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Evaluating Egypt's renewable energy and energy subsidies policies.

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School of Global Affairs and Public Policy

EVALUATING EGYPT'S RENEWABLE ENERGY AND ENERGY SUBSIDIES POLICIES

A Thesis Submitted to the

Public Policy and Administration Department

in partial fulfillment of the requirements for the degree of

Master of Public Policy

By

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Under the supervision of

Dr. Hamid Ali

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ABSTRACT

Egypt and the Middle East region as a whole have the lowest domestic prices worldwide for primary energy and electricity which has resulted in an economic disincentive for investments in renewable energy leading to an underestimation of the true potential of renewable energy due to the absence of commercial incentives for investors. In order to unleash the renewable energy potential in Egypt, it is crucial to reconsider the domestic pricing framework, energy subsidies and restructuring the energy market where the economic advantages of renewable energy become clear. In 2008, the New and Renewable Authority (NREA) announced its goal of reaching a 20 % share of renewable energy in Egypt's overall energy mix for electricity generation, an estimated 7200 MW. Today, almost a decade after setting this ambitious goal, the installed capacity of renewable energy in Egypt has reached a mere 550 MW. This research evaluates the development of Egypt's renewable energy sector and its regulatory policies and draws lessons from the examples of other countries and the policies they adopted to foster the developed of the renewable energy sector. The transition to a wide adoption of renewable energy in Egypt would be slow, if left entirely to market forces due to the considerably high cost of electricity generated from renewable energy sources especially when compared to conventional generation which is heavily subsided by the government. The Egyptian government has a key role to play in order to accelerate the process by implementing the required policies to encourage renewable energy deployment on both the supply-side and demand-side. As Egypt starts to liberalize its energy market by removing energy subsidies to ease the pressure on the national budget, the research reviews Egypt's energy subsidy systems and highlights the failures and successes of countries which have undergone a similar transition and concludes with recommendations for Egypt's energy reality. The Egyptian government has taken the first steps in the right direction by gradually removing the energy subsidies and launching the Feed-in Tariff scheme thus allowing the private sector to develop renewable energy projects. It is recommended for Egypt to adopt a pricing scheme based on the actual incurred cost as it will eliminate inefficiencies and support the transition to renewable energy. In addition, the adoption of cash transfers instead of subsidies will result in a decrease in the over subsidies bill while increasing the efficient targeting of the poor.

Table of Contents

List of Acronyms

CBE: Central Bank of Egypt

EgyptERA: Egyptian Electric Utility for Consumer Protection and Regulatory Agency

EETC: Egyptian Electricity Transmission Company

EEHC: Egyptian Electricity Holding Company

EIA: US Energy Information Administration

FiT: Feed in Tariff

IEA: US International Energy Agency

IISD: International Institute for Sustainable Development

IRENA: International Renewable Energy Agency

MoEE: Ministry of Electricity and Energy

MoF: Ministry of Finance

MW: Mega Watt

NREA: New and Renewable Energy Authority

OECD: Organization for Economic Co-operation and Development

PPA: Power Purchase Agreement

PV: Photovoltaic

PwC: PricewaterhouseCoopers

REN21: Renewable Energy Policy Network for the 21st Century

RECREEE: Regional Centre for Renewable Energy and Energy Efficiency

UNEP: United Nations Environment Program

WEF: World Economic Forum

WEO: World Energy Outlook

List of Tables

List of Figures

I. Chapter One: Introduction

The energy crisis in Egypt has been a pressing issue for both the government and the citizens year after year between the summer blackouts and the gas shortages. Energy intensive industries such ceramics, fertilizers and steel have been suffering from heavy losses in profitability due to the insufficient supply of natural gas to run their daily operations (Al-Ayouty & Abd El Raouf, 2015).

The past decade has seen an increasing consumption of electricity from both the residential and industrial sectors, whose shares of the final electricity consumption are 42.3 and 31.4 % respectively, with an accumulated average growth rate of 6 % annually. On the other hand, the power generating installed capacity has been growing with a slower pace which has resulted in several outages during the peak load periods during the past 2 years (IEA, 2011).

The Ministry of Electricity and Renewable Energy adopted an energy mix diversification strategy to include fossil fuels, renewables and nuclear power plants with the objective of decreasing the dependence on fossil fuels in an attempt to achieve energy independence and self-sufficiency. As part of the government's efforts to encourage the development of renewable energy in Egypt; the feed-in-tariffs scheme was launched during September, 2014 which laid out the pricing schemes designed to attract investment in the renewable energy sector (EgyptERA, 2014).

The Feed-In Tariff (FIT) is a policy mechanism designed to encourage the development of renewable energy projects through offering long-term contracts to energy producers varying on the each energy technology's cost of generation, i.e: cost-based compensation. The effective implementation of a feed-in tariff which ensure long term contracts at previously fixed prices provides the certainty required by renewable energy producers and facilitates the financing of

investments aimed at renewable energy. Feed-in tariffs usual come with "tariff degression" where the price paid to generators decreases gradually over time for new installations. (IRENA, 2012).

In addition, the Egyptian Electricity and Consumer Protection Regulatory Agency (EgyptERA) initiated net metering, also known as Net Energy Metering (NEM) which is a supporting policy designed with the aim to encourage investments from the private sector in renewable energy as it allows the electricity produced by a consumer - which has eligible on site electricity generation capacity – to offset the electricity consumed from the main supplying electric utility which the consumer belongs to at the end of the billing period (EgyptERA, 2014).

The adoption of net metering policies varies from one country to the other and also between one province or state to the other within the same country in some countries. While the government has taken some steps to support the deployment of renewable energy; many constraints are yet to be addressed to facilitate the process namely those related to deficiencies in institutional and legal structures, data and information availability, as well as other capacity and financial related constraints (Abou Bakr, 2014).

Governments around the world have been adopting a diverse array of policies to support the development of the renewable energy industry in their countries. The most commonly adopted policies include: feed-in tariffs, subsidies, tax exemptions, public investment/financing, green certificates, net metering, and public competitive bidding (KPMG, 2014).

OBJECTIVES

This research will evaluate the current regulatory policies and governing laws in Egypt and then suggests policy recommendations to foster the development of the renewable energy industry in Egypt. In addition, as Egypt starts to liberalize its energy market by removing energy

subsidies, the research reviews Egypt's energy subsidy systems and highlights the failures and successes of countries which have undergone a similar transition and concludes with recommendations for Egypt's energy reality with a focus on electricity generation.

RESEARCH QUESTIONS

• What's Egypt's current energy mix for electricity generation and what are the main challenges and opportunities facing the sector today?

• Which policies have proven to be successful in supporting the development of renewable energy in other countries around the world and how does Egypt's policies compare?

• How effective are Egypt's energy policies in fostering the development of the renewable energy industry? Which policies should be adopted to support the renewable energy industry in Egypt?

• What's the breakdown of Egypt's energy subsidies and how effective are they in reaching the targeting beneficiaries?

• How successful were other countries in their attempts to remove their energy subsidies? What's the most effective strategy for Egypt to tackle its energy subsidies?

II. Chapter Two: Literature Review

The importance of Energy as a competitive advantage for nations and businesses

Energy is one of the most strategic drivers for business decision-making and for a country's economic development to remain globally competitive. The prosperity and growth of nations depend largely on the availability of sufficient energy resources which puts the sustainable utilization of energy resources high on both the political and business agendas. In energy-intensive industries such as cement, steel and chemicals, energy plays a crucial role especially when it comes to cost within the manufacturing process. As a result, companies operating within these industries focus on securing the required energy while attempting to increase their energy efficiency. It is important to highlight that energy is a strategic factor for around 40 % of the global GDP amounting to EUR 36,500 billion. This amount is attributable to companies for which energy plays a critical role in their production processes (McKinsey, 2009).

The global energy landscape and future trends

Global energy demand is expected to increase on average by 3% year over the next decades which will result in the overall energy demand rising by more than 50% by the year 2030 (EIA, 2013).

In 2013, Siemens conducted a study reviewing the major trends in the energy sector around the world. The study concluded that if the new power plants built are added with the same approach as they have been in the past, we can expect that the associated CO2 emissions will increase by 25%. On the other hand if coal-fired power plants are substituted with gas-fired power plants on a wide scale by 2030, CO2 emissions could drop by 5% compared to today's levels. Michael Suess, CEO of Siemens' Energy Sector explained the objective of the study as follows: "We examined the local situations and different needs in various regions of the world.

We analyzed various scenarios while keeping an eye on a three-way balance between sustainability, reliability and economy" (Siemens, 2013).

The study clusters countries into 5 different groups after assessing them via the archetype classification system assesses various criteria to characterize countries. These 5 archetypes are: The "Green pioneers" who depend mainly on renewable energy, the "Traditionalists" with a small portion of eco-friendly power, the "Energy-hungry" nations that have an increasing demand for energy and enjoy a high percentage of electricity penetration and the "Next-wave electrifiers" who are facing a gap in supplying power to all consumers. The fifth archetype is the 'Oil export maximizers" which are focusing on enhancing oil and gas exploration efficiency. Countries were then allocated to the appropriate archetype with energy-related macroeconomic criteria was the basis upon which the classification was made. It is clear that Energy-hungry countries represent the biggest portion of the global power generation in 2030 and will have the most significant impact on the energy scene of the future. It's worth noting that around 40 countries will represent more than 90% of world power generation (Siemens, 2013).

Egypt's Energy Transition and Challenges

Egypt is considered to be an Energy-hungry country which facing the challenge of satisfying the energy demand (6-7% per annum) of its growing economy and population. The highest priority is to secure the needed energy supply at a competitive cost levels to ensure the continuation of economic growth and meeting the growing energy demand (MoEE, 2013).

In the last decade, Egypt has experience a rapid economic growth with an average annual growth rate of 6%. The economy has witnessed a slow down due to the political unrest that followed the 2011 revolution which resulted in the economic growth rate contracting to reach an average of 2% (MoF, 2013).

The Egyptian government has acknowledged the importance of securing a sustainable energy supply to ensure continuous economic growth as well as attracting foreign investments in the country. The high economic growth of the last decade has led to an increase in electricity demand where the currently installed capacity hasn't been sufficient to meet the peak demand particularly during the summer of 2012 where Egypt experienced wide-spread electricity shortages. In August 2012, the government carried out a thorough review of the situation and had concluded that the availability of natural gas for power generation has become of critical value to electricity generation (MoEE, 2013).

Renewable Energy Policies

Many regulations have been initiated in countries around the world aiming to reduce carbon emissions and reaching energy independence; these regulations have ranged from tax breaks to encourage the reliance on renewable energy for power generation, to credits, grants and accelerated depreciation to attract investments to the sector (IRENA, 2012).

On the other side, governments can also adapt a deterrent strategy to discourage the utilization of fossil fuels by enforcing penalties namely Carbon tax and Cap and trade schemes. There are at least 83 countries which have adopted some form of policy geared towards renewable energy promotion for power generation with feed-in tariffs being the most common one. In addition, renewable portfolio standards, grants and tax credits are also widely implemented (KPMG, 2014).

Although the Egyptian government has highlighted energy efficiency and renewable energy as a high priority, a closer look reveals that many constraints need to be removed to facilitate the process namely those related to deficiencies in institutional and legal structures, data and information availability, as well as other capacity and financial related constraints (Razavi, 2012).

The Ministry of Electricity and Renewable Energy adopted an energy mix diversification strategy to lessen the reliance on fossil fuels in an attempt to achieve energy independence and self-sufficiency. As part of the government's efforts to encourage the development of renewable energy in Egypt; the feed-in-tariffs system was launched during September, 2014 which laid out the pricing schemes designed to attract investment in the renewable energy sector (NREA, 2015).

The Egyptian government is attempting to adopt an energy market liberalization approach with two main components at its core; encouraging the private sector's participation through financial incentives in the energy market where they produce and sell electricity and the second being the gradual removal of energy subsidies. The merits of different pricing approaches and the expected impact on the households is a critical research area to be considered (Al-Ayouty & Abd El Raouf, 2015)

In addition, the Egyptian Electricity and Consumer Protection Regulatory Agency (EgyptERA) initiated the net metering system which enables consumers to install their photovoltaic systems and connecting them to the national grid where they can sell the electricity produced with an agreed upon tariff (EgyptERA, 2014).

Egypt and the Middle East region as a whole have the lowest domestic prices worldwide for primary energy and electricity which has resulted in an economic disincentive for investments in renewable energy leading to an underestimation of the true potential of renewable energy due to the absence of commercial incentives for investors. In order to unleash the renewable energy potential in Egypt, it is crucial to reconsider the domestic pricing framework, energy subsidies and restructuring the energy market where the economic advantages of renewable energy become clear (El-Katiri, 2014).

Carbon Tax

A carbon tax is a mechanism to put a price tag on Carbon emissions where a tax is linked directly to the amount of Carbon Dioxide emissions generated by an entity measured in value for every ton CO^2 equivalent (per tCO^2e)[1]. These forms of Carbon taxes provide the security regarding the marginal costs which the emitters are faced with, nevertheless, they do not lead to the highest emission reduction possible which is a key differentiating factor when compared with other policy tools like an emissions trading scheme. Yet, carbon taxes can be utilized to achieve an emissions reduction in a cost effective manner. Carbon taxes have been widely adopted in different countries around the world for more than two decades starting mostly in the countries of Northern Europe in the early 90s starting with Finland, which was followed later by Holland, Denmark, Norway and Sweden. (Sumner, Bird, & Smith, 2009)

Since Carbon taxes place a price per ton of emissions, it creates a clear incentive that encourages emitters to alter their processes towards production methods which emit less

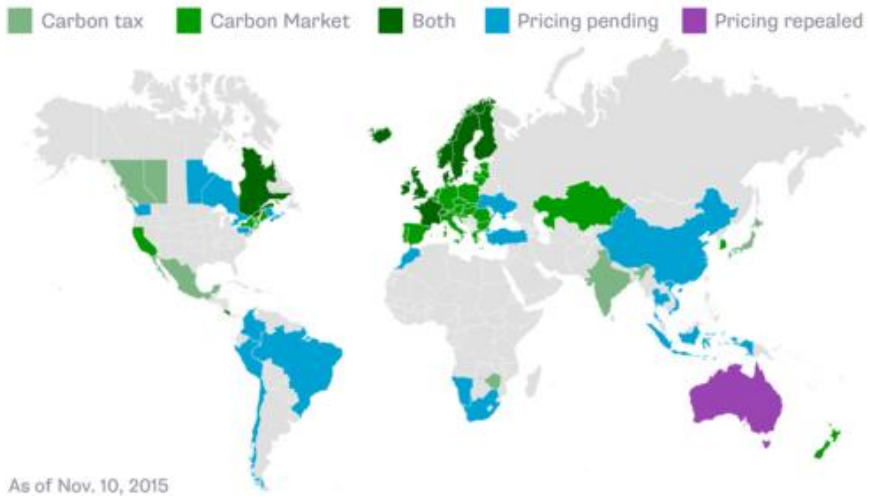


Figure 1- Worldwide Carbon Taxes. Source: Bloomberg New Energy Finance

greenhouse gases (GHGs). This incentive sends a price signal which results in a ripple affect across the whole market which would result eventually to the reduction of emissions. Carbon

[1] Based on "Climate and carbon – Aligning prices and policies, "OECD Environment Policy paper, October 2013 no°01"

taxes are either adopted on their own as an independent tool or as part of a Carbon pricing package which would include other taxes (e.g.: energy tax). Carbon pricing is widely spreading, where almost 40 countries and 20 subnational governments put a price on emissions in 2015 through different mechanisms including cap and trade frameworks and carbon taxes. The figure above (Figure 1) presents where countries pay a carbon tax, have a carbon market or both. (Flavelle & Crook, 2014)

Danish companies have taken significant strides in reducing their carbon emissions where the emissions per unit output dropped by 25% in the years (1993 to 2000). The government of Finland announced that its Carbon tax implementation resulted in a 7% decrease in emissions in the years (1990 to 1998), while in Holland, the roll out of the tax led to a 8% decrease of electricity consumption in households in the years (1994 to 1999). Based on the experiences of different countries, we can observe that there is a variation in the efficiency of implementing a Carbon tax depending on the rate of coverage and the extent of which the tax is applied within different sectors. For example, in Sweden, the industrial sector paid 50% of the standard tax tariff, while in Finland the tax was implemented with a lower rate for the fuel utilized in the agricultural sector. British Columbia took a different approach where the tax rate increased over time starting with 10$CAD per ton CO^2 in 2008 and reached 30$CAD per ton in 2012. The implementation of this approached led to a decrease of 16% in the fuel consumption per capita versus a 3% increase for the rest of the country over the same period of time (Flavelle & Crook, 2014).

