
Policy Coordination, Planning and Infrastructure Provision: A Case Study of Thailand

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Glossary

ADB	Asian Development Bank
AOT	Airports Authority of Thailand
BMA	Bangkok Metropolitan Administration
BMCL	Bangkok Metro Company Limited
BMR	Bangkok Metropolitan Region
BMTA	Bangkok Metropolitan Transit Authority
BOB	Bureau of Budget
BOO	Build – Own – Operate
BOT	Build – Operate – Transfer
BOT	Bank of Thailand
BTS	Bangkok Transit System
CAT	Communications Authority of Thailand
CGD	Comptroller-General’s Department
DAT	Department of Air Transportation
DOH	Department of Highways
DOLA	Department of Local Affairs
EAPR	East Asia and Pacific Region
EBR	Extended Bangkok Region
ECPF	Energy Conservation Promotion Fund
EGAT	Electricity Generating Authority of Thailand
EIA	Environmental Impact Assessment
EPU	Economic Planning Unit (Malaysia)
ESB	Eastern Seaboard
EUR	Extended Urban Region
FPO	Fiscal Policy Office
FRI	Fiscal Research Institute
FRI	Fiscal Research Institute

GHB	Government Housing Bank
GMS	Greater Mekong Sub-region
GSB	Government Savings Bank
ICR	Implementation Completion Report
IMF	International Monetary Fund
IPO	Initial Public Offering
IPP	Independent Power Producer
JBIC	Japan Bank for International Cooperation
LDFC	Local Development Financial Corporation
MEA	Metropolitan Electricity Authority
MOF	Ministry of Finance
MONRE	Ministry of Natural Resources and Environment
MOT	Ministry of Transport
MRTA	Metropolitan Rapid Transit Authority
MWA	Metropolitan Water Authority
NDRC	National Development Reform Commission (China)
NEB	National Environmental Board
NEPC	National Energy Policy Council
NEPO	National Energy Policy and Planning Office
NESDB	National Economic and Social Development Board
NGO	Non-government Organization
NHA	National Housing Authority
NTC	National Telecommunication Commission
OCMLT	Office of the Commission for the Management of Land Traffic
OEPP	Office of Environmental Policy and Planning (MONRE)
OSE	Office of State Enterprise
OTP	Office of Transport and Traffic Policy and Planning
PAO	Provincial Administrative Organization

PAT	Port Authority of Thailand
PCD	Pollution Control Department
PDA	Population Development Agency
PDMO	Public Debt Management Office
PDP	Power Development Plan
PEA	Provincial Electricity Authority
PMO	Prime Minister's Office
PPP	Public Private Partnerships
PTT	Petroleum Authority of Thailand
PWA	Provincial Water Authority
RID	Royal Irrigation Department
RTG	Royal Thai Government
RUDF	Regional Urban Development Fund
SAC	State Asset Corporation
SET	Stock Exchange of Thailand
SIF	Social Investment Fund
SIP	Social Investment Program
SOE	State Owned Enterprise
SRT	State Railway of Thailand
TAO	Tambon (Sub-district) Administrative Organization
TDRI	Thailand Development Research Institute
TG	Thai Airways
TOT	Telephone Organization of Thailand
TRT	Thai Rak Thai (Current Majority Ruling Political Party)
WMA	Wastewater Management Authority
WTO	World Trade Organization

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1. Introduction

1.1 Context

This study, on infrastructure provision in Thailand, is part of a larger effort to prepare a flagship study on infrastructure service provision in the East Asia and Pacific Region (EAPR). It is a joint effort of the Asian Development Bank (ADB), Japan Bank for International Cooperation (JBIC) and the World Bank. The goal of this larger study is to provide guidance to decision makers – governments, multilateral development banks, donor agencies, the private sector, and other stakeholders on how best to effectively engage in infrastructure service provision and financing. Case studies of individual countries, such as this one, inform the larger study, enabling comparative assessment.

1.2 Objectives

The primary objective of this paper is to assess the effectiveness of the Thai infrastructure policy, planning, and provision system by studying the structure, dynamics, outputs, and results of that system. The focus is on the broader decision-making framework, not the specific content of infrastructure provision; a parallel study by the Thailand Development Research Institute is focusing on the latter. By effectiveness we mean the fit between the outputs of the system and the priority needs of Thai society both in terms of human well-being and economic competitiveness. The emphasis is on the period since 1992. This time horizon was chosen because the transitional Government in power in 1992, under Prime Minister Anan Panyarachun enacted much of the legislation, such as provisions for public-private partnerships and innovative finance,² and much environmental legislation, that remain the foundation of Thailand's infrastructure provision system to the present. An important objective of the paper is to facilitate a discourse that could lead to improved infrastructure delivery performance both in Thailand, and other countries in the region. As noted above (1.1), this paper is part of a larger comparative study – thus an important objective is to contribute what is unique, particularly effective, and shortcomings of the Thai infrastructure provision system to a process based on comparative assessment of infrastructure policy and planning frameworks in East Asia and the Pacific.

² Act on Private Participation in State Undertaking (1992)

2. Thailand's Infrastructure Provision System

2.1 Overview

Thailand's infrastructure provision system is characterized by the following parameters:

(i) Most infrastructure spending in Thailand, approximately 55% is by state enterprises, many established in the 1960s and 1970s.³ (So-called 1970s era state enterprises.) Since 1992 there has been limited privatization (Thai Airways, the Petroleum Authority of Thailand [PTT] and Airports of Thailand have been partially privatized, leading the way), and over the last 2-3 years, corporatization of some state enterprises, such as the Electricity Generating Authority of Thailand (EGAT) with ownership remaining public, at least in the short-run. National line agencies account for less than 20% of infrastructure spending. National agencies (both line agencies and state enterprises) account for a declining proportion of infrastructure spending both as a result of privatization, and decentralization, which has devolved urban-serving infrastructure provision, to a limited but increasing extent, to local governments since 1998.

