German – Egyptian Symposium
Solar Thermal Power Plants and Desalination

Legislations for Renewable Energy Promotion

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11 November 2007
Cairo University
Evolution of the Egyptian Electricity Sector

The Egyptian Electricity market went through a number of stages. It did swing between:

- **private sector** activities in its early stages (late 1800 up till early 1960’s)
- **Government owned** responsibility (up till early 2000)
- A gradual growing **co-existence** of government, quasi government and private sectors owned services providers (up till present)
Evolution of the Egyptian Electricity Sector

- Private
- Nationalization
- MOEE

- 1893
- 1962
- 1964
- 1965
- 1976
- 1987
- 1996
- 1997
- 1998
- 2000
- 2000
- 2001
- 2007

- PECE
- EEA
- Law 100
- BOOT
- Law 18
- Discos into Elec. Sec.
- Law 164 - EEHC
- Discos into Elec. Sec.
- Unbundling
- Current Regulatory

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Sunday, November 11, 2007

Cumulative annual rate of change

<table>
<thead>
<tr>
<th>Sector</th>
<th>Generated electricity</th>
<th>Total</th>
<th>Agriculture</th>
<th>Government</th>
<th>Commercial &amp; others</th>
<th>Public utilities</th>
<th>Total Industry</th>
<th>Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>7.9%</td>
<td>5.0%</td>
<td>9.4%</td>
<td>12.3%</td>
<td>8.8%</td>
<td>6.9%</td>
<td>7.1%</td>
<td>7.2%</td>
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</tbody>
</table>

Legislations for Renewable Energy Promotion
Energy forecast during the period 2006/2007 – 2021/2022

Cumulative annual rate of change

<table>
<thead>
<tr>
<th>Industry</th>
<th>Agriculture</th>
<th>Public Facilities</th>
<th>BOOT</th>
<th>Commercial</th>
<th>Residential</th>
<th>Governmental</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.59%</td>
<td>5.54%</td>
<td>6.23%</td>
<td>5.99%</td>
<td>7.80%</td>
<td>5.98%</td>
<td>5.58%</td>
<td>5.98%</td>
</tr>
</tbody>
</table>
Peak load forecast during the period 2006/2007 – 2021/2022

Annual cumulative rate of change = 5.81%
Electricity Market in Egypt
Up till 2000 / 2001
Characteristics of Egyptian Electricity Market which started in 2000 / 2001

• A ______ Single Buyer Model
  – The Electric Transmission Egyptian Company buy electricity from all generation Utilities (government owned, BOOT (based on long term PPA), ..etc.)
  – The Egyptian Electricity Holding Company (EEHC) sets the buying and selling prices … different from actual to end up with positive returns for all government owned utilities …. !! ()

• A Distorted Single Buyer Model
Electricity Market in Egypt
current status in 2007.

Started in 2001

Exports & Imports

MV & LV Customers

MOEE/EEHC

Gov. PP

Generation Co.(s)

Trans Co(s)

Dis Co(s)

UHV Customers

HV Customers

MV Customers

Generation Co.(s)

Exports & Imports

MV & LV Customers

MOEE/EEHC

Gov. PP

Generation Co.(s)

Trans Co(s)

Dis Co(s)

UHV Customers

HV Customers

MV Customers

Generation Co.(s)

Trans Co(s)

Dis Co(s)

UHV Customers

HV Customers

MV Customers

Generation Co.(s)

Trans Co(s)

Dis Co(s)

UHV Customers

HV Customers

MV Customers

Generation Co.(s)

Trans Co(s)

Dis Co(s)

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UHV Customers

HV Customers

MV Customers

Generation Co.(s)

Trans Co(s)

Dis Co(s)

UHV Customers

HV Customers

MV Customers

Generation Co.(s)

Trans Co(s)

Dis Co(s)

UHV Customers

HV Customers

MV Customers

Electricity Market in Egypt

current status in 2007.

Started in 2001

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Is this the right local Customer/Market to target?

To answer this let us look at prevailing prices of electricity.
Values are in pt/kWh and are rounded (2005)
Retail Prices

Gov. owned Distribution Companies

Residential
Commercial
Industrial
Agricultural

From Transmission
Possible Market for RE

Transmission

Distribution

RE

MV & LV users

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Electricity Market in Egypt
current status in 2007.
Started in 2001
Number of electric utilities & customers - year 2005/2006
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Current Market

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Legislations for Renewable Energy Promotion
Electricity Market in Egypt

Started in 2001

Capacity (in MVA & MW)
Year 2005/2006

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Target Market
Current phase one
Target Market
Proposed phase two
Potential energy expansion

Power

Time

Current Market
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- **Demand**
  - 100%
  - X%
  - 0%

- **Time**
  - 1992
  - 2003
  - Near future (0-3 years)

- **Captive Customer**
- **Captive service provider**

- **Bilateral contracts**
- New customers, New service providers & old service providers
Potential energy expansion

Phasing Captive customer into the Free commercial market

Current Market

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Target Market
Proposed phase three
Capacity & energy expansion for existing and new EHV & HV customers that does require additional system capacity.

