

Ending Vietnam's Hydro Threat to Cambodia's Mekong Tributaries: Why Power Sector Reform Matters

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This paper is divided into the following sections:

1. The Abuse of Power
 2. Summary & Recommendations
 3. Electricity Sector Overview
 4. Understanding Vietnam's Hydro Rationale
 5. Trouble in the Electricity Sector
 6. From High Risk to Low Risk Expansion Strategy
 7. Potential for Decentralized Electricity Generation
 8. Recommendations for Reform
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Part 1: The Abuse of Power

The recent drownings and environmental damages caused by Vietnam's newly-operational Yali Falls dam on the Se San river were not deliberate. But they were avoidable. The loss of lives and uncompensated damage to property, riverside crops, and fish catches, is the tragic outcome of a deliberate and economically flawed hydro development strategy.

The problems generated by the Yali Falls dam have yet to be resolved but in June 2002, its owner, the state-owned utility, Electricity of Vietnam Corporation (EVN), began building a second dam, Se San 3, further downstream. One month later, plans for a third dam on the Se San were announced. In all, EVN has plans to build as many as 22 large hydro dams over the next 20 years, mostly in the central highlands region near its border with Laos and Cambodia.

EVN's hydro ambitions received a boost in Phnom Penh earlier this month, when ASEAN government leaders endorsed a multi-billion dollar plan – one long promoted by Western financiers, the Asian Development Bank, the World Bank, and electric utilities such as Statkraft (Norway), EGAT (Thailand) and Electricite de France (France), as a way of expanding electricity supply while maintaining a monopoly grip on the region's electricity generating business. The plan calls for a string of large-scale hydro dams in China, Burma, Laos, and Vietnam with interconnections to a regional grid that extends from the six-country Mekong river basin to Malaysia and Singapore.

While questions about its financial viability remain unanswered, the plan is already generating environmental and economic concerns region-wide. First, because dam-building utilities of this region, including the state-owned Electricity de Vietnam Corporation (EVN), have amassed extraordinary powers and privileges to expropriate the people's rivers, inflict environmental damage and economic losses on riverside communities with impunity, and neglect the rights of upstream and downstream communities to be fairly consulted and compensated for losses and, most importantly, to say 'no' to hydro development along their rivers. Second, because electricity consumers, the alleged beneficiaries of ongoing and future hydro dam construction, whether in

Vietnam or elsewhere, currently have no say whatsoever in where their electricity comes from, how it is generated, and at what cost to riverine communities and ecosystems.

One thing is certain under the prevailing monopoly structure: if EVN and its counterparts in the region are wrong about electricity demand, or if they underestimate the real costs and risks associated with their dams and transmission lines, consumers and citizens will be forced to bear the burden.

The Se San tragedy should prompt an immediate halt to dam construction on the Se San and a thorough review of EVN's chosen path for electricity supply expansion. Now is the time to ask: are more large hydro dams and long-distance transmission investments necessary and, if so, on what terms? Is there a way to end the hydro threat to riverine communities in northeast Cambodia and seek alternative generating options for meeting Vietnam's electricity needs? If so, what reforms are needed to bring them online quickly?

This paper argues that if the goal is providing clean and affordable electricity services to the people of Vietnam, there are far less environmentally damaging and financially risky generating options and strategies available outside the EVN hydrosphere.

It points to the need for further investigation of decentralized power production. "Decentralized power" means not only scaling down the size of power plants but also the investments made. It requires an open decision-making process for deciding who can generate power, where and at what cost to consumers and the environment. It calls for space outside the dominant monopoly structure to expand systems that can flexibly meet people's needs rather than forcing society to conform to the needs of the monopoly. Decentralized power systems differ from the conventional or "hard path" of electricity supply expansion in that they are based on respect for the rights of citizens and consumers.

Part 2. Summary & Recommendations

1. Large hydro dams in Vietnam's central highlands are not being built as an alternative to polluting fossil fuel-fired power plants. **They are an integral part of a plan to build more large thermal-fired generating stations and operate its new hydro dams for peak demand periods and backup for thermal plants, as well as for power export. This is a costly and inefficient strategy for expansion due to the inherent unreliability of hydro reservoirs, and their high costs and liabilities.**
2. Given the uncertainties in predicting peak and average electricity needs of millions of customers, the plans for large-scale additions of generating capacity based on central demand forecasts is a high-risk strategy that will likely result in unsustainable public debt and liabilities.
3. A more prudent expansion strategy would be to set rules promoting smaller, incremental expansion of gas-fired combined cycle plants and allowing local distributors, rural cooperatives, and large industrial and commercial consumers to install their own power systems with technical assistance from EVN and regulatory oversight from the central government. The advantages of small-scale gas-fired plants and a combination of renewable energy systems are compelling. They can be rapidly installed close to the point of consumption, giving far more control to individual consumers and eliminating the need for costly transmission lines.
4. A self-regulating monopoly, EVN, and ministerial-level politicians control Vietnam's electricity industry. As electricity demand grows and more players enter the electricity business, the creation of an independent regulatory authority to govern the system, and provide investor and public confidence, is paramount. One of the key functions of a new regulatory body would be to uphold standards and licensing procedures that would force

- power producers to take responsibility for their actions by declaring all costs, risk, and potential liabilities associated with their proposals, respecting the right of communities to say “no” to development, and full liability for unforeseen damages.
5. An open and participatory review of the government’s 20-year master plan – to review the economic viability of proposed power plants and transmission extensions, system costs, standards for power producers and distribution – should be encouraged to safeguard the public interest and promote greater consumer participation in approving investment plans.
 6. Set rules and policies that recognize and favour the public advantages of high-efficiency generating technologies and renewable energy options.
 7. Introduce public oversight of power sector loans and policy advice from the World Bank, the Asian Development Bank, Greater Mekong Subregion and Mekong River Commission donors and consultants.
 8. Promote public and media awareness in the region about the recent advances in generating technologies and services available.
 9. Phase out all forms of aid and government subsidies for large-scale hydro dams and thermal-fired plants.
 10. Introduce accurate pricing and real-time metering (starting with the largest users of the system) to encourage efficient use and sound investment decisions.

Part 3: Electricity Sector Overview

How is most of the country’s electricity generated?

Vietnam has an installed generating capacity of about 7,000 MW. This includes eight hydro plants that generate 52 percent of the total annual output.

