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A legal policy analysis: the current and prospective regulatory framework for renewable energy and energy efficiency in Egypt

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A LEGAL POLICY ANALYSIS: THE CURRENT AND PROSPECTIVE REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENRGY EFFICIENTCY IN EGYPT

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DEDICATION

FOR MY BELOVED MOTHER MARIANNE

The American University in Cairo
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A LEGAL POLICY ANALYSIS: THE CURRENT AND PROSPECTIVE REGULATORY FRAMEWORK FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY IN EGYPT

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ABSTRACT

Egypt has excellent natural conditions for the generation of electricity from Renewable Energy (RE) sources. It has in particular an immense potential for solar and wind energy. At the same time, an Egyptian energy crisis is emerging. Conventional domestic energy sources are declining and thus, Egypt will have to rely increasingly on costly imported energy in the near future. In addition, energy efficient (EE) consumption is an almost unknown term within the Egyptian society. Experts project for Egypt an energy saving potential of approximately 70%. Therefore, the promotion of RE & EE could be a successful policy instrument to mitigate the emerging Egyptian energy crisis. Furthermore, the development of a green Egyptian economy based on RE & EE could contribute to the country´s economic growth by increasing foreign direct investment, creating employment and providing much needed technology transfer. Besides these political considerations, Egypt could also fulfill its international obligation under the United Nation Framework Convention on Climate Change (UNFCCC) to mitigate the adverse effects of climate change by promoting RE & EE.

Key to the sustainable diffusion of RE & EE and the eventual creation of a green domestic economy is the implementation of a sound and consistent legal policy. The Egyptian regulator has already identified this need and has implemented a series of regulatory measures to promote RE & EE. In the field of RE, it is the declared objective of the Egyptian government to satisfy 20% of the country's primary energy demand through RE by 2020. In order to reach this ambitious goal, Egypt is implementing a tendering system to award RE projects to private developers. However, it is the long-term objective to regulate the Egyptian RE sector through a feed-in law. For the promotion of EE, the Egyptian government has not yet formulated an official policy. Nevertheless, it has developed EE Building Codes, EE standards and labels for electric appliances, and it has promoted solar water heating systems.

Unfortunately, these efforts have not yet led to the creation of a substantial RE & EE sector in Egypt. In general, the reason for this failure is that the Egyptian RE & EE strategy lacks comprehensiveness as well as consistent long-term dedication. Invitations to tender usually focus entirely on wind energy projects, while neglecting the huge potential for solar energy. Legal and price uncertainties further impede the promotion of RE. The Egyptian approach to promote EE is highly fragmented and incoherent, and suffers from lack of enforcement and acceptance in the market.

However, existing subsidies for conventional energy sources and unfavorable electricity pricing structures for RE & EE remain the key barriers to the sustainable development of the sector. Although there are many regulatory instruments to minimize the aforementioned barriers, only consistent long-term commitment by the Egyptian government can lead to the establishment of healthy domestic RE & EE industry.

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I. Introduction

The scientific evidence is overwhelming: climate change presents very serious global risk and demands an urgent global response.[1] Measures to mitigate climate change require international commitment, national response strategies as well as local participation and acceptance. Renewable energies (RE) and energy efficiency (EE) play a crucial role in mitigating climate change by reducing carbon dioxide emissions. In addition, the diffusion of RE & RE could advance energy security by diversifying the energy mix thereby reducing the impact of price instability of fossil fuel and thus stimulating the development of a green economy.[2] The key to successful diffusion of RE & EE is the implementation of a sound legal policy and a regulatory framework that will attract large-scale investments. The purpose of this thesis is to examine the elements of this new and rapidly growing area of law – climate change law[3] – with a particular focus on the Egyptian policy and regulatory framework in regard to RE and EE.

On the international level, climate change law finds its primary source in the United Nations Framework Convention on Climate Change (UNFCCC).[4] The UNFCCC creates an international structure to address climate change, including provisions for reporting on climate change, scientific and technological research, and planning annual meetings of the Conference of the Parties. For the first time, the Kyoto Protocol to the UNFCCC[5] stipulates binding commitments of developed countries to reduce green house gas (GHG) emissions by at least 5% from 1990-levels between 2008 and 2012.[6] No comparable commitment is included for developing countries. Additionally, the Kyoto Protocol introduces three new market-based flexibility instruments, namely international emission trading, joint implementation and the

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[1] Stern Review on the Economics of Climate Change, available in the internet, http://www.hm-treasury.gov.uk/sternreview_index.htm (last visited: 24th June 2009).
[2] Xiadong Wang, Climate Law Reporter: Legal and Policy Frameworks for Renewable Energy to Mitigate Climate Change, 7 Sustainable Development Law & Policy, American University 2007(quoted as Wang 2007) at 17.
[3] John C. Dernbach and Seema Kakade, Climate Change Law: An Introduction, 29 Energy Law Journal, Energy Bar Association 2008 (quoted as Dernbach/Kakade 2008), at 1.
[4] United Nations Framework Convention on Climate Change, New York 1992, available at, http://unfccc.int/resource/docs/convkp/conveng.pdf (last visited: 24th June 2009).
[5] Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto 1998, available at, http://unfccc.int/resource/docs/convkp/kpeng.pdf (last visited: 24th June 2009).
[6] Id. at Art. 3.1.

Clean Development Mechanism (CDM). In contrast to the first two instruments, CDM is the only one that addresses developing countries like Egypt, and therefore merits particular focus in the course of this thesis. International climate change negotiations are still ongoing and should eventually lead to a substantial post-Kyoto agreement that stipulates binding GHG emission reduction obligations for both developed and developing countries. The last phase of international climate change negotiations was the fifteenth Conference of the Parties to the UNFCCC at Copenhagen in December 2009. Unfortunately the result of the conference, the "Copenhagen Accord" was again a non-binding agreement and a prominent example of the barriers of climate change negotiation.

From the national perspective, the current legal discourse sets out three major policy options for the promotion of RE. The first approach is a price-based feed-in law that requires mandatory purchase of RE at a fixed price. Secondly, quantity-based RE portfolio standards are being discussed, which require that a minimum share of power or a minimum level of installed capacity in a given region is met by RE. A third option is a tendering mechanism involving government-sponsored competitive bidding processes for the acquisition of renewable electricity whereby long-term contracts are awarded. All these three legal policy approaches have their specific advantages and disadvantages that must be considered when applied on specific country conditions.[7] Additionally, the diffusion of RE can be facilitated by financial and legal policy incentives such as net metering, public funding and various other tax incentives.[8], The key to a successful national strategy for the mitigation of climate change however is a comprehensive approach including RE policy tools as well as incentives and regulations for a more EE consumption. EE policy measures typically include *inter alia* EE building codes, EE standards for electrical appliances or the phasing out of inefficient lightning.

According to national policy objectives, the various RE & EE policy instruments are selected in view of the specific country conditions as well as in regards to the

[7] Wang 2007, supra note 2, at 18.
[8] Dernbach/Kakade 2008, supra note 3, at 16.

available energy resources and electricity market structure. In the course of this thesis, the advantages and disadvantage of these policy instruments in general and in particular in respect to the Egyptian energy situation will be examined.

The Egyptian government has declared the objective of generating 20% of Egypt´s electricity through RE by 2020.[9] The national conditions for reaching this objective are excellent. Egypt is located in the North-African Sunbelt and is, thus, a prime location to generate solar energy.[10] Furthermore, the wind conditions at the west coast of the Red Sea and in other parts of the country are among the best in the world facilitating the generation of wind energy.[11] However, the objective of the Egyptian government remains very ambitious. In 2005, 94% of Egypt´s energy demand was still satisfied through fossil fuels, including 50.4% as oil share and 43.6% as natural gas share.[12] The remaining 6% is mainly met though coal with a share of 1.05% and hydropower with a share of 4.75%, while the remainder from other sources of RE covered only 0.2% of the primary Egyptian energy demand (solar, wind, biomass).[13]

Despite these excellent conditions for RE, Egypt is also attempting to decrease its dependency on fossil fuels through the usage of nuclear energy. After the Egyptian government had dropped a first nuclear energy program in the 1980s, it officially declared a relaunch for the program for the peaceful use of nuclear energy in September 2006.[14] The objective of the Egyptian nuclear program is the erection of the first nuclear power plant within the next ten years.[15] The utilization of nuclear

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[9] NREA, Annual Report 2007/2008, at 12, available at, http://nrea.gov.eg/annual%20report/eng.pdf (last visited: 24th June 2010).
[10] Rafik Youssef Georgy/ Adel Tawfik Soliman, Mediterranean and National Strategies for Sustainable Development, Priority Field of Action 2: Energy and Climate Change, Energy Efficiency and Renewable Energy Egypt - National study; Plan Bleu, Regional Activity Centre, Sophia Antipolis March 2007, at 19 (quoted as Georgy/Soliman), available at, http://www.planbleu.org/publications/atelier_energie/EG_National_Study_Final.pdf (last visited: 24th June 2010).
[11] Id. at 19.
[12] Id. at 3.
[13] Id. at 3.
[14] BBC News, Egypt Unveils Nuclear Power Plan, 25th September 2006, available at, http://news.bbc.co.uk/2/hi/middle_east/5376860.stm (last visited: 24th June 2010).
[15] Sherine Nasr, Nuclear Power Program Taking Off, Al-Ahram Weekly, Issue No. 953, 2009 (quoted as Nasr 2009), available at, http://weekly.ahram.org.eg/2009/953/ec3.htm (last visited: 24th June 2010).

energy is highly disputed, especially in regard of plant safety issues and the storage of nuclear waste. However, this thesis will not examine the question whether nuclear energy is viable alternative to decrease the dependency from fossil fuels. It should be sufficient to mention that developing countries can hardly be denied the same right as developed countries to satisfy their ever increasing energy demand by means of nuclear energy.

Egypt is currently at an energy 'cross-roads', facing critical decisions over its future energy supply. Conventional fuels are becoming increasingly expensive and it is recognized that these fuel reserves are finite. The Egyptian government officials have declared that Egyptian oil reserves will be exhausted within the next ten years and that current gas reserves are not expected to last beyond 2040.[16] This energy situation makes the transition to a system based on alternative energy resources a pressing need for Egyptian politics. The main political challenge for an alternative energy program in Egypt is two-fold: on the one hand the standing subsidies for conventional energy products and on the other hand a lack of public awareness for the challenges of climate change.

The adverse impacts of climate change combined with the need for an alternative energy solution have already raised the awareness of the Egyptian regulator to this increasingly important issue. Egypt will need to attempt to face the consequences of climate change with a wide range of measures on the domestic as well as on the international level.

On the international level, Egypt signed the UNFCCC in 1992 and also ratified the Kyoto Protocol in 2005. As consequence to its commitment to the UNFCCC, the Egyptian regulator issued a new Environmental Protection law (Law No. 94/1994, "EPL") in 1994 supplemented by the Executive Regulation (Decree No. 338/1995). For the first time in Egypt the EPL introduced mandatory thresholds against noises and polluters including corresponding monitoring procedures.

[16] Egyptian Minister of Energy and Electricity Hassan Yunis quoted in Al-Ahram Weekly, 12-18 October 2006, Experts on Site, available at, http://weekly.ahram.org.eg/2006/816/eg3.htm (last visited: 24th June 2010).

Passed by the Egyptian parliament in April 2009, the new draft Electricity Law is expected to enhance the diffusion of RE. Innovatively, the new draft Electricity Law introduces incentive measures for the generation of electricity from RE sources.[17] It makes allowances for the fact that the absence of an appropriate legal framework was identified as a central obstacle to the further development of the RE sector in Egypt.

In the field of EE the Egyptian regulator has not yet formulated a substantive national strategy. However, it must be acknowledged that certain measures have already been implemented that could pave the way for an Egyptian EE strategy. As early as 1987 a Ministerial Decree was issued stipulating the installation of solar water heating systems in new buildings. Unfortunately, it was enforced only with limited success. Another approach was the creation of EE standards and labels for electronic appliances. Most recently EE building codes for the commercial and residential sector have been developed and have been mplemented by virtue of a presidential decree in 2008.

This thesis will examine the question whether the current and prospective regulatory framework for RE & EE in Egypt is tailored to meet the country's energy situation and the respective structure of the energy sector; and further, whether the chosen policy instruments may lead to the creation of a green economy based on RE & EE. However, the lack of information on the domestic level still hinders the development of RE & EE in Egypt. Therefore, this thesis attempts to discuss how this gap can be closed and provides a comprehensive proposal for facing the challenge of implementing a RE & EE policy in Egypt.

To that end, chapter II will provide an overview on the state of international climate change law and ongoing climate change negotiations. Chapter III will discuss the advantages and disadvantages of the available national policy options for RE & EE, in order to provide a framework for the subsequent analysis of Egyptian policies. Chapter IV will focus on Egypt's social economic development, its energy situation

[17] The Egyptian Draft Electricity Law, available at, http://www.jcee-eg.net/library/draft_electricity_law.doc (last visited: 24th June 2010).

and the structure of the Egyptian Electricity market, so as to establish the basis for Egyptian policy consideration. The results of the two foregoing chapters will provide the basis for a subsequent legal policy analysis of the current and the prospective Egyptian regulatory framework for RE & EE in Chapter V. This thesis will close in Chapter VI with the conclusions drawn from the legal analysis of the Egyptian approach to promote RE & EE and propose general recommendations for future Egyptian policymakers.

At the outset of this thesis it must be noted that any analysis of legal structures in Egypt must take into account the current status of the rule of law. It is not uncommon in the Egyptian legal system that law and actual practice fall apart, due to corruption and other personal interests involved. Therefore, it might be possible that a certain legal issue is interpreted and decided by the competent Egyptian authority in a manner contradictory to the clear wording of the written law. This situation must be kept in mind, while regarding the legal policy analysis conducted in this thesis.

II. International Climate Change Law

International law initially focused on environmental protection rather than on challenges of climate change. International environmental law addresses both specific interests of neighboring states as well as the needs of the international community at large. Since the end of the 1970s the diffusion of international environmental law has gained momentum and today constitutes a complex legal framework of treaties, conventions and statutes.[18]

Central for international environmental law is the precautionary principle that limits territorial sovereignty in relation to neighboring states.[19] A milestone for the development of the precautionary principle was the Stockholm Declaration of the United Nations Conference on the Human Environment, which stipulated the famous Principle 21:[20]

> *"States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibilities to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction."*

Additionally, the concept of sustainable development has gained increasing importance in international environmental law. It primarily refers to the interdependency between economical development and the treatment of natural resources.[21] The normative value of the concept of sustainable development is still vague.[22] However, it functions as guideline for contract interpretation in favor of

[18] Matthias Herdegen, International Law, Munich 2006 (quoted as Herdegen 2006), at 355.
[19] Id., at 355.
[20] Declaration of the United Nations Conference on the Human Environment, Stockholm, June 1972, available at, http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97&articleid=1503 (last visited: 24th June 2010).
[21] Herdegen 2006, supra note 18at 356.
[22] Id., at 356.

environmental issues.[23] The concept of sustainable development was first referred to in Principle 1 of the Rio Declaration on Environment and Development:[24]

> *"Human beings are the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature."*

As seen from these two examples, international environmental law primarily approaches the issue of environmental protection in relation to human life. However, when the scientific evidence on the adverse impacts of climate change on the way of life in all countries became overwhelming, the need for an internationally coordinated response led to the emerging discipline of climate change law. Climate change legislation has been created at the intersection of various areas of law, including environmental law, energy law, business law and international law.[25] The purpose of this chapter is to present and elaborate on the international dimension of climate change law.

First, the scientific basis of climate change will be illustrated in order to explain the pressing need for international action (1.). Next, the United Nations Framework Convention on Climate Change (2.) and its Kyoto Protocol (3.) will be analyzed as the most significant sources of international climate change law. Subsequently, the so-called Copenhagen Accord and the general barriers for future climate change negotiations will be evaluated (4.). Finally, the chapter will close with a short critical excurse on the role of the Clean Development Mechanism for developing countries such as Egypt (5.).

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[23] Id., at 356.
[24] Declaration of the United Nations Conference on Environment and Development, Rio de Janeiro, June 1992, available at, http://www.unep.org/Documents.Multilingual/Default.asp?documentid=78&articleid=1163 (last visited: 24th June 2010).
[25] Dernback/ Kakade 2008, supra note 3, at 2.

A. Climate Change Science

In 1989, the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) to provide policy-makers with an objective source of information on climate change and its potential environmental and socio-economic consequences.[26] The initial mandate of the IPPC is stipulated in UN General Assembly Resolution 45/53 of 1988 and includes actions leading to a comprehensive review and recommendation in respect to the state of knowledge of the science of climatic change, programs and studies on its social and economic impact and possible response strategies to delay, limit or mitigate the adverse impacts climate change.[27] The IPCC has published four climate change assessments reports since 1990. In 2007, the IPCC produced the most recent assessment that includes the reports of the three IPCC´s Working Groups (WGs) and a respective synthesis report. The reports of the WGs address the physical science basis of climate change (WG I), the impacts of climate change including vulnerability and adaptation (WG III), and the mitigation of climate change (WG III). Recently the IPCC has selceted 831 authors for its fifth assessment report that will be published between 2013 and 214.[28]

The concept of climate change (also described as global warming) results from the entrapment of heat radiated from the earth. This is understood by climate scientists as follows. Solar radiation reaches the earth in the form of short wavelengths.[29] Some of this energy is absorbed by the Earth´s surface and thereby heats up the planet, while the rest re-radiates back into space.[30] Because the Earth´s temperature is lower than the sun´s, the energy reflects back out at a lower wavelength.[31] The problem is that the

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[26] IPCC Official Website, History, available at, http://www.ipcc.ch/organization/organization_history.htm (last visited: 24th June 2010).
[27] UN General Assembly Resolution 45/53 of December 1988, Protection of global climate for present and future generations of mankind, available at, http://www.un.org/documents/ga/res/43/a43r053.htm (last visited: 24th June 2010).
[28] IPCC Press Release, 831 Experts selected for the Fifth Assessment Report, June 210, available at, http://www.ipcc.ch/pdf/press-releases/press-release.pdf (last visited: 24th June 2010).
[29] Lynne M. Jurgielewicz, Global Environmental Change and International Law – Prospects for Progress in the Legal Order, University Press of America 1996, at 3.
[30] Id., at 3-4.
[31] Id. at 4.

so-called greenhouse gases (GHGs)[32] in the atmosphere have a low transmissivity for these lower wavelengths and thus, hinder their escape into space.[33] Instead, the lower wavelength energy becomes trapped between the Earth´s atmosphere and surface and result in the warming of the planet.[34]

The evidence for global warming is overwhelming. The 2007 WG I report stipulates that this conclusion is based on evidence of global surface temperatures, changes in precipitation patterns and observations of ocean and arctic temperatures.[35] Eleven out of the last twelve years (1995-2006) ranked among the twelve warmest years since 1850.[36] The rate of warming over the last 50 years is almost double compared to the last 100 years.[37] The melting of ice due to Arctic temperature rises will in turn contribute to rising sea levels.[38] In light of these conclusions climate change cannot be denied.

However, climate scientists were at odds for a long time over the question whether human activities actually do have an impact on climate change. In 1990, the first IPCC assessment reported only little evidence of human influence; the second assessment (1995) found a discernable influence of human activities; and eventually, the third assessment (2001) reported a probability between 60 to 90% that human activities have caused the increase in global temperature due to GHG emissions.[39] This discussion became obsolete when the 2007 WG I report concluded that natural forces cannot offer a sufficient explanation for the observed global warming and that it is

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[32] Major GHGs include carbon dioxide (CO_2) from fossil fuel use and other sources; methane (CH_4) from agriculture, was and energy; nitrus oxide (N_2O) from agriculture.
[33] Jurgielewicz, supra note 27, at 4.
[34] Id. at 4.
[35] IPCC, Climate Change 2007: The Physical Science of Climate Change, Contribution of Working Group I tot he Fourth Assessment Report of the IPCC, Cambridge University Press (quoted as IPCC 2007, WG I), available at, http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm (last visited: 24th June 2010).
[36] Id. at 252.
[37] Id. at 237.
[38] Id. at 237, 252 and 339.
[39] Id., at 669.

very likely (90-99%) that the observed temperature rise is due to human caused GHG emissions.[40]

The 2007 WG II report focused on the impacts of climate change on natural and human systems as well as on the capacity of these systems to adapt and their respective vulnerability.[41] It concluded that human-caused warming has had a discernable influence on many physical and biological systems.[42] This includes for instance, increasing numbers of glacial lakes, increasing ground instability in permafrost areas and rock avalanches in mountain regions as well as warming of lakes and rivers with effects on thermal structure and water quality.[43]

Furthermore, the 2007 WG II report describes future impacts and particular vulnerabilities, of which the major findings will summarized below:[44]

- By 2050, water availability is projected to increase by 10-40% at high latitudes and some wet tropical areas, and decrease by 10-30% in some dry regions that are already today water-stressed areas,
- In a scenario with 1.5-2.5 degree temperature rise, it is projected that 20-30% of species are likely to face increased risk of extinction,
- Coastal areas are projected to be exposed to increasing risks, including coastal erosions due to sea-level rise,
- Corals are at risk of bleaching and mortality, since they are vulnerable to warm sea temperatures and have little adaptive capacity,
- Several million of people are projected to be flooded out of their habitat every year due to sea-level rise,
- Projected climate change is likely to directly and indirectly affect the health of millions of people,

[40] Id. at 669.
[41] IPCC, Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II tot he Fourth Assessment Report of the IPCC, Cambridge University Press (quoted as IPCC 2007, WG II), Summary for Policymakers, at 8, available at, http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html(last visited: 24th June 2010).
[42] Id. at 9.
[43] Id. at 8.
[44] Id. at 11-15.

- By 2020, between 75 million and 250 million people are expected to be exposed to increased water stress in Africa, and
- Certain small islands show characteristics making them especially vulnerable to sea-level rise and other extreme weather events.

The 2007 WG III report addresses the challenges of mitigating climate change.[45] Based on the estimate that global GHG emissions have increased by 70% between 1970 and 2004, mainly due to increased energy consumption[46], the assessment concludes that climate change should be alleviated with a bundle of measures including changes in behavior and lifestyle, progress of technology, upgrades of energy infrastructure and improved EE.[47] Finally, it deduces that reducing GHG emissions will not only have a positive effect on climate change, but will also improve health and energy security.[48]

The IPCC 2007 synthesis report identifies five major concerns in regard of climate change impacts, vulnerabilities and risks:[49]

- High risks to unique and threatened eco-systems,
- Risks of extreme weather events, such as droughts, heat waves and floods,
- Weakest economic regions are most vulnerable to the adverse affects of climate change and especially the poor and the elderly in those societies,
- Growing economic cost of climate change over time when GHG emissions increase, and
- The prospective of significantly rising sea levels due the melting of Arctic ice.

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[45] IPCC, Climate Change 2007: Mitigation of Climate Change, Contribution of Working Group III tot he Fourth Assessment Report of the IPCC, Cambridge University Press (quoted as IPCC 2007, WG III), available at, http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg3_report_mitigation_of_climate_change.htm (last visited: 24th June 2010).
[46] Id., Summary for Policymakers, at 8.
[47] See id., at Chapter 11.
[48] See id., at 669-672.
[49] IPCC, Climate Change 2007: Synthesis Report, Contribution of Working Group I, II, and III to the Fourth Assessment Report of the IPCC, Cambridge University Press (quoted as IPCC 2007); available at, http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm (last visited: 24th June 2010).

The extraordinary scientific work of the IPCC presented in this section played a crucial role in convincing world leaders of the pressing need for an internationally coordinated response to challenge the adverse affects of climate change. The reaction to the IPCC´s conclusions by international political bodies will be elaborated in the following sections.

B. United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC or Framework Convention) was adopted at the UN Headquarters in 1992.[50] The UNFCCC took effect in 1994 and now has 194 parties.[51] Egypt became a signatory party to the UNFCCC in June 1992 and ratified it in December 1994, while it came into force in March 1995.[52]

The Framework Convention stipulates the ultimate objective of stabilizing GHG concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system (Article 2). To that end, it distinguishes between the common but differentiated responsibilities and capabilities of developed and developing countries (Article 3 No. 1). It is one of the most significant characteristics of the UNFCCC to formalize these critical distinctions between developed and developing countries by categorizing them into Annex I countries, comprised of OECD countries and economies in transmission, Annex II countries, comprised of OECD countries only, and Non-Annex I countries, comprised of developing countries.

This differentiation between developed and developing countries is reflected and accounted for in many provisions of the UNFCCC. Pursuant to the preamble, developed countries have contributed the largest share of historical and current GHG emissions, while the per capita emissions in developing countries are still relatively low (Preamble Point 3). At the same time, the preamble recognizes the distinctive

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[50] UNFCCC, see supra note 4.
[51] UNFCCC Official Website, Status of Ratification, available at, http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php (last visited: 24th June 2010).
[52]Id.

difficulties of developing countries in regard to their dependency on fossil fuels and their increasing need for access to sufficient energy resources to achieve sustainable social and economic development (Preamble Point 20 & 22). Therefore, developed countries agreed in the UNFCCC to adopt national policies and take the corresponding measures to demonstrate that they "take the lead" in addressing climate change (Article 4 No. 2 (a)).

Developed countries agreed to the "aim" of reducing their GHG emissions to 1990 levels based on the above-mentioned considerations (Article 4 No. 2 (a)). The progress of the latter shall be periodically reviewed by the Conference of the Parties in light of the objective of the Framework Convention on the basis of the experience gained in its implementation and in relation to the state of scientific and technological knowledge (Article 7 No. 2 (a)). Nonetheless, the Framework Convention does not provide for any binding commitment from developed countries to reduce GHG emissions by a certain amount or a specific date.

Although the UNFCCC obliges developed countries to take the lead in challenging climate change, it requires all parties to formulate, implement and periodically update national programs to mitigate climate change (Article 4 No. 1 (b)). Furthermore, the UNFCCC stipulates provisions for research and systematic observations (Article 5), promotion of education, training and public awareness (Article 6), and communication of information on the implementation of climate change measures (Article 12) as well as annual meetings of the Conference of the Parties (Article 7).

C. Kyoto Protocol

The Kyoto Protocol to the UNFCCC (Kyoto Protocol)[53] was adopted at the third session of the Conference of the Parties in Kyoto, Japan, on 11 December 1997.[54] However, only in 2005, following the ratification from Russia, did the Kyoto Protocol

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[53] Kyoto Protocol, see supra note 5.
[54] Kyoto Protocol to UNFCCC Official Website, Status of Ratification, available at, http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (last visited: 24th June 2010).

become effective.[55] Egypt signed the Kyoto Protocol in March 1999 and it was ratified and came into force in early 2005.[56] Today there are 191 parties to the Kyoto Protocol (190 states and the European Union).[57] The only major industrialized country that has not yet ratified the Kyoto Protocol is the United States of America.[58]

For the first time the Kyoto Protocol comprised binding GHG[59] emission reduction objectives for developed countries. Pursuant to Article 3 of the Kyoto Protocol, developed countries have agreed to reduce their overall GHG emissions by at least 5% below the 1990 levels between 2008 and 2012. A comparable commitment is not included for developing countries. The Kyoto Protocol stipulates in its Annex B the individual commitments of developed countries. For instance, the German commitment is 8% below the 1990 levels.

Moreover, the Kyoto Protocol introduces three market-based "flexibility mechanisms" to support Annex I countries in achieving their emission reduction commitment in a more cost-effective manner.[60] Article 4 of the Kyoto Protocol provides Annex I countries with the opportunity to participate in the Joint Implementation (JD) program. The JD program allows green investment in other Annex I countries to be used for achieving emission reduction units for the investor country´s emission reduction obligation. Additionally, Article 17 of the Kyoto Protocol encourages Annex I countries to participate in emission trading to reach their emission reduction commitment. Although the same Article requires the Conference of the Parties to develop principles and modalities for the implementation of an emission-trading scheme, the Kyoto Protocol itself does not promulgate any specifics of a potential emission market. Eventually, Annex I and non-Annex I countries can participate in the

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[55] Id.; Pursuant to Article 25 No. 1 it was required that not less than 55 parties to the Framework Convention have ratified it and which accounted for at least 55% of the total GHG emissions for 1990 of the Parties included in Annex I (industrialized nations).
[56] Id.
[57] Id.
[58] Id.
[59] The Kyoto Protocol, supra note 5, defines Greenhouse Gases in Annex A and includes Carbon dioxide (CO2), Methane (CH4), Nitrous Oxide (N20), Hydrofluorocarbons (HFCs) and Perfluorocarbons (PFCs) as well as Sulphur hexafluoride (SF6).
[60] Lee Hart, International Emissions Trading between Developing Countries: The Solution tot he other Half of the Climate Change Problem, Florida Journal of International Law, April 2008 (quoted as Hart 2008), at 86.

Clean Development Mechanism (CDM) pursuant to Article 12 of the Kyoto Protocol. The CDM will be elaborated in greater detail in the following Section D due its importance for developing countries and thus for Egypt.

