



VIETNAM'S INFRASTRUCTURE CHALLENGE

Workshop Edition

Power Strategy

Managing growth and reform



The World Bank in Vietnam
2006



VIETNAM'S INFRASTRUCTURE CHALLENGE

As Vietnam becomes richer it faces challenges in adapting its infrastructure policies and institutions. While the old challenges of providing basic services to all remain, new challenges are emerging, such as accessing new sources of finance, refining planning processes, preparing for rapid urbanization, improving the efficiency of infrastructure service providers, developing stronger institutions to encourage private finance of infrastructure or direct private provision of infrastructure, and developing more targeted approaches to poverty alleviation.

This report on Power Strategy – Managing Growth and Reform is one of six volumes dealing with *Vietnam's Infrastructure Challenge*. Other volumes deal with Infrastructure Cross Sectoral Issues, Water and Sanitation, Transport, Telecommunications, and Urban Development. The work for these volumes was carried out between 2004 and 2006 by World Bank staff and consultants.

This workshop edition of the report has been prepared as a means of inviting feedback on its contents from the Government and other stakeholders, prior to final publication.

Executive Summary

Vietnam's electric power industry is facing tremendous challenges. With annual growth in electricity demand of 15% or more expected to continue as the economy grows further, a massive expansion of the power system is required over the next decade. Funds for investment must be mobilized from all sources, including greater self-financing from the domestic power industry itself and large-scale development of independent power production (IPPs). At the same time, the country is embarking on a major power sector reform program, designed to establish new institutional arrangements, restructure the dominant utility and gradually develop a competitive power market. The pressure to meet soaring power loads, urgently mobilize investment for new capacity construction, and ensure that the new corporate configurations and institutions being created for the reformed and restructured power industry will best serve long-term needs, combine together to create probably the most critical juncture of the country's power industry.

In an environment where the dominant power utility, Electricity of Vietnam (EVN), and supervising and regulating government entities are facing major decisions on a weekly basis, this report seeks to provide an integrated, medium-term perspective on the intertwined issues, and some independent suggestions for consideration. The bulk of the report was prepared by World Bank staff in consultation with Vietnamese counterparts during mid and late 2005. Section One provides an overview of Vietnam's power sector, intended primarily for

those new to the sector. Section Two outlines the main current issues facing the sector, and provides analysis of potential solutions and recommendations.

The Twin Challenges of Growth and Reform

The capacity of Vietnam's power system to deliver power to consumers needs to double in just five years, to meet demand growth projected at 16% per year during 2006-2010. Demand is being driven especially by industrial load growth, but also heavy increases in residential power use as incomes are rising. During 2011-2015, demand growth is expected to remain very strong, projected at 11% per year.

During the last five years, performance of the power industry has been good overall, with sound financial performance, declines in system losses, and improved reports on service quality. A particularly noteworthy achievement has been an increase in rural access to electricity to 88% of households in 2004. Beginning in 2005, however, shortages became apparent, and are expected during the dry seasons in 2006 and 2007, with difficulties to add capacity to the system fast enough to meet demands. Short-run options to mitigate shortages include addition of gas turbine capacity to meet peak loads, aggressive demand-side management, and increases in imports from neighboring countries. While demand-side management must be pushed as hard as possible, the main solution to the inadequate reserve margins and gap in meeting demand lies in efficient

implementation of a large-scale medium-term power system capacity expansion program.

Vietnam's far-reaching power sector reform program has been launched with passage of the forward-looking Electricity Law in late 2004, the establishment of the new Electricity Regulatory Authority of Vietnam (ERAV) under the oversight of the Minister of Industry, and the Prime Minister's approval in early 2006 of a Road Map for the reform. The country's efforts to restructure the power industry and develop a competitive power market are a long term proposition. Yet, there are key immediate decisions and actions which will have major implications for the success of the reform over the longer term. It is important to ensure that decisions on the restructuring and equitization of various entities now under EVN and on agreements for new IPP developments provide the proper building blocks for the future. The capacity, credibility and effectiveness of ERAV need to be established to put a regulatory framework in place that ensures predictability for investors. Subsequently, over a period of several years, careful design work and consensus building are required as preparation to roll out the new market.

Optimizing Power Investments

Vietnam has laid a good planning framework for the coming massive capacity expansion program through the completion of the Sixth Power Master Development Plan, covering 2006-2015, with a view to 2025. As of early 2006, the Plan was under final Government review. The basic institutional arrangements, analytical capacity and analytical tools being used are fundamentally sound. The effort is being coordinated with similar planning exercises for the coal and petroleum industries, for the first time all under Ministry of Industry (MOI) purview.

The new Plan emphasizes growth in all three

major power generation subsectors—hydropower, coal-fired power, and power fueled by offshore natural gas. As hydropower projects identified in Vietnam generally provide lower cost alternatives than the average costs of new thermal power through much of the load curve, a strong focus on development of the country's hydropower resources is retained. However, expansion programs for thermal capacity, using domestic coal and eventually imported coal, and large quantities of new natural gas, are also necessarily aggressive, providing the biggest capacity additions. Demand-side management efforts—including both improvements in energy efficiency as well as load management—should play a more significant role than in the past. Finally, imports from China and other neighbors are expected to increase sharply and make a larger relative contribution in the future.

While both coal-fired and gas-fired power are critical for Vietnam, the optimal balance between these two and specific project scheduling priorities are highly sensitive to future relative fuel prices and specific fuel supply arrangements. Ultimate supply levels of domestic coal and natural gas are limited, and use of imported coal for power generation is planned to meet primary energy supply gaps that emerge. Following basic analysis of the sensitivity of the relative economics of these options, two broad conclusions emerge: (a) Aggressive promotion of exploration and firming up of natural gas resources, and continued gas field development, is a key priority for the country's power development, to ensure least-cost generation, and (b) far more than in the past, updated review of both emerging overall fuel supply availability and the latest relative economic costs of coal and gas supply should be carefully reviewed before sanctioning major specific power investment projects, even if they are already listed in the Plan.

Discussed in further detail in pages 13-20, several conclusions concerning specific investment options include:

- In reviewing coal-fired generation, it is important to evaluate investments using economic values for coal inputs as opposed to actual prices. In lieu of development of a truly competitive coal market, the Government needs to review domestic coal pricing strategies. Environmental impacts are also a major issue, requiring strict attention when considering the scale of development, siting and choice of technology.
- More active efforts are required to coordinate the actors and interests involved in new gas field-pipeline-power plant development, given needs for new projects to proceed as quickly as possible. To achieve competitive power pricing at the end of the chain, firm, large-scale and sufficiently long-term commitments from a number of parties are required. Given EVN's financing and borrowing constraints, IPP investment is critical. However, lack of competition is a major disadvantage in arrangements where IPP projects are negotiated solely with fuel suppliers, and where this is undertaken, separate review and close monitoring of fuel supply and power supply cost accounting is important.
- Further work in the hydropower subsector is especially important to improve detailed planning and implementation of reservoir resettlement programs, and alignment of environmental assessment to better inform project designs and focus on key issues. Major progress has been achieved in recent years, including in policy development and financial commitment to resettlement work. The challenge is in the details of implementation to achieve the best long-term results.
- Vietnam's demand-side management programs need to be sharply expanded, as a

strategic measure to help bridge the power supply and demand gap. The main issue is development of the institutional capacity to deliver effective programs, both in EVN and MOI.

- In addition to short-term measures to increase imports, increasing interconnection with Thailand, China, Laos and Cambodia through development of the Greater Mekong System, can bring larger and long term benefits to Vietnam in the coming years.

Financing Investments

Annual power sector investment requirements to meet power demand during 2005-2010 are expected to be over \$3 billion. The country seeks to mobilize investment through a variety of vehicles, from both domestic and foreign sources, to meet this challenge. The two basic categories include EVN's contribution to investment, from its own resources and different types of borrowing, and independent investment, primarily by independent power producers. Both are critically needed.

Financing of new investment through the current EVN system, including sub-entities, is essential for key parts of the construction effort, including the network, most of the hydropower program, and selected elements in the thermal power program. EVN exhibited strong financial performance during 2002, 2003 and 2004, allowing substantial self-financing contribution to the investment program. With increased costs stemming in part from power shortages in 2005, and the sharp increases in investment requirements, however, self-financing ratios will plummet unless EVN's unit sales revenue increases substantially. The corporation is proceeding to borrow from a wide variety of sources, including issuance of bonds. However, EVN will reach borrowing limits very quickly, unless revenues are increased (or there is a

major injection of equity, which is unlikely). Overextension of borrowings above internationally recognized ratios would be highly imprudent, as maintenance of EVN's creditworthiness is essential for any sustainable investment mobilization effort.

It is very clear that average retail power price levels must be increased quickly to cover greater costs but also, especially, to expand revenues for financing of the massive power sector expansion. Ultimately, consumers must contribute to the financing of the new capacity to meet their needs. Power prices in Vietnam are relatively low by international standards, including industrial tariffs, but especially in the residential sector.

EVN's purchase of power from sources currently independent from EVN, including mostly IPPs but also imports, is expected to account for more than one-half of new power production during 1995-2010. A number of IPP projects will be developed by other domestic state-owned companies, or by those companies in joint venture with EVN. However new IPPs wholly owned by foreign or private firms are expected to provide several thousands of new megawatts of build-own-transfer (BOT) IPP capacity.

Use of competitive bidding is strongly recommended as the standard method for awarding new IPP power purchase agreements. In country after country, and project after project, prices and terms awarded through competitive bidding have provided lower costs than negotiated deals. The Phu My 2.2 success in competitive bidding provides a platform of prior experience in Vietnam. Support is needed for MOI's efforts to (a) develop a government guarantee strategy which can meet the needs of investors today but also provide a pathway for limiting government exposure in favor of increasing reliance on Vietnamese corporate assurances and creditworthiness; (b) develop a standard framework for competitive bidding for

a full new patch of IPP projects; and (c) resolve outstanding gas field/transmission/power generation development issues hindering development of gas-based IPP projects.

Power Industry Restructuring, Equitization and Development of a Power Market

The objectives of Vietnam's power sector reform are to maximize efficiency through competition in the power industry and to expand mobilization of investment and managerial resources from outside of the current state-operated system, in order to minimize costs and provide reliable, high quality service to consumers. As described in the recently approved Road Map, the reform process is expected to span twenty years, and proceed through (a) a preparatory phase and initial "trial" market, followed by operation of a competitive market for supply from generators to a Single Buyer; (ii) a second phase introducing a wholesale competitive market for bulk supply to distribution companies and large users, and (iii) a final phase introducing competition at the retail level.

The implications of the approved reform path need to be clearly understood by all parties. Four points worthy of special emphasis include:

- EVN will need to be broken up into truly separate corporations. The model of EVN as a holding company for the state's assets in generation, transmission and distribution cannot be retained if true competition is to be achieved and a level playing field created to facilitate private investment.
- Reductions in costs to consumers should not be expected soon. The main efficiency gains of competition will only be realized when large consumers and distribution companies are able to contract directly with power

generators in a competitive environment. These benefits are not expected during the next five years. The most important factors affecting costs of supply to consumers over the medium term will be the degree of success in using competitive bidding for IPP contracts, changes in fuel prices, the degree of success in maintaining development according to the least-cost investment plan, and the degree of success in load management and achieving system operation efficiency gains.

- Prospective power shortages and tight reserves provide additional challenges for the reform. Use of an internal, “trial” market that emulates the future power market, and careful advance preparations are crucial.
- Greater predictability and flexibility in retail electricity pricing will need to be introduced over time. If a power market is desired, market forces must be brought to play, and hence flexibility in setting the retail tariff is essential, through mechanisms which allow changes in costs to be passed through to consumers, and for consumers to respond.

The current Road Map outlines a solid set of directions and steps for the reform. However, serious consideration should be given to allow direct contracting between generators and large consumers and/or distribution companies for special conditions (e.g. financing new investment) during the single buyer phase. This way the main efficiency benefits of the reform can begin to be realized earlier. In addition, experience elsewhere strongly suggests that vested interests and pricing imbalances may be created by giving a legal monopoly to a Single Buyer, which can create difficult barriers to further reform and limit the benefits of competition. Suitable time and care is required during the preparatory phase of the reform. However, once preparation is in place, it may be

best to roll out the reforms towards direct contracting as quickly as possible.

Decisions made now and in the next few years on how to restructure the power sector, especially as part of the Government’s equitization program, will have far-reaching implications for the industry in the future and the extent to which Vietnam can achieve the power reform goals set forth in the Electricity Law. The size, structure and operational scope of newly formed shareholding companies need to be conducive for the future power market. Companies need to be strong enough to be active market participants, but should not wield excessive control. Distribution companies, in particular, need to have sufficient financial strength and managerial capacity to be perceived as credible and make long-term contracts with generating companies. For this, and other reasons, it is strongly recommended that the Government review the results of current pilot projects to equitize distribution at the provincial level before further rolling out this particular equitization strategy. The concern is that such small provincial distribution companies cannot become the reliable revenue collectors and power purchasing agents upon which the rest of the power industry must depend, unless the Government continues financial backing of many of them indefinitely.

With the introduction of the power market on the horizon, another current issue concerns the balancing of new IPP investors needs for bankable power purchase agreements (PPAs) with the need to move steadily and smoothly towards the power market. Clearly, PPAs must provide investors with sufficient medium-term security of cash flow for them to obtain project financing. It also is important to protect Vietnam’s security of power supply and to ensure adequate reserve margins in the system. The key here is to design the power market to mitigate these concerns. For example, emphasis

may be given in the market design to cover load primarily with contracts, and limit spot trading to non-contracted surpluses and to clearing differences.

Developing the Electricity Regulatory Authority of Vietnam

Two important factors which will define the degree of success of ERAV in its important and very necessary position as the new regulatory agency for the power sector include: (a) ERAV's ability to establish itself as an objective institution, charged with implementation of the country's laws, with a mandate recognized by all parties, and operating as an agency separate from MOI's regular business and departments, and (b) establishment of clear technical competence in addressing the complex issues surrounding regulation of the sector. Some areas for ERAV's attention during its first year

include: (a) establishment of itself with a distinct identity; (b) definition and publication of a clear work program, (c) staff training and development, (d) agreement with power industry participants on clear arrangements for information collection and monitoring, (e) definition of ERAV's enforcement powers, and (f) definition of mechanisms for resolution of disputes.

