Electricity sector planning and hydropower in the Mekong Region.

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Introduction

Long before the first explosives are detonated to initiate construction, hydroelectric projects in the Mekong Region (as elsewhere) exist as abstractions1 – as engineering drawings, as line items in a list of national “hydropower potential”, as some kind of notion that the electricity these dams may produce will be necessary and that these particular dams are a preferable way of meeting expected demand for energy.

How are projections of electricity demand constructed? How are decisions made about what kinds of power plants are chosen and where they are built? What types of assumptions are made about options and alternatives? How does hydropower in the Mekong relate to power sector decision-making processes?

This paper makes three main arguments. First, plans for hydropower projects in the region are largely justified by projections of high demand for electricity in Thailand, Vietnam and China. Second, Thai electricity demand projections are constructed in a closed process strongly influenced by monopoly electric utilities that are incentivized to overestimate demand – and have a track record of over-estimating demand. Vietnamese and Chinese load forecasting arrangements may face similar governance issues. Third, the paper argues that many hydropower projects in the region are not possible without substantial subsidies which currently take the form of grants and risk guarantees, soft loans, and political intervention in power purchase agreements (PPAs); and in the future may well take the form of a subsidized regional transmission grid. I argue that these subsidies should be removed, and hydropower should be forced to compete on a fair, least economic cost basis with a broad range of cleaner and less expensive alternatives.

This chapter proceeds as follows. First, I discuss existing and planned hydropower capacity in each country in the Mekong region, and consider some key historical events in the development of their power sectors. This is followed by a critical analysis of the contemporary power development planning process (especially in Thailand2), with a focus on the actors that decide, the incentives they face, and the methods and assumptions they employ. I then consider how the ways in which these demand projections are used to determine the future mix of power plants – and the peculiar way in which hydropower enters into these plans. The chapter closes with recommendations regarding planning and governance in the sector, including stricter interpretation and implementation of “least cost planning”.

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2 I choose Thailand because I am most familiar with the Thai case, though even here my research only scratches the surface. I expect that key assumptions, methodologies, and conflicts of interest in demand forecasting and power sector planning are broadly similar throughout the region. Thailand is de facto of considerable importance as a major portion of the planned hydroelectric capacity in the region is earmarked for power exports to Thailand.
Regional overview

Electricity demand in the Mekong region is forecast to grow rapidly in the next 15 years (Figure 1); and there are big plans to develop hydroelectric power to meet this projected demand. Increasingly, a pattern is emerging in which poorer economies (Laos and Burma in particular) are lining up to supply hydropower to wealthier neighbors (Thailand and Vietnam). International financial institutions such as the Asian Development Bank (ADB) and the World Bank (WB) are intimately involved in encouraging, funding, and supplying technical expertise for hydro development in the region (see box).

![Figure 1: Peak demand in 2000 and projected peak demand year 2020. Source: Norconsult 2003](image)

While hydroelectric dams play an important role in electricity production and (in some cases) flood control, and irrigation (ICOLD 2000), these massive structures also cause serious damage to freshwater ecosystems, affecting both nature and people. Decimated fisheries, forced relocations of communities inundated by the reservoirs, and downstream impacts from changes in siltation and flood regimes are among the most serious side effects (World Commission on Dams 2000b; WWF 2004).

An ADB-funded study by Norconsult in 2002 identifies “expansion candidate” hydro projects in each country. In Laos, the study identifies 29 sites, totaling 7380 MW, with the vast majority of electricity produced to be exported to Thailand and Vietnam (Norconsult 2002a). In Yunnan, hydropower already provides 5150 MW of capacity. Seven more sites on the Mekong (Lancang) are planned or under construction totaling 14,050 MW (Norconsult 2002a, p 2-24), and a 13-dam cascade of hydropower totaling 23,300 MW is under consideration for the Salween (Nu) river (Sharp 2004). The power from these new projects will serve loads in China, Thailand and Vietnam. In Burma the ADB study identifies 15 projects totaling 23,700 MW, with most power to be exported to Thai load centers. For Vietnam the study lists 34 candidate hydro projects totaling 10,497 MW, mostly for domestic consumption. In Cambodia the
ADB study has identified 16 candidate hydroelectric sites totaling 2074 MW (Norconsult 2002b, p. A2-15, Table A2-3).

**Mekong River Commission: hydropower visions**

For decades, key decision-makers have held a common idea regarding rivers in the Mekong region: to develop water resources as hydropower for industrial expansion. In the corridors of political power, no strong competing vision for water resources has yet evolved to replace hydropower development. This wide-spread vision of large-scale hydropower development in the region began to take root during the Cold War shaped by US, Soviet and Chinese planners who, despite differing political ideologies, shared a common vision of industrial development powered by big dams.

Starting in the 1950s, American economic advisors drew up plans for substantial regional infrastructure development in Thailand, Laos, Cambodia, and Vietnam. The planners envisioned Thailand as the launching pad for a Mekong development plan modeled after the US Tennessee Valley Authority (TVA). The plan would have harnessed the Mekong River for electrical production to provide plentiful cheap electricity to drive industry and mechanized agriculture. Seven huge hydroelectric dams were planned which would have carved the Mekong River into a series of reservoirs over 2000 kilometers long (Hirsch and Warren 1998). One dam alone, the High Pa Mong project upstream from Vientiane, would have required the resettlement of 250,000 people, flooded 3,700 square kilometers of land and reportedly would have cost US $10 billion3 (IRN 1994b; Dieu 2000). The project was investigated for 30 years, with at least US$70 million spent on studies by 1984. The projected electricity generation capacity of the Pa Mong and three other related dams was estimated at almost four times the 1980 electric consumption of all of Thailand.

The Committee for Coordination of Investigations of the Lower Mekong Basin (Mekong Committee), founded under the auspices of the United Nations in 1957, was an intergovernmental agency consisting of government representatives from countries in the Mekong watershed. The mission of the Committee was the comprehensive development of the water resources of the lower Mekong Basin, including the main stream and its tributaries (United Nations 1963).

Regional conflict, disagreements among Mekong states over water management, and the economic non-viability of the proposed hydroelectric projects thwarted efforts to build any dams along the Mekong River. After 1978, the Committee functioned under an interim status, with only the government of Laos, Thailand, and Vietnam participating. During the 1980s, most of the long-range aspects of the Mekong scheme and its key basin-wide projects were abandoned (Hirsch and Warren 1998). In 1994, the Mekong Secretariat issued a study of nine proposed run-of-river dams for the Mekong mainstream. However, the plans were shelved following opposition by NGOs (Imhof 2005).

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3 Dieu (2000) reports that the $10 billion Pa Mong project was highlighted in the Mekong River Commission’s *Indicative Basin Plan (1970-2000)* published in 1971, suggesting that the $10 billion figure is computed using year 1970 dollars.
Thailand: first to develop large hydropower, first to reach hydropower impasse

With increasing communist activity throughout Southeast Asia in the 1950s, the World Bank, the US Agency for International Development (USAID) and other international funding agencies turned their attention to regional economic development as a bulwark against communism. This played a crucial role in Thailand’s energy history. Advice and concessionary financing were catalytic in the construction of a number of large power plants in Thailand starting in the early 1960s. Foremost among these was the Bhumipol (also called Yunhee) hydroelectric dam. The 100 MW dam (later expanded to 779.2 MW) was financed by a $69 million World Bank loan arranged in 1957. The loan was nearly three times larger than any Thailand had previously secured (Chatikavanij 1994, p 33). Contemporary power sector investments facilitated by the World Bank included several thermal (lignite coal) power plants in north, central, and southern Thailand, as well as the beginnings of the Thai transmission grid, which allowed electricity generated in rural areas to be transmitted to industrial, commercial, and residential customers in Bangkok and the surrounding metropolitan area (Greacen 2004). The electricity authorities that built and operated these projects were later consolidated to form the Electricity Generating Authority of Thailand (EGAT), a state-owned enterprise under the Office of the Prime Minister.