(ii) Within this framework, there has been enormous variance in performance, both among state enterprises and across the board (including line government agencies). For example, EGAT is regarded as a leader in East Asian electricity generation, transmission, and distribution (including developed countries such as Japan and South Korea) while other state enterprises and line agencies, particularly those operating in the waste water sector, such as the Wastewater Management Authority (WMA), a state enterprise under the purview of the Ministry of Environment and Natural Resources, the Public Works Department, and local governments, have exhibited very poor performance in sustainably delivering waste water services. In fact most waste treatment systems, of the approximately 160 plants that have been built in Thailand, do not function at even 50% of their design capacity. The State Railway of Thailand (SRT) is an other example of an infrastructure agency that performs below what would be expected in a middle income country such as Thailand. Why such variance in performance among agencies operating in the same culture?

(iii) Investment in infrastructure is again on the front page, topping the current Government's development and investment agenda. There are a variety of reasons for this, but the most important is that the Southeast Asian financial crisis of 1997 (which started in Thailand) shocked the system, leading to virtually no new major infrastructure projects being proposed, planned and designed between 1997 and 2003. Accordingly, there are very few major infrastructure projects in the pipeline. Large projects recently opened, or to be opened shortly, such as Bangkok's 21 kilometer subway, operated on a BOT concession basis by the Bangkok Metro Public Company Ltd. (BMCL)⁴ and the

³ The first state enterprises were established in 1933, with the establishment of the constitutional monarchy.

⁴ The BMCL provided tracks, signaling, rolling stock, and operating systems (ticketing, etc.) on a BOT basis. The civil works were developed by a national state enterprise, the Metropolitan Rapid Transit

new international airport (Suvarnabhumi International Airport), to be opened in late 2005 or 2006, were initiated long before the crisis. Secondly, the current Thai Rak Thai (TRT) government initially spent heavily on rural / village development, but now investment priorities are being shifted to large scale infrastructure projects, focusing on urban transportation (particularly mass transit) and environmental improvement (particularly water management). Improving national logistics systems, eliminating slums (which includes the Uaarrthorn low cost housing program), and energy conservation,⁵ are the other national investment priorities. The national government has committed to spending at least 1.2 trillion Baht (\$29.3 billion U.S.) on new large scale infrastructure systems over the next four years, 2005 –2009, nearly half (518 billion baht) for urban rail systems, the latter to be effected by the Metropolitan Rapid Transit Authority (MRTA), a national state enterprise, which was established to deliver Bangkok's first subway.

(iv) The virtual cessation of new major infrastructure projects since 1997 has been reflected in the distribution of government expenditure. In fiscal 1997, capital expenditure accounted for 20% of total expenditure while in fiscal 2003 it had fallen to 20%. Off-budget debt, which can mask real expenditure in many East Asian countries is still low in Thailand, accounting for 2-3% of GDP or 10-17% of the regular budget in fiscal 2002 and 2003. In 2002, virtually none of this off-budget debt was directly for infrastructure, rather being for village funds, SME loans, and home mortgage loans. In 2003 this changed somewhat with the Government's major push toward improving housing conditions for lower income groups. Homes for the Poor programming in 2003 accounted for 37% of off-budget expenditure –it consisted both of direct building of public housing by the National Housing Authority and provision of accessible mortgage funds through the Government Housing Bank.⁶

(v) There is currently large-scale change occurring in the institutional context and process whereby infrastructure is delivered, designed to improve system performance. This change is both formal based on a large-scale reform of the Government structure (Ministries, agencies, and their functions) and the Strategic Plan for Thai Public Sector Development which was approved by the Cabinet in May 2003, and informal. The latter is at least as important as the former. The role of central agencies in the delivery of infrastructure has changed substantially over the last four years the product of direction from the Government and inter-agency competition. Some agencies have gained considerable power and other have lost influence in the infrastructure delivery process. Assessment of these changes constitutes a significant focus of this paper.

Change, both formal and informally driven, involves: (a) relationships between the Government and bureaucracy in areas such as planning and finance, (b) the structure of state enterprises, e.g., accelerated corporatization and privatization, (c) performance

Authority (MRTA) established by the previous Government to develop the first Bangkok subway line, and subsequent lines.

⁵ GDP Elasticity: For every 1 unit of GDP growth, energy consumption increases 1.2 – 1.3

⁶ For a discussion of off-budget financing and data on distribution by program, see: Phongpaichit, P., and C. Baker, Thaksin: *The Business of Politics in Thailand*, Silkworm: Bangkok, 2004, pp 118-121 and Table 4.2

expectations, by the national government, of state enterprises and line agencies – manifest in the introduction of a performance based budgeting system for line agencies and performance contracts for SOEs, and (d) changes in the role of key central government agencies that determine infrastructure priorities within a context set at the Cabinet and Prime Minister’s office level, e.g., the Bureau of the Budget (BOB), the NESDB, and the Fiscal Policy Office (FPO), the Office of State Enterprises (OSE) and the Public Debt Management Office (PDMO) in the Ministry of Finance. Other actors, such as the Comptroller-General’s Department (CGD) are less central to the process but some have played significant roles in terms of innovation. For example, the CGD has introduced an internet-based procurement system that is lowering costs by as much as 30% for some inputs to infrastructure (and other) projects.

2.2 Overall Structure, Actors, and Processes

As has been noted, for the last four decades, state enterprises have dominated delivery of infrastructure in Thailand. There are 58 state enterprises, of which 25 are directly involved in infrastructure delivery, several others provide facilities or services linked to infrastructure, particularly logistics services.⁷ During the Seventh Plan period (1996 – 2001), it was estimated that 58% of infrastructure capital spending was by state enterprises,⁸ a figure that has declined only slightly for the reasons noted above. (Much depends on the calculation used, for example, the MRTA is about to co-ordinate 518 billion baht in mass rapid transit spending but much (approximately) of the finance will be provided by the private sector in the form of supplier credits, investment by the operating concessionaires [BTO], etc.) Although the details are not yet clear, the 191 billion baht component for operating systems (327 billion baht is for operating systems), is particularly attractive in terms of innovative financing mechanisms. In the case of Bangkok the percentage of infrastructure expenditure by state enterprises is even higher, estimated to be 80%.⁹ The Bangkok government (BMA) controls less than 10% of investment infrastructure in the nation’s capital of over 8 million people. (The larger Bangkok Metropolitan Region BMR [BMR], which includes suburban areas contains over 11 million people and the Extended Bangkok Region [EBR] which includes peri-urban areas contains over 17 million people.) The BMA has fixed (mandatory) expenses, primarily employee salaries, which account for 60% of its expenditures leaving 40% for discretionary spending, including capital expenditure on infrastructure. (By Southeast Asian standards, compared with cities such as Manila and Jakarta this is actually a relatively high percentage, but the absolute amount involved is relatively low – 12.4 billion baht (\$302 million U.S.) out of a total budget of 31 billion baht (\$756 million U.S.). A study by Stanford University indicated that during the Seventh National

