ARAB REPUBLIC OF EGYPT

CONSULTING SERVICES FOR
AN ENERGY PRICING STRATEGY

FINAL REPORT

25 June 2009

KANTOR Management Consultants
Omirou & Vissarionos 1
106 72 Athens,
GREECE

EQI ENVIRONMENTAL QUALITY INTERNATIONAL
18 El Mansour Mohamed,
Apt. 3, Zamalek,
Cairo, EGYPT

A study funded by ESMAP and the World Bank

TABLE OF CONTENTS

1 INTRODUCTION 1

2 PROJECT OVERVIEW AND KEY FINDINGS 2

2.1 Main project objectives and tasks 2
2.2 The case for reforming energy prices 2
2.3 Determination of cost-reflective prices 4
2.3.1 Electricity and natural gas 4
2.3.2 Petroleum products 5
2.4 Length of the price transition period 6
2.5 The effects of energy pricing reform ('PSIA') 6
2.5.1 Aggregate economic impacts 8
2.5.2 Distributional impacts 10
2.6 Commencement of energy price reform 11

3 RECOMMENDED PRICE TRANSITION PATH 13

3.1 Actual prices and required increases to reach full cost recovery 13
3.2 Progression of subsidies during the transition period 15
3.3 Review of prices during the transition period 18
3.4 Automatic price adjustment 18
3.4.1 Rationale for an Automatic Price Adjustment Mechanism (APAM) 18
3.4.2 APAM in the electricity sector 19
3.4.3 APAM in the gas sector 21
3.4.4 APAM in the oil sector 21

4 MITIGATION MEASURES 23

4.1 Eligibility for assistance 23
4.2 Type of support 23
4.3 Compensation levels 24
4.4 Allocation of cash transfers 25
4.5 Targeting and delivery methods 26

5 IMPLEMENTATION, MONITORING AND EVALUATION FRAMEWORK 28

5.1 Inter-ministerial Committee 28
5.2 The Economic Group and the Cabinet of Ministers 30
5.3 Links to wider government policies for energy sector reform 30

6 ACTION PLAN 31

APPENDIX A: VALUE OF SUBSIDIES IN THE ELECTRICITY AND GAS SECTORS BY

CUSTOMER GROUP 34

APPENDIX B: KEY ASSUMPTIONS UNDERLYING THE COST CALCULATIONS.....36

Abbreviations

APAM	Automatic Price Adjustment Mechanism
ASAP	As Soon As Possible
CAGR	Compound Annual Growth Rate
CAPMAS	Central Agency for Public Mobilisation and Statistics
CCTs	Conditional Cash Transfers
CGE	Computable General Equilibrium
cm	cubic metres
CNG	Compressed Natural Gas
CoM	Cabinet of Ministers
EC	Economic Group
EGPC	Egyptian General Petroleum Corporation
EIA	Energy Information Administration (US)
FOB	Free on Board
GDP	Gross Domestic Product
GoE	Government of Egypt
HFO	Heavy Fuel Oil
HIECS	Household Income Expenditure and Consumption Survey
IC	Inter-ministerial Committee
ISC	Inter-ministerial Steering Committee
kTOE	Thousand Tonnes of Oil Equivalent
LE	Egyptian Pound
LPG	Liquefied Petroleum Gas
mcm	thousand cubic metres
MOSS	Ministry of Social Solidarity
OECD	Organisation for Economic Cooperation and Development
PMT	Proxy Means Testing
PSAs	Production Sharing Agreements
PSIA	Poverty and Social Impact Analysis
SAM	Social Accounting Matrix
WACC	Weighted Average Cost of Capital

1 INTRODUCTION

The present report is the final deliverable of the consulting study, "An Energy Pricing Strategy for Egypt", undertaken for the Government of Egypt with World Bank financing. The purpose of the report is threefold:

- To provide an overview and summarise key aspects of the project, and integrate the main findings that have been presented in a series of separate reports developed during the project;
- To provide specific recommendations for energy prices and levels, the transition path to full cost-reflective prices and the proposed mitigation support to accompany the pricing reform; and
- To provide an overview of the organisational arrangements and key actions for implementing the energy pricing strategy.

Accordingly, the present report is broadly structured around the above objectives and, more specifically, comprises of the following sections:

- Following this introduction, section 2 provides an overview of key elements of the study, including its objectives and tasks, the rationale for reforming energy prices, and the methodology for determining cost-reflective prices and assessing the impact of implementing them;
- Section 3 contains the recommended energy prices over the suggested transition period, together with the subsidies that continue to apply during the transition, and proposals for modifying prices in accordance with movements in key price-determining parameters;
- Section 4 sets out the minimum levels of cash compensation that we recommend be provided to eligible households for the mitigation of negative impacts during the reform/transition period;
- Section 5 discusses the organisational arrangements for implementing, monitoring and evaluating the energy pricing strategy; and
- The final section contains the action plan for implementing the strategy.

2 PROJECT OVERVIEW AND KEY FINDINGS

2.1 Main project objectives and tasks

The Government of Egypt (GoE) and the World Bank commissioned the present study with the objective of developing an energy pricing strategy for Egypt that creates a path toward energy price levels that are reflective of the underlying economic costs, whilst explicitly considering the economic and social impacts of the price increases, and prudently managing the potential negative effects of subsidy removal on vulnerable customers. Consistent with this objective, the consulting study:

- Sought to establish the cost of supply to meet current and projected demand for each energy product;
- Examined the economic and distributional impacts of the required price changes for achieving cost recovery under various scenarios; and
- Developed recommendations for the targeting of support to a sub-set of households.

An additional important aspect of the consulting study was to provide to the GoE a set of modelling tools through which key elements and parameters of the energy pricing strategy could be analysed. The delivery of these models and the training provided enable GoE to monitor and analyse the effects of key economic and energy pricing parameters on the pricing strategy, and proceed with changes or refinements accordingly. In this way, GoE can autonomously develop energy pricing and guide its implementation, following completion of the present consulting study.

2.2 The case for reforming energy prices

The current system of energy subsidies involves substantial Government funds, which according to Ministry of Finance figures exceeded LE 40 billion in each of the 2005/06 and 2006/07 fiscal years, and are estimated at approximately LE 60 billion for 2007/08. Energy subsidies in each of the past three fiscal years have represented between 5.4 and 6.7 per cent of GDP. To put this into perspective, the amounts are broadly equivalent to the total wage and remuneration bill of the entire Egyptian budget sector, comprising the central government, local governments and some public corporations. Energy subsidies, therefore, represent a significant cost and divert public funds from other (potentially higher value) alternative uses. Moreover, the government accounts only record financial subsidies, and specifically subsidies only in the oil and gas sectors, while also not incorporating the full investment costs required to fund the future operations of the energy sector. If electricity were to be included and subsidies calculated on the basis of full economic costs (as given

by opportunity costs), the resulting subsidies would be even larger – according to our estimates, as much as LE 130 billion in 2007/08, or a staggering 14.5 per cent of GDP.

In addition to the high budgetary cost associated with the energy subsidies, artificially low energy prices result in excessive energy consumption, as exemplified by the energy and carbon intensity of the Egyptian economy, which is 2.5 to 3 times higher than the OECD average. Artificially priced energy inputs also cause a misallocation of resources, as they differentially favour some industries and firms at the expense of others, while resulting in insufficient revenues for Egypt's energy companies, which in turn impacts upon their ability to fund future capital expenditure, and finance innovations and efficiency improvements. Egypt's energy exports and the country's energy self-sufficiency are also jeopardised by artificially low energy prices, as the lack of energy saving and overconsumption lead to increased dependence on energy imports when national resources are insufficient. Finally, there are negative effects on the environment, given the higher emissions of carbon dioxide and other greenhouse gases associated with energy (over)consumption.

Notwithstanding the above disadvantages of the current energy pricing regime, a common rationale for untargeted subsidies through energy pricing is to ensure access to affordable energy services, particularly by lower income households. However, the benefits of the current energy subsidy system are highly regressive, that is, they are enjoyed mostly by the relatively well-off portion of the population. More specifically, 57 per cent of subsidies are currently captured by the top two quintiles when Egypt is considered as a whole, compared to 26 per cent accruing to the bottom 40 per cent of income earners (the 'poor' and 'near-poor'). In the case of urban households, the top two quintiles receive a full three-quarters of the total subsidies. The poor targeting of energy subsidies is to be expected, as almost any universal consumption subsidy will disproportionately benefit the rich since they, by definition, account for a relatively high proportion of total income and consumption. Moreover, in the case of Egypt, many poor Egyptian households do not have their own vehicles, and therefore receive no direct benefit from the gasoline subsidy.[1] This suggests that reasonably effective support mechanisms that target the poor would be substantially better than the existing subsidy system.

Given the above factors, it is clear that the phasing out of subsidies would reduce Egypt's fiscal burden and generate significant government savings that could be used to fund other priorities, including more targeted assistance to deserving households. Phasing out of subsidies would also reduce energy overconsumption and encourage energy saving, make use of energy more efficient, and enhance the security of supply. Finally, energy price reform would provide correct pricing signals

[1] They do benefit indirectly to a degree, through the use of public transportation.

to producers, consumers and investors and, therefore, create the preconditions for a more competitive economy over the longer term, while resulting in a reduction of environmental pollution.