The newly-completed 720-MW Yali Falls dam on the Se San River in the central highlands is the second largest hydro plant after the 1,920 MW Hoa Binh dam in northern Vietnam. Construction of a second dam downstream, the Se San 3, got underway in June 2002, which is expected to come online in 2005.

The largest thermal power plant is the Phu My gas-fired power complex in Ba Ria Vung Tau, about 125 kilometres from Ho Chi Minh City. Less than half completed, it has an installed capacity of 1,700 MW on line and plans for a total of 3,600 MW from five power stations plus a urea fertilizer plant. The Phu My plants are fired with offshore gas delivered via a 110-kilometre pipeline from the White Tiger field. The gas and pipeline is owned and operated by the state-owned gas monopoly, PetroVietnam.

Who gets electricity from the central grid?

EVN currently produces about 30 billion kWh of power, most of which goes to two markets or demand centres: one in the Hanoi-Hai Phong area and a larger one in the Ho Chi Minh city area. These two markets are about 1,700 kilometres apart and are connected by one 500kv transmission line. Completed in 1994, the north-south line was initially designed to carry a surplus of hydropower in the north to the capacity-starved south. However, rapid demand growth in the north has meant that now power from the south is being sent to the north during off-peak times in the dry season when hydro reservoirs are producing only a fraction of their projected output.

As much as 40 percent of the country's 80 million people are either without power or are not connected to the national grid. About half of all rural households have no electricity service.

(For comparison, neighbouring Thailand has a population of 60 million and an installed generating capacity of more than 22,000 megawatts. Almost 100 percent of rural households are connected to the national grid and local distribution utilities.)

Who decides where and how much electricity will be generated, using what fuels and technologies, and at what price?

The **Prime Minister's Office** sets electricity rates on recommendations submitted by the Ministry of Industry and approved by the Government Pricing Committee. Traditionally, rates have been set not to cover system costs but to subsidize various types of consumers and political constituents, with the largest users of the system, state-owned enterprises, receiving the highest subsidies. More recently, the government has been under pressure from its international financiers, the International Monetary Fund and the World Bank, to set rates at level high enough to cover EVN's costs, allow for debt repayment, and encourage the entry of private investors into the power generation business.

The **Ministry of Industry** and **Ministry of Planning and Investment** are responsible for planning electricity investments in generation, transmission, distribution, and creating joint ventures with other state enterprises and private companies. Their estimates of electricity demand growth are based on economic growth projections.

Electricity of Vietnam Corporation is the state-owned and state-run electric utility responsible for implementing the central government's plans for electricity investment, generation, transmission, and distribution.

Under EVN are **five regional distribution companies** and the power companies of **Hanoi** and **Ho Chi Minh**

Rural distributors (local governments, rural cooperatives, and wealthy farmers) have invested in local distribution networks to buy power from EVN then resell it at unregulated prices.

The **National Assembly** has instructed EVN to have 100 percent of districts and 80 percent of villages connected to the national grid by 2010. EVN says in order to do so it must charge higher rates than the subsidized rural rates set by the Government Pricing Committee. The government has balked at this and instructs EVN to invest its revenues in rural service. The standoff continues while some investment in rural distribution is made with ODA funds.

The **National Assembly** has argued for abolishing EVN's informal arrangement with private rural distributors, accusing them of price gouging. The Assembly wants EVN to takeover the private distribution networks but since EVN argues it does not have the financial resources to compensate them for their investments, the informal arrangements continue.

How much do consumers pay for electricity?

From the national grid – Following a series of rate increases over the past decade, tariffs are now set at about 6 US cents per kilowatt-hour and are expected to go up to 7 US cents per kilowatt-hour as recommended by the World Bank.

From rural distributors – Local governments, agricultural cooperatives and wealthy farmers in some parts of the country have invested in poles and power lines to buy power from EVN and resell to individual households. These unregulated distributors buy power for VND 350/ kWh and resell for VND 700-3,000/kWh.

What are key problems in the electricity sector?

For most of the last decade, EVN has struggled to keep pace with electricity demand growth. Power blackouts were common particularly during the late 1990s when new generation and transmission was not being added fast enough to match demand.

The drought in 1998 highlighted the problem of EVN's over-reliance on hydropower: reservoirs dried up and water levels at the country's largest hydro dam reservoir, Hoa Binh, nearly reached 'dead levels', meaning that the intake valves were fully exposed, and there was just enough water for the turbines to produce 11 percent of the plant's capacity. Yali Falls has a 30 percent chance that it will not be able to produce power in the dry season (according to pre-feasibility documents which tend to make extremely optimistic projections about output). No water at Yali can be expected to cripple production at the downstream facility, Se San 3, if it is completed.

By 2005, EVN expects to have enough thermal capacity online to use its hydro dams in the central highlands for peaking and backup. This is a costly and inefficient strategy for system expansion, according to independent power sector analysts, because it will require building extra generating capacity to back up hydro in the dry season when reservoirs are at their lowest. Additional EVN investments in large hydro will also crowd out less environmentally damaging and more economical investments.

What are EVN's plans for electricity supply expansion?

Based on an estimated demand growth of 11 percent annually, the central government's 2001 Master Plan calls for an expansion of electricity production from 45-50 billion kWh by 2005 to 160-200 billion kWh by 2020.

For the period 2001 to 2005, the Plan lists 12 EVN-owned plants, three Build-Operate-Transfer plants (financed jointly by foreign investors, EVN and/or other state-owned corporations), and four so-called Independent Power Producers (meaning not EVN-owned but still supplying power to the monopoly buyer, EVN).

To date, EVN has four power purchase agreements with three build-operate-transfer (BOT)-financed projects (two gas, one hydro) and one state-owned power producer (Vinacoal), all selling power to EVN in the range of 4 US cents per kilowatt-hour.

Separate from the Master Plan, EVN announced plans for 37 power plants to be built by 2010, requiring an investment of US\$19.1 billion, of which US\$14 billion is expected to come from EVN's funds. The remainder is to be raised from other sources (domestic banks, export credit agencies, foreign private capital, multilateral and bilateral aid, etc.).

Both plans call for an increased reliance on large hydro dams, large-scale gas-fired plants, and coal-fired stations. See Tables.

