

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) has called for, and is now trying to ensure that, of the 166 countries that ratified it, 40 industrialized countries should turn back to the level of emis-

2. In 2007, German Chancellor Angela Merkel put forward a proposal, praised by a number of scientists around the world, to allow developing countries to increase their emissions per capita while industrialized countries cut theirs, until both sides reached the same level. This proposal, however, would not be very fair for countries like those in the GCC, which are less populated and currently witnessing an economic boom, because it would entail slowing development. The proposal also does not take into account the expatriate population (especially labor which moves to booming economies). Furthermore, it might provide a motive for countries to race to increase their population and in that way create another global problem which will end up increasing emissions instead of reducing it.



sions in 1990 and reduce their overall emissions of GHG gases by at least 5% below 1990 levels in the commitment period from 2008 to 2012. GCC countries are either signatories or have acceded to many of these international environmental agreements (see Table 1). In addition, changes in environmental legislation are being made to cope with the requirements of these agreements or to close the gaps in the current environmental laws.

Table 1: Status of Accession to the Major Multilateral Agreements Dealing with the Environment in the GCC **

Country	CITES	CBD	Cartagena	UNFCCC	Kyoto Protocol	Ozone	CCD	POPs	CMS	Basel	Heritage	UNCLOS
Bahrain	-	R 1996	-	R 1994	A 2006	A 1990	A 1997	S 2002	-	R 1992	R 1991	R 1985
Kuwait	R 2002	R 2002	-	A 1994	A 2005	A 1992	R 1997	S 2001	-	R 1993	R 2002	R 1986
Oman	-	R 1995	A 2003	R 1995	A 2005	A 1999	A 1996	R 2005	-	A 1995	A 1981	R 1989
Qatar	A 2001	R 1996	A 2007	A 1996	A 2005	A 1996	A 1999	A 2004	-	A 1995	A 1984	R 2002
Saudi Arabia	A 1996	A 2001	-	A 1994	A 2005	A 1993	A 1997	S 2002	A 1991	R 1990	A 1978	R 1996
UAE	A 1990	R 2000	-	A 1995	A 2005	A 1989	A 1998	R 2002	-	R 1992	A 2001	S 1993

Source: Compiled by author

A=Acceded

R=Ratified

S=Signed

CITES: The Convention on International Trade in Endangered Species of Wild Fauna and Flora

CBD: United Nations Convention on Biological Diversity

Cartagena Protocol on Biosafety to the Convention on Biological Diversity

UNFCCC: United Nations Framework Convention on Climate Change

Kyoto Protocol of Climate Change

Ozone: Vienna Convention for the Protection of the Ozone Layer

CCD: United Nations Convention to Combat Desertification

POPs: Stockholm Convention on Persistent Organic Pollutants

CMS: Convention on the Conservation of Migratory Species of Wild Animals

Basel Convention on the Transboundary Movements of Hazardous Wastes and their Disposal

Heritage Convention Concerning the Protection of the World Cultural and Natural Heritage

UNCLOS: United Nations Convention on the Law of the Sea

The entire Arab region under the UNFCCC pact is in the Non-Annex I Parties category. Only some countries from the Gulf region have submitted their country reports to the convention secretariat (see Table 2). Even though the GCC countries joined the UNFCCC in the mid-1990s, some of them only submitted their report in the last couple of years.



Table 2: Initial National Communication and Date of Submission of Country Report

Non Annex I Parties	Country Reports, Date
Bahrain	April 20, 2005
Saudi Arabia	November 29, 2005
United Arab Emirates	January 2, 2007
Iran	March 31, 2003

Source: UNFCCC, 2007.

As a result, adaptation to the various impacts of climate change has been very low. Information acquisition, public awareness, mainstreaming impacts into policies, monitoring, evaluation, and implementation measures were almost nonexistent. However, mitigation initiatives have gained a lot of attention in the last couple of years and many pioneering initiatives have been undertaken, such as the Masdar initiative and research and funding in the fields of renewable energy, energy efficiency, and clean production and technology especially under clean development mechanisms.