⁷ For information on Thai state enterprises, see: <http://www.mof.go.th/sepc/sepcSITE.htm>

⁸ Kaothien, U., D. Webster, and V. Vorathanyakit, in Brockman, “Country Report of Thailand” (Chapter 16) in, Brockman, R. A., and A. Williams, *Urban Infrastructure Finance*, Manila: Asian Development Bank, 1996, p 544

⁹ Webster, D., *Financing City Building: The Bangkok Case*, Monograph, The Urban Dynamics of East Asia Series, Asia/Pacific Research Center, Stanford: Stanford University, 2000

Development Plan, investment by just 1 national line agency (public works) and 6 state enterprises accounted for 36.4 billion Baht (\$888 million U.S.) in expenditure in BMA.¹⁰

National line agencies of government have played a lesser role in infrastructure investment in Thailand, although the Department of Highways in the Ministry of Transport and the Royal Irrigation Department (RID) remain key actors. Many city building functions (small scale infrastructure such as bridges) of the Department of Public Works are being mandated to local governments, and most road building functions have been re-assigned to the Ministry of Transport but Public Works remains an important actor. The decentralization process is proceeding slower than expected, and in a different fashion than originally anticipated, discussed below (Section 5). In summary, the overall importance (in terms of spending and influence) of the national line agencies has peaked because of: (i) impending privatizations, (ii) technological change, particularly in the telecommunications sector with the advent of wireless technologies, have essentially led to the demise of certain natural monopolies, (iii) ongoing sector liberalization, e.g., electricity, natural gas pricing, telecommunications, aviation routes / pricing, and (iv) fiscal decentralization.

Before the election of the TRT Government in 2000, Thailand was governed from late 1992 (post the Anand Panyarachun Government) by coalition governments. This meant that different parties controlled different infrastructure Ministries, consequently co-ordination and integration of infrastructure planning and provision was weak at the Government / political (Cabinet) level. The result was twofold: (i) individual ministries made their own deals re infrastructure (e.g., the Hopewell –State Railway of Thailand [SRT] concession to provide suburban passenger rail services to the east and north of core Bangkok along SRT right-of-way) and (ii) the bureaucracy exercised more policy and planning powers than at present, particularly through the NESDB (through its mandate to produce national plans and to approve all infrastructure projects over one billion baht in value [\$24.4 million U.S.]) which to some extent filled the vacuum created in terms of co-ordination by the lack of one political party controlling the government. With the election of the TRT majority government much has changed, the government (the Prime Minister's office and Cabinet) now clearly identifies development thrusts, e.g., the current emphasis on logistics, affordable housing provision, urban mass transit, and small settlement water supply so the process is more top-down and strategic. The bureaucracy is now involved in fleshing out design details, improving efficiency, e.g., through development of more competitive procurement, brainstorming innovative means to procure capital, and project management; and relatively less in identifying major thrusts, cross-sectoral priorities, etc.

Of course, the bureaucracy continues to play a key role. The key current actors appear to be the Policy and Planning Divisions of line ministries (under the 2002 –2003 re-organization of the Government, all Ministries are required to have a Policy and Planning

¹⁰ IBID

Divisions),¹¹ the Bureau of the Budget, and three offices in the Ministry Finance, the Fiscal Policy Office (FPO), the Office of State Enterprises (OSE), because of the key role played by state enterprises in infrastructure provision, and the Public Debt Management Office (PDMO). If debt is involved, particularly foreign (which is currently a last choice in terms of financing infrastructure because of excess domestic liquidity), the PDMO is a key actor. Macro economic parameters, and the budget ceiling, i.e., amount of money available for recurrent and capital spending in a given fiscal year (October 1 to September 30) is determined by the Fiscal Policy Office (in preparing the national budget, FPO starts with annual Revenue estimates from the six key revenue flows which constitute virtually all of the national Government revenues which totaled 1.12 trillion baht in fiscal 2004),¹² which in turn allows the PDMO to set debt ceilings. Direct decision-making power is increasingly centered in the Bureau of Budget and the three Ministry of Finance offices noted above, in part because of NESDB's declining technical capacity, and the fact that NESDB's former flagship function (formulation of overall development strategies) is most in competition with the growth of the Government's power (Cabinet) in the infrastructure planning and provision process.

On the expenditure side, Thailand spends more of its budget and GDP on infrastructure than many other Southeast Asian countries, even taking into account the significant slow down in infrastructure spending in the 1998- 2003 period. NESDB estimates, using a very narrow definition of infrastructure (only new projects and only public spending, not leveraged capital through BOTs, etc.) that Thailand will spend about 3.7% of GDP annually on national government public infrastructure investment during the next five years. World Bank data, using a wider definition, estimates that Thailand spends 8.6% of its GDP on infrastructure, the highest in Southeast Asia; compared with 5.7% in Indonesia, 6.6% in Vietnam, 4.3% in Malaysia, and 1.9% in the Philippines.¹³ Although causality is difficult to establish, there is little doubt that such infrastructure spending has contributed significantly to making Thailand the industrial center of Southeast Asia, especially given the lack of basic infrastructure in formerly competing industrial areas of Southeast Asia such as the CALA area in the Manila peri-urban area. With the shift in the Thai economy's competitive advantage to high level business, professional, and hospitality services (e.g., fashion, advertising, tourism, conventions, international governance, finance, etc.) the Government has had to adjust infrastructure priorities

¹¹ The Ministry of Energy does not have a Policy and Planning Division, but does have a Strategy Division. The Policy and Planning Division role is undertaken by the National Energy Policy and Planning office (NEPO), under the Ministry of Energy's mandate.

