

# Renewable energy development in SE Asia

As greater regional efforts are being made, Samantha Campbell and Mireille Hospital of Gide Loyrette Nouel, Vietnam take a closer look at South-East Asia's renewable energy sector.

**E**nergy development and security is a key concern for South-East Asian countries as consumption increases sharply in line with economic and population growth. This is particularly the case on the Indochinese Peninsula where, despite an overall continuing reliance on fossil fuel energy, greater regional efforts are being made to promote alternative and renewable energy sources.

This article focuses on the development of the renewable energy sector, with an emphasis on hydropower, in Vietnam, Lao PDR and Cambodia. The electricity sector in these countries is still at a very early stage of development relative to others in the surrounding region and is characterised by an absence of sufficient energy infrastructure, particularly in rural areas, and inadequate legal and investment frameworks. While some renewable energy sources such as hydropower have been developed in the region, others are yet to be efficiently harnessed for a number of reasons. These include barriers to investment in the power sector in general, and the complexity, newness and relatively high costs associated with renewable energy technology.

Vietnam, Cambodia and Lao PDR each have their own resource-related and economic advantages despite their geographic proximity. Each face country-specific challenges, resulting from historical and legal factors. These factors, and certain regional trends relating to renewable energy, are discussed below.

## VIETNAM IS RICH IN RESOURCES FOR HYDROPOWER

### Vietnam

#### Overview

Vietnam is the largest and wealthiest of the three countries, with 86 million inhabitants and an official per capita GDP of USD1,034 in 2008.

The electricity sector is dominated by the state and prices are among the lowest in the region at 5 to 6 US cents/kWh. Although the private sector may participate in certain generation projects that are specifically set out in the Government Master Plan, the state-owned Electricity of Vietnam (EVN) has the monopoly on the transmission and distribution of power in Vietnam, and is the single purchaser of all electricity generated in the country.

At present, around 60% of Vietnam's total energy production (estimated by the World Bank at 15,763 MW in 2008), is provided by coal and gas-fired plants, and the remaining 40% is produced by hydropower turbines.

Although the electrification program has been successful in Vietnam, the per capita energy demands of the population remain very low relative to other ASEAN countries. Approximately 80% of the rural population still relies on non-commercial biomass, such as wood and rice husks, as an important fuel source for cooking and other purposes.

Despite the financial crisis, Vietnam continues to undergo rapid economic growth. The country's energy requirements, starting from a relatively low level, were forecast by the World

Bank to increase by approximately 16% per year from 2008 to 2010 and continue to increase at 11% per year between 2011 and 2015. As energy supply is currently strained and only just meets domestic demand, this sharp growth is likely to result in Vietnam becoming a net energy-importing country by 2015. The objective of the government is therefore to boost domestic power generation and to secure supply arrangements with neighbouring countries.

#### Fossil Fuel Fired Plants

Vietnam is rich in oil, gas and coal so it is expected that energy demand will be met mainly by fossil fuel plants. A number of such power plants have recently been approved for construction and allocated to sponsors by the Vietnamese authorities. However, where these projects involve foreign investor participation – such as the USD 1.5 billion Nghi Son 2 (2x600MW) coal-fired thermal power plant south of Hanoi which is currently open to tenders from non-Vietnamese sponsors and the USD 1.4 billion Mong Duong project in the northeastern Quang Ninh Province, awarded to a consortium comprising US utility firm AES and the state-owned mining company, Vinacomin – there have been significant delays in project implementation. These are generally recognised as being due to ongoing negotiations with government authorities, state-owned suppliers and EVN, in its capacity as the sole potential purchaser.

#### Water Resources

Notwithstanding the current emphasis on coal and gas-fired plants, hydropower production is also projected to grow by 4.9% per annum from 2002 to 2030, fulfilling some of the increased demand for energy.

Vietnam is rich in resources for hydropower, mainly in the north and central regions near Lao PDR and China where the rainfall is high and there exists a dense system of rivers and streams. The estimated total technical hydropower potential of Vietnam is approximately 18-20,000 MW and several large-scale hydroelectric greenfield and expansion projects are currently underway. The construction of the country's largest hydroelectric venture in North-western Vietnam, EVN's USD2 billion 2,400 MW Son La project, began in late 2005 and is to be completed by 2012.

According to the government's Dong Nai River Master Plan, five other large-scale hydroelectric projects are to be built along the Dong Nai river which runs for nearly 300km. EVN began work on these projects, which were financed by Japan Bank for International Cooperation, in late 2004 and they are expected to be completed by 2010.

As a general rule, however, most hydropower projects in Vietnam, which number 400 approximately, are relatively small in scale (1 to 30 MW).



*Renewable Energy*

In its Sixth Master Plan for Renewable Energy Development in Vietnam (2006-2020), the government made official statements regarding its intention to increase renewable electricity output by 100-200 MW per year. It intends to promote “new” renewable energies, defined as small hydro, wind, biomass and solar energies, so that they will account for at least 5% of all energy production by 2020.