Potential energy expansion

Actual energy expansion

Phasing Captive customer into the Free commercial market

Current Market
Legislations for Renewable Energy Promotion

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Capacity & energy expansion for existing and new EHV & HV customers that does require additional system capacity.
## Schedule for implementation

<table>
<thead>
<tr>
<th>Proposed locations</th>
<th>Projects planned by MOEE</th>
<th>Bidding utilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Company A planned projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Company B planned projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Company C planned projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Company D planned projects</td>
<td></td>
</tr>
</tbody>
</table>
Solar Energy

- High Availability
- First Solar/thermal power generating station in 2009/2010
- 150 MW out of Which 30 MW are Solar
- Expected Energy 985 GWh annually
Solar Energy

- Current domestic and industrial limited use for:
  - Water heating
  - Steam production
  - Photovoltaic (high inv. barriers)
Wind potential in Egypt

- Currently available 230 MW (1.1% of connected capacity)
- Potential 20,000 MW
- Production in 2006/2007
- 850 million kWh. (0.5% of total production)
Wind

- **Blue**: low speed
- **Green**: medium speed
- **Yellow and red**: High speed
Location of Possible Wind farms w.r.t. distribution utilities
Location of Possible Wind farms w.r.t. distribution utilities

Suez
Abu Darog
Zafarana
Ras Sedr
Abu Rudies
Ras Ghareo
El-Sheikh Fadel
EL Tor
Gulf Of El-Zayt
Ras El-Behar
Hurghada
Eastern Desert
Gulf of Suez
Gulf of Aqaba
Gulf of El-Zayt
Ras Sedr
Abu Rudies
Ras Ghareo
El-Sheikh Fadel
EL Tor
Gulf Of El-Zayt
Ras El-Behar
Hurghada
Eastern Desert
Gulf of Suez
Gulf of Aqaba

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Evolution in wind generation Capacity

Expected 13500 MW in year 2022
Electrical Interconnection Between Egypt and its neighboring Countries
Electrical Interconnection
South Mediterranean countries
Electrical Interconnection
<table>
<thead>
<tr>
<th>From-to</th>
<th>Interconnection (MW)</th>
<th>Capability (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain – Morocco</td>
<td>700</td>
<td>1400</td>
</tr>
<tr>
<td>Morocco - Algeria</td>
<td>400</td>
<td>900</td>
</tr>
<tr>
<td>Algeria - Tunisia</td>
<td>300</td>
<td>450</td>
</tr>
<tr>
<td>Tunisia - Libya</td>
<td>470</td>
<td>600</td>
</tr>
<tr>
<td>Libya - Egypt</td>
<td>120</td>
<td>600</td>
</tr>
<tr>
<td>Egypt - Jordan</td>
<td>300</td>
<td>600</td>
</tr>
<tr>
<td>Jordan - Syria</td>
<td>350</td>
<td>600</td>
</tr>
<tr>
<td>Syria - Turkey</td>
<td>350</td>
<td>600</td>
</tr>
<tr>
<td>Turkey - Greece</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>Turkey - Bulgaria</td>
<td>1250</td>
<td>1250</td>
</tr>
</tbody>
</table>
Euro-Mediterranean projected interconnections by 2010
Market Conditions

Current legislations:
- Does not prohibit new service providers (NREA is licensed).
- Promote competition.

Possible commercial market at the MV & LV customer levels (≈ 20% of current consumption)
Market Conditions

Need for further actions such as:

- Acceptance for wheeling RE energy through transmission and distribution.
- Additional aggressive marketing efforts by potential service providers.
Proposed Legislations for Renewable Energy Promotion through the proposed Electricity Law
Proposed Regulations for Wind Energy Promotion through the proposed Electricity Law

Chapter 4

• Renewable Energies and Efficiency Improvement of Energy Use

Section one

• Renewable Energies
الباب الرابع

الطاقة المتجددة وتحسن كفاءة استخدام الطاقة

الفصل الأول

الطاقة الجديده

مادة (54)

يتم إنشاء محطات إنتاج الكهرباء باستخدام الطاقات المتجددة طبقًا للآليات التالية وذلك بمراعاة ما يقره مجلس الوزراء من خطط وبرامج:

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Slide 61 - 61
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• نظام المناقصات التنافسية:

تتولى الهيئة طرح مناقصات لإنشاء محطات لإنتاج الكهرباء من الطاقات المتجددة لتشغيلها بمعرفتها وبيع الطاقة الكهربائية المنتجة للشركة المصرية لنقل الكهرباء بسعر يقترحه الجهاز ويعتمده مجلس الوزراء.

