Chapter 6

Energy Sustainability of Countries

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ABSTRACT

The provision of adequate, reliable, and affordable energy, in conformity with social and environmental requirements is a vital part of sustainable development. Currently, countries are facing a two-fold energy challenge: on the one hand they should assure the provision of environmentally sustainable energy, while, on the other, energy services should be reliable, affordable, and socially acceptable. To evaluate such aspects of energy services one needs energy sustainability barometers, which provide the means to monitor the impacts of energy policies and assist policymakers in relevant decision making. Although sustainability is an ambiguous, complex, and polymorphous concept, all energy sustainability barometers incorporate the three major sustainability dimensions: social, economic, and environmental. In this chapter, we review three models for assessing the sustainability of energy development of countries: ESI, SAFE, and EAPI. We also present a brief discussion of the results, the applied methodologies, and the underlying assumptions of these sustainability barometers.

INTRODUCTION

The Brundtland Report recognizes sustainable development as distinct from environmental protection, and suggests that economic development should be ecologically viable and that environmental protection does not preclude economic development. In this context, the report defines sustainable development as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (UNEP, 1987).

DOI: 10.4018/978-1-4666-8433-1.ch006
The provision of adequate, reliable, and affordable energy, in conformity with social and environmental requirements has been key to economic well-being. It is key for relieving poverty, improving human welfare and raising living standards. However, energy, despite its crucial role to development, is only a means to an end. The end is good health, high living standards, a sustainable economy, and a clean environment (see for example IAEA, 2005).

The overall energy production and use had been increased more than 50 times between 1850 and 2005, from a global total of approximately 0.2 billion tons of equivalent oil (toe) to 11.4 billion toe (IEA, 2007). Currently, non-renewable, carbon emitting fossil fuels provide approximately 80% of the global primary energy needs (IEA, 2007). At the same time, as noted in TWAS (2008), a large fraction of the world’s population still lacks access to one or several types of basic energy services, including electricity, clean cooking fuels and adequate means of transportation. Also, global demand for primary energy is expected to rise by between 27% and 61% by 2050 (WEC, 2013). Thus, both developed and developing countries face a two-fold energy challenge. On the one hand, countries should assure the provision of environmentally sustainable energy, and, on the other, energy services should be reliable, affordable, and socially acceptable. The present overwhelming reliance on fossil fuels is unsustainable primarily because it destroys the climate.

Figure 1. Framework for energy indicators of sustainable development