¹² The main sources of national government revenue are consumption taxes (VAT) which accounted for 287.3 billion baht in revenue (25%) over the first 11 months of fiscal 2004, excise taxes, e.g., on liquor, tobacco, which accounted for 252.6 billion baht (22%) over the same period, tariff duties (which are declining because of accelerated free trade on a bilateral and multilateral basis) which accounted for 96.3 billion baht (8%), contributions from state enterprises which totaled 133.8 billion baht (12%), this does not include the approximately 50 billion baht state enterprises receive in subsidies annually so the net figure is approximately 84 billion baht, personal income taxes which accounted for 124.5 billion baht (11%), and 252.4 billion baht (22%) in corporate income taxes. (Percentages refer to percentage of categories listed which account for virtually all national Government revenues.)

¹³ World Bank, *World Bank Development Indicators*, Washington: World Bank, 2003

quickly, recognizing that the new driver of economic growth, high level services, locate in core urban areas (mainly Bangkok) and they require dense, high transaction business environments with easy accessibility. Hence, the new focus on urban mass transit rather than the former focus on peri-urban industrial platform infrastructure. Within the peri-urban areas there has been a need to adjust infrastructure priorities as well as the industrial base is increasingly focused on a few dominant clusters such as automotives which demand high quality logistics, etc. Despite ambiguities in the infrastructure planning and provision institutional structure, it is quite impressive the way Thailand is able to re-align infrastructure priorities within relatively short periods of time (approximately five years) to take advantage of rapidly shifting comparative and competitive advantage situations. The 1997 financial crisis and the rise of China as the “factory of the world” required significant adaptation on the part of the Thai economy, with far-reaching implications for what constitutes appropriate infrastructure investment.¹⁴

2.3 Central Agency Roles

The formal structure within which infrastructure projects are assessed, modified, and approved within and among the central agencies is not particularly clear. The decision making structure and process is pluralistic, overlapping, and fluid. The mix of key central agencies most involved in infrastructure decision-making depends, to a considerable degree, on whether a line agency is the executing agent or a state enterprise.

The Infrastructure Delivery Process

Figure 1 describes the normal project approval process for infrastructure projects over 1 billion Baht. As indicated, Ministries frequently bypass the NESDB in the approval process. Thus proposals go directly to Cabinet. The Cabinet will then ask relevant central agencies for comment although often on very short notice. However, if a proposal is from a SOE it is required to be sent to the NESDB for appraisal. If the shortcut route is taken (bypassing NESDB), the advantage is expediency, the disadvantage is that the project is not carefully appraised both in stand-alone terms and vis a vis national infrastructure and development priorities. The Environmental Impact Assessment Process (EIA) in Thailand never results in projects being cancelled and mitigation requirements are usually minor. But the process is further weakened by the fact that often decisions on the EIA, the responsibility of the National Environmental Board (NEB) lag the decision of the Cabinet. In other words, Cabinet approves the project, contingent on the EIA being approved by the NEB. Given this situation, it would be very rare for the NEB to stop or even significantly modify a project already approved by the Cabinet. As indicated by Figure 1, once Cabinet approval has been granted, the line agency or SOE then submits the project to BOB for inclusion in the annual budget. If loan funds are involved, the proposal is submitted to the PDMO for inclusion in the annual debt plan.

¹⁴ For details on rapid changes and adaptive responses in Thailand’s urban-based economic system (which accounts for over 80% of economic growth), see: Webster, D., “The Future of Thai Urbanization: New Drivers, New Outcomes” in Warr, P., *Thailand Beyond the Crisis*, London: Routledge, 2004

Figure 2 indicates a short cut route for project approval that is increasingly being used. Although intended only for projects under 1 billion Baht in value, it is now being used for projects much larger. For example, the Laem Pak Bia Causeway, a major infrastructure project that will involve construction of a causeway across the Gulf of Thailand, cutting driving times to the Western Amenity Region (Hua Hin - Cha-Am) and the South of Thailand by close to one hour, and costing 40 billion Baht (1 billion U.S.) was approved this year (2004) using this procedure. As can be seen, using this procedure, the project goes directly to the Bureau of the Budget, and then to Parliament. Although it would appear that the BOB has very significant powers using this process, in fact, very large projects would only be routed in this manner if the Ministry is sure that the project aligns with the Government's agenda, and enjoys Government (PMO and Cabinet) support.

Figure 1: Project Approval Process – Mega Infrastructure Projects (Over 1 Billion Baht)

