PRE-PROPOSAL

(The pre-proposal should be brief and should not be more than three pages, including this cover page)

Program	**ADVANCED AND STRATEGIC TECHNOLOGIES**				
Sub-Program/ Technology Area	Energy Technology; Information Technology				
Track	Oil and Gas; Scientific Modeling				
Sub-Track	Development of Analysis, Visualization and Integration Tools; Computer Simulation and Computer Modeling,				
Project Title	**Estimation and Forecast of Demand for Oil Products and Natural Gas for Saudi Arabia and other GCC Countries**				
Project Type	**Theoretical and Applied**				
Research Team	**Senior Personnel**				
	No.	**Name**	**Rank**	**Role**	**Area of Specialization**
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1. INTRODUCTION

Saudi Arabia and other GCC member countries are all major exporters of crude oil and other oil related products in the world. In recent years, there has been remarkable surge in the domestic consumption of gasoline, natural gas and other oil related products in all these countries. For example, average domestic gasoline consumption in Kuwait, Qatar, Saudi Arabia and UAE between 2000 and 2010 has increased by 86%, 132%, 78% and 87% respectively compared to their historical average between 1965 and 2010. In case of natural gas, average domestic natural gas consumption in Kuwait, Qatar, Saudi Arabia and UAE between 2000 and 2010 has increased by 88%, 98%, 125% and 131% respectively compared to their historical average between 1965 and 2010. This increased demand for oil and oil related products such as gasoline, diesel and jet fuel comes mainly from increased demand from the transportation sector and party from the manufacturing sector. The increased demand for natural gas mainly comes from the utility sector (especially during summer time) and also from the industrial sector. All the GCC countries meet their domestic demand for oil and oil related products from domestic production. These remarkable surges in domestic demands have resulted in devastating prospect for all the GCC countries since they now have to divert more and more of their oil products from exporting them to the international market and channel them towards the domestic market. Forecasts for future growth of consumption of oil, natural gas and other oil related products show an even bleaker prospect in the future. For example, Lahn and Stevens (2011) forecasts that with current trend in domestic consumption Saudi Arabia might become a net oil importer by the year 2038. Similar alarming forecasts have been provided for other GCC countries. In light of this unprecedented increase in domestic energy consumption, domestic demand management of oil, natural gas and other oil related products have become number one priority for governments in all the GCC countries. Demand management policies however, depend on sound understanding of domestic demand and its short term, medium term and long term projections. In this study we will provide an extensive estimation of demand for oil, natural gas and other oil related products for Saudi Arabia and other GCC countries by using various modern and classical estimation techniques. We will also provide short term, medium term and long term forecasts of domestic consumption of oil, natural gas and other oil related products for all the GCC countries by using state-of the art forecasting techniques.

The outcome of the study has two broad implications for Saudi Arabia and other GCC countries. First, estimation of domestic demand for oil, natural gas and other oil related products will be crucial for every GCC country's government. These results will help 'Energy Technology' to develop business models to promote creation and maximization of employment and investment opportunities, as well as economic diversification and competitiveness. It will also lead to 'Development of analysis, visualization, and integration tools' which will lead to the development of analytical tools and technology for the public as well as for the private sector. Second, forecasts for future oil, natural gas and other oil related consumption have clear revenue and expenditure implications for the government and therefore have profound budgetary implications for Saudi Arabia and for other GCC countries. Estimation and forecasts of domestic oil related consumption would be crucial for the sustainability of development plans for governments of all the GCC countries. These results will also help design polices to promote economic growth which will help achieve efficient allocation of resources. The empirical analysis of this project will lead to improvement of 'Information Technology' through the use of advanced computer modelling, simulation and estimation techniques.

2. PROJECT OBJECTIVES

The objective of this study is to estimate and forecast the demand for oil, natural gas and other oil related products for Saudi Arabia and other GCC countries. The project is broadly divided into two parts. First, estimation of demand will estimate short run and long run income and price elasticity of demand for oil, natural gas and oil related products. Our approach will differ from few existing works in terms of its scope, coverage and methods. Firstly, we will look at the GCC countries in a panel setup as well as on individual basis. Secondly, we will use data on monthly, quarter and yearly frequency. Thirdly, we will use several competing estimation techniques and compare our estimation results.

Second, Forecasting exercise will provide monthly, quarterly, yearly, 5 year and 10 year forecasts for demand of oil, natural gas and various oil related products. Forecast will be based on both demand estimation as well as modern forecasting methods. The project will utilize forecasting methods that have not yet been used for Saudi Arabia or any other GCC countries.

3. BRIEF DESCRIPTION OF THE PROPOSED WORK AND EXPECTED OUTCOMES

In this study, we want to estimate the short run and long run income and price elasticity of demand for oil, natural gas and other oil related products for Saudi Arabia and other GCC countries. We will also provide forecast of domestic energy consumption on various products for various time horizons. The estimation part will be based on several steps. First, we will specify four competing models for demand estimation; the distributed lag model, the autoregressive model, the autoregressive distributed lag model and finally, co integration regression model. Second, we will specify our data series in both panel and time series setup and also in monthly, quarterly and yearly frequency. Third, we will carry out respective diagnostic tests associated with each of our specified models such as serial correlation test, multi-colinearity test, lag length tests (AIC and BIC criterion test), several unit root tests, several co integration tests and Granger-Causality tests. Fourth, we will use three alternative estimation techniques; Ordinary Least Squares (OLS), Dynamic OLS and Fully Modified OLS. Fifth, we will test our results for seasonality and structural changes by employing appropriate dummy variables. Finally, we will compare and contrast empirical results derived from alternative models and from alternative specification of data and try to interpret the differences, if any.

The forecasting part will also be carried out in several stages. As we know, short term forecasts differ significantly from medium and long run projections. Therefore, care should be taken to generate these different types of forecast. Although medium term and long term forecasts can be generated from the estimation techniques mentioned above, short run forecast will be based on Autoregressive Integrated Moving Average(ARIMA) method which is been regularly used in monthly demand forecasts for energy consumption in USA but has not yet been used for Saudi Arabia or for any other GCC countries. Next we will also generate forecast from the monthly, quarterly and yearly estimation of the three regression techniques mentioned in the estimation part and compare them with the ARIMA model forecasts. We will also compare the forecast errors for each of these forecasts and investigate the efficacy of each these forecast by looking at in-sample forecasts. This analysis will give us more confidence about the out-of-sample forecasts of future consumption pattern for Saudi Arabia and other GCC countries.

4. VALUE TO THE KINGDOM

The objectives of the project are consistent with the objectives of NSTIP in fostering scientifically knowledgeable and capable government agencies. The outcome of the project should clearly help the governments of Saudi Arabia and other GCC countries to identify strategic sectors in its development plan that might play key roles in Saudi Arabia's economic development in years to come. The private sector might also benefit from this research because it might identify key areas where private sector investment might be warranted and efficient. The project is also consistent with NSTIP's objectives of development of strategic technologies in the fields of oil and gas technology and information technology. The proposed proposal is the first in its kind to analyze, estimate and forecast the demand for oil, natural gas and other oil related products for Saudi Arabia and other GCC economies in its scope, method and coverage. Furthermore, the project will apply and utilize several recently developed statistical tools. Therefore, this research is also expected to benefit researchers not only in economics and finance but also students and researchers in the field of applied mathematics and statistics.

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