Master Plan No. 5 - List of New and Planned Power Plants

Table 1: EVN-owned Power Plants

Power Plant	Type of plant	Capacity (MW)	Commissioning Year	Current Status
Phu My 1	Combined cycle gas	1090	2001	Operational at near full capacity
Pha Lai 2	Coal	600	2001	300MW on line but still using diesel
Yaly Falls Se San 3	Hydro	720	2001	Full operational capacity Under construction
Ham Thuan Da Mi	Hydro	475	2001	Initial operations but low capacity
Ba Ria Steam Add-on 360-2	Gas	56	2002	Under construction
Phu My 2-1 steam add-on	Gas	143	2003	Operational
Phu My 4	Combined cycle gas	450	2002-2003	In planning
Phu My 2-1 extension steam add-on	Gas	140	2003	In planning
Uong Bi Extension	Coal	300	2004-2005	In planning
O Mon	Oil – gas	600	2004-2005	Infrastructure work to begin; Japanese ODA confirmed
Dai Ninh	Hydro	300	2005	In planning
Rao Quan	Hydro	70	2005	In planning

Source: Mekong Research, 2002

Table 2: Build-Operate-Transfer Financed Power Plants

Power Plant	Type of plant	Capacity (MW)	Commissioning Year	Current Status
Can Don	Hydro	72	2003	Under construction
Phu My 3	Gas	720	2003-2004	Under construction
Phu My 2-2	Gas	720	2004	PPA/BOT license completed

Table 3: Independent Power Plants (Not BOT or EVN-owned)

Power Plant	Type of plant	Capacity (MW)	Commissioning Year	Current Status
Na Duong	Coal	100	2003-2004	Under construction
Cao Ngan	Coal	100	2003-2004	Initial construction
Ca Mau	Combined cycle gas	720	2005-2006	In planning
Cam Pha	Coal	300	2004-2005	In planning

[Cao Ngan – US\$123 million plant in northern province of Thai Nguyen; 15 percent financed by Vinacoal; 85 percent financed by Chinese ODA. A Chinese company has been awarded the contract to build the plant. Business Day (Bangkok), November 14, 2002.]

Table 4: EVN Power Purchase Agreements

Project	Owner	Size (MW)	Current status	Price / kWh	Term (years)
Wartsila	Wartsila ND (Finland)	110	Stalled	7 cents / kWh (negotiated in 1997)	20
Phu My 3	BP (Great Britain)	720	Under construction	4.04 cents / kWh	20
Phu My 2-2	EdF/Tokyo Power (France and Japan)	720	Finalized and seeking financing	4 cents / kWh	20
Na Duong	Vinacoal	110	Under construction	VND620 / kWh (4.1 cents)	25
Can Don	Song Da Corporation	70	Under construction	4.5 cents/kWh	25

Source: Mekong Research, 2002

PART 4: Understanding EVN's Hydro Rationale

Building large hydro dams in Vietnam has traditionally made a lot of financial sense for EVN because the large capital costs of dams and transmission lines have been carried first by the former Soviet Union and, in the last decade, by the central government with discount loans from publicly-financed institutions such as the World Bank and the Asian Development Bank.

According to EVN, the total cost of Hoa Binh was about US\$2 billion but the utility carries only \$100 million on its books. Similarly, Yali Falls cost about US\$1 billion to build but much of this cost was covered by Russia, Ukraine, government bonds and budgetary allocations from the central government financed by deficit spending, not by EVN customers.

At present, an estimated one-third of an annual \$US two billion in ODA gets channeled to EVN and its subsidiaries – but this cost is not reflected in government-set electricity rates or on EVN's books. In the last five years alone, the World Bank has loaned EVN US\$575 million for expansion of transmission lines, which includes lines from Yali Falls to the central region and Ho Chi Minh City.

Without having to properly account for the capital cost of large dams and transmission, and by externalizing most of the social and environmental costs associated with large dams, EVN only had to compute running costs (basic maintenance, staff salaries) and fuel, which the state considers free as it is water. The average cost to EVN for large hydro was therefore much less than one US cent per kilowatt-hour. By comparison, the cost of natural gas or coal power is about five cents per kilowatt-hour, and about 10 to 15 cents per kWh for diesel.

From EVN's perspective, large hydro dams have been and are likely to remain its cheapest option. To justify further dam construction and delay the introduction of other suppliers, EVN has lobbied the central government, claiming that hydro is the only way it can supply power at existing underpriced electricity rates set by government. Thermal power will immediately bring 'outsiders' into EVN's sphere of influence. These would be suppliers of coal, gas, diesel. EVN would have to purchase these fuels at netback values or the value at which these fuels can be sold elsewhere. And it's negotiating base is poor: it must pay international prices for inputs but has no authority to

set a sales price for its output. Moreover, the sale of the required inputs such as diesel fuel or coal is controlled by monopoly suppliers such as PetroVietnam and Vinacoal.

One project that could derail the trend towards thermal power is the proposed 3600MW Son La hydropower plant. As the largest power project in Vietnam, it requires the full backing of the National Assembly and the Prime Minister. It would add enormous capacity to the system and eat up available capital that would otherwise go to other projects. Recently, the National Assembly approved what it calls 'low Son La' which is a smaller version (2400MW) of the original plan. This smaller version is a US\$2.7 billion project that would stretch the technical, financial, and political resources of the government while displacing up to 90,000 people.

Despite EVN's inclination for more hydro, its rationale is increasingly under threat from forces beyond its control:

- the Vietnamese government now recognizes the need for alternatives sources of power given the limited capacity of hydro dams to generate enough power in the dry season;
- Vinacoal and PetroVietnam have entered the power generation business, which means that Vietnam now has three monopolies competing for investment capital; this could lead to greater scrutiny of hydro versus other generating options;
- traditional hydro financiers in developing countries, such as the World Bank, have cut back on direct financing of large hydro dams, and are under public pressure to phase out funding for large dams entirely, given their poor social and environmental record, uncompetitive costs, and inherent unreliability in tropical countries. Neither the World Bank nor the Asian Development Bank have committed direct financing for large hydro dams in Vietnam, despite providing pro-dam technical assistance grants and a worldwide campaign to promote more private and public investment in Mekong hydro development. In 1998, the World Bank quietly rejected a request for financing for the proposed Dai Ninh project ostensibly due to concerns about forced resettlement associated with the project; and in 2000 the Asian Development Bank withdrew its plans to finance the controversial Se San 3 dam, also allegedly over concerns about EVN's mishandling of downstream impacts caused by the newly-completed Yali Falls dam;
- the private sector is now building more than 40 MW of fossil fuelled plants for each new MW of hydropower, globally. The Mekong River Commission, the UN-backed agency that has been promoting dam-building in the Mekong river basin since the 1950s, acknowledges this trend. In its 2001 hydropower development strategy, the MRC states: "traditional sources of financing have dried up, without being replaced in equal measure by private funds. A consequence is a sharp decline in start (sic) of new construction of hydropower plants." While insisting that the fundamental economic benefits of hydro dams have not changed, the Commission provides a long list of factors weighing against the prospects for attracting either ODA or private capital for large hydro dams in the region (not least of which is strong public opposition in Thailand);
- as the MRC notes, the private sector tends to favour low-risk projects that can provide a faster return on investment than large dams. As such, "most hydropower projects will have handicaps compared to fossil fuelled thermal plants, particularly to gas fired combined cycle plants." Compare the 720-megawatt Phu My 3 gas-fired plant, which is expected to cost US\$ 420 million and take two years to build, to Yali Falls dam, which cost US\$ 1 billion and took eight years to build;
- large hydro dams are costly and uncompetitive compared to conventional alternatives (See Table 5 for a comparison of capital costs of generating technologies.) Coal is the next most costly while gas is the least costly in terms of capital and is the fastest way of

expanding capacity. With the recent development of Vietnam's offshore gas fields, there is great interest from the private sector to invest in gas-fired power plants;

Table 5: Typical Costs and Construction Periods for Generation

Type	Cost per kWh	Construction period
Hydropower*	\$1,000 - \$1,700	3 – 10 years
Coal-fired	\$900 - \$1,200	36 months
Combined cycle gas	\$600 - \$700	18 months
Single cycle gas	\$300 - \$350	<12 months

*includes interest costs charged during construction

Source: Harvard Institute for International Development, 1999

- large hydro dams take longer to build than other conventional large-scale power plants, they come with uncertainties that, for the private sector, translate into unacceptably high financial risks (i.e., geotechnical conditions, resettlement and environmental problems/potential liabilities, regulatory risks, joint ventures with un-creditworthy utilities);
- the benefits and reliability of large hydro dams are often grossly exaggerated by their promoters. The Se San 3 project is a case in point. An independent economic analysis of the Se San 3 project found that its benefits have been wildly exaggerated, by using flawed assumptions about costs and revenues over the project's lifespan. The actual cost could be US\$600 to US\$ 720 million compared to official estimates of US\$205 to US\$217 million, if interest charges and depreciation were properly accounted for. Also, the value of Se San 3 output has been overvalued, by as much as 367 percent, simply by disregarding the concept of firm or reliable power. With the Yali Falls dam operating upstream, lack of outflow from it during the dry season may mean that Se San 3 produces little or zero power during the dry season. (Review of the Se San 3 Hydropower Project Feasibility Study by US-based Foresight Associates, October 16, 2000);
- given the lack of private sector interest in large hydro dams, and the newfound wariness on the part of traditional dam financiers, such as the World Bank, it is not clear how EVN intends to finance new hydro dams. The recent spate of rate hikes in Vietnam certainly puts EVN on better footing to finance dam construction itself, now that it can recover more of its investment costs from ratepayers. China could play a greater role. The multilateral development banks could renew aid for large dams if requested by their client-government and client-utility, EVN. And already the World Bank, the Asian Development Bank, and the Japan Bank of International Cooperation provide 'backdoor' subsidies for dam construction by providing loans to EVN for long-distance transmission links.

BOT = high-risk strategy

According to the industry master plan, EVN may decide to pursue BOT-type financing for hydro dams, as neighbouring Laos has done for the ADB- and Nordic-financed 210-MW Theun-Hinboun project (a project that has disrupted two large Mekong tributaries).

For the last decade, the Asian Development Bank and the World Bank have been promoting the Build-Operate-Transfer financing model in Vietnam, as a way of cajoling private investment into power plants by transferring certain financial risks onto the public sector and creating a legal/contractual structure for specific projects in the absence of a properly functioning judicial system. The theory is that BOT projects would allow Vietnam to attract much-needed investment in new power plants that it could not otherwise raise. In practice, however, BOT projects generate large liabilities for governments as they usually require that the government assume key financial risks (i.e. currency risk and market risk).

Despite overwhelming interest from the private sector in pursuing BOT power projects in Vietnam, and almost a decade of cajoling from energy multinationals, the World Bank, and the Asian Development Bank (including technical assistance grants and power sector loans designed to pave the way for BOTs), EVN has resisted. Almost a decade after BOT legislation was passed, Vietnam has completed negotiations for just three BOTs, two foreign-invested, one locally invested (See Table 2). And the master plan restricts private sector involvement in expansion at 20 percent.

One of the key difficulties in BOT negotiations, apart from the complex legal and financial contractual structure entailed, has been EVN's inability to offer investors an acceptable price. EVN has argued that it cannot pay commercial rates for power from privately owned power plants as long as the government refuses to raise rates. The government, in response, has repeatedly refused to raise rates arguing on different occasions that 1) EVN didn't deserve an increase because it is too inefficient and its transmission and distribution losses are too high; 2) EVN received a rate increase in 1995 and 1996 but then squandered the additional revenue; 3) Vietnam could not afford rate increases as the cost of oil and diesel imports were already high; and 4) the government's role is to support the people by providing cheap power.

As of October 2002, however, the government approved a price hike of 13 percent on all tariffs (urban, rural, high-end and low-end consumers); the average rates are now about six US cents per kilowatt-hour and are expected to go up to seven US cents per kilowatt-hour, as instructed by the World Bank. What impact this increase will have on EVN's approach to financing its planned hydro dams and future power purchase agreements remains to be seen.

Vietnam's new power players

After decades as a monopoly, EVN now has some competition from two other monopolies. The Petroleum Corporation of Vietnam (PetroVietnam) and the Vietnam Coal Corporation (Vinacoal) have developed plans to build their own thermal power plants. Vinacoal, the state corporation, employs 80,000 workers in its coal mines (which is reportedly twice as many as needed) but does not currently have enough customers for coal. The Ministry of Industry has therefore instructed EVN and Vinacoal to build more coal plants in order to keep Vinacoal afloat and avoid layoffs.