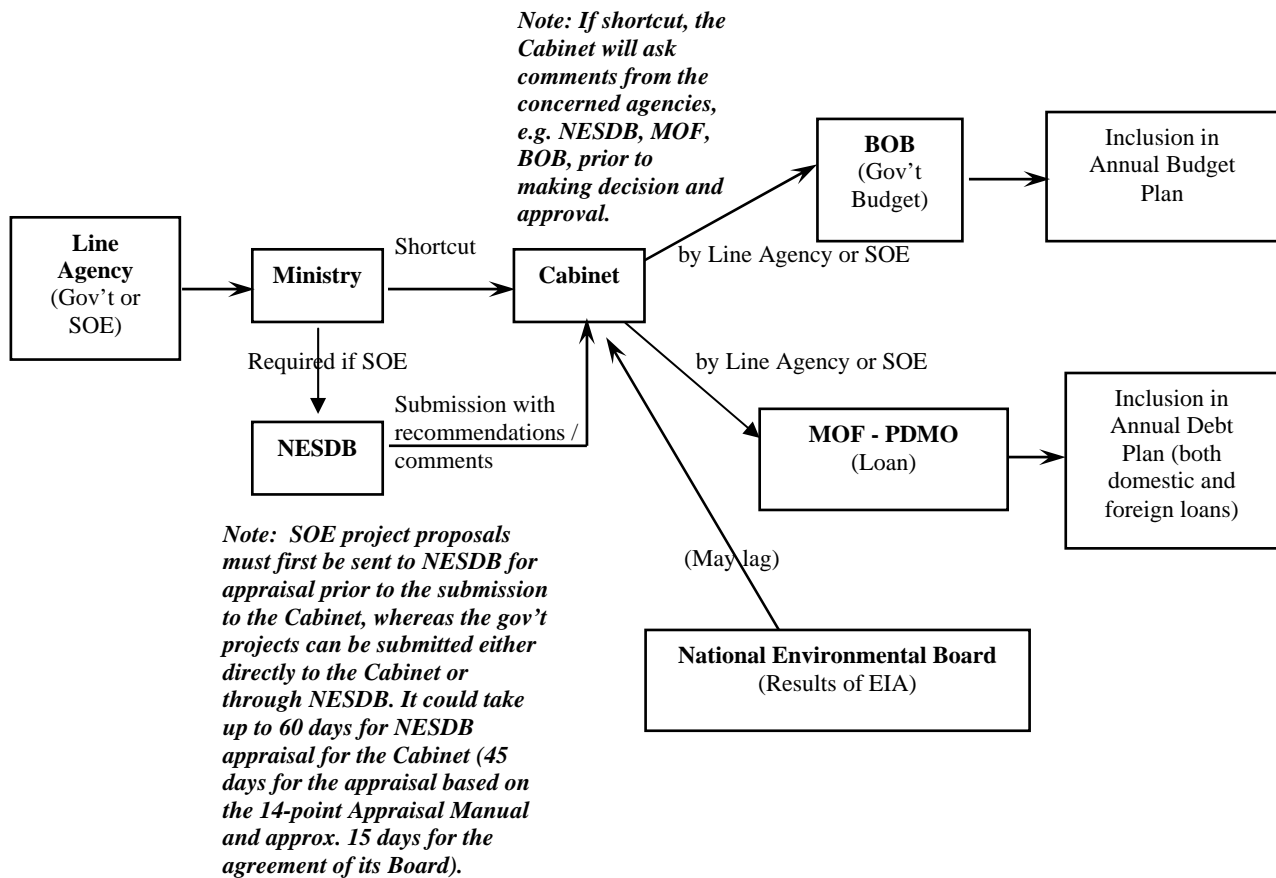


Figure 2: Project Approval Process – 100% Government Budget (Short Cut Process)

Note: Projects submitted using this shortcut channel are normally expected to be less than 1 Billion Baht in Value

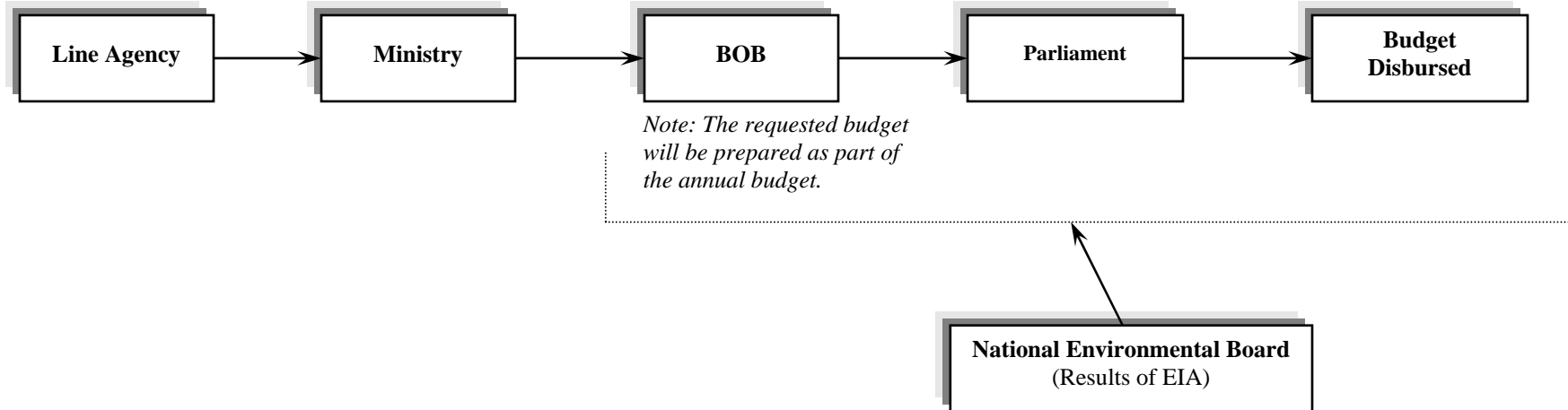


Figure 3 describes the project approval process for joint venture projects, e.g., concessions, BOT ventures, etc. As indicated, new projects must be sent to NESDB for appraisal, whereas expansion, approval of new concessionaires arrangements, etc., are routed through the MOF. Of interest, is the fact that two Committees are formed to sequentially execute the project. The Project Execution Committee, which includes technical experts as well as representatives of central Government agencies oversees the TORs, bidding, awarding of contracts, etc. Once the contract is awarded to a private sector agency (or public-private entity), the Project Monitoring Committee oversees construction and operation of the project.

Figure 3: Project Approval Process – Public Private Partnership (based on the 1992 Act re Private Participation in Joint-Venture Infrastructure Projects)