Although the Kyoto Protocol is generally considered a breakthrough in climate change negotiations, the key point of its critique remains the missing binding commitment from non-Annex I countries to reduce their emissions, which allows large and important developing countries (such as India, China or Brazil) to continue polluting.[61] The subsequent negotiation of the Conference of the Parties failed to include emission reduction requirements for non-Annex I countries. Therefore, it remains insufficient to combat the challenges of climate change on the global level, since especially the USA will remain reluctant to commit to any emission reduction obligation unless major developing countries are also willing to commit themselves.[62] The respective bargaining positions and the current status of climate change negotiations are dealt with in the following Section D by the example of the fifteenth Conference of the Parties in Copenhagen in December 2009.

D. Copenhagen Accord and Future Climate Change Negotiations

The world looked closely at Copenhagen during December 2009 where world leaders gathered at the fifteenth Conference of the Parties to the UNFCCC to negotiate a post-Kyoto agreement. Unfortunately, it must be said that the leaders of the world failed again to reach a new global agreement on climate change which would include binding emission reduction commitments from developed and developing countries. Hence, the only outcome of the summit was the participants taking note of the so-called Copenhagen Accord.[63] This last-minute document was drafted by five nations led by the USA, but has no binding character under international law. The Copenhagen Accord promulgates three key features including the acknowledgment of

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[61] Id., at 86.
[62] Id., at 87.
[63] Copenhagen Accord, 15th Conference of the Parties to the UNFCCC, Copenhagen, December 2009, available at, http://unfccc.int/files/meetings/cop_15/application/pdf/cop15_cph_auv.pdf (last visited: 24th June 2010).

scientific necessities, financial assistance for developing countries and the obligation to submit national quantified emission targets.

The parties recognized for the first time the scientific view that the increase in global temperature must remain below 2 degree Celsius in order to achieve the ultimate goal of the UNFCCC of stabilizing "greenhouse gas concentration in the atmosphere at a level that would prevent dangerous interference with the climate system."[64] They furthermore acknowledged that the time needed to achieve this objective would be longer in developing countries, considering that social and economic development and poverty eradication are the first and overriding priorities of developing countries.[65]

Recognizing the importance of the last point, it was agreed that developed countries should provide adequate, predictable and sustainable financial resources as well as technology and capacity building to support measures to mitigate climate change in developing countries.[66] To that end, developed countries agreed to collectively providing new and additional funding to developing countries amounting to USD 30 billion for the period 2010 – 2012.[67] Furthermore, developed countries committed to the goal of jointly mobilizing USD 100 billion by 2020 to address the needs of developing countries.[68] A significant portion of these funds will be provided through the newly established Copenhagen Green Climate Fund that will support projects, programs, and other activities in developing countries related to mitigation, adaptation and capacity-building as well as technological development.[69]

Thirdly, although the Copenhagen Accord does not include any commitment to collectively reduce global GHG emissions by a certain percentage, it requires developed and developing countries to submit their respective national quantified

[64] Copenhagen Accord, Item No. 1; Article 2 of the UNFCCC.
[65] Copenhagen Accord, Item No. 2.
[66] Copenhagen Accord, Item No. 3.
[67] Copenhagen Accord, Item No. 8.
[68] Copenhagen Accord, Item No. 8.
[69] Copenhagen Accord, Item No. 10.

emission targets by 2020, which will be measured, reported and verified in accordance with existing and future guidelines adopted by the UNFCCC.[70]

All in all, the Copenhagen Accord is just another item on a long list of failures to negotiate a substantial international agreement on climate change. In addition to the fact that the Copenhagen Accord is not a legally binding document, it lacks an explicit commitment of the parties to collectively reduce global GHG emissions. Moreover it does not stipulate any effective strategy for the adaptation to climate change, it neglects the importance of technology transfer and provides only a very limited commitment as regards to financing the mitigation of climate change.[71]

The question remains why delegates left Copenhagen once again without a binding agreement, despite the common understanding that immediate actions are required to mitigate the adverse impacts of climate change. Political commentators blame the reluctance of key governments to reach a global agreement due to their domestic policies (China, USA), the insufficient negotiation-skills of the host government, and a lack of political strategy in general in addition to the 24-hour news culture that put immense pressure on the delegates.[72]

It is obvious that a global bargain to challenge climate change faces many obstacles that differ substantially in form and kind. However, the major problem in simple terms is clear. The historic per-capita emissions in China are less than one-quarter the U.S. level and in many African countries or in a country like India they amount to only one-tenth the U.S. level.[73] In addition, there is a common understanding that developing countries are going to be hurt most by climate change, although they have

[70] Copenhagen Accord, Item No. 4 and 5.
[71] Mohammed T. El-Ashry, An Overview of the Issue: Framework for a Post-Kyoto Climate Change Agreement, Sustainable Law & Policy, winter 2008 (quoted as El-Ashry 2008).
[72] Richard Black, BBC News, Why did Copenhagen fail to deliver a climate deal?, available at, http://news.bbc.co.uk/2/hi/science/nature/8426835.stm (last visited: 24th June 2010).
[73] U.S. Energy Information Administration, World Per Capita Carbon Dioxide Emissions from the Consumption and Flaring of Fossil Fuels 1980-2006, December 2008, available at, http://www.eia.doe.gov/pub/international/iealf/tableh1co2.xls (last visited: 24th June 2010).

contributed relatively little to the creation of the problem.[74] Therefore, many developing countries deem developed countries responsible for climate change and refuse to commit to any binding emission reduction obligation that could endanger their right for social and economic development.

Nevertheless, it is also understood that industrial countries do not dominate GHG emissions alone. Developing countries contribute increasingly to GHG emissions, due to population growth, industrialization and economic growth as well as the related increase in the standard of living for millions. China, for instance, has entered a more energy-intensive stage of its economic development, exemplified by ever increasing energy consumption, while the economic growth rates remain constant at ten percent. [75] Based on this development, it is projected that China either will very soon pass the United States in global GHG emissions or may indeed have already passed the United States last year.[76] Developing countries are, however, at very different stages of economic development and contribute at very different levels to the problem of climate change. At the same time, the position of developed countries in regard of a binding climate change agreement is not coherent. While most European countries would be willing to submit themselves to such an agreement, the USA has traditionally rejected any internationally binding agreement that could impede their sovereignty.

In Copenhagen the parties to the UNFCCC agreed that it is scientifically necessary to keep global temperature rise below 2 degree Celsius, in order to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system.[77] Translated into GHG emission reduction this would mean that all countries should commit to collectively reduce global GHG emissions by at least 50 percent below the 1990 level by 2050.[78] In case no such binding agreement is

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[74] Christopher Flavin, Fordham Environmental Law Review Fifteenth Annual Symposium Energy and Climate Change: North and South Perspective – Keynote Address, 19 Fordham Environmental Law Review, 2009 (quoted as Flavin 2008), at 244 (231).
[75] Id., at 243.
[76] Id., at 243.
[77] Copenhagen Accord, supra note 61 Item No. 1.
[78] See e.g., Flavin 2008, supra note 72, at 235; El-Ashry 2008, supra note 69, at 2.

reached, climate change will seriously affect the way of life in all countries, damage fragile ecosystems and threaten global security through migratory pressures and resource conflicts.[79] It is projected that for every year in which the international community fails to reach a global agreement on climate change, the cost of its adverse affects will amount to approximately USD 500 billion,[80] while the cost of immediate action is comparably small amounting in total to about one percent of the global gross domestic product (USD 60 0000 million).[81] It remains to be seen whether international policymakers will be able to reach a binding agreement on GHG emission reductions for both developed and developing countries at the Sixteenth Conference of the Parties to the UNFCCC at Cancùn, Mexico, in December 2010.

E. Excurse: Clean Development Mechanism

This short excurse on CDM will provide an overview of its implementation and development. It will help to evaluate the CDM potential and the procedures in place in Egypt. To that end, this section will discuss and evaluate the objectives and requirements of CDM in view of the related major barriers for project developers and host countries.

The CDM is an increasingly important tool in international climate change policy that provides a cost-effective means of complying with the requirements of the Kyoto Protocol.[82] Pursuant to Article 12 of the Kyoto Protocol, the purpose of the CDM is to assist Annex I countries to comply with their quantified emission limitation and reduction commitments. The same article provides that the CDM should assist non-Annex I countries in achieving sustainable development and in contributing to the ultimate objectives of the UNFCCC. Basically the CDM can be classified as a "base-

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[79] See IPCC 2007, supra note 48.

[80] Fatih Birol, Chief Economist with the International Energy Agency, quoted by Robin Pagnamenta, Times Online, Watchdog warns of USD 500 billion annual cost of delaying action on climate change, available at, http://business.timesonline.co.uk/tol/business/industry_sectors/natural_resources/article6911658.ece (last visited: 24th June 2010).

[81] Stern Review, supra note 1, at 212; The global gross domestic product amount in 2008 to USD 60 000000 million, see World Bank, World Development Indicators Database, Gross Domestic Product, available at, http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf (last visited: 24th June 2010).

[82] Christina Voigt, Climate law Reporter: Is the Clean Development Mechanism Sustainable? – Some Critical Aspects, Sustainable Development Law & Policy, winter 2008 (quoted as Voigt 2008), at 15.

line-and-credit" system through which credits can be earned by reducing GHG emissions against a constructed baseline.[83] It is important to note that the CDM does not reduce GHG emissions, but, instead, allows Annex I country investors to increase their emissions when they purchase credits.[84]

In a CDM-Project an investor ordinarily implements emission-reducing measures either by investing in an existing project or by developing a new project.[85] Emission reductions resulting from such project activity must be certified by the CDM Executive Board that issues the corresponding Certified Emission Reduction (CER).[86] The investor may use the CERs to comply with his own emission reduction commitments or sell them to third parties and thereby increase the profits of the certified project.[87] From the perspective of an Annex I country CDM is therefore an incentive to invest in climate friendly projects in developing and emerging countries.[88] From the point of view of a non-Annex I country the potential of CDM is to increase the revenues from climate friendly projects thereby making the usage of environment-friendly technology lucrative.[89] The fundamental idea of CDM is to reduce the marginal costs for the commercial utilization of environment-friendly technologies thereby reducing total GHG emissions and thus advancing sustainable development in developing countries.

In order to qualify as a CDM project two essential criteria of the Kyoto Protocol must be fulfilled. Article 12 No. 5 (c) of the Kyoto Protocol requires that a project should only be certified if based on reduction in GHG emission that are "additional" to any that would have occurred in the absence of the project. Furthermore Article 12 No. 2 of the Kyoto Protocol provides that CDM projects must contribute to the "sustainable development" of the host country. Both of these requirements are vague in their nature

[83] Harro van Asselt and Joyeeta Gupta, Stretching Too Far? – Developing Countries and the Role of the Flexibility Mechanisms Beyond Kyoto, Stanford Environmental Law Journal, June 2009 (quoted as van Asselt/Gupta 2009), at 333.
[84] Id., at 333.
[85] Hart 2008, supra note 58, at 88.
[86] Id., at 88.
[87] Id., at 88.
[88] Voigt 2008, supra note 79, at 15.
[89] Id., at 15.

and thus open to interpretation and negotiation in the course of the approval procedure for a CDM project. Some of the related controversial issues will be elaborated on below.

The objective of the criterion of “additionality” is to ensure that Annex I countries do not comply with their obligation under the Kyoto Protocol simply through the purchase of credits from projects that would have also been realized if the purchase had not taken place.[90] In order to prove additionality each CDM project developer must propose a baseline emission scenario which describes the GHG emissions that would have occurred in the absence of the CDM project (business as usual).[91] Against this baseline scenario the actual emission reductions of the CDM project are measured and credited.[92] The problem is that project developers must estimate what would happened in the absence of the CDM project, which can lead to hypothetical assumptions and thereby create an inherent incentive for host countries and investors to cheat in order to increase the amount of CERs.[93] The requirement of additionality also has an impact on policy considerations in CDM host countries. Standing policies in CDM host countries must be considered as a business as usual development and thus, GHG emission reductions under these policies are not valid under the CDM.[94] This leads to the predicament that if countries adopt stricter climate change policies, their prospects of getting GHG emission reduction funded under the CDM are reduced.[95]

The criterion of sustainable development further increases the uncertainties for CDM project developers. It is very difficult to generalize what kind of projects contribute to sustainable development since the specific requirements are highly context-specific and subjective.[96] Thus, CDM´s contribution to sustainable development was subject to intense debate during the negotiations of the Kyoto Protocol and the subsequent

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[90] Van Asselt/Gupta 2009, supra note 80, at 345.
[91] Voigt 2008, supra note 79, at 16.
[92] Id., at 16.
[93] Id., at 16; van Asselt/Gupta 2009, supra note 80, at 345.
[94] Id., at 347.
[95] Id., at 347.
[96] Id., at 348.

Conferences of the Parties.[97] Particularly, CDM host countries were concerned about their sovereignty and thus reluctant to accept any external determination of sustainable development priorities.[98] These are some of the reason why the definition of sustainable development was eventually left to the non-Annex I countries.[99]

It is a reality that most CDM funding is attributed to projects with high GHG emission reduction potential, but have only questionable non-climate sustainable developments benefits.[100] CDM host countries could try to challenge this development through higher national sustainable development standards.[101] However, they are unlikely to do so individually since this could mean that CDM projects would move to neighboring countries with lower sustainable development standards, which would lead to a race to the bottom. Finally, host countries must face the simple reality that in a market-based mechanism like the CDM investors will always seek low-cost projects that are easy to initiate and that the aspect of sustainable development is a consideration without financial value for those investors.[102] Nevertheless, CDM host countries should not underestimate the potential of influencing what kinds of projects are being implemented through the adjustment of the specific national sustainable development standard.

The related high transaction costs for project developers present an additional burden for the CDM. For instance, the registration process of large-scale CDM projects can take an average of 23 months from submission of a plan to obtaining a final approval by the CDM Executive Board.[103] Unfortunately, due to the multilateral character of the CDM, this lengthy registration process in necessary and thus cannot be

[97] Voigt 2008, supra note 79, at 17.
[98] Id., at 17.
[99] See Conference of the Parties to the UNFCCC, Seventh Session, Marrakesh, Morocco, November 2001, Decision 17/CP 7: Modalities and Procedures for a Clean Development Mechanism as defined in Article 12 of the Kyoto Protocol, available at, http://unfccc.int/files/meetings/workshops/other_meetings/application/pdf/17cp7.pdf (last visited: 24th June 2010).
[100] Van Asselt/Gupta 2009, supra note 80, at 349.
[101] Id., at 349.
[102] Id., at 349.
[103] Hart 2008, supra note 58, at 89.

circumvented.[104] Moreover, the lengthy multilateral registration process provides an opportunity for governmental corruption. Cultural barriers and unstable governments could also further increase transaction costs.[105] As shown above, the ambiguities of the Kyoto Protocol requirements also stipulate an uncertain outcome of approval procedures for developers that could constitute a significant loss for unsuccessful proposals. All of these aspects have the potential to increase the cost of transaction immensely.

To date, a total of 2232 CDM projects are registered with the UNFCCC and 87 registrations are pending.[106] Although the CDM ideally provides mitigation incentives throughout the developing world, it is seems that large developing countries have benefited most from the CDM. Alone Mexico (121 projects), Brazil (173), India (509) and China (863) host 74.47% of all CDM projects worldwide, leaving relatively little to smaller developing countries.[107] The reasons for this uneven distribution could be the size of the country in relation to its population, gross domestic product and energy use.[108] Other explanations could be the potential for GHG emission reductions and the ease of implementation for CDM projects.[109] In any case, this issue must be addressed at the Conference of the Parties in order to involve more small and mid-size developing countries in the CDM.

In conclusion, the CDM can be criticized for focusing too much on the interest of Annex I countries to achieve their GHG emission reduction targets in a cost-effective manner, while it substantially neglects the prospect of developing countries for sustainable development. In addition, the participation of many developing countries is often inefficient due to high transaction cost. Hence the CDM has seen a focus on large-sized developing countries with considerable experience as regards the

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[104] Id., at 89.
[105] Id., at 89.
[106] UNFCCC Official Website, CDM Statistics, available at, http://cdm.unfccc.int/Statistics/index.html (last visited: 24th June 2010).
[107] UNFCCC Official Website, Registered projects by host party, available in the internet, http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html (last visited: 24th June 2010).
[108] Van Asselt/Gupta 2009, supra note 80 at 352.
[109] Id., at 352.

procedures. Thus, it can be concluded that the CDM favors developed countries with little consideration of the needs of small and mid-size developing countries.

III. National Policy Options for the Diffusion of Renewable Energy & Energy Efficiency

A sustainable and comprehensive RE & EE policy is needed to combat the challenges of climate change on the national level. Energy markets are traditionally structured in favor of conventional energies. Therefore, to create a market for RE & EE, considerable state intervention is necessary. This chapter will provide an overview of the obstacles and options policy-makers are facing when creating a domestic market for RE & EE.

To that end, this chapter will first examine the barriers that regularly constrain the diffusion of RE & EE (1.). Then the major legal policy options for the promotion of RE will be discussed, including feed-in laws, quota models and tendering systems as well as further supporting policy schemes (2.). Subsequently, EE policy tools will be presented with a focus on EE building codes, EE standards for electronic appliances and the phasing-out of the incandescent lighting bulb (3.). The chapter will close with some general conclusions on the need for a consistent and comprehensive RE & EE policy (4.).

Due the limited scope of this paper, the elaborations of this chapter are by no means conclusive. Nevertheless, they will provide the framework for the analysis to follow the current and prospective approach for the Egyptian regulator to promote RE & EE (Chapter V).

A. Barriers for the Diffusion of Renewable Energy & Energy Efficiency

When addressing the reasons for the slow transition from an economy based on conventional energies to one comprising the potential of RE & EE several main categories of barriers can be identified. These are essentially cost and price as well as regulatory and technical issues. Policies and programs are required to support RE &

EE in the short term, because of the existence of those barriers, but it is also essential to eradicate such barriers over time.

The key for any successful RE & EE policy is the re-shuffling or phasing out of government subsidies for conventional energies. This is essential because subsidized energy prices distort investment decision in RE and constitute a massive disincentive for EE.[110] Estimates stipulate that global annual subsidies for fossil fuels range between USD 100bn to USD 200bn.[111] They can take many forms and regularly include direct financial transfers, tax incentives and public funding for research and development (R&D) as well as trade restrictions and other regulations.[112]

The removal or reduction of existing subsidies for conventional energies would have three major effects on the respective energy market. Most important, the removal of subsidies would send a strong market signal to consumers and would encourage them towards a rational and effective use of power resources.[113] Moreover, the elimination of subsidies would improve competition in the electricity market, eliminating unfair advantages given to nuclear and fossil fuel technologies.[114] Finally, the lifting of energy subsidies would free up billions of dollars of state revenues that could be utilized for R&D, reduction of national state deficits or funding of other programs.[115]

An obstacle closely related to the extensive subsidies for conventional energy is the unfavorable electricity pricing structure that impedes the diffusion of RE & EE in many countries.[116] Therefore, a solid and wisely adjusted electricity price reform is

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[110] Janet L. Sawin, National Policy Instruments: Policy Lessons for the Advancement & Diffusion of Renewable Energy Technologies around the World, Thematic Background Paper fort he International Conference on Renewable Energies, Bonn 2004 (quoted as Sawin 2004), at 1; available at, http://www.oweb.state.or.us/ENERGY/RENEW/Wind/OWWG/docs/SawinWorldWatchTBP03-policies.pdf (last visited: 24th June 2010); Miguel Mendonca, Feed-in Tariffs – Accelerating the Deployment of Renewable Energy, World Future Council, 2007(quoted as Mendonca), at xiii; Benjamin K. Sovacool, The importance of comprehensiveness in renewable electricity and energy-efficiency policy, Energy Policy 37, 2009 (quoted as Sovacool 2009), at 1529, available at, http://www.ren21.net/pdf/Energy_Policy.pdf (last visited: 24th June 2010).
[111] Sawin 2004, at 3.
[112] Sovacool 2009, supra note 107, at 1532.
[113] Id., at 1533.
[114] Id., at 1533.
[115] Id., at 1534.
[116] Mendonca, supra note 107, at 3; Sovacool 2009, supra note 107, at 1534.

essential for the sustainable promotion of RE & EE. An electricity price reform should include considerations to eliminate price caps that keep electricity prices artificially low and thereby facilitate excessive consumption, undervalue EE and distort consumer decisions. [117] An additional candidate for reform is the so-called declining block-rate pricing, the annulment of which could solve the irritating contradiction that large consumers of electricity pay lower prices than small consumers.[118] Furthermore, a price reform should introduce time-of-use electricity rates and bills that could enable consumers to make more energy efficient decisions in regard to their consumption by providing information on how electricity production and consumption varies according to the time-of-use.[119] Eventually, a reform should include the internalization of external cost, which would heavily increase electricity prices, but at same time ensure a more accurate price for electricity.[120] All in all, a solid electricity price reform could improve the efficiency of the electricity sector, provide accurate price signals to consumers and enhance EE consumption on all levels.

Another cost barrier for RE projects is their high initial investment cost.[121] Although lower fuel and operating costs may make RE competitive on the long term, the higher cost of initial technology investment implies that RE projects may provide less generation capacities per initial dollar investment in comparison to conventional energies.[122] Therefore, it can be said that RE projects generally require higher amounts of financing for the same capacity of electricity.[123] This obstacle of primary investment is supplemented by a lack of access to affordable credit for RE projects.[124]

From regulatory perspective, one must first to acknowledge that most regulatory systems were assigned to support conventional energies and thus, often discriminate against the use of RE technologies.[125] In many countries, state owned electric utilities

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[117] Id., at 1534.
[118] Id., at 1534.
[119] Id., at 1534.
[120] Id., at 1534.
[121] Sawin 2004, supra note 107, at 1; Mendonca, supra note 107 at 3.
[122] Id., at 4.
[123] Id., at 4.
[124] Sawin 2004, supra note 107, at 1
[125] Id., at 1.

still maintain a monopoly on electricity production, transmission and distribution.[126] Therefore, investment in RE is often discouraged, because utilities may not guarantee transmission access for RE producer, or may charge high prices for the connection to the national grid. Additionally, legal restrictions on siting and construction can complicate the erection of RE facilities.[127]

Moreover, the absences of technical and commercial skills as well as a lack of sufficient information constitute barriers for the introduction of RE & EE into the market.[128] This tendency is supplemented by the misguided perception that performances of RE & EE technologies are still uncertain and risky.[129] This perception may be based on a lack experience or training in RE technologies or past negative experiences with such technologies.[130] All of these factors decrease the acceptance of RE & EE policies within a society, and thus increase the reluctance to implement such policies.

While the barriers mentioned above are equally valid for developed and developing countries, some specific characteristics of developing countries must be considered for sustainable RE & EE policies. The specific social, economic and political circumstances in developing countries provide a different set of challenges that affect the feasibility of the various policy measures. The most critical question for the application of RE is whether or not there is a substantial national grid without which RE policy measures cannot be applied in the same way as in developed countries.[131] The different situations in developing countries can be demonstrated by considering the respective rural grid-connection. In much of sub-Saharan Africa only 2% to 5% of the population is connected to the grid, while in comparison this figure in Thailand amounts to 98%.[132] The problem of rural electrification is further increased by high

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[126] Id., at 1; Mendonca, supra note 107, at 5.
[127] Id., at 3.
[128] Id., at 7.
[129] Sawin 2004, supra note 107, at 2.
[130] Id., at 2.
[131] Dan Bristow, The Developing World, in Mendonca (quoted as Bristow, Developing World), at 76.
[132] Eric Martinot et al, Renewable Energy Markets in Developing Countries, Annu. Rev. Energy Environ. 2002 (quoted as Martinot et al 2002), at 315, available at, http://www.martinot.info/Martinot_et_al_AR27.pdf (last visited: 24th June 2010).

investment costs in rural areas due to long travel distances, poor transport infrastructure and a lack of trained personnel.[133] And last, unrealistic political plans for electricity grid extension can form a serious barrier to RE market expansion in rural areas. When consumers expect that they will be soon connected to the grid, they have no incentive to invest in off-grid alternatives such as RE.[134]

The diffusion of RE & EE policies in developing countries is closely linked to the relation between energy and poverty. Increased accessibility to electricity is crucial to alleviate poverty, since the availability of energy has a profound impact on general livelihood, the access to water, health and education as well as on other related issues.[135] At the same time, the level of poverty in a country has a strong impact on the generation and availability of electricity. On the one hand, the level of poverty dictates the available funds for the development of large-scale energy infrastructure projects and on the other hand, it determines the ability of individuals to pay for electricity prices.[136] Therefore, any RE & EE policy in developing countries must protect the poor by providing them with additional funds to minimize environmental classism.[137] This is especially valid for electricity price reforms that necessarily lead to more realistic increased electricity prices (see above), from which poor families would suffer the most if no low-income assistance is provided.[138]

Additionally, developing countries often lack the domestic capacities to implement RE & EE projects.[139] Thus, it is imperative for developing countries to build domestic knowledge and expertise to develop, implement and operate RE & EE programs independently from foreign market actors.[140] Every developing country must be able to draw on domestic capacities to ensure long-term sustainable development for the RE & EE sector. The diffusion of RE & EE policies in developing countries is, finally, complicated by the general perception that investment in developing countries is in

[133] Id., at 332.
[134] Id., at 333.
[135] Bristow, Developing World, supra note 128, at 76.
[136] Id., at 76.
[137] Sovacool 2009, supra note 107, at 1536.
[138] Id., at 1539.
[139] Bristow, Developing World, supra note 128, at 77.
[140] Id., at 77.

general very risky because of high uncertainties about political, regulatory and market stability.[141] Despite all these challenges the implementation of RE & EE policies is not only a moral obligation, it is also a great opportunity for developed and developing countries to generate economic growth, decrease unemployment and enhance energy security.

B. Renewable Energy Support Schemes

The transition from an energy system based on fossil fuels to one based on RE is of fundamental importance for various reasons. Firstly, the future of humanity depends on the health and the survival of the planet´s natural resources and eco-systems that are being degraded by the utilization of fossil fuels.[142] Secondly, the utilization of RE could increase independence from fossil fuels and also secure energy supply for all countries, which in turn could enhance overall global security.[143] Thirdly, the economic potential of creating a green economy based on RE & EE is enormous for both developed and developing countries worldwide.[144]

The moral imperative and the economic opportunities driving the dissemination of RE are mirrored by many indicators that have shown dramatic gains during recent years. The global annual investment in new RE capacities doubled from USD 63bn in 2006 to USD 120bn in 2008.[145] In the same time global installed RE power capacities (excluding large hydro) increased from 207 GW to 280 GW, of which 16 GW are contributed by solar PV and 121 GW by wind power, while the remainder is made up by small hydro, geothermal and biomass power generation.[146]

In 2009, policy targets for RE existed in at least 73 countries.[147] Representative national RE targets of developed countries are, for instance, Germany with 18% by

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[141] Id., at 78; Sawin 2004, supra note 107at 2.
[142] Mendonca, supra note, 107, at xiii.
[143] Id., at xiii.
[144] Id., at xiii.
[145] Renewable Energy Policy Network fort he 21st Century, Renewables Global Status Report – 2009 Update (quoted as REN21, GSR 2009), at 9, available at, http://www.ren21.net/pdf/RE_GSR_2009_Update.pdf (last visited: 24th June 2010).
[146] Id., at 9.
[147] Id., at 17.

2020, Sweden with 49% by 2020 and Ireland with 40% by 2020; while representative targets for developing countries include China with 15% by 2020, Abu Dhabi with 7% by 2020 and Madagascar with 75% by 2020.[148] In order to reach these ambitious objectives, it is imperative for each country respectively to implement an enabling RE policy and regulatory framework to attract large-scale investment and to achieve sustainable development in the RE sector. Three major regulatory options for the integration of RE into the national energy mix can be identified that are applied in various jurisdictions worldwide:[149]

- Price-based feed-in laws that require mandatory purchase of RE at a fixed price,
- Quantity-based RE portfolio standards (RPS) that require a minimum share of power or a minimum level of installed capacity in a given region is met by RE, and
- Tendering mechanisms, which involve government-sponsored competitive bidding processes for the acquisition of RE whereby long-term contracts are awarded to the lowest price bidder.

All of these regulatory options ensure the right of RE suppliers to recover the incremental cost between RE and conventional energy as well as the guarantee to connect to the national grid.[150] However, each approach has its specific advantages and disadvantages that must be considered by policymakers in light of the specific country conditions and electricity sector structure. Nevertheless, the following key points provide a frame for the subsequent discussion of the various policy tools:[151]

- Experience has demonstrated that considerable intervention in energy markets is required to introduce a significant amount of RE into the energy mix,
- Effectiveness of government policies depends on how well they are designed and on the status of enforcement,

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[148] Id., at 17; REN21, Renewables Global Status Report 2007 (quoted as REN21, GSR 2007), at 40, 41, available at, http://www.ren21.net/pdf/RE2007_Global_Status_Report.pdf (last visited: 24th June 2010).
[149] Wang 2007, supra note 2, at 17.
[150] Id., at 17.
[151] Sawin 2004, supra note 107, at 3.

