

SECTOR ASSESSMENT (SUMMARY): ENERGY¹

Sector Road Map

1. Sector Performance, Problems, and Opportunities

1. Viet Nam's rapid development has been accompanied by steadily growing demand for electricity for both industrial development and private consumption. Consumption grew by an average of 14% annually during 2004–2010, substantially surpassing the average economic growth rate of 7% per year in the same period. Demand for electricity is expected to continue growing by an average of 14% per year during 2011–2015 and 11% during 2016–2020. It is projected that electricity consumption will increase from 85,932 gigawatt hours (GWh) in 2010 to 251,763 GWh in 2020.

2. Viet Nam has made remarkable progress in expanding access to electricity, as the percentage of households without electricity fell from 22% in 1999 to only 3% in 2010. Communities not yet connected to the grid are mainly in the less developed and rather sparsely populated mountainous areas of the northwest. Industry consumes 52% of electricity, residential consumers 39%, service businesses 8%, and agriculture 1%. While industry is the largest electricity consumer, it is also the most important sector economically, projected by 2015 to account for 41% of gross domestic product, 29% of the workforce, and 87% of export revenues. Ensuring reliable electricity supply is therefore an important prerequisite to sustaining economic growth at the target of 7.5%–8.0% per year.

3. **Institutional arrangements.** The Ministry of Industry and Trade is responsible for guiding and supervising the development of the power sector. Its responsibilities include (i) formulating legal and regulatory reforms and mechanisms for establishing a competitive and financially sustainable power market, (ii) identifying schemes to mobilize funds to meet the power sector's investment requirements, and (iii) preparing programs to modernize the power sector technologically and strengthen the development of domestic manufacturing of power equipment. It needs to coordinate closely with the Ministry of Planning and Investment, Ministry of Finance, and State Bank of Vietnam to develop policies and financial mechanisms to attract foreign investment and official development assistance, as well as increase the self-financing capacity of power sector entities, to meet the funding requirements of the rapidly expanding power sector.

4. Vietnam Electricity (EVN), the country's national power utility, is mainly responsible for undertaking investments in, and managing the operation of, assigned electricity-generating projects. The National Power Transmission Corporation (NPT) was established in 2008 as a company wholly owned by EVN. NPT is responsible for investment in and the management and operation of 500 kilovolt (kV) and 220 kV transmission lines and associated substations. The Northern, Central, Southern, Ha Noi, and Ho Chi Minh power corporations, established in 2010 and currently wholly owned by EVN, are responsible for the distribution network. Several state-owned enterprises are involved in independent power generation projects, notably the oil and gas company PetroVietnam and the mining company Vinacomin.

5. **Technical sustainability.** A total of 22,294 megawatts (MW) in generation capacity will be added during 2011–2015, and a further 35,087 MW during 2016–2020,² to meet projected

¹ This summary is based on ADB. 2010. Energy Sector Assessment Strategy and Roadmap. Manila. Available on request.

² While slower-than-forecast economic growth may reduce pressure for new generating capacity, the transmission network needs to be strengthened and expanded to reduce transmission bottlenecks and evacuate power from existing and new power plants.

peak demand of 45,199 MW in 2020³ and maintain a reserve margin of 41%, which still depends heavily on the availability of hydroelectricity. Electricity imports from regional power trade will represent 3% of the targeted generation capacity of 77,200 MW in 2020.

6. The rapid expansion of new power generation and electricity imports from neighboring countries requires that 500 kV and 220 kV transmission lines and associated substations be strengthened and developed commensurately to better balance regional power load systems by (i) removing transmission bottlenecks, (ii) facilitating power transfers, and (iii) reducing transmission system losses and voltage fluctuations. During 2011–2015, the transmission network is planned to be expanded by adding 3,833 kilometers (km) of 500 kV transmission lines, 10,637 km of 220 kV transmission lines, 17,100 megavolt-amperes (MVA) of 500 kV/220 kV substation transformer capacity and 35,863 MVA of 220 kV/110 kV substation transformer capacity. The government has set targets to reduce system losses from 10% in 2010 to 8% in 2020.