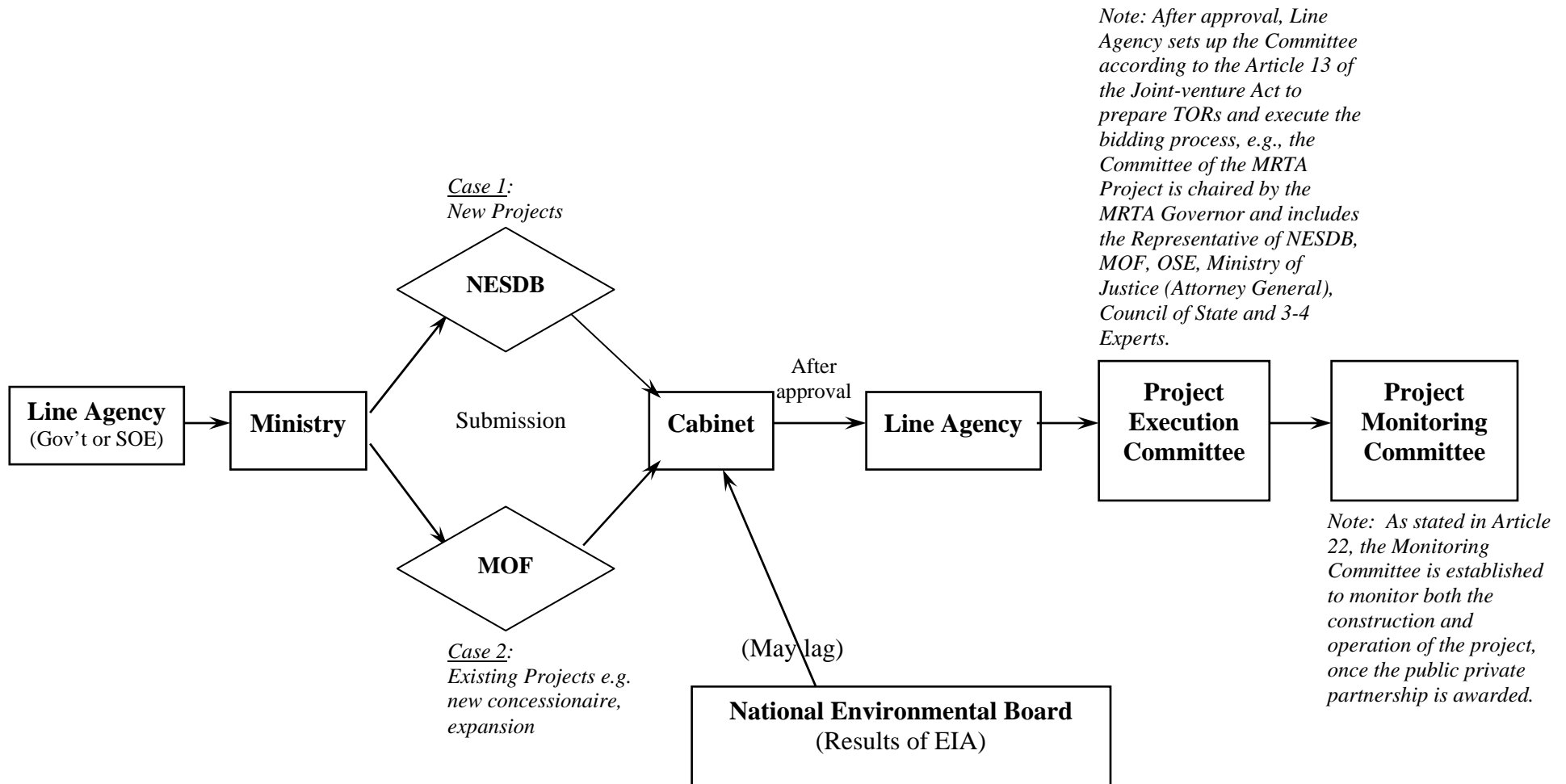
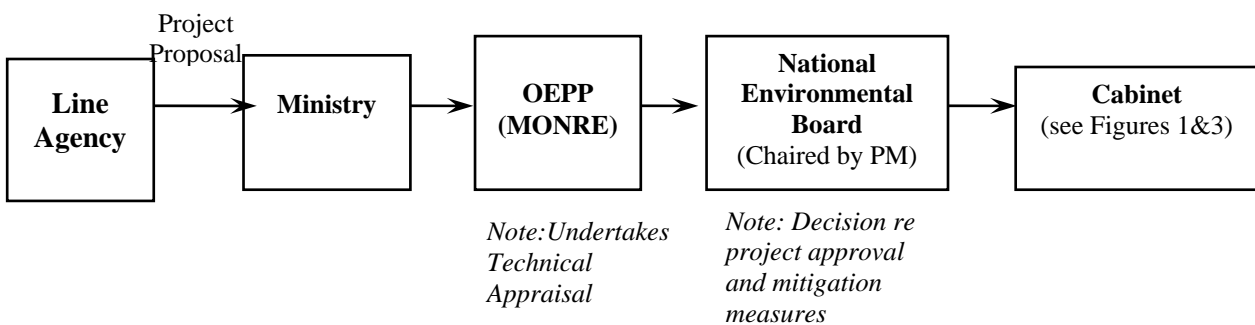


Figure 4 provides more detail on the EIA process. As indicated, the findings and recommendations of the National Environment Board are submitted to the Cabinet.

As noted in the Figure, the technical appraisal work is undertaken by the Office of Environmental Policy and Planning (OEPP) in the Ministry of Natural Resources and Environment (MONRE), based on EIA reports prepared by the project proponent. In effect, OEPP acts as secretariat to the National Environment Board, which is chaired by the Prime Minister. The information is then fed to the Cabinet, but may lag actual approval of the project, contingent on a satisfactory EIA.

Figure 4: EIA Process under Environmental Quality Act (1992)

Note: Only certain projects need EIAs based on Section 46 of the Environmental Quality Act



Bureau of the Budget

Within the central bureaucracy, the Bureau of the Budget plays a critical role. The process is driven from both the top (the Cabinet and Prime Minister's office) and bottom (line agencies and sectoral policy co-ordination and planning agencies such as the Office of Transport and Traffic Policy and Planning - OTP). Strategic top down guidance is input very early in the annual budgeting process when a Budget Meeting is held involving key agencies (FPO, BOB, NESDB, Bank of Thailand [BOT]) which establishes the budget ceiling (based on analysis by the FPO), strategic priorities (from a variety of sources including the Policy and Planning Divisions of key line agencies, NESDB, but currently particularly the Cabinet and the Prime Minister's Office [PMO]). An important feature of the Thai system is the use of workshops and seminars to brain storm new ideas, including infrastructure systems to give strategic thinking some shape. These workshops involve civil society groups, and the private sector as well as representation from all relevant Government agencies. For example, the municipal on-lending program (described in Section 5), the current priority given logistical systems, the routing and systems parameters of the mass rapid rail system, all were discussed at workshops during the early phases of strategizing.

Based on the initial Budget meeting, budget guidelines are circulated to all line agencies. Subsequently, the Bureau of the Budget assesses budget requests (documented on pro forma budget request forms) from line agencies (usually prepared by the line agencies'