- Experience has shown that the key to steady and significant cost reductions is the development of a consistent and reliable market,
- Most RE policies involve some kind of subsidy, direct or indirect,
- Each country has unique circumstances and must design a system based on needs, circumstances and available resources, and
- Markets in developing countries are particularly sensitive to the need for uncomplicated access to the electricity grid and low transaction costs.

The success of a sustainable RE policy is generally measured by the development of certain key indicators, including: the installed capacity and energy generation from RE technologies, technological advances, reduction in cost and price, domestic manufacturing capacity and related jobs, and public acceptance.[152]

Following, the three regulatory options mentioned above will be presented in greater detail and the respective advantages and disadvantages for each approach will examined, in order to analyze in Chapter V whether the current and prospective regulatory framework for RE in Egypt can be considered a success.

1. The Feed-in Model

Feed-in laws are considered to produce the quickest and most cost-effective deployment of RE technologies.[153] The success of world leaders in RE technologies such as Germany, Denmark and Spain, is attributed to the opportunities created by the sudden and rapid market development through their respective feed-in laws.[154]

A feed-in law can be defined as a pricing law, under which electric utilities are obligated to connect RE producers to the electricity grid and to purchase electricity generated through RE at a fixed minimum price.[155] The tariffs are generally set higher than the regular market price and are guaranteed for a specific period of time to ensure

[152] Id., at 1.
[153] Mendonca, supra note 107, at 8.
[154] Id., at xviii.
[155] Id., at 8.

profitable operations for RE projects.[156] Most feed-in laws, for instance in Germany, differentiate for the determination of tariffs between the technology type, the size of an installation and the location of a RE project.[157] The extra costs of a feed-in tariff (FIT) can be covered either through cross-subsidies among all electricity consumers (Spain) or by those customers of the utility obliged to buy electricity from RE (Germany until 2000), or by the taxpayer, or a combination of both systems.[158]

Key to the successful implementation of a feed-in law is the cautious determination of FITs in light of the respective country conditions. It is imperative that tariffs are high enough to cover incremental cost and encourage investment in particular RE technologies.[159] It is further essential that tariffs are guaranteed for a timeframe long enough to ensure investors of an adequate rate of return.[160] Additionally, FITs can be adjusted up or down to encourage more or less investment in RE and to react to externalities.[161]

Figure 1. Tariff level in 2008 (€ Cents/kWh) and duration for support for different technologies

Country		Wind onshore	Wind offshore	Solid biomass	Biogas	PV	Geothermal	Small hydro
Denmark (fixed)		-	-	8.0 10 yrs.	8.0 10yrs.	20.0-25.0 20 yrs.	6.9 20 yrs.	-
Germany (fixed)		9.2 20 yrs.	13.0-15.0 20 yrs.	7.79-22.67 20 yrs.	7.79-29.67 20 yrs.	31.94-43.01 20 yrs.	10.5-20.0 20. yrs	7.65-12.67 20 yrs.
Spain	(fixed)	7.3 20 yrs.	-	10.8-15.9 15 yrs.	8.0-10.8 15 yrs.	23.0-44.0 25 yrs.	6.9 20 yrs.	7.8 25 yrs.
	(premium)	7.1-8.5 no limit	14.1-16.4 no limit	10.4-16.6 no limit	9.4 no limit	-	9.5 no limit	6.5-8.5 no limit

Source: Klein et al, 2008, at 14.

156 Id., at 8.
157 Sawin 2004, supra note 107, at 5.
158 Philip Menanteau, Dominique Finon and Marie-Laure Lamy, Prices versus quantities: choosing policies for promoting the development of renewable energy, Energy Policy 31, 2003 (quoted as Menanteau et al), at 802 (799-812), available at, http://seg.fsu.edu/Library/prices%20vs%20quantities.pdf (last visited: 24th June 2010).
159 Sawin 2004, supra note 107, at 5.
160 Id., at 5.
161 Id., at 5

Moreover, the success of a feed-in law depends on factors such as charges for access to the electricity grid, limits set on qualifying capacities and the ease of permitting and siting of RE projects.[162] Where these general remarks are valid for all feed-in laws, several design options must be considered and applied by policymakers to fit the respective country conditions:[163]

- Tariff levels should be differentiated according to the specific costs of generating electricity from different RE technologies. Appropriate levels can be determined by assessing costs, generation performance and estimated lifetime of a project,
- Guaranteed tariffs should be long enough to ensure a sufficient rate of return to investors. The timeframe for a guaranteed support of RE is quite variable and ranges from one year to no limit, with an average of 14 years,
- Tariff levels should be regularly revised to ensure that tariffs are high enough to cover costs and encourage development in order to achieve the respective national RE policy targets,
- Tariff degression should be considered to accurately reflect decreasing technology prices,
- Feed-in laws should be supplemented by incentives for technological improvements and more efficient designs in order to reduce costs through technological learning.

A variant of FITs is the fixed premium mechanism (applied in Spain) that requires the government to pay a fixed premium on top of the market electricity price to RE producers.[164] In contrast to a normal feed-in law the electricity market price has, thus, an influence on the remuneration of RE producer under the premium option.[165]

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[162] Id., at 5.
[163] Arne Klein, Benjamin Pfluger, Anne Held, Mario Ragwitz, Gustav Resch, Thomas Faber, Evaluation of different feed-in tariff design options – Best practice paper for the International Feed in Cooperation (quoted as Klein et al), at 10 sec, available at, http://www.feed-in-cooperation.org/wDefault_7/wDefault_7/download-files/research/best_practice_paper_2nd_edition_final.pdf?WSESSIONID=f6521f1a77b7d316ffbbf15c9f3c9d2c (last visited: 24th June 2010).
[164] Id., at 9.
[165] Id., at 97.

Therefore, the premium option presents a more market orientated approach to the diffusion of RE.

Generally, inherent to the feed-in model is the so-called net metering which permits consumers to install small RE systems at their homes and to sell their excess electricity into the grid.[166] Net metering differs from a feed-in law mainly in scale and implementation. Its success in attracting investment is determined by the limits set for participation (capacity caps, number costumers or share of peak demand) and the price paid for excess electricity.[167] However, without additional financial incentives, net metering is insufficient to achieve high market penetration due to the high cost of initial investment in RE technologies.[168]

Although feed-in laws were first a predominantly European approach to the diffusion of RE, they are now in place in 63 countries, states or provinces, including parts of Canada and India. They are also in place in Africa, Asia and Australia (see Figure 2).

Figure 2. Cumulative Number of Countries/States/Provinces Enacting Feed-in Policies

Year	Cumulative Number[169]	Countries/States/Province added that year
1978	1	United States
1990	2	Germany
1991	3	Switzerland
1992	4	Italy
1993	6	Denmark, India
1994	8	Spain, Greece
1997	9	Sri Lanka
1998	10	Sweden
1999	13	Portugal, Norway, Slovenia
2000	13	-
2001	15	France, Latvia
2002	21	Algeria, Austria, Brazil, Czech Republic, Indonesia, Lithuania
2003	28	Cyprus, Estonia, Hungary, South Korea, Slovak Republic, Maharashtra (India)
2004	33	Israel, Nicaragua, Prince Edward Island (Canada), Andhra Pradesh and Madhya Pradesh (India)

166 Id., at 15.
167 Sawin 2004, supra note 107, at 6.
168 Id., at 6.
169 Note: Cumulative number refers to number of jurisdictions that had enacted feed-in policies as of the given year.

2005	40	Karnataka, Uttaranchal and Utter Pradesh (India), China, Turkey, Ecuador, Ireland
2006	43	Ontario (Canada), Argentina, Thailand
2007	49	South Australia (Australia), Albania, Bulgaria, Croatia, Macedonia, Uganda
2008	61	Queensland (Australia), California (USA), Gujarat, Haryana, Punjab, Rajasthan, Tamil, Nadu and West Bengal (India), Kenya, the Philippines, Poland, Ukraine
2009	63	Australian Capital Territory (Australia), South Africa

Source: REN21, GSR 2009

In regard of the outcomes of implemented feed-in laws the figures from Germany are particularly impressive. In 2009, the use of RE prevented the emission of 107 million tones of CO_2.[170] For the same year the share of total electricity consumption in Germany from RE rose to 16.1%, and German RE companies had a combined turnover of EUR 33.4bn of which 17.7bn were invested in new RE facilities.[171] The German RE sector currently employs over 300,000 people and is expected to keep growing.[172] These figures of the German RE sector demonstrate that the feed-in approach fosters quick and sustainable RE market development.

2. The Quota Model

In contrast to feed-in laws, the quota model is primarily applied in the USA and only to a relatively small extent in Europe, namely in the United Kingdom, Italy and Sweden. The two models work essentially in the reverse; while feed-in laws set the price for RE and let the market determine capacity and generation, the quota model sets mandatory RE targets and lets the market determine the price.[173]

In a quota model, the government typically mandates a minimum share of RE capacity or generation that often increases over time and that includes a specified final target

[170] German Ministry for Environment, Nature Conservation and Nuclear Safety, Development of Renewable Energy Sources in Germany 2009, March 2010, at 3, available at, http://www.erneuerbare-energien.de/files/pdfs/allgemein/application/pdf/ee_hintergrund_2009_en_bf.pdf (last visited: 24th June 2010).
[171] Id., at 3.
[172] Id., at 3.
[173] Mendonca, supra note 107, at 9.

and end-date.[174] Generally it is a policy choice within the quota model whether such obligation is placed on producers, distributors or consumers.[175] There are two main types of quota systems in place for the generation of electricity: obligate/certificate and tendering systems. The former will be analyzed subsequently, while the tendering system is presented below.

Renewable Portfolio Standards (RPS) are the typical approach to an obligate/certificate system. Under a RPS, a mandatory target is established for the minimum amount of capacity or generation from RE that typically increases over time.[176] The market then determines how it will comply in terms of the type of RE technology to be used and the respective business partners and the prices and contracts that will be applied.[177] Once a target period is expired, the producers (or distributors or consumers, depending on the policy) must demonstrate that they are in compliance with the RPS, through the ownership of credits that they earn through transactions.[178] Otherwise they are obligated to pay a specific penalty determined by law.[179] Credits may take the form of "Green Certificates" for the electricity generated from RE and function as proof for meeting the mandatory RE targets.[180] Market actors with too many certificates can sell or trade them to earn additional income, while those who have not met the RE target have the option to build their own RE capacities, buy RE electricity from other producers or simply to buy certificates on the market.[181] Once a RPS is successfully established, the governmental involvement is limited to certifying credits and monitoring compliance as well as enforcement.[182]

In 2008, RPS policies were enacted in 49 countries, states or provinces, of which the vast majority were enacted in 29 states of the USA (see Figure 3).

[174] Id., at 10.
[175] Id., at 10.
[176] Sawin 2004, supra note 107, at 6.
[177] Id., at 6.
[178] Id., at 6.
[179] Id., at 6.
[180] Id., at 6.
[181] Id., at 6.
[182] Id., at 6.

Figure 3. Cumulative Number of Countries/States/Provinces enacting RPS Policies		
Year	**Cumulative Number**	**Countries/States/Province added that year**
1983	1	Iowa (USA)
1994	2	Minnesota (USA)
1996	3	Arizona (USA)
1997	6	Maine, Massachusetts, Nevada (USA)
1998	9	Connecticut, Pennsylvania, Wisconsin (USA)
1999	12	New Jersey, Texas (USA), Italy
2000	13	New Mexico (USA)
2001	15	Flanders (Belgium), Australia
2002	18	California (USA), Wallonia (Belgium), United Kingdom
2003	19	Japan, Sweden, Maharashtra (India)
2004	34	Colorado, Hawaii, Maryland, New York, Rhode Island (USA), Nova Scotia, Ontario, Prince Edward Island (Canada), Andhra Pradesh, Karnataka, Madhya Pradesh, Orissa (India), Poland
2005	38	District of Columbia, Delaware, Montana (USA), Gujarat (India)
2006	39	Washington State (USA)
2007	44	Illinois, New Hampshire, North Carolina, Oregon (USA), China
2008	49	Michigan, Missouri, Ohio (USA), Chile, India

Source: REN21, GSR 2009

The figure above shows that the implementation of RPS policies gained momentum at the beginning of the 21st century. By1998, RPS had been introduced in only 9 US states, while in the following four years this figure doubled to 18 including major economies like Australia, the United Kingdom and California. Owing to the only recent introduction of many RPS schemes, the experiences in regard to the outcome of quota systems are very limited.

However, a recent study of the UK Renewables Obligation system provides some perspective on the potential of RPS policies.[183] It is projected that the UK Renewables Obligation will cost consumers approximately £ 14bn by 2020 and £ 18bn by 2027, while RE capacities are only expected to reach 10.1% of total the electricity generation by 2020.[184] This would mean that RE penetration would be only

[183] Carbon Trust and LEK Consulting, Policy frameworks for renewables – analysis on policy frameworks to drive future investment in near and long-term renewable power in the UK, 2006, available at, http://www.cleanenergystates.org/international/downloads/Policy_Frameworks_for_Renewables_Carbon_Trust_July2006.pdf (last visited: 24th June 2010).

[184] Id., at 2.

half the way towards achieving the UK 2020 target of 20%.[185] Experts draw from these exemplary figures the general conclusion that RPS may increase RE capacities, but are at the same time less cost-effective than the feed-in models.[186]

3. The Tendering System

Tendering systems are the third option for the integration of RE into the national energy mix. Under a tender system, the regulator issues an invitation to tender for a specified amount of RE capacity or share of total electricity to be achieved at certain price per kWh.[187] In turn, project developers submit their bids for a power purchase agreement and/or governmental funds through a competitive bidding process.[188]

The bidding process itself depends highly on the respective national tender regulations. In principle, regulators establish a set of criteria for evaluation prior to each round of bidding, including the desired level of generation and the growth rates required over time.[189] Project developers then have the opportunity to submit their respective bids. Generally, the tender is awarded to the most competitive bid, starting with the lowest bid and working upwards until the desired level of capacity or generation is reached.[190] Typically the regulator will issue separate tender invitations for the different technologies in order to avoid competition between the various sources of RE.[191]

Project developers who win a competitive bidding process are guaranteed a price for a specific period of time, while the electric utility is obliged to purchase a certain amount of RE electricity from winning producers.[192] The difference between the market and the price of the winning bid is either added to electricity bills in form of special levy (UK), or covered through cross-subsidization among all electricity

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185 Id., at 2.
186 Mendonca, supra note 107, at 11.
187 Id., at 14.
188 Id., at 14.
189 Id., at 14.
190 Id., at 15.
191 Id., at 15.
192 Menanteau et al., supra note 155, at 802.

consumers.[193] It is noteworthy that each tender invitation is a one time competition for funding and contracts. Therefore, the specific contractual arrangement is of paramount importance for project developers, especially the respective power purchase agreements and land-use agreements. An early example of a tendering system is the UK Non-Fossil Fuel Obligation that was introduced in 1991.[194] Tendering mechanisms have been applied in Ireland, France, the US and China.[195] Experiences from these countries have shown that the success of tender systems is very limited due to the uncertainty in the market created by the intermittency of tenders and the complexity of the involved procedures.[196]

4. Discussion of the various Policy Options for Renewable Energy

Although an in-depth analysis of the various models to integrate RE into the energy mix is beyond the scope of this paper, this section will attempt to compare the policy options presented above.[197] And it will close with a chart presenting the key advantages and disadvantages of the feed-in and the quota model (including the specifics of tendering systems). Major issues such as capacity and generation, geographic distribution and technological diversity will be discussed below in greater detail.

The quota model establishes specific targets for RE capacity or generation and thus provides certainty in regard of the future share of the market. In contrast, under a feed-in model it is not possible to predict ex ante how much capacity or generation will be achieved. However, those countries with feed-in laws have regularly surpassed the national RE targets.[198] This development is due to the lesser risk and greater expected profits stipulated by the feed-in model, because the subsidies are granted to all new

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[193] Id., at 803.
[194] Niels I. Meyer, European schemes for promoting renewables in liberalized markets, Energy Policy 31, 2003, at 668 (quoted as Meyer), available at, http://in3.dem.ist.utl.pt/master/06energy/files/class4.pdf (last visited: 24th June 2010).
[195] Mendonca, supra note 107, at 15.
[196] Id., at 15.
[197] Since the tendering system is a sub-category of the quota model (see section X), the advantages and disadvantages are quite similar and only on some issues distinct. Therefore, the following discussion will predominantly focus on the comparison between the feed-in and the quota model, while the specific characteristics of a tendering system will only be emphasized.
[198] Meyer, supra note 191, at 675, Menantaeu et al, supra note 155, at 811.

projects and continue throughout the pay-off period determined by law.[199] On the other hand, the lower prices obtained under a quota system, caused by the pressure of competition, limit the margin with respect to cost for project developers and thus result in fewer installed capacities.[200] In a tendering system the uncertainty regarding the profitability of submitted projects is even stronger, since considerable costs occur in the preparation of bidding procedures that cannot be retrieved by unsuccessful bidders.[201] Therefore, it can be said that the balance between the risk involved and expected profits is clearly to the disadvantage of the quota and tendering models, making them less attractive for investors and thus establishing less RE capacity or generation.

The success of RE projects strongly depends on the local natural resources. Therefore, the impact of the models on the geographic distribution of RE facilities is of importance. Quota type schemes tend to favor least-cost projects and thus limit them to the areas with the best natural conditions.[202] This cost pressure regularly causes project developers to neglect other important aspects including environmental impact, information programs and public interest as well as site integration, which in turn may lead to strong local opposition movement.[203] In contrast, the acceptability of projects is much higher in countries that have FITs, because the certain profitability makes it possible to avoid a concentration of projects at the most efficient sites or the creation of large controversial RE projects.[204] For instance, in Germany, the best wind conditions are found in the North Sea, yet only 53% of wind energy projects are located there.[205]

In regard of the technological diversity, quota systems tend to encourage least-cost technologies that are close to market competitiveness.[206] For instance, the Texan RPS caused a rapid diffusion of wind energy, while it has done little to encourage more

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[199] Id., at 806.
[200] Id., at 806.
[201] Id., at 806.
[202] Meyer, supra note 191, at 674.
[203] Menantaeu et al., supra note 155, at 807.
[204] Id., at 807.
[205] Id., at 807.
[206] Sawin 2004, at 11.

expansive technologies such as solar PVs, despite the excellent conditions for solar energy in Texas.[207] In comparison, FITs can encourage technological diversity provided that tariffs vary according to technology type, since they create a market for all renewables and thus support technologies from early development to market competiveness.[208]

This brief discussion gives an overview of the key issues policymakers have to consider when choosing the appropriate framework for the diffusion of RE in respect to the specific country conditions. However, this discussion is by no means conclusive due to the limited scope of this paper. The chart on the following page presents the advantages and disadvantages of the different policy options based on the studies of key RE analysts and will provide a comprehensive framework for the subsequent analysis of the Egyptian approach to the diffusion of RE (see Figure 4).

Figure 4. Renewable Energy Policy Options Comparison

Design Option	Capacity or Generation	Cost, price and competition	Industry and Innovation	Investor Certainty	Ease of Implementation
Feed-in Laws	Pro: • Have proven most successful at developing renewables markets; • Large amounts of RE in short time.	Pro: • Cost effective if the tariff is periodically and wisely adjusted; • Low transaction costs; Contra: • If tariffs are not adjusted over time, consumers may pay unnecessarily high prices for RE. This can be addressed through monitoring or tariff degression;	Pro: • Have proven most successful at creating domestic industries; • FITs encourage steady growth of small- and medium-scale producers; • Ease of entry; • Supports technologies that are not yet compatible. Contra: • Can involve restraints on	Pro: • Can reduce investor risk with long guaranteed FITs; • Greater certainty, in particular in developing countries; • Ease of financing; • State determines price for RE.	Pro: • Most simple to design, administer and enforce; • Flexibility: FITs can be adjusted to account for changes in technology and market; • Fixed premium mechanisms can create more market orientation; • Net metering can promote small private RE installations.

207 Id., at 11.
208 Id., at 11.

		• Insufficient incentives to lower costs. • Stipulates less competition	RE trade due to domestic production requirements.		
Renewables Portfolio Standard and Tendering Systems	Pro: • If RPS enforced, it can meet realistic targets; Contra: • Targets can set upper limit for development – there are no high profits to serve as incentives to install more than the mandated level because profitability exits only within the quota. • Up to now tendering as not proven very successful (limited experiences).	Pro: • RPS and tendering best at reducing cost & price with competitive bidding; • Promote least-cost projects – cheapest resources used first, which brings down cost early; • Encourage competitio; • Perceived as being more compatible with open or traditional power markets; • Subsidies for RE can be best controlled. Contra: • Price fluctuation in thin markets, creating instability and gaming; • High transaction costs.	Pro: • Favor least-cost technologies (compatible) & established industry players; • More likely to integrate RE into electricity supply infrastructure; Contra: • High risks and low reward for equipment manufacturers and project developers, which slows innovation; • Tend to favor large, centralized merchant plants and not suited for small investors due greater investment risk.	Pro: • Theoretically provide certainty regarding future market share for RE (often not true in practice); • Market determines price; • Green Certificates can provide additional income Contra: • Lack of price certainty for investors, standard PPAs can reduce risk; • Investors must assess future supply and demand balance for the lifetime of the project; • Costs occur up-front in preparation for tendering procedures.	Contra: • RPS complex in design, administration and enforcement, leading to a lack of transparency; • Tendering is more complex than feed-in, simpler than RPS; • Tendering tends to create cycle of stop-and-go development; • Complexity of tender procedures; • Lack flexibility – difficult to fine-tune or adjust in short term if situations change.

Sources: Wang 2007, Sawin 2004 and Mendonca.

All the positive and negative aspects mentioned in Figure 4 must be considered by policymakers in order to identify the most appropriate policy option for the diffusion of RE in respect to the specific country conditions. However, most important for all systems is political stability and a long-term, enforceable and consistent RE policy.

5. Supporting Policy Options for Renewable Energy

For the introduction of RE into a national market, the implementation of one of the policy options discussed above is of utmost importance. Nevertheless, each option should be supplemented by a bundle of supportive measures that challenge the described barriers for the diffusion of RE. The policy tools enlisted below provide an overview on these supportive mechanisms:[209]

- Cost reduction policies: Several policies can be applied as an incentive to reduce the high initial investment cost of RE and thereby reduce the risk for investors: (1) investment tax credits that directly reduce the cost of investing in RE and production tax credits that provide tax benefits against the amount of RE electricity actually produced, (2) other tax reliefs such as accelerated depreciation, relief from taxes on sales and property and value-added tax rebate as well as reduction or removal of import duties on RE technologies, and (3) rebates on a specific share of the cost for RE technology or installation and production payments on a certain amount of generation; (4) financing assistance through low-interest and/or long-term loans and/or loan guarantees, and (5) reduced costs through economies of bulk procurement.
- Public funds: Funds can be collected through special levies on power consumption or penalties for the violation of environmental provisions. Public funds can serve several purposes including subsidizing the difference between RE and conventional energy prices, reducing the cost of RE & EE loans, providing EE services, funding public energy education, providing low-income energy assistance and supporting R&D.

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[209] Sawin 2004, supra note 107, at 18 – 25; Eric Martinot, Global Energy Markets and Policies, New Academy Review special edition on climate change, Spring 2004 (quoted as Martinot 2004), at 3-6, available at, http://www.martinot.info/Martinot_NAR.pdf (last visited: 24th June 2010).

- RE industry standards: RE standards, such as wind turbine standards, can prevent the introduction of inferior technologies into the market and thereby increase confidence in RE products; fair grid connection standards and charge can increase the predictability of profits and RE siting and planning requirements can reduce opposition to RE projects, if they address critical concerns like noise, visual and environmental impacts.
- RE & EE education and information dissemination: An understanding of RE & EE industries is important to increase acceptance by the population and to show investors potential opportunities. These should include resources studies, education about the various RE & EE technologies and training and information about available governmental incentives and support schemes.

An additional challenge for the diffusion of RE is an energy sector structure that has state-owned electric utility monopolies, which traditionally focus on conventional energies rather than on RE. Five key trends for restructuring energy sectors that facilitate the diffusion of RE have been identified by analysts:[210]

- Competitive wholesale power markets and removal of price regulations on generation,
- Self-generation by end users and small-scale generation technologies (net metering),
- Privatization and/or commercialization of electric utilities,
- Unbundling of generation, transmission and distribution, and
- Competitive retail power markets.

These measures regularly result in independent power production and competition in generation, decentralization and privatization as well as unbundling of generation and transmission and even competition in distribution.[211]

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[210] Eric Martinot, Grid-Based Renewable Energy in Developing Countries: Policies, Strategies, and Lessons from the GEF, World Renewable Energy Policy and Strategy Forum, Berlin 2002 (quoted as Martinot 2002), at 1-5, available at, http://www.martinot.info/Martinot_WCRE2002.pdf (last visited: 24th June 2010).

[211] Id., at 1.

C. Energy Efficiency Support Schemes

EE is the natural and essential partner of RE. Without a sustainable EE policy, energy demand will continue to rise and will ultimately exceed global energy production capacities as countries are striving for economic growth.[212] Therefore, it is essential that the energy system as whole is addressed – not only the process of generation, transmission and distribution, but the patterns of energy consumption as well.[213]

Energy is consumed in a very wasteful manner. This situation is primarily based on out-dated assumptions on the availability of conventional energy resources. It is projected that only 37% of global primary energy is converted in useful energy, conversely nearly 66% of primary energy is wasted.[214] Based on this projection, experts estimate the potential for EE gains in developed countries between 15%-35%, while the EE potential in developing countries even exceeds 40%.[215] The realization of this huge potential depends on the implementation of a sustainable EE policy that should address among other issues energy consumption in housing, lighting and electronic appliances.

The use of energy in buildings for several purposes including for heating and cooling, ventilation, lighting and water heating accounts for a large share of the total end use of energy. On the global level, commercial and residential buildings account for roughly 40% of total end use of energy.[216] It is estimated that EE building design can reduce this figure by 50% alone with measures that are already feasible today.[217] An outstanding example for EE building design is the so-called Passive House Movement.[218] To qualify as a passive house, the highest technological EE standards

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[212] Bristow, Energy Efficiency: The Essential Partner of Renewables, in Mendonca (quoted as Bristow, Energy Efficiency), at 19.
[213] Id., at 19.
[214] Eberhard Jochem et al, Chapter 6: Energy End-use Efficiency, in World Energy Assessment: Energy and the Challenge of Sustainability, UNDP 2000, at 174, available at, http://www.undp.org/energy/weapub2000.htm (last visited: 24th June 2010).
[215] Id., at 19.
[216] IEA, Energy Efficiency Requirements in Building Codes, Energy Policies for New Buildings, March 2008 (quoted as IEA 2008), at 10, available at, http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=2042 (last visited: 24th June 2010).
[217] Id., at 79.
[218] Passiv Haus Primer, Passive Haus Institut 2010, at 2, available at, http://www.passivhaus.org.uk/ (last visited: 24th June 2010).

must be applied in regard of heating and cooling, walls and windows as well as for insulations: it will typically have more windows on the south face to enable capture of the sun's heat; it will use solar thermal collectors to heat water; and the ventilation system will use the warm outgoing air to heat the cooler incoming fresh air or vice versa.[219]

Since the high EE standards of the passive house are not yet feasible and thus do not have a high market penetration, the introduction of mandatory EE building codes is essential for the implementation of a sound EE policy. EE Building Codes regularly stipulate provisions on exterior building design, heating, ventilation and air conditioning, RE and installed equipment and zoning of buildings as well as integrated design.[220] Today, mandatory EE requirements exist in nearly all OECD countries and are extensively promulgated in the developing world.[221]

The EE of electronic appliances is an additional key area where large end-use savings can be made. Electric appliances use 30% of all electricity generated in OECD countries, producing 12% of all energy-related CO_2 emissions.[222] It is projected that the introduction of an appliance efficiency policy could achieve a reduction in emission of nearly 322 million tons of CO_2 per year, which is equivalent to nearly 200 gas-fired power stations.[223] For instance, the energy used by electric appliances left on standby is enormous. Although the energy consumption of each appliance ranges between only 0.5 to 10 watts on standby mode, it is projected that these inactive device all together account for 5% to 10% of the total electricity used in most homes, which translates into roughly 1% of global carbon dioxide emissions.[224] To adequately tackle this issue it is essential to introduce minimum EE appliance standards.[225]

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219 Id., at 4-5.
220 IEA 2008, supra note 213, at 19-26.
221 Id., at 14.
222 IEA, Cool Appliances – Policy Strategies for Energy Efficient Homes, 2003 (quoted as IEA 2003), at 11; available at, http://www.iea.org/papers/2008/cd_energy_efficiency_policy/3-Appliances%20and%20equipment/3-cool_appliance2003.pdf (last visited: 24th June 2010).
223 Id., at 14.
224 IEA, Fact Sheet: Standby Power Use and the IEA "1-watt Plan", April 2007, at 1, available at, http://www.iea.org/papers/2007/standby_fact.pdf (last visited: 24th June 2010).
225 Bristow, Energy Efficiency, supra note 209, at 21

Another major approach to increase EE is the phasing-out of the incandescent lighting bulb (GLS) and the introduction of the more efficient fluorescent lamp (CFL). In general, grid-based electricity lighting accounts for 19% of total global electricity consumption which is equivalent to 900 322 million tones of CO_2 per year.[226] With these figures as the backdrop, it is imperative to reduce the energy consumption of lighting. Almost all European countries and many developing countries have introduced formal policies to phase-out GLS lamps.[227] Cuba was the first country phasing-out GLS lamps by implementing a dual approach that included an import ban and a country-wide program to exchange GLS lamps in 2006/2007.[228] The rational behind such policies is the fact that CFLs use only a quarter of the energy of a GLS lamp for the equivalent light output and thus leads to very significant and cost effective energy savings.[229] It is projected that for each million GLS lamps replaced, the respective national electricity demand reduces by 25 MW.[230]

The three policy options presented above are only a selection out of many ways to increase EE in the residential, commercial and industrial sector. A recent analysis of the IEA provides the following overview (Figure 5.) of available EE policy options.[231]

Figure 5. Energy Efficiency Policy Options

Sector	Energy Efficiency Policy Option
Cross-sectoral	• Measures for increasing investment in EE; • National EE strategies and targets; • Compliance, monitoring, enforcement and evaluation of EE measures, and • EE indicators.
Buildings	• Building Codes; • Passive Energy Houses and Zero Energy Buildings; • Policy package to promote EE in existing buildings; • Building Certification schemes, and

[226] IEA, Light´s Labor´s Lost – Policies for Energy-efficient Lightning, 2006 (quoted as IEA 2006), at 25, available at, http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=1695 (last visited: 24th June 2010).
[227] IEA, Phase out of Incandescent Lamps – Implications for international supply and demand for regulatory compliant lamps, April 2010 (quoted as IEA 2010), at 9, available at, http://www.iea.org/papers/2010/phase_out.pdf (last visited: 24th June 2010).
[228] Id., at 25.
[229] Id., at 9.
[230] Id., at 25.
[231] IEA, Energy Efficiency Policy Analysis, 2007 (quoted as IEA 2007), at 4-5, available at, http://www.iea.org/textbase/nppdf/free/2007/EnergyEfficiency.pdf (last visited: 24th June 2010).