Recommendations for Follow-up

Recommendations in this report are summarized in the final pages (pp. 34-36). Follow-up actions on many of these recommendations are already underway. Given the challenges which Vietnam faces in development of its power sector over the next five years, in particular, international assistance will be important, both in financing and as a source of ideas and lessons from experience elsewhere.

Section one:

Current status of Vietnam's power sector

Overview

Introduction to Vietnam's Energy Sector

1. Vietnam is a net energy exporter, and is expected to remain such for the foreseeable future. The country is endowed with offshore oil and gas resources in the south, coal in the north, and hydroelectric power resources in the mountains running from north to south along the country's western regions. The country is not exceptionally well endowed in any of these resources, however, so Vietnam's exploitation of its energy resources will continue to be primarily for its own use.

2. Vietnam produced about 20 million tons of crude oil in 2004, up from 16 million tons in 2000. Almost all was exported, earning some \$5.7 billion in foreign exchange revenues, and accounting for about 21% of the country's total export earnings. However, Vietnam imported some 11 million tons of petroleum products in the same year, at a cost of \$3.6 billion, so that net petroleum exports totaled just \$2.1 billion. Vietnam is currently constructing petroleum refining capacity, so that an increasing portion of its domestic petroleum product demand will be met by processing its own crude oil. Crude oil production is expected to increase in the future, but not dramatically: average production rates of 25-40 million tons per year are expected through to 2020.

3. Vietnam has substantial offshore natural gas resources, including associated gas,

but also major reserves of non-associated gas. All natural gas is planned for domestic use for the foreseeable future—the industry will do well to meet planned domestic needs, especially for the power sector, but also for fertilizer production and several other large industries. In 2005, about 6.6 billion cubic meters of natural gas were brought on shore. Production is expected to increase to some 15-20 billion cubic meters by 2015.

4. Currently exploitable coal resources in Vietnam are sufficient for an increase in production from the current 20 million tons per year to about 45 million tons per year. Predominantly anthracite, the highest quality coals are exported as metallurgical coal, and lower quality coal is used domestically, primarily in the power and cement industries. Coal production has increased sharply over the last few years, rising from some 11 million tons in 2000. With the rise in international energy prices, export earnings from the 7.5 million tons exported in 2004 totaled \$355 million.

5. Less than one quarter of Vietnam's estimated economically exploitable hydropower resources had been developed by 2004. With the notable exception of the Da River in northern Vietnam, the country's hydro potential is not amenable to massive single development projects, but rather to medium and small-scale hydro plant construction. Except for the Hoa Binh, Son La and Lai Chau

sites on the Da, all other hydro sites in Vietnam are earmarked for hydro plant development well under 1000 MW.

Introduction to Vietnam's Electric Power Sector

6. **Vietnam's Power System.** Vietnam's electric power system caters to the country's resource endowment and geographic configuration. With hydro resources available in all three of the country's main regions (see Figure 1), hydroelectric power was the dominant source of power generation from the late 1980s until very recently. Thermal generation from coal adds base load capacity in the north. Thermal generation from new

offshore natural gas has been developed in the south since the late 1990s, adding to small amounts of oil-fired thermal capacity. Total generating capacity on the system by the end of 2004 was almost 11,200 MW (see Table 1). A 500 KV backbone transmission line connects the regions and generation sources, enhancing the optimal use of resources during different seasons and as the generation mix and demand evolve. This basic configuration of the system is expected to continue over the long term as the overall system expands. Although the mix will continue to vary from year to year, as new large plants are added, hydro and gas are each expected to contribute about 40% of power generation, and coal about 20%, over medium term.

7. Electricity of Vietnam (EVN) is now completing a parallel, second north-south 500 KV line, and strengthening power transfer capabilities. With additional 500 KV lines for power evacuation from new major generation complexes and work beginning on high-voltage rings around Hanoi and Ho Chi Minh City, the total 500 KV network will increase from 2423 km in 2004 to 3533 km in 2005. At the end of 2004, 220 KV lines totaled 4798 km and 110 KV lines totaled 9339 km. Power transfers with neighboring China, Cambodia and Laos were small in 2004, but will grow significantly in the future.

8. Vietnam's power industry has struggled over the last decade to expand the system to meet rapidly growing demand, and has been generally successful, although serious shortages did appear during the summer of 2005, when drought conditions coincided with tight capacity constraints. From 1995 to 2004, electricity sales grew by 15.1% per year, at almost double the 7.1% p.a. rate of GDP growth (see Table 2).

Table 1.

Vietnam's Power Generating Capacity (MW)

	2002	2003	2004
Hydro	4187	4154	4227
Coal	1245	1245	1495
Oil and gas	3428	4496	5475
Total	8860	9895	11197

Source: EVN.

Figure 1: The Regional Character of Vietnam's Power System

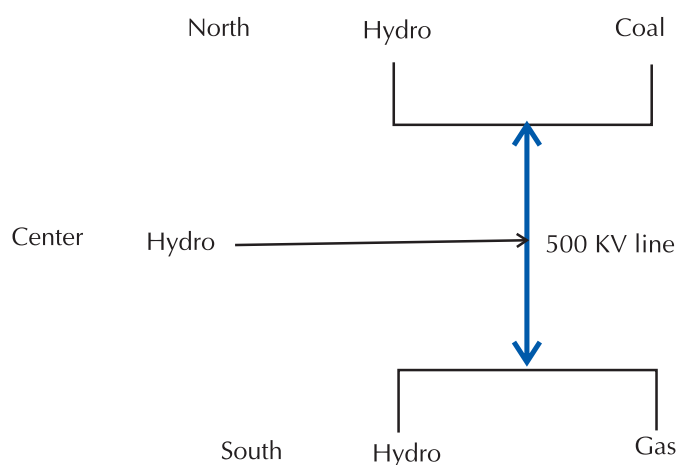


Table 2.**Total Electricity Production and Sales (1995-2004)**

	1995	2000	2001	2002	2003	2004
Total production (TWh)	14.6	26.6	30.6	35.8	40.8	46.2
Total Sales (TWh)	11.2	22.4	25.8	30.3	34.9	39.7
Own Use ^{a/} (%)	9.3	4.1	4.2	4.9	4.8	4.3
Transmission & Distribution Loss (%)	21.4	14.5	14.2	13.4	12.2	12.2

a/ Unidentified consumption in addition to internal use may be included.

Source: EVN Staff calculations.

Electricity production during the same period grew by 13.6% per year, growing somewhat slower due to power system efficiency gains. Transmission and distribution losses, for example, fell sharply during the period from an unfortunate 21.4% of power production in 1995 to a reasonable level of 12.2% in 2004.

9. Total power production amounted to 46.2 TWh in 2004 (Table 3).¹ Power generation from oil and gas surpassed hydropower generation for the first time in many years, as a number of units in the natural-gas based Phu My complex came on line. Power purchases from independent entities rose to about 6.3 TWh (14% of total generation) in 2004. In 2005, the share of independent power production will

be substantially higher, as capacity additions during the course of 2004 brought the IPP share in total capacity to 22% by the end of the year.

10. Sources of Demand Growth.

Electricity use in Vietnam is growing from a very low base for a country its size. In 1995, total power sales of 11,185 GWh amounted to only 156 KWh per person per year. Even after growth of more than threefold in electricity use during 1996-2004, total end-use consumption amounted to only 484 KWh per capita per year, compared to an average of 1265 per capita per year in low and middle income countries worldwide.

11. Industrial and residential electricity use each accounted for about 45% of total sales in 2004 (See Table 4). Although the service sector has played a role, industry and household use have been primarily responsible for the total growth in electricity demand, and this trend is expected to continue. The share of agriculture in electricity demand, which is not an electricity-intensive sector, has fallen sharply.

12. Rapid increases in industrial electricity use are following rapid growth in the manufacturing sector. Industrial value added grew by about 11% per year during 1996-2004. The share of GDP of industry, which is a relatively electricity-intensive sector, increased

Table 3.**Electricity Production by Generation Type**

	2002	2003	2004
Hydro	18.2	19.0	18.1
Coal	4.9	7.2	7.2
Oil and gas	12.7	14.6	20.9
Total	25.8	40.8	46.2
EVN generated	33.7	34.8	40.1
Purchased by EVN	2.1	6.0	6.1

Source: EVN.

1. All figures in this chapter are from EVN's statistical series including only production and sale from capacity on the network. Other sources of power generation totaled some 0.6 TWh in 2004.

Table 4.**Electricity Sales Growth by Type of User (1995-2004)**

	Terawatt Hours			Percentage of Total		
	1995	2000	2004	1995	2000	2004
Industry & Construction	4.6	9.1	17.9	41.0	41.0	45.0
Agriculture ^{a/}	0.6	0.4	0.6	6.0	2.0	1.0
Residences	4.9	11.0	17.7	44.0	49.0	45.0
Commerce/other	1.1	1.9	3.5	9.0	8.0	9.0
Total	11.2	22.4	39.7	100.0	100.0	100.0

a/ Methods for collecting and calculating statistics for agriculture appear to have changed during the period.

Source: EVN

from 22.6% in 1995 to 30.8% in 2004, while the share of agriculture fell from 26.2% to 20.3%. Moreover, the types of light industry which are growing fast in Vietnam—food and beverage processing, textiles, light chemicals, and light consumer durable goods—often tend to increase power use per unit value added as development proceeds, due to increasing automation, packaging and (for food, beverages and textiles) increased use of cooling. Industrial electricity demand growth increased especially fast during the last few years (e.g., 18.5% p.a. during 2001-2004), and is expected to continue to be a key demand driver.

13. The sharp, steady increases in residential electricity demand follow both an increase in household access and addition of loads other than the basic lighting load. With both increases in the urban population and the success in rural electrification (see para. 29) about 30 million new people were added as power users from 1995 to 2004, representing some 37% of the total population. Probably even more influential on demand growth, however, given the low consumption levels of new household customers, has been growth in household appliance ownership, as disposable incomes have grown from very little in the mid-1990s. Even so, the current average consumption of about 20 kWh/month per person among residential electricity users is

low, and certain to increase, as power use grows from nascent levels in the countryside and as heavy appliance use, especially use of air conditioners, begins to take hold among middle-income groups.

Policy and Institutional Framework

14. In conformity with Vietnam's socialist market economy, public ownership dominates the energy sector, but increasingly, market forces are being brought to bear and private sector participation is expanding. Since 1995, energy sector operations have been organized into three General Companies, which are among the largest companies in Vietnam: PetroVietnam, Vinacoal and Electricity of Vietnam.

15. Key legislation on the energy sector includes the Petroleum Law (1993) and its Implementing Decree (1996); and the new Electricity Law (2004), followed Decrees 105 and 106 (2005), which have to do with implementation of the Electricity Law. Key government decrees include Decree 55 (2003, establishing the functions, tasks, powers and organizational structure of the Ministry of Industry), Decree 45 (2001, on electricity operations and use), Decree 48 (2000, defining the policy and regulatory framework for the upstream oil and gas sectors) As discussed in

later parts of this chapter, the new Electricity Law aims at development of a new framework for the regulation and operation of the power sector in the coming years.

Government Policy and Regulation Responsibilities

16. The Ministry of Industry (MOI) has first-line policy and supervisory responsibilities for the energy sector, both as the 'line ministry' and as the ministry with oversight responsibility for state-owned companies. MOI is responsible for supervising implementation of government policy, and recommending and drafting major policy reforms for government adoption. MOI is responsible for review and submission for Prime Minister approval of master investment plans for the sector and all major investment projects. Although these often require review and approval from other agencies as well, including the Ministry of Planning and Investment (MPI) and the Prime Minister's office, MOI is the government window for the energy companies. MOI reviews and recommends retail price adjustments for approval by the Prime Minister. Of the major energy subsectors, MOI has been particularly involved in the oversight of the electric power subsector.

17. In addition to the Government Office of the Prime Minister, other key government agencies for the power sector include:

The **Ministry of Planning and Investment (MPI)**, which is responsible for the preparation of the country's overall economic development plans, and review and provision of recommendations to the Prime Minister for all projects using public funds or other resources;

The **Ministry of Finance (MoF)**, which, in addition to its broad role overseeing financial matters for the Government and the

budget, arranges Government guarantees for export credits, and provides, through its Development Assistance Fund (DAF), public sector loans to qualified users;

The **Ministry of Natural Resources and Environment (MONRE)**, which is responsible for environmental regulation;

The **State Bank of Vietnam (SBV)**, which is responsible for allocation of foreign exchange, and, as such, is the counterpart for international donor lending, and a key agency for implementing guarantees for foreign exchange convertibility; and

Provincial Peoples' Committees (PPCs), which have integrated government oversight responsibility for local government, including all government functions delegated by the central government.

Power Sector Structure and Ownership

18. Electricity of Vietnam (EVN) is the vertically integrated power utility charged with development, management and operation of the state's electric power industry assets. With the passage of Vietnam's Electricity Law, however, the country is just now embarking on a long-term program to restructure the power industry, which will fundamentally alter EVN, the legal, ownership, and management structure of the industry, and how the industry is regulated by Government. The sections below describe the situation as of 2005, whereas the strategy for the future, and a number of key trade-offs and choices, are described later.

19. EVN is organized as a General Company, with a series of wholly owned subsidiaries. EVN owns and operates state-owned power plants built to date, and is taking shareholding stakes in a number of independent power plants (IPPs). Key subsidiaries include seven regional Power

Companies (PCs), which are in charge of power transmission and distribution from 110 KV downwards. The three largest PCs are PC1 (northern Vietnam), PC2 (southern Vietnam), and PC3 (central Vietnam), while the remaining four manage the power distribution systems in Hanoi, Ho Chi Minh City, Hai Phong and Dong Nai. The PCs each maintain their own financial accounts, although these are also consolidated in EVN's overall accounts. Other key entities under the EVN umbrella include four Power Transmission Companies, four Power Engineering Consulting Companies, the National Load Dispatch Center, and a number of equipment manufacturing companies.

20. Especially compared to many other state-owned companies in Vietnam, EVN has been successful in establishing a corporate culture and commercial orientation, particularly in recent years. EVN's financial accounts are strictly separate from the Government budget, and EVN receives no Government budget subsidy support for investment or its operations, with the exception of certain grants for a few multipurpose hydropower projects resettlement. The company is now facing only commercial terms for borrowings, except for (i) concessional loans for rural electrification (e.g., from IDA), and (ii) DAF loans for resettlement costs and locally manufactured equipment, carrying interests rates 2-3% lower than commercial rates. EVN was able to steadily maintain profitability through 2004, covering all of its costs, including depreciation and financing costs, from internally generated revenues.