Policy and Planning Divisions) that are expected to be consistent with the guidance that has been circulated. Of course, smart Ministries will have readily picked up on strategic priorities of the Government without needing to consult such circulars. Senior officials in the Bureau of the Budget indicated that their modus operandi over the last 4 years has been to accord key nationally defined priority strategies high priority in make decisions, particularly those clearly signaled by the PMO and the Cabinet. (Officials indicated this was much less so previously, when they played a more reactive role as did the Government – reacting to initiatives from line agencies, sectoral policy and planning co-ordination agencies such as OTP, and the NESDB.) For example, a strategic priority is to dramatically improve Thailand's logistics performance – Thailand's logistic costs are at least 15% of GDP compared with less than 9% in the United States. Accordingly, projects related to logistics (ports, air freight facilities, inland container depots, connecting road and rail systems, etc.) would receive priority. (Of course, much of the high cost of logistics in Thailand involves institutional factors such as 3-day long customs clearance on some imported materials, etc. Logistics costs will never fall to 9% of GDP unless these issues are addressed as well as infrastructure such as rail lines, electronic interchange processing of customs documents (including outbound for the United States), etc.) Appendix 1 describes current infrastructural priorities in Thailand based on preliminary identification by NESDB. Within the Bureau of the Budget, the Budget Policy Office and the Budget Strategy Office are particularly attuned to national priorities. Given current operating procedures, the latter Office in the BoB has gained significance. Such strategic prioritization is in addition to the use of normal assessment techniques (e.g., financial and economic rates of return, technical feasibility, learning from past performance in the sector, fit with international best practice, unit cost analysis). At present, infrastructure priorities in Thailand, based on the Bureau of the Budget's reading of the situation are: (i) mass transit in Bangkok (including to the new Suvarnabhumi International Airport), (ii) completion of the new airport and ancillary urban, industrial platform, and logistics infrastructure, (iii) improving the efficiency of the national logistics system (in terms of cost, energy consumption, and travel/movement times) – which has hardware and software components, (iv) energy conservation, reflected in a variety of initiatives related to electricity generation including demand management and pricing, urban form, etc., and (v) water management – including provision of water to small settlements and addressing regional water shortages which are rapidly becoming a critical constraint to growth in many areas of Thailand such as the Nakhon Ratchasima and the Western Amenity Regions, flood prevention, etc.

In the case of certain thematic areas, particularly land transportation and energy, there are intermediate planning / policy co-ordinating agencies that play a key role in sorting projects according to national strategic priorities before submissions arrive at the Cabinet, NESDB, Ministry of Finance, or Bureau of the Budget, depending on the process involved, as discussed above. These umbrella agencies, in particular the OTP and the National Energy Policy and Planning Office (NEPO) act as intermediaries between the line agencies in these thematic areas (sectors broadly defined) and the Central Agencies, importantly including the BOB. They have played a positive role in co-ordinating infrastructure delivery in sectoral areas over the last two decades, e.g., designing

Bangkok's rail transit system, encouraging the shift to natural gas fired electricity generation (currently over 70% of the total), encouraging the IPP process in EGAT, etc.

Once the budget has been worked out by the Bureau of the Budget it is sent as a Budget Bill to parliament where it is scrutinized by the Budget Committee of Parliament, however, normally only fine-tuning occurs. The Bureau of the Budget prides itself on having its ear to the Government's priorities. For example in the 2005 (fiscal year) national budget, changes by the Budget Committee of Parliament involved items totaling only 1.5% of the total budget.

One of the potentially most important initiatives of the Thai Government, coming out of the 1997 financial crisis, has been the commitment to *performance based budgeting*. Based on the experience of the United States, which mandated such an approach under the Government Performance and Results Act of 1993¹⁵ and other governments, the intention is to shift budget monitoring (and future allocations based on past performance) from input indicators to outcomes and results (impacts). Seven Thai agencies have been selected to pilot this transition, but progress to date seems slow, in part because post 1997 civil service re-structuring in Thailand, of which performance based budgeting is a part, has been slower than expected. On the technical side, line agencies have struggled with the difficult technical issue of developing appropriate indicators of output, although considerable progress has been made in certain areas, e.g., watershed management.¹⁶

The Bureau of the Budget also plays a key role in local government finance, a substantial portion of which is used for local infrastructure. This topic, including the role of the Local Government Division of the BOB, is discussed in Section 5 below.

National Economic and Social Development Board (NESDB)

In theory and by law, the NESDB (formally, its Board) is supposed to approve all capital projects over 1 billion baht in value. However, many agencies such as the Department of Highways break projects, e.g., an expressway, into smaller components so that the project submission goes directly to the Bureau of the Budget, avoiding both the NESDB and the Cabinet. Lately, as indicated above, large projects, involving tens of billions of Baht have sometimes not been sent to NESDB, going directly to the BoB (as in Figure 2) or the Cabinet (as in Figure 1). This, of course, has weakened the influence of the NESDB. In cases where projects go directly to Cabinet (Figure 1 shortcut route), the Cabinet frequently allows very little time, sometimes only one day, for NESDB and other relevant

¹⁵ The United States is still in the process of implementing such a system, based on strategic planning. For more information on the United States system of performance based planning and budgeting and its applicability to management of water resources in the Asia and Pacific Regions, see: Webster, D. and T. Le-Hui, *Guidelines on Strategic Planning and Management of Water Resources*, New York and Bangkok: United Nations (ESCAP), 2002

¹⁶ For a description of indicators (headline and priority indicators) designed by the Thai Government and the ADB to measure performance in the water management sector, in support of results based budgeting, see: NESDB/ADB, "Environment and Natural Resources" (Section IV) in, *Implementing the Ninth Five Plan*, Bangkok: Asian Development Bank / NESDB, 2002

agencies to review the project in question. However, NESDB continues to hold significant power in its role as the appraiser and approver of the annual budgets of all state enterprises, and by the fact that all SOE projects have to be appraised by NESDB (as indicated in Figure 1). However, there has been discussion in Government circles that the approval of annual budgets of state enterprises function could be moved to the Office of State Enterprises in the Ministry of Finance.

NESDB has developed five year National Socio-economic Development plans since 1961; during the 1970s and 1980s these plans offered real quantitative and strategic guidance in regard to infrastructure investment (and capital expenditure as a whole), and so provided guidance to both other central agencies (such as the Bureau of the Budget), line agencies (who were expected to prepare five year development plans for each agency), and the Government itself, as well as the private sector, e.g., property developers. However, the last 3 five year national development plans (since 1992), are very soft, limited to qualitative analysis, centered on themes such as human centered development. Although well-meaning, they provided very little substantive meaningful strategic guidance in terms of resource allocations across specific sectors, let alone projects. The current plan (Ninth Plan) was prepared as the TRT Government took power, but the Government had virtually no input into the plan. Accordingly, the Ninth National Development Plan, probably rightly so given genesis, plays virtually no role in guiding infrastructure (and other) investment. In fact, the current strategic priorities of the Government in infrastructure (and most other areas) are radically different than what is proposed in the Ninth Plan. Given this situation, there has been considerable debate within the Thai Government and NESDB concerning whether future five year development plans should be produced at all, but as of late 2004 a decision appears to have been taken to produce a 10th plan. However, unless the Government's agenda is firmly reflected in the content of the 10th plan, and it is based on solid analysis, related to resource allocations, etc., and real strategic content is put forward, it will again serve very little purpose in guiding Thai infrastructure development. In summary, NESDB appears to have lost much of its power in co-ordinating infrastructure investment in Thailand through: (i) its own decline in capacity (basically an inability to attract enough highly talented young economists and planners as it did in the past, as an elite organization), (ii) its institutional culture, and (iii) changes in the broader political economy of Thailand – an external factor not under the direct control of NESDB.