	• EE improvements in glazed areas.
Appliances and equipment	• Mandatory energy performance requirements or labels; • Low-power modes, including standby power for electronic appliances, and • Energy performance test standards and measurement protocols.
Lightning	• Best practice lighting and the phase-out of incandescent bulbs, and • Ensuring least-cost lightning in non-residential buildings and the phase-out of in efficient fuel based lightning.
Transport	• Fuel efficient tires; • Mandatory fuel efficiency standards for light-duty vehicles; • Fuel economy of heavy-duty vehicles, and • Eco-driving.
Industry	• Collection of high quality EE data for industry; • Energy performance of electric motors; • Assistance in developing energy management capability, and • Policy packages to promote EE in small and medium-sized enterprises.
Energy utilities	• Utility end-use EE schemes.

Source: IEA 2007.

Eventually, the design of a national EE policy must necessarily consider the so-called "Jevons Paradox", which implies that increase in EE can result in increased energy consumption, since the lowering of demand reduces the cost of energy and thereby encourages greater consumption.[232] The essence of this idea is that as long as the profit of utility companies is related to the energy they sell, they will have no interest in reducing energy consumption, because this would in turn diminish their profits. Therefore, if power companies would no longer generate profits in relation to their output, they would no longer be motivated to increase energy consumption.[233] For instance, if a utility company would be contracted to provide the heating and lighting for a building, for a certain period and a fixed rate, it would have an incentive reduce energy consumption, since doing so would reduce costs.[234] The decoupling of energy consumption from the profits of the utility companies would be a milestone of an increase in EE. However, such a reform would require a fundamental restructuring of the entire energy market, which will be very hard to achieve on the short-term.

232 Bristow, Energy Efficiency, supra note 209, at 22.
233 Id., at 22.
234 Id., at 22.

All in all, the implementation of a sound EE policy may be difficult to achieve in an environment that lacks the awareness for the necessity of energy reduction in consumption, due to unrealistically low energy prices and outdated perceptions about the availability of conventional energy resources. Nevertheless, the large potential of EE and the related energy cost reduction and other economical gains provides an overwhelming argument for policy-makers to create and enforce a sustainable EE policy.

D. Conclusion

The objective of this chapter has been to provide an overview of the barriers regularly facing the promotion of RE & EE, the various policy options to overcome those barriers and their respective impact on the creation of a domestic market for RE & EE. In addition to these specific design options the following general considerations must be included in order to provide a comprehensive framework for the subsequent analysis of the current and prospective approach to the promotion of RE & EE in Egypt (Chapter V).

All the policy options presented in this chapter tackle specific barriers to the promotion of RE & EE. However, their individual impact is very limited when implemented in isolation, since the barriers for RE & EE are diffuse but at the same inter-dependent. Therefore, any sound and sustainable RE & EE policy requires acknowledging the interdependencies between the barriers and the various policy tools:[235]

- Making RE mandatory without changing subsidies and electricity prices would send improper price signals to consumers,
- Making RE mandatory without providing information and education would ensure that consumers remain uninformed about EE technologies and practice,
- Making RE mandatory without funding EE would force utilities to procure more electricity supply,
- Removing subsidies does little to eliminate the market power already afforded to conventional energies,

[235] Sovacool 2009, supra note 107, at 1537- 1539.

- More accurate electricity prices without low-income assistance will hurt poor families the most, and
- Distributing information about RE & EE without internalizing the cost of negative externalities erodes the incentive for EE investment.

When considering these reciprocal effects it is obvious that an effective and comprehensive approach would require treating the available policy options as complementary, rather than as isolated tools that stand in competition to each other.[236] There is no such thing as one magic policy bullet. Only the implementation of a comprehensive policy can ensure that RE & EE will realize their full potential. Furthermore, consistent and long-term RE & EE policies are important to ensure the healthy development of the emerging sector.[237] The consistency of policy is crucial to guarantee steady growth and stability in the market, to develop a domestic industry, to reduce the investment risk and thereby to provide easy access to financing for RE & EE projects.[238] For instance, when a certain incentive expires, the interest of investors could cease and thus, markets and industries could vanish.[239] It is imperative to avoid such stop-and-go in RE & EE policies in order to anticipate uncertainties and market re-orientation which are risky and costly for project developers.

A successful RE & EE policy will require consistent long-term commitment of governments and the implementation of a comprehensive regulatory framework. It will be the aim of Chapter V to analyze whether the current and prospective Egyptian framework for the promotion of RE & EE complies with these requirements.

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236 Id., at 1539.
237 Sawin 2004, supra note 107, at 25.
238 Id., at 25.
239 Id., at 25.

IV. Egypt

Egypt is located in Northern Africa, bordering the Mediterranean Sea, between Libya and the Gaza Strip and includes the Asian Sinai Peninsula. And it is bordered in the South by Sudan. The following chapter will provide an overview on the impact of climate change for Egypt, the Egyptian electricity market and Egyptian energy situation. The objective is to establish an empirical fundament for the subsequent in-depth legal policy analysis of the current and prospective regulatory framework for RE and EE in Egypt.

Figure 6. Map of Egypt (Source:www.weltkarte.com.).

A. Social, Political and Economic Background

The Arab Republic of Egypt was established as a presidential republic after the revolution of 1953 and has been governed by President Mohamed Hosni Mubarak since October 1981.[240] President Mubarak has been re-confirmed in office for the fifth time during the first ever multi-candidate elections in 2005.[241] Mubarak´s National Democratic Party (NDP)[242] is the dominant actor within the officially multiparty political system. The continuity and stability of the Egyptian system is, further, enhanced by the prevailing state of emergency that is operative pursuant to Law No. 162/1958 since 1967. The Emergency Law empowers the Egyptian government to suspend basic liberties in regard to demonstrations and strikes or the freedom of press in the name of national security. Thus, it attracted massive critique by human rights activist for posing an imminent threat to democracy at large in Egypt.[243] Nevertheless, Egypt must be characterized as one of the world´s most stolid, but capable authoritarian regimes.[244]

Egypt has a population of approximately 80 million with an average growth rate of 2%.[245] The official language in Egypt is Arabic.[246] However, English and French are widely understood by educated classes and used in business, government and diplomacy. Islam (mostly Sunni) is the predominant faith with 90% of the population adhering, whereas Coptic and other Christians make up the remaining 10%.[247] The urban population represents approximately 43% of the total population and the annual rate of urbanization is estimated at 1.8% for 2005-2010.[248]

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240 The CIA World Factbook, Egypt, at Government, available at, https://www.cia.gov/library/publications/the-world-factbook/geos/eg.html (last visited: 24th June 2010).

241 Id., at Government.

242 NDP Official Website: http://www.ndp.org.eg/en/index.aspx (last visited: 24th June 2010).

243 Human Rights Watch, Egypt´s Emergency without End, Rushed Renewal of Repressive Legislation, available at, http://www.hrw.org/en/news/2003/02/24/egypts-emergency-without-end (last visited: 24th June 2010).

244 Mona El Ghobashi, Constitutional Contention in Contemporary Egypt, American Behavioral Scientist 2008, at 1607 (1590), available at, http://abs.sagepub.com/cgi/rapidpdf/0002764208316359v1.pdf (last visited: 24th June 2010).

245 The CIA World Factbook, supra note 237, Egypt, at Population.

246 Id., at Population.

247 Id., at Population.

248 Id., at Population.

With the appointment of Ahmed Nazif as Prime Minister in 2004[249], a liberal reform agenda was initiated. The reform included the establishment of a well-functioning foreign exchange market, a reduction of import tariffs, a reform of personal and corporate income taxes and the streamlining of corporate regulations as well as the privatization of the banking sector combined with a profound financial sector reform.[250] The reform policies led to growth rates of 6.8% to 7.2% for 2006-2008. However, a declining growth rate of 5.0% is projected for 2010/2011, due to world economic crisis.[251] The main components of the current Egyptian GDP are the agricultural (13.1%), industrial (37.7%) and service sectors (49.2%).

Figure 7. GDP of Egypt 2004-2008					
Year	2004	2005	2006	2007	2008
GDP (current prices billion USD)	n.a.	89.68	107.48	130.47	162.28

Source: World Bank Data.

In 2008, total inbound foreign direct investment (FDI) amounted to USD 9.5bn in Egypt, while outflows aggregated to USD 1.9bn for the same year.[252] Despite falling FDI inflows from USD 12bn in 2007 to USD 9.2bn in 2008, Egypt remains among the largest recipients of FDI in the region and at the same time has maintained its position as a leading regional economy for outward FDI.[253]

Traditionally, Egypt is one of the closed allies of the USA in the Arab World and receives annually USD 2bn aid from the US, much of it as a result of the Camp David Accord in 1978.[254] In 2004, Egypt implemented the Qualifying Industrial Zones (QIZ)

[249] Id., Egypt, at Government.
[250] Klaus Enders, Egypt: Reforms Trigger Economic Growth, IMF Middle East and Central Asia Department February 2008, available in the internet, http://www.imf.org/external/pubs/ft/survey/so/2008/car021308a.htm (last visited: 24th June 2010).
[251] IMF, World Economic Outlook – Rebalancing Growth, April 2010, at 160, available at, http://www.imf.org/external/pubs/ft/weo/2010/01/index.htm (last visited: 24th June 2010).
[252] UNCTAD, World Investment Report 2009 – Transnational Corporations, Agricultural Production and Development, at 250, available at, http://www.unctad.org/en/docs/wir2009_en.pdf (last visited: 24th June 2010).
[253] Id., at 43, 46.
[254] Oxford Business Group, Egypt – Country Profile, available at, http://www.oxfordbusinessgroup.com/country.asp?country=3 (last visited: 24th June 2010).

Protocol, which established designated geographic areas within Egypt and Israel that enjoy a duty free status with the USA provided the agreed upon Israeli component is satisfied.[255] However, the ties with Europe are gaining priority. In June 2004 an Association Agreement between Egypt and the European Union came into force. It forms the legal basis governing the relations between Egypt and the EU and stipulates free trade arrangements for industrial goods, concessionary arrangements for trade in agricultural products and opens prospect for a greater liberalization of trade in services that gradually will lead to the establishment of a free trade area.[256] Moreover, Egypt and the EU signed a Memorandum of Understanding to enhance their strategic partnership on energy in 2008.[257] Additionally, Egypt is member of World Trade Organization (WTO)[258] and signed free and preferential trade agreements with Libya (1990), Syria (1991) and Tunisia (1998) as well as with Morocco (1998), Lebanon (1999), Jordan (1998) and Iraq (2001).[259] In 2008, the main trade partners of Egypt were the European Union (34.4%), the USA (9.8%), and China (7.5%), Saudi Arabia (5%) and Japan (3.8%).[260]

Notwithstanding Egyptian economic growth up to 7.2% in the past decade, wealth is not trickling through to the weakest parts of society. A reported 18.4% of the Egyptian population is still living below the poverty line, while 41.5% of income goes to the wealthiest 20% of the population.[261] The comparison of these two indicators is evidence of the ever increasing gap between rich and poor in Egypt. Therefore, it is

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[255] The Qualifying Industrial Zones Protocol, Cairo 2004, available at, http://www.qizegypt.gov.eg/About_Textprotocol.aspx(last visited: 24th June 2010).

[256] The EU-Egypt Association Agreement, Luxembourg 2001, available at, http://ec.europa.eu/external_relations/egypt/eu-egypt_agreement/index_en.htm (last visited: 24th June 2010).

[257] Memorandum of Understanding on Strategic Partnership on Energy between the European Union and the Arab Republic of Egypt, Brussels 2008, available at, http://ec.europa.eu/external_relations/egypt/docs/mou_energy_eu-egypt_en.pdf (last visited: 24th June 2010).

[258] WTO, Member information – Egypt, available at, http://www.wto.org/english/thewto_e/countries_e/egypt_e.htm (last visited: 24th June 2010).

[259] Egyptian Ministry of Trade and Industry, Free and Preferential Trade Agreements between Egypt and the Arab countries, available at, http://www.mfti.gov.eg/english/Agreements/arab.htm (last visited: 24th June 2010).

[260] European Commission for Trade, Egypt – EU Bilateral Trade and Trade with the World, available at, http://ec.europa.eu/trade/creating-opportunities/bilateral-relations/countries/egypt/ (last visited: 24th June 2010).

[261] World Bank Data, available at, http://data.worldbank.org/indicator/SI.DST.05TH.20 (last visited: 24th June 2010).

not surprising that the latest Human Development Index of the UNDP ranks Egypt 123rd out of 177 analyzed countries.[262] Another major hazard for the Egyptian political system is the widespread corruption in the public sector, which is exemplified by rank 111 of 180 in the 2009 Transparency International Corruption Perception Index.[263]

B. Climate Change in Egypt

Egypt is especially vulnerable to the adverse impacts of climate change, due its growing population, its limited fetile land and the economic concentration in coastal zones. Negative effects will concern agricultural productivity, water resources, human habitat and human health as well as the ecosystem at large. Any adverse effect on these issues will in turn affect Egypt´s national economy and in particular the energy, industry, and tourism sector.[264]

The low lying Delta and the narrow valley of the Nile comprises only 5.5% of the area of Egypt, but accounts for over 95% of its population and its agriculture.[265] Therefore, it is particularly alarming that the Mediterranean coast and the Nile Delta have been identified as most vulnerable to sea level rise and coastal erosion.[266] It is projected that climate change will cause saline sea water to penetrate far into the northern Delta and will turn coastal lakes into saline lagoons, decrease natural fish supply, cause the disappearance of weed swamps and endanger proper functioning of infrastructure facilities directly exposed to the sea water.[267] Moreover, water balance in the lakes will be affected contributing to a possible extension of the lake boundaries

[262] UNDP, Human Development Report 2009, Overcoming barriers: Human mobility and development, at 173, available at, http://hdr.undp.org/en/media/HDR_2009_EN_Complete.pdf (last visited: 24th June 2010).

[263] Transparency International Corruption Perception Index 2009, available at, http://www.transparency.org/policy_research/surveys_indices/cpi/2009/cpi_2009_table (last visited: 24th June 2010).

[264] EEAA, Egypt State of the Environment Report 2008, September 2009 (quoted as EEAA 2008), at 90; available at, http://www.eeaa.gov.eg/English/reports/SoE2009en/Egypt%20State%20of%20Environment%20Report.pdf (last visited: 24th June 2010).

[265] EEAA, The Arab Republic of Egypt: Initial National Communication on Climate Change, prepared for the United Nation Framework Convention on Climate Change (UNFCCC), June 1999 (quoted as EEAA 1999), at j, available at, http://unfccc.int/resource/docs/natc/egync1.pdf (last visited: 24th June 2010).

[266] Id., j.

[267] Id., at 73-74.

southwards.[268] Sea level rise constitutes in particular a massive peril for human habitat and settlements. In a scenario based on a sea level rise between 0.5 m to 1 m about 30% of the city of Alexandria will be lost due to inundation, which would force 2 million citizens to abandon their homes and would destroy 195,000 jobs constituting a total economic loss amounting to USD 35 billions.[269] A scenario including a sea level rise of 0.5 m would respectively affect 33% of the employment in the City of Rosetta and a loss of employment in Port-Said amounting to 6,759 jobs causing economic loss in billions of dollars.[270] It is expected that 2 million people will be forced to migrate from the Delta coastal areas. Such a scenario would have tremendous socio-economic consequences, especially in the cost of resettlement and political stability.

The adverse impact of climate change on the Egyptian agricultural sector could be devastating for the national food supply and employment situation. Although the agricultural sector accounts for only 17.3% of the Egypt´s GDP, it provides the income-base for 50% of the population.[271] However, the rapid growth of the country´s population and the limited area for agriculture requires Egypt to rely on food imports.[272] Climate change is projected to decrease the national production of major crops (ranging from 11% for rice to 28% for soybeans) by 2050 compared with production under current climate conditions.[273] At the same time temperature rise will increase water requirements and thereby decrease the crop water-use efficiency.[274] Therefore, climate change as projected will adversely affect crop production and will thereby increase Egypt´s reliance on costly food imports.[275]

More than 95% of the Egyptian water budget is generated outside of its territory and provided only through the flow of the river Nile.[276] In 2000, Egyptian water

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[268] Id., at 73.
[269] Id., at 70.
[270] Id., at 70.
[271] Rubel/Elsayed, Egypt´s Carbon Emissions and the Kyoto Protocol, in Selim, Egypt, Energy and the Environment: Critical Sustainability Perspectives, AUC Press 2008, at 140.
[272] Id., at 61.
[273] IPCC 2007, WG II, supra note 39, at 448.
[274] Id., at 445.
[275] EEAA 1999, supra note 262, at 62.
[276] Id., at 74: the Nile originates partially from the Equatorial lakes and partially from the Ethiopian Highlands.

consumption was estimated at about 70 km^3 which is already in excess of the available resources.[277] The key issue will be to close the increasing gap between the limited water supply and the escalating demand due to high population growth rates and the rise in the standard of living.[278] Recent studies on water resources in Egypt provide only uncertain estimates on the impact of climate change on the flow of the Nile.[279] Nevertheless, water management actions such as improvement of rain harvesting techniques, increased abstraction of ground water, recycling of water, desalination of water and the efficiency of water use must be considered to combat Egypt´s vulnerability.[280]

Furthermore, climate change related temperature rise will have negative effects on Egypt´s magnificent Red Sea coral reefs. Corals may bleach when exposed to elevated sea surface temperature. Although corals can recover from short term bleaching, prolonged bleaching can cause irreparable damage and eventually mortality.[281] Long-term damage to the natural wealth of the coral reefs could have a devastating effect on the tourism industry in Egypt.[282]

In regard of human health, scientists generally differentiate between direct and indirect adverse impacts of climate change. Direct effects are not limited to heat phenomena such as heat strokes, but also include physiological disorders, skin cancer and eye cataracts.[283] Indirect effects cover factors like demographic dislocations, socio-economic disruptions, ecological system impacts and air pollution.[284] Even though this differentiation between direct and indirect adverse impacts on human health is generally acknowledged by scientists, studies on the correlation between climate change and human health are still unavailable for Egypt.[285]

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[277] IPCC 2007, WG II, supra note 39, at 445.
[278] Id., at 445; EEAA 1999, supra note 262, at 75.
[279] IPCC 2007, supra note 39, at 445; EEAA 1999, supra note 262, at 75; EEAA 2008, supra note 261, at 90: Some studies show that Nile flow may decrease by approximately 60%.
[280] EEAA 1999, supra note 262, at 75-76.
[281] Id., at 71.
[282] EEAA 2008, supra note 261, at 91.
[283] EEAA 1999, supra note 262, at 71.
[284] Id., at 71.
[285] Id., at 71.

Although Egypt´s contribution to GHG emissions is relatively limited with 0.59% of total global CO_2 emission (ranking 27th) in 2006,[286] the above-mentioned adverse impacts of climate change constitute a serious challenge for Egyptian policymakers. Considering Egypt´s growing population, its limited fertile land and its large area of desert as well as the economic concentration in coastal zones, the potential social and economic effects could be devastating for the country´s future.[287] Combating and adapting to climate change should be, thus, one of the major concerns of Egyptian policies during the next decades, in particular the mitigation of climate change through the implementation of sound RE & EE policy.

C. The Egyptian Electricity Market

The Egyptian electricity market is state owned and is to-date organized in a single buyer form. The Egyptian Electricity Holding Company (EEHC) owns 90% of the installed capacities, whereas three private projects contribute with 9% and the remaining 1% is made up by wind farms and small isolated units.[288]

The only company licensed for extra high voltage and high voltage electricity transmission is the Egyptian Electricity Transmission Company (EETC). It purchases electric energy from all generation companies and in turn sells it to the nine distribution companies with 24 million households, 85 extra high voltage and high voltage consumers and to some of the 12 private distribution companies (less than 1% of the market).[289]

The Egyptian electric energy market is constantly growing. In 2008, the peak load reached 21,330 MW and total electrical energy generation amount to 131,040 GWh,

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[286] Climate Analysis Indicators Tool (CAIT), World Resources Institute, available at, http://cait.wri.org/ (last visited: 24th June 2010).
[287] EEAA 1999, supra note 261, at j.
[288] Georgy/ Soliman, supra note 10, at 20.
[289] RECREE, Provision of Technical Support/Services for an Economical, Technological and Environmental Impact Assessment of National Regulations and Incentives for Renewable Energy and Energy Efficiency, Country Report Egypt, September 2009, at Annex 7 (quoted as RECREE 2009), available at, http://www.jcee-eg.net/libdetails.asp?typeID=2 (last visited: 24th June 2010).

which constituted a growth rate of 4.7% in comparison to 2007/2008.[290] For the same year, total installed capacities reached 23,502 MW of which steam power stations accounted for 48.8%, combined cycle power plants for 30.5%, hydropower stations for 11.9%, gas-fired steam power plants for 7% and wind farms for 1.8%.[291] Additionally, Egypt has 35 decentralized power plants, including one wind farm in Hurghada (5 MW), that are not connected to the national grid with a combined installed capacity of 256.7 MW.[292]

This following section will identify the key players of the Egyptian electricity market, the status of the national and international electricity grid as well as the Egyptian electricity prices and respective subsidies.

1. Electricity Market Actors

The Egyptian electricity market is structured and organized under the oversight of the Ministry of Electricity and Energy (MOEE). Key market actors include the Egyptian Electricity Holding Company (EEHC), the Egyptian Electric Utility and Consumer Protection Agency (EEUCPRA) and the New & Renewable Energy Authority (NREA).

a) Ministry of Electricity and Energy

The Ministry of Electricity and Energy [293] was first established in 1964 and is organized by virtue of Presidential Decree No. 1103 of 1974 which is amended by Presidential Decrees No. 360 of 1976, No. 14 of 1978 and No. 131 of 1981.

Pursuant to Presidential Decree No. 1103 of 1974 it is the objective of the MOEE to provide electric energy for consumers in Egypt. For that purpose the competences of the ministry include the following:

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[290] EEHC, Annual Report 2008/2009, at 10, 18; available at, http://www.moee.gov.eg/english/e-fr-main.htm (last visited: 24th June 2010).
[291] Id., at 16.
[292] Id., at 27.
[293] MOEE Official Website: http://www.moee.gov.eg/ (last visited: 24th June 2010).

- Development and implementation of a general national strategy for energy generation,
- Transmission and distribution of electricity utilizing high tech and the latest technological developments,
- Suggestions of the electric energy prices for all different voltage levels and the various consumer groups,
- Supervision of studies and execution of essential electric energy projects,
- Publication of statistics and data related to electric energy production and consumption, and
- Provision of technical services and consultancies in the field of electric energy generation for Arab and international clients.

Moreover, the MOEE supervises the Egyptian Electricity Holding Company, the New & Renewable Energy Authority and the Hydro Power Projects Executive Authority as well as the Rural Electrification Authority and the Atomic Energy Authority.

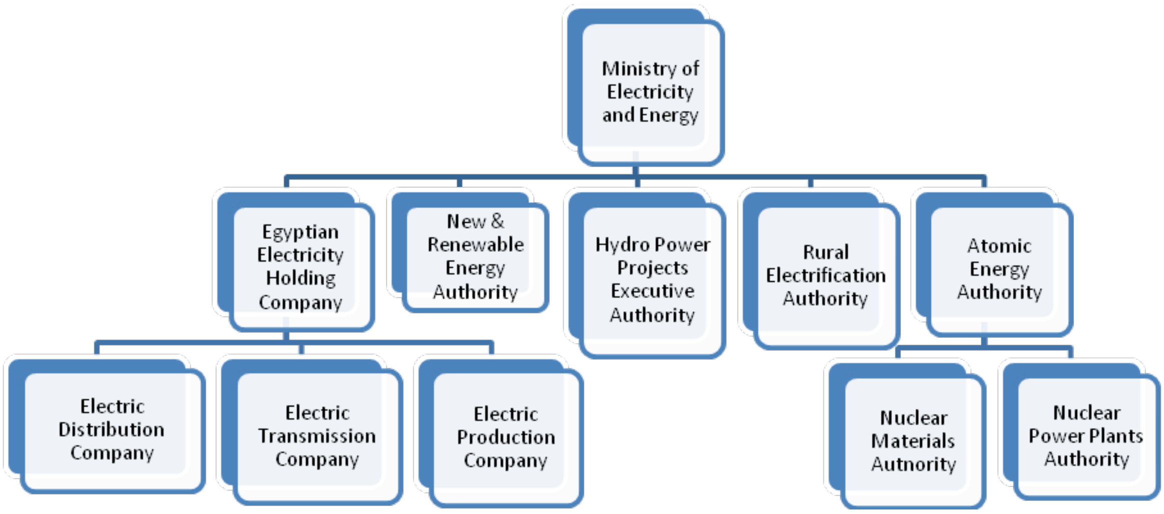

Figure 8. Organizational Chart of Agencies and Companies affiliate to the Ministry of Electricity and Energy (Source: Official Website of the MOEE).

Due the focus on RE and EE and the respective relevance of the companies and governmental agencies affiliated to the MOEE to this issue, the explanations below will be limited to the competences and responsibilities of the EEHC, the EEUCPRA and the NREA.

b) Egyptian Electricity Holding Company

The mission of the Egyptian Electricity Holding Company (EEHC)[294] is to provide electric energy to all kind of costumers taking into consideration environmental, social and economic indicators as well as the terms and conditions set by the EEUCPRA.[295]

The predecessor of the EEHC was the Egyptian Electricity Authority (EEA), which was established by Law No. 12 of 1976 and had the exclusive right to produce transmit and distribute electricity throughout Egypt. Only in 1996, this exclusive right of the EEA was eliminated by virtue of Law No. 100 permitting the private sector to generate electricity on an Build, Own, Operate and Transfer (BOOT) basis.

In 2000, the EEA was transformed into a state owned Egyptian joint stock company by virtue of Law No. 164 modifying Law No. 12 of 1976 with the name EEHC. The EEHC owns, coordinates and supervises the activities of its affiliated companies in the field of production, transmission and distribution (see Figure 9).

