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Book Review : Energy Economics: Concepts, Issues, Markets and Governance

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Review Subject: ***Energy Economics: Concepts, Issues, Markets and Governance***

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Energy Economics has progressively emerged as a specific discipline since the 1960s and particularly since the oil crises. The significant impacts of the oil crises on the functioning of economies led to the development of a number of concepts, methods, analyses and insights. Over time, new dimensions, stemming for example from growing environmental concerns or questions related to different forms of governance, have also enriched the subject. Subhes Bhattacharyya [1]'s book presents a comprehensive and updated account of the main directions the discipline has taken in recent years. Although many authors have written on the subject in the past, the coverage was often limited by recent developments or influenced by the experience of certain countries, mostly from the developed world. The distinctive feature of the book under review is its extensive coverage (including demand, supply, markets, environmental issues, regulation and restructuring of the sector) and its emphasis on the developing world. It can be viewed both as an introduction to the discipline while simultaneously providing sophisticated analyses of new phenomena that have emerged in the energy sector. *Energy Economics* is not only of relevance to economists, and academics from natural and other social sciences, engineers and managers will also benefit significantly from reading this work.

This new publication successfully plays a dual role: it fulfils the main tasks of a textbook but simultaneously it is a product of extensive, high quality research work carried over more than two decades. It presents simple elements of *Energy Economics* to provide a comprehensive orientation on how to re-focus and update analyses in this field, while taking into consideration critical on-going changes in the energy sector.

In the six parts of the book, the reader will find the following:A clear comprehension of complex issues related to energy demand (Chapters 1-6) both at an aggregated and disaggregated level, as well as sophisticated methods for the prediction and management of energy demand. The importance given to energy demand and consumption is one of the characteristics of this book, and stems from Bhattacharyya's particular focus on energy systems. Indeed, for decades the main emphasis has been on the components which determine energy supply, since the critical objective was to cover a specific energy demand and consequently plan necessary investments.The author analyses energy supply from different perspectives (Chapters 7-11), but insists on a integrated view on energy systems as a chain of activities that embraces energy production, transformation, transmission and transport all the way to final consumption. Development of renewable energies is increasingly necessary, both to provide alternatives to finite fossil fuel resources and to address growing environmental concerns. In this book a short chapter is dedicated to the topic of “The economics of non renewable resource supply” providing an introduction to the theory of resources based on the presentation of Hotelling's basic model. Ending this chapter the author states that “[t]he outcomes of the model are at odds with the reality of the energy sector and therefore, the practical relevance of the theory remains limited” (p. 225). Next, the author centres his attention, in 25 pages, on the “Economics of Renewable Energy Supply” (Chapter 11). This is probably a sign of major transformations in energy systems and of the incorporation of sustainable development perspectives in *Energy*

Economics and policies.Chapter 12 is dedicated to energy markets and price determination. The author starts with the basic model and its extensions: indivisibility of capital, depletion of exhaustible resources, assets specificity, natural monopoly, existence of rents, externalities and public goods. The discussion of these issues, as well as those related with equity and energy security, brings the author to the conclusion that the energy sector does not satisfy the requirements of competitive markets, which leads to a preponderant presence of the state in developed and developing countries, despite different liberalization waves. After two decades of liberalization policies, the pendulum returns once more towards interventionist policies through tax, commercial, property, management, regulations and research and developments instruments.Chapters 14-16 are dedicated to international markets for oil, gas and coal, with an emphasis on changes in organizational forms, the participation of new actors, their interactions and the emergence of the phenomenon of commoditization of oil from the 1980s (spot markets, futures). Although for the author there are interactions, natural gas requires a separate analysis, contrary to traditional approaches which analyses it together with oil. Indeed the increasing importance of natural gas justifies this, as well as its energy and environmental advantages, its market structures, its gradual internationalization and new geopolitical dimensions in a context in which regional market still predominate. The author considers in particular the economics of transport, via gas pipelines or LNG transport, and compares these alternatives. He further explores the options of developing countries, which possess natural gas reserves taking into consideration capital requirements for infrastructure development, financial restrictions, narrowness of their market, low potential for electricity production, weaknesses in its regulatory systems and restrictions to long-term export.After reviewing different aspects of the energy system, from demand and supply sides, the author presents an integrated analysis (Chapter 17). Since this system is not isolated and energy decisions and actions have broad implications, the author analyses the interactions between energy, economy and the environment. Accordingly, he further proposes tools, such as (top-down, bottom-up) modelling, input-product models, computable general equilibrium model and social accounting matrix.After presenting diverse theoretical and analytical tools, Bhattacharyya analyses the main issues and challenges of the energy sector (Chapter 18), their explicative factors and policy alternatives to solve them. Although issues, such as energy security, have been particularly addressed recently, others are of equal importance: affordable and acceptable access to energy services as a prerequisite for development and the globalization of patterns of consumption characterized by inefficiency and waste. A fundamental change is needed: […]in a dynamic world where profound political, social, economic, technological and even ideological changes shape our present and future lives and living conditions, changes in the energy scenario are quite natural and inevitable (p. 420). On this basis the author reviews the energy transitions and associated structural changes: industrialization, urbanization, technological innovation, emergence of knowledge societies, transformation in ways of life, etc. These are factors of progress in the energy sector as well as obstacles. Profound transformations are needed associated with different problems and challenges according to whether countries are rich in resources or not. If the first are faced with the challenge of the management of their resources and the possibility that competitive energy alternatives may appear before the physical exhaustion of oil resources, the second must face price shocks and fluctuations. Price volatility affects both groups of countries, but its effects are transmitted in different manners, particularly when prices are high (Chapter 19). Recent trends and facts must be taken in consideration, such as the electrification of economies associated with specific requirements regarding capacity,