After dozens of large hydroelectric projects had been built, most of Thailand’s hydropower potential was realized. In the process, Thai society became increasingly concerned about the inundation of hundreds of villages and massive areas of farmland and forests caused by hydropower projects. In 1989, after years of protest by villagers and environmental groups, the government under then Prime Minister Prem Tinsulanonda halted the project (Phongpaichit 2000).

Following the cancellation of Nam Choan, EGAT built the Pak Mun project with most construction during the years 1991 to 1994. EGAT expected that the Pak Mun would face little opposition because as a “run of river” project it had a relatively small reservoir. Instead, the project became one of Thailand’s most controversial projects with over a decade of protests by villagers whose fishing livelihoods were negatively affected by the project (World Commission on Dams 2000a). A World Commission on Dams case study on the project noted that actual dependable capacity of the dam was only 20.1 MW -- vastly less than the 150 MW used in EGAT’s options assessment. At the same time, costs escalated 68% in nominal terms over estimated costs (Amornsakchai, Annez et al. 2000).

Since then, EGAT has found it more difficult to develop dams in the face of greater public and community opposition. EGAT turned to greater reliance on natural gas and coal, which currently account for 70% and 12% of installed capacity respectively. Whereas hydropower accounted for 30% of installed generation capacity in 1986, by year 2005 domestic hydropower accounts for only 13% of installed capacity (Norconsult 2002a, p. 2-1; Asia Today 2005; Federal Research Division of the Library of Congress).

Thailand also imports hydropower from Laos (currently equivalent to 2% of installed Thai capacity). The latest Thai government projections estimate demand will more than double from 19,326 MW in 2004 to 40,978 MW by the year 2015 (Thai Load
Projects would not have gone forward in the first place without IFI involvement; many project developers are
2003; Lang 2003). They also make the point that IFI claims about increasing good governance are moot if these
large amount of publicly available documents that characterize the World Bank involvement in NT2 (Porter 2005).
and environmental impacts than would have otherwise occurred, and point to unprecedented public meetings and a
benefits will ultimately trickle down to consumers in the form of lower electricity rates depends on
competition between generators. Effective competition requires conditions such as free flow of information, lack
of regional transmission constraints, large numbers of competing generators none of which has more than a few
percent of market share, and effective and rigorous regulatory oversight to eliminate market manipulation. Based
on experience with attempts to develop power markets in other countries, these conditions will be difficult to
achieve in the GMS plans, according to a senior transmission planner who reviewed the documents (Garret 2005).
The motivations behind IFI involvement in hydropower in the region are not entirely clear. On the one hand, there
appears to be a strong belief among leaders of these organizations that large hydropower projects are the best
option available to help lift poorer countries in the area “out of poverty”. “Only projects like this offer any
future for development in the country,” argues Homi Kharas referring to the Bank’s involvement in the Nam
Theun 2 (NT2) project in Laos (Balls 2005). The argument is that development requires large sums of money, and
these countries have few other options for revenue generation.

Aid from multilaterals often comes at the behest of Third World leaders who share the bank’s visions of
development, or who see dams as national symbols of modernity and independence (Williams and Dubash 2004). Some lawmakers have raised concern that corruption may motivate funding requests in some cases: in 2004 witnesses testified to the US Senate Foreign Relations Committee under the chairmanship of Richard Lugar, that borrowing-nation bureaucracies and crooked contractors have stolen over $100 billion from the World Bank over the past five decades (Bhargava and Bolongaita 2005). However, IFI leaders claim that their involvement in big dam projects ensures a greater degree of transparency, accountability, and attention to mitigating or reducing social and environmental impacts than would have otherwise occurred, and point to unprecedented public meetings and a large amount of publicly available documents that characterize the World Bank involvement in NT2 (Porter 2005).

Some nongovernmental organizations (NGOs) take issue with the argument that “IFI involvement increases
accountability,” pointing out instances of corruption that violate IFI lending policies (Environmental Defense
2003; Lang 2003). They also make the point that IFI claims about increasing good governance are moot if these projects would not have gone forward in the first place without IFI involvement; many project developers are
Russia and technical assistance continues to be important, particularly for hydropower dams. The former began operations in 1988 and the latter in March 2000. Hydropower dams including the 1,920 MW Hoa Binh and the 720 MW Yali Falls financial, and construction management aid for many of the country’s major monopoly Electricity of Vietnam (EVN) included technical capacity building, Bank played for Thailand. Contributions from Russia to the Vietnamese electricity impact concerns that Chinese hydropower developers and financers with fewer environmental and social safeguards than benchmarks for projects (Norconsult 2003). Chinese hydropower developers are already active with a number of smaller projects in Laos, Burma, and Cambodia. NGOs and IFIs alike have raised one significant question is whether or not other financiers would have been found if the IFIs had never supported and promoted these projects. One need look only as far as Burma, Vietnam, or Southern Laos to see substantial bilateral hydropower development assistance and/or private investment for projects that the World Bank and ADB refuse to touch (Akimoto 2004). Similarly, many of China’s own dams are built without IFI assistance. These projects receive considerably less NGO attention, and proceed with substantially less environmental and social impact assessment -- but likely higher environmental and social impact -- than dams in which IFIs are involved. One important case is the Vietnam’s Nam Theun 2 website: www.worldbank.org/laon2).

In the wake of power sector crises in India, Indonesia, and the Philippines in the late 1990s, many governments declined Bank advice on power sector liberalization. At the same time, large economies like Brazil and India that previously were major World Bank clients have shifted to other sources of capital (Mallaby 2004). In this light, critics argue that the Bank is attempting to use large infrastructure projects in countries like Laos to prevent a decline in the Bank’s financial base and to bolster justifications of its own existence (Imhof 2005).

Critics of IFI involvement in big dams point out that there are plenty of countries whose development have arguably been hindered, not helped, by exploitation of energy resources for export. The economy and government of Algeria, Angola, Ecuador, Indonesia, Iraq, and Nigeria, for example, are arguably worse off because of excessive focus on extraction of a single energy resource. Critics are concerned that corruption and lack of democracy in Mekong countries will be increased rather than decreased by revenue streams from mega-hydropower projects. Some analyses argue that even if one disregards their failure to fully account for social and environmental costs, key Mekong region hydropower projects are still uneconomic (IRN 1999; Ryder 2004).

China’s large dam building industry is of particular concern in this regard. Evidence suggests that Chinese developers may be able and willing to take on projects that do not look financially attractive to other investors. The ADB-funded Norconsult document reports that Chinese investment costs for hydropower projects are “very low” compared with those in Thailand and Vietnam (Norconsult 2003). Chinese hydropower developers are already active with a number of smaller projects in Laos, Burma, and Cambodia. NGOs and IFIs alike have raised concerns that Chinese hydropower developers and financers with fewer environmental and social safeguards than IFIs would step in to build these dams if the IFIs pulled out (Osborne 2004; Balls 2005).