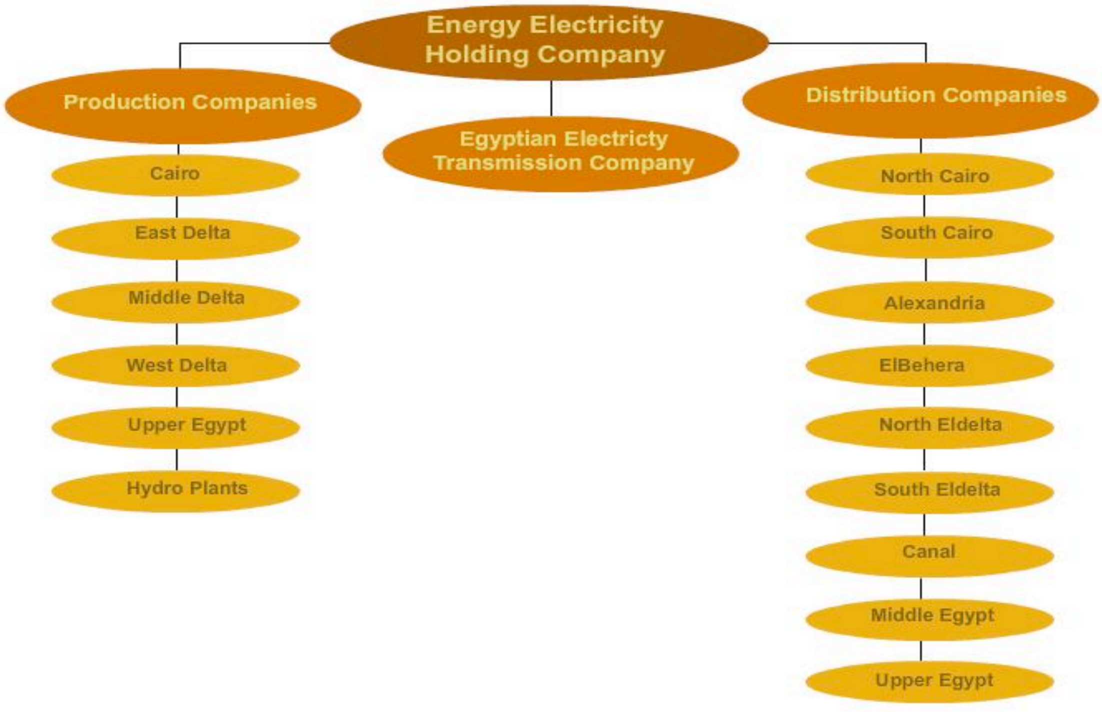

Figure 9. Organizational Chart of the EEHC and its affiliated production, transmission and distribution companies (Source: Official Website of the EEHC).

[294] EEHC Official Website: http://www.egelec.com/ (last visited: 24th June 2010).
[295] EEHC, Annual Report 2008/2009, supra note 287, at 7.

The purpose of the six Egyptian electricity production companies is the generation of electric energy from the annexed power plants, including management, operation and maintenance of these plants.[296] They sell the generated electricity to the Egyptian Electricity Transmission Company (extra high and high voltages) and to the respective distribution companies (medium and low voltages).[297] Additionally, the production companies implement new power plant projects, conduct research and studies and carry out any other activities in the framework of the company´s objectives.[298]

The Egyptian Electricity Transmission Company (EETC) purchases electricity from the production companies and resells it to extra high and high voltages consumers.[299] For that purpose, it manages, operates and maintains the extra high and high voltages electricity grid.[300] Moreover, it implements electric power transmission projects, including interconnection projects for the exchange of electricity with other power grids connected to the Egyptian grid.[301]

The objective of the nine distribution companies is the distribution and selling of medium and low voltages to their costumers.[302] To achieve this goal, distribution companies manage, operate and maintain the Egyptian medium and low voltages grid.[303] The distribution companies have a total of approximately 24 million consumers, whereas the residential (71.5%), commercial (5.9%) and industry (2.5%) sectors make up for the vast majority of the customers.[304]

Although NREA is ordinarily a R&D facility, it acts as the operator of the Zafarana wind farm and sells the generated energy for a "reasonable price" to the EEHC.[305] For

[296] Id. at 11.
[297] Id. at 11.
[298] Id. at 11.
[299] Id. at 30.
[300] Id. at 30.
[301] Id. at 30.
[302] Id. at 36.
[303] Id. at 36.
[304] Id. at 39.
[305] GTZ, Energy-policy Framework Conditions for Electricity Markets and Renewable Energies, 16 Country Analysis, TERNA Wind Energy Program, November 2009, at 183 (quoted as GTZ 2009), available at, http://www.gtz.de/de/dokumente/gtz2009-en-terna-analysis-complete.pdf (last visited: 24th June 2010).

future RE projects, the EEHC will be as well the counterpart in power purchase agreements for private developers.[306] Furthermore the EEHC cooperates with NREA in the field of RE by taking into in consideration RE contributions for its electricity generation and network planning.[307] The main role of the EEHC is to coordinate and monitor the activities of its 16 (+ NREA) affiliated companies to improve and develop their technical, operational and financial performances in order to optimize the utilization of all energy sources and to establish a profit oriented economic activity.[308]

c) Egyptian Electric Utility and Consumer Protection Regulatory Agency (EEUCPRA)

The Egyptian Electric Utility and Consumer Protection Regulatory Agency (EEUCPRA)[309] was established by Presidential Decree No. 326 of 1997 and subsequently reorganized by virtue of Presidential Decree No. 339 of 2000.
Pursuant to Article II of Decree No. 339 of 2000, it is the objective of the EEUCPRA to regulate, monitor and control all matters related to electricity generation, transmission and distribution as well as consumption, in order to ensure constant electricity supply at suitable prices and the protection of the environment by taking into consideration the interest of all stakeholders of the Egyptian electricity market. Additionally, Article II s. 2 stipulates the objective of creating an enabling environment for market-based competition in the framework of existing laws and to avoid the creation of commercial monopolies in the energy sector.

In order to achieve these objectives, Article III of Decree No. 339 of 2000 promulgates the following responsibilities and delegated powers to the EEUCPRA:

- Ensuring that all activities of electric power generation, transmission and distribution and sale, are carried out in compliance with the laws and regulations in effect in the Arab Republic of Egypt, especially those relating to environmental protection,

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306 EEHC, Annual Report 2008/2009, supra note 287, at 28.
307 Id. at 28.
308 Id. at 7.
309 EEUCPRA Official Website: http://www.egyptera.com/en/e-default.htm (last visited: 24th June 2010).

- Reviewing regularly the plans arranged for the electric power consumption, production, transmission and distribution, including the investments necessary for such plans, so as to ensure availability of power for various usage in conformity with state policies,
- Setting regulations that ensure lawful competition in the field of electric power production and distribution in the best interests of the consumer,
- Making sure that the cost of power production, transmission and distribution guarantees the interests of all parties involved in these activities,
- Ensuring realization of fair return to the electric utilities to ensure continuity of the activities and a sound financial position thereof;
- Reviewing the policy and procedures of the National Energy Control Center to ensure compliance with the optimum operation standards and technical performance levels in coordination with the Egyptian Electricity Holding Company framework and in the best interests of all parties within the Electric Utility,
- Following up on the availability of technical, financial and economic capabilities for the Electric Utility,
- Ensuring the quality of the technical and administrative services provided by the Electric Utility to the consumers,
- Publishing such information, reports, and recommendations that assist the Electric Utility and the consumers to be aware of their rights and responsibilities and of the role played by the Agency for the Electrical Utility with full transparency,
- Investigating consumer complains to ensure protection of their interests and settlements of any disputes that may arise among the parties' involved in the activity, and
- Issuing licenses for the construction, management, operation, and maintenance of the power generation, transmission, distribution, and sale projects.

EEUCPRA´s Board of Directors is appointed by the MOEE and consists of ten members, three members representing the electric energy sector, three members experienced practitioners that are not employed in the public sector and four members representing consumers (Article VI of Decree No. 339 of 2000). The key external functions of the Board of Directors pursuant to Article VII of Decree No. 339 of 2000 include the following:

- Issuing decisions for granting, renewing and monitoring licenses for the construction, management, operation, and maintenance of the power generation, transmission, distribution, and sale projects,
- Reviewing the conditions required to be provided in agreements relating to the use by any Electric Utility,
- Approving the decisions related to the settlement of disputes that may arise among the electric sector entities or between the electric sector entities and the consumers,
- Settlement of complaints pertaining to activities contradicting with recognized rules of lawful competition among Electric Utility parties and taking necessary actions to avoid causes of complaints, and
- Determining the fees of licenses generated and services rendered by the Agency to electricity sector entities.

The budget of the EEUCPRA is comprised of funds allocated in the state budget, proceeds paid for obtaining or renewing licenses and for services rendered by the agency as well as of returns of its own investment and donations, allowances and grants that do not contradict its objectives (Article IV of Decree No. 339 of 2000).

d) New & Renewable Energy Authority

The New & Renewable Energy Authority (NREA)[310] was established pursuant to Law No. 102 of 1986 with the objective of bundling the Egyptian activities in the field of RE and EE. The mandate of NERA is the planning and the implementation of RE and EE programs in cooperation with the competent national and international

[310] NREA Official Website: http://www.nrea.gov.eg/ (last visited: 24th June 2010).

institutions.[311] For that purpose the responsibilities and competences of NREA include the following:[312]

- RE resources assessment,
- Research, development, demonstration, testing and evaluation of the of the different RE technologies focusing on solar, wind and biomass,
- Implementation of RE projects,
- Proposing the Egyptian standard specifications for renewable energy equipment & systems and conducting tests to evaluate their performances, under the prevailing conditions in Egypt, hence issuing respective licensing certificates to that effect,
- Rendering of consultancy services in the field of RE,
- Technology transfer and development of local manufacturing of RE equipment, and
- Education, training and information dissemination.

NREA is the operator of all wind farms in Egypt, including the demonstration projects in Matrouh and Hurghada as well as the grid connected wind farms in Zafarana on the Gulf of Suez.[313] However, NREA is increasingly trying to attract private investment for the RE sector. Therefore, it supports private investment by providing resource assessment, the necessary data for feasibility studies and technical support for potential project developers as well as information on reputable domestic partner companies.[314]

Furthermore, NREA has established a national center for testing and certifying RE equipment and systems.[315] Eventually, NREA will run two training facilities, one in Cairo and one in Hurghada, to comply with its mandate in regard of training and information dissemination. The training program is to include general awareness

[311] NREA, Annual Report 2007/2008, supra note 9, at 6.
[312] Id. at 6.
[313] GTZ 2009, supra note 302, at 183.
[314] NREA, Annual Report 2007/2008, supra note 9, at 12.
[315] Id., at 17.

courses, special programs for engineers and technicians and specific training programs for NREA staff as well as summer training for students.[316]

2. Electricity Grid

Egypt has an electrification rate of 99% with only some 121 remote communities not yet connected to the national grid.[317] The Egyptian extra high and high voltage transmission grid is supervised by the EETC and consists of 41,016 km. It is divided into six geographical zones: Cairo, Canal, Delta, Alexandria and West Delta, Middle Egypt and Upper Egypt.[318]

Figure 10. Key figures of the Egyptian transmission grid

	500 kV	400 kV	220 kV	132 kV	66 kV	33 kV
Transformer capacity (MVA)	7 765	-	29 688	3 467	36 222	1 774
Total transmission lines (km)	2 479	33	15 647	2 504	17 515	2 838

Source: EEHC Annual Report 2008/2009.

The medium and low voltage grids are owned and controlled by the respective distribution company. In total the distribution grid consists of 147,143 km of medium voltage and 234,898 km of low voltage lines, whereas distribution transformers capacities amount to 53,664 MVA.[319]

On the regional and international level Egypt makes profound efforts to improve its energy trade balance by increasing the electrical interconnection to Arab, African and European countries. To date, the interconnections between Egypt - Libya (May 1998), Egypt - Jordan (October 1998) as well as the interconnection between Syria - Jordan (March 2000) and Syria – Lebanon (April 2009) have been completed, which has led to the interconnection between the transmission networks of Syria, Jordan, Libya and Egypt.[320]

[316] Id., at 19.
[317] GTZ 2009, supra note 302, at 182.
[318] EHHC, Annual Report 2008/2009, supra note 287, at 31.
[319] Id., at 38.
[320] Id., at 33.

Figure 11. Electricity trade balance between Egypt, Syria, Jordan, Libya and Lebanon 2008/2009				
	Libya	Jordan	Syria	Lebanon
Voltage (kV)	220	400	400	400
Exported energy (GWh)	70	638	186	128
Imported energy (GWh)	111	13	2	-

Source: EEHC Annual Report 2008/2009)

Egypt is further aiming to increase the connectivity between the Arab Maghreb Countries through upgrading the interconnection with Libya to 500/400 kV.[321] Moreover, a feasibility study for an interconnection between the Kingdom of Saudi Arabia and Egypt has been conducted. Activating these plans would further increase the connectivity between all Arab countries.[322]

In regard of an Africa electrical interconnection, a feasibility study has been conducted for an interconnection between Egypt and the Inga Dam in Congo, passing through Central Africa and Sudan, to transmit hydro power from Inga to North Africa and Europe. Moreover, in the framework of the Nile Basin Initiative (Egypt, Ethiopia and Sudan)[323] a recent feasibility study projected a possible export of 3200 MW from Ethiopia to Sudan and Egypt.[324]

Eventually, Egypt is seeking in the long run an interconnection to the European electricity market. Links have been already established through the connection between Syria and Turkey in the east and Morocco and Spain in the west.[325] Nevertheless, discussions are on the way for a direct interconnection between Egypt and Greece with the long-term objective of exporting electricity from RE to the European market.[326]

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[321] Id., at 33.
[322] Id., at 33.
[323] Nile Basin Initiative Official Website: http://www.nilebasin.org/ (last visited: 24th June 2010).
[324] EHHC, Annual Report 2008/2009, supra note 287, at 33.
[325] GTZ 2009, supra note 302, at 178.
[326] EHHC, Annual Report 2008/2009, supra note 287, at 33.

3. Electricity Prices and Subsidies

Electric energy prices in Egypt are among the lowest in the world, due the high subsidies of the Egyptian government.[327] The respective energy tariff structure is set by the Egyptian authorities in a non-transparent manner. In principle, the prices of all voltage levels for the residential and commercial sector are set by the MOEE (see Figure.13). However, electricity prices for specific industries are set by virtue of a Prime Minister Decree (see Figure. 12). Generally, the Egyptian electrical energy tariff structure is set in respect to the different voltage levels (extra high, high, medium and low) considering the costs of installation and operation as well as the corresponding costs of the transmission and distribution networks. At the same time the purpose of the consumption is considered by differentiating between the tariff for residential and commercial use from those applicable to the agricultural, industrial and public sector.

Figure 12. Electricity prices applied to specific industries pursuant to Prime Minister Decree No. 446/2009

	Extra High voltage (220/ 132 kV)		**High voltage (220/132 kV)**		**Medium voltage energy intensive Industries**		**Medium voltage other industries**	
	Energy intensive[328]	Other	Energy intensive	Other	Demand charge	Energy rates	Demand charge	Energy rates
€ ct/kWh	2.52	1.73	3.06	2.10	1.30	4.17	1.18	2.87
Pt/kWh	20.2	13.9	24.5	16.8	10.4 EGP/kw-month	33.4	9.5 EGP/kw-month	23

Source: EEHC, Annual Report 2008/2009

For the first time since 1992, several electricity tariffs were raised by an average of 8.6% in 2004 and subsequently increased by 5% for the following five years. In total, electricity tariffs have been increased by an average of 10% till 2008.[329] Pursuant to the Egyptian government this tariff increase is justified by the constantly high growth

[327] GTZ 2009, supra note 302, at 181.
[328] The definition of the MOEE for "energy intensive industries" includes the following sectors: Glass, Ceramic, Chemicals, Steel, Cement, Fertilizer, Aluminum, Copper and Petrochemicals.
[329] Id., at 182.

rate of demand, the increase of investment costs for the construction of new power plants and networks and the devaluation of the Egyptian Pound in comparison to international leading currencies as well as by the increase of thermal power generation in Egypt.[330] Only the tariffs applied to the first segment of residential consumption (up to 50 kWh, representing 23% of residential costumers) remained unchanged at 5 Pt/kWh since 1993, while the actual service cost for this segment amounted to 18.62 Pt/kWh in 2008.[331] However, all other segments of residential consumption up to 350 kWh/month are subsidized by the Egyptian government representing 98% of residential costumers.[332] In total, electricity subsidies reached EGP 4.3bn in 2008 (EGP 2.9bn only for the residential sector).[333] These direct subsidies to the electricity price must be differentiated from the subsidies already granted for oil and natural gas that still constitue the main inputs in the Egyptian electricty production.[334]

Figure 13. Electricity Tariffs in Egypt 2008

	€ ct/kWh	Pt/kWh
Very high voltage (220/132 kV)	0.59 - 3.40	4.7 - 27.3
High voltage (66/33 kV)	1.41 - 1.96	11.34 - 15.7
Medium & low voltage ≥ 500 KW		
Demand Charge (EGP/kW-month)	1.18	9.5
Energy rate	2.67	21.4
Medium & low voltage ≤ 500 KW		
Agriculture	1.40	11.2
Annual charge per fedan for irrigation (EGP)		135.2
Other purposes		25.0
Residential (kWh/month)		
0 – 50	0.62	5
51 – 200	1.37	11
201 – 350	2.00	16
351 – 650	2.99	24
651 – 1000	4.86	39
≥ 1000	5.99	48
Commercial (kWh/month)		
0 – 100	2.99	24
101 – 250	4.49	36
251 – 600	5.74	46
601 – 1000	7.23	58
≥ 1000	7.48	60
Public lighting	5.11	41.2

Source: EEHC, Annual Report 2008/2009.

[330] EHHC, Annual Report 2008/2009, supra note 287, at 44.
[331] Id., at 44.
[332] Id., at 44.
[333] Id., at 44.
[334] World Bank, Egypt – Toward a more Effective Social Policy: Subsidies and Social Safety Net, December 2005 (quoted World Bank 2005), at 46, available at,

In 2008, financial subsidies for energy products were estimated at EGP 61.7bn.[335] In total, direct energy subsidies for electricity prices and energy products, can be estimated at approximately EGP 66bn per annum. Therefore, any reform of subsidies for oil and gas products would in turn implicate far-reaching consequences for the cost structure of electricity prices.[336]

It is acknowledged that high energy subsidies are a major disincentive for EE, since they lead to excessive energy consumption that contributes to pollution and environmental degradation. Nevertheless, the Egyptian Ministry for Trade and Industry called to freeze energy prices again in 2010, after they have been flat in 2009 at 2008 levels, in order to support domestic industries dealing with the consequences of the financial crisis.[337]

D. The Egyptian Energy Situation

The Egyptian energy mix is dominated by fossil fuels, which amount to 94% of primary energy demand with oil taking a share of 50.4% and natural gas accounting for 43.6% in 2004/2005.[338] The rest is made up by hydropower at 4.75%, coal at 1.05% and RE at 0.2% for the same year.[339]

The primary energy demand of Egypt has increased annually by an average of 4.64% in the time frame from 1981/1982 to 2004/05.[340] In regard of the analysis of the sector shares for the same period of time, final energy demand of the transportation sector had growth rates of 5.1% with a flat share of around 30%.[341] The residential and commercial sector share increased from 17.82% to 22.02% with annual growth of

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http://siteresources.worldbank.org/INTPSIA/Resources/490023-1171551075650/Egypt_PSIA_121605.pdf (last visited: 24th June 2010).

[335] Energy Information Administration, Country Analysis Brief: Egypt (quoted as EIA, Country Analysis Brief: Egypt), at 2, available at, http://www.eia.doe.gov/cabs/Egypt/pdf.pdf (last visited: 24th June 2010).

[336] World Bank 2005, supra note 330, at 46.

[337] JCEE News of 21st of December 2009 quoting Minister of Trade and Industry Rachid Mohamed Rachid, available at, http://www.jcee-eg.net/newsDetails.asp?newsID=182 (last visited: 24th June 2010).

[338] Georgy/Soliman, supra note 10, at 3.

[339] Id., at 3.

[340] Id., at 21.

[341] Id., at 21.

6.5%, while the industry share decreased from 50% to 40.7%, due to technological advancement.[342] It is projected that the Egyptian demand for oil and gas products will reach 117 million tons (mtoe) per year by 2021/2022.[343]

The following section will provide an overview on the current status and potential of the various energy sources in Egypt including conventional energy (oil, natural gas and coal), renewable energy (hydropower, wind, solar, biomass) as well as an outlook of the recently re-launched Egyptian nuclear energy program.

1. Conventional Energies

Egypt is a significant oil producer and a rapidly growing producer of natural gas. Additionally, the Suez Chanel and the Sumed Pipeline are strategic routes for Persian Gulf Oil shipments, making Egypt an important transit corridor. Considering the fact that oil and natural gas satisfy 94% of Egypt's primary energy demand, it is evident that fossil fuels will remain the key to any Egyptian energy policy in the next decades. Nevertheless, any sustainable Egyptian energy strategy must consider the finite availability of conventional energy resources and the corresponding increase in global market prices.

a) Oil

Different studies expect Egypt to become a net importer of oil in the near future, since domestic demand continues to grow while production is declining.[344] Proven Egyptian oil reserves amount to 3.7 billion barrels, or 0.3% of world reserves.[345] However, Egyptian oil production is declining from a peak of around 980,000 barrels per day (bbl/d) in 1995 to 664,000bbl/d in 2007, less than 1% of world production.[346]

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342 Id., at 22.
343 Id., at 22.
344 Id., at 12; IEA, World Energy Outlook 2005, Middle East and North Africa Insights (quoted as IEA 2005), at 325, available at, http://www.iea.org/textbase/nppdf/free/2005/weo2005.pdf (last visited: 24th June 2010).
345 Id., at 9; EIA, Country Analysis Brief: Egypt, supra note 331, at 1.
346 Id., at 2.

Demand for petroleum products is rising in Egypt. After being relatively flat since 1999 with 560bbl/d, domestic demand reached 660bbl/d in 2007.[347] The main reason for this rapid increase in domestic consumption is the high level of Egyptian subsidies for oil products. Government subsidies to petroleum products increased from EGP 14.3bn in 2004 to EGP 62.7 billion in 2008, whereas the subsidies for 2008 were 71.3% higher than those that had been projected for the previous year at EGP 36.6bn.[348]

Egyptian oil production is allocated in four major areas: the Gulf of Suez, the Western Desert, the Eastern Desert and the Sinai Peninsula with the Gulf of Suez accounting for 50% of the Egyptian production.[349] The last major discovery of oil reserves was the Saqqara oil field in 2003, which is estimated to contain reserves of 80 million barrels and went online in May 2008.[350]

International oil companies play a key role in the field of exploration and production in the Egyptian oil sector. Operations are traditionally structured on a production sharing basis with a domestic stated owned entity.[351] Oil from the Gulf of Suez is produced by the Gulf of Suez Petroleum Company (Grupco) under a Production Sharing Agreement between BP and the Egyptian General Petroleum Company Corporation (EGPC).[352] The second largest producer of oil is Petrobel a joint venture between EGPC and the Italian company Agip. Other major companies operating in Egypt include Badr el Din Petroleum Company (EGPC and Shell), Suez Oil Company (EGPC and Deminex) and El Zaafarana Oil Company (EGPC and British Gas).[353] Although many international oil companies are operating in the Egyptian oil sector, many of the products are not of international standard – e.g. gasoline tends to be off a relatively low octane number and high sulphur content.[354]

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[347] Id., at 1.
[348] Id., at 2.
[349] Id., at 2.
[350] Id., at 1.
[351] Id., at 2.
[352] Id., at 2.
[353] Id., at 2.
[354] RECREE 2009, supra note 286, at Annex 7.

b) Natural Gas

Egypt has proven gas reserves of 66 trillion cubic feet (Tcf) that amount to over 1% of the world total.[355] In 2006, Egypt produced approximately 1.9 Tcf and consumed in the same period of time 1.3 Tcf of natural gas.[356] The IEA projects that that Egypt´s proven gas reserves will double between 2005 and 2030.[357]

Power plants continue to dominate Egypt´s domestic gas demand with 63% of the market share, while industry and the energy sector´s own consumption as well as transport and residential consumption make up the remainder.[358] It is, however, the declared objective of the Egyptian government to allocate one third of the proven gas reserves for domestic needs, the second third for long term strategic requirements and the remaining third for medium term export commitments.[359]

Due to major recent discoveries and the continued expansion of the Arab Gas pipeline (see below), Egypt is on the way to becoming a leading supplier of natural gas throughout the Mediterranean region. Despite increasing domestic gas demand, Egypt´s net exports are projected to increase to 19 bcm by 2010 and 28 bcm by 2030.[360]

The Nile Delta region and the Western Desert are the most important gas exploration and production areas in Egypt.[361] The Abu Qir, Badreddin and Abu Madi fields in the Nile Delta account for roughly 50% of Egypt´s gas production. Other sources include Port Fuad, South Temsah, Wakah, Rosetta and the Scarab/Saffron fields as well as the recently discovered Satis field found by BP and Eni in early 2008.[362] Nevertheless, the most important national gas areas are the Obeiyed and Khalda fields in the Western Desert, since they have comparably low development and operating costs due to an

355 IEA 2005, supra note 341, at 329.
356 EIA, Country Analysis Brief: Egypt, supra note 331, at 4.
357 IEA 2005, supra note 341, at 330.
358 IEA, Energy Statistics, Natural Gas in Egypt in 2007, available at, http://www.iea.org/stats/gasdata.asp?COUNTRY_CODE=EG (last visited: 24th June 2010).
359 EIA, Country Analysis Brief: Egypt, supra note 331, at 4; IEA 2005, supra note 341, at 330.
360 Id., at 330.
361 Id., at 328; EIA, Country Analysis Brief: Egypt, supra note 331at 4;
362 Id., at 5; IEA 2005, supra note 341, at 329.

expanding network of pipelines and processing plants that allow for quick transport upstream to Alexandria via a 180 mile pipeline.[363]

Egyptian gas exports are facilitated by the Arab Gas Pipeline that currently connects Egypt to Jordan and Syria and is expected to export some 33.2 billion cubic feet (bcf) rising to 77.3 bcf in 2013.[364] Syria has signed an agreement with Turkey to connect the pipeline to the Turkish grid for use in 2011 and to extend it into Europe for exports to Austria, via Bulgaria, Romania and Hungry. Moreover, policymakers are currently discussing an extension of the Arab Gas Pipeline to Lebanon and Cyprus. The Arish-Ashkelon gas pipeline to Israel became operational in 2008 and is expected to add another 60 bcf per year to Egypt´s gas exports.[365]

Egyptian gas exports are further facilitated through the usage of liquefied natural gas (LNG), which has immense technical advantages in regard of storage and transportation. Egypt became an LNG exporter in 2005 and reached an estimate of 523 bcf of LNG in 2006.[366] To date, two LNG terminals are operational in Egypt, one in Damietta with a production capacity of 240 bcf and one in Idku with a production capacity of 174 bcf.[367] For the plant in Damietta a framework agreement has already been signed for operation of a second terminal by 2010/2011.[368]

c) Coal

Owing to the fact that coal resources are limited in Egypt, its share in the energy mix is relatively low with 1.05%.[369] Egyptian coal reserves are estimated to amount to 27 mtoe.[370] Egypt only began mining in 1996 and has low quality coal that is primarily used as a raw material. Before 1996 Egypt depended totally on coal import. Today Egyptian coal production ranges between 0.025 and 0.6 mtoe a year. Nevertheless, 1

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363 Id., at 328; EIA, Country Analysis Brief: Egypt, supra note 331, at 4.
364 Id., at 5; IEA 2005, supra note 341, at 329.
365 Id., at 329; EIA, Country Analysis Brief: Egypt, supra note 331, at 5.
366 Id, at 5; IEA 2005, supra note, at 329.
367 Id., at 329; EIA, Country Analysis Brief: Egypt, supra note 331, at 5.
368 Id, at 5; IEA 2005, supra note, at 329.
369 Georgy/ Soliman, supra note 10, at 12.
370 Id., at 16.

to 1.2 mtoe of coal is now being imported as feedstock for the Egyptian steel industry per annum.[371]

2. Renewable Energies

It is the declared objective of the Egyptian government to generate 20% of Egypt's electricity through renewable energies by 2020.[372] The natural prerequisites to reach this objective are excellent. Egypt is located in the North-African Sunbelt. Therefore, it is in a prime location to generate solar energy.[373] Additionally, the wind conditions at the west coast of the Red Sea and in other parts of the country are among the best in the world constituting immense potential for the generation of wind energy.[374]

The objective of the Egyptian government is, nonetheless, very ambitious: in the year 2005 94% of Egypt's energy supply was still generated through fossil fuels (50.4% oil and 43.6% oil). The seemingly high percentage of renewable energy of 4.95% is mainly generated through hydropower (from the Aswan High Dam). The portion from other sources of renewable energies for the same period of time covered only 0.2% of the primary energy demand (solar, wind, biomass and small-scale hydropower projects).[375] The following section will provide an overview of the current status of renewable energies in Egypt and the respective energy potential, considering hydropower, wind and solar energy as well as biomass.

a) Hydropower

Hydropower generated from the High Dam and other waterfalls across the river Nile was a major energy source in Egypt. Although the first Nile dam in the area of Aswan was primarily used for water regulations, by 1967 the hydropower plant at the Aswan

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[371] Id., at 12.
[372] NREA, Annual Report 2007/2008, supra note 9, at 6.
[373] Id., at 7; Georgy/Soliman, supra note 10, at 17; RECREE 2009, supra note 286, at Annex 7: Energy Situation in Egypt.
[374] NREA, Annual Report 2007/2008, supra note 9, at 14; Georgy/Soliman, supra note 10, at 17; RECREE 2009, supra note 285, at Annex 7: Energy Situation in Egypt.
[375] Georgy/Soliman, supra note 10, at 3.