Carbon taxes can be utilized to reduce emissions in sectors which are not addressed via cap and trade schemes due to emissions tracking concerns such as the case for non-stationary sources which includes vehicle emissions which are quite challenging to tackle with a cap and trade scheme (Sumner, Bird, & Smith, 2009).

Egypt's Renewable Energy Ambitions: Missing the target

In 2008, The New and Renewable Energy Authority (NREA) announced its ambitious goal of generating 20% of Egypt's required electricity by the year 2020 where wind energy contributes with 12% and 8% mainly from hydropower and some solar energy. From the stand point of 2014, hydropower accounts for 12% of power generation which is expected to be reduce to 8%. Currently, the wind energy portion is 1% and is planned to reach 12% by 2020 while the solar energy share is negligible, yet is expected to reach 2% according to the 20/20 plan. NREA had planned to reach the 7,200 megawatts goal via state-owned projects (2,375 megawatts, i.e.: one third of the goal) and private sector projects (4,825 megawatts, i.e.: two thirds) (NREA, 2014).

The government plans to encourage private investors through various incentives including customs exemptions, financial guarantees, power generation licenses, carbon credit awards and pre-allocated land permits. NREA is planning to issue tenders that allow the private sector companies via a build, own and operate (BOO) scheme for the wind farms and allow them to sell electricity at a pre-negotiated tariff. 6 years later, no progress towards the target when compared to the vision created in 2008. No major changes are expected in the energy mix by 2020 as we see in the projection of where Egypt's power generation mix is likely to be in 2020 (NREA, 2014).

The failure to achieve the 2020 plan has contributed to the energy crisis we are facing now in Egypt where the gap between supply and demand has reached unprecedented levels amounting to 4190 megawatts which is almost double the power generating capacity of the High Dam and accounts for 20% of the total installed capacity. The Ministry of Electricity and Energy (MOEE) expects that it would take more than 5 years to resolve Egypt's energy crisis and that

the power outages will remain common especially in times of peak load where the energy consumption increases substantially especially during the summer period (MoEE, 2013).

Egypt's Energy Subsidies

Reforming energy subsidies in Egypt is one of the most discussed topics in the past decade. The amount of energy subsides has grown from EGP 1 billion in 1996 to EGP 95 billion 2011, significantly increasing the burden on the Egyptian economy. Around one third of the government expenditure is aimed at subsides with 71% of that amount allocated to energy only; accounting for 6.2 % of our GDP in FY 2011/12 (Ministry of Finance, 2015).

The unequal distribution of energy subsidies can be captured by looking at the highest and lowest quintiles benefits. It was found that in Egyptian urban areas, the richest quintile benefits from 33% of the energy subsidy, whereas the poorest quintile benefits from only 3.8%. Furthermore, in Egyptian rural areas the richest quintile benefits from 22.8% while the poorest benefits from 5.6% only. We can clearly conclude that Egypt's energy subsidies are poorly targeted, benefiting the rich rather than the poor (Baig et al., 2007).

It is worth mentioning that industry alone benefits from one third of all subsidies. The combination of higher consumption rates, higher international prices for importing petroleum and higher domestic extraction and distribution costs, set against maintained low selling process to the consumer, has spelled spiraling costs for the government (Vidican , 2012).

As we navigate through these troubled waters in search of a solution; we must realize that, no choice will be without cost. Generally speaking, the benefits of eliminating energy subsidies are the increase in government revenues, investment, production, in addition to the decline of inflationary repercussions of the government budget deficit that would be narrowed. The question lies, however, in whether these macroeconomic benefits would be seen on the micro-economic front; whether citizens would be able to accrue the aforementioned benefits and

benefit from lower poverty levels. Studies have shown the ineffectiveness of the "top-down approach" in enabling the target groups in question in accruing economic benefits (Nwafor et al., 2006).

When reforming subsidies, governments always face the tradeoff between eliminating energy subsidies to fix market distortions, as opposed to maintaining subsidies in order to avoid the negative effects on social welfare. This pricing policy that changes the price of electricity according to the level of consumption is applied by assigning a low price to low electricity consumption levels (general consumption levels of the poor), avoiding unified prices for the poor and rich. Furthermore, another compensating measure is temporarily expanding the existing government programs such changing the eligibility requirements for ration cards to include more people (Gupta, et al., 2000).

III. Chapter Three: Theoretical Framework and Methodology

The transition to a wide adoption of renewable energy in Egypt would be slow, if left entirely to market forces due to the considerably high cost of electricity generated from renewable energy sources especially when compared to conventional generation which is heavily subsided by the government. The Egyptian government has a key role to play in order to accelerate the process by implementing the required policies to encourage renewable energy deployment. There are 3 main methods to achieve this goal namely; Supply-side policy tools (technology push), Demand-side policy tools (market creation) and General conditions for innovation (Rules of the game) as detailed in the figure below. In this thesis, we will attempt to allocate the current policies into this theoretical framework and propose new policies that would potentially lead to promoting renewable energy in Egypt (Lester, 2009).

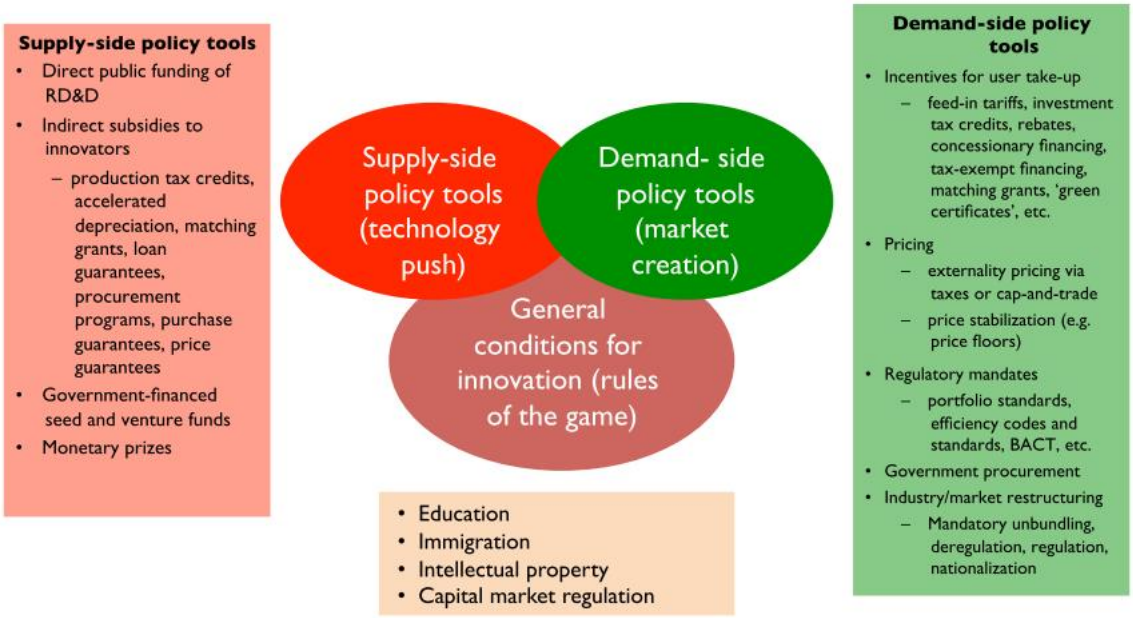


Figure 2 - The Government Role in Energy Innovation. Source: Lester, 2009

The primary data from the different governmental bodies will be analyzed to provide descriptive statistics and trend analysis to draw expected future scenarios upon which the recommendations will be based.

Secondary research will be conducted through summarizing and synthesizing existing research on Egypt's renewable energy and energy subsidies schemes development, renewable energy progress and policy instruments supported with quantitative methods to seek empirical support for the research hypotheses.

Renewable energy supporting policy mechanisms

Renewable energy supporting mechanisms aim to increase the intalled capacity of renewable energy and the percentage of electricity generated from renewable sources in the country's overall energy mix. Keeping this notion in mind; the adopted polcies may also address other outcomes ranging from energy security, increasing public awareness, job creation and increasing the local market share of renewable energy. Hence, when a government chooses a set of policies to impliment, it is curicual that they are regularly evaluated since they are a considrable invesment which should be monitored and controlled. Moreover, it is only through a ridgid evaluation process, that the gaps and opportunites for imporvement can be identified (IRENA, 2012).

There are several policies that governments adopt in order to support the growth of renewable energy depending on the stages of the industry development should that be early adoption, demonstration, commercial rollout or fully competitive diffusion (WEF, 2010).

Egypt is currently in the commercial rollout stage which is also know as the deployment stage. Hence, we will be focussing on the related policies as we compare the countries in the case studies. The deployment polcies have been classfied into four groups: Fiscal incentives, public

finance, regulations and access policies. The summary of these policy categories is concluded in Table 1 below (Mitchell, 2011).

Table 1 - Policies to Encourage Deployment of Renewable Electricity Generation Source: Mitchell et al. (2011)

POLICY	DEFINITION
Fiscal incentives	
Grant	Financial support provided by the government without the requirement of repayment to eligible projects. Grants support in decreasing the required investment costs to develop a renewable energy related project.
Energy production Payment	Payments provided by the government directly for every renewable enery unit produced.
Rebate	Direct payments given out one-time from the government to cover a portion of the investments required to develop a renewable energy related project or service. Rebates are typilically paid out after the completion of the project.
Tax credit (production or investment)	Tax credits allow investors to fully or partially deduce tax obligations for investments in renewable energy.
Tax reduction/ Exemption	Purchases or production of renewable energy or renewable energy technologies qualify for reductions in taxes including: Sales Tax, VAT and Carbon Tax.
Public finance	
Investment	Governments can facilitate financing schemes to spport renewable enrgy projects in exchange for a percentage of eqiuty. This is usually organized

	via dedicated funds managed by the government.
Guarantee	A guarantee is a method to share risk with the objective to facilitate lending from local commercial banks to support renewable energy companies and projects.
Loan	Govermental entities or banks can provide loans in return for a debt thus providing financing for renewable energy companies and projects at lower interest rates or collatorals.
Public procurement	Governmental entities will give priority to renewable energy serviesdasd Public entities preferentially purchase RE services (such as electricity) and/or RE equipment.
Regulations	
Quantity-driven	
Renewable Portfolio Standard/Quota obligation or mandate	Obligates designated parties (generators, suppliers, consumers) to meet minimum (often gradually increasing) RE targets, generally expressed as percentages of total supplies or as an amount of RE capacity, with costs borne by consumers. Building codes or obligations requiring installation of RE heat or power technologies, often combined with efficiency investments RE heating purchase mandates. Mandates for blending biofuels into total transportation fuel in percent or specific quantity.
Tendering	Public authorities organise tenders for given quota of RE supplies or supply capacities, and remunerate winning bids at prices mostly above standard market levels.
Price-driven	

Fixed payment feed-in tariff (FIT)	Guarantees RE supplies with priority access and dispatch, and sets a fixed price varying by technology per unit delivered during a specified number of years.
Premium payment FIT	Guarantees RE supplies an additional payment on top of their energy market price or end-use value.
Quality-driven	
Green energy Purchasing	Regulates the supply of voluntary RE purchases by consumers, beyond existing RE obligations.
Green labelling	Government-sponsored labelling (there are also some private sector labels) that guarantees that energy products meet certain sustainability criteria to facilitate voluntary green energy purchasing. Some governments require labelling on consumer bills, with full disclosure of the energy .
Access	
Net metering (also net billing)	Allows a two-way flow of electricity between the electricity distribution grid and customers with their own generation. The meter flows backwards when power is fed into the grid, with power compensated at the retail rate during the 'netting' cycle regardless of whether instantaneous customer generation exceeds customer demand.
Priority or guaranteed access to network	Provides RE supplies with unhindered access to established energy networks.
Priority dispatch	Mandates that RE supplies are integrated into energy systems before supplies from other sources.

The research reviews the different policies implemented by various countries and benchmark them with the situation in Egypt and summarized in Table 2 below.

Table 2 - Benchmark Policies

	China	France	India	Spain	Egypt
RE Targets					
Feed in Tariff					
Electric Utility Quota Obligation					
Net Metering					
Biofuels Obligation					
Heat Obligation					
Tradable REC					
Tendering					
Capital Subsidies, Grants or Rebates					
Investment or Production Tax Credits					
Reductions in Sales, VAT or Taxes					
Energy Production Payments					
Public Investment, Loans or Grants					

IV. Chapter Four: Renewable Energy Policies

A. Overview

Governments around the world have been adopting a diverse array of policies to support the development of the renewable energy industry in their countries. Many regulations have been aiming to reduce carbon emissions and reaching energy independence; these regulations have ranged from tax breaks to encourage the reliance on renewable energy for power generation, to credits, grants and accelerated depreciation to attract investments to the sector. On the other side, governments can also adapt a deterrent strategy to discourage the utilization of fossil fuels by enforcing penalties namely Carbon tax and Cap and trade schemes. There are more than 80 countries which have adopted some form of policy geared towards renewable energy promotion for power generation with feed-in tariffs being the most common policy deployed. In addition, renewable portfolio standards, grants and tax credits are also widely implemented. (KPMG, 2014).