Vietnam: Hydropower development in high gear

Hydropower development in Vietnam followed a path somewhat similar to that of Thailand, but with the Soviet Union broadly playing the role that the US and World Bank played for Thailand. Contributions from Russia to the Vietnamese electricity monopoly Electricity of Vietnam (EVN) included technical capacity building, financial, and construction management aid for many of the country’s major hydropower dams including the 1,920 MW Hoa Binh and the 720 MW Yali Falls hydropower dams. The former began operations in 1988 and the latter in March 2000. Russian aid and technical assistance continues to be important, particularly for
environmentally controversial projects such as the 2,400 MW Son La and the 586 MW Se San 3 hydropower dam which international financial institutions (IFIs) will not touch (Wyatt 2002).

By the late 1990s, Vietnam relied on domestic hydropower for about 70% of its electricity. Doi moi tu duy (or “renovation thinking”) economic reforms in 1987 initiated a transition to a “market-based socialist economy”, and the dominance of the state (EVN) in the power sector came under criticism by IFIs in the 1990s. One consequence was increased deployment of electricity generation from natural gas, which foreign investors found more profitable and less risky than hydropower because of lower capital costs, fast construction times, and (at the time) low natural gas prices (Wyatt 2005). By 2000 Vietnam’s reliance on hydropower decreased to 49% of installed capacity, while natural gas rose to 20% (Norconsult 2002a). Nine new thermal and gas fired power plants currently under construction with total capacity of 3620 MW are expected to come online in 2006-8 (Socialist Republic of Vietnam 2004).

Unlike Thailand, however, Vietnam continues rapid development of large hydropower projects. Within 3 years, from 2002 to 2004, construction has started on 17 medium and large hydropower plants with total capacity of 2,952 MW and about 20 small hydropower plants with total capacity of 500 MW. Like Thailand, Vietnam is looking to buy additional hydropower from Laos and China. Vietnam and Laos have signed an "accord on energy cooperation" in which Vietnam will purchase 2,000 MW of electricity from Laos. Vietnam is planning two 500 KV lines and two 220 kV lines to transmit this power. In December 2005, the Vietnamese government licensed a Vietnamese company to build a 250 MW hydropower project in Sekong Province in Lao PDR. The project is expected to cost US$271.3 million (Xinhua 2005).

In August 2004, Vietnam signed a contract to purchase 40 MW of electricity from China via 110 kV line, and is currently engaged on a joint study to connect the transmission networks of the two countries. Another 2,000 MW import from China is planned by 2014 (Socialist Republic of Vietnam 2004).

The Vietnamese Ministry of Energy’s year 2000 Master Plan on Power Development of Vietnam projects electricity sales to increase from 38.8 TWh in 2005 to 61.5 TWh in 2010 and 146 TWh by year 2020 (Socialist Republic of Vietnam 2000). Projections from EVN are even more aggressive: EVN forecasts demand to double from 39.95 TWh in 2004 to 81.9 TWh by the year 2010. By 2020, demand is projected to more than double again, reaching 180.3 TWh (Dr. Lam Du Son 2005). The differences are indicative of the uncertainty that underlies these types of predictions.

**Laos: “Battery of Asia”**

Though very little hydro capacity has been built so far, Laos has substantial hydropower potential. Laos also has inadequate enforcement of environmental laws, an undemocratic political system, and a population unlikely to mount effective

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protests against damaging hydropower projects (Anonymous Lao 2005). National leaders in Laos (as well as some key leaders in Thailand and Vietnam), working together with project developers, IFIs, bilateral organizations, and private financiers, have placed high hopes on future fat revenue streams from hydropower export from Laos to wealthier Thailand and Vietnam.

Norconsult lists 23 possible hydropower projects in Laos totaling 7,383 MW. Thus far, Laos has a total installed electricity generating capacity of just 642 MW, of which 628 MW comes from hydro.

Laos has been selling hydropower to Thailand since 1971, following the completion of the 150 MW Nam Ngum Dam (Ryder 1994). In 1998 the 210 MW Theun Hinboun Dam began selling power to Thailand as well. Theun Hinboun has come under criticism from environmental advocacy groups who report a decline of 30% to 90% in the quantity of fish caught downstream of the dam, substantial loss of agricultural land both above and below the dam, and damage to fragile ecosystems (Shoemaker 1998).

“Battery of Asia” is the new moniker for Laos employed by Thai Prime Minister Thaksin Shinawatra, referring to future plans to develop hydropower in Laos for export (Associated Press 2005; Petty 2005). Laos is featured strongly in Thai Ministry of Energy plans which include an additional four planned hydropower dams and a lignite project totaling 3,300 MW (See Figure 2 below).

![Figure 2: Planned power projects in Laos that will export electricity to Thailand. Hongsa is a lignite power plant. Source: Thai Ministry of Energy, 2005.](image)

One of the most controversial mega-projects in the Mekong Region in recent times is the Nam Theun 2 (NT2) dam, currently under construction. In March 2005 the World Bank decided to provide grants and a partial loan guarantee up to $270 million for
NT2. In November 2003 EGAT signed a contract to buy 995 MW of electricity, guaranteeing a market for most of the electricity from the planned 1,060 MW project (IRN 1994a).

NT2 will create a 450 km² reservoir that will flood the Nakai plateau, an area of rich biological diversity. The project requires displacement of some 6,200 villagers, most of them members of ethnic minority groups, and affects some 40,000 to 170,000 villagers living downstream who rely on the rivers for fish, agriculture, water supply and many other aspects of their livelihoods (Osborne 2004 page 36; Balls 2005; Perrin 2005).

The project is built by a consortium of investors led by Electricité de France (with a 35% share). Electricity Generating Company of Thailand (EGCO) is a subsidiary of EGAT, and holds 25% of the shares of the project. In addition, the Ital-Thai Development Company (based in Thailand) holds 15% and the Lao government holds 25%.

EGCO’s part ownership in NT2 raises the specter of significant conflicts of interest. EGAT has a 25% stake in EGCO. But EGAT also is the main customer for NT2 power. As such, EGAT may have faced a perverse incentive to engage in lackluster negotiations in their power purchase agreement (PPA) for NT2 power. At the time the contract was signed, the price that EGAT agreed to pay for NT2 electricity -- US$0.047/kWh (1.974 baht/kWh) -- was 16 percent higher than the price that EGAT agreed to pay for power from gas-fired combined cycle plants -- US$0.04/kWh (Baht1.70/kWh) (Permponsacharoen 2005). This is not the first instance that potential conflict of interest involving EGCO and EGAT has been flagged. In year 2001, an anonymous source within EGAT leaked data that EGAT paid about 20 percent more for power from EGCO’s natural gas power plants compared to power from other natural-gas fired private power producers (Anonymous source within EGAT Undated (circa. 2001)). EGCO’s director was a former EGAT deputy director (Greacen and Greacen 2004).

Proponents claim that the NT2 project will provide revenues of up to US$150 million per year to the Lao government, which they claim is essential for helping the country to eradicate poverty and protect the environment. According to World Bank advisors, “The NT2 proposals, taken as a whole, represent the most promising development package before Laos at this stage in its evolution for the net environmental, economic and social benefits substantially outweigh the downside costs.” (Business Day 2003)

Opponents of the project, on the other hand, point out that the “up to $150 million” statement is disingenuous. The International Rivers Network notes that “between 2009, when project revenues come online, and 2020, net revenues for the Government of Laos will total only $20 to $29 million per year, or approximately 3% of total projected government revenue.” Throughout the 25-year concession period ending in

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5 http://www.egat.co.th/english/about_egat/

6 With the current rapid escalation in gas prices, however, NT2 is electricity is now less expensive than electricity from natural gas
2034, revenues are expected to amount to around 5 percent of projected Lao Government revenues. According to environmentalists, past experience shows that benefits will not “trickle down” to affected people, that the project’s studies (environmental and social impact, hydrology, resettlement plans, and project economics) are seriously flawed, and that the project violates World Bank policies; they argue that the project developers should have been left to sink or swim without World Bank assistance (Ryder 2004; Environmental Defense 2005). A critical analysis of the project economic appraisal by Thai economists and this author argued that the World Bank project appraisal used unjustified fine-print assumptions to make NT2 appear to be economically preferable to natural gas fired generation (Greacen and Sukkamnoed 2005).