21. EVN's generation and network development plans, and all major investment projects, must be approved by the Government. MOI also is currently responsible for executing bidding and contracting procedures for large IPPs. The retail electricity tariff is also tightly regulated by the Government, with adjustments recommended by MOI requiring approval by

the Prime Minister. Vietnam maintains a unified national tariff, across the country.

22. State policy has increasingly encouraged development of independent power generation by investors outside of the EVN system. Whereas IPP capacity totaled some 620 MW in 2002, accounting for just 7% of installed capacity connected to the system, this has grown sharply to over 2400 MW in 2004 with the commissioning of the gas-based Phu My 2.2 and Phu My 3 units, accounting for almost 22% of system capacity. IPPs may be wholly owned by foreign, private firms, by domestic firms, or in various joint-venture arrangements, including with EVN. Vinacoal and PetroVietnam are developing several IPPs, both wholly owned or as joint ventures with EVN. Small hydro plants also are being developed by local firms, for connection with the main grid and sale of electricity through power purchase agreements to EVN.

23. In the countryside, local communities own and operate the low-voltage electricity distribution systems in most areas. The basic approach adopted for rural electrification in Vietnam has been for EVN's PCs to develop the medium-voltage network, and for local communities to develop the low-voltage system (although EVN has undertaken this role for about one-fifth of Vietnam's communes). Provincial People's Committees have oversight for rural electrification in their provinces, and provide substantial financial support for the local share of investment. Until 2004, local power distribution was handled by informal Commune Electricity Groups or other informal entities in about two-thirds of Vietnam's electrified communes. According to Government regulations, however, all of these entities are now required to convert to formal legal entities, such as cooperatives or joint-stock companies. Developed initially at cooperative or commune levels in most cases, but also as

district-level joint stock companies in some cases even at this stage, these companies need to consolidate and expand, in order to develop over time into important commercial actors in the overall power system.²

Investment Needs

24. With electricity demand increasing unabatedly, Vietnam is facing sharp increases in power sector investment requirements. Whereas Vietnam's original Fifth Power Master Development Plan foresaw an increase in power generation averaging 13.4% per year during 2001-2010, to power a continued economic growth rate of around 7.5% per year, power generation actually grew by 14.9% p.a. during 2001-2004, as demand grew faster than expected. EVN revised its development plans upwards in 2003, foreseeing shortfalls in capacity, but even so, the country still found itself seriously short of capacity in 2005, with needs for large scale, involuntary load shedding.

25. In the new Sixth Power Master Development Plan, covering 2005-2015, with a

view towards 2020, forecasted sector development and investment requirements through the balance of the decade will be substantially higher than originally projected (see Table 5). The new Plan remains under preparation, and drafts will be reviewed at all Government levels at the end of 2005. Demand projections prepared during the summer of 2005, however, suggest a base case growth in power generation to 113 TWh in 2010, up from 46.2 TWh in 2004—a growth rate of 16% per year, compared to the 12.4% per year originally planned. This growth rate implies a further continuation of a power demand/GDP growth elasticity of about 2.0. Industrial load growth is expected to be particularly strong. During 2011-2015, recent base-case forecasts point to a slow down in power demand growth to 11% per year, followed by 9.1% per year during 2015-2020.

26. Total power sector investment requirements to meet demand will exceed US\$3 billion per year during the latter half of this decade; representing levels which are triple those at the outset of the decade, and an immense

Table 5.
Power Sector Demand Growth (2004-2020)

	2004	2010	2015	2020	2004-2010 Growth Rate (% p.a)
Fifth Power Master Plan					
Total Sales (TWh)	39.7	81.2	113.8		12.7
Generation Requirement (TWh)	46.2	98.0	129.8		12.4
Capacity Requirement (MW)	11,197	20,636	30,892		10.7
Updated EVN Estimates (2004)					
Generation Requirement (TWh)	46.2	98.0		228.0	13.4
Capacity Requirement (MW)	11,197	24,447		42,000	13.9

Source: Fifth Power Master Development Plan (2000-2010); EVN Estimates.

2. IDA's Second Rural Energy Project provides a major program of support for the development of new Local Distribution Utilities in the countryside.

challenge for the country. As shown in Table 6, EVN's substantial investments in generation, all of the country's transmission development, urban distribution and a portion of rural low-voltage distribution, will total \$2.4-2.5 billion per year (in constant terms), just to meet original Fifth Power Master Plan load estimates, which are now clearly unrealistically low. Transmission investments will continue to be substantial in 2005 and 2006, as EVN seeks to complete the backbone of the system, before tapering off some towards the end of the decade. EVN's distribution investments are expected to increase just modestly (although rural investments outside of EVN are likely to increase substantially). Particularly critical, however, EVN's investment forecast foresees a tapering off in investment in generation, despite heavy growth, with a dramatic shift to greater reliance on power purchased from IPPs (see Table 7). Whereas purchased power accounted for just

13.6% of total power production in 2004, Vietnam aims to increase purchases from IPPs to account for about a third of power production on the system by 2010. EVN's seeks to focus its generation investment primarily in hydropower, and rely much more on IPP development of thermal power. As a result, it is hoped that IPPs will account for over one-half of total incremental power production during 2005-2010.

27. Issues relating to financing of EVN's investments, and the fostering of greater IPP investment, are discussed in further details in paras. 73-87.

Sector Performance

28. Performance of Vietnam's power industry, managed primarily by EVN, has been quite good during recent years. The industry basically kept pace during the last decade with extraordinary increases in demand, maintaining

Table 6.

EVN Investment Requirements (2004-2010)^{a/}

	2004	2005	2006	2007	2008	2009	2010
Generation	711	1229	1544	1961	1869	1818	1917
Transmission	275	306	239	161	104	113	121
Distribution	381	331	402	412	421	397	398
Total b/	1367	1866	2185	2534	2394	2328	2436

a/ Based on Fifth Power Master Development Plan requirements, which are not clearly insufficient.

IPP investment requirements are excluded.

b/ Numbers may not add due to rounding.

Source: EVN and World Bank estimates (2005 IAS model).

Table 7.

Planned Increasing Role of Purchased Electricity (TWh) 2004-2010

	2004	2005	2006	2007	2008	2009	2010
Power Purchased EVN	6.3	11.9	14.2	18.4	23.2	25.3	30.3
EVN	39.9	41.5	45.5	48.3	51.3	57.9	62.7
Total^{b/}	46.2	53.4	59.7	66.7	74.5	83.2	93.0

Source: EVN estimates (2005 IAS model).

basic service for its customers most of the time. EVN has maintained strong financial viability while keeping costs to consumers at quite low levels by international standards. Dramatic increases in rural access and steady reductions in transmission and distribution losses have been particularly notable achievements. The challenge for the future is clearly to meet the rapidly expanding demands of the economy and population, with minimum disruption, hopefully with further improvements in service quality and without unreasonable increases in costs to consumers.

Access to Electricity Service

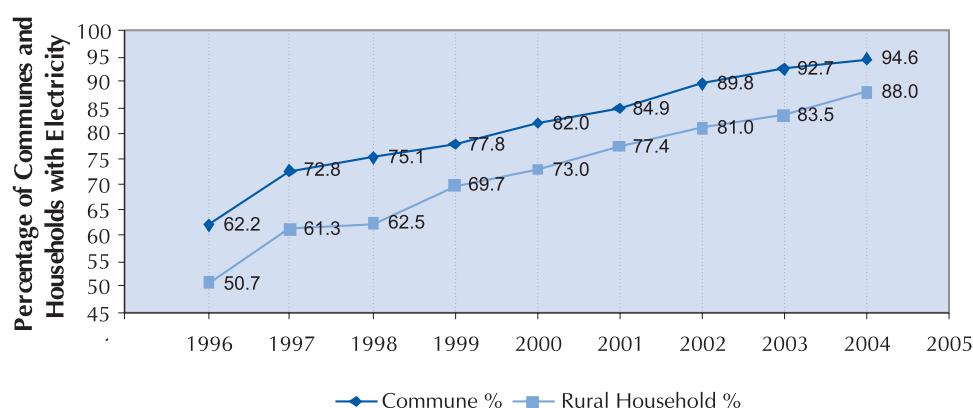
29. Access to electricity in rural areas has increased dramatically during 1996-2004, marking one of the most successful recent rural electrification programs in the world. As shown in Figure 2, the number of rural households with access to electricity has increased from 50.7% in 1996 to 88.0% in 2004. Rural household access rates are expected to further increase during the next several years, although achievement of access among the final 5% of rural households will not be easy. The success of Vietnam's program lies especially with the commitment of the Government to rural electrification, and the definition and

systematic implementation of national plans as a matter of priority, with public investment support to match local community funds.

Quality of Electricity Service

30. Widespread anecdotal evidence points to substantial increases in the quality of electricity service over the last ten years, with basic service for most customers in urban or peri-urban areas becoming noticeably more reliable. However, there is a basic lack of systematic statistical monitoring of service interruptions and voltage drops, by service area and customer voltage level. This shortcoming needs to be rectified, to develop benchmarks, comparative performance indices between service areas and categories, and monitorable programs for improvement. The new Electricity Regulatory Agency will need to monitor such data as a basic regulatory tool. While there may have been general improvement in recent years, it also is clear further improvement is needed. In the World Bank's recent Investment Climate Survey for Vietnam, 19% of all manufacturing firms surveyed, although connected to the electricity grid, still described electricity supply as a major or server constraint for their business. This was due in many cases to complaints about the electricity prices charged. However, in almost half of the

Figure 2: Rural Access to Electricity in Vietnam, 1996-2004



firms listing electricity supply as a constraint, a core reason listed was insufficiently reliable service from the grid. Surveyed firms reported an average of 12 power outages or surges per year, and, in the case of small and medium-sized firms, sales losses of 2-3% due to outages. This points to a need for a major and systematic effort to properly monitor service quality, and for improvement in service provision.

System Efficiency

31. As shown in Table 2 previously, transmission and distribution losses in EVN's system have fallen steadily over the last decade to 12.2% in 2004. This is not an unreasonable level for a system such as Vietnam's at its current stage of development, especially given the heavy role of low-voltage residential consumers, but there is room for further improvement. In the future, the Electricity Regulatory Agency must also monitor these efficiency indicators carefully against various benchmarks.³

32. Management of consumer accounts receivable has been exceptionally effective for a developing country, with accounts receivable in 2003 equivalent to only about 17 days of sales. Non-technical losses, including theft, are low compared to many countries.

33. Fuel efficiency in thermal power generation is highly plant specific. New, large-scale combined-cycle natural gas based power plants incorporate world-class technology and provide high fuel efficiency. With the exception of the Ph Lai 2 plant, however, existing coal-fired power plant efficiencies are poor, as the facilities and technology are relatively old, and units are relatively small. In 2004, the average heat rate for coal-fired units was 458 grams of standard coal equivalent per gross kWh (e.g., with two plants in the 500-700 gmCE/kWh range. Similar issues exist with some of the

older oil-fired plant. Plans have been made to renovate or retire older, inefficient units, once reserve margins allow.

Retail Power Price Levels

34. Vietnam has a uniform retail power tariff which applies across the country. Excluding value-added tax, the average revenue from the tariff was VND800 per kWh in 2004 (US5.1 cents/kWh). Including the 10% V.A.T., the weighted average retail price was US 5.6 cents per kWh. This is lower than the average retail price today in most countries. The financial position of EVN has remained sound with this unit revenue level during the last few years through 2004, covering all of its direct and indirect costs, but this level will prove insufficient for the future (paras. 73-80).

35. Vietnam's power tariff is sophisticated in structure, with rates varying by voltage level and consumer type, and offering time-of-day rates for major consumers (see Annex 1). Urban residential rates increase progressively with increasing consumption. Rural rates are cross-subsidized by other consumers. Both average urban residential rates and rural residential rates are modestly cross-subsidized by higher rates for industry, commerce, and foreign establishments.

36. Concern is often expressed in Vietnam that electricity rates for industrial production are high, compared to rates in other countries, undermining competitiveness. In reality, however, the current average industrial rates of US 5.4-6.2 cents/kWh, including V.A.T., are not high by general international standards. In China, for example, electricity rates for industries in coastal provinces are now US 7-10 cents/kWh, with recent increases in Chinese domestic coal prices, and even reach more than US 12 cents/kWh in some export-oriented regions.

3. Particular care is needed to maintain consistency in defining the boundaries of the system to be monitored, including the statistical treatment of rural low-voltage systems.

Section Two

Main Power Sector issues and Study Recommendations

Optimizing Power Sector Investments

Overcoming Shortages

37. Meeting the rapidly growing demand for electric power is the paramount challenge for Vietnam's power industry. Key drivers of the country's economic growth—especially manufacturing and commercial and service industries—are highly dependent upon power supply. Reliable electricity service is essential for light industries to remain competitive with similar industries in neighboring countries. Electricity has also become an expected, basic element in the livelihood of most people, and an essential part of increasing standards of living. Costs to the economy of insufficient power supply from the grid are estimated to be some \$0.50/kWh where small-scale auto-generation is an option, and are well over that where production is actually lost due to lack of power.

38. The power shortages experienced in May-July of 2005 clearly reinforced a priority focus on meeting demand throughout Vietnam's power industry, with highly visible national attention. The capacity shortfall was estimated at some 800-1300 MW during peak load. The shortage was caused by coincidence of severe drought conditions, reducing hydropower production, with a paper-thin reserve margin in the overall system, due to an inability to develop new capacity over a short time to meet the higher-than-expected surges in power demand. During the dry season, top

priority must be assigned to ensuring sufficient water supply for basic livelihood and agriculture at the 1920 MW Hoa Binh Hydropower station, and with exceptionally low water levels in the reservoir due to drought, water flows for power production had to be halted. With insufficient options to pick up the slack, rolling load shedding was required in northern Vietnam for weeks, including in Hanoi.