7. **Financial capacity.** A key challenge for power sector entities is to mobilize financing to meet investment requirements in power generation, transmission, and distribution. While independent power producers are increasingly essential to attracting more investments in power generation, the NPT remains solely responsible for meeting investment requirements by using its own resources and mobilizing financing from development partners. Without strong cash flow, power sector entities will find it increasingly difficult to finance their investment requirements. Further, the availability of concessionary official development assistance and domestic funds from the government is limited. Local finance is available for priority infrastructure projects but with loans of only short tenure. Power sector entities therefore resort to borrowing on commercial terms from export credit agencies and Asian Development Bank (ADB) ordinary capital resources.

8. **Electricity tariff and transmission charge adjustments.** Although affordability and public welfare must be considered at Viet Nam's stage of development, the government recognizes that increases in tariffs are inevitable to cover greater costs associated with expansion in power generation and transmission.⁴ The average electricity retail tariff was raised by 8.9% in 2009, 6.8% in 2010, and 20.3% in 2011 and is currently set at D1,304/kWh, or \$0.06/kWh.⁵ Transmission charges were increased by 14.3% in March 2011 to D77.5/kWh, or \$0.004/kWh.

9. **Environmental sustainability.** The share of coal-fired thermal power plants in the energy matrix is planned to be 48% by 2020 and of natural gas-fired plants 17%.⁶ Without investments in the most efficient thermal technologies, environmental impacts are expected to increase. Industries in particular still consume massive amounts of energy because of inefficiency. Industrial energy intensity in Viet Nam is 1.5–1.7 times that of Thailand and Malaysia. The ratio of energy demand growth to gross domestic product growth is 2, or more than double the world average. In January 2011, the Law on Efficient Utilization of Energy and Energy Conservation became effective, supported by an implementing decree. The government is seeking ways to reduce energy consumption for industrial production by 10%–50% by

³ Targets have been set to improve energy efficiency, especially in industry. The elasticity ratio of electricity demand is projected to decline from 2.0 in 2011 to 1.0 in 2020.

⁴ Viet Nam's power generation, mainly from hydropower, has historically been relatively low-cost. However, as most large hydropower sites have been or are being developed, and given the need to reduce dependence on seasonally fluctuating hydropower generation, the blending of low-cost hydropower energy with more expansive new thermal power energy is gradually increasing costs.

⁵ The depreciation of the Vietnamese dong against the dollar did not result in a real increase but kept the tariff at a same level when adjusted for inflation.

⁶ Renewable energy, mainly wind power, is planned to be 6% of Viet Nam's energy balance in 2020.

implementing the national energy efficiency and conservation program. However, to improve energy efficiency, industries need to be encouraged through (i) the implementation of guidelines and standards, (ii) the provision of financing tools to allow upfront investments in new technology, and (iii) improved human resource and knowledge capacity to upgrade equipment and effectively operate and efficiently manage design.

10. **Human resource development.** EVN has successfully expanded its activities and capability, acquiring the technical and managerial skills necessary to sustain its activities. However, in particular with regard to NPT as a fairly new entity, human resource capacity in the key operational areas of corporate strategic business planning, management, accounting, financial management, and planning need to be strengthened, and appropriate tools, processes, and procedures need to be further updated, developed, and implemented to allow the entity to efficiently and effectively keep pace with expansion requirements.

2. Government's Sector Strategy

11. Expanding power generation, transmission, and distribution capacity in an economically and environmentally sustainable manner to meet rapidly growing electricity demand is a key priority of the Government of Viet Nam. It is one important prerequisite to sustaining economic growth, expanding employment and income-generating opportunities, and thus continuing to reduce poverty. The government's Socio-Economic Development Plan, 2011–2015 acknowledges the importance of large infrastructure investments for socioeconomic development. Recognizing the need to overcome current constraints in the power sector, the government approved on 27 July 2011 the National Power Development Master Plan VII (PDMP VII). With the PDMP VII, the government approved multiple power generation and transmission projects to be implemented during 2011–2020 and laid out a detailed road map and reform framework for (i) strengthening financial capacity, (ii) improving the operational performance of power sector entities, (iii) enhancing human resource capacity and development, (iv) improving the technological optimization and modernization of power sector infrastructure, and (v) enhancing energy efficiency in generation and consumption to sustainably develop and modernize Viet Nam's power sector.

