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Energy supply, demand, and policy in Viet Nam, with future projections

Pham Khanh Toan, Nguyen Minh Bao*, Nguyen Ha Dieu

Institute of Energy, 6 Ton That Tung Street, Khuong Thuong, Dong Da, Hanoi, Viet Nam

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ABSTRACT

This article provides background on the current status and recent trends of energy use in Viet Nam, as well as projections of energy demand and energy supply in the coming decades. The article summarizes the results of the current national Master Plan for developing the electricity supply sector to meet increasing electricity demand. Also described are the evolution and current status of Viet Nam's energy policies, including those related to energy security, energy efficiency and conservation, the environment, and development of renewable energy sources, as well as strategies for power sector development and restructuring of the energy sector toward greater use of competitive energy markets. The initial phase of the Viet Nam energy sector modeling effort under the Asian Energy Security (AES) project is described. The final section of this article offers conclusions regarding the status of Viet Nam's energy sector and policies, and recommendations regarding "next steps" in energy security analysis.

1. Introduction

Viet Nam, a developing country in Southeast Asia, shares common borders with the People's Republic of China (PRC) in the north, and with Laos and Cambodia in the west. Viet Nam stretches along the east coast of Indochina over a length of 1600 km between the northern latitudes of 8° and 23°. Of Viet Nam's total area of about 330,000 square kilometers (km^2), or 33 million hectares (ha), 50 percent is in productive use. Of the total land area, 21 percent, or about 6.9 million ha, is used in agriculture, and the remaining 9.8 million ha (29 percent) are productive forestlands. Fig. 1 shows the regions of Viet Nam.

Although the country is located in the tropics, the climate is tropical only in central and southern Viet Nam, with warm and humid weather all year round (22–35 °C). In the north, there is a distinct winter season due to cold inland winds. Usually, the winter is also the dry season for the entire country, but the rains are highly unpredictable owing to the influence of several monsoons.

The population of Viet Nam in 2007 was 85.2 million, of which 61.2 million or 71.8% lived in rural areas.

2. Viet Nam's energy sector: current status and recent trends

Below we describe some of the key drivers of energy use, and provide sketches of the current status, and recent trends in energy demand and supply in Viet Nam, with a focus on the important electricity generation sector.

2.1. Key drivers of energy use

Starting in 1986, Viet Nam has undertaken a comprehensive reform called Doi Moi, and the Government of Viet Nam liberalized economic production and exchange in 1989. As a result of these policies, Gross Domestic Product (GDP) grew at an annual average rate of 7.6 percent since 1990, with all sectors growing rapidly. Viet Nam's rapid economic growth has resulted in a corresponding rapid increase in energy needs. Between 1995 and 2008, per capita GDP increased from US$290 to US$605 in 1995 dollars, an annual growth rate of 7.3 percent. Even with growth at that level, as of 2005, Viet Nam's per capita GDP remained below those in neighboring Thailand and China. Though Viet Nam's economic output was dominated by the agricultural sector for many years—agriculture and related industries accounted about for 57 percent of total output in the 1990s—the last twenty years have seen a considerable increase in the importance of the industrial sector and the commercial/services sector in overall GDP. The total of the industrial and commercial/services sector accounted for about 80 percent of GDP in 2005, increasing to nearly 83 percent by 2008, with the remaining fraction of GDP being in the agricultural sector (GSO, 2009). Fig. 2 provides a summary of GDP by sector during the period 2000–2008.

Viet Nam's economic growth rate increased every year during the 5 years from 2001 to 2005, rising from 6.79 percent to 8.4 percent annually, with a decrease to 6.23 percent/yr in 2008 as the global economic downturn began. Table 1 compares GDP

* Corresponding author. Tel.: 84 4 574 4160; fax: 84 4 852 3311.
E-mail address: nguyenmbao@hotmail.com (N. Minh Bao).

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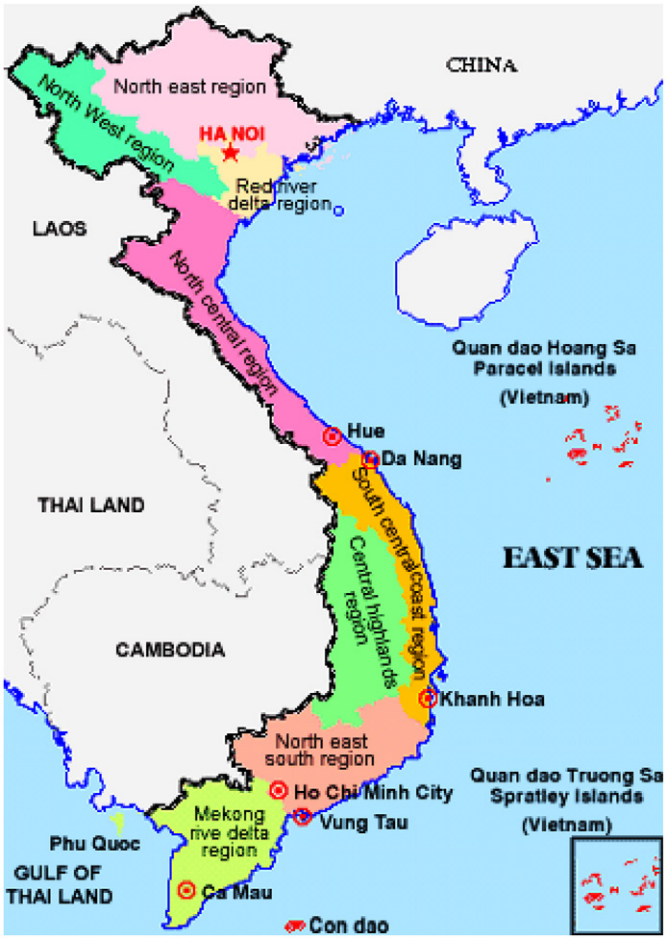

Fig. 1. Viet Nam's major regions and cities.