تتولى الشركة المصرية لنقل الكهرباء بالتنسيق مع الهيئة طرح مناقصات عامة على المستثمرين لإنشاء وتملك وتشغيل محطات إنتاج كهرباء بأحد مصادر الطاقة المتجددة وبيع الطاقة الكهربائية المنتجة للشركة المصرية لنقل الكهرباء بالسعر المتعاقد عليه بينها وبين المستثمر.
للمستشارين أنشاء وتملك وتشغيل محطات إنتاج كهرباء بأحد مصادر الطاقة المتجددة وبيع الكهرباء للشركة المصرية لنقل الكهرباء بموجب تعاقد بالسعر المعتمد والمعلن من مجلس الوزراء وتسري هذه التعاقدات لمدة 15 عام، على أن لا يتم تحفيضه خلال هذه المدة بما يجاوز 2% سنوياً.

وتلتزم الشركة المصرية لنقل الكهرباء بشراء أو سداد قيمة الطاقة المتاحة من محطات الإنتاج من الطاقات المتجددة.
مادة (٤٦)

يلتزم المرخص له بالنقل أو التوزيع بربط محطات إنتاج الكهرباء من الطاقات المتجددة بشبكته على أن يتحمل التكاليف اللازمة لتوسيعها.
• امادة (٧٤)

ينشأ صندوق يسمى "صندوق تنمية إنتاج الكهرباء من الطاقات المتجددة" يتبع مجلس الوزراء تكون له الشخصية الاعتبارية، وتكون مهمته تقديم الدعم اللازم للشركة المصرية لنقل الكهرباء لشراء الطاقة الكهربائية المتاحة من محطات الإنتاج من الطاقات المتجددة وفقاً لما تحدده اللائحة التنفيذية.
مادة (٤٨)
تتكون موارد ومصادر تمويل الصندوق على النحو التالي:

- ما يخصص له من اعتيادات مالية في الموازنة العامة للدولة وتسلم بداية كل عام مالي.

- الهبات والتبرعات والمنح وغيرها من الموارد التي يقبلها مجلس إدارة الصندوق.

- عائد استثمارات أموال الصندوق.

مادة (٤٩)
 يكون للصندوق حساب بالبنك المركزي.

مادة (٥٠)
يصدر بنظام عمل الصندوق وتشكيل مجلس إدارته قرار من رئيس مجلس الوزراء.
Article 45

- Renewable energy electricity generating stations are built in accordance to the following mechanisms, and taking into consideration the programs and plans set by the cabinet of ministers:
Proposed Regulations for Wind Energy Promotion through the proposed Electricity Law

Biding Tenders Mechanisms

1. NREA call for RFQ for RE-electricity generating stations, which it will operate and sell the produced electricity to the Egyptian Electric Transmission Company, with a price proposed by the regulatory agency and concurred by the cabinet of ministers.
Proposed Regulations for Wind Energy Promotion through the proposed Electricity Law

Biding Tenders Mechanisms

2. The Egyptian Electric Transmission Company in coordination with NREA call for RFQ for RE-electricity generating stations, which investors will bid for. Investors will own, operate and sell the produced electricity to the Egyptian Electric Transmission Company, with a price which they jointly agree upon and sign a PPA accordingly.
Investors may build, own, operate RE electricity generating stations and sell the produced electricity to the Egyptian Electric Transmission Company according to contracts that has a selling price that is announced and concurred by the cabinet of ministers. These contracts will last for 15 years and the price can not be reduced during this period by more than 2% annually.
The Egyptian Electric Transmission Company is obliged to buy or pay for the available energy from the RE electricity generating stations.
Article 46

The licensed utilities for transmission or distribution are obliged to interconnect their networks with RE electricity generating stations as well as cover the corresponding needed investment for expanding its own networks.
A special fund is to be established entitled "The fund for development of electricity production from renewable energies". This fund is under the umbrella of the cabinet of ministers. The aim of the fund is to provide support to the Egyptian Electric transmission company to buy available electricity from RE electricity generating stations and in accordance with the implementing rules of that fund.
Article 48

The fund is financed though the following:

• From the national budget, to be forwarded to the fund in the beginning of each fiscal year.
• Grants, donations and contributions, which the fund board of directors accepts.
• Return on investments of its own fund.
Article 49
The fund has its account at the central Bank of Egypt

Article 50
The PM issue a decree for:
• the rules of operation of the fund
• the formation of the board of directors.
Thank You