The most common justification to adopt some kind of an economic support mechanism is to correct a market and/or regulatory failure which is currently present and in turn hindering the wide scale adoption of renewable energy. It is worth mentioning that costs of several externalities are not accounted for while performing the feasibility studies for renewable energy projects with environmental impacts of conventional power generation and climate change being the main examples. There are other externalities which are not accounted for which are less recognized like energy security and capitalizing on the benefits of innovation. Moreover, there are non-economic components that policies are also designed to address such as grid access, capacity building and the ease of doing business (ECORYS, 2008).

Governments select the combination of policies which address their country's barriers together with their aspirations and potential. The Renewable Energy Policy Network of the 21st Century (REN21) published in its recent studies that high-income countries tend to use tax concessions and capital grants while regulatory policies are less common in low-income counties. It is worth mentioning that Feed-in tariffs (FITs) is the most commonly adopted regulatory policy in both developing and developed countries (REN21, 2012).

B. LESSONS FROM OTHER COUNTRIES

1. CHINA

China as one of the fastest growing countries in the field of renewable energy, has implemented a wide array of both supporting and operational policies. China has implemented a combination of supporting schemes which include Investments and feed-in tariff incentives available to energy performance contracting (EPC) projects. The investments and subsidies include: Corporate Income Tax (CIT), Value Added Tax (VAT), Vehicle and Vessel Tax and Vehicle Purchase Tax. The Corporate Income Tax (CIT) is a reduced to 15 % for enterprises with qualified new technologies in the fields of solar energy, wind energy, bio-energy and geothermal energy. Income generated from environmental protection or energy/water conservation projects are exempted from the CIT for the first 3-years starting from the year in which revenues were first generated. The projects then receive a 50 % exemption for the following 3 years (KPMG, 2014).

The sales of wind power and PV power which is self-produced receive a 50 % refund of the VAT paid while sales biodiesel oil generated by the usage of vegetable oil receives a 100 % VAT refund. In addition, the VAT generated from the sale of recycled goods is refundable while the sales of self-produced goods, garbage disposal, and sewage and sludge treatment is exempted

from paying VAT. It's worth mentioning that starting January 2012, China implemented a 50 % vehicle and Vessel Tax discount on electric vehicles. In addition, starting September 2014, the electric cars will be exempted from paying the vehicle purchase tax (KPMG, 2014).

The supporting schemes are complemented with operational schemes which include the Feed-in tariff, financial allowances, and subsidies for the development of energy conservation technologies and renewable energy development. The feed in tariff policy states that the government will purchase all electricity generated from renewable energy sources as detailed in the revised Renewable Energy Law which became active in April 2010 under the supervision of the State bureau of Energy and the support of the State Council. The new law states that the competent price department which is part of the State Council will set the price of the electricity generated from the renewable energy sources (IRENA, 2014).

The Chinese authorities have committed dedicated funds which are directed to support activities related to the development of renewable energy which include: renewable energy projects which are planned in rural areas, state-alone renewable energy systems on islands and remote areas, scientific and technical research and standardization processes, local manufacturing factories which are utilized in the renewable energy sector and finally, surveys and information systems focusing on renewable energy (GENI, 2012).

The state decided to continue its special subsidies in its 12^{th} 5-year plan with the objective of supporting projects aiming at developing energy conservation technologies. These activities include mechanism for energy conservation innovation, the creation of supporting capacities and platforms for energy conservation, upgrading and promotion of the significant technologies in the energy conservation field. These financial subsides take different forms ranging from interest discounts, direct allowances and reimbursement based on the actual costs incurred. The government has designed financial subsidies which are aimed are supporting

activities related to renewable energy development which demonstrate the importance of renewable energy technologies and its industrialization, development and the utilization of renewable energy (IRENA, 2014).

2. INDIA

The renewable energy supporting schemes in India can be categorized into two main groups: A. investment and subsidies which include supporting Foreign Direct Investment (FDI) and tax holidays, and B. financing solutions facilitated by the government.

India has been enjoying a rapid growth in renewable energy installation in the past years thanks to the provisions of the Electricity Act of 2003. Under this Act, there is no prior approval required from the regulatory authorities to allow the infusion of foreign investment with an exception in the case of investments directed to a limited liability partnership (LLP). The government of India allows up to 100% FDI to access through an automatic route for generation and distribution projects in the renewable energy sector (Ministry of Law and Justice, 2003).

> Infrastructure, by the definition of the Reserve bank of India (RBI) guidelines regarding the External Commercial Borrowings (ECBs) cover the energy sector which includes subsectors ranging from electricity generation, transmission and distribution , oil and gas pipelines and storage facilities. RBI has allowed ECBs to be raised for project use under Special Purpose Vehicles (SPVs) (RBI, 2015).

Under the domestic income law, the government has granted a 10 year tax holiday for renewable energy power plants with the condition that the electricity generation starts before the 31st of March, 2017. Nevertheless, the plants will be charged the minimum alternative tax which is set at a rate of (20.4% - 21.4%) depending on the income to be offset over the course of the following 10 years (KPMG, 2014).

The Ministry of New and Renewable Energy (MNRE) has established the Indian Renewable Energy Development Agency (IREDA) which is to act as a financing agency specialized in promoting renewable energy projects. The MNRE has created an incentive scheme called the Generation Based Incentive (GBI) scheme which was designed with the objective to attract foreign investors and promote independent power producer (IPP) projects for wind and solar power plants. In addition, companies operating in activities related to renewable energy qualify to receive an accelerated depreciation of 80 % on a written down value basis (MNRE, 2013).

The government set a Renewable Purchase Obligation (RPO) under the National Action Plan on Climate Change (NAPCC) which recommends the renewable energy increase to reach 15 % by the year 2020 nationally. In order to achieve this goal, State Electricity Regulatory Commissions (SERCs) are requested to set their own Renewable Purchase Obligations (RPOs) for the distribution companies and thus enabling the purchase of a percentage of their total required power from renewable energy sources. It's worth mentioning that the current RPO levels are between 2 – 14 % of their total required energy (C2ES, 2008).

The Renewable Energy Certificate (REC) has been introduced with the objective of aligning the availability of renewable energy and the requirements of the RPOs to ensure that they are able to meet their obligations. The REC market has started trading in February, 2011, yet the REC mechanism has not yet been adopted on a wide scale and is currently under review. In 2010, the Jawaharlal Nehru National Solar Mission (JNNSM) was launched with the objective to position India as a world leader in the field of solar energy. The MNRE revised its national solar mission and increased its target from 20 GW to 10 GW by 2022 with 40 % generated

through large scale rooftop projects, solar parks will generate an additional 40 % and the remaining 20 GW should be generated through large scale projects (MNRE, 2011).

In order to support Engineering, Procurement and Construction (EPC) projects in the renewable energy field, the central government has decided to offer customs and excise exemptions on specific goods related to these projects. A step which is off considerable positive impact when we take into consideration that the costs of tax form a significant cost in EPC projects as they could range between 10 to 20 % (KPMG, 2014).

3. SPAIN

Spain has several supporting and operational schemes which foster the development of the renewable energy sector. Nevertheless, it is important to keep in mind that the some of the taxes mentioned below were not created specifically for the renewable energy sector. The renewable energy market in Spain was considered attractive for investor until 2010 as it provided them with a stable framework which guaranteed an adequate level of profitability (Ragwitz, 2012).

Renewable energy investors in Spain can benefit from the R&D tax Credits. Research and development expenses and when applicable, investments in tangible fixed assets as well as intangible assets, not including land nor real estate. The tax credit rates are set at 30% of the expenses during the given period. If expensed covering research and development in the tax period far exceed the average of those previously incurred over a period of two previous years, the rate established shall apply up to that average, added to that a 50 % to the amount exceeding the average (Haas, 2011).

In additional, renewable energy projects could qualify for the technological innovation activities tax credits with a rate of 12 %. Research & Development and Technological innovation activities tax credits that are considered for a certain fiscal year and are unutilized in the current year as the tax due was deficient could be forward over the coming 18 years. Moreover, a refund in the form of cash amounting to the sum of the pending tax credits is applicable in the case tax due is insufficient for these tax credits. Due to the recent modifications to the Spanish tax law entitled RD 13/2010, Spanish Transfer Tax Law predicts an exemption of the Capital Duty regarding: Share capital increase, company mergers, shareholder contributions which don't result in share capital rise and the allocation to Spain if the office of a company not formerly based in the EU. From 2005 to 2012, biofuels receive a full tax exemption as part of the hydrocarbons tax which was applicable for the usage of biofuels in the transportation sector and for heating purposes. In addition, from 1 May 2011 to 31 December 2012, a tax credit was announced which was focused on the utilization of renewable energy in buildings as an option which taxpayers could choose (KPMG, 2014).

Facilities might obtain a "fix remuneration including based on each unit of installed capacity with the objective to cover, where suitable, the investment costs of a typical installation which can't be reclaimed from energy sales and a term per operation, if applicable, to cover the difference between operating costs and revenues for the market share of such typical installation" along with the compensation for the sale of energy valued at market price. The structured tariff regime, for a given period and updatable according to a prefixed formula, is thus stopped (KPMG, 2014).

The feed-in tariff (FIT) in addition to the feed-in premium (FIP) schemes have been highlighted as the main attractive polices for investors, yet in the past years, due to the major

overhaul of the supporting measures of renewable energy, the sector has lost a lot of its traction as the changes had a negative impact on the market demand (Haas, 2011).

Some of the administrative amendments requested all projects which were expected to benefit from the FIT and/or FIP schemes, to pre-register giving the government a better ability to monitor and control the project pipeline (Winkel , et al., 2012).

4. FRANCE

Renewable energy is promoted in France mainly through a feed-in tariff and tax benefits, while the heat generation via renewable energy power plants is also supported through multiple schemes of energy subsidies, no interest loans and tax regulations and finally a quota system forms a platform for supporting the utilization of renewable energy in transportation. There is no special support available for renewable energy for the utilization of the national electricity grid for transmission (REN21, 2012).

Electricity produced from sources such as wind, solar, geothermal, biomaterial and hydroelectricity is compensated through the feed-in tariff scheme. Électricité de France (EDF), in addition to other electricity distributors are committed to buying electricity generated from renewable energy producer at specifics tariffs, as well as, for a minimum duration. For example, EDF is committed to purchase onshore wind power over a period of 15 years and geothermal and biomaterial for a period of 20 years (KPMG, 2014).

The government encourages the use of biofuel by using a partial exemption from the internal tax on petroleum products and tax on polluting activities to at least in part compensate the burden of biofuel production additional costs. In addition, companies that invest in environmental research are eligible for tax credit grants. Companies which carry out relevant research that does not exceed EUR100 million can benefit from a tax credit of 30 % and 5 % for

the eligible research and development expenses exceeding EUR 100 million. Also, surplus tax credit will establish a receivable for the company that can later be utilized to cover three years of corporate income tax and may be reimbursed afterwards (IRENA, 2014).

C. The Case of Egypt

1. Missing the Target

Egypt is the biggest oil producer in Africa and the second biggest of natural gas making it the largest producer out of the OPEC countries. Nevertheless, Egypt is also the largest oil and natural gas consumer in the continent as they are the main fuels utilized to the growing energy demand where they account for more than 90% of the total energy consumption. The 2012 was marked by a key milestone where the country shifted from being a net exporter of energy to becoming a net importer due to the increasing demand for energy and inefficient management of resources. Over the past 5 years, Egypt's natural gas exports has been steadily declining with an annual rate of 3% as the produced gas has been rerouted to domestic consumption rather than exportation. The development of renewable energy will free up more natural gas for exportation thus creating more revenues for the state (MoP, 2013).

The fuel shortage together with aging infrastructure and poor transmission and distribution capacities led to the frequent electricity blackouts which plagued the summer of 2012 and 2013. The political and social instability which Egypt has been suffering from in the post revolution years have delayed the government plans of doubling its installed electricity generating capacities by 2020. It has become crucial for renewable energy to contribute in diversifying Egypt's energy mix and as a result Egypt's energy security (EgyptERA, 2013).

In 2008, the New and Renewable Energy Authority (NREA) announced its 20/20 energy target aiming to generate 20% of its power from renewable sources by the year 2020 where wind

energy contributes with 12% and 8% mainly from hydropower and some solar energy. This target would be translated to 7,200 MW of wind. Currently, the wind energy portion is 1% and is planned to reach 12% by 2020 while the solar energy share is negligible, yet is expected to reach 2% according to the 20/20 plan. NREA had planned to reach the 7,200 megawatts goal via state-owned projects (2,375 megawatts, i.e.: one third of the goal) and private sector projects (4,825 megawatts, i.e.: two thirds). The government plans to encourage private investors through various incentives including customs exemptions, financial guarantees, power generation licenses, carbon credit awards and pre-allocated land permits (NREA, 2014).

NREA is planning to issue tenders that allow the private sector companies via a build, own and operate (BOO) scheme for the wind farms and allow them to sell electricity at a pre-negotiated tariff. As we review the progress of the 20/20 plan 5 years later, we realized how limited the progress has been and it appears to be unlikely that the ambitious goals (20% renewable energy by 2020) will be achieved. Wind energy currently has only 405 megawatts installed base capacity which is only 5.6% of the 2020 target and there are no changes on the hydropower or the solar energy fronts. As we can see from the figure; in 2015 that has been to progress towards the target when compared to the vision created in 2008. Business Monitor International (BMI) expects no major changes in the energy mix by 2020 as we see in the projection of where Egypt's power generation mix is likely to be in 2020 (BMI, 2015).

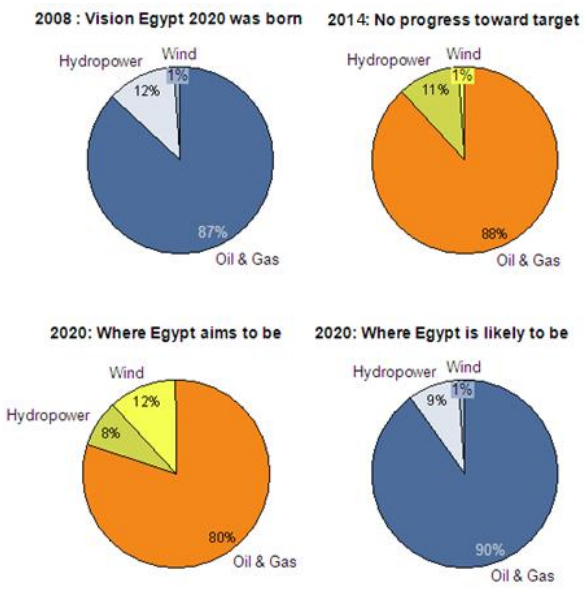


Figure 3 - Renewable Energy Priorities in Egypt

Despite the social and political unrest of the past years following the Egypt revolution in 2011, the government's commitment to driving the renewable energy agenda has been progressing although there overall market risk of the country had increased. This commitment; coupled with Egypt's high potential for the development of a promising renewable energy industry still create an attractive opportunity for investors. In the recent years, Egypt has adopted some fundamental key initiatives which are forming the critical cornerstones to the country's emerging renewable energy sector. In 2013, the government, through its Egyptian Electric Utility & Consumer Protection Regulatory Agency (EgyptERA) started the implementation of the net-metering policy, also known as Net Energy Metering (NEM) which is a supporting policy designed with the aim to encourage investments from the private sector in renewable energy as it allows the electricity produced by a consumer - which has eligible on site electricity generation capacity – to offset the electricity consumed from the main supplying electric utility which the consumer belongs to at the end of the billing period (e.g. end of the month/quarter/year). Net metering, as a policy tool goes hand in hand with the feed-in-tariff policy framework which the Egyptian Ministry of Electricity and Energy (MoEE) launched in September, 2014 which lays out the specific feed-in tariffs for the electricity producers from renewable energy sources, namely solar energy and wind energy (EgyptERA, 2014).