High Dam started generating electricity for Egypt.[376] In 1985, a further hydropower plant was put in operation in Aswan, followed by the Esna Barrage Hydropower Station in 1995. Today five hydropower plants are operating in Egypt with a joined capacity of 12,644 GWh: Aswan High Dam, Aswan I, Aswan II, Esna and Naga Hamady.[377]

However, installed hydropower capacities could not keep up with the rapidly increasing Egyptian energy demand. Newly discovered oil and gas fields covered this gap in the 1980s with the relative importance of hydropower declining over the last 25-30 years. While hydropower provided 13.2% of total primary energy demand in 1981/1982, this figure went down to 4.75% in 2005/2006.[378] Respectively hydropower provided 21% of Egypt´s electricity in 1995, whereas this share has come down to 12% in 2005.[379] This figures mirror the assessment of experts, namely that most of Egypt´s hydropower potential has already been exploited.[380] Consequently, hydropower is projected to provide no more than 3% of total primary energy demand by 2020.[381]

b) Wind Energy

Egypt has excellent conditions for the generation of wind energy. In particular, the sparsely populated coastal regions with high and stable wind speeds are a prime location for the implementation of large wind energy projects.

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376 GTZ, Energy-policy Framework Conditions for Electricity Markets and Renewable Energies, 23 Country Analyses, Chapter Egypt, September 2007, at 10 (quoted as GTZ 2007), available at, http://www.gtz.de/de/dokumente/en-windenergy-egypt-study-2007.pdf (last visited: 24th June 2010).
377 Id., at 10.
378 Georgy/Soliman, supra note 10, at 26.
379 GTZ 2007, supra note 373, at 10; EIA, Country Analysis Brief: Egypt, supra note 331, at 6.
380 Eichhammer et al., Assessment of the World Bank, GEF Strategy fort he Market Development of Concentrating Solar Thermal Power, at 106, available at, http://siteresources.worldbank.org/GLOBALENVIRONMENTFACILITYGEFOPERATIONS/Resources/Publications-Presentations/SolarThermal.pdf (last visited: 24th June 2010).
381 Hussein Abdallah, Egypt´s coming energy crisis, Al-Ahram Weekly, Issue No. 895, 2008 (quoted as Abdallah 2008), available at, http://weekly.ahram.org.eg/2008/895/focus.htm (last visited: 24th June 2010).

The detailed Wind Atlas of Egypt was the result of a joint effort of NREA, the Egyptian Metrological Authority and the Danish UNEP research center Risø.[382] The purpose of this project was the establishment of a solid meteorological assessment of wind resources all over Egypt.[383] It not only provides a coherent and consistent overview of Egypt´s wind energy resources, but also the results of mesoscale modeling available in a database (numerical wind atlas) that can be employed for the assessment of site requirements for medium-seized and large wind farms.[384] Although the Wind Atlas covers the entire country, particular attention was given to six promising regions: the Northwest Coast, the Northeast Coast, the Gulf of Aqaba, the Gulf of Suez, the Rea Sea and the Western Desert.[385]

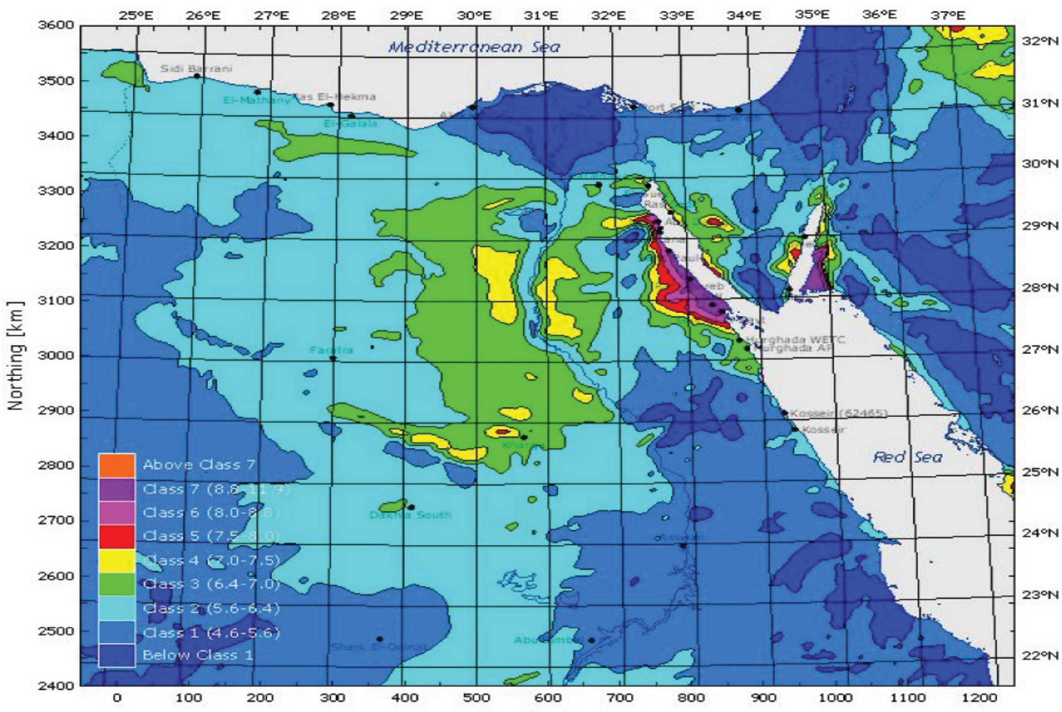

Figure 14. Wind resources map of Egypt (Source: Wind Atlas for Egypt, 2005).

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382 Mortensen et al., Wind Atlas for Egypt, Measurements and Modeling 1991-2005, New and Renewable Energy Authority, Egyptian Metrological Authority and Risø National Laboratory, Roskilde 2005.

383 Mortensen et al., Wind Atlas for Egypt, Executive Summary, at 1, available at, http://www.windatlas.dk/Egypt/Download/Wind%20Atlas%20for%20Egypt%20paper%20%28MENAREC3%29.pdf (last visited: 24th June 2010).

384 Id., at 1.

385 Id., at 3.

The Wind Atlas documents the existence of very high wind resources in the Gulfs of Suez and Aqaba. Additionally, a large region in the Western Desert with fairly high resources was documented. A separate wind atlas only for the Gulf of Suez was completed in 2003.[386] The Wind Atlas for Egypt is considered to be reliable source of information and is used as the basis for all governmental decisions related to wind energy project planning and feasibility studies.[387]

In February 2008, the Supreme Council of Energy in Egypt adopted an ambitious plan committing to 20% of electricity generation from renewable energies by 2020, including 12% contribution from wind energy, translating into more than 7200 MW of grid-connected wind farms.[388] The plan includes the objective of building 600 MW installed wind capacity per year by 2020. [389] The private sector is targeted to play a key role in achieving this goal. The Egyptian government anticipates that about 400 MW/year will be developed by the private sector, while NREA will develop about 200 MW/year.[390]

The first demonstration wind farm was established in Hurghada on the Red Sea Coast in 1992. It includes 42 units with different technologies and capacities constructed in close cooperation with the USA, Denmark and Germany (pitch control, stall control, lattice and tubular towers as well as 100 and 300 kW units), with some components already locally manufactured such as blades, towers, mechanical and electrical joints.[391] The demonstration farm produces only 5.2 MW; however it was connected to the local grid of Hurghada as early as 1993.[392]

Large scale wind projects have been established in Zafarana at the Gulf of Suez. In Zafarana about 144 km^2 were earmarked for NREA to implement large-scale grid

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[386] Mortensen et al., Wind Atlas for the Gulf of Suez , Measurements and Modeling 1991-2001, New and Renewable Energy Authority and Risø National Laboratory, Roskilde 2003.
[387] NREA, Annual Report 2007/2008, supra note 9, at 7.
[388] Id., at 12.
[389] Id., at 12.
[390] Id., at 12.
[391] Id., at 8.
[392] Id., at 8; GTZ 2007, supra note 378, at 12.

connected wind farms.[393] In cooperation with Germany, Denmark, Japan and Spain the farm has been constructed and operated in stages since 2001 and produced the total capacity of 425 MW in 2009.[394] In 2007/2008 the Zafarana wind farm generated 840 GWh of electricity with an average capacity factor of 35.5% saving 466,000 tons of CO_2.[395] In the next stage, an additional 120 MW are planned in cooperation with Denmark, scheduled to be finalized in mid 2010, making Zafarana the largest wind farm in the Middle East and Africa with an installed capacity of 545 MW.[396]

Figure 15. Installed Wind Capacity in Egypt: 2006-2009

Year	2006	2007	2008	2009
MW	230	310	390	430

Source: World Wind Energy Report 2009.

After passing the years of infancy focusing on resource assessments and demonstration projects, the Egyptian wind energy sector is growing in 2008/2009 with an annual rate of 10% and has established large-scale wind energy projects resulting in a total installed capacities of 430 MW, ranking 26th worldwide.[397] Though Egypt is on a good pathway to develop its high wind energy potential, the Egyptian wind sector would have to grow by over 100% per annum over the next ten years to reach the targeted electricity market share of 12% by 2020 (7200MW). To reach the goals of the Egyptian strategy for wind energy up to 2020, the Egyptian government earmarked additional 1300 km^2 for extension north of the Gulf of El-Zayat.[398] Furthermore, the Egyptian government designated 1.5 million acres of stated-owned land, located on the east and west of the Nile River in the governorates Beni Suef, El Minya and Assiut, for the construction and operation of wind farms that are supposed to contribute another 30,000 MW.[399] In light of the excellent natural conditions for the

[393] Id., at 9.
[394] Id., at 9.
[395] Id., at 9.
[396] Id., at 9; World Wind Energy Association, World Wind Energy Report 2009 (quoted as WWEA 2009), at 16, available at, http://wwindea.org/home/images/stories/worldwindenergyreport2009_s.pdf (last visited: 24th June 2010).
[397] Id., at 16.
[398] NREA, Annual Report 2007/2008, supra note 9, at 13.
[399] Egyptian Ministry of Electricity and Energy, Announcement, 2 August 2009, available at, http://www.moee.gov.eg/english/e_speach_info.asp?id=61 (last visited: 24th June 2010).

generation of wind energy in Egypt, the success of the national strategy for wind energy will highly depend on the implementation of a sound RE policy and corresponding legal framework.

c) Solar Energy

Egypt, being one of so-called North-African Sunbelt countries, is a natural location for the utilization of solar energy. A solar atlas issued by NREA in 1991 indicates that Egypt has extraordinarily high levels of solar concentration, ranging from 2000 kwH/m^2 in the north up to 2600 kwH/m^2 in the south, whereas daily sunshine duration ranges between 9-11 hours with only a few cloudy days all over the year.[400] Based on these excellent conditions in Egypt and the greater MENA region, solar energy is considered to have by far the biggest potential in comparison to all other sources of renewable energies.[401] Therefore, Egypt must be recognized as a prime market for solar thermal application. Nevertheless, the Egyptian RE strategy is focusing predominantly on wind energy, neglecting the high solar energy potential. The reason for this surprising policy decision might be the high cost of solar energy projects with respect to the subsidized energy prices in Egypt.[402]

The total Egyptian capacity of photovoltaic (PV) systems amount to 5.2 MW, of which 49% are used for communication, 22% for commercial advertisements on highways, 18% for lighting, 8% for water pumping and 2% for cathodic protection as well as 1% for desalination systems.[403] Furthermore, the Egyptian government plans to use PV systems for the electrification of remote settlements that are not integrated into the national grid. For that purpose, NREA and the Italian Ministry of Environment signed a protocol of cooperation to electrify remote settlements in the

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[400] Id., at 14.
[401] German Aerospace Center, Concentrating Solar Power fort he Mediterranean Region, 2005, at 10, available at, http://www.dlr.de/tt/Portaldata/41/Resources/dokumente/institut/system/publications/MED-CSP_complete_study-small.pdf (last visited: 24th June 2010).
[402] Mubarak/Khalil et al., Renewable Energy Sector in Egypt Volume I, Energy Research Center, Faculty of Engineering Cairo University, 2006, at 30, available in the internet, http://www.jcee-eg.net/download.asp?path=library/RE%20in%20Egypt%20Report%202006.pdf (last visited: 24th June 2010).
[403] NREA, Annual Report 2007/2008, supra note 9, at 16.

Matrouh Governorate with PV systems of about 43 kW, including 50 houses, 2 medical clinic units, 3 mosques and 40 street lightning units.[404]

The potential flagship of the Egyptian solar energy sector is, however, the Kuraymat Solar Thermal Power Plant (140 MW) located 90 km south of Cairo. The conventional part of the power plant (so-called Combined Cycle Island) consists of one gas turbine, one heat recovery steam generator and one steam turbine.[405] The solar field (so-called Solar Island) consists of 1920 solar collectors with typically U shaped glass mirrors forming parabolic troughs.[406] It is projected that the Solar Island will generate 20 MW and thereby save 20,000 tons of CO_2.[407] The Kuraymat project is expected to be operational by October 2010.[408] Additionally, two similar solar thermal power plants (each with 300MW) are planned to be installed during the period 2010 to 2020.[409]

d) Biomass

Biomass activities in Egypt have been focused mainly on small-scale biogas plants. Larger systems were limited or unsuccessful. Biomass resources contribute approximately 3.6 mtoe/year to Egypt´s primary energy generation.[410] Most of the quantities used for energy purposes are burned in low efficiency (less than 10%) traditional stoves and furnaces.[411] However, due to the lack of awareness of the biomass potential, many resources remain unused. For instance, the burning of about 1.23 million tons of dry cotton stalks each year is evidence of a great loss of energy, translating into 0.532 mtoe/year.[412]

Today it is estimated that 800 small biogas digesters are installed in Egypt of which less than 50% are in operation, while the potential for small biogas plants is estimated

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[404] Id., at 16.
[405] Id., at 14.
[406] Id., at 14.
[407] Id., at 15.
[408] Id., at 15.
[409] Georgy/Soliman, supra note 10, at 38.
[410] Id., at 32.
[411] Id., at 32.
[412] Id., at 32.

as more than 1 million units.[413] The main reason for this balance is the relatively high initial investment for small-scale biogas plants, approximately EGP 2500 combined with a payback period of 5-8 years, making it impossible for most rural Egyptian families to finance such an investment without subsidy or support.[414] Thus, most small biogas plants were only installed as part of programs supported by donors or through a national subsidy scheme.[415]

Large-scale biogas plants have not left the level of initial assessment and demonstration projects. Only a few large-scale biogas plants have been constructed in Egypt. One of the exemplary projects is a 170 m3 digester in the El-Giza Army Camp that was already constructed in the early 1980s.[416] Today there are, however, no mentionable activities in the field of large-scale biogas plants in Egypt which can be associated with the failure to integrate biogas plants into the national grid.[417] Nevertheless, NREA is constantly trying to foster energy generation from biomass sources by providing state of the art research facilities in cooperation with international institutions.[418]

3. Nuclear Energy

Egypt is attempting to diversify its energy mix and to decrease its dependency from fossil fuels, not only through an increased utilization of renewable energies, but also through the usage of nuclear energy. After the Egyptian government had dropped a first nuclear energy program in the 1980s, it officially declared that it would relaunch a program for the peaceful usage of nuclear energies in September 2006. [419] Egyptian government officials project that 20% of Egypt´s energy demand could be satisfied through the utilization of nuclear energy.[420] The international community welcomed

[413] Id., at 33.
[414] Id., at 33.
[415] Id., at 33.
[416] Id., at 34.
[417] Id., at 34.
[418] Id., at 34; NREA, Annual Report 2007/2008, supra note 9, at 16.
[419] BBC News, Egypt Unveils Nuclear Power Plan, 25 September 2006, available in the internet: http://news.bbc.co.uk/2/hi/middle_east/5376860.stm (last visited: 24th June 2010); Nasr 2009, supra note 15, at 1.
[420] Gamal Essam El-Din, A Nuclear Falling Out, Al-Ahram Weekly, Issue No. 963, 2009 (quoted as El-Din 2009), at 1, available in the internet: http://weekly.ahram.org.eg/2009/963/eg3.htm.

the Egyptian initiative and many countries have already offered support, including Russia, the EU and China.[421]

The Egyptian nuclear project is planned for 2 stages of implementation. In the first stage studies of proposed locations for nuclear power plants will be updated. The second stage will include the evaluation and revision of submitted designs, necessary testing during the various stages of construction until the power plant is integrated into the national grid.[422] For the implementation of the first stage, the Egyptian government signed a 10 year consultancy contract with the Australian firm Worely Parsons in 2009.[423]

The primary objective of the nuclear program is the erection of the first Egyptian nuclear power plant in Al-Dabaa (220 km north of Cairo, east of Marsa Matrough), a site that was already earmarked by Presidential Decree No. 309 of 1981. However, the site is currently being criticized by parts of the Egyptian business community because the situation at the Northern Mediterranean coast has changed dramatically. It has gone from being sparsely populated desert land to a prime location for real estate development.[424] Although site assessment included not only Al-Dabaa, but also Al-Najila (west of Marsa Matrough), Marsalam and Safaga on the western coast of the Red Sea as well as Hamman Pharaon on the eastern part of the Gulf of Suez, Al-Dabaa remains the preferred site by the Egyptian government.[425]

4. Energy Efficiency

Contrary to the extensive considerations given to the RE sector, the Egyptian government has not formulated a comprehensive strategy for EE. Nonetheless, the program of the ruling NDP party stipulates the unofficial objective of mitigating

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[421] Nasr 2009, supra note 15, at 2.
[422] Id., at 1.
[423] Id., at 1.
[424] El-Din 2009, supra note 417, at 1.
[425] Id., at 2 quoting Egyptian Minister of Electricity Hassan Younis.

energy consumption by 8% by 2022.[426] The projected sectoral energy saving potential is shown in Figure 15, with the saving potentials range between 5% and 20% for the various sectors, accumulating to a total of 70%.

Figure 16. Potential Savings at the End User Side for 2022 according to 2007/2008 values		
Sector	**Current Use**	**Sector Potential Savings**
Agriculture	1%	5%
Gov. & Pub Utilities	3%	15%
Res. & Comm.	20%	15%
Transportation	29%	15%
Industry	47%	20%
Total	100%	70%

Source: *RECREE, Annex 7, Characterization of Energy Efficiency Situation.*

Despite this huge potential for energy savings in Egypt, experts estimated that existing EE measures have a saving effect of only 0.5% to 1% of the annual primary energy consumption which equals the avoidance of 0.8 to 1.6 million tons of CO_2 per annum.[427] Nevertheless, it is acknowledged that Egyptian authorities must implement various measures to improve the EE situation from the supply as well as from the demand side.

From the point of view of the supply side, fuel specific consumption has decreased from 346 goe/kWh (gram oil equivalent per kWh) for 1981/1982 to only 226 goe/kWh in 2005/2006 with an average annual decrease of 1.7%. This improvement in energy conversion efficiency is due to the rehabilitation of old power plants, adding 35% of the existing installed capacities through new modern power stations and switching all existing steam power stations to have dual firing (oil/gas).[428] In addition, the ratio of transmission and distribution losses has decreased for the same period from 18% to 12% due to the rehabilitation of transmission and distribution networks.[429]

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[426] RECREE 2009, supra note 286, at 6; JCEE, Status of efficiency and renewables in Egypt: Institutions and Policies, available at, http://www.jcee-eg.net/reee.asp?sublinkID=22 (last visited: 24th June 2010).
[427] Georgy/Soliman, supra note 10, at 56.
[428] Id., at 51.
[429] Id., at 51.

The Egyptian government, further, tries to regulate the demand side by issuing EE building codes, developing EE and energy labels for appliances and by promoting the utilization of Compact Fluorescent Lamps (CFL). With regard to EE in buildings, a non-binding guideline for green buildings was issued in 1999.[430] In 2003, measures were taken in the form of comprehensive EE Building Codes for residential and commercial buildings stipulating minimum performance standards for windows, openings, natural ventilations and thermal comfort as well as for ventilating and air conditioning equipment and natural and artificial lighting (see Chapter V, Section E).[431] Already as early as 1987 the Egyptian Minister of Housing issued Ministerial Decree No. 401/1987 prescribing the installation of solar water heaters in new buildings. Unfortunately, this early effort was not successful and the decree has been largely abandoned today.[432] The reasons for this failure will be elaborated at a later point in this thesis (see Chapter V, Section D).

The first EE standards in Egypt were issued for refrigerators and room air conditioners in 2002, followed by a standard for laundry machines in 2003.[433] Today standards have been developed as well for electric water heaters and electronic ballasts.[434] For the same appliances EE labels have been developed that are mandatory for all locally manufactured and imported products.[435] The legal requirements and effects of the EE standards and labels will be presented in Chapter V, Section F.

Egyptian authorities have identified lighting as the strongest use of electricity in the residential and commercial sector. Thus, the EEHC is promoting CFLs through its distribution companies, allowing their customers to pay the purchase price in 18 installments added to the electricity bill (more than 6,000 lamps have been sold).[436] An even more ambitious program for the dissemination of CFLs was initiated by the MOEE, in which 6.2 million lamps have already been sold at half price through the

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430 JCEE, Buildings and Services: Regulations, standards and labels, available at, http://www.jcee-eg.net/reee.asp?sublinkID=28 (last visited: 24th June 2010).
431 EEHC, Annual Report 2008/2009, supra note 287, at 42.
432 Georgy/Soliman, supra note 10, at 38.
433 Id., at 59.
434 EEHC, Annual Report 2008/2009, supra note 287, at 42.
435 Id., at 42; Georgy/Soliman, supra note 10, at 42.
436 EEHC, Annual Report 2008/2009, supra note 287, at 42.

distribution companies.[437] In total, these programs are projected to annually save 400 MW.[438]

To further support the national EE standards and labeling program an EE testing center has been established at NERA.[439] The center has a set of laboratories for testing and certifying the various appliances in regard of their EE standard.[440] Eventually, it must be acknowledged that the driving force for a successful implementation of a profound EE policy in Egypt would be as simple as increasing fuel and electricity prices, but as complicated as creating market and framework that renders EE products and service economically profitable.[441]

5. Summary: Egyptian Energy Situation

Egypt`s primary energy demand is constantly rising with a growth rate of 4.64% with 94% of the energy demand satisfied by oil and natural gas. Therefore, it is obvious that Egypt will have to rely on fossil fuels to satisfy its energy demand for the near future. However, Egyptian oil production is constantly declining and it is expected that Egypt will become a net importer of oil. On the other hand, it is projected that proven gas reserves will double until 2030. Nevertheless, increasing Egyptian gas exports combined with growing domestic demand poses the risk that Egypt will soon become a net gas importer as well.[442] Such an energy crisis scenario in which Egypt would be a gross oil and gas importer could lead to an import bill amounting up to USD 90bn.[443]

Other energy sources do not seem to provide a substantial alternative to solve this emerging Egyptian energy crisis. Nuclear energy is a compelling alternative, but is not expected to be available before 2020, provided that all political, financial and

[437] Id., at 42.
[438] Id., at 42.
[439] NERA, Annual Report 2007/2008, supra note 208, at 62.
[440] Id., at 62.
[441] Georgy/Soliman, supra note 10, at 35.
[442] Abdallah 2008, supra note 378, at 1.
[443] Id., at 2.

technical obstacles are resolved.[444] The hydropower potential has already reached its maximum and is expected to provide no more than 3% of the primary energy demand. Solar and wind energy represent only a minor fraction of the Egyptian energy mix today. As elaborated earlier the potential for solar and wind energy is massive in Egypt. At the same time efforts to reduce energy demand by EE measures are still at the beginning, however they could ultimately facilitate an enormous reduction of energy consumption (up to 70%) in Egypt. It is the responsibility of Egyptian policymakers to utilize the identified RE & EE potential to increase domestic energy production and to decrease national demand. Thus, it is imperative to implement a sound regulatory framework for RE & EE to attract private investment and to create local production capacities to challenge the looming Egyptian energy crisis.

V. The Current and Prospective Regulatory Framework for Renewable Energies & Energy Efficiency in Egypt

This chapter will analyze the current and prospective regulatory framework for RE & EE in Egypt. To that end, the general conclusions of Chapter III about the legal policy options available for the promotion of RE & EE will be applied in light of the specific Egyptian country conditions presented in Chapter IV. The Egyptian regulator has already implemented a series of measures to introduce RE & EE into the market.

In 1994, the first Egyptian Environmental Protection Law (EPL, Law No. 4/1994) was issued as reaction to the ratification of the UNFCCC by Egypt in the same year. Despite its minor importance for the diffusion of RE & EE, the EPL must be mentioned as an early effort of the Egyptian regulator to mitigate the impact of human behavior on environment. Therefore, the provisions of the EPL will be presented briefly below (A.).

In the field of RE, it is the declared objective of the Egyptian government to generate 20% of electricity supply through RE by 2020.[445] This plan includes a 12% contribution from wind energy, which would translate into 7200 MW grid-connected

[444] Id., at 1.
[445] NREA, Annual Report 2007/2008, supra note 9, at 12.

wind farms.[446] In order to reach this ambitious goal the Egyptian regulator has developed a two stage strategy. In the first stage, the private sector is invited to participate in tender procedures based on competitive bidding for the development of RE projects. In this tendering system the risk for investors will bed reduced through long-term PPAs.[447] In the second stage, a feed-in law should be issued based on the price experiences made in stage one.[448] Egypt is to-date in the first stage of its RE strategy. The first tender invitations have been issued and international project developers are currently preparing their respective bids. Therefore, Section B of this chapter will analyze the applicable tender procedures including the specifics of land-use agreements (2.) and PPAs (3.) that are essential parts of the respective tender documents.

For the promotion of EE, the Egyptian government has not yet declared any official policy objectives. However, it has already implemented several legal policy tools to increase EE consumption of electricity in Egypt. In 1987 it issued a Ministerial decree on the mandatory use of solar water heating systems, the history of which and its acceptance in the domestic market will be analyzed in Section D. Subsequently, the recent Egyptian efforts to develop and enforce EE Building Codes will be presented in Section E. The part on the implemented EE legal policy option will be closed with Section F on the Egyptian EE standards and labeling program for electronic appliances.

In addition to the measures mentioned above, the Egyptian regulator has recently developed a new Draft Electricity Law that for the first time stipulates explicit provisions on RE & EE by law in Egypt. The objective of the draft law is to encourage the implementation of private RE projects by guaranteeing access to the national grid and the mandatory purchase of electricity generated from RE. Moreover, it stipulates mandatory provisions for EE electricity consumption. The specific provisions of the Draft Electricity Law on RE & EE will be analyzed in Section C of this chapter.

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[446] Id., at 12.
[447] Id., at 12.
[448] Id., at 12.

Finally, this chapter will be concluded in Section G with a deconstruction of the CDM in Egypt. In particular, it will focus on the institutionalization of the CDM, the applicable evaluation and permit procedures and the current Egyptian CDM portfolio.

A. Environmental Protection Law (Law No. 4/1994)

The Egyptian Environmental Protection Law (EPL, Law No. 4/1994) came into force in February 1994. It is supplemented by its Executive Regulations (Decree No. 338/1995), which came into effect in March 1995. The EPL replaced several individual laws and decrees that divided the competences and responsibilities for environmental protection among various governmental entities and therefore, lacked coherence in implementation. The objective of the unifying EPL was to establish comprehensive environmental guidelines and standards in order to empower the competent government entities with greater authority for monitoring and enforcement.

The preliminary part of the EPL stipulates the general definitions related environmental protection (Article 1), the competences and responsibilities of the Egyptian Environmental Affairs Agency (Articles 2 to 13) and the establishment of the Environment Protection Funds (Articles 14 to 16). However, the normative elements of the EPL are the provisions on the environmental protection of land (Articles 19 to 33), air (Articles 34 to 47) and water (Articles 48 to 83) from pollution. The Executive Regulations of the EPL supplement its mandatory provisions on environmental protection by stipulating thresholds against noise and pollution, including the respective monitoring procedures. The EPL closes in its part four (Articles 84 to 101) with an extensive catalogue of penalties for violations against the provision for environmental protection.

1. The Egyptian Environment Affairs Agency

The Egyptian Environmental Affairs Agency (EEAA) was established by virtue of Article 2 of the EPL. It replaced the old Egyptian Environmental Authority (established pursuant to Decree 631/1982) in all its obligations and rights (Article 4 of the EPL).

