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Introduction

Today, energy has a great impact on worlds' economy and plays a defining and leading role on nations' wealth. Meanwhile, those who seek to impose their wills over other nations, follow the same path at a glance. Iran also as a hot spot for kinds of energy resources such as oil and gas always grabs worlds' attentions as a main key player in the region and worldwide as well. Energy reserves and resources as driving force behind nations' economy and gross domestic product (GDP), and also as a leverage and means for worlds' giant economies and compelling powers in order to ensure their national interests and security in the world are immensely important. Meanwhile, Iran's energy policies and plans have a great impact on our future socio-economical issues and developments.

In this regards, nuclear energy as an alternative source of energy and also peaceful industry which could serve different fields such as agriculture, medicine and generating electricity is urgently needed in our country.

Nowadays, many countries especially Europeans supply a great ratio of their electricity through nuclear. At the end of ۲۰۰۹, global nuclear-generating capacity was ۳۷۰ GWe: ۴۶ percent in Europe (including Eastern Europe and Russia), ۳۰ percent in North America and ۲۱ percent in the Far East. The rest of the world: Africa, Latin America, the Middle East and South Asia, accounted for only three percent. Regardless of ratios, percent share and variations, nuclear energy as an economic option is always justifiable.

Scarce of fossil resources in coming decades, low supplies and higher

demands for energy, environmental benefits, higher standards and safety of nuclear energy and better economic performance, all indicate that the chain of nuclear fuel cycle and their future development in breeder reactors and nuclear fusion along with higher safety for next half-century and third millennium is quiet promising.

Despite of outstanding progress in nuclear science and technology during last fifty years, still many aspects are not explored. When it comes to nuclear energy, most people like the mushroom clouds from nuclear explosions or nuclear reactors to generate nuclear electricity to their mind and less conceive various aspects or applications of nuclear energy. The truth is, as the results of the efforts in nuclear science and technologies, many industries, agriculture and medical services have grown and as an outcome, living standards have been improved.

For students' better understanding, a chapter containing some details about nuclear fuel cycle has been added to this book.