The Vietnamese government has expressed particular interest in the development of wind power which has, to date, been largely unexploited. According to a survey by the World Bank, the annual wind energy potential of Vietnam is estimated at 513,360 MW, which is much greater than that of other countries on the Indochina Peninsula. The best areas for development are concentrated around Vietnam’s long coastal area and in the mountains of central and southern Vietnam.

The first wind power project completed in Vietnam was the Phuong Mai 3 Wind Power Plant, which has an annual capacity of 55MW. Construction started in September 2007 in the central province of Binh Dinh and was completed in September of this year at a total project cost of USD35.7 million. Over 15 wind power projects are currently under construction and expected to generate approximately 1,050 MW. Of particular note is the USD57 million Cau Dat Wind Power Plant project in the Central Highlands province of Lam Dong scheduled to be operational in June 2011.

A combination of fossil-based and renewable energy sources are also being investigated, with Switzerland-based Aerogie Plus working on a diesel-wind power plant on the island of Con Dao with a total investment of EUR20 million.

**Lao PDR**

*Overview*

Lao PDR is much smaller than Vietnam, with a population of 6.8 million and an official per capita GDP of US\$765. The country has more than enough power generation capacity to meet its current domestic demand. However, Lao PDR has no integrated national transmission grid and the electrification rate is one of the lowest in South-East Asia with only 20% of all villages and approximately 35% of households having access to electricity.

Most of the power generated in Lao PDR is currently produced for export and this is a major contributor to the country’s revenue. As a result, the sector has been identified as a key strategic growth area for export purposes, but the extension of the domestic distribution network is also a priority for the Lao state.

However, due the low credit of Electricité de Laos and the Government, domestic independent power producers (IPPs) and the development of the transmission network are not generally considered to be financially viable. These sectors are therefore reliant on state funds and international and multilateral donations.

*Water Resources*



In contrast to Vietnam, Lao PDR has limited coal, oil and gas resources. It does, however, benefit from very significant hydropower potential, estimated by the Lao Government at 18,000MW. Large-scale hydropower projects with foreign investment such as Theun Hiboun have been implemented in the country for over a decade and there are a large number of much smaller hydro projects at various stages of implementation. Unsurprisingly, hydropower is currently the main energy resource in the country and provides over 97% of total generating capacity. Despite this, less than 10% of Laos’ hydro potential has been developed so far and IPPs continue to be attractive to investors where their energy output is intended for export to a creditworthy purchaser.

Of particular note, the Nam Theun 2 Power Company (NTPC) project implemented by a French-Thai-Lao consortium comprising EDF, EGAT, Italy-Thai Co. and the Lao Government is due to reach commercial production in early 2010. The majority of the power produced will be exported to Thailand and is expected to earn the Lao state USD80 million per year.

*Alternative Resources*

As one might expect, due to the availability of hydro resources, the development of alternative renewable energy production is not a priority in Lao PDR. However, the government’s aim to achieve 90% electrification by 2020 through grid extensions and through de-centralised renewable energy supply options is consistent with the reality of rural electricity generation in Lao PDR, which involves a number of very small wind and solar photovoltaic projects, as well as micro hydro projects. There is, however, nothing planned on the scale of the Vietnamese wind projects.

**Cambodia**

*Overview*

Cambodia has a population of approximately 13 million and an official GDP of USD739 per capita.

Cambodia suffers from a very low domestic generation capacity and currently depends on oil and electricity imported from Thailand and Vietnam. In addition, the electricity transmission system is fragmented and most towns are supplied through isolated systems usually reliant on diesel power stations. Official sources state that about 10% of the population (mostly in the capital, Phnom Penh) consumes 90% of the country’s electricity. The electricity price is the highest of South-East Asia, with an average tariff around 16 US cents/kWh rising to 30 to 90 US cents/kWh in some rural areas.

**IN CONTRAST TO VIETNAM, LAO PDR HAS LIMITED COAL, OIL AND GAS**

*Water and Renewable Energy*

Substantial hydropower resources - estimated by the Government of Cambodia at 10,000 MW - are available for exploitation, although hydropower currently makes up only 3% of the energy generated in Cambodia. To date, the large-scale hydro projects in Cambodia, which are generally dominated by Chinese investors, have raised serious criticisms from environmental organisations for their potentially detrimental environmental effects.

Significant hydropower projects in Cambodia include the construction of the Chinese-funded Stung Atay Hydropower station in Khétt Kaôh Kông Province, which began in 2009 with an estimated budget of USD505 million. The commercial operation of this BOT project is expected at the end of 2013 with 246 MW installed



capacity and an average annual generating capacity of 858 million kWh. All electric power generated by the hydropower station is destined for the Phnom Penh-Battambang transmission and distribution lines.