The mandate of the EEAA includes the development national policies for the protection of the environment and the monitoring of their implementation, the strengthening of regional and international environmental cooperation and the preparation of Egypt´s participation in international environmental conventions (Article 5 of the EPL). In order to fulfill these objectives, the EEAA may implement the following key functions pursuant to Article 5 of the EPL:

- Preparation of draft legislation related to its mandate and commenting on proposed legislation related to the protection of the environment,
- Preparation of studies on the state of the environment and the formulation of a national project plan for the protection of the environment,
- Stipulation of criteria and conditions for environmental protection that project developers and establishments have to comply with in construction and during the operation of an project,
- Monitoring of the compliances with the set environmental criteria and conditions,
- Promulgation of principles and procedures for assessing the environmental impact of projects,
- Administration of national environmental protectorates,
- Preparation and implementation of programs for the environmental education of the public, and
- Compilation on annual reports on the environmental situation in Egypt.

Furthermore, the EEAA established the Environment Protection Fund, which is comprised of funds allocated in the state budget, grants and donations and fines for damaging the environment as well as of other revenues of the EEAA (Article 14 of the EPL). The resources of the fund should support the EEAA to finance its responsibilities mentioned-above (Article 15 of the EPL). Eventually, the EEAA has developed an incentive program to support other public entities with the implementation with environmental protection activities or projects (Article 17 of the EPL).

2. Protection of Land from Pollution

The environmental protection of land from pollution is regulated in Articles 19 through 33 of the ELP. In order for project developers to obtain a license, the competent administrative authority for the "establishment"[449] must conduct an "environmental impact assessment"[450] that must be submitted to the EEAA for evaluation (Article 19 of the ELP).

Based on the "environmental impact assessment" of a proposed project, the EEAA must issue its respective opinion and propose measures to mitigate the project´s negative impacts on the environment (Article 20 S. 1 of the EPL). The EEAA must issue its evaluation within 60 days after obtaining the "environmental impact assessment" from the competent administrative entity, otherwise the assessment is deemed approved by the EEAA (Article 20 S. 3 of the EPL). The competent administrative authority is obliged to send the results of the evaluation to the respective applicant by registered mail (Article 21 S.1 of the EPL). Any objections by the project developer must be submitted in writing to a special committee of the Egyptian Ministry of Environment, comprised of the representatives of the EEAA, the competent administrative authority and the project developer (Article 21 S. 2 of the EPL).

Already established projects must keep a register to record the effects of the project activities on the environment (Article 22 S.1 of the EPL). It is the role of the EEAA to verify these records by conducting the applicable environmental tests (Article 22 S. 3 of the EPL). In case of violation, the EEAA notifies the competent administrative authority that must direct the owner to rectify the situation within 60 days. If the owner fails comply, the EEAA has the authority to implement the necessary steps on behalf of the owner and to claim compensation (Article 22 S. 4 of the EPL).

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[449] "Establishment" is defined in Article 1 No. 34 of the EPL as "any industrial and touristic project, establishments used for electric power generation, mines and other exploration projects and all infrastructure projects as well as any other establishment that may have a considerable impact on the environment."

[450] "Environmental impact assessment" is defined in Article 1 No. 36 of the EPL as "studying and analyzing the environmental feasibility of proposed projects, whose construction or activities might affect the safety of the environment in order to protect it."

3. Protection of Air and Water from Pollution

The procedural provisions on the protection of air and water are essentially similar to those concerning the protection of land that were presented above. Any environmental damage must be reported and the owner is required to eliminate the damage or to bear the costs of remediation.

Pursuant to Article 34 of the EPL, a project site must be suitable for a project activity to guarantee that the thresholds of air pollutant emission are not exceeded. The specific thresholds are stipulated in the Executive Regulations of the EPL. Explicitly mentioned in the EPL is the prohibition of certain machines with high emission levels (Article 36 of the EPL), to burn garbage and solid waste (Article 37 of the EPL) and to use pesticides and other harmful chemicals (Article 38 of the EPL).

In regard of the protection of water, the ELP differentiates between pollution caused by ships (Articles 48 to 68 of the EPL) and pollution caused on land (Articles 69 to 75 of the EPL). The Executive Regulations stipulate a list of substances that are prohibited from being released into the water. Moreover, there are some special regulations concerning the transport of oil by sea (Articles 48 to 49 of the EPL).

4. Penal Provisions

Any violations of the environmental protection provision of the EPL and its Executive Regulations are either punishable with fines or even imprisonment (Article 84 to 101 of the EPL). In order to provide a comprehensive overview on the penal provisions of the EPL, the following list summarizes the key categories:

- A fine of up to EGP 5,000 is imposed for minor violations, e.g., causing noise above the permitted threshold,
- A fine of up to EGP 20,000 is imposed for the violation of legal provisions protecting air and water, whereas each day of pollution is deemed to constitute a separate violation,
- A fine of up to EGP 300,000 may be imposed for a violation of the obligation to inform the authorities of environmental damage, for not having a requisite approval, or for simple cases of oil pollution,

- A fine of up to EGP 500,000 is imposed for a ship accident caused intentionally or by negligence, and
- Imprisonment may be imposed if someone causes an incurable disease to a human being, or causes the death of a human being by violating an environmental protection provision.

5. Conclusion

The EPL has only a minor importance for RE & EE. It does not conclude any provisions in this regards. However, any RE & EE project developer must comply with "environmental impact assessment" and make the changes in the project structure proposed by the EEAA.

B. The Egyptian Tendering System

The tendering system is the central policy instrument for the promotion of RE in Egypt. This section will analyze the Egyptian tender procedures and the corresponding land-use agreements and PPAs, which are an essential part of the tender document for RE projects.

Currently, the EETC has issued a tender invitation to Build Own Operate (BOO) a wind farm at the Gulf of Suez with installed capacities of 250 MW.[451] The invitation for tender allows operation of the wind farm for 20-25 years while the Egyptian government guarantees the purchase of the generated electricity under the terms and conditions of the respective power purchase agreement for the same period of time.[452]

In addition to the designated areas for wind energy projects at the Gulf of Suez, Egyptian authorities have earmarked 247 km^2 for the development of large-scale wind farms at the Gulf of El-Zayet.[453] Projections for the Gulf of El-Zayet include various

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[451] The Development of BOO Wind Power Project at the Gulf of Suez, Invitation for Pre-Qualification (RFPQ 75/2008/2009), available at, http://www.moee.gov.eg/arabic/tender111.pdf (last visited: 24th June 2010).
[452] Id., at 1.
[453] NREA, Annual Report 2007/2008, supra note 9, at 9: 93 km^2 are still subject to governmental approval pending a bird's migration study.

projects that will add up to 720 MW.[454] The complete capacity of 720 MW is planned to be reached in three stages: 200 MW in cooperation with Germany and the European Investment Bank, 220 MW in cooperation with Japan and an additional 300 MW in cooperation with Spain.[455] Moreover, a number of private companies have expressed their interest in developing large-scale wind farms at the Gulf of Zayet. In November 2007, an Italian company signed a MoU with the Egyptian government to install 120 MW with the option for an extension up to 400 MW.[456] In order to develop RE projects in Egypt, private investors have to comply with applicable public tender procedures and have to sign the respective land-use agreements and PPAs.

1. Tender Procedures

Any contract with the object of purchasing of movables, or agreements for construction works as well as all service contracts to be concluded by Egyptian government or other public entity has to follow the procedures and rules stipulated by Law No. 89 of 1998 on the Reorganizing of Tenders and Auctions (Tender Law), which replaced Law No. 9 of 1983. The Tender Law is supplemented by its Executive Regulations, which were promulgated by Ministerial Decree No. 1367 of 1998.

The Tender Law is divided into four parts: the purchase of movables, contracts for construction and service agreements are treated in part one; the second part deals with the purchase and lease of real estate; this is followed by the provisions for the sale and lease of realties and movables including ancillary rights such as the right to exploit and usufruct rights in part three. The fourth part contains further general conditions, which apply to all cases. The Executive Regulations consist of four parts which reflect the Tender Law and mainly stipulate procedural rules for the concerned government bodies.

Any public tender under Egyptian law must consider the general principles of publicity as well as equal chances and competition (Article 2 of the Tender Law). The

[454] Id., at 11.
[455] Id., at 11.
[456] Id., at 11.

law sets out two basic procedures for the tendering of contracts with governmental, public or administrative entities: public tender and public negotiations, the selection of which is at the discretion of the competent authority (Article 1 of the Tender Law). Subject to certain conditions, it is possible to issue a limited tender pursuant to Article 3 of the Tender Law. The tender can be issued locally (local tender, Article 4 of the Tender Law), or the negotiations may be limited to certain pre-selected companies (limited negotiations, Article 5 of the Tender Law). Only in very limited situations may contracts be directly entered into between the public entity and the private contractor (Articles 30 and 31 of the Tender Law); and, once a public tender has been issued, the public entity may not change it to limited negotiations.

Pursuant to Article 2 of the Tender Law, each tender begins with the publication of the contractual specifications in the Egyptian press and by specific invitation to order the tender documents, which include the appeal to the bidders to make their respective offers. In order to participate in a public tender Article 61 of the Executive Regulations requires that the bidder must be resident in Egypt or have an Egyptian agent. Offers are to be submitted in two parts, one for the technical specifications and one for the financial calculation of the bidder, which need to be submitted in two different envelopes (Article 10 of the Tender Law). In addition, each bidder has to deposit a bond or other guarantee according to the specifications of the issuing entity. Generally this is 2% of the estimated contract value, and same deposit is restituted to the unsuccessful bidder without the need for any request (Article 17 of the Tender Law).

Upon the expiration of the time limit for the submittal of the bids, the designated "decision committee" composed according to Article 33 of the Tender Law, will evaluate the bids. First, the technical envelope will be opened. Only in case of fulfillment of the technical requirements, the financial envelope will be opened as well; the bidder with the lowest offer will be selected.[457] Pursuant to Article 28 of the Executive Regulations, the "decision committee" must establish a point system to

[457] Florian Amereller, International Public Procurement – Egypt, Oxford University Press 2007 (quoted as Amereller 2007), at 8.

assess the financial and technical aspects of each bid, which will provide the basis for the decision that should be made by dividing the financial calculations of the contract by the total technical points given to a bid. It is noteworthy that Egyptian bidders with a high percentage of local production can be preferred to cheaper foreign bidders, if their offer does not exceed the foreign bidder's offer by more than 15% and if the same quality standard is assured (Article 16 of the Tender Law). Following a successful tender, the selected bidder is required to deposit a bond or other guarantee over 5% of the contract value (Article 18 of the Tender Law).

For the purpose of ensuring quality standards, special tendering procedures, i.e. local and limited tender, are restricted to participants who meet certain requirements such as technical know-how and financial means (Article 3 of the Tender Law). Pursuant to Article 4 of the Tender Law, the local tender aims at privileging the domestic economy and is only permitted in cases where the value of the contract to be concluded does not exceed EGP 200,000.

According to Article 7 of the Tender Law, the above mentioned procedures may, in situations of urgency, if inadequate to meet the needs of the contracting entity may be deviated from, thus enabling the authority to enter into contracts directly with a suitable contract partner by way of the negotiation procedure. The tender procedure is then replaced with the approval of the competent Egyptian authority and, where the specific contract value exceeds EGP 100,000, with the additional approval of the competent Minister and in certain cases even of the Prime Minister (Article 7 of the Tender Law).

In difference from the former law, Article 42 of the Tender Law expressly permits arbitration in case of dispute between the Egyptian government and the other contracting party, the approval of the competent Minister provided.

a) Purchase and Rental of Movables and Real Estate

The basic form for the acquisition or use of public land or movables is the public auction, which may also be locally restricted. Perishable goods do not have to undergo a public auction in cases of urgency (Article 30 of the Tender Law). Further reasons for the non-implementation of a public auction are cases in which the minimum of EGP 50,000 has not been attained and in all other cases, where the minimal amount for sale has not been reached or where no offers were received (Article 31 of the Tender Law).

b) Operating Models

Operating models are gaining increasing popularity in Egypt.[458] The best known operating model in Egypt is the so-called BOT (Build Operate Transfer), in which the government awards a project developer the right to build and operate, for instance a RE facility, in the frame of a kind of concession for a specific time period, at the end of which the project developer must hand over the installation to the State.[459] Additional varieties of operating models are BOO (Built Own Operate), BOOT (Built Own Operate Transfer) and DBOT (Design Built Own Transfer). With regard to RE projects, Law 100 of 1996 modifying Law 12 of 1976 is of particular importance for the implementation of operating models, since in Article 7 it permits that private investors may construct and operate power facilities and other facilities for the public welfare for a period up to 99 years.

2. Land-use Agreements

Land-use Agreements are an essential part of the tendering documents for RE projects. Traditionally, there are three basic scenarios for land use for RE:[460]

- The project developer buys the land,
- The project developer rents the necessary land, or
- The landowner is the project developer or there is cooperation between the landowner and the project developer.

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[458] Id., at 18.
[459] Id., at 18.
[460] RCREEE, Land Use Agreements for Renewable Energy Installations – Experiences, Principles and Draft Model for Lease Agreements for Public Property Lease, May 2009 (quoted as RECREEE, Land Use Agreements), at 11, available at, http://www.jcee-eg.net/download.asp?path=library/MED-EMIP_RCREEE%20report%20LUA%20for%20RE%20installations.pdf (last visited: 24th June 2010).

In Egypt land was allocated by virtue of a Presidential Decree from the government to NREA for the erection of RE installations.[461] The Egyptian regulator intends not to sell the land, but instead lease it to RE project developers.[462] It is problematic that the respective land-use agreement is not to be concluded between NREA and the project developer, but between the project developer and the EETC.[463] Therefore, the current allocation raises the issue that the land is not allocated to the administrative entity that will be the contractual counterpart for project developers. To solve this situation the land could be reallocated to the EETC, NREA could assign the land use rights to the EETC or the land-use agreement could be signed as a tri-party agreement, including NREA. In any case, this situation should be resolved to provide project developers with a clear contractual counterpart. Another critical point in land-use agreement for RE facilities is the agreed contract period. Ideally, the contract duration should cover the production phase of a RE facility, which is ordinarily between 20 to 30 years.[464] However, longer periods could function as an incentive for project developers to redevelop and repower the sit with new RE installations.[465] In this regard, no information on the position of the Egyptian government is available.

In order to provide RE project developers with certainty in regard of the conditions of land-use agreement, it would be desirable to develop standard land-use agreements that could provide legal certainty for project developers.

3. Power Purchase Agreements

Power Purchase Agreements (PPAs) are the other essential part of the tendering documents for RE projects. Up to now, PPAs have been signed between NREA, as operator of the Zafarana wind park, and the EETC. However, the EETC will remain the counterpart for future private RE project developers. Unfortunately, only limited details of the PPAs between NREA and the EETC are available.

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[461] Id., at 8.
[462] Id., at 9.
[463] Id., at 8.
[464] Id., at 17.
[465] Id., at 17.

Generally, the EETC will cover all expenses of overhead transmission lines and substations that are required to connect a RE facility to the grid.[466] The PPAs between NREA and the EETC stipulate a tariff of 12 piaster/ kWh (2.11 US cents); in contrast the EETC purchases thermal generated electricity at 10 piaster/kWh (1.8 US cents).[467] Due to this price difference some analysts deem the PPAs as inherent incentive for the promotion of RE in Egypt.[468] However, this conclusion seems a bit exaggerated in comparison to a German feed-in tariff of 9.2 € cents/kwH guaranteed for period of 10 years (see Figure 1). Nevertheless, it should be remembered that the Egyptian government intends to use the price experiences from the PPAs for the adjustment of an appropriate future feed-in tariff. In the absence of a fixed feed-in tariff it would be also desirable to develop a standard PPA for the RE sector, which could avoid lengthy negotiation and thereby increase legal certainty. These agreements could leave the respective price open for negotiation, in order to help the Egyptian government to assess the appropriate price level for the subsequent establishment of a fixed feed-in tariff.

4. Conclusion

Although prospectively the establishment of feed-in model is the overall objective of the Egyptian regulator, the choice for now is the implementation of a tendering system for the promotion of RE. This decision brings along the respective advantages and disadvantages of a tendering system compiled in Figure 4.

In contrast to a feed-in law, under a tendering system the regulator determines the level of installed capacity, while the market determines the price. A tendering system is best at reducing cost and price through the implementation of a competitive bidding process, which favors least-cost projects. This explains the focus of the Egypt RE sector on wind energy, instead of more cost intensive solar energy. In theory, a tendering system can provide certainty regarding the future market share of RE, but RE targets could also set the upper limit for capacity development, since there is no incentive to install more than the mandate level of RE. In the absence of a fixed tariff,

[466] Georgy/Soliman, supra note 10, at 46.
[467] Id., at 47.
[468] Id., at 46.

a tendering system includes a lack of price certainty for potential investors. The problem of price uncertainty should be reduced through the development of standard PPAs for RE facilities in Egypt.

One of the major disadvantages of a tendering system is the related high transaction cost for RE project developers. These costs occur through the often complex and intransparent tendering procedures. This observation is especially valid for Egypt, since the Tender Law provides for relatively broad discretion of the competent authorities in selecting the respective tender process. Additional cost may occur in the preparation of tender documents that can not be retrieved by unsuccessful bidders. Furthermore, the "decision committee" could be undermined by personal interest and the widespread corruption in the Egyptian legal system. Generally, a tendering system is considered more complex than a feed-in law, but simpler than a RPS. However, the complexities of tender procedures lack the necessary flexibility to fine tune or adjust prices in case of a change in circumstances. In addition, a tendering system tends to create cycles of stop-and-go in the development of RE, since new projects depend on the issuance of new tender invitation by the competent authorities.

While the aforementioned advantages and disadvantages are also true for Egypt, the key explanation for the decision of the Egyptian regulator for a tendering system could be the greater control of subsidies in comparision to the other available legal options. It is entirely up to the competent Egyptian authorities to decide the location and number of RE projects implemented as well as the respective purchase price in PPAs and the conditions in land-use agreements. In addition, energy subsidies are a politically sensitive issue in Egypt that will take many years to tackle, since vast part of the population could not afford unsubsidized energy prices. Therefore, any reshuffling of energy subsidies towards RE must be handled cautiously in order to protect economic growth and the poorest parts of society.

In conclusion, the greater control a tendering system provides in the development of the RE sector in regard of number of approved projects and price, seems to be the key argument for Egyptian policymakers to continue to favor a tendering system.

Nevertheless, the prospective implementation of feed-in law exemplifies the increased commitment of the Egyptian government to create a domestic RE sector.

C. The New Draft Electricity Law

The new Draft Electricity Law is the result of many years of development and legal consultations.[469] To date, it is under discussion in the Shoura Council and the People´s Assembly, before it will be submitted for approval to the Egyptian Cabinet. It is expected that the Draft Electricity Law will not be promulgated before 2011 because the current parliamentary term is exceptionally short due to the upcoming presidential elections in 2011, and thus, does not provide sufficient opportunity for in depth discussion.[470] The general objective of the new Draft Electricity Law is to unify the several laws regulating the energy sector in Egypt, namely Law No. 12 of 1976 establishing the EEA, the predecessor of the EEHC, and Presidential Decree No. 339 of 2000 re-organizing the EEUCPRA.[471] In addition, it aims to re-define the role of the Egyptian government from managing the public electric utility directly to a more organizational and controlling function.[472]

For first time in the history of Egyptian legislation, Part IV of the Draft Electricity Law stipulates provisions on the implementation of RE projects (Chapter I, Articles 45 to 50) and mechanisms to improve EE in Egypt (Chapter II, Articles 51 to 57). The objective of this section will be to deconstruct the provisions of Part IV of the Draft Electricity Law and to assess their potential to promote RE & EE in Egypt.

1. The Role of the EEUCPRA and Licensing Procedures

Pursuant to Article 4 No. 9 of the Draft Electricity Law it will be the mandate of the EEUCPRA to set the applicable rules and procedures for developing RE & EE in Egypt. For generating electricity from RE it will be mandatory to obtain a respective

[469] Nadia Mansour, The Unified Electricity Law – will it meet the interest of low-income brackets? (Interview with Dr. Hafez El Salmawy, Director of the EEUCPRA), Al Ahram Daily Newspaper, 15 of February 2010, English translation available at, http://www.jcee-eg.net/libdetails.asp?typeID=1 (last visited 24th June 2010).
[470] Id., at 1.
[471] Id., at 3.
[472] Id., at 3.

license from the EEUCPRA (Article 13 of the Draft Electricity Law). In this respect, the Draft Electricity Law mirrors the current procedures applicable pursuant to Presidential Decree No. 339 of 2000.

A license for generating electricity must be applied for at the EEUCPRA and should ordinarily be issued within 60 days as of the date of submission of all required documents by the licensee (Article 14 of the Draft Electricity Law). A granted license generally includes the following obligations that must be honored by the EEUCPRA and the licensee (Article 15 of the Draft Electricity Law):

- The license period,
- The type of service (generation, transmission or distribution),
- The geographic location of the project,
- Abidance by the vocational and environmental safety and health regulations,
- Submitting to the EEUCPRA any information and data requested in connection with the respective license, and
- Any additional permit conditions the Board of Directors of the EEUCPRA may decide.

Once a license for the generation of electricity is granted, Article 24 of the Draft Electricity Law requires the licensee to execute the approved project, sell the generated electricity to the transmission company and to provide ancillary services that are required for the safe and stable operation of the transmission network as well as to conduct research and studies within the scope of the approved project. Although a license is granted for specific geographic area, it does not entail a monopoly right to generate electricity in the designated territory (Article 13 of the Draft Electricity Law). Moreover, the licensee is not permitted to transfer the license to any third party without the prior approval from the EEUCPRA (Article 19 of the Draft Electricity Law). Pursuant to Article 16 of the Draft Electricity Law, a license is generally granted for a period of 20 years and is subject to renewal. Each year of the granted license period the EEUCPRA must issue a certificate evidencing the validity of the license after verifying that the licensee is in compliance with all license requirements.

In case a licensee is not in compliance, the EEUCPRA may impose the following penalties after giving a sufficient grace period (Article 21 of the Draft Electricity Law):

- A written notice for the suspension or revocation of the license,
- Fines that should not exceed 1% of the authorized capital of the license for each violation,
- Suspension of the license for a fixed period and additional procedures to maintain the concerned project activity and the rights of consumers, or
- Revocation of the license and additional procedures to maintain consumer rights, including the operation of the concerned project on the account and the expense of the violator.

In case electricity is generated without obtaining a license from the EEUCPRA, the penalty will be not less than 6 months to 3 years imprisonment and/or a fine up to EGP one million, and this penalty will be doubled in case of recidivism (Article 74 of the Draft Electricity Law).

As mentioned at the beginning of this section, the described licensing procedures and requirements essentially mirror the procedures in place pursuant to Presidential Decree No. 339 of 2000. Therefore, any private investor aspiring to implement a RE project in Egypt, must obtain a license for generating electricity and comply with respective approval procedures.

2. Provisions on Renewable Energy

The Draft Electricity Law stipulates provisions on RE in Article 45 to 50. However, the term RE is already defined in Article 1 of the Draft Electricity Law as “non fossil fuel that can be used for electricity generation.” This rather wide definition of RE includes not only traditional sources such as wind, solar, biomass or “small” hydropower, but also big hydropower plants, such as the Aswan High Dam. The rational behind this broad definition might be that the very ambitious political goal of generating 20% of Egypt´s energy supply from RE by 2020 may not be otherwise achievable.

Article 45 No. 1 (a) of the Draft Electricity Law codifies a mandatory tendering system for building and operating RE facilities. The generated electricity from those projects will be sold to the EETC at a rate proposed by the EEUCPRA and approved by the Cabinet and subsequently negotiated between the EETC and investors in the respective PPAs. It will be the responsibility of the EETC in cooperation with the NREA to call domestic and international investors for public tenders and issue the respective tender documents (Article 45 No. 1 (b) of the Draft Electricity Law). In comparison to the current regulatory framework for the promotion of RE, the applicable tendering system remains unchanged. Although the Draft Electricity Law does not provide any new developments in this respect, the codification of a tendering system for RE projects would exemplify the commitment of the Egyptian regulator to create a domestic RE industry.

In addition to the tendering system, the EETC may set fixed tariffs for electricity generated from small RE projects up to 50 MW (Article 51 of the Draft Electricity Law). This instrument aims at supporting small RE facilities that are built by local private developers for which a competitive tender process would lead to extraordinary and unnecessary expenses. However, it is to be expected that the first tariffs for small RE facilities will only be fixed after the initial experience from the competitive bidding process in regard of the price levels that are available.

Furthermore, the Draft Electricity Law includes the guarantee that the EETC and the Egyptian distribution companies are obliged to connect RE facilities to the national grid, while RE generators would have to bear the cost for a grid expansion, if required (Article 46 of the Draft Electricity Law). A guaranteed access to the grid for RE facilities would constitute an additional incentive for project developers that would decrease investment uncertainties.

The Draft Electricity Law, further, introduces the “Fund for Development of Power Generation from Renewable Energies” that will have its own legal personality (Articles 47 to 50 of the Draft Electricity Law). It will be financed from the national budget and income from its own investment and other subsidies (Article 48 of the

Draft Electricity Law). The funds should provide the necessary support for the EETC to cover the additional costs that will occur from purchasing electricity generated from RE for prices which are above the price level for conventionally produced electricity (Article 47 of the Draft Electricity Law).

3. Provisions on Energy Efficiency

The provisions on RE in the Draft Electricity Law are supplemented with some instruments for the promotion of EE in Egypt, which will be now presented in brief.

The EETC and the distribution companies are obliged to connect co-generation[473] units and recoverable-energy[474] generation units to the grid and cover a potential network expansion cost, while producers have to pay the connection cost (Article 52 of the Draft Electricity Law). In addition, the EETC and the distribution companies may conclude contracts with consumers to reduce or shift loads at a specified price (Article 53 of the Draft Electricity Law). Both instruments introduce a greater flexibility for the electric utility towards electricity consumer behaviors.

Article 54 of the Draft Electricity Law obligates electricity consumers with a capacity above 500 KW to assign a specialist to improve EE and to maintain an energy register. Furthermore, the Egyptian EE standard and label program (see Section F) will be codified into law (Article 57 of the Draft Electricity Law). Producers and importers of electronic appliances are required to tag their products with EE labels. In addition, Article 56 of the Draft Electricity Law mandates the concerned Ministries with the task to develop policies to expand the application of EE standards and labels for electric appliances and to replace appliances with low EE.

4. Conclusion

The enactment of the Draft Electricity Law would be a milestone for the promotion of RE & EE in Egypt and could be an important stimulus for the entire region. Although

[473] Co-generation is defined by Article 1 of the Draft Electricity Law as "simultaneous production for both electrical and thermal energy.
[474] Recoverable Energy is defined by Article 1 of the Draft Electricity Law as "wasted energy that can be used for electricity generation."

the tendering system remains the central instrument for the diffusion of RE, its codification in the Draft Electricity Law would exemplify the political commitment of the Egyptian government to create a domestic RE industry. Fixed prices for small RE facilities, a guaranteed grid access for project developers and additional funds for purchasing green energy, would all together further increase the incentive for international and domestic investors to participate in the emerging Egyptian RE sector.

The provisions on EE in the Draft Electricity Law stipulate a more efficient consumption of energy. Especially, the requirement to install EE specialists in facilities that consume above 500KW stipulates the commitment of the regulator to improve EE in Egypt. In addition, the codification of EE labels might improve the weak impact of the Egyptian EE standard and label program. All in all, the lack of details and constant reference to the not yet existing Executive Regulations of the Draft Electricity Law renders it impossible at this point to assess its real potential in regard of EE.

The success of the Draft Electricity Law will depend highly on the specifics of its Executive Regulations and the degree of its enforcement. In addition, many critical questions are unanswered: this is in particular valid for the contractual details of the PPAs and Land-Use-Agreements, which would be essential to provide investment certainty in the absence of a feed-in law.

It is noteworthy that the tendering mechanism, which is the most important instrument for the promotion of RE, is already in place today as described in Section B of this Chapter. Therefore, any delay by the Egyptian regulator in enacting the Draft Electricity Law will have no negative impact on ongoing tendering procedures.

D. Ministerial Decree No. 401/1987 for the Mandatory Use of Solar Water Heating Systems

Already by 1987 the Egyptian Ministry of Housing, Utilities and Urban Development (MoH) had issued Ministerial Decree No. 401/1987 that stipulated the mandatory use of domestic solar water heating systems in new houses and communities. This effort is exemplary as evidence for the early understanding of the Egyptian government of the need to promote RE & EE.

In the years from 1987 to 1993 solar water heating systems were increasingly used in Egypt and domestic production capacities ranged between 1000 to 2500 units per year.[475] Unfortunately, this initial success was undermined by a lack of after-sale services and the absence of enforcement standards, which led in sum to unsatisfactory market performance of domestic solar water heaters(DSWH) and thus, to a bad market reputation in Egypt.[476] The effect was that new building constructions did not comply with Decree No. 401/1987, thus rendering it irrelevant eventually.[477] Until today, no efforts have been made to re-vitalize the compliance with the Ministerial Decree.