A clear strategy for removal of energy subsidies in Egypt is needed. The starting point of any such strategy is the setting of target levels for energy prices. A decision on the pace and timing of energy price reform towards the target is also necessary, whilst also having due regard to assessing and mitigating impacts, particularly on vulnerable customers. The following sub-sections consider each of these matters in turn.

2.3 Determination of cost-reflective prices

Correct economic signals are given by prices that recover opportunity costs, i.e. those which ensure full recovery of the economic costs associated with the supply of energy products in Egypt. Hence, the target prices should be determined on this basis.

Current energy prices in Egypt are only a small fraction of relevant economic or opportunity costs. In most cases, energy prices are below one-quarter of the underlying economic costs. For example:

- The current LPG price covers only 4 per cent of its cost;
- Current gasoline prices cover on average 19 per cent of costs; and
- Current electricity tariffs for residential customers are on average at a level representing 22 per cent of relevant economic costs.

The basis and methodology adopted by the Consultant for determining cost-reflective prices is described briefly below, while full details are provided in the report prepared by the Consultant earlier in the study, “Energy Cost of Supply and Pricing Report”.

2.3.1 Electricity and natural gas

The cost of supply across the value chain of electricity and natural gas was determined by assessing both current demand and cost levels, and the additional capital and operating costs that would be incurred in the future to meet growing customer demand. Subsequently, costs were aggregated and used to derive cost-reflective prices per customer category and sub-sector. The financial viability of each sub-sector was then verified using demand, price, and operating and capital cost data.

The current cost base was defined and estimated for all activities in the value chain for both electricity and gas. The cost of gas and electricity at the source, i.e. the cost of natural gas entering Egypt’s

transportation system and the fuel cost of the power generation plants, was calculated under alternative methodologies described in detail in the cost and pricing report. All operating and capital costs were forecast for the 15-year time horizon agreed for the purposes of the analysis (2007/08 - 2021/22). Unit costs of supply for each activity in the supply chain were then calculated using a 'cost of service' methodology.

The cost of service methodology essentially entails, firstly, the determination of a 'revenue requirement' that ensures the recovery of all underlying costs i.e. fixed and variable operating costs, depreciation and a return on assets, with the latter being derived by multiplying the value of the asset base with the relevant weighted average cost of capital (WACC). The WACC used for all natural gas and electricity activities (i.e. electricity generation, transmission and distribution, and natural gas transportation and distribution) was 8 per cent real, pre-tax. Average cost-reflective prices were then calculated for each customer category and electricity/gas sub-sector by aggregating the unit costs of the applicable sub-sector activities.

2.3.2 Petroleum products

End-user prices for all oil products (gasoline, LPG, kerosene, gas oil and fuel oil) were calculated in three steps:

- First, the crude oil cost in Egypt was estimated using a number of alternative methodologies (the reader is again referred to the separate cost and pricing report for full details);
- Ex-refinery prices for each product were then calculated on the basis of the crude oil costs by estimating the historical statistical relationships between the crude oil price and each finished petroleum product price taking a historical sample of Mediterranean FOB prices (monthly prices from January 2003 until December 2007) and applying these relations to the crude oil price derived previously; and
- Finally, local distribution, storage, supply and other costs were added to the ex-refinery prices to calculate end-user prices for each petroleum product.

The ensuing project work entailing the examination of the impacts of the cost-reflective prices continued to consider two alternative costing options - "actual cash costs" and "opportunity costs" (as defined in the cost and pricing report). However, it was finally agreed with the Inter-ministerial Steering Committee (ISC) to adopt opportunity cost prices, which yields the price-cost deficits referred to at the beginning of this section.

2.4 Length of the price transition period

As the current levels of energy prices are very low compared to economic costs, one-off subsidy removal would necessitate very high price increases (which are discussed in section 3). Hence, the adoption of a transitional period for price reform is necessary and, for this purpose, much of the Consultant's analysis examined both five-year and 10-year transition periods. However, there is no objective or 'correct' transition period and the choice largely depends on considerations of political economy.

A long transition period (exceeding five years) has a relatively smaller economic and distributional impact and is more politically palatable, but delays benefits and makes it difficult to sustain reform. A shorter transition period of five or less years, on the other hand, generates more rapid budget savings and ensures earlier establishment of the preconditions for longer term growth, but has a larger economic and social impact due to the higher annual price increases required and, therefore, requires careful management.

If a five-year transitional reform of prices for all energy products were to be pursued, as previously recommended and adopted by the Consultant in this report, annual real price increases, on average, would range between approximately 13 per cent and 85 per cent. These are very high price increases and, therefore, the resulting impacts from the removal of energy subsidies must be examined and understood. The effect of price increases on poorer households must particularly be analysed, as these households are likely to have limited opportunities for substitution and/or income enhancement.

2.5 The effects of energy pricing reform ('PSIA')

Prices in a market-based economy provide important signals that influence the production, consumption and investment decisions of all economic agents, while they also have obvious implications for their incomes. This is particularly the case for energy prices, given the role of energy in the economy as both a final consumption good and its extensive use as an intermediate input in all production processes. Hence, energy price increases impact the breadth of economic activity inducing shifts and changes in aggregate and sectoral demand and supply, consumption and resource allocation decisions, production choices (as a result of different input prices), wages (which in turn differentially affect net buyers and sellers of labour) and, of course, real and nominal household incomes.

In order to capture the effect of energy price changes through all these transmission channels and

the complex interactions between the various sectors of the Egyptian economy, a tailored Computable General Equilibrium (CGE) model was developed specifically for the purposes of this study. The CGE model is a simulation that combines an abstract general equilibrium economic structure with realistic economic data to solve numerically for the levels of supply, demand and price that support equilibrium across a specified set of markets and can capture the aggregate welfare impacts of increased energy prices (under different scenarios), whose effects may be transmitted through multiple markets.

The original intention was to use an existing CGE model for Egypt (used for the World Bank study, "Toward a More Efficient Social Policy: Subsidies and Safety Net") but as it transpired, the CGE model provided was static, had a highly aggregated energy sector (as opposed to highly disaggregated food processing sector), and used the outdated 2004 Social Accounting Matrix (SAM) for Egypt. We therefore constructed a new CGE model, with a dynamic inter-period adjustment mechanism, a detailed breakdown of the energy sector and the most recent SAM (2007) for Egypt. Nevertheless, it must be emphasised that even the newly constructed model has limitations, chief amongst which is the static nature of the within-period calculations, and therefore the CGE modelling results need to be treated with some caution.

Moreover, another shortcoming of general equilibrium models is that they assess impacts for 'representative' households and enterprises and, therefore, cannot evaluate socio-economic impacts. Accordingly, for the purposes of assessing the effects of energy pricing reform, or undertaking the 'Poverty and Social Impact Analysis' (PSIA), we complemented the findings of the CGE model with more disaggregated household and poverty analysis to better understand the real income effects of energy price increases and the impact on households in different points of the income distribution.

The starting point for the PSIA was the cost and pricing scenarios adopted as a result of the preceding stages of the study. These price increases were fed into both the CGE model and the household analysis in order to determine the economy-wide and household distributional impacts, respectively. Important inputs to the household analysis, other than the energy price increases, were the consumption data derived from the most recent (2005) Household Income Expenditure and Consumption Survey (HIECS) undertaken by the Central Agency for Public Mobilisation and Statistics (CAPMAS), a qualitative field study undertaken by the Consultant and the prices for non-energy products derived from the CGE model. Finally, a separate and detailed review and assessment of international experience (and relevant literature) was undertaken in order to develop principles and criteria for the design of mitigation measures and to draw out key lessons and issues that must be taken into account when compensating 'deserving' groups as a result of subsidy removal. This

analysis then formed the basis of the development of mitigation measures.

The key results of the PSIA at both the aggregate economic and household distributional levels, particularly as they relate to the chosen scenario of opportunity cost pricing with a five-year transition, are discussed below.

2.5.1 Aggregate economic impacts

On the basis of our modelling and analysis, the progressive removal of energy subsidies generates both positive and negative outcomes. On the negative side, the increase in energy prices would contribute to increasing other domestic prices and therefore inflation. These price increases would reduce the demand for final and intermediate consumption goods, as well as the income of households and other private and public institutions (including the general government sector). Private consumption, for example, grows 3 percentage points less in real terms compared to a scenario of no subsidy removal. Furthermore, GDP growth in the short-to-medium term is expected to be slightly lower (by 0.1 - 0.7 percentage points) compared to the case where subsidies are not removed, while the output of the energy sector declines significantly.[2] Finally, the growth rates of non-energy exports also decrease due to the high energy prices associated with subsidy removal and the resulting loss in 'competitiveness'.

On the positive side, both government revenues and savings – as a proportion of GDP - are expected to improve. More particularly, government savings, as a share of nominal GDP, are expected to increase by some 8 percentage points compared to a scenario of no subsidy removal. In addition to government and national savings, other important economic parameters, such as the trade balance and the current account improve markedly, with significantly greater energy exports largely driving this improvement. Specifically, the trade balance and current account surpluses, as a share of nominal GDP, would increase by some 6 percentage points compared to the scenario of no subsidy removal.