39. Power shortages are likely to continue in 2006 and 2007, especially in the dry season. Quick measures to help alleviate the problem include addition of gas turbine generating capacity, which can be constructed relatively quickly, and aggressive promotion of demand-side management (DSM) measures. Imports of electricity from China also are likely to be increased substantially over the next few years. Current plans call for addition of four oil-fired 37 MW gas turbine units in northern Vietnam, and larger additions of gas turbines in the south, which can utilize either oil or natural gas. In the north, the new gas turbines will remain expensive to run, once new, larger capacity gas, coal or hydro resources is finally brought on stream, and will most likely be used for emergency peak load service. In southern Vietnam, it is important to integrate the new gas turbines eventually into the future combined cycle natural-gas-based power complexes, to gain optimal efficiency over the long run. On the DSM side, there is potential to reduce system requirements by some 600-800MW over

the next few years, through energy efficiency and load management measures, but this will require aggressive efforts to put the institutional and program capacity in place (see paras.70-72). Aside from these measures, however, the key is to develop new capacity, through efficient development of new generating plant, construction of transmission lines for imported power, and steady investments in the power network to deliver power to consumers.

Vietnam's Power Sector Expansion Program

40. During the latter part of 2005, Vietnam has been engaged in a major power sector



Vietnam is facing a need of massive power system expansion

expansion planning exercise. The draft Sixth Power Master Development Plan (2005-2015, with a view to 2025) is scheduled for completion by the end of the year. The effort is being coordinated with similar master planning exercises for the coal and petroleum industries, for the first time all under the purview of the Ministry of Industry. Based on the increased base-case demand forecasts developed over the year, projecting electricity demand growth of 16% p.a. during 2006-2010, 11% p.a. during 2011-2015 and 9.1% p.a. during 2016-2020, the power industry expansion foreseen is a massive challenge for the country. Power system capacity will need to double in only five years. During 2011-2020, system capacity will need to increase by 2.5 times again. This huge expansion will test the planning, financing, organization and construction limits of the power industry as never before.

41. On the planning side, the basic institutional arrangements, analytical capacity and analytical tools being used are fundamentally sound. In its review of the major work being undertaken, the Bank team has recommended (a) a strengthening of the economic and sensitivity analysis in the planning exercise, especially relating to assessment of the balance between coal-fired and gas-fired thermal power generation, and (b) increased explicit attention to demand-side management (DSM) investments and benefits.⁴ In addition it also would be useful to explore more sophisticated modeling options appropriate for hydropower projects.

42. On the network side, a basic, stronger transmission backbone for Vietnam's system, planned under the Fifth Master Plan will be completed during the next few years, including

4. Further details were provided in a note by the Bank's Vietnam Energy Team to MOI, EVN and the Institute of Energy, "Suggestions on Economic and Sensitivity Analysis for Preparation of Vietnam's Sixth Power Development Plan" (November 11, 2005).

the second north-south 500 KV line, and the two 500-KV urban rings. With the size of the expansion envisaged, however, basic planning must now proceed for further transmission expansion over the longer term. On the distribution side, steady investment is required to expand and upgrade systems to meet increasing load and minimize losses by replacing outdated, inefficient and overloaded substation equipment, lines and transformers. Losses in outdated and overloaded rural systems are often over 20%.

43. More than two-thirds of the investment for system expansion will be needed for expansion of power generation. The previous Master Plan called for development with a blend of roughly 40% hydropower, 40% gas-fired thermal power, and 20% coal-fired thermal power. In the more rapid growth anticipated under the Sixth Power Master Plan, the focus on strong development of the country's hydropower resources will be retained. However, the share of coal-fired power generation may increase to take up a large portion of the accelerated growth, although this is always subject to the extent of new discoveries and development of offshore gas. Although the economic viability of hydropower projects are highly site-specific, the hydro projects under consideration in Vietnam generally provide lower cost power than the average costs of new thermal power through much of the load curve. Thus, the country's overall strategy is to develop existing hydropower resources relatively quickly. Assessment of best balances between coal and gas-fired power, however, is a key long-term planning issue, which is highly sensitive to future relative fuel price and supply expectations. During the next few years,

decisions on launching specific power plant construction projects are clear: all power plants which have available domestic coal or gas supply will be needed as soon as possible to meet the pressure of rapid demand growth. Over the longer term, however, definition of optimal balances requires careful attention, also tied with the country's coal export and gas exploration policies. The main parameters of this balancing issue include the following:

- Both exploitable domestic coal supplies and offshore gas supplies entail supply constraints. The availability of domestic coal for the power industry is capped by domestic resource limits, given current technology, and export levels. Expansion of gas supply requires not only field and pipeline development, but also further exploration and firming up of reserves if supplies of over some 14 billion cubic meters (bcm) per year are to be provided for power generation.
- Thermal power generation using imported coal is expected to be the most cost effective option once the main options for generation from domestic coal and gas have been exploited. However generation from imported coal is expected to be significantly more expensive, in both financial and economic terms, than the other options, at least until strong diminishing returns begin to prevail in domestic coal mine operations.⁵
- At current domestic coal prices, set with a view towards production costs, power generation from domestic coal is significantly less expensive than combined-cycle gas-based power generation at capacity factors exceeding 50-60%. However, in economic terms, considered

5. An exception may be if coal-fired power plants are developed in the south, in which case costs of imported coal and domestic coal (shipped from north to south) may be similar, in economic terms.

from the perspective of the country as a whole, the value of domestic coal used for power generation is higher than its current price, as it can be exported for more money, which would accrue to Vietnam.⁶

In economic terms, then, combined-cycle power generation from offshore gas at recently contracted gas prices is quite competitive with generation from domestic coal. The most cost effective option depends largely upon the evolving fuel costs (in economic terms) relevant for specific projects. Hence, the Bank team's recommendation to pursue careful economic and sensitivity analysis in the planning exercise.

44. While conclusions on the best specific scheduling of investment projects must await completion of the Master Plan, two broad conclusions concerning the coal and gas-fueled generation balance can be drawn from the parameters above: (1) Aggressive further promotion of exploration and firming up of natural gas resources, and continued gas field development, is a key priority for the country's power development, to ensure least-cost generation, and (2) Far more than in the past, sanctioning of major specific power investment projects in the future must include updated review of both emerging overall fuel supply availability and the latest relative coal and gas supply costs (including opportunity costs of exports foregone), as the optimal mix between these two is very sensitive to these parameters.

45. The Bank team also has recommended that sensitivity analysis also be conducted with different demand growth assumptions, especially on the lower side. Assessment of electric power demand is particularly hard during periods of fast economic growth. Demand scenarios should be quite different from each other (e.g. 3-4% p.a., in this case)—the

purpose is not only to forecast the most probable scenarios, but also to understand how the schedule of investment would change under faster or slower growth.

46. The basic framework and main issues for each of the generating subsectors are outlined below.

Coal-Fired Power Generation

47. Thermal power plants fueled with domestically produced anthracite will continue to provide a key base-load power source for northern Vietnam. Coal is currently supplied exclusively by Vinacoal, the general corporation holding all of the state's assets in the coal industry. Coal sold for power generation totaled about 4.3 million tons in 2004, accounting for some 22% of Vinacoal's 20 million tons of sales, while Vinacoal's exports totaled 7.5 million tons and other domestic users purchased 8.2 million tons. Production can increase strongly in current coal fields, and a major new coal mining operation is planned at Mon Duong. Production in 2010 is expected to reach 35-40 million tons. Further increases in production beyond 2010 are expected to be moderate, unless viable methods can be developed to exploit coal under the Red River Basin. Average production costs are expected to rise.

48. The highest quality anthracite produced is beneficiated, achieving calorific values of 7200-8500 kilocalories per kilogram, and then exported as metallurgical coal at high market prices. Supply to the power industry is of far lower quality, with calorific values in the 3500-5500 kcal/kg range. Similar to "white coals" produced in central and southwestern China, the high-ash anthracite used domestically may be difficult to ignite, but it is acceptable for

6. Over the short term, the government may wish to consider its regulatory position vis-a-vis the coal sector before undertaking any reforms to price coal at export parity levels (see paras. 51-52)

power generation if boiler adjustments are made and, often, starter fuel is used.

49. With the country's coal resources limited, the Government's strategy is to cap export levels strictly, in favor of expanding domestic supply—essentially to postpone the expected eventual need for coal imports. The high quality anthracite fetches a premium price on the international market. The low and mid-range quality anthracite, however, must be sold at a major discount. In mid-2005, Vietnamese anthracite of some 5000 kcal/kg was being sold at US\$29-33/t, f.o.b. to Japanese and Chinese customers, compared to the US\$50-53/t, f.o.b. paid for Australian coal of 6500 kcal/kg.

50. Issues confronting the coal-fired thermal power subsector include coal pricing, power plant siting, and environmental concerns.

51. Future domestic coal pricing is uncertain, and additional clarity on how coal prices will move is important for the power industry, as the optimal role of coal-fired plant is quite sensitive to fuel prices. Vinacoal sold coal to EVN in 2004 at the Government regulated price of \$22/ton, which is well under international prices, adjusted for quality. Although Vinacoal reports that this price is below average production costs, the price appears quite high as a cost-based price to the Bank study team, given the role of several large open pit mines and prices and costs for similar coal in China. However, reasonable production costs are very difficult to assess, as (a) there are wide disparities in unit costs between collieries, such that efficient producers provide heavy cross subsidies to high-cost, inefficient producers, and (b) there is little incentive for efficiency, as individual collieries are not operated with transparent, independent accounts, with Vinacoal undertaking all sales at standard prices, and then transferring funds to collieries to cover costs. To improve efficiency, and ensure that prices are aligned with

reasonable costs, major reforms will be required to allow greater autonomy and proper market incentives to bear at the mine level. Inevitably yielding winners and losers, such a reform is not a simple undertaking, but necessary over the medium term if the coal industry is to meet its performance potential. Barring such reform, the Government can undertake more in-depth review of actual production costs, in an attempt to at least provide greater clarity to the domestic coal pricing issue.

52. Vinacoal and others advocate a gradual increase in the coal price charged domestically until prices reach CIF import parity levels, adjusted for quality. In the medium term, it is in the country's best interest to allow coal prices to move to import parity levels, which best reflect economic costs. However, this is best achieved through development of a true domestic coal market, with competition between a meaningful number of domestic suppliers. If pricing policy remains one where the Government sets prices, it is not advisable to fix coal prices at import parity levels until (a) a strong, independent review of production costs and efficiency incentives is completed, (b) a transparent and clear way of estimating the economic rent which will accrue to Vinacoal is developed and agreed, and (c) clear agreement is reached in the Government as to how such rents will be collected and used.

53. Concerning power plant siting, the bulk of the new coal-fired power plants will continue to be in northern Vietnam. However, there are plans to develop a major coal-fired power facility in central Vietnam to provide base-load power there, using a blend of trans-shipped domestic and imported coal. The ongoing least-cost expansion plan study will need to review these plans, and other potential plans for coal-based power outside of the north, from the perspective of the integrated power transmission and generation system.

54. Coal-fired power generation carries a substantial disadvantage globally in terms of greenhouse gas emissions. In terms of local pollution, Vietnamese air pollution emission standards are now quite strict, such that new plants will be required to install sophisticated pollution control equipment to meet them. Even so, the overall impact of large new power plants on ambient air quality must be reviewed in some cases, as in the tourist areas of Quang Ninh Province, because coal deposits and hence power plant siting may be concentrated to such an extent that ambient air quality still suffers, even if emissions standards are met.

Gas-fired Power Generation

55. Development of large-scale power generation using Vietnam's offshore natural gas resources requires alignment of the interests of a series of institutional actors, and both major upfront financing and long-term commitments. PetroVietnam Gas Corporation (PVGC), PetroVietnam's subsidiary charged with natural gas operations, is a central entity, holding the Government's shares in field production facilities, retailing the sole rights in most cases to buy offshore gas and sell gas to end-users, and charged with gas transmission system development, although this may be in cooperation with international companies. Upstream, gas exploration and development is undertaken in joint venture or production sharing arrangements between PVGC and international petroleum companies, including concessions held with British Petroleum (BP) and KNOC in the Nam Con Son field, and with Unocal in the Malay Basin. On the power generation side, development of IPPs with investors independent of EVN is essential for a large portion of the power generation capacity, due to EVN's limited financing capacity. IPP investors may include the gas developers, but other investors are needed as well. EVN

represents the purchaser of the final electricity product. Finally, the Government (aside from its ownership position of PetroVietnam and EVN), must play key roles, both sanctioning the specific development arrangements, but also providing some type of partial risk coverage on the electricity sale arrangements to outside investors.

56. Vietnam's offshore gas is earmarked at this point for a series of onshore, large-scale gas utilization complexes, which, aside from several nitrogen fertilizer plants, are focused on power generation. Other, smaller-scale utilization loads are not expected to materialize in sufficient concentration over the medium term to warrant network development for such uses. With the exception of the planned interconnection of a new complex at Nong Trach with the existing Phu My complex, the gas utilization complexes also are not interconnected, with each basically relying on different gas resources. Thus, the development of each complex requires negotiation of separate satisfactory arrangements for a full field development, pipeline transmission and power generation facility chain.

57. Gas supply prospects are summarized in Table 8. Gas supplies are expected to grow from some 6.6 billion cubic meters (bcm) expected in 2005 to 10-12 bcm in 2010 and at least some 14 bcm in 2015. The main fields include the following:

- **Cuu Long Basin.** Located to the southeast of Vietnam's coast, petroleum production in this basin began in 1995. Associated gas from Vietnam's main current oil fields in this basin, is supplied onshore through the Bach Ho pipeline. Currently connected associated gas supplies are declining, but some additional gas can be captured that is currently being flared. In addition there is a most promising discovery of non-associated gas at Su Tu Trang in the Cuu Long Basin,

relatively close to shore, that is currently being appraised. If reserves are sufficient (e.g. some 40 bcm or more), this gas may be brought onshore to Binh Thuang Province via a new pipeline.

- **Nam Con Son Basin.** Also located to the southeast of Vietnam's coast, but further offshore, Nam Con Son is the supply source for the Phu My complex. Production from fields contracted mainly with BP and KNOC is expected to rise steadily, until constrained by the 7 bcm carrying capacity of the existing pipeline. Although the capacity of the pipeline might be stretched somewhat through additional compression, development above 7-8 bcm per year will require new pipeline development.
- **SW Basin.** This basin includes two major project developments: the PM3 development in the Joint Development Area of PetroVietnam and Malaysia, and blocks with Chevron (formerly Unocal). Whereas Vietnam's 50% share of the 2.8 bcm of associated gas in PM3 is currently sold to Malaysia, PV is now developing a 300 km pipeline to bring that 1.4 bcm onshore at Ca Mau for use in Vietnam, to be completed by

December 2006. Use of gas from the Chevron blocks will require construction of a new 400 km pipeline. Supply potential from currently proven reserves in the Chevron blocks is assessed at some 4 bcm per year, sufficient for the full O Mon power generation complex.