Nevertheless, GCC countries lack clear targets to reduce greenhouse gas intensity. Moreover, much work needs to be done on establishing, maintaining, and improving the emission reduction registry. In addition, there is a need to implement a comprehensive range of new and expanded domestic policies, such as tax incentives for renewable energy and clean technology. Finally, cross-sectoral policies to fight climate change must be developed and integrated, especially in sectors like energy, agriculture, transportation.

Although the Gulf region only contributes about 2.4% of the GHG emissions, there is concern within Gulf countries about the climate change issue. In November, Gulf countries of the Organization of Petroleum Exporting Countries (OPEC) pledged a total of \$750 million to a new fund to tackle global warming through research for a clean environment. Kuwait, the UAE, and Qatar pledged \$150 million each for the fund. Saudi Arabia, the world's biggest oil exporter, will invest \$300 million in the fund, which is aimed at finding technological solutions to climate change, notably carbon capture and storage.

UN CLIMATE CHANGE CONFERENCE IN BALI

The United Nations Climate Change Conference in Bali was held from December 3-15, 2007. The main focus in Bali, however, was on long-term cooperation and the post-2012 period, when the Kyoto Protocol's first commitment period expires. Negotiators agreed on a two-year process, or "Bali roadmap," to finalize a post-2012 regime by December 2009. It was thus never intended that the Bali conference would focus on precise targets. Instead, the different parties and groups who drive the climate regime process launched a negotiating framework with "building blocks" hoping to reconcile local and global collective actions both in short and long-term interests. The informal dialogue over the past two years has now been transformed into a platform for the



engagement of parties from the entire development spectrum, including the United States and developing countries.

One of the significant outcomes bringing together both adaptation and finance was the decision to operationalize the Adaptation Fund, which was set up to finance adaptation in developing countries. The Fund had proven to be particularly delicate to negotiate because, unlike other funds under the UNFCCC, it is funded through a levy on CDM projects undertaken in developing countries and is therefore not dependent on donors. The Global Environment Facility (GEF) secured an interim role in providing a secretariat function of the Fund.

There was agreement to open up options in future discussions on long-term cooperative action with reference to reduced emissions from deforestation and consideration of the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks. The Adaptation Fund is of great importance to the region as it must seize the opportunity and garner funds and technology to fight both desertification and climate change at the same time. The Adaptation Fund was established in December 2007. Qatar joined the fund two months after its establishment, showing that awareness is very high among GCC countries now.

EMISSIONS TRADING MARKET IN GCC COUNTRIES

The Kyoto Protocol established three flexible mechanisms to assist Annex I parties in meeting their national targets cost-effectively: an emissions trading system; joint implementation (JI) of emission reduction projects between Annex I parties; and the Clean Development Mechanism (CDM), that allows for emission reduction projects to be implemented in non-Annex I parties (developing countries).

While countries such as India and China, in addition to many others in Latin America, were prepared to follow this path when the Convention and Protocol were signed in 1997, the Arab and Gulf region only started to think about emissions trading in 2006 and began implementing projects in 2007. Currently, there are many CDM projects in progress in the Middle East, in countries such as Egypt, Jordan, Bahrain, Morocco, and Tunisia. But given that in 2006 the global emissions trading market was worth \$30 billion and that this is an emerging new market in the GCC countries, there is a huge potential for Gulf companies to reduce emissions and earn money from generated credits.

In the Gulf, many companies and consulting firms have thus begun to explore this now fast-developing field. One of them, the UK-based EcoSecurities, opened a regional office in Dubai. The company has offices in Bahrain and Lebanon and is planning for branches in Saudi Arabia and Qatar as well as intermediates in Egypt and Libya next year. The Masdar Company of Abu Dhabi, meanwhile, is the first local company in the region to pursue a CDM project.

Regarding Clean Development Mechanisms (CDM), under the Kyoto Protocol, CDM encourages developing nations to cut GHG emissions by earning carbon credits through implementing CDM projects. Such credits can be bought and traded by companies and nations in the developed world. Kyoto Protocol mechanisms are,



however, not only about additional money; rather they provide an incentive for better environmental management and go beyond Business As Usual (BAU). The additionality principle is not only environmental additionality, but also economic and technological additionality.