Vinacoal and PetroVietnam are the new state-owned Independent Power Producers (IPPs), the key difference between these and other IPPs in the region being that they are wholly state-owned and they also hold monopolies in the fuel needed to fire the generators. Also, unlike foreign-invested IPPs (financed using the BOT arrangement), the power stations will not be handed over to EVN after a contracted period of time. PetroVietnam and Vinacoal will continue to own and manage the power stations. For the time being, they will still need to deal with EVN for transmission and distribution and thus will require a PPA with EVN. (Note: it is not known how these IPP deals reflect market and other financial risks compared to foreign-invested BOTs. This warrants further investigation.) Potentially however, these companies could potentially be long-term competition for EVN. In any event, the entry of these new players is certain to disrupt EVN's traditional way of doing business and could force a faster pace of reform as its own plans for expansion become subject to greater scrutiny.

Vinacoal is the furthest along with its 100MW coal-fired station at Na Duong. The station is under construction and Vinacoal already has a PPA to sell power to EVN at VND620/kWh for 25 years. This is four cents per kilowatt-hour at current exchange rates. It is expected to deliver first power in 2003. The corporation has at least two more thermal stations in the pipeline, the 100MW Cao Ngan station in the northeast and the 300MW Cam Pha station in the northern province of Quang Ninh. China is providing 85 percent of the financing for US\$ 123 million Cao Ngan plant and Vinacoal is still seeking funding from commercial banks for the \$250 million Cam Pha plant.

PetroVietnam's plans are much larger though not as far along in terms of development. It has broken ground on a \$1.2 billion energy complex for the Mekong Delta using offshore gas from two

fields in the Gulf of Thailand. Its phase one plans call for 720MW combined-cycle generator units and a urea manufacturing plant in Ca Mau (the southern most province of Vietnam). The project is closely tied to the development of the PM3 field, which is a joint development between PetroVietnam and Petronas from Malaysia. The PM3 field overlaps the Vietnam / Malaysia boundary and the two governments have an agreement on the use of the gas from the field. The nature of the agreement will require that Vietnam either consume the gas or lose the rights to it. This will require a 300-kilometre sub-sea pipeline for which Japanese ODA is being finalized. Also in the Gulf of Thailand is Unocal's field, which has commercial reserves of gas. Providing there is a market, Unocal wants to bring this gas onshore by 2005.

For both corporations, their entry into the power generation industry is an opportunity to move up the value chain in the electricity industry. At the same time, they can maintain their monopoly positions as fuel suppliers. By becoming IPPs, they can stimulate demand for their products (gas and coal) and earn additional revenue by selling electricity to EVN. Both companies can also continue to sell their fuels to EVN-owned plants.

PART 5: Trouble in the Electricity Sector

What's wrong with the current expansion scenario?

Emphasis on coal and large hydro; environmental and health costs not accounted for, requires the expropriation of public resources (i.e., clean air, freely-flowing rivers) victimization of certain groups, denying consumer choice, and shutting out cheaper, cleaner producers.

Emphasis on large-scale gas-fired plants, risk of over-investment and over-concentration of supply in certain areas (see Appendix 1: for the advantages of small-scale gas-fired and combined cycle plants).

Fuel monopolies entering the power generation business spells monopoly abuse. Experience elsewhere indicates that these two aspects of the energy business should be operated as separate business to avoid investment and expansion mistakes and cost inefficiencies that serve the monopolies but not consumers (Enron's empire was built on similar integration, as an owner of pipelines and power plants). Separation or "unbundling" of fuel supply, generation, and transmission is one piece of advice from the World Bank that is sound, regardless of whether Vietnam decides to privatize parts of the business or keep it in state hands.

PetroVietnam's gas monopoly is stifling investment in the development of onshore gas distribution networks required to serve small-scale gas-fired producers; its gas monopoly has led to over-concentration of oversized gas-fired power plants outside Ho Chi Minh; it also has a serious conflict of interest: its private subsidiary is the country's monopoly provider of diesel.

Rates likely to keep going up to cover uncompetitive-bid power projects and transmission expansion; meanwhile consumers denied choice, and no public/regulatory oversight of investment proposals or system costs.

Investment decisions still driven by political decisions i.e. keeping coalminers employed, rather than consumers' need/right to cleanest available sources of electricity.

No regulatory authority for governing power producers (state-owned or otherwise); EVN as monopoly buyer/seller; the coal, gas, and diesel monopolies; and local distributors. Given that delivery of electricity and gas to consumers/producers is a natural monopoly, and that Vietnam now has three state monopolies in the power generation business, both gas and electricity sectors urgently require scrupulous regulation to: 1) protect consumers from monopoly abuse; 2) review system costs and ensure that prices charged for each component of service are fair and reasonable; 3) enforce standards of service; and 4) enforce open and participatory procedures for licensing new power producers. To curb its powers and prevent "regulatory capture" by vested

interests, this authority should only be responsible for enforcing rules, not making them, and should be required to publish decisions with explanations, hold quasi-judicial hearings, and run a consumer advocacy unit to help facilitate consumer participation and complaints procedures. Despite receiving grants and loans from the World Bank for the express purpose of establishing such an authority, the Vietnamese government has yet to do so. As such, the public and consumer interest is threatened as private power producers are now signing deals with a self-regulating and unaccountable monopoly generator and buyer, EVN. Unregulated and uncompetitive private and state expansion of the power producer is a recipe for private profits at public risk, price gouging, and other forms of consumer and citizen abuse. It is hard to see how the World Bank and other aid agencies can justify additional loans to Vietnam's power sector until this is remedied.

EVN still accepting the market risk for all generating capacity expansion, a practice independent analysts confirm is a financially unsound policy for governments, yet actively promoted by the World Bank and the Asian Development Bank as a way of attracting foreign capital into capital-intensive, high-risk, oversized power projects.

PART 6: From High Risk to Low Risk Expansion Strategy

The World Bank and other international financiers maintain that without government and its state-utility to accept market risk for private power producers, and without an array of subsidies and guarantees to lower costs and protect private profits, no investors would invest in Vietnam's electricity sector. But this is only true for large-scale power projects, the kind promoted by the central government, a handful of foreign energy multinationals, and the multilateral development banks.

There is an alternative approach that has not yet gained currency in Vietnam but warrants further investigation and attention.

For EVN to shoulder the market risk associated with large-scale power plants (whether state-owned or otherwise) is a path fraught with financial risk. Why? Because investing in power plants is an uncertain business: the larger the plant, the larger the uncertainty that it can find enough customers for its power and recover its costs over the project's life.