58. The gas utilization complexes underdevelopment or on the medium-term horizon include:

Phu My and neighboring areas. This area includes the Ba Ria and Tra Noc power facilities, totaling 484 MW owned by EVN, and with 0.78 billion cubic meters (bcm) of annual gas demand from Cuu Long associated gas reserves. It also includes the large new Phu My complex, totaling 3893 MW at the end of 2005, with an annual power generation gas demand from Nam Con Son of about 4.3 bcm. The Phu My complex includes Phu My 1 (1107 MW owned by EVN), Phu My 2.1 (896 MW owned by EVN), Phu My 2.2 (720 MW owned by EdF), Phu My 3 (720 MW owned by BP), and Phu My 4 (450 MW, owned by EVN). A urea plant supplied with Cu Long gas is also located at Phu My. International donor finance played an important role in development of EVN's plants. Closer to Ho Chi Minh City, 447 MW of new thermal capacity is also planned by EVN at Hiep Phuoc and Ve Den, eventually to use gas.

Ca Mau. 720 MW of combined-cycle independent power plant capacity is under development by PetroVietnam to become operational in 2006-2007, together with fertilizer production facilities, as part of this new industrial area. A second power plant is also planned. Gas will come from the SW Basin.

Table 8.

Prospective Natural Gas Supply in Vietnam

(billion cubic meters per year)

	2010	2015
Cuu Long		
Bach Ho pipeline	1-2	2
New pipeline		0-3
Nam Con Son		
Existing pipeline	7-8	7-8
Southwest		
DM3 PV pipeline	1.4	1.4
Pipeline for Chevron fields	0-3	2-4
Total	10-12	12-18
Gas from other fields & new discoveries		5-10

Source: Bank team estimates based on various sources.

O Mon. The O Mon complex is planned for development with gas under contract with Chevron in the SW Basin. Four power plants are envisaged, totaling 2700 MW, with gas demand of about 3.3 bcm per year. O Mon 1 is in advanced development stages as a 600 MW steam unit being developed by EVN with JBIC financing, which can burn oil until gas is available. Unocal (now Chevron) had expressed interest in partnering with EVN for another of the plants. Financing for the balance is being sought. Original plans were to commission the first unit in 2007. However, without firmer commitments for the full development, to offset the upfront field and pipeline development costs, Unocal had not been able to offer attractive prices and contractual terms for the gas. In mid 2005, the gas development remained on hold, pending a solution which could satisfy all of the key parties.

Nhon Trach. Located about 60 km from the Phu My complex, initial plans for this facility included four power plants, for commissioning during 2010-2015, totaling 2640 MW and requiring some 3.3 bcm of gas per year. Gas supply has been planned from Nam Con Son, via a pipeline extension from Phu My. However, gas supplies are now less certain, and development of the full complex would certainly require new offshore pipeline capacity above current 7 bcm level.

59. The cases of O Mon and Nong Trach demonstrate the challenge of aligning interests and balancing risks to realize these technically and economically attractive developments. Solutions require both increasing clarity on the specifics of the following issues, as well as results-oriented dialogue between the parties:⁷

- The optimal share of gas-based power generation relative to other options in Vietnam is ultimately quite sensitive to the contracted gas prices. Gas prices, in turn, are sensitive to the firmness and scale of off-take commitments. Hence, development of firm, large-scale and sufficiently long-term commitments would seem to be required to achieve competitive gas-based electricity prices.
- Participation of EVN in most of the power plant ownership is not feasible, even with borrowed resources, due to EVN's financing constraints (paras. 75-79). Outside IPP investment, in addition to investment from gas developers, is likely to be required in each major complex.

60. The PM3-Ca Mau development, involving development of the required pipeline and two power plants solely by PetroVietnam, needs to be supervised closely by the Government to ensure efficiency and lowest possible costs. Assignment of the full-chain development to PV may have some organizational advantages, given the urgent need for new power generation capacity, but also carries potential serious disadvantages due to absence of competition. The Bank team recommends that the Government monitor all aspects of this project closely, including (a) separate review of each cost center in the integrated project—including well-head gas supply cost and internal pricing, pipeline development and operation costs and internal pricing, and power plant development and operation costs and internal pricing; and (b) ensuring that procurement for all contracts proceeds in a fully transparent manner, using competition to the maximum extent. Such close, transparent supervision is also important

7. A Bank mission in October 2005 reviewed these issues with the relevant parties, moving on from the construct developed for the Phu My complex, and seeking to identify pathways forward.

to provide some comfort for other, needed investors that the Government seeks to maintain a level playing field for gas-based power generation developments in Vietnam.

61. On the gas exploration and development side, it is critical for the longer term for Vietnam to maintain an attractive framework for international companies to continue exploration and firming up reserves, as much potential remains unexplored. In the current high-oil price environment, international companies have a variety of investment options to choose from. Areas for the Government to review include (a) simplification of fiscal terms and sharpening of their competitiveness, including for deep water areas, (b) continuing efforts to expand and clarify gas marketing opportunities, and (c) development of a clear regulatory framework for pipeline investment and operation.

Hydropower Development

62. Vietnam is embarking on an ambitious plan to develop the bulk of its high-potential hydropower resources over the next decade. Hydro capacity in 2004 stood at 4227 MW, with Hoa Binh (1920 MW) and Yali (720 MW)

accounting for 60% of the total. Future plans call for two additional large plants on the Da River, upstream from Hoa Binh, including Son La (2400 MW) and Lai Chau (1100 MW). Once completed, this cascade of three large plants on the Da River will total over 5400 MW. Aside from this integrated development, the balance of Vietnam's hydropower program focuses on 30 medium-sized projects (generally 100-350 MW each), and scores of small hydro (under 30 MW). These projects are dispersed over nine major river basins in northern, central and southern Vietnam. Fourteen new medium-sized plants were listed as under construction in early 2005 (with construction of all but one initiated in 2003 and 2004), totaling 3170 MW. Plans are being drawn up for an additional 16 medium-sized plants, totaling a further 2775 MW, for which EVN would like to begin construction as soon as possible.

63. Son La is a key national project, for which preliminary construction work has commenced. Power generating units are expected to come on line during 2012-2015. The project is intended as a key new source of economic electricity, and will also benefit operations at Hoa Binh. However, there are

also substantial risks, as for any construction project of this magnitude. A particularly big challenge is the effective resettlement of some 70,000 people. The Government has set high standards and a solid, modern policy framework for the resettlement program, and committed over \$650 million for the program, which is quite high compared to budgets per resettler in other large projects in the region. Nevertheless, to ensure that the funding achieves sustainable positive results for the affected people,



Vietnam is embarking on an ambitious plan to develop high-potential hydropower resources to meet power demand

implementation will require greater attention to livelihood development, effective planning and design at local levels, and stronger management both centrally and locally.

64. With goals to provide almost 6000 MW over the medium term, Vietnam's program to develop its many medium-sized hydro sites will provide a core contribution to the overall power development program in each of the three geographic regions. Particular advantages include development of a source of domestic renewable energy divorced from international energy price and security risks, and benefits from associated water control in many cases. Although economics vary by site, costs are generally quite competitive with the thermal power options in Vietnam. The challenge will be in effective implementation—to maintain quality project development under the pressure for speed to meet every-climbing load growth. International assistance is needed in this subsector of the power industry more than any other, to enable Vietnam to benefit from international experience. As international agencies have been reticent to support major hydropower developments in recent years, practitioners in Vietnam have been relatively isolated, and now need gain from the rich recent development experience elsewhere, as Vietnam's hydropower development program accelerates.

65. One area for strengthening in Vietnam's hydropower development program includes hydro subsector planning, plant siting and design, and reservoir and power plant operating practices. Planning and operational improvements could be made to best optimize between complex choices and trade-offs to: (a) maximize multiple water control benefits; (b) minimize adverse impacts, including negative social impacts and negative downstream impacts; and (c) maximize the value of electric power within the overall power system.

66. An especially important area for

additional work is to further improve detailed planning and implementation of reservoir resettlement programs, and alignment of environmental assessment work to better inform project design and to sharpen focus on key issues and their mitigation. Vietnam has made substantial progress during the last five years in upgrading its reservoir resettlement and environmental assessment practices. Current policies provide a reasonably well structured set of legal and regulatory requirements. Financial commitments for resettlement work in new projects are now substantial. The primary issue concerns needs to strengthen implementation to achieve the best results. Analysis, planning, organization, execution and, especially, follow-up often lack depth as capacities for this specialized work are thin, especially at local levels. Staff and local experts often lack experience and understanding of best practices. The most difficult issues—including restoration of livelihoods for ethnic minorities which may be affected by reservoir development, for example—are complex in every country, and require concerted efforts in consultation with local people throughout implementation. Given plans to develop many projects over the medium-term, strong efforts are necessary to integrate knowledge from elsewhere and to build local capacities to achieve results which are sustainable over the long term.

67. With costs comprised almost completely of upfront capitals costs, and relatively long project gestation periods, EVN's plan to concentrate its own financing and borrowings particularly on the hydro sector makes sense, leaving more substantial portions of the thermal power investment requirement to potential IPP investors. Once operational, however, there is potential to sell off hydro capacity to investors, as EVN has been pursuing for some older plant. Opportunities also exist for independent power production in small

hydro facilities, and, over time, to explore innovative approaches to blend independent financing sources into project packages

Other Means to Meet Capacity Requirements

68. Vietnam's renewable energy development program is growing, and can provide an increasing contribution in the future. Development has focused especially on off-grid power supply, in isolated areas, but small hydro facilities, in particular, can also provide an important source of renewable energy to the grid. Wind power generation also can provide a small contribution.

69. Vietnam plans to develop nuclear energy capacity over the long term.

70. Interconnections with neighboring countries are expected to become increasingly important. Discussions with power companies in southern China during 2005 seek to result in increases in power imports from China to some 400 MW over the near term. Vietnam also is investing in hydro facilities in Laos, with arrangements to buy back the bulk of the power produced. Vietnam has undertaken to sell some 200 MW of power to Cambodia. Especially over the medium term, potential exists to substantially increase the beneficial role of such interconnections, through development of a Greater Mekong System (GMS), which could involve large-scale transfers between Vietnam, Thailand, China, Laos and Cambodia.

71. Both MOI and EVN have developed demand-side management (DSM) and energy efficiency programs in recent years, in part through Bank and GEF support. With the severe shortages experienced in 2005, and continued pressure for more electricity service, the Government and EVN are moving to strengthen and accelerate these efforts. Load management programs and energy efficiency promotion and investment programs are

proven means to address capacity constraints which are far less expensive than new capacity. Such efforts also can yield results relatively quickly in some cases, but do require sophisticated institutional development which has proved challenging in most countries.

72. As discussed with MOI and EVN in late 2005, the Bank team recommends that the DSM effort be strengthened through: (a) development of a DSM chapter in the Sixth Power Development Master Plan, to assess and establish the role of DSM in helping to meet the country's future power service needs, (b) the establishment of a formal DSM Center within EVN, to provide an expanded institutional and human resource base to mobilize implementation of a scaled-up DSM program, (c) development and implementation of a plan for a dramatic scale-up in EVN's energy-efficient lighting programs, including substitution of compact fluorescent lamps for incandescent lamps, and popularization of more efficient fluorescent tube lamps, and (d) continued, and yet stronger efforts by MOI to catalyze a new energy efficiency business industry in Vietnam, which can play a substantial role in achieving energy efficiency gains in the future, especially in the commercial building sector, but also in industry. In addition, ongoing load surveys and analysis, coupled with expansion in time-of-use metering, can provide the foundation for improved load management efforts based on time-of-use pricing. Using the load research strategically, time-of-day sensitive pricing regimes and continued metering investments can provide a framework for customers to respond to pricing signals on the costs of service, and adjust consumption accordingly.

Financing Investments

73. As discussed in para. 26, annual power sector investment requirements during 2005-

2010 are over \$3 billion per year. In developing strategies to mobilize this level of finance, two basic starting points are clear:

- EVN cannot even come close to meeting this requirement from its own resources or massive borrowings, especially without further increases in unit sales revenues. EVN has maintained profitability each year since its inception in 1995, and has retained a sound financial position, at least until the shortages of summer 2005. However, the size of the sector investment requirement is no match for the company's borrowing capacity.
- The Government is neither willing nor able to pick up the bill. Having basically eliminated subsidies to the sector, the Government would like to reduce its liability exposure in the sector, not increase it. One way or another, directly or indirectly, consumers will need to pay the cost of the power system expansion. The task of the Government and power industry is to implement the expansion program as efficiently as possible, to keep the costs as reasonable and affordable as possible for consumers.

74. Chinese state-owned power companies faced a similar situation in the latter half of the 1980s and into much of the 1990s. Demand was rising so fast that the power industry had trouble to keep up, and even though the financial position of the power companies was fundamentally sound, the investment needs far surpassed their capacity. The problem was solved in two basic ways: (1) the power-starved industrial consumers, and the local government entities supporting them, pooled resources together to construct large numbers of new, joint-venture IPP power plants, and (2) various power investment surcharges were added onto retail electricity tariffs, directly raising more funds from consumers specifically for new power capacity.

75. Vietnam's case has distinct differences, but the same two basic categories of solutions are required: (1) IPPs must carry a large portion of the investment requirement (albeit with greater use of foreign capital than in the case of China, where almost all IPP investors were domestic), and (2) average electricity prices must be increased, to directly raise more capital from consumers for investment in the aggressive capacity expansion. These are discussed in more detail below.

EVN's Contributions to Investment

76. With net profitability, self-financing ratios of 50-60%, debt-service coverage ratios of 3-5, and debt:equity ratios of 1.0-1.4 in the three financial years of 2002, 2003 and 2004, EVN might seem well positioned within its current financial framework to shoulder most of the coming investment program. Unfortunately, nothing could be further from the truth—the sharp escalation in investment needed now to put capacity on the system for the future is no match for the company's revenue stream.