The superior saving at a national level creates the preconditions for greater investment and therefore growth, which serves to mitigate the dampening in demand due to the generalised price increases resulting from the removal of the energy subsidies. As a result, over the medium term, it is expected that GDP growth under the energy price reform scenario would be broadly equivalent to GDP growth under a scenario involving no energy price reforms, while over the longer term it is expected that

[2] Prior studies undertaken in Egypt have shown similar results. For example, the 2006 Booz Allen report on energy subsidies that was commissioned by the Ministry of Finance predicted a real GDP growth reduction of 0.6 – 1.7 percentage points in the years of price reform (despite the continuation of subsidies for some energy products).

GDP growth under the energy price reform scenario would overtake the GDP growth of the scenario where energy prices remain unchanged.

Finally, according to our modelling results, we expect an improvement in aggregate employment outcomes under the reform scenario, despite a significant reduction in employment (almost 20 per cent) in the energy sector over the five-year transition period. Overall, we estimate that compared to a scenario of no subsidy removal, employment by 2011/12 in aggregate would increase by a little over 4.2 per cent, or about 1.2 million jobs. The most significant job growth is expected in non-energy intensive industries (4.6 per cent increase) and particularly in construction (32 per cent), the tourism, financial and business sectors (11 per cent) and in food and beverages (7 per cent). Significant job growth is also expected in some energy intensive industries, such as fertilizers (11 per cent) and chemicals (8 per cent).

The key transmission mechanisms and impacts of energy subsidy removal can be summarised as follows:

- The progressive removal of energy subsidies results in price increases in other final and intermediate goods and services, with those of the energy-intensive sectors increasing most;
- The higher energy prices and the associated increase in non-energy prices negatively affect household demand and the intermediate consumption of industries. The average annual growth rate of private final consumption spending in real terms is expected to decrease significantly (as much as 50 per cent) compared to the 'reference scenario' (where energy prices are retained at current levels);
- Since the demand for commodities is composed of both domestic and imported goods, demand for imports is also expected to decline from a little over 4 per cent in the 'do nothing' scenario to about 2 per cent when energy subsidies are removed;
- For analytical purposes, crude oil and natural gas production (or extraction) rates were assumed fixed, hence, with the decline in domestic demand, the exports of these energy products are expected to increase. Because these exports account for a considerable component of total Egyptian export proceeds, overall real exports are expected to grow even though the exports of petroleum-refined products and non-energy commodities fall;
- The relative increase in exports coupled with the drop in demand for imports would improve the performance of net exports. The positive effect on net exports partly mitigates the negative impact on the demand for goods and services and reduces the negative impact on aggregate GDP; and

- The negative impact of subsidy removal on GDP is further mitigated by two other positive effects: (i) the increase in net indirect taxes resulting from the elimination of energy subsidies, and (ii) the expected increase in the GDP of high-investment sectors.

Taking account of all the above factors, the basic result is that the composition of the Egyptian economy changes so that it becomes relatively less consumption-driven and more export-driven, and its savings position improves significantly so that the country also becomes an exporter of capital.

2.5.2 Distributional impacts

Two approaches were used to measure the impact of removing energy subsidies on households. The first approach used simulations based on the HIECS survey together with (i) the price increases derived from the costing exercise to determine the impact of more expensive energy products and services (the direct impact), and (ii) price indices from the CGE model to capture the impact of the resulting increases in non-energy products (the indirect impact). The total real income effect was calculated as the sum of the direct and indirect real income effects, and the incidence was also determined by calculating the average effect for households in different parts of the income distribution. This approach may be considered as a first-order estimate of the loss in real income, as it does not take into account substitution possibilities. However, it provides a bound on the real-income effect, and is likely to closely approximate short-run welfare impacts given that short-run substitution possibilities are smaller than in the long-run. This estimate is also likely to be highly relevant for the poorest households who have more limited opportunities for substitution, as supported by the qualitative field study we undertook

The second approach did not seek to differentiate the direct and indirect effects and took the total impact as provided by the CGE model (which includes all substitution and income effects) and combined it with the HIECS data to determine distributional impacts. Further details on both approaches can be found in the relevant project report, “Poverty and Social Impact Analysis”.

The main findings of the household analysis may be summarised as follows:

- The expected real income losses from the removal of energy subsidies are significant;
- More specifically, we estimate that the cumulative five-year losses will range from a lower bound of 6-12 per cent to as high as 22-23 per cent, i.e. over one-fifth of total income in real terms;
- The most significant transmission channel is the increased prices in goods and services other than energy – the direct impact resulting from the increase in the prices of energy products is

estimated at between 1.5 and 3 per cent, with the remainder of the income loss being attributable to indirect impacts;

- The poorer households are expected to be particularly affected, as the impacts are relatively high in proportional terms (e.g. the impacts on the bottom quintile are second only to the top quintile), while these households have limited opportunities for substitution and/or income enhancement; and
- Given the above factors, in the absence of any mitigation measures and support, poverty is expected to be much higher than it would otherwise be, particularly in areas that are already very poor, such as the rural regions of Egypt.

2.6 Commencement of energy price reform

When the present project was tendered to consultants (late 2007) and even in the early period of the study's implementation (March – September 2008), there was a pressing need to quickly arrive at some key policy directions and decisions for energy price increases. Beyond the resource allocation and efficiency arguments for removing energy subsidies, the cost to Government of maintaining the subsidies was rapidly increasing in view of spiralling international hydrocarbon prices, and placing added strain on Egypt's fiscal position. Since that period, international oil and gas prices have fallen precipitously, and the world has been gripped by a financial crisis of almost unprecedented proportions that has also resulted in a continuously deteriorating economic outlook for most, if not all, countries across the globe. While there is no actual risk of recession in Egypt, real annual GDP growth is expected to fall from its recent average of 7 per cent to about 4 per cent. The standard policy response in most countries (beyond expansionary monetary policies) has been to provide fiscal stimulus to maintain economic activity in light of reduced private sector output (resulting from the credit squeeze and/or other factors). In this context, it is noteworthy that GoE in February this year agreed to reduce electricity and gas prices to the glassware, chemical and ceramic industries by about 30 and 40 per cent, respectively. In this environment, it is difficult to ascertain whether there is an ongoing urgency and commitment to progressively increasing energy prices to cost-reflective levels in the immediate future.

The short-term contraction of GDP and slowing of private consumption compared to a 'do nothing' scenario, which we predict would follow the progressive increase of energy prices, might suggest that immediately embarking on energy subsidy removal under present circumstances would indeed be ill-timed. However, we believe there are a number of compelling reasons for not postponing and proceeding with energy subsidy reform, including the following:

- With inflation appearing to have gone beyond its peak and heading toward single digit rates, progressive energy price increases might result in a lower inflationary impact than would otherwise be the case;
- The deteriorating balance of payments situation of the Egyptian economy and the recent reversal of capital flows as a result of the financial crisis have all but eliminated the country's current account surplus – according to our analysis, the progressive removal of energy subsidies will have a positive (and large) impact on precisely these parameters (although, of course, the extent to which oil and gas exports can increase significantly will also depend on the timing and strength of the recovery of the international economy);
- The removal of subsidies is consistent with GoE's medium term goal of fiscal consolidation, while subsidy removal could free up resources that could be applied to higher impact uses, especially under the current difficult economic conditions, such as strengthening cash-based social programmes (over and above the compensation contemplated in the context of this study), and accelerating planned, or introducing new, public infrastructure spending;
- Delaying the removal of energy price subsidies would jeopardise ongoing efforts to liberalise the energy sector and attract private sector investment, which in turn impacts on the efficiency of the sector and, therefore, the competitiveness of the Egyptian economy more generally; and
- The sooner energy pricing reform is embarked upon, the higher are the chances of achieving some of the structural changes necessary to place Egypt in a position to take advantage of a recovery in the international economy when it comes.

Notwithstanding the above, the decision on the timing of the energy pricing reform is a political one, and one that is likely to be delayed given current uncertainties (and the recent price reductions for certain classes of customer). This in many ways represents an opportunity because, as we discuss in later sections of this report, there are a number of actions and further work that must be undertaken to ensure the successful implementation of the pricing reform, not least among which is finalising the establishment of targeted and efficient mechanisms for delivering compensation to eligible households. However, in our view, any delays should be kept to the absolute necessary minimum; we have developed the action plan under the assumption that the pricing strategy will be implemented in about one year from now, which in our view allows sufficient time for finalising key preparatory actions.

3 RECOMMENDED PRICE TRANSITION PATH

In this section, we present the end-user energy prices that we recommend to apply in each of the five years of the transition period. The subsidies that continue to apply during the five-year transition to fully cost-reflective prices are also presented, while we provide suggestions for reviewing and adjusting energy prices within the transition period in response to key changes in assumptions or underlying parameters.

3.1 Actual prices and required increases to reach full cost recovery

It is important to note that we have retained 2006/07 as the base year and applied the price increases for the period 2007/08 to 2011/12, as the entire study and analysis was based on agreed and available underlying data and assumptions applying to actual years during this period, and which permeate all study elements (demand forecasts, cost and price determination, CGE modelling and impact assessment, determination of compensation levels, etc.). Moreover, we have smoothed the price changes so that they increase at the same average annual rate for any given customer category and/or energy product, and ensure that by the end of the period (i.e. in 2011/12) prices are equal to full economic costs (in that year). This implies that the absolute price increases are smaller in the beginning of the period and progressively increase over time.[3] Finally, we emphasise that for electricity and gas, the prices shown below represent average tariffs and are not the individual tariffs that will be faced by customers in practice – the latter will also depend on the structure of tariffs (by customer category) adopted by the gas and electricity businesses, but on average these revised tariffs should recover the average prices/costs shown below (if opportunity cost pricing is used).