In 2012, the cabinet of ministers approved a fund dedicated for providing finance support for renewable energy projects, yet without clear identification of the financing sources or the disbursement procedures of the funds and the mechanisms upon which they will be allocated for the projects. The leading government entity in charge of the promotion of renewable energy is the New and Renewable Energy Authority (NREA) while the Energy Research Center is the leading the technical research within the field in Egypt support with Cairo University. In addition, an estimated 7,000 km2 of desert land has been allocated by the government for the

future development of wind farms by both the public and private sectors with the permits issuing responsibility resting with NREA (NREA, 2015).

2. EVALUATING EGYPT'S FEED-IN TARIFF FRAMEWORK

As the Egyptian government had announced 12 Billion USD in its electricity sector throughout the next 5 years to enable the country to meet the growing electricity demand of 6% per year, renewable energy, including both solar and wind energy will have a key role to play in this initiative. The government estimates that 2,300 MW of solar and 2,000 MW of wind will be installed by the end of the first regulatory period. The first regulatory period has been set to be the duration required for these goals to be met or 2 years, whichever comes first (PwC, 2015).

As we have previously concluded; Feed in Tariff (FiT) is one of the most widely implemented policies that contribute effectively to increasing the swift adoption of renewable energy since they provide the energy developer with a certainty which isn't available in the case of competitive tendering processes. This fact led the Egyptian government to design its own Feed in Tariff (FiT) policy which was announced on the 18th of September, 2014 (IRENA, 2012).

The developers and consortia formed to participate in these projects have the right to develop several projects although they should be under the maximum allowable size by the FiT. Nevertheless, since material changes could lead to a need to reapply, some consortia have been concerned. In addition, the Egyptian government had announced that it will be restricting the consortia's ability to alter their compositions which could form a barrier for investors as some consortia may want to sell their position or add new partners to their consortia. The government has not yet laid out the process and it is said to be discussed between the government and the developers on an individual basis. The government announced that there would be more rounds up to four per year. Applicants who did not qualify in previous rounds will be able to apply again

in the coming rounds especially that the reasons of disqualification in previous rounds will be released giving them the opportunity to improve on their offers (EgyptERA, 2014).

3. EGYPT'S FIT FEATURES

The FiT framework is coupled with a Power Purchase Agreement (PPA) where solar energy projects have a 25 year agreement while wind energy projects have a 20 year agreement on a take or pay basis. Investors will be granted access to governmental land pursuant the presidential law which regulates the matter where the usufruct's cost consists of a 2% of the electricity produced by the plant, in addition to the tariff. This usufruct is backed up with a land bond that starts at the beginning of the project and land use and then ends after commercial operation. It's worth mentioning that the use of government land is not mandatory; the presidential law regarding land allocation also defines the site decommissioning process (EgyptERA, 2014).

The Egyptian Electricity Transmission Company (EETC) will be facilitating the agreements with the related public authorities and permit issuing processes. The EETC also houses the FiT central department which has the available public land database which is designated to be allocation for renewable energy projects. It is worth noting that the costs of interconnection and taxes, which is estimated to be around 25%, will be deduced from the tariff which would render the feed in tariffs to be less attractive. The currency in which the PPA payments will be made is Egyptian Pounds while the Government will be caring the currency risk. If we take into consideration previous IPPs, we can predict that the payments would be escalated as to take into consideration the Egyptian and international indices (EETC, 2014).

While continuous grid access charges will be applied; however projects will be relied upon to hold up the expense of interconnection to the closest grid substation and possibly the expense of growing the substation to suit the extra load. The costs are estimated to be about

US$2Million for a 50MW project according to some reports, covering an average of 10km to the substation. Costs can be shared with multiple neighboring projects, with a maximum of eight projects connected to each substation. These expenses are said to be currently under investigation within the Egyptian Government (EgyptERA, 2014).

4. POWER PURCHASE AGREEMENTS (PPA)

In an attempt to steer clear from the various concerns which have surfaced based on the experiences of the previous renewable energy strategies across the Middle East, Egyptian regulators have affirmed an endeavor to produce a viable PPA.

• The PPA shall be organized as a take or pay contract until the greatest yield of the Project.

• The project organization will profit from governmental guarantees provided by the Central Bank of Egypt (CBE) to support the Government's commitments of the PPA offtaker.

• Upon the signing of the PPA, a project development bond should be deliverable upon request to be returned after the business operation date of the project.

• Without the assent of the PPA offtaker, The PPA might disallow refinancing.

The offtaker can be relied upon to have the right under the PPA to venture in and operate the project at the expense of the undertaking organization if in the offtaker's sensible conclusion there is a genuine and impending danger that the project organization's capacity to convey power is influenced by the event of a default. In such a case, the project organization would keep on being paid, yet it would need to pay the expenses of the offtaker's operation of the project.

The PPA can be relied upon to deny assignments or changes of control without the assent of the offtaker. The PPA will most likely be represented by Egyptian law with disputed being resolved in Egyptian courts (EgyptERA, 2014).

5. Other Features

The main investor is required a 30% share maintenance in the SPV until date of commercial operation. Only then, can the main investor sell down, upon the notice and approval of EgyptERA. Further details on these transfer restrictions will be concluded upon finalization of the PPA draft. Other documentation will compromise the following items:

1. Land use agreement;
2. Interconnection contract
3. Implementation agreement
4. Third party access agreement

6. Initial Post-Prequalification Requirements

The issuing of an interim license concludes the search for qualified bidders. Only projects which are approved may be granted the interim license. Despite the program not being of a competitive structure in terms of bid process, there may come a time when similar competing projects would be evaluated conjointly. In such a case, technical competence will be the central component. The license is valid for two years for developers who meet the initial criterion or upon the issuance of a final license. The EgyptERA reserves the right to revoke an interim license if the developer proves inability to settle permits, reach fiscal close and increase the capital to be identical to the value of the equity of proposed project. An additional year of license may be prolonged if evidence is provided by the developer, proving their ability to fulfill said conditions within license extension period (EgyptERA, 2014).

A few parts of task execution timing might display challenges if they continue as currently considered. These include the following:

• A project permanent license will only be issued upon full financial close.

• There is some perplexity with respect to when the tax for the project will be secured. Some direction has shown that it will be secured once the license has been approved, but may be a problem if it depends on the approval of a permanent license, since that would only be issued after financial close.

• Egypt has few limitations on deportation. Then again, a portion of the specific guidance issued in the FiT Program has recommended that coordination with the national bank in regards to foreign currency will just cover a rate of project incomes to pay debt service.

• The PPA may be initialed before fiscal close. In any case, it is as of now proposed that the PPA will only be signed upon the final license issuance.

Then again, the PPA will be discussed with certain key lenders and it is conceivable that bank remarks will be consolidated to address these potential challenges.

Organizations that produce electric would be the beneficiaries of certain incentives under the Investments Incentives Law number 8 of 1997 (as amended). Some of which include:

- Protection against nationalization or seizure
- Protection against the freezing of assets
- License to purchase buildings or land
- License to import equipment, raw materials and vehicles directly, as well as export
- Relief from stamp tax
- Dispensation from some provisions of the companies' law
- Relief from some registration feels
- Unified 5% customs duty (EgyptERA, 2014)

V. Chapter Five: Energy Subsidies

A. Overview

Throughout this research, energy subsidies will be defined as: "the actions or policies adopted by governmental entities with the objective to decrease the costs of energy production, increase revenues generated by energy producers or decrease the prices paid by the energy consumers. (IEA, OECD and World Bank, 2010)

These expenses which burden the government's budget are undertaken as investments with the goal of making energy prices more affordable and in turn improving energy access. In addition, energy subsidies are deployed with the objective to protect citizens from the price volatility of international energy markets and provide financial security for investors working in energy intensive industries. (IISD, 2005)

It is crucial for policy makers to understand the full-fledged impacts of implementing one energy subsidies strategy over another and to balance both the short and long term benefits and impacts. While energy subsidies have criticized for creating an overall market condition which is unsupportive for renewable energy investments and could be considered as counter-productive for the climate change efforts which the Egyptian government, together with world leaders has adopted in the Paris climate change conference which took place in December, 2015 (IEA, OECD and World Bank, 2010).

In addition, we must also consider that the funds invested in energy subsidies could have otherwise been allocated to research and development efforts directed towards supporting renewable energy technologies. The effects resulting from the implementation of energy subsidies rely mainly on where they were applied should that be on the supply or the demand side as shown in the theoretical framework (WEF, 2010).

Adjustment of the way price controls are utilized to endorse efficiency and competitiveness depends on the various needs of developed economies and to normalize markets around the world. Producer subsidies – subsidies on the supply side- ultimately debilitate strategies to minimize costs and in doing so largely protect companies from competitive pressure. This may result in misallocated resources that would significantly generate less revenue had there not been subsidies. (Fattouh & El-Katiri, 2012)

On the contrary, inefficiency can be a consequence upon keeping prices low on the demand side by offering subsidies. It was found in a 2007 report in the Middle East that the fuel efficiency for both the private transport and the public transport is remarkably low, having consumption per vehicle reach an average of more than double in comparison to countries without fuel subsidies. Such distortions are likely to appear in subsidies that are placed on other energy forms, along with renewables and nuclear. Economic incentives are eliminated due to these large fuel subsidies. (Fattouh & El-Katiri, 2012)

A step was taken by G20 leaders in September 2009 in an attempt to improve energy subsidies by pledging to "rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption" The nature of global energy markets was considered, while international leaders willingly investigate new approaches to escalate efficient alternatives to tackle the every rising consumer demand. The International Energy Agency (IEA) expects that distortions remain present in the energy markets today in spite of interest in reform. Moreover, it was found that fossil fuel subsides are mostly in favor of oil, gas, nuclear and renewables. Fossil fuels have not only remained but have also expanded, as IEA has highlighted. In 2011, fuel subsidies increased by 30% when compared to 2010 reaching a soaring US$ 532 billion. The removal of fuel subsidies at the time was challenged by four major constraints: price hikes, troubled growth, speculation and hording, and political unrest (IEA, 2011).

B. Lessons From Other Countries

1. Bolivia

A sudden 83% subsidy removal was imposed in 2010 after a price freeze of six years by President Evo Moral in an effort to put an end to smuggling low-priced diesel and gasoline to near-by countries. The government was encouraged to impose this large subsidy removal due to an estimate of US$150 million that was falsely ending up in the pockets of foreign consumers and smugglers. This sudden subsidy removal lead to local unrest as thousands of demonstrators took to the streets, transport and teachers' union going on strike forcing the reinstatement of subsidies by the government (Vagliasindi, 2013).

2. Nigeria

Similar to Bolivia's reform model, Nigerian government ended its fossil fuel subsidies abruptly in January 2012, causing a rapid 215% increase in gas prices from US$ 0.40 per liter to US$ 0.86 per liter almost suddenly. Citizens reacted violently to the end of fossil fuel subsidies through mass protest. The government's justification was based on the burden subsidies added on public finances. The estimated increase of the cost of subsidies in 2012 due to the rise of cost of fuel to an already soaring US$ 8 billion in 2011 was a motivator (Moyo & Songwe, 2012).

After mass protests had taken place, the Nigerian government partly reinstated the subsidy. The government of Nigeria could have avoided citizen wrath by clearly communicating the costs of subsidies and the benefits that would come with subsidy removal. Subsidy reform in this case was poorly managed on the demand side, lack of clear communication added to the strain of citizen concerns about corruption, which eventually lead to public backlash. (IISD, 2012)

3. INDIA

India has a history with subsidizing energy to maintain energy access for its citizens away from international price volatility, particularly the poor. These subsidies only seem to place a substantial drain on government's budget. India has the top subsidies among importers, with a total of US$ 22 billion in 2010. In aims to support the poor, Indian government shifted from subsidies to targeted cash transfers in their 2012-2013 revised budget. Later that year, the minister of petroleum and natural gas broadcasted the government's intention to consider decreasing the number of LPG cylinders which are heavily subsidized per household, in addition to a "partial decontrol" of the prices of diesel. In order to prepare the needed infrastructure for distributing the direct transfers in substitution of kerosene subsidies, the government of India created the Unique Identification Authority of India (IDAI). Public backlash, on the other hand, has significantly slowed down progress in achieving a national policy to design the cash transfer framework (IISD, 2005).

4. INDONESIA

In recent years, the subsidies directed to fossil fuel subsidies have created a large financial burden on the government of Indonesia. The Indonesian budget deficit ballooned in 2010 with the cost of subsidies reaching a soaring US$16 billion, making the prices of gasoline in Indonesia among the lowest across the Asian continent. Indonesia announced policies aiming to decrease subsidy expenditure in 2012, such as; monitoring the fuel utilization by vehicles, forbidding state-owned vehicles and other certain company vehicles from the benefit of fuel subsidies, also replacing natural gas for kerosene and diesel, finally, decreasing the electricity consumption in state owned buildings and for public street-lighting (IISD, 2012).

Currently, Indonesian government reform plans include four areas to redirect the subsidy reform savings, these are: cash transfers, public transport, a rise in expenditure for productive activities and education. These policies have been met with public demonstrations that later led to a delay in price increase plans in April 2012. A need for two areas of activity has surfaced as a result of public's discontent, these two areas being: a simultaneous government communication strategy and an ongoing consultation with stakeholders, especially the poor who seem to be facing the most hostile consequences to subsidy reform. (IISD, 2012)

5. CHILE

Chile is a successful example when it comes to energy sector reform, despite the fact that it highly depends on international energy supplies, where 80% of its primary energy is imported, making the country susceptible to price volatility and supply interruptions. However, the reason Chile is regarded as such a success in the energy sector reform is because it is considered as one of the leading countries to liberalize its electricity market in the region. (IISD, 2005)

Energy reform in Chile is concentrated on the demand side. The excise transport fuels tax is complemented by the Consumers' Protection System reduces the price volatility felt by the transport fuel consumers. This takes the form of a price band around the average fuel price throughout a five-month window. In case of an overshoot price beyond the price band ceiling, the reduce tax comes into play in the favor of the consumer. In the opposite case, when there is a dip in the fuel price beyond the price band floor, the amount of tax paid by the consumers will increase creating additional revenues to the government (Chochet & Buckle, 2012).