**Burma: hydropower for export to Thailand, China & India**

*International Water Power & Dam Construction* featured Burma as “Southeast Asia’s last great hydropower frontier” (Sharp 2001). The Burmese Ministry of Electric Power has identified 268 sites with a total capacity of 39,720 MW, and Norconsult identifies 35 candidate hydro projects in Burma totaling 23,700 MW (Norconsult 2002a). The importance of hydropower to the Burmese government is underscored by the creation, in January 2002, of a high-level Department of Hydroelectric Power (DHP) reporting directly to the Deputy Minister in the Ministry of Energy (Myanmar Ministry of Electric Power 2004). The DHP reportedly employs a staff of 3,000 including over 400 engineers (Hydropower & Dams 2005).

At least sixty percent of hydropower potential is in the eastern and central regions, mostly in Karen and Shan states (Hydropower & Dams 2005), and construction of reservoirs would flood Karen, Shan, and Karenni communities that the Burmese army is currently fighting (Earthrights International 2005). Construction of dams in Burma has reportedly used forced labor, relocations at gunpoint, and the use of landmines to prevent displaced populations from returning (Akimoto 2004). Planned dam sites are all located in non-ceasefire ethnic areas where war continues, which is contributing to deteriorating livelihoods, worsening food security, people becoming internally displaced in Burma and political refugees in Thailand. Human rights activists argue that the proposed dams would exacerbate this already desperate situation through increased militarization by the SPDC and through forced relocation, land confiscation, forced labor, and environmental injustices (Noam 2006).

As in the case of Laos, very little hydropower has actually been developed in Burma: total hydropower capacity in the country is 745 MW (Hydropower & Dams 2005), much of which is built in ethnic minority areas (such as the Baluchaung No. 2/ Lawpita 168 MW dam in Karenni State) sending generated electricity to Yangon and Mandalay. As of 2002, Burma’s total installed capacity was 1,240 MW (Norconsult 2002a) with the non-hydro capacity being mostly natural gas turbines.

Most of Burma’s planned hydropower capacity, including the 7,000 MW Tasang Dam, the 1,200 MW Hat Gyi (or Hut Gyi) dams, the 500 MW Lower Salween Dam (Dag Win), the 4,000 MW Upper Salween (Wei Gyi) dam, and the 600 MW Tenasserim dam are expected to be built to export power to Thailand (Bangkok Post 2005; Hydropower & Dams 2005).
In July 1997, Thailand and Burma signed a Memorandum of Understanding (MOU) on cooperation to develop hydropower and natural gas power plants in Burma for export to Thailand. The MOU specified power export of up to 1,500 MW by 2010 (Norconsult 2002a). In March 2005 the Burmese Department of Hydroelectric Power (DHP) of the Myanmar Electric Power Enterprise (MEPE) and the Thai MDX Group of companies signed an agreement for the joint-development of a 7,110-megawatt dam at the Ta Sang site in Shan State; another MOU between MDX and the Burmese regime was secured in April 2006. Another MOU was signed in December 2005 between the Energy Generating Authority of Thailand (EGAT) and the MEPE. The latest serious development for dam construction on the Salween River to secure investment occurred in June 2006 when EGAT and the Chinese Sinohydro Corporation signed a MOU to jointly develop five large hydropower dams in Burma with an estimated total output of 12,700 megawatts, starting with the Hat Gyi dam (Noam 2006). This MOU followed on the heels of a Thai Ministry of Energy Plan, released in a November 2005 seminar chaired by the Thai Prime Minister, that included five large Burmese hydropower projects by the year 2020 (Figure 3) (Thai Ministry of Energy 2005). Further export possibilities are planned with China and India (Hydropower & Dams 2005).
Currently, hydropower in Burma is largely financed by Chinese and Japanese bilateral loans, as well as private investors from China, Thailand, and Japan (Akimoto 2004). Chinese firms have a long history of involvement in hydropower in Burma. Chinese finance and construction of dams in Burma has a history. Burma has about 30 hydro power projects either operating or being built that involves China in some capacity. For example, The Burmese Department of Hydroelectric Power (DHP) of the Myanmar Electric Power Enterprise (MEPE) and the Yunnan Machinery & Equipment Import & Export Co. Ltd (YMEC) in China signed a MOU to implement the Upper Paunglaung Hydro-electric Power Project located east of Pyinmana, the new government capital of Burma. According to the MOU, Burma will buy the necessary machinery and equipment for the project worth US $800 million from YMEC. Also, Burma’s military government signed agreements recently to purchase equipment from a consortium of state-owned Chinese companies to build the Ye Ywa hydropower plant. The MEPE also agreed to purchase equipment from China's CITIC Technology Company Ltd. and Sinohydro Corporation worth US $125 million.

China (Yunnan): targeting the upper Mekong and the Salween Rivers

Discussed in depth in a separate chapter (Dore & Yu) in this volume, hydropower development in Yunnan is driven primarily by high and increasing domestic demand for electricity, and secondarily by perceived opportunities to sell electricity to Thailand and Vietnam. Much of Yunnan’s electricity production is sent through China’s southern power grid to fuel industrial development in Guangdong province, where GDP has been growing at 13% to 15% per year. Guangdong’s economic growth has outstripped available electricity, and unmet demand in 2005 was estimated at 4,500 MW (Li 2005).

Yunnan is home to the upper portion of the Mekong and Salween rivers; and while considerable hydropower has already been developed, an even greater potential remains undeveloped. China began building a series of large dams on the upstream of the Mekong River starting in the early nineties. The 1,500 MW Manwan was completed in 1996. Limited information was available to the general public about the project, and project developers sought no international finance. By the time news of Manwan was generally known, the dam was nearing completion and work was being initiated on a second dam, at Dachaoshan. The 1,350 MW Dachaoshan project was completed in November 2003 (Samabuddhi 2004). Construction on the Xiaowan was begun in January 2003 with expected commissioning in 2010-2012. With a projected power output of 4,200MW, Xiaowan will be the second largest dam in China, after the Three Gorges Dam on the Yangtze. Construction on the 1,500 MW Jinghong is also underway, with planned commissioning in 2012-2013 (Norconsult 2002a, page 2-24; Li 2004). A MOU for sales of electricity from the Jinghong Dam to Thailand was signed in November 2000 (Samabuddhi 2004). A fifth project, the Nouzhadu, has an even larger capacity at 5,500 MW, and according to Norconsult has a planned commissioning date of 2013-2016 (Norconsult 2002a).
In addition to dams on the Mekong, a 23.3 GW 13-dam cascade has been proposed on the upstream Chinese portion of the Salween, an area that was also declared in 2003 to be a UNESCO World Heritage site. In March 2004 Chinese Prime Minister Wen Jiabao surprised the world by rejecting a National Development and Reform Commission (NDRC) proposal for the cascade, citing environmental and social concerns (Sharp 2004). However, development of the Salween’s hydropower potential remains a priority of Huandian Corporation, one of China’s “big 5” power generating companies.