77. Financial projections completed by the Bank and EVN in early 2005 include major increases in investments by EVN compared to 2002-2004, rising to \$2.4-2.5 billion during 2007-2010 (see Table 6 shown previously). EVN's investments are financed with EVN's own resources plus heavy borrowing, through ODA and export credit facilities, and various commercial sources. Even so, these investment levels are conservative, in that they are built around earlier demand forecasts, and assumed that over one-half of the new, incremental electricity to be generated during 2005-2010 will be purchased from outside of EVN. The forecasts also assume that some \$600 million will be raised by EVN through sale of existing power system assets to other investors through its equitization program. The forecasts are also overly conservative in that the increases in costs caused by the shortages—including power

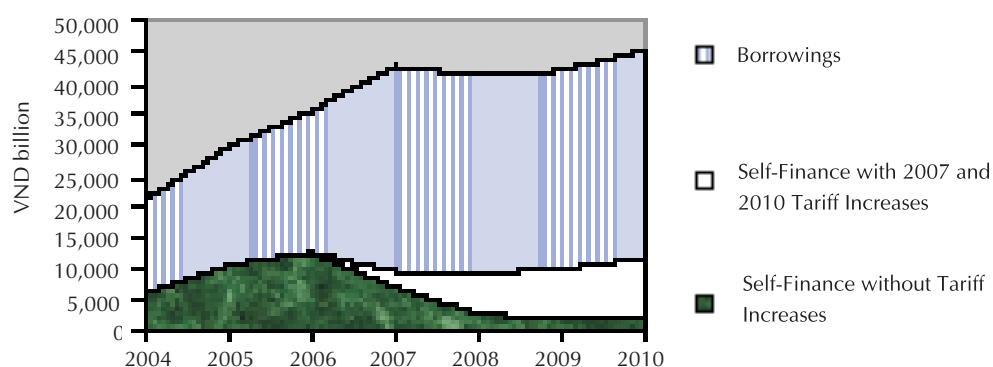
that over one-half of the new, incremental electricity to be generated during 2005-2010 will be purchased from outside of EVN. The forecasts also assume that some \$600 million will be raised by EVN through sale of existing power system assets to other investors through its equitization program. The forecasts are also overly conservative in that the increases in costs caused by the shortages—including power purchases and power generation with high fuel costs in lieu of hydro from plants with basically no operating costs—are not yet included.

78. Even without allowing for certain increases in costs, EVN's basic position becomes untenable very quickly, unless additional revenue is obtained. Key ratios depicting investment and borrowing capacity plummet. The self financing ratio falls to 20% in 2007, and then steadily to just 5% in 2010. EVN's debt: equity ratio climbs steadily to 2.4 in 2007, and reaches 3.9 by 2010. As shown in Figure 3, debt service costs from mounting debt quickly absorb EVN's cash for self-financing; even with

increasing sales, cash for investment financing falls precipitously in absolute terms. Equally alarming, the heavy borrowing for investment brings debt:equity ratios to levels which would rate the company as clearly not creditworthy in any independent financial assessment.

79. Although funds from its equitization program can defray a small portion of the borrowing requirement, EVN is gearing up for big increases in its borrowing from all sources to meet its portion of the sector's investment requirement, including increased official development assistance (ODA) borrowings, export-credit financing, and expanded use of local commercial bank finance (if local banks can arrange more capital for the long-term loans required). Borrowings from the DAF have been limited to resettlement and local equipment expenditures, but EVN is seeking to expand DAF borrowings beyond this scope. EVN successfully issued about \$13 million in domestic bonds in 2004, and plans are being made to follow PetroVietnam with issuance of

Figure 3: Financing of EVN's Capital Expenditures under the Fifth Power Master Plan



Notes:

- 1) An updated picture of post-2005-shortage investments, revenues and costs, and tariff requirements (available when EVN 2005 financial statements are completed and fully reviewed) will show different quantities, but yield the same conclusion, most likely even more strikingly.
- 2) All scenarios assume VND 9.2 billion is raised by EVN through equitizations during 2005-2009.
- 3) 2007 and 2010 assumed weighted average tariff increases are 11% in current terms in each year.



The signing ceremony of development credit for Vietnam

increasingly expensive, if not impossible, to borrow funds from independent sources.

80. Forecasts completed by the Bank and EVN in early 2005 concluded that prices would need to increase by a minimum of some 11% in 2007 and 10% in 2010, on average, for EVN to meet the now conservative investment requirements depicted in the Fifth Power Master Plan. With EVN subsequently reporting substantial losses due to the summer power shortages and the expectation of increases in operating costs from efforts to stem further expected shortages, price increases are now required as soon as possible, and at clearly at higher levels. Following revisions in forecasts to reflect higher growth in demand, higher generating costs due to needs to add more expensive sources of power to meet load, and consequential updates in analysis of EVN's borrowing capacity, a tariff increase must be implemented before the situation worsens. Preparations and reviews in the Government for a substantial tariff increase were underway in early 2006. Clearly, substantial retail price increases will need to be implemented as soon as possible, as a basic and key measure to ensure that future power demand is met.

Securing Investment Independent from EVN

81. Clearly, dramatic increases in power sector investment from outside of EVN will be required to meet overall sector investment requirements. As depicted in Table 7, EVN will need to purchase more than one-half of the incremental power required during 2005-2010 from independent sources, mainly independent power plants. The most important source of independent investment is through development of various types of IPPs. In addition, however, independent investment

could play a substantial role in the distribution sector, if divestiture of EVN's assets in distribution were strategically planned to provide conditions under which shareholders would be interested in investing in distribution system expansion and upgrading (see paras. 92-93).

82. **Independent Power Producers (IPPs).** Vietnam is pursuing a full range of IPP arrangements, in its efforts to meet the huge and rapid increases in power demand. IPP arrangements for new power plants include (a) BOT or BOO ventures wholly owned by other public-owned Vietnamese entities, (b) joint-venture BOT/BOO arrangements, involving EVN investment with other parties (local public or foreign), and (c) BOT arrangements wholly owned by foreign parties, either public or private. In addition, new joint-stock company IPPs are being created from EVN's partial divestiture of existing power plants under its equitization program (paras. 90-91). This aggressive IPP development runs in parallel with the Government's effort to gradually restructure and unbundled the power industry, as dictated in the new Electricity Law (paras. 88-89). In general, the

Government seeks to pursue all manner of IPPs, as quickly as possible, in its efforts to get new plant quickly on the system.

83. Investment of other domestic public entities in new IPPs, either as sole investors or in joint ventures, proved to be an effective means to develop power generation quickly and reasonably efficiently in China during the late 1980s and 1990s. However, the Chinese case has been marked by large numbers of different types of public investing entities, with quite varied sources of capital and often supervised by Government entities well removed from Government entities supervising the purchasing public power utilities (e.g. local governments as opposed to central government). Many public investors represented major power users, either directly or indirectly.

84. In the case of Vietnam, public entities with resources and interest for major power generation investments are few, and are, for the most part, limited to the state-owned fuel supply companies or large construction companies. While IPP development by such companies may succeed in putting new plant on the system quickly, the built-in potential for insufficient transparency and inefficiency may result in unfairly high costs to consumers, unless rigorous attention is given by the Government and new Electricity Regulatory Authority of Vietnam to seek to resolve potential issues. Key issues include (a) potential actual or perceived unfair competition of power plants involving PetroVietnam and Vinacoal, as the country's fuel supply companies, with other independent power plants, in terms of fuel supply costs and priority, and, potentially, in terms of dispatch priority assigned by another public entity which may be under pressure to favor large public entities; (b) inefficiencies and potentially high costs associated from direct negotiation, as opposed to competition, for award of power purchase agreements, and (c) expansion of these companies away from their core business, into

areas where they have little prior experience.

85. EVN's involvement in large joint venture IPPs may help project development now in some cases. However, it must also be recognized that management of these new assets will need at some point in the future to be held by entities not involved in any way in power transmission or distribution, to avoid conflicts of interest when the power market eventually begins operation.

86. New IPPs wholly owned by foreign or private firms are expected to be the biggest area of development over the medium term, amounting to several thousands of new megawatts of BOT IPP capacity. The process of competitive bidding and closure of BOT IPP arrangements for the Phu My complex provides a platform of prior experience. Yet, progress in closing new BOT IPP deals with foreign firms has been stymied since the successful arrangements for Phu My were concluded. Prominent issues have included coordination of gas field, pipeline and gas-fueled power plant development, and desires by many in the Government to avoid or more strictly constrain the scope of Government guarantees. By the end of 2005, however, the urgency of unblocking these constraints was clear to the Government, which wishes to proceed aggressively. MOI seeks to (a) review approaches to provision of guarantees, to provide concrete solution which can be acceptable to investors in the competitive international market of today, but also provide a pathway for limiting Government exposure in favor of increasing reliance on Vietnamese corporate assurances and credit-worthiness; (b) develop a standard framework of competitive bidding for a full new batch of IPP projects, using Phu My 2.2 documentation as a foundation, developing several initial transactions using the framework, and then hopefully rolling out the framework for a series of additional transactions, and (c) move to coordination gas field/transmission/power

generation development issues, especially for the O Mon field, but also for others as well. In addition, it also is important to review details in proposed power purchase agreements, with consideration of the planned eventual development of a power market, to enable flexibility for integration into the market, where possible.⁸



Phu My 2.2 - one successful example of IPP development in Vietnam

consumers will be the ones to suffer from higher than justifiable costs, unless competitive bidding is strongly favored over negotiated contracting. In cases where negotiated contracts proceed, clear and transparent information should be provided to the public on costs and contract details. If power providers are public entities, detailed and accurate reporting of all aspects of equipment contracting, construction contracting, and power plant operation affecting costs should be openly reported to all relevant government agencies, and made public where possible. If power providers are also fuels suppliers, the Electricity Regulatory Authority of Vietnam and other government supervising authorities should insist on clear, separate and transparent accounting of fuel supply costs (and how that relates to other fuels supply cost arrangements), as well as electricity generation costs.

87. The World Bank strongly recommends that competition be used wherever possible in awarding IPP power purchase agreements. In country after country, and project after project, prices and terms awarded through competitive bidding have been shown to provide lower costs than negotiated deals. As in Vietnam, power utilities, public officials, and especially potential power providers often argue that there is insufficient time to proceed with competitive bidding. Often, however, this is due to lack of planning and/or lack of proper incentives to minimize costs. Vietnam's power

Sector Restructuring, Equitization and the Development of a Power Market

88. With the passage of the new Electricity Law, Vietnam has embarked on an ambitious long-term program to completely restructure its power sector by discarding its current vertically-integrated electrical utility system in favor of a competitive power market. The objective of the reform is both to improve efficiency through competition in the power industry, to minimize costs to consumers, and to expand the mobilization of investment and

8. MOI has requested assistance from the World Bank for these efforts, in part with support from PPIAF. The Bank has planned a substantial assistance program for this in 2006.

managerial resources from outside of the current, state-operated system. As spelled out in the initial 2005 Road Map for the reform, the full process may span 20 years from beginning to end. However, critical strategic choices will need to be made over the next 1-2 years, and major restructuring will need to be completed before 2009, to adhere to the plan.

89. The passage of the Electricity Law represents a key milestone for Vietnam's power industry, built through national consensus, and creating a legal foundation for development of a commercial, market-oriented sector (see Box 1). It is important to move steadily on the comprehensive and far-sweeping agenda, or else the benefits will be postponed too far into the future. However, the current pressure on the power industry of increasing demands and looming further shortages provides an especially challenging environment for such reforms, and dictates caution in approaching fast radical restructuring of a system which is currently functioning decently. The transition to a new structure needs to be undertaken smoothly to avoid disturbances or inefficiencies in the effort to attract much needed new investment. The tension between these two concerns shapes current debate and reform planning.

Current Plans for Equitization in the Power Sector

90. "Equitization" in the Vietnamese context means to transform a wholly state-owned enterprise into a shareholding company. The basic objective, as being pursued in Vietnam, is to restructure state-owned monopolies such as EVN into shareholding companies, or a series of shareholding companies, including additional investors, to create more market-oriented companies which are more separate from government. In a sense, the enterprise reform goals of this effort are common to many "corporatization" reforms

pursued in other countries. The objective is not "privatization" per se—investors holding shares may be public investors as well as private ones. In the power sector, the equitization program involves splitting various subsidiary entities from EVN, to form new shareholding companies. Current government policy requires EVN to maintain at least 51% of the shares of the new "equitized" companies. The prevailing model is to offer a minority block of shares in subsidiary company of EVN undergoing equitization to common investors, usually in many small shares.

91. EVN is under strong pressure from the Government to accelerate equitization as quickly as possible. By the summer of 2005, pilots had been undertaken in both generation and distribution. Two hydropower plants (Song Dinh with 70 MW and Vinh Son with 66 MW) formerly wholly owned by EVN were equitized into one company. Also in March 2005, one provincial-level power distribution subsidiary of EVN—the Khanh Hoa Company—was equitized. In late 2005, shares in the Pha Lai thermal power plant were offered for sale to the public, including foreign investors. Plans exist to equitize all of the existing power plants of EVN, except for the large, multi-purpose hydro plants, during the next three years. In addition, there are plans to proceed further with equitization in power distribution, through further equitization of Vietnam's 64 provincial-level power distribution subsidiaries.

92. The process of equitization is a useful reform for the country, especially as a step to develop more commercially-oriented companies. However, the process of equitization in the power sector carries major long-term consequences in terms of the structure of the industry, which need to be carefully considered in the light of needs for mobilizing independent investment and the overall power sector reform as dictated in the Electricity Law. The size, state share, and

characteristics of the shareholding companies to be formed are especially important:

- Financial goals for equitization should include both creation of companies with clear conditions for financial viability over the short and long term, and maximization of the proceeds of divestiture to the state. In addition, most divestiture programs in the power industry in other countries have sought strategic shareholders which are strong enough to shoulder new investments in system upgrading and expansion and introduce modern management and efficiency improvements. Maximizing divestiture proceeds, and especially attraction of quality investors with incentives and capacity to undertake major investments will require revisiting policies on majority state ownership. Attraction of active investors usually requires sale of majority share ownership.
- The goal of reducing government guarantees and liabilities in contracting for new generation can best be achieved if the payment capability of the equitized distribution companies (the financial strength and their efficiency as distribution operators and retailers) is perceived by private investors as sound and sustainable. The scale (e.g., market share) and consumer mix of each equitized distribution company needs to be sufficient for strong financial viability and sufficient scale economy. An additional issue, given the long duration of PPAs, is to create conditions that give predictability to distribution revenues (retail tariffs and recovery of generation / bulk purchase costs) to ensure investors that the payment chain includes a pass-through of PPA costs outside their control.
- The size, structure and operational scope of newly formed shareholding companies

need to be most conducive for the development of the power market under the planned reform. Companies need to be strong enough to be active market participants, able to compete with others, but should not wield excessive control over the market. As the sector and market structure changes, distribution companies will be the drivers in attracting new generation investment and thus protecting end consumers reliability of supply. To be able to contract in a market framework, companies must not only be financially viable, but also have substantial financial strength, scale (market share) and operational and commercial capacity to make long-term contracting credible and generation companies be willing to sell at reasonable prices. A distribution company perceived to have financial problems would probably face a premium in the prices at which generation is willing to sell.