The good news is that projects are now moving fast, as awareness is raised on all levels. Doha Bank, for example, is planning to launch the Arabian Gulf's first carbon credits exchange in 2009 to tap an emerging market for emissions trading. Moreover, CDM projects in the Gulf are being considered in various fields like renewable energy, waste, cement, etc. Current CDM projects include:

- A landfill project in Sharjah (in the very early stages but has received Designated National Authority (DNA) approval).
- The Dubal CDM Project. Masdar, Abu Dhabi will work with Dubai Aluminum Company Limited (Dubal) to develop and register a project to reduce GHGs from aluminum smelting, to claim credits of reduced GHGs at Dubal smelter at Jebel Ali.
- The Al-Shaheen Oilfield Gas Recovery and Utilization Project. The Qatar project, registered on May 29, 2007 (the path to registration took one year), is aimed at recovery and utilization of gas from oil wells that would otherwise be flared. The project is in the monitoring phase now and expected to receive Certified Emissions Reduction (CER) by March 2008.

The Al-Shaheen project is the first of its kind in the region and third CDM project in the petroleum industry worldwide. Other registered CDM projects are Rang Dong (Vietnam) and Kwale (Nigeria). The project activity has three main components: recovery of associated gas; transmission of associated gas along a pipeline; and processing of the associated gas at the gas processing plant, and local end-user utilization.

The Al-Shaheen oilfield has flared the associated gas since the oilfield began operations in 1994. Prior to the project activity, the facilities used 125 t/day (tons per day) of associated gas for power and heat generation, and the remaining 4,100 t/day was flared. Under the current project, total gas production after the completion of the project activity is 5,000 t/day with 2,800-3,400 t/day to be exported to Qatar Petroleum (QP); 680 t/day for on-site consumption, and only 900 t/day still to be flared. The project activity will reduce GHG emissions by approximately 2.5 million t/CO₂ per year and approximately 17 million t/CO₂ during the initial seven-year crediting period.

Still, questions need to be raised, including why the region did not witness registration of a CDM project until 2007 and why there are no CDM projects in the oil and gas industry, which is the dominant industry in the region. In this context, the following reasons could be provided:

- Political will was very weak.
- There is a lack of education and awareness on all aspects related to



CDM projects (even tax-wise on how to handle CDM revenues).

- Development is happening very fast and the region wants to use the money to develop as much as possible. Until recently, not much attention was given to environmental issues at the policy level; instead, the focus has been primarily on the economy and security (in case of conflicts).
- There is lack of infrastructure and capacity (expertise) in private and public sectors in some of the environmental fields such as CDM.
- Projects in the region are huge and take time to develop.
- The process of implementing CDM projects takes more time, especially in big oil companies.
- CDM projects, it is believed, do not fit in well with the oil business.
- Petroleum companies do not need the extra few thousand dollars that would accrue out of CDM.
- The petroleum industry cannot stop or change production easily, unlike other industries such as cement where overnight changes are possible.

As a result, while development in the Gulf region is rapid, political support and funds are available for development and environment activities, and environmental awareness is growing. As such, CDM is now considered an additional revenue source based on carbon credit sales. Potential CDM activities could thus be initiated in areas such as cement, landfills, industrial efficiency, waste management, industrial processes, agriculture, land use change, and forestry inventory. The energy efficiency projects in the Gulf, for instance, can save millions and reduce tons of CO₂ emissions and qualify as CDM projects. In addition, renewable energy — in particular solar energy — holds great potential for the region, similar to biomass in Asia. In the long term, the region could in fact export clean energy to the whole world.

In the meantime, while environmental laws exist, some executive regulations may be required to implement these laws and promote CDM projects in the Gulf. All concerned stakeholders should be involved, such as in Bahrain, where a committee for climate change was established that included local NGOs. On the regional level, the GCC also has a committee on climate change to create a unified opinion.