Cambodia: facing hurdles to hydropower development
Like Burma and Laos, Cambodia has very little installed electrical generation capacity. Electricité du Cambodge operates about 130 MW of total installed capacity, the vast majority of which is expensive diesel generation (Norconsult 2002b). Though
much of Cambodia’s topography is flat with little hydropower potential, a recent review concluded that Cambodia had the technical potential for 65 hydropower projects, mostly located in the mountainous western part of the country, with a combined installed capacity of 5,300 to 8,135 MW and total energy generation as high as 41,400 Gwh/year (CPEC & ACT, 1995). The Norconsult study funded by ADB identified 16 candidate hydroelectric sites totaling 2,074 MW (Norconsult 2002b, p. A2-15, Table A2-3). Compared to sites in Lao, Burma, and Yunnan, however, little Cambodian potential is economically competitive (Norconsult 2002a). Lack of personnel and financial resources limit Cambodia’s ability to build hydropower. In the short or medium term, most hydropower development will likely be fairly small, used to supply domestic consumption.

Regional summary
The previous sections can be summarized as follows: (1) Thailand faces difficulties in developing new hydropower projects, because most sites are already exploited and new dam projects are highly controversial. (2) Hydropower construction in Vietnam is significant and growing, mostly to meet domestic demand. (3) Dam construction is intense in the upper reaches of the Mekong in China’s Yunnan province, both for providing electricity to domestic loads (largely in southeastern China), and for export to Thailand and Vietnam. (4) The governments of Laos and Burma, together with hydropower project developers and investors, are moving towards extensive development of hydropower inside their borders, primarily for export to Thailand, and secondarily to Vietnam.

What dam proponents say
Proponents of dams cite a number of reasons why hydropower development makes sense in the Mekong (Nam Theun 2 Power Co. Ltd. 2004; Regional Power Trade Coordination Committee 2004; Chantanakome 2005):

1. There is a lot of hydropower potential in the region
2. Demand growth is high and many new power plants need to be built to keep up
3. Hydropower is inexpensive
4. Dams provide fuel diversity
5. Hydropower is reliable power
6. Hydropower helps reduce greenhouse gas emissions
7. The environmental and social downsides of hydropower can be mitigated without destroying the economics of the projects.

These is little dispute about the first claim, as discussed in the previous section. The other claims, however, have been contested. The remainder of this paper addresses claims 2 and 3, regarding projections of demand growth and the costs of hydropower in the Mekong context. Based on historical records and on an analysis of the process of constructing demand projections in Thailand, it is likely that actual demand will be considerably less than projected demand. Regarding the claims that hydropower is low cost, it is noteworthy that power development plans in Thailand consider hydropower as foregone conclusions, not options – that is, hydropower comes into the plans without having to compete on a cost basis with other approaches. Furthermore, hydropower projects under consideration are all a great distance from major load
centers. Even the closest of these projects, the Nam Theun 2 (NT2) dam in Laos, requires 500 km of expensive transmission lines. While some hydropower projects may be able to generate electricity at competitive costs, this electricity is worth little if it cannot reach markets. A World Bank-commissioned study concludes that even in the NT2 case (a relatively low-cost project near the Thai border) other options such as energy conservation are considerably less expensive (du Pont 2005a). Under these circumstances it is not surprising that there is a significant movement to subsidize transmission costs by constructing a rate-payer-funded regional grid that would transfer electricity from dams to distant loads.

The remaining claims are discussed in a variety of other publications (McCulley 1996; Sant, Dixit et al. 1998; Hildyard 2000; World Commission on Dams 2000b; Environmental Defense 2003; Environmental Defense, Friends of the Earth et al. 2003; WWF 2004) and, while deserving special attention in the Mekong context, are beyond the scope of this paper.

**Load forecasting in Thailand**

As discussed in the country-by-country review, much of the hydropower development in the region is justified by expectations of high demand growth in Thailand, Vietnam, and Yunnan. How is demand for electricity projected? Who decides how much power will be needed and what types of power sources will be exploited to meet demand? How does hydropower fit in?

When the Bhumipol dam was built in Thailand in the late 1950s, a small handful of Thai power sector planners, having little hard data to work with, used guesswork and a “build it and they will come” philosophy to justify new generation capacity additions. Kasame Chatikavanij, the “father of EGAT” wrote in his autobiography about the process he and a few colleagues used in defending parliamentary approval of the World Bank loan for the Bhumipol dam:

> “We looked for ways and means to solve the puzzle and in the end decided to use the 'supposition' method. We supposed for everything - what if this house had this appliance and that house another. We included every possible appliance into our calculations until we felt we were safe.” (Chatikavanij 1994, p 34)

The process is notable in several respects: first, the conception for the project preceded and, indeed, guided the “quantitative” assessment of the need for it. Second, it was fundamentally based on speculation about what electrical loads people might use in the future.

More recent power sector planning by the Thai government and by EGAT is considerably more sophisticated than this early “stab in the dark” approach, but the fundamental uncertainty about future electricity demands that characterized Chatikavanij’s guesswork remain an inescapable part of Thailand’s Power Development Planning process. Specifically development planning is based on power demand projections that, in turn, are based on projections of future economic growth. In the long term (greater than 5 years) these projections can only be regarded as speculative. Problems with the speculative basis for projections are compounded by
potential conflict of interest: key decision-makers in developing load forecasts benefit from high forecasts. The devil is in the details:

Since 1993, the process used in Thailand’s generation planning is as follows:

1. The Thai Load Forecast Subcommittee (TLFS) develops projections of future electricity demand. The TLFS reports to the Committee for the Administration of Energy Policy chaired by the Minister of Energy. The TLFS includes representatives from the three Thai monopoly utilities (EGAT, MEA, PEA), the Energy Policy and Planning Office (EPPO), the Department of Alternative Energy Development and Efficiency (DEDE), the NESDB, the National Statistics Office (NSO), the Federation of Thai Industries, the Thailand Chamber of Commerce, the Association of Private Power Producers (APPP) and consultants/academics appointed by the Minister of Energy (Thai Load Forecast Subcommittee 2004).
2. EGAT uses the TLFS demand forecast to determine, in its opinion, the most cost-effective power plants to add to meet the expected demand plus a safety margin.

The TLFS uses a variety of methodologies depending on the distribution utility (Metropolitan Electricity Authority (MEA) in the Bangkok metropolitan area and the Provincial Electricity Authority (PEA) in the rest of the country); on customer class (residential, commercial, industrial, etc.); and on the forecast horizon (long-term or short-term).

Future electricity use of residential customers is estimated based on surveys conducted in 1998 on appliance use in households of different income levels (Vernstrom 2004; du Pont 2005b). The predictions adjust for expected growth in number of households, appliance saturation, and expected appliance energy efficiency improvements. Similarly, predictions of electricity consumption in office buildings in Bangkok are based on year 1998 surveys on energy use per square meter of several varieties of office buildings, adjusted to account for new building construction or demolition and changing occupancy rates. In the short term, utilities also use information from the Board of Investment (BOI) and applications for new service hookups from large industrial customers.