12. Since enacting the Electricity Law in 2005, Viet Nam has demonstrated strong commitment to creating a competitive, transparent power market and broadening ownership in the sector.⁷ EVN was transformed into a vertically integrated holding company operating in generation, transmission, distribution, and retail. In the next phase, the state-owned power sector entities scheduled to be privatized are the Northern, Southern, and Central power corporations, three of the five distribution companies. In addition, EVN is transferring power-generation plants to independent power producers. However, the government specified that the national transmission network and large electricity-generation projects that are of high socioeconomic importance for national defense and security will not be privatized.

13. During 2011–2020, the share of power plants with foreign and domestic investment and ownership is expected to increase. Of new power-generating capacity, 46% is planned as coming from foreign and domestic private-sector entities. To attract more private and foreign direct investments in power generation and to strengthen the self-financing capacity of state-owned power sector entities, the government has embarked on tariff reform. As per PDMP

⁷ A reform road map approved in 2009 describes the reform process as spanning 15 years and implemented in three phases: (i) creating competition in generation by allowing power plants to sell electricity to a single buyer during 2009–2014, (ii) introducing a competitive wholesale market for bulk sale to distribution companies during 2015–2022, and (iii) establishing a competitive retail market commencing in 2023.

VII, retail tariffs may be increased to \$0.09/kWh by 2020, which reflects an average annual increase of 5.2%, in line with the estimated long-run marginal cost of electricity supply.

14. In April 2011, Decision 24 on the Market-Based Adjustment of Electricity Retail Tariff was approved. It allows for the quarterly review and, if required, adjustment of electricity prices based on changes in international fuel prices and foreign exchange. A circular has been prepared and will be issued in 2011 to implement Decision 24. Following Circular 14 on Specifying the Methodology for Electricity Transmission Pricing, which implements processes and procedures for developing, issuing, and regulating wheeling charges, the transmission charge is reviewed and, if necessary, adjusted annually, ideally set to allow the NPT to gradually achieve a self-financing ratio of 25% and a debt-service coverage ratio of 1.5. In addition, the 2005 Electricity Law is currently being revised to further facilitate the development of a competitive power market. One important amendment will include transferring approval authority for retail tariff adjustments from the Prime Minister to the Ministry of Industry and Trade.

3. ADB Sector Experience and Assistance Program

15. ADB has provided long-term, consistent, and coordinated support for the power sector, combining public sector and private sector loans for generation, transmission, and distribution, as well as technical assistance and policy dialogue to plan reform and design the power market. Since 1994, ADB has provided financing for \$2 billion to Viet Nam's energy sector, of which \$480 million supported the development of the transmission system, \$180 million the development of the distribution system, and the remainder, power generation capacity expansion. ADB's country assistance program evaluation for Viet Nam, 1999–2008 assessed the energy sector assistance strategy and program *highly relevant, successful, effective, likely to be sustainable, and substantial in impact and contribution to development results and value addition.*⁸