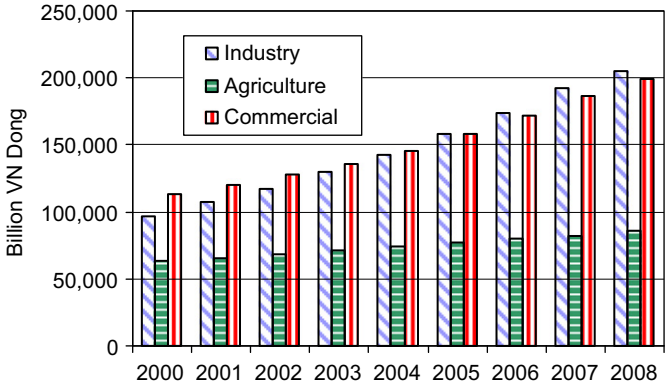

Fig. 2. GDP in Viet Nam by sector, 2000–2008.

growth rates by sector from 2000 to 2008 (Pham, 2007, with updates). Among the industrial subsectors, those contributing the most to growth in overall GDP have been the steel, cement, chemical, textiles, and paper industries.

Another key driver of increased energy use has been population growth, accompanied by a considerable increase in the fraction of the population living in cities. Table 2 summarizes recent trends in overall population growth, and growth in population in rural and in urban areas. As shown, during the period 2000–2008, total population growth in Viet Nam averaged 1.31 percent annually, with population growth slowing somewhat

Table 1
Annual GDP growth in Viet Nam by sector, 2000–2008 (percent per year).

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Industry	10.07	10.39	9.48	10.48	10.22	10.69	10.38	10.60	6.33
Agriculture	4.63	2.98	4.17	3.62	4.36	4.02	3.69	3.40	3.79
Commercial	5.32	6.10	6.54	6.45	7.26	8.48	8.29	8.68	7.20
Total	6.79	6.89	7.08	7.34	7.79	8.44	8.23	8.48	6.23

over time (1.22 percent annually since 2005). Although over 70 percent of the population continues to live in rural areas, growth in urban population during that period greatly outstripped rural population growth, as people moved to cities to seek jobs in the industrial and service sectors. The transport sector also has undergone explosive growth in Viet Nam in recent decades, with the number of vehicles—especially private cars and two-wheeled motor vehicles (motorcycles and scooters) growing very rapidly, especially in cities.

During the period from 1990 to 2007, per capita commercial energy (purchased fuels) consumption in Viet Nam rose at a rate of 9.3 percent per year, from 66 kilograms oil equivalent (kgOE) to 301 kgOE per person as a result of the combination of the industrialization of the Viet Namese economy—and particularly the development of energy-intensive industries—plus urbanization, population growth, and growth in personal consumption as a result of rising incomes. Electricity consumption grew even faster, from 93 kilowatt-hours (kWh) per capita to 718 kWh/capita, a 12.8 percent growth rate per annum. A national program of electrification of cities, towns, and villages has contributed to the high growth in electricity consumption (see below). As a result, Viet Nam had a relatively high income elasticity of energy demand (increase in energy use per unit increase in economic activity) over the period 2000–2007 of 1.46, and an even higher income elasticity of electricity demand of 2.0.

2.2. Energy demand

Fig. 3 shows changes in energy demand by sector for Viet Nam over the period 1990–2007. Most notable here is the considerable growth in energy demand in all sectors, but particularly in industry, transport, and the residential sector in the 1990s, and in the service sector. The residential sector accounted for the largest portion—60.3 percent—of total final energy demand in 1990, out of which most of the energy used consisted of biomass fuels used for household cooking, followed by the industrial sector (27.8 percent), the transportation sector (8.7 percent), the commercial sector (2.0 percent), and the agricultural sector (1.4 percent). The share of total energy consumption by the residential sector fell during the period from 1990 to 2007 due to a significant portion of households switching from biomass fuels to commercial fuels, which are used with higher-efficiency stoves. At the same time, the share of energy consumption by industry has increased continuously from 1990 to 2007. Fig. 4 shows the division of energy demand by sector in 2007.

When Viet Nam's economy was mostly agriculture-based, biomass (wood and crop wastes) supplied the bulk of energy needs. As the country's economy has developed, the role of biomass fuels in the energy sector have diminished, but even as of 2005 the biomass/renewable energy (or non-commercial energy) consumed in Viet Nam totaled 14,880 kilotonnes oil equivalent (kTOE), comprising over one third of total energy demand in the country. Fig. 5 provides a summary of trends in energy demand by fuel in Viet Nam. Among petroleum fuels, demand is strongest for diesel oil, gasoline, and residual fuel oil. Diesel oil accounted for the largest portion of total oil consumption, at 43.9 percent in