According to a government report submitted to parliament in 2008, Cambodia will also open nine dams of varying sizes between 2010 and 2019 with the aim of generating 1,940 MW. At least four of the dams will be backed by Chinese investors.

The Government of Cambodia has set in the Renewable Electricity Action Plan 2002-2012 the objective of providing cost-effective and reliable electricity to rural Cambodia through the use of renewable energy technologies. The installation and operation of 10-17 MW of renewable generation is envisaged.

### Financing and Financial Aid

As alluded to above, a number of hydro and other renewable projects would not typically reach the project implementation stage on an unassisted basis as they are not commercially viable.

This is often because the price that the purchaser of the electricity is willing or able to pay is too low to make the return on an investor's investment worthwhile. In Vietnam, for instance, the low electricity pricing set by EVN has frequently been quoted as the stumbling block to progressing investments. This issue is exacerbated by the perceived commercial risk and the lack of credit behind domestic state-owned and state entities that are either the counterparties to power project documents and/or their guarantors in emerging markets such as Vietnam, Cambodia and Lao PDR. It is also particularly acute in the context of developing a clean energy project (other than hydro), where one of

the fundamental problems is the fact that such projects cannot compete with the profitability of fossil fuel energy generation, particularly when fuel prices are low in countries such as Vietnam where the resource is plentiful.

Even where an investor may be willing to invest for a relatively low rate of return, the required debt financing would likely not be available for two reasons: the perceived risk associated with South-East Asian emerging markets, and the perceived risk of new and untested renewable energy technology. In the current constrained financial markets, offshore financing will only be available to the most economically viable and lowest risk project, which has greatly reduced the amount of capital available for renewable energy projects in the recent past. There are, however, indications that local bank financing, at least in Vietnam, may be available for a portion of project costs in these circumstances.

Against this background, financial assistance in the form of incentives and direct and indirect loans to clean projects from the World Bank, ADB, JBIC and SIDA has been and will continue to be crucial in developing clean energy in the region.

### Clean Development Mechanism

Vietnam, Cambodia and Lao PDR have all signed/acceded to the Kyoto Protocol, under which, a clean development mechanism (CDM) has been established. The CDM allows developed countries with a greenhouse gas reduction commitment to invest in emission reducing projects in developing countries where reduction costs are lower and claim certified credits for the reductions achieved. CDM projects approved by each host country are further subject to the vali-

ation and registration with the UN CDM Executive Board.

Carbon finance is relatively new in Vietnam, Lao PDR and Cambodia, and the institutional framework for evaluating suitable projects is still in its infancy. In addition, amongst a number of challenges, the current market pricing for carbon revenue is generally considered not favourable enough by promoters of green projects. However, the financial attractiveness of the CDM mechanism is expected to grow when the implicit price of carbon rises and as carbon markets improve their abilities to manage risk.

As of November 2009, Vietnam has eleven CDM registered projects, there are four in Cambodia, and one in Lao PDR, the majority of these projects being in the renewable energy sector.

### Development of Renewable Energy Legislation

Foreign investors often cite unclear foreign investment mechanisms and policies, as well as significant uncertainties due to ongoing structural reform of the power sector, as difficulties preventing or delaying their investments into the renewable energy sector in South-East Asia. In addition, due to their high establishment cost and long break-even time, renewable energy projects require especially supportive policies and laws to attract investors.

The Renewable Energy Law enacted by the People's Republic of China and which came into effect on 1 January 2006 marked a significant milestone in the development of green energy in Asia. With its renewable energy regulations, China expects to boost the use of alternative resources up to 10% by 2020. In 2008, China led new renewable energy investment in Asia, with USD15.6 billion mostly in wind projects and biomass plants.

At the end of 2008, the Philippines also enacted a Renewable Energy Law which has been favourably received by the investment community. The new law provides fiscal and non-fiscal incentives for renewable energy investors, including tax credits on domestic capital equipment and services, special realty tax rates on equipment and machinery, tax exemption of carbon credits, duty-free importation mechanisms, and income tax holidays, among others. The law also provides for the establishment of a Renewable Portfolio Standard system, which would require electricity suppliers to source a certain amount of their energy supply from renewable resources such as wind, solar, hydro, geothermal and biomass.

Although Vietnam is expected to pass an Energy Conservation Law in 2010 with a view to encouraging the efficient use of energy, there is currently no indication that general Renewable Energy Law - which provides a clear legal framework and incentives for investing in the renewable sector - will be enacted in the near future in Vietnam, Lao PDR or Cambodia. Investors and non-profit organizations in the renewable energy sector have voiced their hope that these countries will follow the example of China and the Philippines by enacting similar legislation, increasing the relative attractiveness of the region to the renewable energy sector investment community.

## CAMBODIA WILL ALSO OPEN NINE DAMS OF VARYING SIZES