Since Bangkok office buildings and residences comprise only 30% and 20% of Thailand’s electricity consumption respectively (du Pont 2005b), these bottom-up models account for about half of electricity demand projections. The remaining methods are “top down” in the sense that they are derived from macroeconomic trends. One top-down method employed by the TLFS focuses on energy intensity and is essentially a spreadsheet that lists gross domestic product (GDP) data disaggregated by region and business sector. Total electricity consumption is estimated based on historic consumption per unit of gross regional product (GRP), combined with forecasted growth in each sector. This approach is used for long term modeling for business and industrial loads for both utilities. Econometric regression modeling, which is even further removed from bottom-up data, is used for remaining types of customers (small businesses, water pumping, etc.)
Fundamentally, economic forecasts drive the Thai load forecast, especially long-term forecasts (Vernstrom 2004). In the short term (less than 5 years) these economic forecasts are issued by the Government of Thailand’s National Economic and Social Development Board (NESDB).

TLFS long term electricity demand forecasts are based on long term economic forecasts developed by a non-profit policy research institute, the Thailand Development and Research Institute (TDRI), and funded by the three Thai electric utilities EGAT, MEA and PEA (TDRI 2005). Although the methodology employed by TDRI is similar to that used by the NESDB for short-term forecasts, because of the inherent uncertainty of predicting technical, political and social determinants of economic growth in the long-term (more than five years), these forecasts can only be regarded as speculative. This last point is of crucial importance since most power projects, and especially hydropower projects, have lead times longer than five years.

The TLFS assembles short-term and long-term forecasts for different customer types and sectors and issues its official electricity load forecast. In Europe and North America, forecasts are contested in public rate cases, or in market price referent proceedings. There are lots of interveners that have their own points of view, and the final result is determined through an open, transparent and participatory process. Not so in Thailand. There is no room for interveners in the TLFS's official forecast – the forecast is concluded behind closed doors and presented as a done deal. The closed nature of the proceedings means that there are insufficient checks and balances in this speculative and interest-ridden process.

Thai utilities play a lead role in the TLFS by providing most of the key data used in the forecasts. They are clearly not neutral actors: they exist in an industry structure that (perversely) actually rewards overestimates. As is common with regulated monopolies worldwide, the Thai electricity tariffs are set according to a “cost plus” structure with a guarantee of sufficient utility revenues to expand. The more that utilities spend to expand the system, the more they are allowed to collect. These arrangements provide incentives for continual system expansion – and may lead to a proclivity to overstate demand. If demand for electricity is less than expected, Thai utilities are protected by mechanisms that allow the cost burden of over-investment to be passed through to consumers in the form of higher tariffs.

Not all demand overestimation is attributable to lopsided incentives of TLFS members, however. A significant source of load forecast overestimation in the short term arises from proposed industrial loads that apply for new hookups, but later are not built or are delayed (Bangkok Post 2002).

To summarize, in the case of Thailand most electricity demand forecasting is based on top-down models, the accuracy of which depends to a large extent on the accuracy of economic forecasts. In the long term, these economic forecasts are very uncertain. A minority of the forecast (residential and commercial floor-space) is based on outdated

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7 Currently, the pricing principle states that tariffs should be sufficiently high that the return on invested capital (ROIC) should be 8.39%. Before 2005, the pricing principle stated that the net income after expense of EGAT should not be less than 25% of the investment budget (self-financing ratio not less than 25%). Either way, the more the system is tipped to expand, the higher the allowed tariffs.
surveys and demographic/business expansion forecasts, or on applications for service hookups. All of the data is brought together to create an overall load forecast in a closed, non-transparent process with leadership and key data provided by monopoly utilities. These utilities tend to benefit from high electricity consumption projections, while at the same time being buffered from the negative consequences of overestimating demand.

One would expect from this arrangement that demand forecasts in Thailand would tend to overestimate demand. The evidence shows that this has indeed been the case.

**Track record of Load Forecast overestimation in Thailand**

Figure 5 below shows successive base-case forecasts over the past 13 years in which the Thailand Load Forecast Sub-committee TLFS has issued demand forecasts. The thick red line in the graph below the other lines is the actual demand. Demand forecasts for Thailand have tended to over-estimate actual demand – sometimes by as much as 48%. Out of nine “base case” forecasts, all nine have substantially over-estimating current demand.

![Figure 5. Comparison of base case Thai Load Forecasts to Actual Demand from 1992 to Present. MER = “Medium economic recovery”; MEG = “Medium economic growth”. Data source: Thai Energy Planning and Policy Office. The “Alternative-04” load forecast was developed by citizen’s groups concerned about the systematic bias in official TLFS forecasts.](image)

There are two interpretations of the past record. Defenders of the TLFS forecast argue that the discrepancy between forecasts and actual demand can be largely explained by the Asian financial crisis in 1997-98 and the repeated but excusable failure of the
TLFS to predict the severity of the downturn (Vernstrom 2005, p. 19). Those who challenge the forecasts claim that the overall record highlights the long-term bias of influential members of the TLFS (Permponscharoen 2005). The “Asian financial crisis excuse” does not work for the most recent demand forecasts. The current January 2004 forecast already overestimated 2006 peak demand by 1,674 MW, or about 1.7 times the planned import from the Nam Theun 2 dam. A new April 2006 forecast has been issued but is not yet official. The forecast was issued just two weeks before the actual 2006 peak load occurred. Remarkably, this forecast overestimates actual 2006 peak demand by 899 MW. The 2006 load forecast is based on a projection of average economic growth of 5.38% per year for the next 15 years. By comparison, the actual average annual GDP growth rates over the past 10 and 15 years were only 2.8% and 4.7% respectively (Bank of Thailand 2006), and the size of the economy was much smaller then.

While Thailand’s economy has been recovering -- economic growth in 2005 was 4.5% (Bank of Thailand 2006) -- it is unclear that this recovery can be sustained. The World Bank, among others, has noted that Thailand’s recent economic expansion has been driven mostly by private consumption (fueled in part by double-digit growth in personal credit), and that private investment’s contribution to growth has been less than in previous economic recoveries and lower than in many other countries in the region (Malaysia, Indonesia, Korea, and Singapore). The World Bank concludes that Thailand will have to become more productive and competitive in order to convert the current recovery into sustained high economic growth (World Bank 2003).

Load forecasting in Vietnam appears to be broadly similar to that in Thailand, with even less reliance on detailed household and commercial survey data, and more reliance on economic growth projections (Socialist Republic of Vietnam 2000). The author has no specific data on how load forecasts are constructed in China, but it would be surprising if they were not also fundamentally based on economic growth assumptions.

The considerable uncertainties of these electrical demand forecasts are forgotten by most observers. The TLFS (or its Chinese or Vietnamese counterpart) issues a precise sounding prediction with five significant figures such as “40,978 MW demand by year 2015”, and this number, stripped of its uncertainties and caveats, forms the basis of big plans.

**Thailand’s Power Development Plan (PDP)**

The biggest of these plans in Thailand is EGAT’s Power Development Plan (PDP). The PDP is a 15-year investment plan that specifies which power plants are to be added at what time. A new official PDP is issued about once every two years by EGAT. EGAT’s PDP is reviewed by the Ministry of Energy and approved by the National Energy Policy Council, and then by the Cabinet. In practice the Ministry of Energy seldom questions the fundamental underpinnings of the PDP. After the approval of its PDP, EGAT then undertakes to develop and expand the power system according to the plan.

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8 Peak demand in Thailand occurs in the early afternoon (air conditioning load) during the hottest working days of the hot season (typically in March or April)
The methodology is as follows: in a computer modeling program called STRATEGIST, power plants are added to the system in a way that seeks to optimize lowest overall costs including investment costs, fuel, operation and maintenance (O&M) costs, and financing subject to two criteria: the planned reserve margin is at least 15%, and the loss of load probability (LOLP) is less than one hour per year. The reserve margin indicates the amount of generating capacity available in excess of the annual peak demand (which occurs once a year in early afternoon sometime during the hot months of March, April or May). When EGAT defines its reserve margin, it counts only plants that it considers “dependable”. The amount considered “non-dependable” includes certain percentage of hydroelectric projects since the availability of hydropower during the dry season differs from year to year. The LOLP addresses the fact that there are regional differences in the availability of transmission and generation and everywhere in the country should have sufficient generation and transmission to have power 99.99% of the time.