93. Given the long-term implications and importance for the country, Government authorities should undertake a review in 2006 of the experience of the pilot equitization efforts of EVN to date, and optimal strategies for further proceeding with equitization reform, given realities on the ground and experience achieved. The purpose of pilot efforts is to allow experience to be gained in a limited scope and evaluated, to then design a best informed broader implementation strategy and minimize the risk of failure or undesired outcomes. Particular attention needs to be given to equitization strategies in the power distribution sector. It is clear that many of Vietnam's provincial power companies with predominantly rural loads are in a poor position to maintain financial strength if made independent from more profitable load centers. For the planned power industry reform to

succeed, distribution companies must be strong and creditworthy to contract successfully with large power generators.⁹

2005 Electricity Market Road Map

94. The Electricity Law calls for development of the electricity market through implementation of three phases—the first phase focusing on competition in generation, the second phase adding competition for bulk supplies including supply to big customers, and the final phase involving competition at the retail level. The Law leaves the timing, and design of the phased approach to the Government. In July 2005, MOI completed an initial, detailed road map on how to proceed. Figure 4 provides a schematic of the basic plan.

95. Phase I in the current Road Map involves establishment and operation of a competitive market for power supply from existing and new power generators, to be purchased in bulk by one Single Buyer. The Single Buyer will then provide power to the distribution companies and large-scale end-users. The generation market is planned to begin in 2009, with operation under the Single Buyer model for about five years. The basic Single Buyer model envisaged is similar to the model implemented in China beginning in 2002. As designed in Vietnam, operation of the competitive market for generation will involve: (i) power generation companies, selling into the system, largely through contracts, but also into a spot market; (ii) development of one transmission company, integrating the current four; (iii) development of the National Load Dispatch System into the System Operator; (iv) assignment of responsibilities to undertake the

Single Buyer function, involving contracting with all bulk suppliers and selling to all bulk purchasers; and (v) development of a Market Operator to administer and settle the market spot transactions. The Road Map does not call for distribution companies to be involved in the market during Phase I, but the plan notes that it will be important for them to increase their commercial orientation, acquire trading and contracting know how, and develop as proper companies.

96. The first step for Phase 1, to commence as soon as possible, is the creation of an internal, "trial" market within the current EVN system. The internal market will involve current generating plants owned by EVN, or joint-stock generating companies where EVN owns the dominant share. Key aspects include the transparent legal and financial definition of the power plants as separate entities, definition of market design and rules, clarification of legal and regulatory issues, and gaining experience among the parties on market operation mechanics. Based on this experience, and with the addition of the institutional reforms necessary to allow real market operation, competition between these existing power plants and other generators would commence at the end of Phase 1.

97. Development of wholesale competition is envisaged in Phase 2 by moving from the Single Buyer model to a market with multiple bulk buyers and sellers. Distribution companies and large consumers directly connected and supplied from the transmission system will become independent players in the market, contracting with generating companies (and other bulk suppliers or regional imports as may be allowed)

9. EVN has commissioned a major study of equitization in the power sector, financed through IDA's SEIER project, which will be completed during 2006. In addition, the Bank's energy team will provide an analytical note and recommendations to the Government on equitization of power distribution companies, based on the experience gained so far, during the first half of 2006.

BOX 1: Vietnam's New Electricity Law

Vietnam's National Assembly passed the country's first Electricity Law on December 3, 2004, following a drafting process of several years. The Law became effective on July 1, 2005. Its primary scope and key provisions are summarized below.

Listed tenants of **state electricity development policy** include: (i) to develop the power sector based on optimal development of all sources to satisfy increasing demand; (ii) to establish and develop a power market on the principle of transparency, fairness and healthy competition, while maintaining a State monopoly in power transmission, national load dispatch, and construction and operation of certain large-scale power plants which have key socio-economic, defense and/or security roles; and (iii) to apply advanced technology and science, to improve efficiency in energy consumption, to protect the environment, and to promote new and renewable energy resources.

National **power development plans** will continue to be formulated for each 10-year period, but also including a notional view towards the next 10 year period. MOI will organize the formulation of the Plans, utilizing funds from the central budget, for Prime Minister approval. Power investment projects must be included in the Plans, unless special exceptions are granted.

Support is provided for **electricity savings measures**, including preferential tax treatment for relevant products and investment, implementation of demand-side management programs, provisions enabling implementation of efficiency standards for electrical equipment, endorsement of time-of-use pricing, encouragement of power factor standards, and energy auditing provisions. Investment incentives, preferential pricing and preferential taxes will be provided for development of **new and renewable energy** resources, regulated by MoF.

The **power market** is to be established through sequential development of three levels or phases: (i) a competitive power generation market; (ii) a competitive market in bulk power; and (iii) a competitive retail power market. The Law does not provide details on these, but assigns responsibility to the Prime Minister to set the road map for development, and the conditions and timing for proceeding through the phased program. The power market will eventually include: (i) power generation units; (ii) power transmission units; (iii) power distribution units; (iv) bulk power selling units; (v) power retailing units; (vi) the national load dispatch

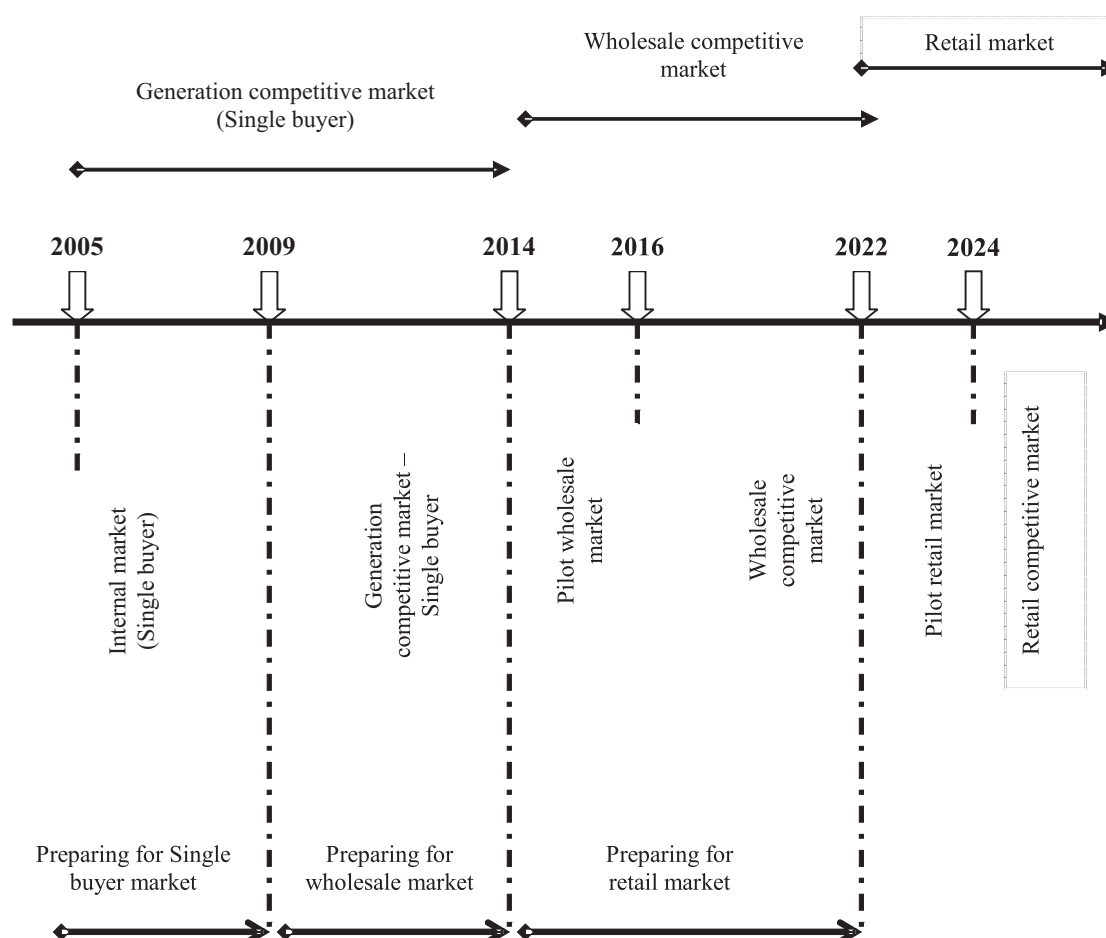
center; (vii) the power market's transaction administrator; and (viii) electricity consumers. The rights and obligations of these different parties are specified. Electricity may be bought and sold through time-bound contracts between purchasers and sellers, or through a spot market overseen by the power market administrator. The Law outlines the basic scope, payment framework, and metering requirements for the time-bound contracts, but spot market arrangements are left open for future scoping.

Electricity tariff policy provisions include instructions to gradually reduce and eliminate the cross-subsidy of residential prices by prices for (industrial) production, and provision for self-determination of electricity sale and purchase prices in the power market within the electricity framework and tariff stipulated by the State. The retail electricity tariff shall be approved by the Prime Minister. The new Electricity Regulatory Agency will assist the Minister of Industry to propose the electricity retail tariff. The pricing framework for the entities in the power market will be appraised by the Regulatory Agency, and approved by the Minister of Industry.

Licensing for various activities in the sector remain the responsibility of the Ministry of Industry, where the national power system is involved, and the responsibility of Provincial People's Committees for small-scale activities. The Law includes provisions for the **protection of electricity equipment and works**, and for **safety**. The Law stipulates that State support is to be provided for rural power operators where power investment and operation is considered financially unviable and for rural household connections where subsidies are needed to conform with social policies.

The Law provides for the establishment of the new **Electricity Regulatory Agency**, which will assist the Minister of Industry to undertake his assigned electricity regulation functions. Key areas of Agency focus listed in the Law are to assist the Minister to: (i) establish regulations on the operation of a competitive power market and guidelines for implementation; (ii) review and recommend solutions concerning overall sector supply and demand; (iii) oversee and approve licenses; (iv) oversee connection and supply suspension or interruption policies; (v) review and implement electricity pricing frameworks and provide retail pricing proposals to the Government; (vi) supervise power system development in accordance with approved plans; (vii) check execution of approved electricity tariff policies; and (viii) adjudicate complaints and appeals rising in the power market.

Figure 4: Roadmap for Developing the Vietnam Electricity Market



Source: MOI Roadmap Proposal, April 2005.

for bulk power supply. The current plan is to move to this stage around 2014, initially with a pilot effort, with limited geographic coverage.

98. Phase 3 will involve competition for retail customers, who will have access to different supply companies. This is tentatively planned to commence around 2022, beginning with a pilot effort in several localities, and with a gradual approach. A threshold will define the consumers that will have the freedom to choose from whom and how to buy electricity. Depending on results and development, the threshold will gradually be reduced until achieving full retail competition.

Key Implications of the Reform

99. With the passage of the Electricity Law, and discussions on the Road Map, the implications of the development of a true power market for the sector as a whole are gradually becoming clear, but perhaps not yet to all parties. Four points are worthy of special emphasis:

- *EVN will need to be broken up into truly separate corporations.* The existing model of EVN as the holding company for all of the state's assets in the power sector cannot be retained if true competition is to be achieved

among existing and new generators, and later, in wholesale and retail supply. The market requires independence among players, to avoid perceived conflicts of interests or potential collusion. If commercial, independent generators are asked to compete with state-owned generators, they must be convinced that those generators maintain no special interests with the buyers or they will not trust the system.

- *Reductions in costs to consumers should not be expected soon.* International experience shows that the main gains of competition will only be realized when large consumers and distribution companies are able to contract directly with power generators in a competitive environment. The big benefits from competition come from the power of consumer choice. Although it would be useful to consider introduction of competition for bulk power supply to distribution companies and large consumers earlier than planned in the Road Map (e.g. 2014), large amounts of careful preparation work need to be completed prior to introducing such a market. For the near-term, therefore, costs to consumers can be expected to increase modestly, and the most important factors influencing how much the cost of electricity supply will go up are likely to be (i) the degree of success in using competitive bidding for IPP contracts; (ii) the extent of increases in fuel prices; (iii) the degree of success in maintaining development according to least-cost plans, despite the pressure of power shortages; (iv) the degree of success in shifting demand for high-cost peak periods to lower cost off-peak periods; and (v) the degree of success in realizing efficiency gains in the power network and dispatch systems, being retained for now under EVN.
- *Current and prospective power shortages*

provide additional challenges for the reform. Introduction of competition during times of shortage will tend to drive up prices, which may necessitate specific measures to minimize excessive rent-seeking behavior. With the current plan to focus on an internal "trial" market in the near-term, this may not be a major problem when it comes to introduction of the true market. In addition, if properly designed, the power of consumer choice can be an efficient means to allocate shortage and/or to overcome it. In China in the late 1980s and early 1990s, the willingness of large consumers to pay higher "second-track" prices or make other types of contributions for new power plant investments, in exchange for guaranteed power in time of shortage, was the most important single factor in overcoming national power shortages.

Other types of problems may arise if assets which are uneconomic over the long-term are developed as state-owned assets in the near-term to meet urgent needs for power in time of shortage. When the shortage is overcome, headaches will arise as these new assets will have trouble competing in the market.

- *Increased predictability and flexibility in retail electricity pricing will need to be introduced over time.* With the introduction of a true competitive market for generation, and even more so with the development of competition for bulk supplies, flexibility must be built into the system for setting the retail tariff. Where prices for power supply coming into the system rise and fall following market forces, but end-user prices are inflexibly fixed, the utilities in the middle are in position where they may be either squeezed into bankruptcy or gain undue profits. (International experience has examples of both.)