It is unlikely that countries in the region will try to solve the carbon emission problem by imposing carbon taxes. These countries depend heavily on petroleum and gas as the main source of revenue for their development plans and any carbon taxes might hamper this process. Furthermore, despite its approval in 2007 by the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 (London Convention), the potential for Carbon Capture and Storage



(CCS) is also very limited as a safe way of disposal. From the environmental point of view in relation to climate change, it is not the best solution as it will only postpone the problem and encourage more release and storage of CO₂. Leakage of the huge quantities of stored CO₂ might then turn this into an environmental disaster.

INSTITUTIONAL DEVELOPMENTS

On environmental issues, the GCC countries operate through a number of international and regional bodies that coordinate activities and set the framework for regional efforts.

At the state level, environmental ministries, agencies and councils, which are still fairly new, are struggling to play a significant role in the decision-making processes to address priority environmental challenges, problems, and threats facing both the GCC countries and the region. (See Table 3)

Table 3: Governmental Environmental Institutions and Agencies in GCC Countries

Countries	Policy institution	Executive agency
Bahrain	Environment and Wildlife Affairs	Public Commission for the Protection of Marine Resources, Environment and Wildlife
Kuwait	Environment Public Authority	Environment Public Authority
Oman	Council of Ministers	Ministry Environment and Climate Change
Qatar	Council of Ministers (Permanent Commission for Environmental Protection)	Supreme Council for the Environment and Natural Reserves
Saudi Arabia	Ministerial Committee on Environment	Presidency of Meteorology and Environment (PME)
UAE	Council of Federation	Federal Environment Agency/Ministry of Environment and Water Resources

Source: Compiled by author.

Due to the relatively new environmental authorities and lack of institutional capacity, many GCC countries first join international agreements and then seek solutions to fulfill commitments. Still, there have also been local developments among which the most notable are:

- In recognition of the importance of the impact of climate change, in November 2007 Oman changed the name of the Ministry of Environment and Regional Municipalities to the Ministry of Environment and Climate Change.
- Due to the lack of reliable data on environmental affairs, the Environment Authority in Abu Dhabi (Abu Dhabi Global Environmental Data Initiative (AGEDI)) launched an initiative with WWF-UAE and Global Footprint network to collect and prepare the footprint for the UAE. The Al Basama Al Beeiya (Ecological Footprint) Initiative, launched on October 18, 2007,



is the UAE's national effort to cut down its ecological footprint and to ensure a sustainable future. Three key objectives of the Al Basama Al Beeiya mission were identified as raising awareness about the project and its mission; facilitating research on vital footprint components; and institutional capacity building across the UAE. The project team is currently engaged in the challenging task of sourcing data on population and energy, which have been identified as priority areas in the project's current phase.

CIVIL SOCIETY

Civil society plays a very important role in modern societies. In the Gulf countries, civil society varies between the traditional type of organization that depends upon family and tribal networks and the new style of organization, such as NGOs and CBOs. There are about 2,000 NGOs in the six GCC countries (a relatively high number in comparatively new societies). Civil society is more developed in Bahrain, Kuwait, and the UAE as compared to Qatar, Saudi Arabia, and Oman.

The activities of civil society organizations in the environment field are mainly centered on greening projects, clean-up campaigns, workshops and seminars, conferences, training, and public lectures. Many of the NGOs in the GCC region face problems such as a lack of funds and volunteers, especially young volunteers. These obstacles hinder their ability to carry out their mission effectively and achieve their environmental goals. As such, environmental NGOs have not been very effective in lobbying for their causes.

Yet, NGOs can potentially play a very important role in new matters such as CDM. In fact, supporting CDM causes can be one way an NGO can improve their image, spread their message, and attract funds and volunteers. This could include raising awareness (among individuals and in the public and private sectors); serving as watchdogs to monitor, foster, and propose CDM projects for different industries; and proposing new ideas for clean projects to authorities and the private sector.