The risk lies in central planning itself. EVN cannot possibly know how much new generating capacity is needed or what the electricity needs of 80 million people would be ten or twenty years from now, or even next year. If, for example, demand grows at eight percent per year from 2002 to 2012, the need for new capacity is expected to double in the same time period. If demand grows at 12 percent per year, the need for new capacity will have tripled (Master Plan No. 5 assumes a demand growth rate of about 11 percent per year).

Basing investment decisions on demand forecasting such as this has proven inherently unreliable worldwide. Under the BOT financing model, private investors don't have to concern themselves with market risk because EVN is guaranteeing to pay for their power whether or not they have a market for it.

If the central planners are wrong, about where new generating capacity is needed and about how much, how fast (witness Thailand's experience in the last decade) EVN will either add too much capacity, in which case plants will sit idle, while EVN is forced to pay for electricity it can't sell. Or it will add too little capacity, which may be the result of failure to attract enough capital for expansion or because it underestimated the demand growth rate, then the central system will not be able to meet demand. This, in turn, will deter local and foreign investors who need a reliable electricity supply. (More optimistically, EVN's failure to build enough capacity has already begun driving investors in Vietnam to demand the right to self-generate i.e. install their own generators or buy from local off-grid generators.)

Given the huge uncertainties associated with trying to centrally plan for the country's electricity needs, and the high risk of accruing massive public debt and stranded investments (i.e. costs not recoverable from ratepayers either because the investments aren't needed or wanted or have become obsolete), a more prudent strategy warrants serious attention.

With policy and regulatory changes, the market risk can be vastly reduced and spread to those better able to accept it, by canceling large-scale hydro and thermal BOT projects in favour of much smaller-scale and hence lower-risk investments, that can be scaled up in incremental units as needed. That way, private investors would be willing to accept market risk, rather than have it foisted upon ratepayers by EVN.

Forcing power producers to take the market risk (i.e., eliminating take-or-pay clauses in power purchase contracts) would be a bold reform, and not likely to be welcomed by EVN as it would be another step towards competition among power producers. But it does provide a solution to the government's problem of mobilizing capital for expansion, by phasing out plans for high-risk large hydro and large-scale BOTs, it would stimulate more local investment and partnerships with foreign suppliers of new technologies, breeding an entirely new generation of power companies and entrepreneurs, of community-managed micro-hydro and renewable energy systems and rural cooperatives entering the biogas-fired electricity business.

Apart from lifting the financial burden off the public sector, decentralized energy systems – (meaning owned and operated by local utilities, private companies, communities, business, industry, rural cooperatives etc.) have numerous economic and environmental advantages. They can improve fuel efficiency, reduce costs, emit less pollution, minimize the need for expensive transmission lines, deliver higher quality power and offer consumers more control and choice over the type and level of service they need.

What's the potential for decentralized power in Vietnam?

First, it must be recognized that technology or cost no longer limits decentralized energy systems. Analysts maintain that Vietnam has plenty of local capital that is not being mobilized. Rather, investment is stifled by outdated energy policies and rules that keep monopolies such as EVN in place, shut out competitors, place unnecessary financial burden on the public sector, and cause needless displacement of people and environmental damage.

Private distributors have already started operating because of the failure of the state monopoly to provide service, private entrepreneurs using local capital could enter the power generation business given a new set of rules and standards, and a regulatory authority established to ensure that ratepayers are getting service at a fair price. To suggest as the government has that EVN should takeover these private distribution networks would defeat their potential; regulation is needed, not expropriation and nationalization.

More than 100 foreign and local companies have approached EVN in recent years to begin discussions on power plant investments, which indicates the huge potential for private sector investment, and one that could be directed away from large-scale hydro and thermal plants provided new rules were introduced to favour decentralized investments in high fuel-efficiency generators and small-scale innovative systems designed to meet household or community needs.

A 1995 EVN survey found that there are nearly 90 industrial users of electricity that require more than 1,000 kWh per day – thus ideally suited to buying from small producers nearby or installing their own plants thereby reducing the need for large-scale expansion. Many hotels and office buildings already have their own generators (though using diesel is expensive, they would likely shift to solar cell systems or mini gas turbine units if rules were set to allow entry of small-scale suppliers).

In central Vietnam, estimates of current electricity demand totals only about one-tenth the country's total peak demand and could easily be supplied by small-scale systems, including small

hydro and solar PV systems. Again, rules have to be set to empower communities and local governments to define service areas, direct investment by encouraging competition among potential suppliers of services where those services are needed.

Onshore gas distribution is needed

Natural gas, an abundant resource in Vietnam, is recognized by energy experts worldwide as the ideal fuel source for phasing out dependence on dirtier and more hazardous power plants, improving efficiency (i.e. generating more using less fuel and with less waste) in high-performance combined cycle plants, as well as being compatible with other decentralized investments in renewables. Vietnam has vast gas reserves and more are being discovered each year.

PetroVietnam's Bach Ho pipeline is now delivering gas to the Phu My power complex and British Petroleum is building a second pipeline to serve its Phu My 3 power station. Other offshore gas fields are waiting to be developed; much depends upon whether or not onshore markets for gas are developed. At present, development of onshore gas distribution markets has been largely stifled due to PetroVietnam's monopoly, both as a supplier and now an IPP.

Is there potential for advancing renewable energy systems in Vietnam?

The government's 2001 Master Plan recognizes, at least in principle, that renewable energy can play an important role in delivering service to remote and mountainous areas, although it remains to be seen what steps will be taken to mobilize investment if the bulk of local and foreign capital is directed to state monopolies for large-scale conventional generation.

A key challenge for renewable energy companies and advocates will be finding allies outside the existing hydro, coal, and gas monopolies, who can advocate for state-of-the-art technologies as competitors to conventional power plants, not just utopian tinkering or supplemental providers in times of central grid failure.

Detractors will point to the higher costs per kilowatt-hour of renewably-generated electricity compared to grid-supplied electricity (costs that vary greatly depending upon many factors, including fuel source, location, project scale, technology, financing, and transmission and distribution). However, when discussing the potential for renewables, it is important to bear in mind the following: 1) a comparison on per kilowatt-hour basis can be meaningless where consumers and communities are willing and able to pay more per kilowatt-hour for off-grid systems that they can operate themselves using locally available resources or that provide other benefits i.e., local job creation; and 2) the global trend: markets for renewable energy technology are rapidly expanding while prices are dropping; and 3) work is already underway to develop financing strategies that will make renewable energy systems increasingly affordable for households and communities in Vietnam.