The resulting prices for each of the electricity, natural gas and petroleum product sectors are shown in Tables 1 (a), (b) and (c), respectively. Electricity and gas prices are shown by broad customer categories, while in the case of the petroleum sector, prices are shown by product. The prices applying in the base year (2006/07) are presented together with those for each transition year, as are the relevant compound annual growth rate (CAGR) and the total percentage change in prices for the entire five-year transition period.

As shown in the table immediately following, significant annual price increases are required in electricity for all customer categories, which are generally in the order of 30 per cent per year, and result in a three- to fivefold increase in current (i.e. 2006/07) prices over the five-year transition

[3] This profile of price changes also means that price increases will be lower during the early part of the transition where the economy is expected to be subdued compared to its recent trajectory, whereas the larger increases apply when the recovery in the international economy should be well in train.

period. The largest increases needed to align prices with underlying economic costs are for residential customers, and public utilities connected to the high voltage electricity network, while relatively lower price increases are necessary for medium-low voltage commercial customers and public utilities connected to the distribution network.

Table 1(a): Average electricity prices - LE / MWh (nominal)

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	*CAGR*	*Total price change*
High voltage customers								
Industry	*140.50*	182.43	236.87	307.55	399.33	518.49	*29.8%*	*269%*
Agriculture	*144.20*	186.26	240.59	310.76	401.41	518.49	*29.2%*	*260%*
Public utilities	*98.30*	137.09	191.17	266.60	371.80	518.49	*39.5%*	*427%*
Government	*144.00*	186.05	240.39	310.59	401.30	518.49	*29.2%*	*260%*
Medium and low voltage customers								
Industry	*226.80*	273.41	329.61	397.35	479.01	577.46	*20.6%*	*155%*
Agriculture	*135.90*	181.50	242.40	323.74	432.38	577.46	*33.6%*	*325%*
Public utilities	*325.40*	364.95	409.32	459.07	514.88	577.46	*12.2%*	*77%*
Commercial	*265.00*	309.67	361.87	422.88	494.16	577.46	*16.9%*	*118%*
Residential	*114.00*	157.70	218.15	301.77	417.45	577.46	*38.3%*	*407%*
Government	*228.00*	274.57	330.65	398.19	479.52	577.46	*20.4%*	*153%*

Table 1(b) illustrates the prices and required increases for natural gas. The price increases in this case are generally lower than electricity. In fact, in the case of industrial customers connected to the high pressure transmission network, their current (i.e. 2006/07) price is slightly above (four per cent) the 2011/12 cost-reflective price and we have therefore assumed that this price adjustment is made immediately in the first year of the transition. Similarly, for industrial customers of the gas distribution network, we have applied their relatively low total required price increase (10 per cent) from the first year. In the case of compressed natural gas (CNG), a total price increase of a little less than 40 per cent is necessary, which we have made to apply over the first three years of the transition period. For all remaining customers (electricity, petroleum and residential), price increases are spread over the full five-year transition period.

Table 1(b): Average natural gas prices - LE / cm (nominal)

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	*CAGR*	*Total price change*
High pressure system customers								
Electricity	*0.230*	0.273	0.325	0.386	0.459	0.546	*18.9%*	*137%*
Industry	*0.570*	0.546	0.546	0.546	0.546	0.546	*n/a*	*-4%*
Petroleum	*0.230*	0.273	0.325	0.386	0.459	0.546	*18.9%*	*137%*
Medium and low pressure system customers								
Industry	*0.570*	0.626	0.626	0.626	0.626	0.626	*n/a*	*10%*
Residential	*0.200*	0.251	0.316	0.396	0.498	0.626	*25.6%*	*213%*
CNG (vehicles)	*0.450*	0.502	0.561	0.626	0.626	0.626	*11.6%*	*39%*

Note: The CAGR for CNG is calculated for the three years 2007/08 – 2009/10.

Petroleum product prices are shown in Table 1(c). The largest price increases across the energy spectrum are for this group of products, particularly for LPG which needs to increase at approximately 85 per cent each year, or almost 22 times its current price. Gasoline, kerosene and gas oil all require price increases in the order of 40 per cent per annum, while annual increases of approximately 20 per cent are needed for fuel oil to achieve cost-reflective prices by the end of the five-year transition period.

Table 1(c): Petroleum product prices - LE / tonne (nominal)

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	*CAGR*	*Total price change*
LPG	*200*	370	685	1,269	2,349	4,350	*85.1%*	*2075%*
Gasoline	*1,110*	1,537	2,127	2,945	4,077	5,643	*38.4%*	*408%*
Kerosene	*887*	1,278	1,841	2,653	3,823	5,509	*44.1%*	*521%*
Gas oil	*923*	1,274	1,759	2,429	3,354	4,630	*38.1%*	*402%*
Fuel oil	*1,000*	1,202	1,446	1,738	2,090	2,513	*20.2%*	*151%*

3.2 Progression of subsidies during the transition period

In the next set of figures, we show the progressive development of subsidies (as a proportion of cost-reflective prices) during the transition period for each relevant customer category and/or energy product. Hence, for example, if one were to look at industrial customers connected to the high voltage electricity network (first row in the left panel of Figure 1 (a) below), these customers will continue to have prices that are subsidised by 61, 51, 36 and 20 per cent in each of the first four years of the transition period, respectively, before their subsidies fall to zero in 2011/12. As demonstrated by the right hand panel of the figure, the subsidies generally fall at an increasing rate, which is consistent with the greater absolute price increases during the latter years of the transition period shown and discussed above.

The subsidies (in percentage terms) for each of the electricity, natural gas and petroleum product sectors are presented in both tabular and graphic form in Figures 1 (a), (b) and (c), respectively. We note that although prices are immediately increased to cost-reflective levels for industrial customers connected to both the transmission and distribution gas network (see Figure 5 (b)), these still entail some level of subsidy prior to 2011/12, given that the underlying opportunity costs fluctuate from year to year. Consistent with the price paths presented earlier, prior to their full elimination, subsidies generally remain higher for petroleum products (in proportionate terms), followed by electricity and then natural gas.

Figure 1 (a): Electricity subsidies, as a proportion of opportunity cost prices

	2007/08	2008/09	2009/10	2010/11
High voltage customers				
Industry	61%	51%	36%	20%
Agriculture	60%	50%	36%	19%
Public utilities	70%	60%	45%	25%
Government	60%	50%	36%	19%
Medium and low voltage customers				
Industry	46%	38%	26%	13%
Agriculture	64%	54%	39%	22%
Public utilities	28%	23%	14%	7%
Commercial	39%	32%	21%	10%
Residential	69%	59%	44%	24%
Government	46%	38%	25%	13%

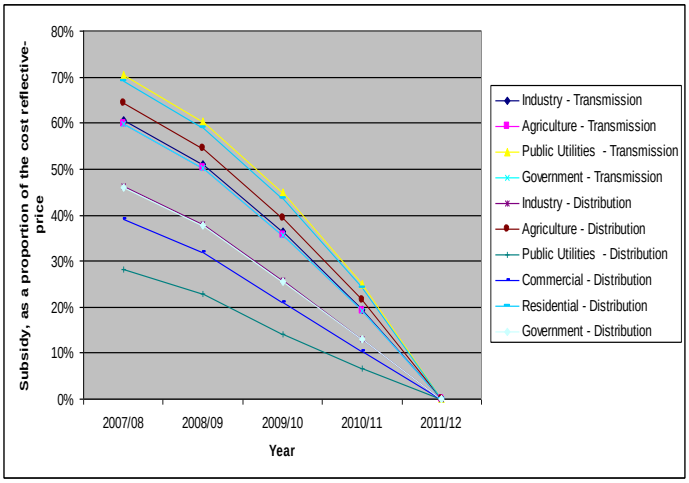


Figure 1 (b): Natural gas subsidies, as a proportion of opportunity cost prices

	2007/08	2008/09	2009/10	2010/11
High pressure system customers				
Electricity	50%	45%	31%	15%
Industry	0%	7%	3%	0%
Petroleum	50%	45%	31%	15%
Medium and low pressure system customers				
Industry	3%	4%	1%	1%
Residential	59%	52%	37%	19%
CNG (vehicles)	18%	14%	1%	1%