Despite this early frustrating experience, NREA started the establishment of a research facility for solar water heating systems in 2008 which will provide technical consultancy services as well as monitor the market development of DSWH.[478] Although the market potential for DSWH is estimated at 10 million units, approximately only 200,000 DSWH units are installed in Egypt today.[479] The main reasons for this under exploitation of the RE & EE potential of DSWH are the subsidized energy prices that distract consumer decisions and the still unsatisfying production standards and after-sales service of domestic DSWH producers.[480]

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475 Georgy/Soliman, supra note 10, at 38.
476 Id., at 38.
477 Id., at 38.
478 NREA, Annual Report 2007/2008, supra note 9, at 15.
479 Georgy/Soliman, supra note 10, at 68.
480 Id., at 69.

E. Energy Efficiency Building Codes for the Commercial and Residential Sector

In order to realize the enormous potential for energy savings in the building sector (see Chapter III), the MoH developed and published EE building Code No. 305/2005 for the commercial and residential sector. Although promulgated under the same number, the codes were published in two separated editions. Nevertheless, the respective structure and context are essentially the same and only adjusted for the specific construction requirements of the commercial and residential sector. Both stipulate provisions on the exterior building design (chapter 3), natural ventilation and heating (chapter 4) and equipment for air-conditioning (chapter 4) as well as on artificial and natural lighting (chapter 5), systems of electrical power supply (chapter 8) and on the total building performance (chapter 10). Due to the limited scope of this thesis and the focus on legal aspects, the respective construction details of the EE Building Codes cannot be analyzed in-depth here. It should be sufficient to mention that the codes comply with international EE standards for buildings.

The major problem was that the codes are not binding and that efforts of enforcement were practically non-existent. The newly founded Egyptian Green Building Council (EGBC),[481] headed by the Egyptian Minister of Housing, Utilities and Urban Development, tried to close this gap between code requirements and code compliance in the housing sector with a bundle of measures.[482] The EGBC developed a Green Building Rating System and corresponding Green Building Permits which are expected to be in place in the course of 2010.[483] In order to gain the acceptance of the Egyptian building sector the following incentives are included in Green Building Permits:[484]

- Access to preferred and prime locations and property,
- Tax breaks, wavers and postponements,
- Financial assistance guarantees, credit and insurance,

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[481] EGBC Official Website: http://egypt-gbc.org/ (last visited: 24th June 2010).
[482] EGBC, Egyptian Green Building Council: Formation & Achievements, October 2009, at 2, available at, http://egypt-gbc.org/Templates/EGBC_Report_October%20_2009.docx (last visited: 24th June 2010).
[483] Id., at 2.
[484] Id., at 3.

- Utility concessions,
- EE equipment support and finance, and
- EE training and assistance for employees.

In addition, the EGBC proposed a national eco-villages project with the objective of providing a platform for EE technologies, methodologies and systems, which eventually could define what constitutes a green building in Egypt.[485] Another effort is the initiation of a training program for EE building inspectors, which is a reaction to the insufficient technical expertise in the field of EE building constructions.[486] Eventually, the EGBC promoted EE in buildings with a series of conferences and workshops held in Egypt.[487]

Despite the efforts of the EGBC the level of compliance with the Egyptian EE Building Codes was still rudimentary. Therefore, the MoH issued Ministerial Decree No. 368/2008 making the Egyptian EE Buildings Codes for the commercial and residential sector mandatory law. It remains to be seen whether the issuance of this decree can raise the level of enforcement and compliance in the Egyptian building sector.

F. Energy Efficiency Standards and Labels for Electronic Appliances

As the result of the joined efforts of the Energy Efficiency Improvement and Gas Reduction Project and the Organization for Energy Planning, the Egyptian regulator developed EE standards and labels for specific electronic appliances.[488] Based on a local manufacturer´s survey and the review of international EE standards and programs,[489] the following four EE standards for electronic appliances have been promulgated so far:

- Egyptian Standard No. 3794/2006 for refrigerators up to 1100 liter and deep freezers up to 850 liters,

[485] Id., at 3.
[486] Id., at 6.
[487] Id., at 7.
[488] Georgy/Soliman, supra note 10, at 58.
[489] Id., at 59.

- Egyptian Standard No. 4100/2006 for laundry machines up to 10kg of dry washing load,
- Egyptian Standard No. 5806/2007 for electric water heaters up to 150 liters, and
- Egyptian Standard No. 3795/2008 for window and split air-conditioners up to 6500 BTU/h.

Each of these EE standards applies to imported and domestic products and stipulates specific energy performance requirements for the respective appliance, the applicable test procedures and the minimum energy consumption level. NREA established an internationally accredited testing and certification center to implement the required testing procedures of the Egyptian EE standards for electronic appliances.[490] Through 2008, NREA has tested 413 imported and domestic refrigerators and 368 laundry machines.[491] The results of the testing are presented below in Figure 16.

Figure 17. NREA EE Test Results for Specific Imported and Local Electronic Appliances

	Imported Refrigerators	Local Refrigerators	Imported Laundry Machines	Local Laundry Machines
Not Accepted	10%	26%	0%	0%
Poor Efficiency	14%	17%	2%	11%
Low Efficiency	11%	7%	1%	45%
Medium Efficiency	14%	12%	3%	22%
High Efficiency	20%	23%	8%	0%
Excellent Efficiency	31%	15%	86%	22%

Source: NREA Annual Report 2007/2008.

These figures clearly indicate that imported electric appliances are still superior in comparison to locally produced electric equipment in regard of EE. This in particularly obvious when comparing the test results of imported (86% excellent efficiency) and locally produced (only 22% excellent efficiency) laundry machines. It desirable that the Egyptian electric appliance producers face this challenge and increase the EE standards of domestically produced products.

[490] NREA, Annual Report 2007/2008, supra note 9, at 17.
[491] Id., at 17; official results of the testing of electronic water heaters and air-conditioners are unfortunately not available – yet.

Based on the test results of NERA, the Egyptian Organization for Standardization and Quality Control (EOS) issues corresponding EE labels for laundry machines, refrigerators, air-conditioners and electric water heaters. The selected label format is a graduated bar design that starts from the green letter (A) and ends with the red letter (E), with (A) representing the highest EE standard in the local market and (E) the lowest EE standard of the respective appliance.[492] Since market introduction in 2006, the success of the Egyptian EE standard and labeling program has been very limited. It suffers especially from a low market understanding of the program´s objectives and lack of consumer awareness.[493] In addition, the trust of the market in the compliance of the issued labels and standards is relatively low and retailers do not support the program through promotion of EE labels.[494] Nevertheless, the establishment of the necessary framework conditions of the Egyptian EE standard and labeling program is a crucial first step for the promotion EE electric appliances, which will in time, create market acceptance and will raise the awareness of consumers.

G. The Clean Development Mechanism in Egypt

This section will identify the institutional and procedural framework of the CDM in Egypt. Moreover, it will assess the potential of CDM projects, in order to validate whether the CDM is viable option to generate much needed additional revenues streams for clean technology projects.

The Egyptian national CDM strategy was initiated through the National Strategy Study (NSS) launched by the World Bank and the Government of Switzerland in 1997, having the objective of identifying the potential and opportunities of the CDM in Egypt.[495] The NSS concluded that Egypt would in particular benefit from the CDM through increased profitability of clean technology projects and thereby from an

[492] Georgy/Soliman, supra note, at 58.
[493] Id., at 62.
[494] Id., at 62.
[495] The Official CDM Website for Egypt, National Strategy Study on the CDM, available at, http://www.cdm-egypt.org/NSS.htm (last visited: 24th June 2010).

increased inflow of FDI.[496] Furthermore, the CDM is identified as an instrument that can promote the transfer of state of the art technologies for GHG emission mitigation to Egypt.[497] In order to secure these benefits of the CDM, the NSS stipulated that Egypt must develop an effective institutional framework for marketing, approving and monitoring CDM Projects, which would ensure the mentioned benefits and could create an attractive environment for international CDM investors.[498]

The potential for GHG emission reductions is enormous in Egypt. The main sectors responsible for GHG emissions in Egypt are the energy (22%), industry (21%) and the transport sector (18%).[499] Based on these figures, the NSS proposed the following list of CDM projects types for Egypt:[500]

- Co-generation and EE in textile, chemicals, food and beverages, metals, buildings as well as the hotel sector,
- Fuel switching to natural gas in industry and transportation,
- Wind energy,
- Organic waste management and municipal solid waste methane utilization, and
- Afforestation projects.

The NSS was followed by an UNDP led study on "Capacity Development for the CDM" (CD4CDM) that aimed at improving Egypt´s technical and institutional CDM capacity.[501] Both of these two studies formed the basis for the subsequent establishment of an Egyptian Designated National Authority (DNA) in 2005. The institutional structure of the Egyptian DNA, the respective CDM approval procedures and the current Egyptian CDM project portfolio will be analyzed below.

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[496] National Strategy Study on the Clean Development Mechanism - Egypt, Executive Summary, 2003 (quoted as NSS 2002), at 2, available at, http://www.cdm-egypt.org/CDM/NSS_Summary.pdf (last visited: 24th June 2010).
[497] Id., at 3.
[498] Id., at 2.
[499] Id., at 3.
[500] Id., at 4
[501] UNDP et al., Capacity Development for the Clean Development Mechanism –Egypt, December 2006 (quoted as CD4CDM 2006), available at, http://www.cdm-egypt.org/EgyptCd4CDM_FinalReport.pdf (last visited: 24th June 2010).

1. Designated National Authority

The Egyptian DNA was established under the supervision of the Ministry of Environment pursuant to Ministerial Decree No. 42 of 2005. The mandate of the DNA includes all CDM related issues, including the promulgation of evaluation and approval procedures, the assessment of the CDM requirements stipulated in the Kyoto Protocol and the promotion of Egyptian CDM projects.[502] The DNA consists of two related but distinct entities, the "Egyptian Council for CDM" (EC-CDM) and the "Egyptian Bureau for CDM" (EB-CDM).[503]

The EC-CDM has 13 permanent members that represent all related CDM stakeholders, such as government departments, private business and non-governmental organizations.[504] The Egyptian Minister for Environment is the chairman of the EC-CDM.[505] On the national level, the EC-CDM is responsible for the implementation of the CDM. Its mandate includes, inter alia, the proposal of new legislative projects, the enactment of directives for the approval process, the establishment of criterias and procedures for the assessment of existing CDM-Projects and the approval of new CDM-Projects.[506] On the international level, the EC-CDM is the counterpart to the CDM Executive Board of the UNFCCC and contact point for all other CDM stakeholders. The members of the EC-CDM participate in international debates, with a particular focus on the climate change negotiations of the UNFCCC.[507]

The EB-CDM is the permanent secretariat of the EC-CDM. It is supervised by the Chairman of the EEAA and consists of seven members including representatives from the Ministry of Environment (5), the Ministry of Trade and Industry (1) and the MOEE (1).[508] The key operational functions of the EB-CDM are monitoring of

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502 The Official CDM Website for Egypt, Designated National Authority, available at, http://www.cdm-egypt.org/index.htm.
503 Id.
504 Id.
505 Id.
506 Id.
507 Id.
508 Id.

existing CDM-Projects, fostering of the relations with the CDM Executive Board of the UNFCCC and preparation of EC-CDM meetings.[509]

2. CDM Project Evaluation and Permit Procedures

As elaborated in Chapter II, the UNFCCC requires the fulfillment of two essential criteria to qualify as a CDM project. A CDM project must achieve GHG emission reductions that are additional to any that would occur in the absence of the project ("additionality").[510] Moreover, a CDM project activity must contribute to sustainable development in the respective host country ("sustainable development"). [511] It is the mandate of the Egyptian DNA to assure that a proposed CDM projects fulfills these two essential requirements of the UNFCCC. While the DNA must consider the international standard of "additionality" that will be reassessed by the UNFCCC, it must apply the Egyptian national standard of "sustainable development" (see Chapter II, Section B). The Egyptian DNA established a two-stage procedure for the assessment of potential CDM projects in regard to their compliance with these two requirements of the UNFCCC.

In a first step, CDM project developers are required to submit a Project Idea Note (PIN), which will be the basis for a first report conducted by the EB-CDM.[512] This initial report assesses the compliance of the proposed CDM project with international requirements and the Egyptian standard of sustainable development.[513] With reference to the respective conclusions, the EB-CDM consults the EC-CDM, which in turn either issues a Note of Interest or a negative notification within two weeks after the submission of the PIN.[514] The purpose of this first evaluation is to signal to a potential investor as early as possible whether a specific project has a chance to be recognized as a CDM-Project and thereby avoid unnecessary additional expenses for project developers.

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[509] Id.
[510] Article 12 No. 5 (c) of the Kyoto Protocol, supra note 5.
[511] Article 12 No. 2 of the Kyoto Protocol.
[512] The Official CDM Website for Egypt, Preliminary Evaluation, available at, http://www.cdm-egypt.org/ProjectsAP.htm#Preliminary%20Evaluation (last visited: 24th June 2010).
[513] Id.
[514] Id.

In a second step, provided a project developer has obtained a Note of Interest from the EC-CDM, it is required to submit a detailed Project Design Document (PDD) that will describe the project activity in the standard format of the UNFCCC, which will be the basis for CDM project validation and registration.[515] The assessment of the PDD will primarily focus on the Egyptian standard of sustainable development by applying certain environmental, social and economical criteria.[516] Provided that the PDD complies with the Egyptian standard of sustainable development, a National Approval Notification will be issued that confirms Egypt´s voluntary participation in the CDM activity and that the project contributes to the country´s sustainable development.[517] In a last step, the nationally approved CDM-Project must be registered with the CDM Executive Board of the UNFCCC.

In 2010, the Egyptian CDM project portfolio is comprised of 29 projects, including projects in the fields of RE (7), Industry (3), EE (6) and fuel switching (11) as well as afforestation (1) and transportation (1.).[518] However, only the following six projects have been so far registered with the UNFCCC:[519]

- Catalytic N20 destruction project in the tail gas of the Nitric Acid Plant of Abu Qir Fertilizer Co. (registered October 2006),
- Onyx Alexandria Landfill Gas Capture and Flaring Project (December 2006),
- Egyptian Brick Factory GHG Reduction Project (under review for minor corrections),
- Zafarana Wind Power Plant Project (June 2007),
- Waste Gas-based Co-generation Project at Alexandria Carbon Black Co., and
- Zafarana KfW IV Wind Farm Project.

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515 The Official CDM Website for Egypt, In-depth Evaluation, available at, http://www.cdm-egypt.org/ProjectsAP.htm#In-depth%20Evaluation (last visited: 24th June 2010).
516 Id.
517 Id.
518 The Official CDM Website for Egypt, Accepted Projects, available at, http://www.cdm-egypt.org/ProjectsAP.htm#Accepted%20Projects (last visited: 24th June 2010).
519 The Official CDM Website of the UNFCCC, Project Search, available at, http://cdm.unfccc.int/Projects/projsearch.html (last visited: 24th June 2010).

3. Conclusion

The Egyptian government has created a positive institutional environment for the CDM, for which the initial support of the NSS and the CD4CDM study were crucial. With six CDM projects registered with UNFCCC and additional 29 projects in the pipeline, Egypt can be today considered as one of the more advanced CDM host countries.[520] However, in comparison to major CDM host countries such as China (863 projects) and India (509), the CDM potential in Egypt is nowhere near to being exploited. This is especially surprising since Egypt cannot be considered a small developing country, which traditionally benefit less from the CDM (see chapter X), but is comparable to Mexico (121) in regard to size and GHG emission reduction potential.

The reasons for this underdevelopment of the Egyptian CDM potential are the rather lengthy approval procedures in Egypt and a lack of familiarity with the procedures of the Kyoto Protocol.[521] Insufficient funding and the general lack of transparency in the carbon market constitute further barriers for the CDM in Egypt.[522] Egypt is, however, already approaching these barriers through the presentation of the Egyptian CDM project portfolio at international conventions and a series of conferences and workshops to increase domestic CDM capacities.[523] Provided that the international community will extend the CDM beyond the expiry of the Kyoto Protocol in 2012, the efforts of the Egyptian government could not only enfold the entire eco-political value of the CDM, but could in particular stipulate increased FDI inflows, the modernization of important infrastructure as well as the creation of new employment in Egypt.

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[520] Dagmar Koths/Wolfgang Sterk, Clean Development Mechanism – Egypt: Country Profile, Wuppertal Institute for Climate, Environment and Energy, August 2006 (quoted as Koths/Sterk 2006), at 13, available at, http://www.jcee-eg.net/download.asp?path=library/laenderprofil_egypt_eng_final.pdf (last visited: 24th June 2010).
[521] Id., at 13.
[522] Id., at 13.
[523] Id., at 13.

VI. Conclusion & Recommendations

As a signatory party to the UNFCCC, Egypt is committed to its ultimate objective of stabilizing GHG concentration in the atmosphere at level that would prevent dangerous interference with the climate system (Article 2 of the UNFCCC). In addition, Egypt is currently at an energy cross-road and faces critical choices about its future energy supply. Egypt´s primary energy demand is currently rising and will be satisfied with conventional energies for the near future. However, energy experts project that domestic gas and oil reserves are constantly declining and thus Egypt will become a net importer of conventional energy resources in the near future. Other alternative energy sources do not seem to provide a substantial alternative to solve Egypt´s emerging energy crisis. Although nuclear energy is a compelling alternative, it cannot be expected to be available before 2020, provided all political, financial and technical obstacles are resolved. The Egyptian hydropower potential has already reached is maximum and is expected to provide no more than 3% of the primary energy demand. RE energy sources cover today only 0.2% of the primary energy demand representing a minor fraction of the Egyptian energy mix. However, the natural condition for the utilization of wind and solar energy are excellent in Egypt. Moreover, Egypt could reduce its primary energy demand by EE measures that have the estimated potential to reduce energy consumption by 70% (see Chapter III, Section D). Therefore, the utilization of the huge Egyptian RE & EE potential is not only an international obligation for Egypt, but as well a pressing domestic need to find an alternative solution for the emerging Egyptian energy crisis.

The purpose of this thesis has been to examine the question whether the current and prospective regulatory framework for RE & EE in Egypt is tailored to challenge the emerging Egyptian energy crisis as well as to satisfy Egypt´s international obligations; and whether the chosen legal policy instruments might lead to the creation of green economy based on RE & EE in Egypt.

It is the declared objective of the Egyptian government to generate 20% of electricity supply through RE by 2020. The natural conditions to reach this objective are excellent. Egypt is located in the North-African Sunbelt and the wind conditions at the

West coast of the Red Sea are among the best in the World. Therefore, Egypt is a prime location for the utilization of wind and solar energy (see Chapter IV, Section D). In order to use this huge natural RE potential and to reach the ambitious goal of 20% by 2020, the Egyptian regulator has developed a two stage strategy for the promotion of RE. In the first stage, the private sector is invited to participate in tender procedures based on competitive bidding for the development of RE projects. In the second stage, a feed-in law should be issued based on the price experiences made in stage one (See Chapter V).

Egypt is currently in stage one of its RE policy, implementing a tendering system for the promotion of RE. In general a tendering system is the best policy options for reducing price and cost of RE project through a competitive bidding process. Additionally, it can provide certainty regarding the future market share of RE, while the price determination is left to the market. The latter point creates the problem of price uncertainty for RE project developers. In the absence of a feed-in law, this problem could be reduced through the development of standards PPAs for RE facilities in Egypt. The same solution should be applied for legal uncertainties related to land-use issue by developing standard land-use agreements for RE projects (see Chapter V).

Furthermore, tendering systems ordinarily suffer from high transaction cost for RE project developers. These costs occur through the often complex and intransparent tendering procedures. This conclusion is in particular valid for Egypt, since the Tender Law provides for a relatively broad discretion of the competent authorities in the selecting the respective tender procedure. In addition, RE project developers must only comply with the applicable tender procedures, but as well with the licensing procedures for the generation of electricity and the required environmental impact assessment stipulated in the EPL. Therefore, the entire process to erect a RE facility in Egypt is related to several administrative hurdles that all together increase transactions cost. This is especially true for the cost that may occur in the preparation of tender documents that can not be retrieved by unsuccessful bidders. Eventually, the uncertainties of transaction costs are increased through the unpredictable decisions of the "decision committee" that could be undermined by personal interest and the widespread corruption in the Egyptian legal system. Despite all these difficulties related to tender procedures, the key argument for the Egyptian regulator for a tendering system could be the greater control of subsidies and installed capacity in comparison to the other available policy options for the promotion of RE. In tendering system, it is entirely up to the competent Egyptian authorities to decide the location and number of RE projects implemented as well as the respective purchase price in PPAs and the conditions in land-use agreements (see Chapter V). In light of these considerations it can be concluded that the two stage approach of the Egyptian regulator is a wise and balanced decision. In the first stage, it can keep direct and strict control over the development of the Egyptian RE industry through the implementation of a tendering system, while the experience made in the first stage could lead to appropriate fixed feed-in tariff that could increasingly facilitate the growth of the RE sector through market forces.

However, when considering former Egyptian RE targets, the success of the tendering system must be considered very limited. In the late 1980s the Egyptian RE target was to satisfy 5% of the primary energy demand with RE by 2005, then during the mid 1990s this target was reduced to 3% of primary energy demand by 2005.[524] In 2000, the target period was again adjusted to reach 3% of primary energy demand by 2010.[525] In light of these objectives, a current share of 0.2% of the primary energy demand must be considered failure of the Egyptian RE policy so far. Therefore, the current target to of satisfying 20% of primary energy demand through RE by 2020 seems to be exaggerated and unlikely to be achieved by the Egyptian RE sector.

For the promotion of EE, the Egyptian government has not yet declared any official policy objective. However, it has already implemented several legal policy tools to utilize the huge Egyptian EE potential of reducing primary energy consumption by 70%. In 1987, the Egyptian regulator has issued a Ministerial decree on the mandatory use of solar water heating systems. The success of this early effort was very limited,

[524] Georgy/Soliman, supra note 10, at 36.
[525] Id., at 36.

due to a bad market reputation of solar water heaters and a lack of enforcement in the construction sector, which rendered the decree eventually legally irrelevant (Chapter V, Section D). Another more recent effort has been the development of EE Building Codes for the commercial and residential sector. Although the codes comply with international EE building standards, they suffer from a lack of enforcement and EE capacity in the building sector. The Egyptian government is trying change this situation with the issuance of a Ministerial decree in 2008 making the codes mandatory and through capacity building measures in cooperation with the EGBC (Chapter V, Section E). Furthermore, the Egyptian regulator has developed an EE standard and labeling program for electric appliances. But again the success of this program has been very limited, because of a low market understanding of the program objective´s and a lack of consumer awareness. In addition, the trust of the market in the compliance of the issued labels and standards is relatively low and retailers do not support the program through the promotion of EE labels (Chapter V, Section F). All in all, the Egyptian policy choices for the promotion of EE lack enforceability and market acceptance by consumers.

In regard to the thesis questions it must be concluded that the implemented RE & EE policy options have neither created a substantial domestic RE & EE market, nor have they increased the installed RE capacity in a manner that could overcome the emerging Egyptian energy crisis. The reasons for the failure to promote RE & EE in Egypt are manifold. In general, the Egyptian legal strategy for the diffusion of RE & EE lacks comprehensiveness and a consistent long-term commitment of the Egyptian government (see Chapter III, Section D). The tender invitations focus entirely on wind energy projects, while neglecting the huge potential of solar energy in Egypt. The diffusion of RE is, further, impeded through legal and price uncertainties for RE project developers. Also the perspective of the future issuance of feed-in law changes nothing in this situation, since it is rather a vague political promise than legal certainty. The Egyptian approach to promote EE is highly fragment and not coherent. In addition neither the Ministerial decree stipulating the mandatory use of solar water heaters, the EE Buildings Codes nor the Egyptian EE standards and labeling program are enforced and accepted by the domestic market.

The key barriers for a sustainable promotion of RE & EE remain the existing subsidies for conventional sources of energy and unfavorable electricity pricing structures for RE. Both elements distort investment decisions in RE and constitute an immense disincentive for EE electricity consumption. The phasing out of subsidies for conventional energies would send a strong market signal to consumers and would encourage them towards a more rational use of power resources. It would also increase the competition in the electricity market by eliminating unfair advantages given to fossil fuel technologies. Moreover, the lifting of subsidies would free up billion of dollars in the state budget that could be used for other activities. In addition, a solid electricity price reform could further improve the efficiency in the electricity sector, provide consumers with accurate price signals and enhance EE consumption on all levels (see Chapter III, Section A). In 2008, Egyptian subsidies for conventional energies and directly to the electricity prices amounted to approximately to EGP 66bn. Although it is acknowledged that those subsidies are a key barrier for the diffusion of RE & EE, Egyptian government officials declared that electricity prices will be frozen again in 2010 to support domestic industries scoping with the consequences of the financial crisis (see Chapter IV, Section C).

Another key barrier for RE projects is their high initial investment cost. Although lower fuel and operating cost may make RE competitive on the long term, the higher cost of initial technology investment implies that RE projects may provide less generation capacities per initial dollar investment in comparison to conventional energies This obstacle of primary investment is supplemented by a lack of access to affordable credit for RE projects in Egypt (see Chapter III, Section A). As a potential solution to this problem, the CDM could provide additional revenue streams to green technology projects. The Egyptian government has created thoughout a positive institutional environment for the CDM. However, the Egyptian potential with six registered CDM projects is nowhere near being exploited (see Chapter V, Section G).

The Egyptian regulator has already identified the lack of a coherent and consistent regulatory framework as one of the key barriers for the promotion of RE & EE and has thus developed a new Draft Electricity Law. The general objectives of the Draft

Electricity Law are on the one hand, the unification of the several laws regulating the Egyptian energy sector and on the other hand, the re-definition of the role of the Egyptian government from managing the public electric utility directly to a more organizational and controlling function. Although the enactment of the Draft Electricity Law would be milestone for the RE sector, the tendering system would remain the key instrument for the diffusion of RE in Egypt. Nevertheless, the Draft Electricity Law would stipulate further incentives for RE investors such as fixed prices for small RE facilities, a guaranteed grid access for RE facilities and additional funds for Egyptian government to purchase energy generated from RE facilities. Furthermore, the Draft Law stipulates a more EE consumption of energy by requiring the installation of EE specialist in facilities consuming more than 500KW and codification of EE labels that could improve the so far poor market performance. The success of the Draft Electricity Law will depend highly on the specifics of its Executive Regulations and the degree of its enforcement.

Although the Draft Electricity Law is a step in the right direction and exemplifies the increased commitment to develop an Egyptian RE & EE industry, it is by no mean sufficient to reach that objective. Therefore, Egyptian policymakers should consider the following seven key steps to further promote RE & EE in Egypt:

- The phasing out of subsidies for conventional energies and an electricity price reform in order to eliminate unfair competitive disadvantages for RE and to provide consumers with accurate electricity prices that could enhance a more efficient consumption of electricity. It is important that any price reform considers the increasing gap between rich and poor in Egypt and thus must include low-income assistance for the weakest part of society.
- The Egyptian RE strategy should be refocused to include not only wind energy, but also the huge potential for the application of solar energy.
- In the absence of a feed-in law, the Egyptian regulator should develop standard PPAs and land-use agreements to provide RE project developers with greater investment certainty.

- In the field of EE a holistic approach is required that establishes not only EE policy tools, but guarantees their enforcement. EE should be further supported through increased capacity building and consumer awareness programs.
- In order to obtain additional revenue streams for RE & EE projects, the Egyptian CDM potential should be increasingly explored by streamlining national CDM approval procedures and increasing the domestic familiarity with procedures of the Kyoto Protocol. In addition, Egypt should formulate comprehensive and available sustainable development strategy to provide CDM investors with certainty in regard to potential project that could contribute to the sustainable development of Egypt (requirement of "sustainable development" pursuant to Article 12 No. 2 of the Kyoto Protocol).
- The Draft Electricity Law should be issued as soon as possible and subsequently a feed-in law should be developed for promulgation in the near future.
- In general, the Egyptian government should increase RE & EE funding, capacity building and public awareness through all appropriate means.

All of the measures mentioned above could further diffuse RE & EE in Egypt. However, only the consistent long-term commitment by the Egyptian government to promote RE & EE can lead to the establishment of a healthy domestic industry. The Egyptian political agenda is, though, not topped by the promotion of RE & EE, but by more pressing social and economic issues such as economic growth, social injustice and education (see Chapter IV, Section A). Nevertheless, the development of an Egyptian RE & EE industry could contribute to the country´s economic growth by increasing FDI, creating employment and providing technology transfer. In addition, a strong Egyptian RE industry could provide Europe with a much supplemented energy supply in the long-term. Eventually, the mitigation of climate change and the related promotion of RE & EE could be one of the rare positive topics on the Egyptian political agenda that could be promoted as cornerstone for campaigning in the up coming presidential elections in 2011.