In the last ten years, for example, the cost of photovoltaic systems (which transform sunlight into electricity) has dropped ten-fold and the cost of wind turbines and solar thermal technologies (which use sunlight to heat water, or for drying and heating systems) is also going down. On a per kilowatt-hour basis, most of these systems are still not competitive with the average price of power from conventional sources but experts are predicting further rapid decline in cost as production increases.

Vietnam has already made some inroads into the renewable energy sector.

Mini-hydro (200 kw – 2 MW) - 400 small hydro stations are already serving more than one million people and there are more than 100,000 family-owned micro (less than 200 kw) hydro units, mostly in northern mountainous regions, according to data from Vietnam's Hydropower Centre and the Research Centre for Thermal Equipment and Renewable Energy at Ho Chi Minh University.

Wind - One of the world's fastest growing energy sources. Germany and Denmark are currently the world leaders in wind power development. Favourable policies in India have meant that India now has the fastest growing market for wind power. China is not far behind.

Although wind turbines are not well suited for base load power they can be combined with other energy options, and are now cost competitive with coal power. In the US, several wind installations are now producing power for as little as 4.5 US cents per kilowatt-hour. Northern Europe pays more, in the range of 10 US cents per kilowatt-hour.

In Vietnam, over 800 small wind generators have already been installed in over 40 provinces, mainly used to power batteries for household electricity. RECTARE has expressed interest in purchasing higher-grade wind turbines from foreign suppliers.

Solar Electricity Systems – another rapidly growing market, with European and Japanese companies in the lead, investing heavily in the manufacturing of photovoltaic systems.

In Vietnam, five large-scale photovoltaic power systems have been installed and there are 110 monitoring stations tracking data on solar energy resources. Solar Lab, at the Institute of Technology, Ho Chi Minh University and the Institute of Hanoi are the two leading institutes working on the development of solar power generation systems. To date these institutes have installed solar systems for 65 villages and several hundred solar home systems throughout the country. In the Mekong delta, Solar Lab is developing financing strategies for PV sales as well as credit programs for families interested in buying solar systems.

Biogas - using wood waste, rice husks, crop residues or methane gas, biogas fuel is widely used for electricity generation and cogeneration (the use of gas turbines or conventional steam turbines to generate heat and electricity) in many parts of the world, including China, Finland, and the United States. Although this paper did not investigate the potential and use of biogas in Vietnam, Thailand is promoting the use of biogas under its Small Power Producers Programme. As one example, several Thai rice mills are now using rice husk that is usually burned or left in fields to generate electricity and sell surplus to the grid. Under new rules for small-scale renewable energy producers linked to the provincial and municipal transmission grids, several pig farms are preparing to generate electricity from methane gas.

Is the World Bank supporting decentralized energy?

This year, the World Bank approved a US\$225 million loan (entitled the "System Efficiency Improvement Equitization and Renewables Project") which is aimed at reducing peak load on the central system, improving local distribution, expanding service to about 10,000 rural households using community-based renewable hybrid power plants, and developing rules for renewable power providers. This could be an important step for advancing renewable energy systems in Vietnam although the Bank's fundamental lack of accountability for past policy and investment mistakes in Asian power sectors, and its ongoing promotion of a regional grid interconnecting massive-scale power plants suggests this initiative could be public relations tinkering rather than a challenge to the prevailing monopoly structure; due cause for skepticism and careful monitoring.

PART 7: Recommendations for Power Sector Reform

The following is a partial list of principles for power sector reform in the public interest which draws on EPRF's 20 years of experience in electricity, gas, and water utility regulatory hearings, as consumer advocates for a phase out of nuclear power and a shift to decentralized power systems.

1. Establish an Independent Regulatory Body

An independent regulatory authority should have no less than five members, reporting to the National Assembly and ideally financed through a levy on power producers. This new body or commission should be accountable to consumers, free from political interference, and legally separate from the power producers and investors. Its duties and powers should be clearly outlined in legislation and made available to the public. Its decisions should be available to the public and subject to judicial review. As part of its review of the costs and profits in the electricity system, the new regulator should have the legal authority to invite and review submissions from all interested parties.

In general, the new regulatory body should be responsible for monitoring the service, price, and financial performance of power producers and distributors. It should be obliged to publish reports of their performance to inform customers about the prices and services they receive, and to facilitate competition by comparison of services.

The regulator's chief task is to ensure that rates are fair and accurately reflect all costs and risks. Without dictating electricity prices, it must set rules to establish a clear link between consumer rates, financial performance, investments in the system, environmental performance, and supply and demand. As much as possible, the costs and value of electricity generated should be determined by the independent actions and choices of producers and consumers but subject to review by the regulator to prevent monopoly pricing.

As electricity subsidies are phased out, forcing power producers to take financial responsibility for their actions, the government can decide to provide financial assistance to low-income households for electricity use by giving them a direct subsidy rather than by subsidizing electricity rates. It is the responsibility of government, not power producers or the regulator, to decide whether and how to protect the poor and provide subsidies to them.

To protect consumers and ensure system reliability, the regulator must develop new rules, procedures, and standards. For example, the regulator must set rules to ensure that transactions between power suppliers and customers serve the public interest (i.e., in terms of grid stability, noise restrictions, and environmental mitigation). It must develop rules and procedures for resolving conflicts between customers and power producers or distributors. It must set standards for plant efficiency and allowable emissions, and it must monitor and enforce compliance with system performance, safety, technical, and environmental standards.

2. Create a Public Licensing System for Power Producers

The new regulator should be responsible for licensing power producers. A license agreement is essentially a contract between the power producer, the government, and the public, reflecting community standards for public service. As such, all licenses should be public documents. The regulator should be required to publish notices of license applications, organize public hearings, and consider submissions from the public prior to the issuance of a license. The regulator should have the legal authority to enforce licensing procedures, reject license applications (in cases, for example, where the developer has failed to obtain local consent), and impose certain terms and requirements pertaining to electricity rates, transmission and distribution service, service quality, operating codes, environmental performance, and environmental mitigation.