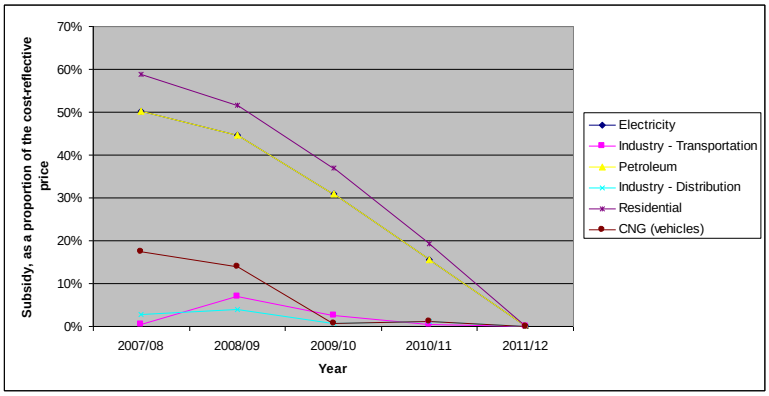
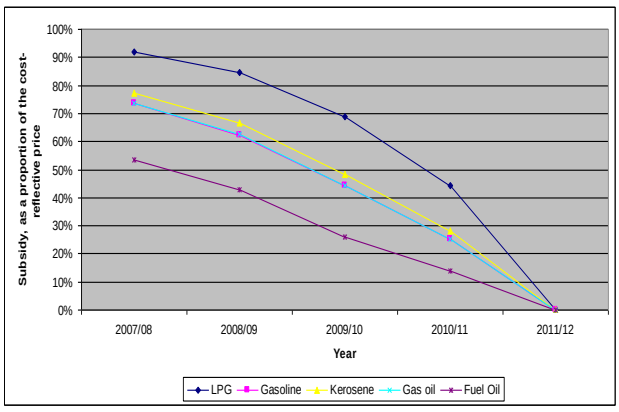


Figure 1 (c): Petroleum product subsidies, as a proportion of opportunity cost prices

	2007/08	2008/09	2009/10	2010/11
LPG	92%	85%	69%	44%
Gasoline	73%	62%	44%	25%
Kerosene	77%	67%	48%	28%
Gas oil	74%	63%	44%	25%
Fuel oil	54%	43%	26%	14%



Multiplying the unit subsidies for each energy product with the projected domestic energy consumption levels for each year yields the total amount of actual/implied subsidies during the transition period. These results are presented in Table 2.

Table 2: Total value of subsidies in LE million, nominal (on opportunity cost basis)

for the period 2007/08 – 2010/11

	2007/08	2008/09	2009/10	2010/11	*% of total (on average)*	
Electricity	29,594	27,756	21,195	12,570	*27%*	
Natural gas	7,804	9,271	6,340	3,285	*8%*	
LPG	16,444	15,432	12,080	8,279	*15%*	
Gasoline	14,062	12,733	8,746	5,346	*12%*	
Kerosene	1,303	824	561	336	*1%*	*66%*
Gas oil	37,237	32,050	21,779	13,276	*30%*	
Fuel oil	11,222	7,729	3,912	1,911	*7%*	
Total	**117,667**	**105,794**	**74,614**	**45,001**	***100%***	

As shown above, in the first year of the transition the subsidies are estimated to exceed LE 117 billion and in the penultimate year of the transition the subsidies are still a significant LE 45 billion. As also shown in the table above (far right-hand columns), about two-thirds of the subsidies are attributable to petroleum sector products, approximately a quarter of the total subsidies in each year are accounted for by electricity, while natural gas represents less than 10 per cent of the total amount of subsidies. Among the petroleum products, gas oil (or diesel) represents the largest proportion of subsidies (namely, 30 per cent of total energy subsidies), notwithstanding the fact that larger unit subsidies apply to all other fuel products (with the exception of fuel oil). The differences are explained by the higher consumption levels of gas oil compared to the other fuels.

It should be noted that the subsidies above represent the economic cost of the energy subsidies as measured by opportunity costs and are not comparable to the financial subsidies that are currently reported in the government budget accounts. The financial subsidies are broadly equivalent to those derived by the Consultant under the “actual cost” methodology (see cost and pricing report for an explanation of this approach). Using the latter, total energy subsidies are estimated at LE 47 billion, LE 41 billion, LE 29 billion and LE 17.5 billion for the fiscal years 2007/08, 2008/09, 2010/11 and 2011/12, respectively. The projected subsidies on an actual cost basis for each energy product and transition year are shown in the following table. Appendix A shows the progression of subsidies under both the opportunity and actual cost methodologies for each broad customer group in the electricity and gas sectors.

Table 3: Total value of subsidies in LE million, nominal (on actual cost basis)

for the period 2007/08 – 2010/11

	2007/08	2008/09	2009/10	2010/11	% of total (on average)	
Electricity	17,375	15,821	12,625	7,677	*40%*	
Natural gas	4,507	4,512	3,620	2,176	*11%*	
LPG	6,715	6,105	4,577	2,963	*15%*	
Gasoline	4,794	4,102	2,548	1,450	*10%*	
Kerosene	494	299	191	107	*1%*	*49%*
Gas oil	11,710	9,419	5,591	3,140	*22%*	
Fuel oil	1,524	858	72	7	*2%*	
Total	**47,120**	**41,115**	**29,224**	**17,520**	***100%***	

3.3 Review of prices during the transition period

Given, on the one hand, the length of the transition period (five years) and the likelihood of deviations from forecasts, and the need to avoid frequent revisions on the other, we recommend that one comprehensive review of prices be undertaken in mid-term (i.e. after 2.5 years) and revised prices be adopted if necessary. The review should be approved as part of the energy pricing strategy from the outset, i.e. it will need to be pre-announced and explicitly explained in any communication campaign. In the intervening periods, there may be a need to have an automated adjustment or indexation system to take account of fluctuations in the key cost driver (fuel prices) - in the section immediately following we describe how such a mechanism could operate. The adoption and functioning of this mechanism will similarly need to be made clear at the outset of pricing reform implementation.

3.4 Automatic price adjustment

3.4.1 Rationale for an Automatic Price Adjustment Mechanism (APAM)

The proposed path for energy pricing reform is based on assumptions concerning the underlying economic cost of supply of the different energy forms and thus the extent to which current energy prices should be increased over the five-year transition in order to reach the assumed cost levels.[4] A significant portion of the costs of supply of the energy products is accounted for by the cost of primary fuels, namely crude oil and natural gas in the case of Egypt. The evolution of crude oil and natural

[4] Refer to Appendix B for a list and brief discussion of the key underlying assumptions.

gas prices is nevertheless subject to considerable fluctuations as clearly evidenced in the past 12 months. International fuel prices should thus be closely monitored, and corrective actions with respect to the energy pricing path should be taken if there are considerable deviations in international fuel prices compared to the assumed forecasts embedded in the costing and pricing assumptions and models.

The costing and pricing models developed in our study are useful tools that permit the policy maker to assess the impact of changes in parameters influencing costs and make necessary adjustments to the energy prices and transition path. These could be used, for example, during the suggested mid-term review. Nevertheless, it is also necessary for the policy maker to avoid initiating frequent revisions in the established energy pricing reform path. By introducing frequent adjustments to an energy pricing strategy, which will have been approved and pre-announced, the policy maker begins to lose credibility, introduces unnecessary administrative complexity and costs, and risks discontent among consumers.

In order to protect energy product suppliers in the case of significant changes in international fuel prices, but also to limit the Government's exposure to changes in international prices of fuels in case energy prices cannot recover such increased costs and the Government is asked to subsidise the difference, an Automatic Price Adjustment Mechanism (APAM) can be considered. An APAM, can permit electricity and gas suppliers to levy an extra charge to customers in order to recover part of the costs incurred as a result from large increases in fuel prices, and in the case of electricity or gas to refund customers in case of significant fuel price decreases. In the case of oil products, an automated fuel adjustment mechanism that indexes reference oil product costs to movements in international prices can enable suppliers of oil products to increase or decrease their prices (in liberalised markets, this is done automatically).

3.4.2 APAM in the electricity sector

In the electricity sector, the APAM could be introduced to enable the electricity company to be compensated for differences in fuel purchase prices against a set of reference prices, provided these differences are above certain pre-defined thresholds. The difference would be charged to customers.

As part of the APAM, reference prices would have to be set for the unit costs of the commonly used fuels for electricity production, such as fuel oil and natural gas. Deviations from the set reference prices can then be established by comparing reference prices to relevant fuel costs. In the case of Egypt, such costs would be the actual average gas and oil (HFO) prices paid by the electricity

company to the gas and oil suppliers respectively (verified by invoices). Internationally, APAM mechanisms index oil and gas prices to international prices e.g. HFO 1 per cent FOB Med price, as published in Platts, and indices of Henry Hub or Rotterdam prices for natural gas. In Egypt, this approach is not suitable, as the electricity company is not allowed to make its own gas imports and its primary fuel purchases derive entirely from the national oil company.

The review period for monitoring price changes, and assessing whether the electricity company should charge or refund customers in relation to swings in fuel prices in the context of the APAM should also be defined. For example, it can be set every three months.

Defining the "threshold limit", above which the APAM compensation mechanism is triggered, is also important. For example, a primary threshold could be set to 10 per cent, on the premise that the electricity company has the ability to achieve economies of fuel purchases through long term purchases and/or hedging its position, and is thus able to absorb fluctuations up to 10 per cent in fuel prices. This may well apply to utilities in developed countries operating under liberalised market conditions (including freedom to procure fuel supplies/imports). In the case of Egypt this may not be the case, and therefore it could be more appropriate to either have a smaller limit and/or lengthen the review period so as to avoid the possibility of frequent adjustments.