Some Suggestions and Key Strategic Choices

100. Serious consideration should be given to allowing contracting between generators and large consumers and/or distribution companies earlier in the reform phasing than currently planned. The basic goal of the reform is to improve efficiency through market competition, and the driver of market competition is consumer choice. The main benefits of the reform can be expected only when large consumers and distribution companies can contract directly with power producers. In addition, there are shortcomings from use of a Single Buyer system for a substantial period of time alone. As shown in China's recent experience, vested interests and pricing imbalances may be created in a Single Buyer system which then become barriers to further reform. Introduction of at least some direct large user-generator contracts during Phase I could help ensure that the reform is kept on track, and that the ultimate, main benefits can be kept in sight.

101. The preparatory phase for the reform, involving all of the activities currently included in the Road Map, is essential for success, and will require time. Implementation details must be worked out in advance of implementation, and issues concerning the structure of the power industry and roles of the different actors are major and difficult issues which must be clarified so that key decisions can be made. The new Electricity Regulatory Authority of Vietnam (ERAV) must be developed and its relationships with all other actors clarified (if the credibility of the Regulator is not well established, it will be difficult for the reform to proceed effectively). Trying to cut corners during the preparation phase is dangerous, and rarely beneficial in the long run. However, eventually the point must come when a major shift has to be made between existing command

and control approaches and reliance on the market—ultimately the choice must be made clearly for one or the other. Once preparation is in place, and the country is ready to proceed with a power market, the Bank team suggests that the reform then be rolled out quickly, including allowances for direct contracting between producers and users.

102. Several key choices which are important to review and debate in the near term, involving strategic consequences, include:

- *How should Vietnam's power distribution sector be organized in the future?* With the program to equitize companies in the country's distribution sector beginning, it is now critical to consider the best future organization Vietnam's distribution sector for the medium and long term. This includes the future roles of the PCs, the provincial power service companies, and rural distribution companies. For the reform to succeed, including attraction of generation investment with minimal Government guarantees, strong, financially viable distribution companies must be in place. This is an important topic to begin to address seriously in 2006 (see also para. 92).
- *How should the state's assets in the sector be organized?* The main state-owned entities needed for operation of the competitive market for generation include (a) entities charged with managing state assets in generation, (b) the transmission company, (c) the System Operator, (d) the Market Administrator, (e) the (temporary) Single Buyer, and (f) the distribution companies. These may be structured and grouped in a variety of ways. However, in the Bank team's opinion, entities charged with managing the state's assets in generation must be completely divorced from the other entities, to ensure a level playing field. The simplest alternative to visualize is to

organize the generation assets into a number of state-owned Generating Companies. As noted in the 2005 Road Map, a good general principle is to ensure that no single company holds more than 25% of total generation assets, to enable competition. Concerning the other entities, a number of them may be merged together, but different configurations have different advantages and disadvantages over the longer term, and should be studied carefully, and decided prior to equitization.

- *How will IPP projects and contracts be procured and managed over the medium term?* Securing thousands of megawatts of new IPP capacity, with outside capital, is of paramount importance to the sector, and implementation of the reform in the near term must facilitate this. It is important to make it very clear exactly who will maintain responsibility for contracting with IPPs, and how these contracts will be managed, both now and in the future-uncertainty about future changes to undetermined entities is not helpful.

It is essential to balance both the need to attract private investment for new generation capacity, and the need to move steadily and smoothly towards the power market. IPP investors must have sufficient medium term security of cash flow in order to obtain project financing. New PPAs must accommodate these concerns. In addition, it is important to protect the security of Vietnam's power supply and to ensure adequate reserve margins in a system that is partly based on hydro plant and subject to risk of drought. Lessons from international experience show that it is possible to mitigate the concerns of IPP investors and financiers, and ensure sufficient supply security, through careful power market design. For example, emphasis may be

given initially to covering load primarily with contracts, and limiting spot trading to a small share of the market..

103. Not only must these choices, and others, be carefully studied, but it also is clear that different stakeholders will have different views on the best ways to manage the consequences of the choices. Care must be taken to ensure that the genuine interests of the consumers-for whom reforms are planned-are not lost to the vested interests of powerful stakeholders.

Economic Regulation of the Power Sector

104. The Electricity Law provides for the establishment of the new Electricity Regulatory Authority of Vietnam (ERAV), which will assist the Minister of Industry to discharge all of the regulatory functions necessary for the functioning of the electricity industry and market. A working group developed the basic organizational setup, staffing plans, and work scope during the first half of 2005, and ERAV was subsequently established by a Decision of the Prime Minister later in 2005.

105. As described in Box 1, the scope of work assigned by the Law to ERAV includes the standard tasks expected of such a regulatory agency. However, ERAV is not independent from the Government, in that the Minister of Industry presides over it. In addition, approval of retail tariffs remains the prerogative of the Prime Minister. With these caveats, which many argue are advisable under current conditions in Vietnam, ERAV can and should become a key player in the power sector henceforward, and is well positioned to provide the objective, technically robust guidance and oversight which will be required. Two important factors which will define the degree of success of the new agency include (i) its

ability to establish itself as an objective institution, charged with implementation of the country's laws, with a mandate recognized by all of the relevant parties, and operating as an agency separate from MOI's regular business and departments, and (ii) establishment of clear technical competence in addressing the complex issues surrounding regulation of the sector. Keeping this in mind, the following are recommendations for ERAV as it moves into its first year of operation:

- *ERAV should be established as a distinct identity separate from the executive departments of MOI.* To discharge its functions effectively, ERAV must be recognized by the various market players as the sole agency responsible for the Government's regulatory oversight of the industry and market. If ERAV develops without a distinct identity and strong degree of independence, market players will consider MOI as the regulatory agency, and ERAV as just one more MOI department. It is therefore recommended that ERAV's funding should become separate from that of MOI, and best provided through fees charged issuing licenses and in the dispatch of its regulatory functions. It would be best if relevant licenses and especially regulatory decisions could be issued under the letterhead of ERAV, with an indication of ministerial approval affixed somewhere in the document, to comply with legal requirements. The necessary relationships between ERAV and various MOI departments should also be developed as arms-length relationships.
- *Definition and publication of a clear work program.* To signal the role of ERAV in the coming months, and to set the priorities for regulatory attention, ERAV should publish a work program. The program should

identify the tasks, and particularly the licenses and regulations to be issued, and an associated timetable for perhaps the next 18 months. Such a work program could be regularly updated.

- *Staff training and development is a key and high priority task.* With experience in Vietnam limited, ERAV is unlikely to be able to recruit staff with operational regulatory experience. Training is therefore especially important, and needs to be well planned from the outside. Technical excellence is an essential part of establishing a solid reputation with players in the industry.
- *Clear arrangements for information collection and monitoring need to be agreed with power industry participants.* Information from sector entities is a basic requirement for the work of a regulator. For ERAV to implement the tasks required of it by the Law and the Prime Minister's Decision, large amounts of timely and accurate data must be sent regularly, in appropriate formats, by the various power sector entities in the country. ERA needs to develop the basic requirements, templates and timetables, and these need to be coordinated with the entities for effective implementation. Clear consequences for lack of provision of timely, complete, accurate and not misleading information must also be established.
- *Powers of enforcement need to be defined.* Current legal provisions are not clear as to how enforcement of regulatory decisions will be ensured. This issue needs to be addressed as a matter of urgency, or ERAV may not be taken seriously. Requirements include needs for ERAV to be legally authorized to order operators in the sector to submit such information necessary for the execution of its duties.
- *Mechanisms for dispute resolution need to be defined.* Adjudication of disputes within the

power sector is one of the functions assigned to ERAV in the Law. Provisions need to be made for further action in the event that ERAV is not able to solve some disputes to the satisfaction of the both parties, and regarding appeals of ERAV decisions.

Summary of Recommendations

106. Recommendations to the Government and EVN for action are included in the discussions above, and summarized briefly below for convenience. Paragraph references refer back to discussion in the main text. Recommendations pertaining to action during 2006 and early 2007 are listed under "short term recommendations."

Short-term Recommendations

- i) As Vietnam's comprehensive Sixth Power Development Master Plan is finalized, analysis should include (a) analysis relevant to the sensitivity of the mix between coal and gas-fired generation plant, especially using fuel price assumptions reflecting true costs to the country, (b) analysis on the implications of slower demand growth for power plant construction scheduling, and (c) analysis of the role of DSM (paras. 41-45). This work was already underway in late 2005.
- ii) Average retail power price levels must be increased to cover increased costs resulting from generation capacity shortages and hydropower production shortfalls, and, especially, needs to expand revenues for power sector investment (paras. 77-80). Increases would best be concentrated especially on the residential consumption categories.
- iii) A standard competitive bidding framework for a full new batch of BOT

IPP projects needs to be developed, and applied to several pilot transactions (paras. 86-87). Following analysis and consensus building, the framework should include an acceptable approach to provision of government guarantees, integration of IPPs into the future power market, and PPA design. The Bank team attaches high priority to this work, beginning in the first half of 2006.

- iv) Active efforts need to be made to coordinate the actors and interests involved in new gas field-pipeline-power plant development, including for O Mon, to allow the development of new gas-based power generation facilities to proceed as quickly as possible (paras. 55-59). The Government should also closely monitor thermal power projects owned by fuel suppliers, insisting on separate fuel and power sales accounting (para. 60).
- v) Government authorities should review the experience of EVN's pilot equitization efforts so far, and develop optimal strategies for further proceeding with equitization in the power industry, especially in the distribution sector. This should take into consideration needs to develop financially strong and creditworthy new shareholding companies, and to provide the best building blocks for the development of the future power market (paras. 92-93; 102 bullet 1).
- vi) As ERAV is beginning its first year of operation, major efforts must be undertaken to develop staff, operational procedures, the short and medium-term work program, clarify the relationships between ERAV and other entities, and develop and agree on reporting and information systems (paras. 104-105).

International assistance is being organized.

- vii) Efforts need to be launched to review and improve the implementation of hydroelectric power projects, especially concerning resettlement and environmental management (paras. 65-66). International assistance is being organized.
- viii) Vietnam's DSM efforts need to be greatly expanded, as a least-cost means to provide additional power services through greater efficiency, including a major effort to include operationally-oriented institutional capacity within EVN's system (paras. 71-72).

Longer Term Recommendations

- i) Vietnam's plans to unbundled the power industry and develop a power market are a most worthwhile endeavor, aimed at improving efficiency through competition. In reference to the current Road Map, direct contracting between generators and large consumers and/or distribution companies might best be considered earlier in the reform. Increased advanced planning and consensus building are needed, concerning the details of the restructuring of EVN's various holdings, to best accommodate the long-term interests of the power industry and its reform. The development of suitable, synchronized power industry structural reforms, implementation details, and clear understandings of procedures and expectations between participants is essential during the preparatory phase, which requires suitable time and strong effort. EVN and ERAV coordination and cooperation in Phase 1 is

important, including in the establishment and operation of the trial market (paras. 99-103).

- ii) Vietnam's equitization program in the power industry should be developed in harmony with plans for power sector reform and development of the power market. Consideration should also be given to how to maximize returns to the state from divestiture and attract investors capable of shouldering major new investments (paras. 90-93).
- iii) Once a suitable framework for competitive bidding for BOT IPPs is developed, it is critical for this framework to be rolled out for a full series of new projects over the medium term (paras. 82-87).
- iv) Once Vietnam's Sixth Power Development Master Plan is finalized, it remains important for the Government to re-review relative costs and priorities, especially between coal and gas-based plant, prior to sanctioning major new generation developments, to ensure least-cost development from the country's perspective (para. 44). Periodic reviews also must consider assessment of existing PPA commitments, and their impact on the system and relationship with actual, rather than projected, evolving demand, to ensure that new commitments are most appropriate. It also would be worthwhile to develop more sophisticated modeling options appropriate for hydropower projects.
- v) Electricity retail tariffs need to be reviewed regularly by the Government, and adjusted periodically to ensure not only power sector financial viability, but also that sufficient revenue can be mobilized for new investment (paras. 77-80). In addition, the Government

needs to consider greater flexibility in setting retail tariffs, allowing tariffs to vary in different localities based on the cost of supply, and, eventually, following market forces, as required under a proper power market system, while also allowing for socially sensitive power pricing where justified for low income households (para. 99, bullet 4).

- vi) Gas-based power generation development will require continued coordination between the various industrial actors and the Government to meet the needs of the country (paras. 56-59). In addition, it is critical for Vietnam to maintain, through revisions where required, an attractive framework for international companies to continue exploration and firming up reserves (para. 61).
- vii) Strong Government support is required to ensure that ERAV can develop its role

and credibility in the market, with a position distinct from the general MOI, with strong and capable staffing, with clear authority, and with sufficient budgetary resources through enforceable funding mechanisms, (para. 105).

- viii) Options exist for increasing beneficial power exchanges between Vietnam and neighboring countries through development of a Greater Mekong System (GMS), which are in Vietnam's interest and deserve strategic attention and support (para. 70).
- ix) The Government needs to undertake a careful review of domestic coal pricing options, and, in lieu of a reform of the coal industry to allow development of competitive market between domestic coal suppliers, develop a clear set of coal pricing regulations which are transparent and meet the country's interests (para. 51-52).

Annex 1

Vietnam: Retail Electricity Tariff

(effective from September 2002, excluding VAT)

Main Categories ^{b/}	VND/kWh ^{a/}		
	Peak Load	Off Peak Bid	Average
Industry			
≥ 110 kV	1325	425	785
22 kV-110 kV	1370	445	815
6 kV-22 kV	1430	480	860
< 6 kV	1480	505	895
Commercial			
≥ 6 kV	2190	790	1350
< 6 kV	2300	815	1410
Agriculture			
≥ 6 kV	950	240	600
< 6 kV	1000	250	630
Urban Residential			
First 100 kWh/month			550
Next 50 kWh/month			900
Next 50 kWh/month			1210
Next 100 kWh/month			1340
Over 301 kWh/month			1400
Rural, excluding Agriculture			
Direct residential connection			390
Other direct connection			730
Collective meter for residences			570-580
Collective meter for other			770

a/ June 2005 exchange rate = VND15,856 / US\$1.00.

b/ Addition categories include urban water & sewage, by voltage and time of day; administration, by voltage; and foreign establishments by type, voltage and time of day.

Source: September 20, 2002 Government Decree.