The reason Chile is a success story is because transparency has aided the public's understanding of price fluctuations and has helped in building a road for liberalization of the domestic fuels market. (IISD, 2005)

6. JORDAN

In 2005, Jordan set out to gradually remove subsidies over a period of three years. This strategy was put in place after several failed efforts to remove subsidies that took place during the late 1980s and then early 2000s that pushed Jordanian government to reverse subsidy removal due to widespread demonstrations. Jordan took the decision to eliminate the majority of its energy subsidies in 2008, leading to a price surge. The government arranged a dedicated committee which has the responsibility of setting the price on a monthly basis to reflect international prices and freight allowance in order to align prices set on the domestic level with the ones present in international markets. The employment of such a price calibration approach reduced the possibilities of policy reversal (Fattouh & El-Katiri, 2012).

Energy subsidies dropped in 2010 to 0.4 % from a significantly higher 5.8 % in 2010. This aided the government to improve its public finances, but with negative impacts on the households and the industrial sector. The government was then forced to invest considerably in means to safeguard the households with low and medium income levels by raising the wages of the public sector, pensions and low income earners in the private sector were on the receiving end of a separate and dedicated compensation framework. The Jordanian government started lifeline tariff schemes for electricity as well as a revised food subsidy program to counter balance the adverse effects of the price increases. In 2011, however, there were several public protests that took place due to rising living expenses which later led the government to take back some of the earlier subsidy reform. This case demonstrates the significance of reviewing the prices of fuel

with an overall holistic approach to of energy pricing as a whole and the energy sector liberalization (Fattouh & El-Katiri, 2012).

7. CHINA

China not only acknowledges the advantages of subsidy reform but also identifies fossil fuel subsidies as a key factor in shaping the energy security of the country, and in turn its foreign policy. A reform strategy was introduced by China recently which encompassed a multi-tier electricity pricing framework, with that, the first tier rates will stay at the same level, but gradually increase for the second and third tiers. In which case, provinces establish their own price brackets accordingly. Seemingly keeping fossil fuel subsidies is not something China is fearful about. The government announced late 2012 that it will over a 0.4 Yuan for every cubic meter of shale gas as subsidy from 2012 to 2015, with further subsidies planned to cater to the growing regional demands. China has proved that its strategy to progressively reduce energy subsidies is effective and is, in fact, politically feasible. Given what large footprint China covers, the infrastructure and transport sectors are regularly subsidized. All in all, China's subsidies are planned to guarantee the availability of the energy required to support the country's fast growing economy (IISD, 2010).

8. IRAN

Iran is considered the first major oil exporting country as of December 2010 to endorse large subsidy cuts in reaction to Western sanctions over its nuclear program, this only added fiscal pressure over its budget. Reforms later decreased the subsidies for both fuel and electricity on the supply side and altered its focus on the demand side. Alert of public unrest that was ignited due to the rationing of gas which took place in 2007, the Government of Iran opted for an

alternative approach with these energy reforms. The increase of fuel prices was approved; in the meantime citizens were financially compensated with financial payments paid on a monthly basis. At the time a public relations campaign set out to deliver the message that subsidies encourage inefficient utilization of resources and social injustice. After the reform Iranian government raised the prices of gasoline prices by 400 %, natural gas by 700 %, diesel reached 1000 %, electricity 300 % and water almost overnight. (Fattouh & El-Katiri, 2012)

Despite the large subsidy removal in a relatively short time, riots did not materialize and the rise in prices resulted in an approximate saving of US$ 55 billion in fuel subsidies with a distribution of almost US$ 30 billion in financial payments to citizens and unrepressed US$ 10-15 billion to be dedicated to energy efficiency investments.

Iran's inflation rate is expected to suffer a temporary increase, as well as a slowdown in economic growth. However, it will mostly have a positive impact on the medium-term by due to the rationalization of the utilization of energy domestically, increasing the revenues generated from exports, reinforcing competitiveness and pushing economic growth in Iran to its fullest potential (Fattouh & El-Katiri, 2012).

9. GHANA

The government of Ghana decided to reallocate money spent on fuel subsidies to social priorities. Several strategies were implemented in order to expand the transition to a more market-driven energy economy in a successful manner. Preliminary research and an entire communications strategy was carried out along with initiatives that were mainly planned to diminish political meddling in fuel prices and policies to help the poor. A study was commissioned by the Government of Ghana before applying subsidy reforms in 2005 in order to

evaluate which groups of the population would benefit from the removal of the subsidies (IISD, 2010).

Ghana implemented various steps to economically support the vulnerable groups affected by the increase in energy prices due to the removal of energy subsidies by eradicating the expenses for government managed primary and secondary schools, increasing the number of public-transport buses, placing an upper limit for the public-transport tariffs, and levitating the minimum wage. These strategies took on certain challenges undoubtedly. Surprising outcomes of this transformation in the prices of fuel encompassed temporary fuel shortages, as the suppliers resorted to storing fuel prior to the price increase. The government didn't sustain its commitment throughout the unanticipated price increases, only to showcase that policies are only as successful as the government which is driving them (IISD, 2010).

C. The Case of Egypt

The reformation of the energy subsidies system: The energy subsidies bill has reaching a staggering 14 billion USD from fuel products subsidies alone and another 2 billion USD from electricity subsidies which has placed a heavy burden on the Egyptian government's budget resulting in a growing deficit year after year. Egyptian policy makers have recognized the danger and impotence of the energy subsidies system in its current setting and have been actively attempting to reform it (MoF, 2013)

The first step was taken in 2013 where the government increased the electricity tariffs for energy intensive industries like cement, ceramics, fertilizers and aluminum. In addition, the government reduced the subsidies to electricity producers' inputs while also increasing the tariffs for households which consume more electricity per capita. The overall long-term objective of the government is to continue remove energy subsidies gradually until they are completely removed by the year 2018. The second prong of Egypt's energy subsidies reformation plan is the proper targeting of subsidies towards those who need it the most. The government is planning to achieve this objective by the nationwide implementation of the smart card system which gives the government the ability to monitor individual consumption per capita and in turn direct the subsidies towards the most in need based on their income (MoF, 2013).

Reforming energy subsidies in Egypt is one of the most discussed topics in the past decade. The amount of energy subsides has grown from EGP 1 billion in 1996 to EGP 95 billion 2011, significantly increasing the burden on the Egyptian economy. The following figure demonstrates that around one third

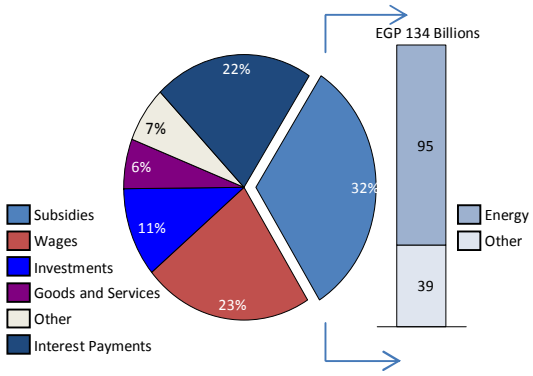


Figure 4 - Budget FY 2011/12: Weighted towards Energy Subsidies

of the government expenditure is aimed at subsides with 71% of that amount directed for energy only accounting for 6.2 % of GDP in FY 2011/12 (Ministry of Finance, 2015).

Egypt's energy subsidies are poorly targeted, benefiting the rich rather than the poor. In Egypt, the unequal distribution of energy subsidies can be captured by looking at the highest and lowest quintiles benefits. It was found that in Egyptian urban areas, the richest quintile benefits from 33% of the energy subsidy, whereas the poorest quintile benefits from only 3.8%. Furthermore, in Egyptian rural areas the richest quintile benefits from 22.8% while the poorest benefits from 5.6% only (Abouleinein, El-Laithy, & Kheir El-Din, 2009).

The following figure shows the petroleum subsidies by product. It is worth mentioning that industry alone benefits from one third of all subsidies. The combination of higher consumption rates, higher international prices for importing petroleum and higher domestic extraction and distribution costs, set against maintained low selling process to the consumer, has spelled spiraling costs for the government (Vidican , 2012).

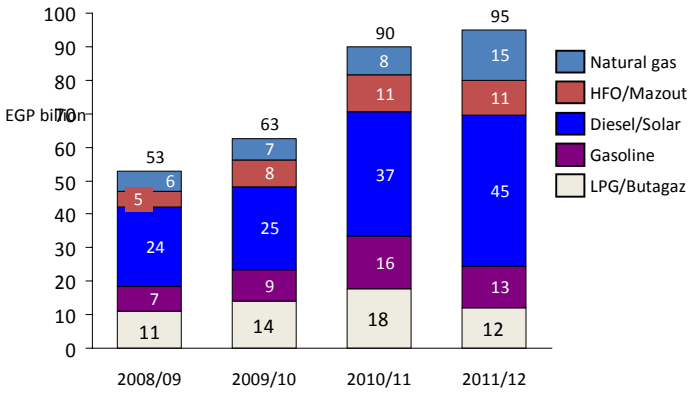
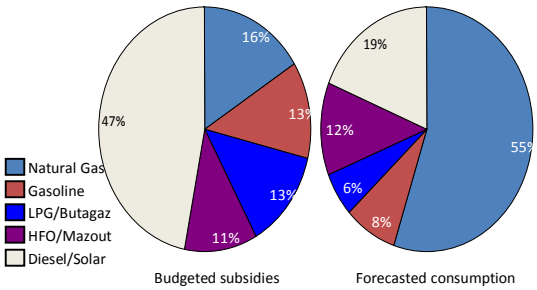


Figure 5 - Petroleum subsidies by product

The following figure clearly shows that subsidies are not parallel to the rate of consumption. For instance, diesel is over-subsidized at 47% when it only accounts for 19% of petroleum product consumption. In order to avoid poorly targeted subsidies,



Source: Adopted from Pharos Holding

Figure 6 - Allocation versus consumption: FY 2011/12

subsidies benefiting the rich, such as higher quality gasoline, should be abolished while low quality fuel subsidies should be phased out gradually (MoF, 2013).

When reforming subsidies, governments always face the tradeoff between eliminating energy subsidies to fix market distortions, as opposed to maintaining subsidies in order to avoid the negative effects on social welfare. Due to the inevitable inflationary effects that result from energy price hikes following subsidy removal, and the second round effects due to increases in input prices of other industries, there is an unquestionable need for governments planning on removing energy subsidies to place poverty alleviating mechanisms for the most vulnerable groups. Table 3 below lists some of the benefits and hurdles of subsidy reform. The first challenge in applying such alternative mechanisms is efficient targeting; ensuring that the most vulnerable groups are in fact the ones that have access to the support. It is essential to use targeting policies that neither fall within the exclusion error (exclude those groups that need the help the most), nor the false inclusion error (include groups that do not need the subsidy, thereby reducing the effectiveness of such mechanisms) (UNEP, 2004).

Table 3 - The Tradeoffs of Subsidy Reforms

Benefits	**Hurdles**
Efficient resource allocation	Defining the target group
Reduce wasteful consumption	Encouraging the media to promote a positive campaign
Reduce budget deficit	Government conflict of interest: owner, producer and consumer
Improve balance of trade	Lack of social safety net
Reduce CO2 emissions	Inadequate public transportation
Less congestion	

Energy subsidies are at the core of Egypt's current economic problems. Estimated to reach almost EGP 126 billion in Fiscal Year 2013/14, with an increase from the revised budgeted EGP 99.6 billion. This has decreased to some extent from EGP 128 billion spent on subsidies a year earlier yet with an increase of a hundredfold since 1996 when the nation's energy bill stood at a humble EGP 1 billion. These subsidies denote approximately 20% of the total budget, but if opportunity costs were added (i.e. had Egypt sold its own gas at global prices) these costs are valued at 50% higher.

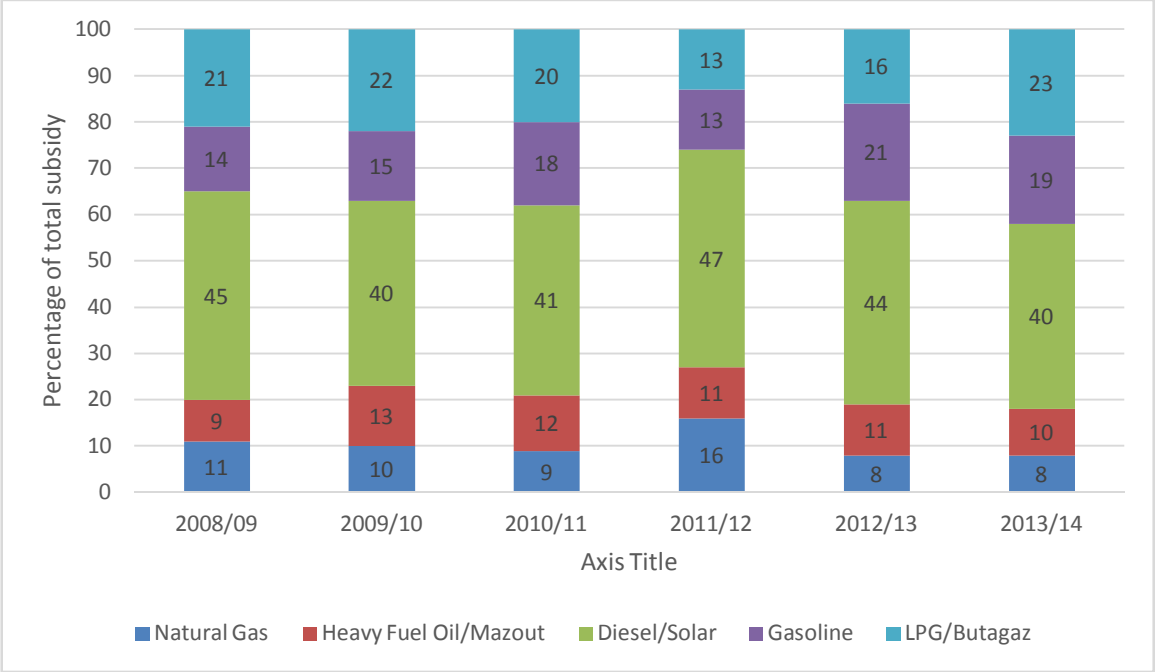


Figure 7 - Petroleum Subsidies Breakdown by Year. Source: Ministry of Finance

This has led to a growing government deficit that was 12% of GDP in FY 2013/14 and would have reached 16% had there not been an estimated USD 16 billion in aid from Gulf countries. The consequences of these subsidies are severe; a drop in foreign currency reserves, numerous downgrades on independent debt, and an ill effect on private investment as local banks accept the vast majority of government borrowing. (BSAC, 2015)