In any case, if a primary limit is set at 10 per cent within the set review period, and the average fuel price (weighted by the quantities of fuel purchased by the electricity company, which are included in the APAM), exceeds (or falls below) the reference costs by less than 10 per cent, the electricity company is not allowed to recover (or expected to pay back) the difference between the actual prices experienced in the same period and the reference price for each fuel per total fuel consumption of the period. As a result, customers would not be charged (or credited in case of a price decrease) an extra charge for their consumption.

If, on the other hand, average fuel prices within the review period exceed (or fall below) the reference prices by more than 10 per cent, the electricity company is allowed to recover (or expected to pay back) the difference between the actual prices experienced in the same period and 110 per cent of the reference price (or 90 per cent of the reference price) for each fuel per total consumption of the period. As a result, customers would be charged (or credited in case of a price decrease) an extra charge for their consumption (which is, nevertheless, smaller than the actual fuel price change).

There is also the possibility for APAM to have a secondary threshold limit e.g. 20 per cent. If the average fuel cost within the review period exceeds (or falls below) the reference price by more than

20 per cent, this would trigger the redefinition of the reference price itself (set equal to the average quarterly fuel price). The electricity company would be allowed to recover the difference between the previous and the new reference price, basically the total difference between the reference price and the average prices in the quarter under review. The difference will be charged (or credited) to customers for every following quarterly period, until a redefinition of the price is required again (i.e. the average price increases/decreases again by more than 20 per cent). At the same time, in following review periods, if the average fuel price for the electricity company exceeds the primary limit (i.e. is over 10 per cent) but is less than the secondary limit (i.e. 20 per cent) compared to the new reference price, the electricity company would also be entitled to apply an extra charge in order to recover the portion of the fuel cost associated with the increase over the primary limit.

3.4.3 APAM in the gas sector

As with electricity, an APAM could be introduced to enable the gas company to be compensated (or refund customers) for differences in natural gas supply prices against a set of reference prices, with approved differences charged to (or paid back to) customers in the form of a levy. The reference price in the APAM could be the weighted average of:

- The price EGPC assigns to the gas it receives for free from the foreign concessionaires according to their licence terms (currently having zero cost);
- The agreed price at which Egypt buys gas (above the 'free' limits) from its concessionaires; and
- The price of gas imports in Egypt (if applicable).

Deviations from the set reference prices would be established by monitoring each component against movements in relevant indices. The review period for monitoring price changes, and assessing whether the gas company should charge or refund customers in relation to swings in fuel prices in the context of the APAM should be defined. For example, it can be set every three months. In addition, similar to APAM in electricity, limits could be set for triggering or not gas price changes, based on the assessed ability of the gas company to absorb changes due to its scope for efficiency improvements in purchasing or hedging.

3.4.4 APAM in the oil sector

In the oil sector, it would not be possible to introduce an APAM, or more precisely an automatic fuel price adjustment mechanism, similar to the one described for electricity and gas. In electricity and gas, the APAM is used to retrospectively estimate extra charges (or refunds) for a review period,

which are then provided to customers in their bills in the next period. In the oil sector, the policy maker can use a mechanism to monitor the underlying costs of oil products *vis-a-vis* reference costs, and assess whether the administratively controlled prices for oil products would have to change; however, suppliers or customers of oil products would not be compensated for the period that intervened between the identification of extra costs (or profits) to the suppliers due to the fluctuation in their underlying costs and the change of the retail price.

The policy maker must assess the magnitude of change in the underlying cost of the oil product and the length of period during which the cost change was manifested, which would warrant a change in the retail prices. A fuel price monitoring and adjustment mechanism for an oil product can thus take one of two forms:

- Index the price of the oil product in question according to the movements of the price of the same product in an international market e.g. Platts FOB, possibly including in the index an allowance for transport and insurance costs so as to establish a border price index for that oil product in Egypt; or
- Index the price of the oil product in question according to the movements of a composite index comprising the cost of crude oil purchases and the price of imports of the oil product in question. The rationale for this type of indexing is that the underlying cost of the oil product in question is an average cost which is made up of the cost of imports of the oil product in question, which move in accordance with international prices, and of the cost of crude oil used for the production of the oil product in question, which is linked to international prices (for the proportion of crude oil which is purchased from the joint venture partners/imported, otherwise the remainder has zero cost).

For the abovementioned average cost to be estimated and monitored however, the Egyptian cost of imports and the crude oil purchases should be allocated to specific oil products. In the costing and pricing report, we nevertheless remarked that crude oil purchases cannot be readily allocated to specific oil products; for this reason, we used an approximation of the relationship between the price of different oil products to crude oil prices, by correlating prices of crude oil and prices of oil products over a period of three years using Platts data. Accordingly, the correlations described in our costing and pricing report could be used as a proxy for the indexing of the final oil product price in question to the price of crude.

4 MITIGATION MEASURES

This section sets out the recommended mitigation support to accompany the phasing out of energy subsidies.

4.1 Eligibility for assistance

In light of the impact analysis, the Consultant recommended that, at a minimum, the first two quintiles of Egypt's population should be provided with assistance to mitigate the impact of energy price reform; the first quintile includes households that are below the poverty line, whereas the second quintile households are only just above the poverty line and are thus susceptible to falling into poverty as a result of energy (and other) price increases. Furthermore, given the very flat income distribution of Egypt, mitigation support was also recommended by the Consultant, and accepted by the ISC, to be extended to the third quintile of the population – households at the bottom end of the third quintile could be classified as 'near poor', while the quintile as a whole has a mean income well below the average for Egypt and a mean per capita annual income that is not significantly higher than that of the second quintile.

Regarding the period of support, our view is that this should not extend beyond the price transition period of five years. Mitigation support to accompany the transition to higher energy prices should be viewed as short to medium term assistance to adjust to the higher prices, while persistent symptoms and causes of poverty should be addressed through other more appropriate poverty alleviation policies.

4.2 Type of support

During the study, a comprehensive review of the forms of assistance that could be provided to eligible households was undertaken, on the basis of which it was decided that the most effective support in the context of the energy pricing strategy is the provision of direct cash transfers to the targeted households (without any conditions). In this regard, it should be noted that the study terms of reference required that the Consultant consider conditional cash transfers (CCTs). CCTs can potentially be a powerful and effective tool as part of a broader strategy for alleviating poverty and can generate sustainable benefits for poor households by seeking to remove the underlying causes of poverty (rather than its effects). Nevertheless, CCTs are less appropriate in the context of extensive energy pricing reform and the removal of large subsidies, where there is a need for more immediate 'no-strings attached' support for expected losses in the real income of households.

Moreover, we have placed particular emphasis on ensuring that direct, effective and expeditious assistance be provided to households to mitigate the large price shock and resulting direct and indirect income loss that would result from the phased removal of energy subsidies. Beyond the provision of cash compensation to mitigate the impact of energy price reform, there is a wealth of policy tools that can be employed both at the energy sector level (e.g. differential taxes for fuels used by the poor, such as LPG, energy efficiency measures and demand side management, etc.) and the macroeconomic level (improvement of health and education services, rural economic development policies, investment in infrastructure, etc.). Alternatively, the large expected savings from the removal of subsidies could be employed to pursue broader social safety net reforms and poverty reduction strategies. However, the decision to adopt any of these policies requires a broader assessment, which we consider lies beyond the scope of this study and strategy, but will need to be considered in the follow-up to this study in the context of designing complementary actions to the cash transfers.

4.3 Compensation levels

The principle adopted for determining the minimum level of compensation was that the targeted households be provided with a level of assistance that ensures that the households are no worse off than they were before the removal of energy subsidies. In accordance with this principle, for the purposes of estimating the required cash compensation levels, we estimated the real income loss of the eligible households (bottom three quintiles), as derived in the PSIA. As discussed earlier in this report, we used two broad approaches to estimate income losses, which provide lower and upper bounds of the estimated loss. The former takes into account full income and substitution effects as derived under the assumptions of the CGE model; the second approach assumes no substitution and income effects and estimates losses by multiplying the consumption shares of household expenditure by their corresponding estimated prices following the removal of subsidies. For the purposes of deriving compensation levels, we took the average of the loss determined under these two methodological approaches.

The total cash to be transferred to eligible households on the basis of the above for each year of the transition is shown in Table 4 below. To these compensation levels we have added estimated incremental administration costs, which are assumed to be equal to five per cent of the total compensation levels, in order to derive the total estimated GoE outlays that would be needed in each

of the five years.[5]

Table 4: Cash compensation levels for eligible households (bottom three quintiles), and associated administrative costs in LE million (nominal)

	2007/08	2008/09	2009/10	2010/11	2011/12
Cash transfers	2,896	3,099	3,315	3,548	3,796
Administrative costs	145	155	166	177	190
Total outlays	3,041	3,254	3,481	3,725	3,986

4.4 Allocation of cash transfers

The compensation levels above represent the total amounts to be transferred to eligible households. These amounts need to then be divided among the eligible population to determine the payments that will be received by each recipient. During the course of the study, we considered three different payment options as follows:

- Option 1: Fixed payment per household – this is a uniform transfer scheme where each household within the bottom three quintiles would receive the same absolute amount as cash compensation, irrespective of the number of household members. The problem with this approach is that it discriminates against households with more members, which tends to be the case for poorer households, although is simpler to administer.
- Option 2: Fixed payment per household member – under this scheme, each individual within the eligible population receives the same cash transfer.
- Option 3: Progressive transfers – this payment scheme assumes that the bottom three quintiles can be further divided into four groupings and that the compensation would then be distributed to individuals in each group with a ratio of 4:3:2:1 from poorest to 'richest'. For example, if LE 100 is the total available compensation for the three quintiles (= 60 per cent of the population), the poorest 15 per cent would receive LE 40, the next poorest up to the 30th percentile LE 30, those between the 31st and 45th percentile LE 20 and those between the 46th and 60th percentile LE 10.