Journalists and consumer groups have raised concerns that EGAT has virtually no oversight in developing the PDP (Crispin 2001). EGAT decides what power plants to install, and (because of the cost-plus tariff structure) all costs are borne by consumers. If EGAT is wrong and costs are underestimated they are still allowed to recoup most, if not all, costs through tariffs. In practice, planned costs and actual costs can differ significantly, as in the Pak Mun example discussed above.

From a societal perspective, another shortcoming is that the PDP is determined by considering commercial costs from EGAT’s perspective, and not economic costs from society’s perspective. Thus, although an energy solution could be beneficial for Thai society, it will not be chosen if it costs EGAT more money. Energy efficiency provides an excellent example: many studies have shown thousands of MW potential to save electricity (du Pont 2005a). Implementing these savings would cost a small fraction of the cost of new power plants. But EGAT has little incentive to invest in energy efficiency because its revenues are based on the amount of electricity sold, and energy efficiency leads to lower electricity sales. In contrast, worldwide many utilities have made decisions on the basis of economic costs using a decision framework known as Integrated Resource Planning (IRP) (Swisher and Jannuzzi 1997). IRP requires utilities to consider all options, including energy conservation, and choose the package that has least overall economic costs.

Energy activists in Thailand also criticize the PDP for considering only capital-intensive options such as coal, gas, oil and big hydropower plants for future energy generation. Demand side management (DSM) - systematically improving efficiency of electricity use or shifting load to off-peak periods - renewable energy, and cogeneration, are not considered as options that STRATEGIST can pick, even if they are less expensive than conventional options. In Thailand, EGAT’s own DSM program (with a variety of programs launched in the mid-1990s) has provided over

9 Grid-connected biomass fired generation that use fuels with seasonal variations in availability are also not included in the “dependable” reserve.

10 Search Google for “integrated resource planning” to see dozens of utility programs.
735 MW of demand reduction\(^\text{11}\) by year 2001 at a cost of 0.5 baht (US $0.0125) per kWh (Phumaraphand 2001). This is about one third the economic cost of electricity generation from natural gas combined cycle gas turbines which are currently the “low cost” generation source from EGAT’s planning perspective. A World-Bank commissioned report estimates that 1,225 MW of DSM in Thailand is “economic and achievable” by 2015 that is not included in the 2003 PDP (du Pont 2005a).

![Figure 6: Vicious circle leading to over-investment](image)

Taken together, the load forecast, the PDP, and the cost-plus structure form a vicious circle (Figure 6): demand forecasting that tends to overestimate actual demand, power development planning that favors capital-intensive supply-side solutions, and tariffs that pass costs on to consumers. In 2003, Prime Minister Thaksin Shinawatra estimated that accumulated unnecessary investment in the power sector totaled 400 billion baht ($US 10 billion) (The Nation 2003).

**How do hydropower imports end up in the plan?**

The demand forecast and planning methodology discussed above describes the process by which “least cost” power plants like combined cycle gas turbines (CCGT) are added to the power mix. *But, while the discussion provides useful context for hydropower power additions, it does not fully explain them. What do I mean by this? EGAT’s 2006 PDP makes an assumption that power imports will account for 20% of all new capacity (EGAT 2006). In EGAT STRATEGIST modeling, specific projects such as Nam Theun 2 are entered into the PDP assumption matrix as foregone conclusions, not just as candidate options (Vernstrom, 2005, page 27; EGAT 2006).*

Convincing EGAT to sign power purchase agreements from these projects in the past may have involve government pressure as part of regional economic cooperation initiatives. But increasingly, EGAT’s business interests are aligned in ways that encourage imports from neighbors. In the case of EGAT subsidiary EGCO’s involvement in NT2 (discussed earlier in this chapter), EGAT may have had incentives to sign because it is part project owner. With the formation of EGAT International Co., a wholly-owned private subsidiary of EGAT, the potential for this type of conflict of interest may increase. EGAT International Co. will invest in a 23-kilometer transmission line from Lao and Udonthani, another hydropower project in Lao, and two power plants in Burma – with all electricity sales to EGAT (Dow Jones Newswires 2006).

**Wires on the Horizon**

Transmission costs are very large for hydropower projects distant from large load centers. For example, the Nam Theun 2 dam in Laos, although located very close to the Thai border, still requires over 500 km of new 500 kV line to reach the closest tie-in to Thailand’s transmission grid located near Nakorn Sawan. At a cost of US $300,000\(^{12}\) to $800,000 per km\(^{13}\), the transmission cost for bringing NT2 power from the Thai border to the Thai grid exceeds US$150 million. In the case of NT2, EGAT will pass these costs directly on to consumers.

Considering the competitiveness of alternatives such as natural gas CCGT power plants (or even better, combined heat and power plants), which can generally be sited much closer to existing transmission networks and load centers, it is likely that many hydropower projects are financially unfeasible unless hydropower developers avoid paying the bulk of transmission costs.

Plans for a regional transmission grid offer just this opportunity: a massive transmission network funded by ratepayers, reaching near to hydropower sites, but with accounting separated from the financial calculations of hydropower projects. In July 2005, leaders from Mekong countries gathered at the Second Greater Mekong Subregion (GMS) Summit in Kunming, China to sign a Memorandum of Understanding on the Implementation of Stage 1 of the Regional Power Trade Operating Agreement (RPTOA). Stage 1 is the first of four stages that promoters envision leading to a region-wide transmission network spanning Thailand, Lao, Burma, Yunnan, Cambodia, and Laos. In addition to the GMS plans, a separate ASEAN grid, championed by EGAT, includes all of the countries in the GMS plan plus Malaysia, Indonesia, Brunei, and the Philippines.

In both the GMS and ASEAN plans, the claimed benefit of the scheme is that sharing electricity will lower costs: while Thailand’s peak electricity demand occurs during the middle of a hot day in April, Thailand’s neighbors’ greatest power needs might

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\(^{12}\) 500 kV, Double Circuit, four-bundled conductor per phase, using 1272 MCM ACSR/GA conductor costs 12.2 million baht per kilometer, according to personal communication with EGAT.

\(^{13}\) $800,000 per km figure is based on costs in British Columbia and includes materials, labor, project management, indirect costs (IDCs), and all substation and protection work.
occur at other times and all will in theory be better off by sharing with others when they need it.

But GMS studies concede that interconnection will enable a regional coincident peak load reduction of only 2.5% (Norconsult 2003). An independent transmission expert who investigated the ADB study found that the hope that the scheme will pay off is actually based on the assumption that lots of “cheap” hydropower will be built in Laos, Burma, and Yunnan, and that this hydropower will displace electricity generation from gas and coal (Garret 2005). But whether the hydropower is actually “cheap” is anybody’s guess, given that no one knows what these projects will really cost. The RPTOA final report confesses that “there is not enough base information to estimate costs for developing hydropower plants”; yet a companion document, the *Indicative Master Plan on Power Interconnection in GMS Countries*, somehow derives a set of favorable hydropower cost assumptions to conclude that the scheme will save US$914 million (THB 36.6 billion) (Norconsult 2002a).