The Egyptian government's efforts to reduce fuel subsidies are benefitting from the fall in oil prices by the end of 2014. Global benchmark Brent crude has suffered a fall from a peak of USD 115 per barrel in June 2014 to USD 45 per barrel by the end of January 2015. After the fall in prices, the government announced that the FY 2014/15 subsidy bill would reach EGP 70 billion, about 30% drop, if prices continued at their current levels. (MoF 2014)

The petroleum products being subsidized are heavy fuel oil (mazout), diesel (solar), gasoline, butagaz (liquefied petroleum gas (LPG) cylinders), natural gas and kerosene. These subsidies were initially meant to help the poor and assist certain industries at competing internationally while appealing to foreign investors. According to the African Development Bank, the poor receive about 20% of all subsidies, in the meantime the wealthiest 40% of Egyptians receive about 60% of subsidies. This discrepancy is further highlighted in urban areas where the poorest 20% actually witness an eighth of what the wealthiest 20% receive in terms of subsidies. (NREA, 2015)

The poor are the main consumers of kerosene and LPG (butagaz), whereas those capable of affording a vehicle are the recipients of gasoline subsidies. The consumption of the three other subsidized petroleum products - heavy fuel oil (mazout), diesel (solar) and natural gas, with annual consumption of 13 million tons, 14 million tons and 40 million tons, respectively-are broken down in Figure 8. (BSAC, 2015)

Gasoline prices increased on average 42% in an energy price increase that was implemented as of July 5, 2014. Only after a November 2012 increase on Octane 95 grade gasoline from EGP

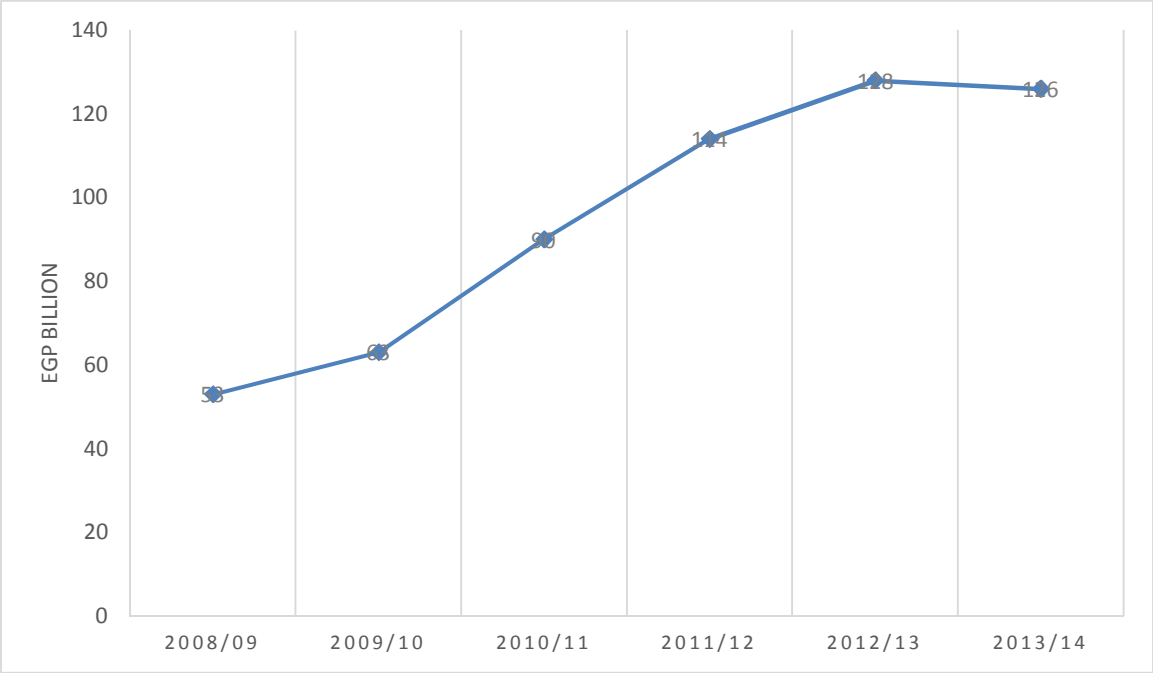


Figure 8 - Annual Petroleum Subsidies. Source: Ministry of Petroleum

2.75 to EGP 5.85. The car fuel price increases will make a dent in petroleum subsidies, even though most of the fuels consumed remain well below international prices.

In the first quarter of FY 2014/15 (i.e. July- September 2014), after the July 5 price increase, Octane 92, which represents 41% of petrol demand (as of February 2014), cost the government EGP 5.8 per liter at a selling price of EGP 2.6 per liter. (MoF, 2014)

Table 4 - Subsidy Reform - Fuel Price Increases for Vehicles (July 2014)

Fuel	**Old Price (EGP)**	**New Price (EGP)**	**Increase**	**Primary Consumer**
80 Octane	0.90 per liter	1.60 per liter	78%	Old vehicles
92 Octane	1.85 per liter	2.60 per liter	41%	Most popular vehicle fuel
95 Octane	5.85 per liter	6.25 per liter	7%	Luxury vehicles
Diesel	1.10 per liter	1.80 per liter	64%	Public transport trucks
Natural Gas	0.40 per cubic meter	1.10 per cubic meter	175%	Taxis

Octane 80, which constitutes 55% of demand, cost the government EGP 3.8 per liter and was sold for EPG 1.6 per liter; diesel cost EGP 4.9 per liter and was sold for EGP 1.8 per liter. The revenue to cost ratio for petroleum products in the first quarter of FY 2014/15 reached 57% (i.e. EGP 53 billion in costs versus EGP 30 billion in revenues from local prices).

The Egyptian government announced electricity price escalations outlined in Table 5. The government also announced its intention to double prices over the following five years to eliminate subsidies for power generation and implement a second petroleum price increase by FY 2015/16. (MoF, 2014)

Table 5 - Subsidy Reform - Electricity Rate Increases (July 2014)

Consumption Bracket (kWh)	**Old Rate (EGP)**	**New Rate (EGP)**	**Increase**
Up to 50	0.05	0.075	50%
50 - 100	0.08	0.14	75%
100 - 200	0.10	0.16	60%
200 - 350	0.20	0.24	20%
350 - 650	0.29	0.34	17%
650 - 1000	0.48	0.60	25%
Over 1,000	0.58	0.74	28%

One of the most heavily subsidized petroleum products are LPG butane cylinders. Cylinders are provided by the government at a price of EGP 2.8, with adding transportation to depots the cost rises to EGP 8 (raised from 5 EGP in April 2013). In comparison with an international price of EGP 67, about 8 times the retail price. About 50% of Egypt's butane needs is imported. Almost 12 million Egyptian households use these cylinders for cooking since they are not connected to the national gas grid. These subsidies are unlikely to see significant changes in the near future, since they are fundamentally directed towards poorer communities. Butane

shortages and black market exploitation are a constant cause of apprehension for the government. The subsidy reform agenda aims at eradicating black market exploitation and smuggling, by introducing the smart card system which is presently in the process of being employed. The first phase which was completed in July 2013 involved of issuing cards for tanker trucks and gas stations and documenting a database of fuel distributing companies. More than1 12,000

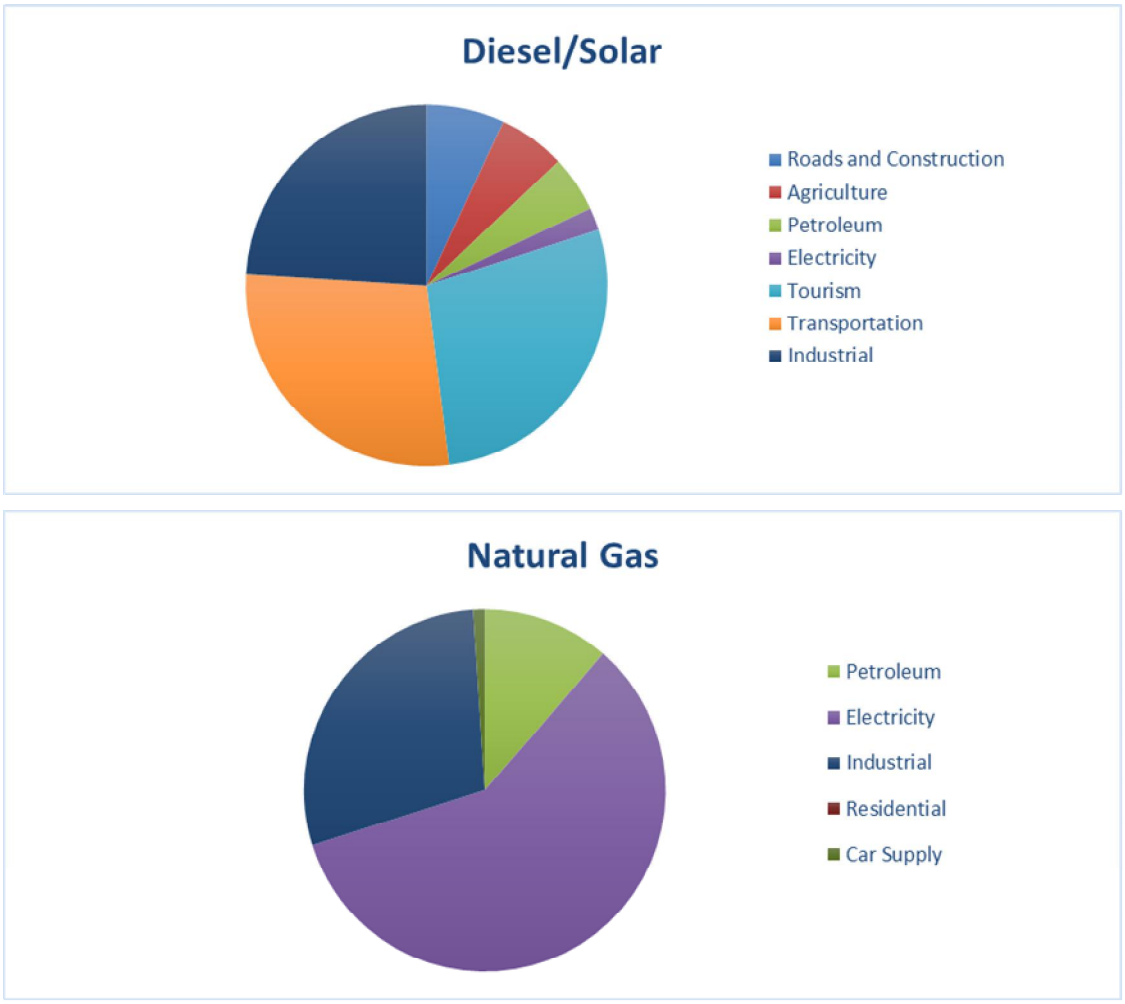


Figure 9 - Petroleum Product Consumption by Sector FY (2013/14) Source : EGPC

petroleum stations nationwide had smart card machines and 8,000 employees had been trained by October 2014. (BSAC, 2015)

Social safety nets will be vital so the needy don't suffer from price hikes. A replacement strategy can be the switch to cash grants or in-kind transfers of energy products. This direct methodology would be ideal for directly compensating those who would suffer from the effects of subsidy removal. Alternatively, the use of indirect cash transfers are more likely to be suitable, this can take place through applying coupons or smart-cards, whereby each individual is entitled to a certain quantity of fuel- a type used by the poor such as Kerosene-at a subsidized price. Another possibility is protecting small-scale producers and workers, by extending cash transfers to them to compensate the higher input prices (Baig et al., 2007).

This can be applied in relation to the scale of economic activity, and unemployment benefits to those getting pushed out of the market may also be provided. Some governments reallocate part of the energy subsidy through applying electricity lifeline tariffs. This pricing policy that changes the price of electricity according to the level of consumption is applied by assigning a low price to low electricity consumption levels (general consumption levels of the poor), avoiding unified prices for the poor and rich (Ragab, 2010).

Furthermore, another compensating measure is temporarily expanding the existing government programs such changing the eligibility requirements for ration cards to include more people (Granado et al., 2010). Finally, in times of changes in subsidy systems, it may be necessary to have specially-tailored programs for employment support since vulnerable people will not only suffer from higher prices of products but also lower incomes due to lower employment levels. These temporary measures should be retracted gradually, until full social safety nets are in place permanently. Policymakers need to weigh the tradeoffs involved in any

solution using a holistic framework and recognize that there will be some losers; the goal is to target carefully and mitigate or compensate losses (Baig et al., 2007).

As we navigate through these troubled waters in search of a solution; we must realize that, no choice will be without cost. Generally speaking, the benefits of eliminating energy subsidies are the increase in government revenues, investment, production, in addition to the decline of inflationary repercussions of the government budget deficit that would be narrowed. The question lies, however, in whether these macroeconomic benefits would be seen on the micro-economic front; whether citizens would be able to accrue the aforementioned benefits and benefit from lower poverty levels. Studies have shown the ineffectiveness of the "top-down approach" in enabling the target groups in question in accruing economic benefits (Nwafor et al., 2006).

It is worth noting that our policymakers need to account for the effects of counter-incentives, where the provision of monetary subsidies to the poor incentivizes them to work fewer hours, thereby lowering overall production and income levels of such groups. Targeting methodologies can take place effectively through conditional cash transfers (i.e.: shift from a product-based subsidy to a cash-based one). This policy has proven effective in countries such as Bangladesh that applied the food-for-work program, tying monetary subsidies to a requirement that the beneficiaries remain going to work.

One of the main obstacles to subsidy removal is the fear of public resistance. Consequently, a public awareness campaign is need in order for governments to communicate with the public the real burdens of subsidies, such as the inability of allocating more government expenditures to areas such as health and education in the presence of those subsidies. This will help shape views to gain acceptance of the price increase for the greater social welfare. Monetary policy should be adapted to mitigate inflationary pressures from energy price liberalization.

Given dwindling foreign reserves and the current monetary situation, a fine line will have to be drawn in this area, bearing in mind that doing nothing in the face of rising inflation will likely lead to social unrest which was one of the main drivers behind the 25th of January revolution in 2011 (IISD, 2010).

It is critical to phase-in and sequence the price increases in an appropriate manner. Otherwise, a sharp price increase could result in a strong resistance to the reforms, especially in the case of the absence of an effective communication strategy. Moreover, when a phasing-in price increase is adopted, the households and industries would be given a window of opportunity to adapt to the price changes, and the government would be able to create and sustain the required social safety nets. The development of a comprehensive reformation plan for the energy sector is a critical success factor. It should be co-created in consultation with the relevant stakeholders and it should layout the long-term goals complimented with a clear impact assessment of the reforms (IISD, 2012).