Our analysis concluded that option 3 (progressive transfers) had superior poverty outcomes and therefore we recommend that this payment option be adopted. The annual per capita cash transfers

[5] On the basis of the discussions we had with the Ministry of Social Solidarity (MOSS), the additional administrative cost would be about 3 per cent of the total cash compensation payable to eligible households. We have added an 'uplift' to this estimate, as it appears to be on the low side.

that result under this payment option are presented in Table 5 below.

Table 5: Annual per capita cash transfers, LE nominal

	2007/08	2008/09	2009/10	2010/11	2011/12
1st – 15th percentile	103	110	118	126	135
16th - 30th percentile	77	83	88	95	101
31st - 45th percentile	51	55	59	63	67
46th - 60th percentile	26	28	29	32	34

4.5 Targeting and delivery methods

By early next year, according to the MoSS, Egypt is expected to have in place an effective system of targeting and delivering assistance to needy households, entailing the use of proxy means testing (PMT) for targeting purposes and the full roll-out of smart cards, which is intended to replace the ration-card system and be used to administer the food subsidies, but can also be used to deliver other forms of assistance (including cash compensation) to eligible persons. The cost of establishing these systems would have been prohibitive (on a stand-alone basis) in the context of delivering temporary cash transfers as a result of energy subsidy removal. However, with these systems established, PMT and smart cards represent the obvious choice for targeting and delivering cash transfers to mitigate the removal of energy subsidies. Besides other reasons, there are few incremental costs that would be incurred, while the fixed system overheads would further be shared. The only additional costs would be the processing of the cash transfer transactions. This cost, however, is not expected to be large – on the basis of the information provided to us we estimate that the cost of making four quarterly instalments to all eligible households would be less than 5 per cent of the total cash compensation that would be payable to these households.

For the purposes of the study, we assumed that the eligible households will be targeted through proxy means testing and payments executed through smart cards, which, as mentioned above, we understand from MOSS will be feasible by early next year. It is important to note, however, that despite significant work having been undertaken to develop capacity and systems that will allow for the application of PMT in Egypt, coverage is currently low (1-2 million households) and therefore widespread application of this targeting method (coverage of all three bottom quintiles entails targeting approximately 9 million households) is very likely to involve implementation risks. This points to the need for extensive monitoring of the roll-out of PMT and the cash transfers.

Moreover, if the PMT and smart card systems are not fully established at the time that the Government proceeds with subsidy removal, other temporary, but less effective, mechanisms for targeting and delivering compensation will need to be considered. By way of example, geographic targeting could be used to identify eligible households on the basis of the most recent and detailed poverty mapping of Egypt, which identifies the poorest governorates, districts and/or smaller areas. Under this approach, the allocation of cash compensation would be determined by the estimated share of the total number of poor/near-poor households or individuals living in each geographic area. Moreover, in the absence of the full roll-out of the smart cards, the existing cash transfer mechanisms as administered by the Ministry of Insurance and Social Affairs local offices will need to be relied upon.

5 IMPLEMENTATION, MONITORING AND EVALUATION FRAMEWORK

This section describes the proposed organisational arrangements for the implementation, monitoring and evaluation of the energy pricing strategy.

5.1 Inter-ministerial Committee

An Inter-ministerial Committee (IC) is proposed to be the main organisational unit responsible for overseeing the implementation of the approved energy pricing strategy and action plan. The IC should comprise representatives from stakeholder ministries and organisations, including:

- The Ministry of Finance;
- The Ministry of Petroleum;
- The Ministry of Electricity;
- The Ministry of Economic Development;
- The Ministry of Investment;
- The Ministry of Industry; and
- The Ministry of Social Solidarity.

The IC could be headed by the Ministry of Finance, which has a strong interest in reforming prices, and reducing subsidies and the burden on public finances. The head of the IC should preferably be at a high level (undersecretary or first secretary).

The IC should in our view also include representatives of economic regulatory agencies, as the latter have a significant role to play in the implementation, monitoring and assessment of the energy pricing strategy. Regulatory agencies supervise the operation of energy markets at large, regulate monopolistic activities and ensure fair and efficient prices that keep a balance between energy suppliers' and consumers' interests. Currently, there exists an electricity regulatory agency (EEUCPRA) whilst there are plans to institute a new regulatory agency for oil.

The number, composition and level of the members of the IC will be subject to fulfilling the different requirements for energy pricing implementation and monitoring, including expertise in the different energy subsectors, economic and financial expertise, technical expertise, analytical and modelling skills, etc. Several sub-committees or working groups could be formed underneath the IC, each of these groups focusing on specific topics, and comprising several experts who do not all participate in

the IC (but at least one representative does). Depending on requirements, external specialised experts could also be contracted to take part in the IC or in the sub-committees.

We propose that the IC be a supervisory and advisory body with responsibilities for:

- Drafting a detailed action plan for implementation of the energy pricing strategy to be submitted to the Economic Group in the Cabinet of Ministers for approval;
- Continuously monitoring the implementation of the approved energy pricing strategy and action plan, and reporting implementation progress at regular intervals to the Economic Group in the Cabinet of Ministers;
- Evaluating the need for any amendments and/or improvements to the energy pricing strategy and action plan, and proposing such changes to the Economic Group in the Cabinet of Ministers;
- Formulating a comprehensive communication plan, with the objective of informing and raising the awareness of the public regarding the planned energy price reforms, together with budgetary, resource and other prerequisites for the plan's implementation;
- Implementing the communication plan, including outsourcing of services (campaigns, research, media advertising, etc.) to third parties;
- Continuously monitoring domestic and international energy market conditions, international and domestic energy prices, and other key energy, economic and social parameters that affect or are affected by the energy pricing reform; and
- Undertaking research and analysis on issues and topics relevant to the energy pricing strategy, on the instructions of the Economic Group in the Cabinet of Ministers.

The IC should meet at regular intervals. We expect that appointed members would spend a sizeable amount of their time for undertaking the above tasks linked to energy pricing implementation, monitoring and evaluation and for participating in the formal IC meetings. The IC should be formed and start operations in advance of the energy pricing reform, as the action plan provides for a number of actions that are prerequisites for its implementation. It is expected that the IC would then be necessary to operate for the full period of the transition to cost-reflective energy prices i.e. five years. The Inter-ministerial Steering Committee (ISC) for the current consulting project, which has been closely involved with the consultants for the formulation of the energy pricing strategy, could be the nucleus for the formation of the IC.

Finally, the mandate, responsibilities (and allocation of roles), the operational procedures, the authorisations granted to it, the resources and tools required, and the budget for the operation of the

IC, should be clearly defined and documented in an Operations Manual.

5.2 The Economic Group and the Cabinet of Ministers

The Economic Group (EC), headed by the Minister of Finance, comprises the Ministers of the stakeholder ministries. The EC would therefore be politically responsible for overseeing the implementation of the energy pricing strategy and action plan, including the communication plan. The EC would report to and make proposals for the approval of the Cabinet of Ministers, taking into account the reports and proposals formulated by the IC.

The Cabinet of Ministers (CoM) consists of all Government Ministers, under the chairmanship of the Prime Minister. The CoM is responsible for taking all political decisions and this would therefore include all relevant matters for the energy pricing strategy. The Prime Minister would sign all decrees and secondary legislation pertinent to the implementation of the energy pricing strategy and any approved diversions or changes to the strategy.

5.3 Links to wider government policies for energy sector reform

Energy pricing strategy is not independent from wider government policies aimed at energy market liberalisation, restructuring and reform. The latter reforms are necessary and go hand-in-hand with energy pricing reform, so as to allow the emergence of competitive forces in the market and limit the need for energy price controls (except regulation of the monopolistic components after the five-year energy price transition). It is therefore prudent and necessary to maintain a connection between the IC with other mechanisms involved in energy market liberalisation and restructuring, so as to ensure the compatibility and complementariness of measures and actions undertaken.

6 ACTION PLAN

The key prerequisites for successful implementation, in addition to having an approved energy pricing strategy in place with a clear and comprehensive implementation action plan, are:

- Effective implementation, monitoring and evaluation arrangements for energy pricing strategy implementation, including strong cooperation and coordination arrangements for all ministries and stakeholders involved;
- Comprehensive communication plan – a necessary input to the development of an effective communication strategy is the analysis of qualitative aspects in relation to the expected reactions by consumers to the energy price increases, which would complement the quantitative impacts undertaken as part of this study. Such an analysis would need to examine, for example, the interests of various stakeholder groups and evaluate their perceptions, identify potential centres of opposition to energy pricing reforms, consider the impact on the middle class or middle income groups who are generally more vocal and likely to protest to the changes, etc.;
- Adequate mitigation measures aimed at protecting eligible households and social safety net targeting and delivery mechanisms in place by the first quarter of 2010; and
- Redesigned gas and electricity tariffs, that ensure cost recovery, avoid cross subsidies between customers and include (dis)incentives to customers for (in)efficient use of energy and (dis)incentives to suppliers for cost (in)efficiency.