conversion process and appropriate technologies, all of which demand enormous investments difficult to finance in the current context. Besides, in the present crisis specific political and economic issues arise related with energy security (Chapter 20).Critical challenges related with inequity in energy access and the conditions in which it is provided to most poor regions are addressed in Chapter 22. It should be noted, that it is uncommon to find a chapter on "Access to energy" in a book on *Energy Economics*, with topics including: energy poverty, energy demand of the poor or renewable energy and the poor. This is a particularly serious challenge: two billion people live without access to clean energy for cooking purposes and nearly as much without access to electricity. This has critical consequences for health and environment and implies important costs for society. Yet, development and increasing incomes rise energy consumption and frequently bring also a transition from traditional to commercial, particularly fossil based energy forms. Bhattacharyya sees in facing this challenge no solutions based on half measures or subsidised clean energy: […][w]hat is required in the long term is to ensure adequate supply of monetary resources to households to sustain a life style that relies on clean energies and other monetized inputs (p. 520).

This position is debatable; though clear from an economic perspective: put the issue of energy access in the context of income generation, its monetization and the provision of an energy supply, affordable and accessible. All of this embedded in a particular development vision.

Until Chapter 22, Bhattacharyya focuses on the study of diverse aspects of energy demand and supply, energy markets and various issues of current relevance. He further dedicates the next two parts (until Chapter 29) to the environmental impacts of the energy sector and to the questions of regulation and governance. He analyses the interactions between energy and environment at global (climate change), macro, micro, regional and community levels and presents options to face these challenges from an economic perspective. He further reviews various instruments of contamination control, such as tax measures, the permit market, technological options and the evaluation of externalities. In successive Chapters (24 and 25) the author highlights the control of stationary and mobile sources of pollution, since the energy sector is primarily responsible for this type of pollution. For the author, it is necessary to combine technological solutions with market (cap-and-trade) and direct regulatory instruments. This strategy, however, cannot address household pollution, very important in developing countries and not fully resolved in more developed ones.In the case of climate change (Chapter 26), economic analysis can contribute to the analysis of this phenomenon, in particular to evaluate the potential costs of its impacts and of mitigation and adaptation strategies to global warming. Policies are designed at national and international level (e.g. system of emission rights trading, all what has been done around the Kyoto Protocol, etc.). Recognizing the extent of the challenges at hand, the author proposes a multi-dimensional strategy based on the following components: effective management of demand, adoption of better technology, good governance, effective use of domestic resources and clean energy for all (MAGIC strategy).To conclude, Chapter 29 considers the reforms of energy industries with an institutional perspective, focusing on changes in governmental interventions, especially in the electricity industry. Starting from an analysis of the reasons which have led to deregulation, Bhattacharyya views the reforms as a political process of changing the rules of the game in the abolition or creation of new organizations, the modification of the mechanisms of governance and the adaptation of institutional arrangements. He analyses the introduction of competitions and restructuration options, breaking away

from the model of vertically integrated monopole (i.e. independent producers, single buyer, complete unbundling of generation, transmission and distribution). Radical reforms have been implemented in Chile in the 1980s, then in the UK and Argentina; others with minor alterations followed in the 1990s. However, since the electricity crisis in California, reforms have been critically scrutinized and have caused social outcries. This added to concerns related energy security has pushed reforms into the background.Bhattacharyya has carried out his research primarily in developing countries, in particular in India, his country of origin. This allows him to make a distinct contribution to the field of *Energy Economics*, for example interesting developments in non-commercial traditional energies or on the access of the poorest to energy services. In addition, the book also successfully integrates the lessons from his research on the energy sector reform, energy security, energy-environment interaction and the climate change. This research-driven focus of the book and its systematic, comprehensive approach to the energy sector are the main highlights of the book.

As in the review of any textbook, it is possible to signal that certain topics could have been addressed more exhaustively (nuclear energy for electricity generation, for example, or refinery economics). The reading of Bhattacharyya's *Energy Economics: Concepts, Issues, Markets and Governance*, from different countries and realities, would surely help to pinpoint current gaps in information or in specific analyses. The author took on a tremendous challenge, which he faced with exceptional theoretical and practical knowledge, the fruits of many years of dedicated research, teaching and contact with many policy-making institutions. This first edition will certainly be followed by many others: let us hope that the reading of this book will inspire new contributions and debates.