Liberalizing Energy Markets in Egypt

There is a need for an unambiguous strategy to facilitate the transformation of Egypt's energy market to a liberalized one. Defining the suitable approach for every pricing is the first step to coming up with such a strategy. In addition, it's crucial to consider the speed and scheduling of the reformation of the energy prices. Also, it is necessary to evaluate the overall influence on the country's economy and which measures should be adopted by the government in order to safeguard the vulnerable stakeholders.

Energy pricing approaches

Literature proposes various energy pricing approaches, based on the individual product or on the market requirements itself which would vary from one country to the other. One cannot find

an unambiguous and clearly identified energy pricing policy in Egypt (Abouleinein, El-Laithy, & Kheir El-Din, 2009).

The authors summed up all the various energy pricing schemes in to five following five main ones:

1) The marginal cost pricing which is a precise appraisal based on the expenses incurred in an extra energy unit is consumed.
2) The short-run marginal cost does not include the cost of capital, but takes into consideration the fuel costs, the materials required, in addition to the costs of labor and maintenance. Added to that, the marginal cost accumulated on the long run which includes the expenses which are incurred during the capacity escalation which is required to boost the output.
3) Historical cost recovery requires the energy product price which tolerates the recovery of expenditures which took place in the past.[2] Also, cost recovery enables the earning of an adequate market rate of return.
4) Discriminatory energy pricing is based on distinguishing prices based on dividing consumer groups based on income capacity. This pricing mechanism can also be applied when differentiating among the various groups of users, which include; the commercial, industry or residential.
5) Opportunity cost pricing is when the cost of energy is based on the international benchmark price rather than its domestic consumption price.

Booz Allen Hamilton (2007) offered 3 alternations approaches to the pricing of energy which could potential be implemented in Egypt. The first approach is called "low fixed pricing regime",

[2] There was no specification for the time span over which "past "expenditures are accounted for. This approach does however appear to be in line with the cost-based pricing recommended by Booz-Allen Hamilton (2007).

in which the government bases prices according to a set of considerations which include the socio-economic and political aspects, which could be put forth to encourage the industrial sector to consume specific types of fuels. Next, is the "cost recovery pricing regime" in which the setting of prices are based on the real cost incurred for the energy to be delivered. Lastly, is the "market-based prices regime", where the market forces set the prices, which would result to a convergence of the domestic prices to the international prices. As such, this approach would factor in the opportunity costs.

Despite the fear of price volatility in the case of gradual "cost based pricing" regime, the study endorsed it and recommended that the method to calculated the prices will be though a formula that is simultaneously announced as the prices accelerate, for transparency, even if the calculations are executed at an aggregation level that does not jeopardize confidential information. In Egypt, the pricing approach currently being implemented is closer to that of the low fixed pricing approach in which the government determines prices according to the various aspects of the social, economic and political conditions. (Booz Allen Hamilton, 2007)

The opportunity cost method to energy price, which is the pricing of energy products is established on the variation between international fuel prices and those on the domestic level is the methodology implemented by the majority of the leading international institutions such as the International Energy Agency (IEA) and the World Bank to calculate the resources countries allocate to subsidies. (Fattouh & El-Katiri, 2012)

An alternative method would make the real economic costs of energy reflected in the calculations as recommended by Razavi (2009). This can be achieved when the difference between the real and the reference price is identified.

It is worth mentioning that the government of Egypt bases the subsidies of petroleum on the variance between the domestic selling price of each product on in the market and the costs of

EGPC. Although the value of the actual cost incurred by the EGPC does not account for EGPC's share of total cost paid in the process of extracting petroleum products in partnership with a foreign company (Hussein, 2014). If the actually cost was factored in the current process, the overall subsidies which the government had to pay would be much higher reaching approximately twice as much of what has been announced in the budget (Castel, 2012).

The means of liberating energy prices

The political economy is the main consideration in determining the duration of reform transition in different forms of energy. A transition period exceeding five years is politically appealing due to somewhat smaller economic and distributional impact; however, it delays the return on investment and makes it difficult to sustain reform. On the other hand, quicker budget savings are produced through shorter reform transition periods of less than five years, yet this mechanism has a much more extensive economic burden and communal impact as a result of the higher annual price escalations. There is no agreement on an ideal transition length, but with every reform strategy each country decides to undertake considering the special political situation and economic dimensions in order to have an evaluation of the scale of the effect on lower income families. (Kantor, EQI, 2009).

A five-year configuration of price reforms on varied energy products would ultimately obstruct both high price increases and powerful social dismay. The ascending price reform scheme gives households and companies some time to adapt to the new scheme. Also, it gives the government some time to display how subsidy savings are in fact put to practice. In reflection on the Egyptian government's latest subsidy reform introduced in July 2014 the government saved about EGP41 billion, increasing health and education spending in FT2014/2015 to respectively amount to EGP 51.6 billion and EGP 105.3 billion. (Alleyne, et al., 2013)

Moreover, price rise can be sequenced differently for different energy products, where the rise in petroleum can escalate for higher-income consumers and industries. Later, successive cycles of reform can push to compromise greater hikes in prices for fuel products. Tariff increases for electricity can primarily focus on large residential and commercial users. An electricity price adjustment plan was recently presented by the Egyptian government, intended to push a double tariff rate on high income fuel product consumers over five years. (2014/2015-2018/2019). The effect of consumption patterns is taken into account in the new tariff system. An increase of 114 % is expected for high consumption households in comparison to a more subtle 47 % increase for low consumption households (Ministry of Finance, 2015). In other words, large consumers will cross subsidize smaller consumers.

Most studies seem to display agreement in regards to the progressive liberalization of energy prices and how it might be the most suited reform tool for Egypt. The sudden removal of subsidies would lead to a whopping 37 % increase in the national CPI. A recent 3.5 % increase in petroleum prices as of July 2014 led the Central Bank of Egypt to increase its interest rates in an effort to hold inflationary effects of the subsequent round consequence of the price increases. (Abouleinein, El-Laithy, & Kheir El-Din, 2009).

The various impacts of liberalizing energy prices

For a long time, Energy prices stayed constant in Egypt with slight variations over time. For example, oil prices were maintained without variation from 1991 until 2005. Later, various price increases were presented in 2005 as summarized in Table 6. In addition, electricity prices of households increased by almost 16% during 2012/2013, in the meantime natural gas and oil charges for electricity increased by 33 % (Sdralevich, Sab, Zouhar, & Albertin, 2014).

Table 6 - Changes in Petroleum Product Prices

Period	Energy product (A in prices)
2005-2008	- Gasoline, octane 90 (34.6%); - Gasoline, octane 92 (32%); - Gasoline, octane 95 (57%); - Fuel oil (100%); - Kerosene (46.6%); - Diesel oil (46.6%).
2012/2013	- Gasoline, octane 95 (112%); - Fuel oil used by energy-intensive industries (50%); - Fuel oil used by non-energy-intensive industries (33%).
2014	- Gasoline, octane 80 (78%); - Gasoline, octane 92 (40%); - Diesel oil (63%). - Natural gas for vehicles (175%)

(Al-Ayouty & Abd El Raouf, 2015)

The impact of liberating energy prices was studied from the following three viewpoints: distributional impact, household consumption impact and macro economy, and lastly, the effect on various industries. In 2008, a Computable General Equilibrium (CGE) framework was used to assess the effect of subsidies elimination. The first scenario assessed a 10% rise in the price of all petroleum products, while the second assessed a price adjustment to true costs with the removal of all subsidies, the third only assessed the removal of subsidies for producers, and lastly the fourth scenario assessed the removal of subsidies on the energy intensive industries only. (Abouleinein, El-Laithy, & Kheir El-Din, 2009) Another study also undertook a CGE framework to evaluate the macroeconomic influence of phasing out subsidies over five years. (Kantor, EQI, 2009) A comparison between both study findings is displayed in Table 7.

Table 7 - Macroeconomic Impacts of Liberalizing Energy Prices

Indicator	Abouleinein, El-Laithy and Kheir El-Din (2009)	Kantor and EQI (2009)
Annual growth rate of total private consumption	1.4 percentage points lower	3 percentage points lower

GDP growth rate at market prices	GDP grows at 1.44 percentage points lower	0.1-0.7 lower percentage points growth in real GDP
Budget deficit	Surplus (reaches 5.8 % of GDP in real terms by the final year)	-
Exports	Grows slowly	Real exports are expected to increase
Imports	Same	
CPI	Higher	Increase in prices of final and intermediate goods and services
Government revenues (as % of GDP)	-	Improves significantly
Government Savings (% of GDP)	-	Increase by 8 percentage points
Trade balance (as percent of GDP)	-	Increase by 6 percentage points
Employment	-	Increase by 4.2 % by the fifth year, especially for the non-energy intensive industry

(Al-Ayouty & Abd El Raouf, 2015)

As presented in the previous couple of studies, the yearly progression rate of private consumption and the GDP are in fact less than the no-subsidy elimination scenario. Both studies expected growth of exports, due to a deterioration in national demand. However, there is an expected CPI increase, demonstrated in the price increases of intermediate and final products and services. A surplus was forseen by Kantor and EQI (2009) by the end of the fifth year in the government's budget, as well as an enhancement in employment, indirect taxes, and trade balance. The need to increase petroleum product prices is predicted by the chamber of petroleum and mining in order to amount to their real cost on a period of four years. Added to that, the savings amount anticipated to be created for every product while its price is increasing over the four-year period. As presented in table 7, the maximum price increases should be presented to

the LPG that is intensely under subsidization, on the other hand, the lowest hikes are directed towards the Mazot. Government savings will reach EGP 307.4 in year four as anticipated.

VI. Chapter Six: Conclusions

SUMMARY

Initially this thesis sought out to evaluate the current regulatory policies and governing laws in Egypt, where the failure to achieve the 2020 plan has contributed to the energy crisis we are facing now in Egypt where the gap between supply and demand has reached unprecedented levels.

In recent years, Egypt has adopted some fundamental key initiatives which are forming the critical cornerstones to the country's emerging renewable energy sector. Egyptian policy makers have recognized the danger and impotence of the energy subsidies system in its current setting and have been actively attempting to reform it as further explained in Chapter 6.

As mentioned earlier throughout the thesis, renewable energy incentives are presented in various forms, this includes mixing mandates, feed in tariffs, portfolio obligations, tax credits and quotas, with the goal of achieving a better rate of return than the regular prices available in the market to counterbalance the costs. Incentives such as feed-in tariffs, quota compulsions and mixing mandates are paid by end-users. On the other hand, incentives similar to tax credits are funded through the national budget. Various supporting mechanisms are targeted towards the electricity generated via renewable energy. Steady growth is foreseen for the energy industry in general and renewable energy in particular. Studies suggest the following: (OECD, 2012)

- There will be a global electricity demand increase by over 70 %
- The energy demand is expected to increase by 30 %
- Three times increase in renewable energy generation from its 2010 level
- 31 % increase in the share of renewable generation mix

It would be fictional to state a single formula for success with so many variables at play, such as; the status of country and overall shifting global factors which should be considered when formulating approaches to build a strong competitive global market from an earlier subsidized market. International interest in energy reform is maintained by the growing dependence and interconnectedness of global supply chains. It is certain that the road towards energy reform needs to be planned on properly designed strategies that meet individual country needs in order to ensure successful reform. The Egyptian government needs to put into consideration the supporting initiatives and processes such as: the formation of stakeholder committees, communication campaigns, research and development, which are fundamental to ease the process of subsidies removal

POTENTIAL FOR IMPROVEMENT

The literature review and country case studies clearly show that the most widely adopted and effective regulatory policies are: Quotas, tendering, certificate markets and FITs. FITs stand out as the most effective policy when well-designed, yet we must take into consideration that the available data for the effectiveness of non-FIT policies case studies (EC, 2008; IEA, 2008; IEA, 2011b). Moreover, it is crucial to keep in mind that policies could be designed with different objectives, for example, a quota system could be utilized to support a low-cost renewable energy technology. The key drivers behind the effectiveness of the FIT as a policy instrument is drawn from the fact that an already pre-determined price of electricity leads to investor confidence, facilitates access to finance and decreases the overall project risk (Mitchell et al., 2011; Jager et al., 2011).

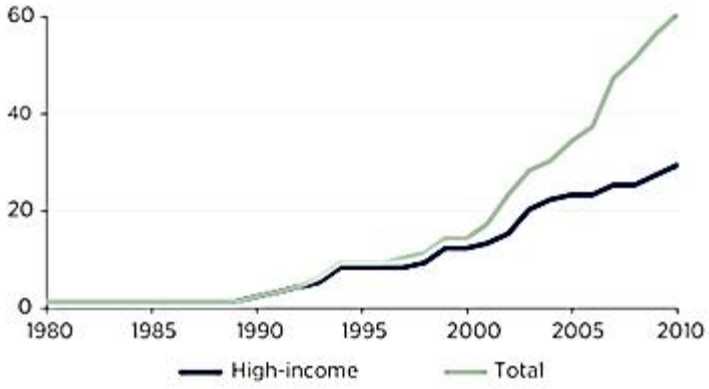


Figure 10 - Number of Countries Using Feed-in Tariffs, 1980 – 2010 Source: REN21 2010

The case studies of the different countries have concluded that the usage of project and capital grants are most effective when utilized in the startup, and pre-commercial rollout stages while FITs, incentives and quota obligations are more often utilized in the cases of commercialization stage (Jager et al., 2011). However, Davies & Allen after conducting a study of FIT in some of the most high profile countries, including Germany, South Korea and Spain, the authors also conclude that FITs may pose some serious downsides to energy policy making.

The implementation of FITs might create turmoil given their fundamental objective to disrupt existing energy systems. This requires strong management and planning as such systems mature. However, if changes are made too frequently or dramatically, this can damage investor confidence and slow innovation and market penetration for renewables. While FITs and similar systems are intended to self-destruct when renewable markets mature, it is not easy to determine when such technologies have achieved grid parity. Moreover, there is a threat of political lock-in, with vested interests seeking to end the use of FITs.

FITs led to remarkable growth of renewable energy development in some countries, but managing costs is a critical consideration to their feasibility. Equity considerations are also

important, with large industrial enterprises released from FIT surcharges, forcing consumers to bear the costs.

Studies have shown that tax credits have an overall unwanted outcome where the benefits end up being concentrated with the developers with the higher profits and thus creating a barrier for entry for new smaller developers which have little tax liability and also for non-taxability entities like non-profit organizations and cities. Several research papers have investigated the level fairness delivered by these policies. There has been extended criticism for tax credits given to companies since they most probably result in the benefits shifting between the developers generating higher profits (Batlle et al., 2011; Farrell, 2009). As we take a look at quota systems utilizing the trading of certificates, we observe that they create a barrier for small players to enter the market since they have high costs for transactions and administration, especially when compared to FIT policies (Mitchell et al., 2011).