As of August 2004, only five of eight Lao hydropower projects even had feasibility studies. Without feasibility studies for all the main proposed projects, the economic benefit of the projects, and thus the entire interconnection plan, is uncertain. Indeed, even having feasibility studies offers no guarantees of economic benefits: a World Commission on Dams study found that the average cost overrun for 248 large dam projects was 54% (World Commission on Dams 2000b).

The uncertainty in estimating hydropower project costs is just the tip of the iceberg. Equally important, the expert said, is a profound underestimation of the costs, time, and leadership required to harmonize technical planning and operating standards across the region, as is required to operate an interconnected power grid that must respond without fail to any disturbances, within minutes, in a coordinated fashion, 24 hours a day, 7 days a week (Garret 2005). Though the technical challenges are formidable, the political ones are even tougher. It takes good neighbors to share a transmission link. The Canadian economy, for example, lost US$400 million (THB 16 billion) in August 2003, when a US utility caused a massive cascading blackout throughout the east coast of North America that literally pulled the plug on Ontario’s industries. This example indicates how tying transmission systems of different countries together can introduce new power stability risks.

Promoters (the Asian Development Bank and dam developers) of the grid are publicly confident that it will “yield benefits” (Norconsult 2003). But promoters are not the ones who will be left footing the bill. The additional US$1.2 billion (THB 48 billion) in costs for the transmission scheme go directly to the electrical consumers, embedded in electricity tariffs. The benefits go to the private sector electricity producers. If there is sufficient competition to force producers to forego some of their profits, then the resulting lower costs trickle down to consumers. But experience in California showed all too clearly that the two relatively unique traits of electricity—its non-storability and the “obligation to serve” of utilities (effectively eliminating price elasticity for short-term price movements)—allows even small suppliers to gouge customers when supplies are tight (Duane 2002).

If governments are not willing to agree to the regional grid plans, then many hydropower projects are likely not to be cost-competitive. Projects will have to
proceed as bilateral “international cooperation” initiatives rather than as commercially viable business propositions. Considering the low economic projected returns, it is perplexing that countries would sign on to a large risky project such as the GMS regional transmission grid. But there may be significant extenuating factors. The ADB has done an effective job of encouraging “buy in” by key decision-makers in the region, with little critical discussion of the risks and costs involved. Another extenuating factor is that while the overall economics are not great, there are significant profits to be made by well-placed players. Client politics may play a significant role and the process may be challenging to stop, especially as all key decisions occur in restricted, non-transparent settings.

**Needed: Strong Independent Regulation and Integrated Resource Planning**

Without a strong independent regulator and a regulatory process that guarantees public involvement and scrutiny, there is little reason to believe that the interests of the consumers and other vulnerable stakeholders will be protected with respect to hydropower development. In this sense, “strong” means that the regulator has the authority to enforce the law, and has the political will to do so. “Independent” means free from political influence, and not “captured” by special interests. So far, electricity sector governance in all countries in the region is far from this ideal. In Thailand, Laos, Burma, and Vietnam there is no regulatory authority (Chantanakome 2005) and the utilities in these countries are largely self-regulating. While China and Cambodia have official regulatory bodies, analysts have raised questions about the independence and authority of these organizations (Yeh and Lewis 2004; Shi 2005). In no countries in the Mekong can there be said to exist a strong, independent, public-minded regulatory authority.

Perversely, the RP TOA report recommends against implementing “a highly independent regional regulatory agency” because “the introduction of liberalization and truly competitive markets is not a short or medium-term objective of GMS countries.” This makes little sense. It is precisely the lack of competition that is a primary motivation for strong and independent regulation, as has been the case for regulated monopolies in the US and elsewhere for almost a century. Without competition, an independent regulator is essential to ensure that monopolies or oligopolies do not gouge ratepayers, and that regional transmission investments are prudent, timely and in the best interests of consumers.

While an independent regulator is not, in itself, sufficient to guarantee positive outcomes, it is a necessary step. Another essential step is effective public hearings, which would allow for a degree of transparent oversight of power sector investments. Public hearings are an essential safeguard mechanism for meaningful intervention by consumers and other vulnerable stakeholders in decisions that will ultimately become their lasting economic and social burden.

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14 As this chapter goes to press, the Thai government has appointed a 7-member interim regulatory body. The body has no legal authority to penalize, and citizens groups have raised concerns that the appointed commissioners are not sufficiently independent.
Finally, the regulatory process should include a mandatory Integrated Resource Planning (IRP) decision framework that selects risk-adjusted economic least-cost alternatives. The options considered should include demand side management (DSM) and clean distributed generation, which have proven again and again to be cheaper and less risky than building massive transmission and centralized generation (Swisher and Jannuzzi 1997; D’Sa 2005).

Strong and fair independent regulatory authorities, public participation, and IRP have been three pillars of successful utility practice for decades in developed countries, have saved consumers billions of dollars, and helped minimize social and environmental impacts of power sector infrastructure. But all of these practices and institutions are currently lacking in every country in the Mekong Region. Strong progress in these areas is desperately needed considering the aggressive plans currently underway for the many dubious mega-hydropower and transmission projects discussed in this paper.

Summary

This chapter suggests several hypotheses that warrant further study: (1) Hydropower development is based in part on ideologies of river basin development that were transplanted from the US and Soviet Union during the Cold War era and have largely remained unchallenged. (2) Future plans for hydropower projects in the region are justified in part by uncertain projections of high demand for electricity in Thailand, Vietnam and China. (3) Thai projections are led by utilities that generally have self-interest in, and a track record of, over-estimating demand. Vietnamese and Chinese load forecasting arrangements may face similar governance issues. (4) Hydropower selection occurs outside of cost-based planning (e.g., as part of socio-politically-constructed bilateral or regional “cooperation”; (5) Many hydropower projects in the region are not economically competitive and therefore would not proceed were it not for substantial subsidies – which currently take the form of grants and risk guarantees, soft loans, and political intervention in PPAs; and in the future may well take the form of a subsidized regional transmission grid.

In closing, we consider the question, “how can electricity needs be met fairly and sustainably in the region?”

1. Governments should adopt power sector reforms designed to promote public oversight, rigorous least-cost planning, effective environmental and safety regulation, respect for citizens' rights, and consumer protection. Such a campaign would build on citizens’ ongoing attempts to demand open and honest government, recognition of local rights to resources, environmental, public health and safety regulations, and, respect for citizens' property rights in the development of new electricity and fuel supplies.

2. Governments and/or ratepayers in the region should not subsidize large hydropower by shouldering the cost burden of building a regional transmission grid.

3. Citizens of countries in which hydropower is built must be guaranteed the right to question and oppose new dam construction, and have their concerns addressed in all phases of planning, construction and operation. As long as the governments of Laos, Burma, and China remain strongly authoritarian, this will be a difficult challenge.
4. True least-cost economic planning and realistic demand forecast practices must become common practice among power sector planners. The current planning paradigm considers only large-scale coal, natural gas, and hydropower as options. True least-cost planning means a public planning process and a framework within which the costs and benefits of all options are considered. Thus demand side management and cogeneration or renewable energy would be considered on a level playing field with conventional supply-side resources, and the options selected are those with the lowest overall cost to society. In many cases “least cost planning” is interpreted to include consideration of environmental and social damages caused by electricity supply/transmission, for example by including “environmental adders” in cost-estimation processes. IFIs must to provide detailed, transparent, competent studies of the economics of dam projects and comparisons of least-cost studies of alternatives. IFIs must be held more accountable for inaccuracies and misrepresentations in project appraisals.

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