ENERGY AND PETROLEUM ECONOMICS

Abayomi Awujola Ph.D
Anna Dyaji Baba Iyakwari
Emily Joshua Gyang

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Kaduna
08029670000
kabodlimited@gmail.com
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Preface to the first edition

Many years ago, the publicly accessible textbook of what can be broadly termed the "energy and petroleum economics" of Nigeria was practically non-existent. Outside of specialized trade publications, proprietary consultant reports and periodic assessments by government agencies often for an internal civil service and ministerial audience, there was little by way of information about how energy issues, at global, regional and domestic levels, were affecting Nigeria. To be sure, it is also true that the demand for such information primarily emanated from those relative few who "did" energy, that is, those who were in the energy industry as businessmen, academics, or civil servants responsible for some area of activity in the industry. Energy issues occupied policymakers whose bailiwick include aspects of the energy sector, ranging from managing power utilities and attracting foreign direct investments in the export-oriented oil refining and petrochemical industry to setting up competitive domestic markets for petrol and others.

This book provides an introduction to energy and petroleum economics. It shows how to apply general economic theory as well as empirical and analytical methods to explain the drivers of energy markets and their development. Readers will learn about the specific properties of energy markets as well as the physical, technological, environmental, and geopolitical particularities of energy sources and products. The book covers types of energy markets and also addresses energy efficiency, economics of natural resources and environmental protection, and energy trade and OPEC. This book will serve students as a textbook and practitioners as a reference for their understanding of energy rudiments, energy policy, energy supply and demand, petroleum subsidy, oil crisis and inflation.

Abayomi Awujola Ph.D
Assoc. Prof. of Economics

TOPIC ONE

ENERGY DEFINITION, TYPES AND SOURCES

INTRODUCTION TO ENERGY ECONOMICS

Energy economics or more precisely the economics of energy is a branch of applied economics where economic principles and tools are applied to ''ask the right questions'' and to analyze them logically and systematically to develop a well-informed understanding of the issues. The energy sector is complex because of a number of factors:

- The constituent industries tend to be highly technical in nature, requiring some understanding of the underlying processes and techniques for a good grasp of the economic issues.
- Each industry of the sector has its own specific features which require special attention.
- Energy being an ingredient for any economic activity, its availability or lack of it affects the society and consequently, there are greater societal concerns and influences affecting the sector.

The sector is influenced by interactions at different levels (international, regional, national and even local), most of which go beyond the subject of one discipline. Consequently, analyses of energy problems have attracted inter-disciplinary interests and researchers from various fields have left their impressions on these studies. The influence of engineering, operations research and other decision support systems in the field of energy economics has been profound. Energy issues have been analyzed from an economic perspective for more than a century now. But energy economics did not develop as a specialized branch until the first oil shock in the 1970s. The dramatic increase in oil prices in the 1973–1974 highlighted the

importance of energy in economic development of countries. Since then, researchers, academics and even policymakers have taken a keen interest in energy studies and today energy economics has emerged as a recognized branch on its own.

Like any branch of economics, energy economics is concerned with the basic economic issue of allocating scarce resources in the economy. Thus, the microeconomic concerns of energy supply and demand and the macro-economic concerns of investment, financing and economic linkages with the rest of the economy form an essential part of the subject. However, the issues facing the energy industry change, bringing new issues to the fore. For example, in the 1970s, the focus was on understanding the energy industry (especially the oil industry), energy substitution and to some extent on renewable energies. Moreover, there was some focus on integrated planning for energy systems with a major emphasis on developing countries.

The scope of the work expanded in the 1980s. Environmental concerns of energy use and economic development became a major concern and the environmental dimension dominated the policy debate. This brought a major shift in the focus of energy studies as well- the issue of local, regional and global environmental effects of energy use became an integral part of the analysis.

In the 1990s, liberalization of energy markets and restructuring swept through the entire world although climate change and other global and local environmental issues also continued. These changes brought new issues and challenges to the limelight and by the end of the decade; it became evident that unless the fundamental design is not well thought through, reforms cannot succeed. In recent years, the focus has shifted to high oil prices, energy scarcity and the debate over state intervention as opposed to market-led energy supply. This swing of the pendulum in the policy debate is

attributed to the concerns about security of supply in a carbon-constrained world.

Accordingly, the objective of this course is to present in a single volume basic economic tools and concepts that can be used to understand and analyze the issues facing the energy sector. The aim is to provide an overall understanding of the energy sector and to equip the students with the analytical tools that can be used to understand demand, supply, investments, energy-economy interactions and related policy aspects.

Energy and Multidimensional Interactions

The multidimensional nature of the energy-related interactions is indicated at the global level based on three influences. They are:

(a) **Energy trade**: All transactions involving energy commodities (especially that of oil and to a lesser extent that of coal and gas) are due to the differences in the natural endowments of energy resources across countries and the gaps in domestic supply and demands; similarly flow of technologies, human resources, financial and other resources as well as pollutants generated from energy and other material use can also be considered at this level.

(b) **International institutional influences**: Various influences through international institutions affect interactions among countries and govern transactions. These include the legal frameworks, treaties and conventions, international organisations such as the United Nations (UN), the World Bank and the International Monetary Fund (IMF), the judicial system and the like.

(c) **Other interaction**: Other interactions among countries (co-operation, competition and conflicts) involving their governments or other entities (such as the firms) also influence the energy sector.