As previously mentioned, FITs is the most commonly used policy instrument due to its lower administrative cost and their ease of implementation (Haas, 2011). Nevertheless, the proper design of a FIT policy is not an easy task as it should account for the rapidly changing renewable energy technologies and the continuous evaluation to guarantee the effectiveness of the policy in achieving the expected long term objectives. The cultural aspects and the full proper comprehension of Feed-in Tariffs as a policy scheme has created a challenging obstacle for its roll out in countries of the Middle East and North Africa. Egypt's New and Renewable Energy Authority (NREA) had been struggling to design and implement its FIT system for almost 10 years until it was finally deployed by the end of 2014 (RCREEE, 2010).

The implementation of tradable certificates has proven to be challenging due to the complexity of creating the required secondary market for the certificates. On the other hand, in order to create quotas and design noncompliance fines, technical know-how is needed. On the

other hand, competitive bidding, one of the most commonly used policy instrument in many countries. Nevertheless, while tendering is widely utilized in Egypt and the Middle East as a whole, there has been no evidence of success (RCREEE, 2010).

The following table below summarizes the various policies adopted by the countries we have reviewed previously together with the situation in Egypt.

Table 8 - Global Policies in Comparison with the Situation in Egypt

	China	France	India	Spain	Egypt
RE Targets		√	√	√	√
Feed in Tariff	√	√	√	√	√
Electric Utility Quota Obligation	√		√		
Net Metering	√	√	√	√	√
Biofuels Obligation	√	√	√	√	
Heat Obligation	√	√	√	√	
Tradable REC		√	√	√	
Tendering	√	√	√		√
Capital Subsidies, Grants or Rebates			√		√
Investment or Production Tax Credits	√	√	√	√	
Reductions in Sales, VAT or Taxes	√	√	√		√
Energy Production Payments			√		
Public Investment, Loans or Grants	√	√	√		

CRITICAL INPUT

As we've mentioned earlier, sometimes, it's crucial to design policies which address the "non-economic" barriers which hinder the development of renewable energy projects. These barriers range from lack of grid access, lack of capacity building, inefficient administrative processes and inaccurate estimations of costs and expected outcomes. These barriers are the inevitable outcome of the absence of an aligned national energy policy, undefined and fragmented responsibilities across governmental entities. The best practices to overcome these barriers are; the formation of a one-stop administration office which investors can rely on to issue all the required documentations, clear and well communicated permitting processes and conditions, and the implementation of policies that ensure the ease of grid access for investors (ECORYS, 2008; IEA, 2010).

FURTHER RESEARCH

There is a prominent need of studying the nature of policy fluctuations in Egypt with access to data regarding energy uses in all the different sectors, further statistics should be drawn out to determine which policies can be undertaken for energy reform, with simulations and analysis of how those policies affect the market in Egypt. Alternatives for energy reform policies cannot be drawn out unless some strategies are undertaken with the power of proper research and means for researchers to access up-to-date data on energy usage. Also, the advantages of different pricing approaches and the expected impact on the households is a critical research area to be considered.

RECOMMENDATIONS

The case studies regarding energy subsidies mentioned earlier exhibit how extremely challenging it is to remove energy subsidies once in place. Political will is the true determent of

energy reform strategy success during the transition period. In several of the case studies presented earlier, transparency was a major dilemma in removing subsidies.

A range of suggested ideas for reform may include the following:

1. Fuel price regulation that is independent.
2. Price mechanisms that is based on automatic setting, which depoliticizes energy pricing.
3. Decision-makers awareness along with the education of the public regarding the challenges that are posed on the government as it intervenes in fuel pricing. (Laan, Beaton , & Presta, 2010)
4. Citizens need to be properly given the information and knowledge to set the scene of how and why subsidies are to be tampered with. An unambiguous strategy scenario needs to be presented in order to justify government actions.
5. There is no "one solution fits all" Every country has its special conditions that need to be acted upon.
6. Proper research should be done in order to design strategies that accurately depict the needs of the citizens of that country.
7. A tool such as carbon taxes could be presented as a means for decreasing and monitoring emissions or could exist together with an energy tax.
8. Energy alternatives need to be sought after.
9. A reform plan that is comprehensive entailing unambiguous sustainable objective, study of the effect of reform as well as stakeholder consultation.

The key message is clear; the reformation of Egypt's energy subsidies policy is a daunting yet necessary task that requires wise and visionary leadership. Egyptian policymakers need to weigh the tradeoffs involved in any proposed solution using a holistic framework that takes the big picture into consideration. It is only possible for reform to happen in a setting that fosters

government complete transparency concerning the situation, reform strategies specifically designed with the public's well-being in mind, and a bank of research resources that cater for the implementation of those reform policies.

References

Abou Bakr, T. (2014). *Addressing Egypt's Energy Problem: Current Situation until 2013.* Cairo: A working paper of the Energy Committee of the Federation of Egyptian Industries.

Abouleinein, S., El-Laithy, H., & Kheir El-Din, H. (2009). *The Impact of Phasing out Subsidies of Petroleum Energy Products in Egypt.* Cairo: Egyptian Center for Economic Studies.

Al-Ayouty, I., & Abd El Raouf, N. (2015). *Energy Security in Egypt.* Cairo: ECES: The Egyptian Center for Economic Studies.

Alleyne, T., Villafuerte, M., Josz, C., Singh, S., Ruggiero, E., & Andreas, B. (2013). *Energy Subsidy Reform: Lessons and Implications.* IMF.

Baig et al. (2007). *Domestic Petroleum Product Prices & Subsidies: Recent Developments & Reform Strategies.* IMF.

Batlle, C., Perez- Arriaga, I., & Zambrano-Barragan, P. (2011). *Regulatory Design for RES-E Support Mechanisms: Learning Curves, Market Structure, and Burden Sharing.* Massachusetts: MIT Centre for Energy and Environmental Policy Research.

Birdsall, N., & Subramanian, A. (2009). *Energy Needs and Effciency, Not Emissions: Re-framing the Climate Change Narrative.* Center for Global Development.

BMI. (2015). *Annual Report.* Business Monitor International .

Booz Allen Hamilton. (2007). *Energy Pricing Framework for Industry.* . Cairo: Booz Allen Hamilton and Ministry of Trade and Industry.

BSAC. (2015). *The Energy Sector in Egypt.* Cairo: American Chamber of Commerce in Egypt.

C2ES. (2008). *Summary: India's National Action Plan on Climate Change.* Center for Climate and Energy Solutions.

Castel, V. (2012). *Reforming Energy Subsidies in Egypt.* Abidjan: African Development Bank.

Chochet, Y., & Buckle, E. (2012). *Fossil fuel subsidies and governemnt support in 24 OECD countries. Summary for decision-makers.* The Greens European Free Alliance.

ECORYS. (2008). *Assessment of Non-cost Barriers to Renewable Energy Growth in EU Member States* . AEON: DG Directorate-General.

EEHC. (2013). *Annual Report for Fiscal Year 2013/2013.* Cairo: Egyptian Electricity Holding Company.

EETC. (2014). *Annual Report 2013.* Egyptian Electricity Transmission Company.

EgyptERA. (2013). *Indicators of Electric Power Consumption in Economic Activities.* Cairo: Egyptian Electric Utility for Consumer Protection and Regulatory Agency.

EgyptERA. (2014). *Renewable Energy - Feed-in-Tariff Projects' Regulations.* Cairo: Egyptian Electric Utility for Consumer Protection and Regulatory Agency.

EIA. (2013). Washington D.C.: US Energy Information Adminstration.

El-Katiri, L. (2014). *A Roadmap for Renewable Energy in the Middle East and North Africa.* Oxford: The Oxford Institute for Energy Studies.

Ernst and Young, Eversheds. (2013). *Developing Renewable Energy Projects. A Guide to Achieving Success in the Middle East.* ESIA. Retrieved from http://www.mesia.com/wp-content/uploads/Developing%20Renewable%20Energy%20Projects%20-%20MENA%20Guide%202013.pdf

Farrell, J. (2009). *Feed-in tariffs in America: Driving the Economy with Renewable Energy Policy that Works.* Minneapolis.

Fattouh, B., & El-Katiri, L. (2012). *Energy Subsidies in the Arab World.* Oxford: UNDP.

Fattouh, B., & El-Katiri, L. (2013). *Energy Subsidies in the Middle East and North Africa.* Energy Strategy Reviews 2:1.

Flavelle, C., & Crook, C. (2014, September 29). Climate March, Climate Summit, Climate Tax? *Bloomberg View.*

GENI. (2012). *Renewable Energy Potential of China: Making the Transition from Coal Fired Generation.* Global Energy Network Institute .

Granado et al. (2010). *The Unequal Benefits of Fuel Subsidies: A Review of Evidence for Developing Countries.* IMF.

Gupta, Sanjeev, & et al. (2000). *Equity and Efficiency in the Reform of Prices Subsidies.* IMF.

Haas, R. e. (2011). *A Historical Review of Promotion Strategies for Electricity from Renewable Energy Sources in EU Countries.* Elseview Ltd.

Hussein, W. M. (2014). *The Impact of Reforming the Subsidy System on Egypt's Budget Deficit.* Egypt: M.A. Thesis, The National Planning Institute.

IEA. (2010). *Deploying Renewables in Southeast Asia: Trends and Potentials.* Paris: OECD/IEA.

IEA. (2011). *World Energy Outlook 2011.* Paris: OECD/IEA.

IEA, OECD and World Bank. (2010). *The Scope of Fossil-Fuel Subsideies in 2009 and a Roadmap for Phasing Out Fossil-Fuel Subsidies.*

IISD. (2005). *A Citizen's Guide to Energy Subsidies in India.* The International Institute for Sustainable Development.

IISD. (2010). *Mapping the characterstics of Producer Subsidies: A review of pilot country studies.* Geneva: IISD.

IISD. (2012). *A Citizens' Guide to Energy Subsidies in Nigeria.* Lagos: Center for Public Policy Alternatives.

IISD. (2012). *Indonesia's Fuel Subsidies: Action Plan for Reform.* Geneva: IISD.

IRENA. (2012). *Evaluating Policies in Support of the Deployment of Renewable Power 2012.* International Renewable Energy Agency.

IRENA. (2014). *Renewable Energy Prospects: China.* International Renewable Energy Agency.

Jager, D., & et al. (2011). *Financing Renewable Energy in the European Energy Market.* Brussels: European Commission, DG Energy. Retrieved from http://ec.europa.eu/energy/renewables/studies/renewables_en.htm

Kantor, EQI. (2009). *Energy Pricing Strategy in Egypt.* Washington, DC.: Workd Bank.

KPMG. (2014). *Taxes and incentives for renewable energy.* KPMG International.

Laan, T., Beaton , C., & Presta, B. (2010). *Strategies for Reforming Fossil-Fuel Subsidies: Practical lessons from Ghana, France and Senegal.* Geneva: International Institute for Sustainable Development.

Lester, R. K. (2009). *America's Energy Innovation Problem (and How to Fix it).* Energy Innovation Working Paper Series.

McKinsey. (2009). *Energy: A Key to Competitive Advantage.* NY: McKinsey & Company.

Ministry of Finance. (2015). *The Financial Statement for Budget of the Fiscal year 2014/2015.* Ministry of Finance (MOF).

Ministry of Law and Justice. (2003). *The Electricity Act.* India: Ministry of Law and Justice.

Mitchell, C. e. (2011). *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation.* Cambridge and New York: Cambridge University Press.

MNRE. (2011). *Jawaharlal Nehru National Solar Mission.* Ministry of New and Renewable Energy .

MNRE. (2013). *Annual Report.* Ministry of New and Renewable Energy.

MoEE. (2013). *Annual Report.* Ministry of Electricity and Energy.

MoF. (2013). *The Financial Statement for Budget of the Fiscal Year 2013/2014.* Cairo: Ministry of Finance.

MoP. (2013). *Annual Report.* Cairo: The Egyptian Ministry of Petroleum.

Mourougane, A. (2010). *Phasing out Energy Subsidies in Indonesia.* France: Organization for Economic Cooperation and Development.

Moyo, N., & Songwe, V. (2012, January 10). Removal of Fuel Subsidies in Nigeria: An Economic Necessity and a Political Dilemma. *BROOKINGS*.

Müller, S., Brown, A., & Ölz, S. (2011). *Renewable Energy. Policy Considerations for Deploying Renewables.* Paris: International Energy Agency.

NREA. (2012). *New and Renewable Energy Authority Annual Report.* Egypt: Ministry of Electricity and Energy.

NREA. (2014). *Annual Report 2013.* New and Renewable Energy Authority.

NREA. (2015). *Future of Renewable Energy in Egypt.* New and Renewable Energy Authority.

Nwafor et al. (2006). *Does Subsidy Removal Hurt the Poor?* Secretariat for Institutional Support for Economic Research in Africa.

OECD. (2012). *REN 21 Renewables 2013 Global Futures Report.* International Energy Association (IEA).

PwC. (2015). *Developing Renewable Energy Projects: A Guide to Achieving Success in the Middle East.* Egypt: PwC.

Ragab, A. (2010). *Fossil Fuel Prices in the Arab World and Fear of Reform.* Germany: GTZ.

Ragwitz, M. e. (2012). *RE-Shaping: Shaping an Effective and Efficient European Renewable Energy Market.*

Razavi, H. (2012). *Clean Energy Development in Egypt.* African Development Bank.

RBI. (2015). *Annual Report.* Reserve Bank of India. Retrieved from www.rbi.org.in

RCREEE. (2010). *Policies for Energy Efficiency and Renewable Energy in the RCREEE Group of Countries.* Cairo: Regional Centre for Renewable Energy and Energy Efficiency.

REN21. (2012). *Renewables 2012 Global Status Report.* Paris: REN21 Secretariat.

Sdralevich, C., Sab, R., Zouhar, Y., & Albertin, G. (2014). *Subsidy Reform in the Middle East and North Africa: Recent Progress and Challenges Ahead.* Washington, D.C.: International Monetary Fund.

Siemens. (2013). *Connecting Possibilities - Scenarios for Optimizing Energy Systems.* Siemens.

Sumner, J., Bird, L., & Smith, H. (2009). *Carbon Taxes: A Review of Experience and Policy Design.* Colorado: National Renewable Energy Laboratory.

UNEP. (2004). *Executive Summary.* . United Nations Environment Program and Greanleaf Publishing.

Vagliasindi, M. (2013). *Implementing Energy Subsidy Reforms: Evidence from Developing Countries.* Washington D.C.: International Bank for Reconstruction and Development / World Bank Publications. Retrieved from http://www.scribd.com/doc/111657654/Implementing-Energy-Subsidy-Reforms

Vidican , G. (2012). *Building Domestic Capabilities in Renewable Energy.* German Development Institute.

WEF. (2010). *Green Investing 2010: Policy Mechanisms to Bridge the Financing Gap.* Geneva: World Economic Forum.

Winkel , T., Rathmann, M., Ragwitz , M., Steinhibler, S., Winkler, J., Resch, G., . . . Konstantinaviciute, I. (2012). *Renewable Energy Policy Country Profiles: 2011 Version.* Intelligent Energy Europe Project RE-Shaping.