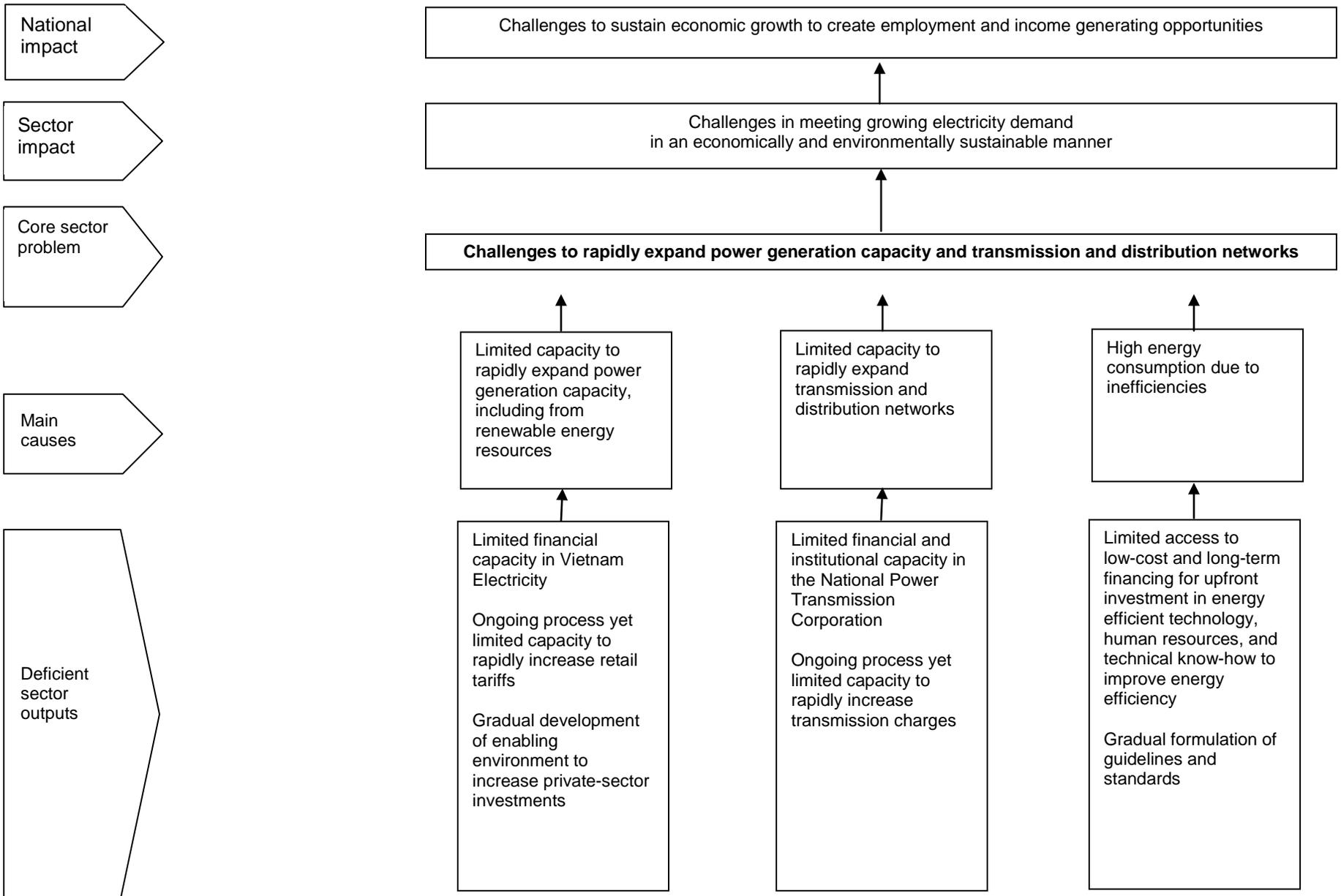
16. The country assistance program evaluation identified efficiency issues related to implementation delays, in particular (i) lengthy government administrative and approval procedures involving several ministries; (ii) many layers of approval for procurement, construction, land acquisition, and safeguards; (iii) delays in finalizing detailed technical designs; (iv) small procurement packages in the interest of attracting local bidders; and (v) limited trained human resources to implement safeguard measures in an effective and timely way. Appropriate measures should be incorporated in the preparation and design of assistance to reduce the risk of implementation delays.

17. ADB's country partnership strategy, 2012–2015 supports the government's aim to achieve continuous (i) inclusive economic growth, (ii) environmentally sustainable growth, and (iii) regional integration.⁹ Coupled with sustained growth in electricity demand, it will require ADB's continuous engagement and long-term commitment in the energy sector with both loans and technical assistance. As Viet Nam is close to 100% electrified and the private sector is increasingly involved in power generation, ADB's Southeast Asia Department will continue to focus its assistance on transmission, one of its areas of strength. The proposed Power Transmission Investment Program will, using the multitranche financing facility, provide the NPT with critical financing support, predictability, and continuity in line with the objectives and time frame of the PDMP VII. Regarding power sector performance efficiency and environmental sustainability, ADB will remain active in supporting (i) regional initiatives through the proposed Lao–Vietnam Power Interconnection Project, (ii) power sector reform, and (iii) energy efficiency. ADB's energy sector assistance strategy will thus continue to be a major factor toward achieving business-led, inclusive, and environmentally sustainable economic growth.