The key actions that need to be implemented in the lead up to implementing the progressive removal of energy subsidies are presented in the table over the page. The Action Plan assumes that the phasing out of energy subsidies will commence in the second quarter of 2010, in order to allow for the preparation of the above prerequisites.

No.	Activity	Priority	Output	Inputs	Start date	End date	By whom
1.	Approval of energy pricing strategy implementation, monitoring and evaluation organisational mechanisms	H	IC (or other organisational arrangements) in place and operational	Elaborated proposals from Ministries and stakeholders	asap	June 2009	CoM
2.	Update energy pricing strategy parameters/scenarios and propose final strategy	H	Final energy pricing strategy proposal and action plan, including price reform and transition plans, mitigation measures and detailed implementation plan	Government directions, outputs of updated costing and pricing models	asap	September 2009	IC
3.	Approval of energy pricing strategy and action plan	H	Agreed energy pricing strategy		October 2009	October 2009	CoM
4.	Formulation of communication plan	H	Proposed communication plan	Qualitative stakeholder analysis (stakeholder identification, assessment of potential reactions, etc.) Plan of actions - internal and outsourced, implementation arrangements, estimation of effort and costs, budgets, listing of resources and key prerequisites for implementation	September 2009	December 2009	IC
5.	Approval of communication plan	H	Approved communication plan	IC proposal	December 2009	December 2009	CoM
6.	Implementation of approved communication plan	H	*Indicative outputs*: information and awareness campaigns to alert public opinion on the planned energy price reforms, research activities, production of brochures/leaflets, setting up help lines and web	Preparation of necessary materials for campaigns, participation of Government officials in campaigns and presentations, preparation of terms of reference and launching of tenders to outsource services, etc.	January 2010	March 2010	IC and advisors/contractors undertaking outsourced services

No.	Activity	Priority	Output	Inputs	Start date	End date	By whom
			sites, media advertising, etc.				
7.	Develop cash subsidies and other mitigation measures	H	Mitigation measures package and implementation plan ready	Database of eligible households/targeting system in place, smart card production, contracts with delivery mechanisms preparation	November 2009	March 2010	MOSS IC
8.	Launch cash subsidies and other mitigation measures	H	Mitigation support delivered to eligible households	CoM approval	April 2010	April 2010	IC
9.	Redesign electricity and gas tariffs	H	New gas and electricity tariffs	CoM approval	November 2009	March 2010	IC
10.	Monitor the implementation of the approved energy pricing strategy and action plan/ report progress	M	Progress reports	Updated information and trends on parameters affecting costs and prices. Information on domestic and international energy market conditions, international and domestic crude oil, gas and energy prices, information on other key energy, economic and social parameters. Updated costing and pricing model runs	Continuous		IC
11.	Fine tune energy pricing strategy and action plan, initiate changes	H	Proposals for changes	Updated information and trends on parameters affecting costs and prices/updated costing and pricing model runs	Continuous		IC
12.	Mid-term review of pricing reform	H	Proposals to maintain or change pricing reform plans	Updated information and trends on parameters affecting costs and prices/updated costing and pricing model runs	November 2012		IC
13.	Approval of any changes in energy pricing strategy	H	Agreed changes, backed up by Government Decrees	IC Progress reports and proposals for changes (also from mid-term review)	Ad hoc and certainly following mid-term review		CoM

H = High

M = Medium

APPENDIX A: VALUE OF SUBSIDIES IN THE ELECTRICITY AND GAS SECTORS BY CUSTOMER GROUP

This appendix contains the estimated subsidies for each of the major customer groups in the electricity and gas sectors, for the period of the transition, under both opportunity and actual cost calculations. We note that the economic cost of the energy subsidies as measured by opportunity costs (Tables A1 and A2) and are not comparable to the financial subsidies that are reported in the government budget accounts. However, the financial subsidies are *broadly* equivalent to those derived by the Consultant under the actual cost methodology, which are shown in tables A3 and A4.

Table A1: Value of electricity subsidies by customer group in LE million (on opportunity cost basis)

	2007/08	2008/09	2009/10	2010/11
High voltage customers				
Industry	3,181	2,978	2,270	1,343
Agriculture	526	489	369	216
Public utilities	1,445	1,381	1,093	672
Government	916	856	650	382
Medium and low voltage customers				
Industry	6,134	5,622	4,090	2,310
Agriculture	761	715	554	332
Public utilities	1,127	1,021	674	348
Commercial	1,443	1,323	938	516
Residential	13,501	12,857	10,184	6,241
Government	560	513	372	210
Total	**29,594**	**27,756**	**21,195**	**12,570**

Table A2: Value of gas subsidies by customer group in LE million (on opportunity cost basis)

	2007/08	2008/09	2009/10	2010/11
High pressure system customers				
Electricity	5,964	7,395	5,203	2,653
Industry	11	267	113	24
Petroleum	1,394	1,039	726	358
Medium and low pressure system customers				
Industry	105	216	42	95
Residential	292	318	254	150
CNG (vehicles)	38	37	2	4
Total	**7,804**	**9,271**	**6,340**	**3,285**

Table A3: Value of electricity subsidies by customer group in LE million (on actual cost basis)

	2007/08	2008/09	2009/10	2010/11
High voltage customers				
Industry	1,895	1,714	1,357	818
Agriculture	311	279	218	130
Public utilities	935	871	715	447
Government	541	488	385	231
Medium and low voltage customers				
Industry	3,222	2,814	2,128	1,227
Agriculture	494	452	363	221
Public utilities	275	220	138	66
Commercial	642	552	405	227
Residential	9,061	8,431	6,916	4,310
Government	0	0	0	0
Total	**17,375**	**15,821**	**12,625**	**7,677**

Table A4: Value of gas subsidies by customer group in LE million (on actual cost basis)

	2007/08	2008/09	2009/10	2010/11
High pressure system customers				
Electricity	1,992	2,155	1,676	953
Industry	956	952	782	495
Petroleum	466	303	234	128
Medium and low pressure system customers				
Industry	934	947	792	512
Residential	141	140	122	79
CNG (vehicles)	18	16	14	9
Total	**4,507**	**4,512**	**3,620**	**2,176**

APPENDIX B: KEY ASSUMPTIONS UNDERLYING THE COST CALCULATIONS

The assumptions underpinning the cost calculations are discussed at length in the relevant cost and pricing report that was produced as part of the study. In Table B1 below, we reproduce the key assumptions that were adopted for the purposes of determining energy prices and which potentially have a significant impact on the cost and price estimates.

Table B1: Key assumptions underpinning the calculation of energy costs and prices

	2007/08	2008/09	2009/10	2010/11	2011/2012
Inflation rate	7%	7%	7%	7%	7%
Exchange rate (LE/USD)	5.50	5.50	5.74	5.99	6.26
International crude oil price* (USD/bbl)	100.61	92.50	80.00	78.28	76.46
Henry Hub natural gas price* (USD/mcm)	217.5	221.0	207.6	197.3	191.6
WACC - electricity and gas (all vertical sectors)	8%	8%	8%	8%	8%
Domestic energy consumption (kTOE)	69,160	77,448	82,538	88,412	94,249
- Electricity	*9,044*	*9,670*	*10,337*	*11,042*	*11,789*
- Natural gas	*32,728*	*40,381*	*44,755*	*49,763*	*54,582*
- LPG	*4,388*	*4,613*	*4,804*	*4,995*	*5,198*
- Gasoline	*3,640*	*3,971*	*4,130*	*4,295*	*4,467*
- Kerosene	*326*	*244*	*244*	*244*	*244*
- Gas oil	*11,161*	*11,619*	*12,084*	*12,568*	*13,070*
- Fuel oil	*7,873*	*6,950*	*6,185*	*5,505*	*4,899*

**Source: EIA*

The factors above all significantly influence the resulting energy prices and will need to be closely monitored. However, the most important parameters that impact on the final energy prices are fuel input costs (natural gas and crude oil), which in turn are heavily correlated with the international prices shown in the table above and are highly volatile. The estimated impact of an increase in international fuel prices on final energy prices for all energy products is shown in Table B2 below.

As demonstrated in the table, the change in final prices resulting from fuel price increases in excess of 10 per cent can be quite significant. This raises the issue of whether the prices presented in the main body of this report need to be revised in the event of significant departures from the assumed key pricing parameters. In section 3.4 of the report, we recommend price adjustment mechanisms to deal with significant changes in international fuel prices.

Table B2: Estimated impact of changes in international fuel input prices on end-user prices for electricity, gas and petroleum products in Egypt

	+/- 10%	+/- 20%	+/- 30%
Electricity			
High voltage customers	5.6%	11.2%	16.8%
Medium-low voltage customers	5.1%	10.1%	15.2%
Natural gas			
High pressure system customers	14.7%	29.5%	44.2%
Low pressure system customers	13.1%	26.2%	39.2%
Petroleum products			
LPG	8.8%	17.6%	26.3%
Gasoline	8.1%	16.1%	24.2%
Kerosene	7.9%	15.7%	23.6%
Gas oil	8.5%	17.0%	25.5%
Fuel Oil	8.1%	16.2%	24.4%