RENEWABLE ENERGY AND CLIMATE CHANGE

There is no doubt that renewable energy projects and other clean technology for mitigating climate change will enable GCC countries to align their GHG reduction and human development efforts, and promote mitigation activities that do not slow down, but rather accelerate socioeconomic progress. The Arab region is not only granted an enormous supply of oil and natural gas but also a perfect geopolitical positioning wherein it receives maximum exposure to sunlight and in many areas wind, which would provide endless renewable energy. According to a regional expert, "the region is exposed to direct sunlight, as well as a reduction in the percentage of clouds. The usual Direct Natural Exposure (DNE) in the Gulf region is about 1800 kilowatt/h per every square meter and this makes the adoption of solar energy in the region technically and economically feasible. Statistics show that both the Middle East and the North of Africa are equipped to deal with this technology..."³

3. Dr. Basel Al-Yousafy and Dr. Aly Alkorah, "Environmental and Economic Feasibility of Renewable Energy in the Arab Region," *Dar Alhayat*, March 5, 2007.



Wind-generated energy is the least costly among all sources and wind is in abundance in the region. For example, it covers areas as wide as 8-11 meters per second in countries like Oman. Despite these facts, however, renewable energy is almost non-existent in Arab states, representing only around 0.1% of their energy supplies and producing less than 0.3% of their electricity. The few renewable energy projects in GCC countries include:

- A mobile reverse osmosis desalination unit in Bahrain operated by solar power with a capacity of 200 gallons per day and a mobile generator operated by solar and wind power with a capacity of 1.5 kilowatts.
- Solar cooking, solar desalination, thermal and solar electricity and photovoltaic systems projects in Saudi Arabia. These projects were implemented through the American Cooperation Program that carried out many research and development programs in the last two decades of the 20th century.
- A desalination project in Oman using thermal and solar power established to produce a limited amount of drinking water. Photovoltaic systems with a capacity of 352 kwt were built for pumping water, lighting, and communications.
- Prior to the Gulf War in 1990, research and development projects were carried out in Kuwait on solar lakes, air conditioning, and photovoltaic systems.
- Some mini-solar projects were implemented in the UAE for different purposes, such as phone cabins and traffic signals.

THE MASDAR INITIATIVE

In April 2007, Abu Dhabi's government began construction on Masdar, a carbon-free city. As part of a new vision, the Masdar Company intends to build a new carbon-free community as a unique integrated "green community." This green energy and technology campus will offer a sustainable living environment and state-of-the-art office and research facilities dependant on green construction, desalination, bio-fuels, sustainable transport, water recycling, waste water management, solar cooling, sustainable irrigation, and other renewable aspects.

Although difficult to measure precisely, the following direct results are expected from the project by 2015:

- 10,000 new high-quality jobs in the clean energy and sustainable technologies sector in Abu Dhabi.
- 800 full-time Masters and Ph.D. students at the Masdar Institute specializing in clean energy and sustainable technologies.
- A multi-billion dollar expansion of the Abu Dhabi non-oil



economy.

- The creation of a world-class scientific and research hub which is currently non-existent in the Gulf region; such a hub can become the core of other knowledge-based activities and industries in addition to clean energy.

There is no doubt that the announcement of Masdar and the accompanying initiative is a step in the right direction. The most important direct benefit is the ability to help cut emissions and therefore set an example for others to follow. This will raise awareness and hopefully cause people to follow up with similar initiatives.

That renewable energy is a focus in GCC countries is also evident in the many conferences held during 2007. Such conferences included “Potential of Alternative Energy in the GCC,” held in Manama; and “Future Arabian Gulf Energy Sources: Hydrocarbon, Nuclear or Renewable?” the “International Conference on Integrated Sustainable Energy Resources in Arid Regions,” and “The Arab Regional Forum on Energy for Sustainable Development: Strategies, Policies and Plans,” all held in Abu Dhabi. In January 2008, the Abu Dhabi-based company Masdar held a renewable energy event entitled the World Future Summit, dubbed the biggest energy event of 2008.

CONCLUSION

GCC countries face numerous environmental challenges and will have to reconcile the many conflicting priorities from economic diversification, water supply, food security, environmental protection, and conservation to newly hazardous impacts of global warming.