⁸ ADB. 2009. *Country Assistance Program Evaluation: Viet Nam*. Manila.

⁹ ADB. 2011. *Proposed Country Partnership Strategy, 2012–2015: Viet Nam*. Manila.

Problem Tree for Energy



Sector Results Framework Energy, 2011–2015

Country Sector Outcomes		Country Sector Outputs		ADB Sector Operations	
Sector Outcomes with ADB Contribution	Indicators with Targets and Baselines	Sector Outputs with ADB Contribution	Indicators with Incremental Targets	Planned and Ongoing ADB Interventions	Main Outputs Expected from ADB Interventions
Increased and more efficient use of electricity by industrial, commercial and residential consumers in Viet Nam	<p>Per capita electricity consumption increasing to 1,720 kWh by 2015 (2010 baseline: 985 kWh)</p> <p>System losses reduced to 9% by 2015 (2010 baseline: 10%)</p> <p>Elasticity ratio of electricity demand reduced to 1.5 by 2015 (2010 baseline: 2.0)</p>	Electricity system expanded, upgraded, and well-managed	<p>3,833 km of 500 kV transmission line added by 2015 (2010 baseline: 3,987 km)</p> <p>10,637 km of 220 kV transmission line added by 2015 (2010 baseline: 10,820 km)</p> <p>17,100 MVA in 500/220 kV substation transformer capacity added by 2015 (2010 baseline: 12,450 MVA)</p> <p>35,863 MVA in 220/110 kV substation transformer capacity added by 2015 (2010 baseline: 28,032 MVA)</p> <p>22,294 MW in generation capacity added by 2015 (2010 baseline: 26,157 MW)</p> <p>Electricity tariffs gradually increase by at least 5% per year to \$0.08/kWh by 2015 (2010 baseline: \$0.06/kWh)</p>	<p>Planned key activities</p> <p>Electricity transmission (62.6% of funds)</p> <p>Conventional energy (35.9% of funds)</p> <p>Energy sector development (0.34% of funds)</p> <p>Energy efficiency and conservation (1.1% of funds)</p> <p>Pipeline projects with estimated amounts</p> <p>O Mon IV (\$320 million, OCR, €330 million, KfW)</p> <p>Power Transmission Investment Program (tranche 1 \$120.5 million, tranche 2 \$209.5 million, tranche 3 \$200 million, OCR)</p> <p>Lao–Viet Nam Power Interconnection (\$30 million, OCR, \$50 million cofinancing)</p> <p>Energy Efficiency Program in the Industry Sector (\$10 million, OCR, \$50 million cofinancing)</p> <p>Power Sector Restructuring and Market Reform (\$0.5 million, TASF)</p>	<p>Pipeline projects</p> <p>502.6 km of 500 kV, 101.3 km of 220 kV transmission lines expanded, and 600 MVA of 500/220 kV, 1000 MVA of 220 kV substation transformer capacity added</p> <p>750 MW in Combined Cycle Gas Thermal power generation capacity added</p> <p>Energy-efficiency measures implemented by five cement and steel firms</p> <p>Operational effectiveness and efficiency measures implemented by NPT and EVN</p> <p>Ongoing projects</p> <p>Capacity to design and implement climate change response measures improved (TA-7779)</p> <p>NPT's operating efficiency in procurement, financial systems, and setting of transmission charges improved (TA-7668)</p> <p>572 km of 500 kV, 172 km of 220 kV transmission lines added, and 1350 MVA of 500/220 kV, 250 MVA of 220/110 kV substation transformer capacity added (Loan-2225)</p> <p>500 MW in Mini-hydropower generation capacity added (Loan-2517)</p> <p>156 MW in hydropower generation capacity added (Loan-2429)</p> <p>1000 MW in circulatory fluidized bed (coal) power generation capacity added (Loan-2353)</p>

ADB = Asian Development Bank, ADF = Asian Development Fund, CDTA = capacity development technical assistance, EVN = Vietnam Electricity, kWh = kilowatt-hour, km = kilometer, MVA = megavolt-ampere, MW = megawatt, NPT = National Power Transmission Corporation, OCR = ordinary capital resources, TA = technical assistance, Technical Assistance Special Fund. Source: ADB.