3. Define Rights and Responsibilities in Power System Development

Consumers must have the right to buy power from suppliers or generating companies of their choice. They should be able to buy power from environmentally preferred sources or invest in their own generating units. Whenever consumers gain this fundamental right, competition is created, and lower-cost, high-efficiency generating options will flourish at little or not risk to the

public purse. The rights and responsibilities of power producers and investors must be clearly defined. Power producers should have the right to sell electricity directly to consumers and distributing companies. They should have the right to set their own prices and know that government will not interfere with their ability to recover reasonable costs and earn a profit commensurate with the risk they take. At the same time, they must not be allowed to impose costs and risks onto others without their informed consent or compensation. Thus effective regulation is essential.

Private investors require certainty in order to have the confidence to tie up capital in electricity investments and will want reassurances from the new regulator that their investment will not be expropriated or subject to arbitrary actions that amount to de facto expropriation, that the government will uphold the rule of law (i.e., by respecting investor property rights and upholding commercial contracts). Investors also expect the government to uphold citizens' rights and to articulate those rights in its laws, regulations, and standards for power producers and to regulate power producers on that basis. They also expect government to place limits on the prices power producers can charge for electricity and impose certain obligations on power producers relating to safety, supply, and the environment.

4. Strengthen Citizens' Rights

In shaping the new electricity system, the government must recognize citizens in their capacity as consumers, ratepayers, property rights holders, resource users, and others with a public interest in electricity investments. To uphold their rights, citizens must have access to regulatory proceedings and licensing procedures for power producers. At a minimum, citizens must have:

- the right to fair and timely notification of a developer's proposal;
- the right to know about a developer's proposal to alter their resources and livelihoods, and to have adequate time to develop a response or course of action;
- the right to information regarding a developer's proposal and license application (including but not limited to all engineering studies, technical feasibility studies, economic assessments, environmental assessments, social assessments, proposed terms and conditions of operation, proposed mitigation and compensation measures);
- the right to know about proposals affecting their lives and resources before a license application is approved;
- the right to participate in a public hearing process and have their concerns and vote on the project recorded;
- the right to know the real benefits, risks, and costs associated with a project and to have the opportunity to challenge the proponents' claims and negotiate rules and conditions for a dam's operation;
- the right to fair compensation including enforceable procedures for negotiating fair compensation. This right puts the burden of evaluating damages on the proponents and prohibits coercion, forced resettlement, and ad hoc deal making;
- the right to appeal a regulator's decision thus enabling citizens to hold the government-appointed regulator accountable for its actions and decisions, which discourages political interference.

Even with these rights enshrined in legislation, citizens may not always be protected by the electricity regulator and its licensing procedures and standards for power producers. There may be people who feel that, even after mitigation and compensation has been agreed upon, the project still imposes unacceptable risks on them. There may be people who feel wrongly excluded from the decision-making process. There may also be people who initially favored the project but experience unforeseen – and thus uncompensated – problems with it. Or, problems may arise, conditions might change, or unexpected events might occur. The practice of the power producer might deteriorate or the regulator might fail to make decisions or enforce its own operating and environmental standards on the producer. To protect themselves, citizens must have the right to legal remedies if damages occur, and they must have the right to a special

appeals process to obtain compensation. Citizens must have the right to argue for revisions to license agreements. Establishing these rights gives proponents an incentive to work out fair compensation and publicly acceptable license agreements prior to project construction rather than risk delays, higher compensation costs, and legal action later on.

5. Policy and Structural Reforms for Preventing Monopoly Abuse

- Set new rules and standards that recognize and promote the advantages of high-efficiency gas-fired and renewable generating technologies
- Setup a regulatory commission to protect consumers from monopoly pricing and to ensure that the system provides the best quality electricity services for prices that are acceptable to the consumers, investors, and producers
- Introduce market-based investment decisions; the burden of uncertainty in electricity demand, construction costs, currency values, and fuel prices should be placed on power plant investors and their customers, not on government and taxpayers
- Phase out subsidies and guarantees for large hydro dams and other large-scale power plants; when power producers can rely on public subsidies and guarantees and “free” transmission, investments will tend to be oversized and skewed in favour of maximizing revenue for power producers, rather than optimally meeting consumers’ needs
- Separate potentially competitive activities (generation and supply) from monopoly activities (transmission and distribution) to eliminate conflict of interest and discriminatory access to the grid
- New transmission lines should be financed by beneficiaries (i.e., power producers and their customers), the company that owns the transmission system should be responsible for its maintenance and coordinating use, its costs should be financed by user fees collected from power producers using the grid.

Appendix 1: The Advantages of Small-Scale Gas-Fired Turbines and Combined Cycle Plants

Less Capital Cost, Faster Construction – Gas-fired turbines in single or combined cycle (one gas turbine coupled with a steam turbine) can be added in stages, as demand emerges, and take the least time to install. A 50-100 MW plant can be installed in less than one year and could profitably deliver electricity to customers for 4 to 5 cents per kilowatt-hour, possibly less depending on the price of natural gas.

Eliminates the Need for Long Distance Transmission – Gas-fired plants have low emissions and can be built where power is needed thus eliminating the need for costly long-distance transmission lines. (Yet ODA funds are going to expansion of the central grid to promote investment in large-scale hydro and other plants; it is not clear how these costs will be reflected on EVN’s books or the central government’s.)

Reliability – Private power companies and consumers demanding a high degree of reliability prefer gas-fired plants to any other type of power plant – private companies will guarantee performance and rely on a gas distribution network (private sector willing to invest here also). Unlike hydro dams, they do not depend on the vagaries of rainfall.

Flexibility – Gas turbine and combined cycle plants come in a wide range of sizes, with high fuel efficiency and performance specifications, and can be easily ramped up or down depending upon the customers’ needs, hooked up to the grid or operated independently of the grid. Combined cycle plants in particular are ideally suited to customers with large power and heating needs

because they can be designed to produce electricity and use waste heat for industrial applications i.e. pharmaceutical companies, sugar refineries, agricultural processing, electronics manufacturers, university campuses, hotels, hospitals, rural cooperatives etc. The smallest gas turbine units on the market today are relatively unobtrusive, clean, and quiet, and can therefore be installed, for example, on office building or hotel rooftops or within a factory compound. As such, they also promote greater accountability between producer and consumer which facilitates greater compliance with environmental and other community-set standards, as well as innovation that can lead to greater savings and resource efficiency.

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