These countries have continued to play an increasingly important role in the climate change field; they are at once the producers and exporters as well as victims of climate change. Thus, they must be fully backed and supported by the international community. There is no room for unilateral efforts that ignore other players. Over the next two years, with negotiations of the Bali roadmap, there is a very good opportunity for GCC countries to garner financial and technical support from the industrial world to help them combat the negative impacts of desertification and climate change.

One can draw the following concluding remarks in relation to the issues of climate change and CDM in the Gulf region:

- The Gulf region’s traditional view on the whole issue of climate change, renewable energy, and traditional fossil energy sources has changed significantly in the last year. There is a shift toward energy diversification, with more research and initiatives in the field of renewable energy, and a resolve to fight climate change and play a vital role in the emissions trading market.
- The UAE and Qatar are ahead of the region in CDM and emissions trading due to the fact that the countries’ leaders/rulers



are supportive.

- Inexperienced environmental authorities and lack of institutional capacity are a disadvantage. However, many initiatives are in the pipeline to improve data and expertise and promote environmental awareness and protection.
- There are many indicators that civil society will play an important role in general and especially in environmental issues in the near future.
- There is a definite need for the use of economic instruments in environmental policy to encourage environmental protection and promote clean technology that combats the negative impacts of climate change.
- There is no need for new environmental legislation but more support is required from government for CDM through the establishment and maintaining the role of DNA.
- It is possible that Dubai will be the center of emissions trading in the region.
- The share of renewable energy in the energy pie will increase in the Middle East in the medium and long term.
- The engagement, projects, and initiatives with international communities are very low compared to other countries and regions (such as EU-India Initiative on Clean Development and Climate Change of September 2007).

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Appendix: Emissions Per Capita for year 2000

GHGs= Greenhouse gases tCO2e = tons of Carbon dioxide equivalent

Country	GHG(tCO2e)	Rank	CO2 only	Rank
Qatar	67.9	1	60.0	1
United Arab Emirates	36.1	2	25.2	3
Kuwait	31.6	3	26.8	2
Australia	25.6	4	17.3	7
Bahrain	24.8	5	20.6	4
United States	24.5	6	20.4	5
Canada	22.1	7	17.1	8
Brunei	21.7	8	13.7	10
Luxembourg	21.0	9	19.2	6
Trinidad & Tobago	19.3	10	16.7	9
New Zealand	18.9	11	8.6	32
Antigua & Barbuda	18.5	12	4.9	62
Ireland	17.3	13	10.9	18
Estonia	16.6	14	11.3	17
Saudi Arabia	16.4	15	13.4	11
Belgium	14.5	16	12.2	14
Czech Republic	13.9	17	12.1	15
Singapore	13.9	18	13.1	12
Turkmenistan	13.8	19	7.8	40
Netherlands	13.5	20	10.9	19
Finland	13.3	21	10.9	20
Russia	13.2	22	10.6	21
Palau	12.9	23	12.7	13
Nauru	12.8	24	11.4	16
Denmark	12.5	25	9.7	27
Germany	12.3	27	10.4	22
United Kingdom	11.1	32	9.4	30
South Korea	11.1	33	9.9	26
EU-25	10.5	37	8.5	34
Japan	10.4	39	9.5	29
Poland	9.8	43	7.8	41
Ukraine	9.7	44	6.3	47
South Africa	9.5	46	7.9	39
Spain	9.4	47	7.5	44
Italy	9.2	48	7.7	42
France	8.7	50	6.2	48
Argentina	8.1	52	3.9	70
Iran	7.5	60	5.3	56
Turkey	5.3	75	3.3	78
Mexico	5.2	76	3.9	71
Brazil	5.0	83	2.0	100
China	3.9	99	2.7	88
Indonesia	2.4	122	1.4	111
Pakistan	2.1	131	0.8	132
India	1.9	140	1.0	120
Developed world	14.1		11.4	
Developing world	3.3		2.1	
TOTAL WORLD	5.6		4	