NESDB's formal legal powers remain strong in regard to infrastructure provision – powers that could be resurrected. For example, under Article 12 of the NESDB Act, NESDB has the power to stop projects underway that are not in the public interest, e.g., no longer fiscally affordable. Such powers have been used. For example, during the 1997 financial crisis, the then Prime Minister Chuan asked NESDB to order postponement of 17 mega projects. Given the coalition Government that prevailed at the time, with different political parties controlling different infrastructure ministries, it was necessary for the Prime Minister to take this route.

Fiscal Policy Office (FPO)

The Fiscal Policy Office's main role is to establish the overall macro economic parameters for the economy in conjunction with the Bank of Thailand and the Government in power – as such it establishes the overall ceiling for the budget (based on forecast revenues plus a deficit level determined by the Government) on an annual basis, as well as establishing an overall framework for expenditures. (For Fiscal 2005 the FPO has put forward a balanced budget.) This, in turn has a significant impact on infrastructure spending in that relatively small changes on the margin in terms of budget size tend to affect capital spending significantly because operating and recurrent costs are basically fixed. In short, a large proportion of increases in marginal expenditure go to capital spending, particularly infrastructure.

The FPO is also increasingly involved, but still to a limited extent, in high level policy-making affecting infrastructure, e.g., policies on privatization, national logistics systems, etc. – policy areas that will have a significant impact on Thailand's macro economy both in terms of expenditure and feedback affects on economic growth.¹⁷ For example, the logistics strategy was initiated in a seminar (as noted, workshops and seminars are a frequent means of initiating new projects and programs in Thailand, although less so than in the 1980s and 1990s) hosted by the Minister of Finance, Somkid Jatusripitak. The FPO is an advocate of privatization of a number of state enterprises, arguing economic efficiency would be increased. This reflects the policy of the PMO and the Government itself, despite setbacks in trying to privatize EGAT. Recently, the Prime Minister, Thaksin Shinawatra, unequivocally stated that, "state enterprise privatization will remain a key economic policy for the Thai Rak Thai Party if it returns to lead the next government".¹⁸ (A national election must be held by early 2005.) The Finance Minister, a highly trained economist and strategic thinker, is directly involved in key policy areas.

In the case of very large multi billion dollar (U.S.) mega projects, such as the Suvarnabhumi International Airport, separate national committees are formed, often under the auspices of the Ministry of Finance, to organize financing, overall project content (e.g., deciding winners of bidding processes or design competitions), monitoring implementation progress, etc. For example, in the case of the new international airport, the Prime Minister chairs a committee that includes key actors such as the Ministry of Finance (secretariat to the committee – an important role in terms of the bureaucracy), Thai Airways, the Royal Irrigation Department, the State Railway of Thailand (SRT), the Department of Highways, etc. Obviously those committees chaired by the PM are accorded high implementation priority. As indicated by Figure 3, when private sector actors are involved in the project's operation, this Committee is termed a Project Execution Committee, later a Project Monitoring Committee is established.

¹⁷ In our interviews, officials of the FPO downplayed this role, but other central agencies indicated it was important in catalyzing national development themes. The FPO prides itself on its solid macro-economic work, for which it justifiably enjoys a good reputation.

¹⁸ Quoted in: Bunyananee, S., "Privatisation to Remain a Key Policy: PM says State Entities Need to Turn a Profit", *Bangkok Post*, September 10, 2004, p 1

The Government's intention is to finance the capital costs of most major infrastructure projects over the next five years off budget, by issuing bonds, private offerings, soliciting supplier credit, granting BOT concessions, etc. In particular, the Government's intention is to soak up excess domestic liquidity, making international borrowing a last resort. By pursuing innovative private-public initiatives, tapping domestic savings, etc., formal budget constraints are unlikely to play a major role in constraining infrastructure development over the next five years. As indicated above, current off-budget debt is relatively small, providing space for off-budget strategies. Other constraints are more likely to cause problems, e.g., management capacity to oversee and deliver large-scale projects, etc. For example, the new international airport is likely to open a year behind schedule partially because of such constraints. Although international borrowing will be minimized, given the overall magnitude of expected infrastructure investment over the next five years, it could still be important. In this regard, the FPO plays an important role in setting borrowing ceilings for international loans as a percentage of the GDP, enforced by PDMO.

FPO, with other Ministry of Finance agencies, is a key member of a high profile committee currently studying innovative means to finance the large announced infrastructure program. Detailed technical work for this Committee is being done by the Office of State Enterprises and PDMO, discussed below.

The FPO increasingly appears to be taking over the overall strategic planning role in Thailand. According to Virachai Virameteeku, Vice Minister for the Finance Ministry, "the FPO must develop into an agency able to co-ordinate among the different "economic pillars" of the country in setting macroeconomic policy".¹⁹

Office of State Enterprises (OSE)

As has been indicated, state enterprises are the most important entities delivering infrastructure in Thailand. Their overall role is diminishing slightly in relative terms, but more importantly they are being subject to rapid re-structuring grounded in Government expectations related to profitability, management, customer orientation, national development orientation, etc. Thus it is not surprising that the OSE, located in the Ministry of Finance, is a key actor in terms of infrastructure provision in Thailand.

The NESDB is legally responsible for assessing and approving annual investment plans of the state enterprises, as well as approving new large projects. In effect, NESDB plays the BOB role for state enterprises. (This is a major task, there are 58 state enterprises – their investment plans fill 18 volumes each year. NESDB estimates that it takes a team in its Infrastructure Bureau 4 months per year to analyze these budgets.) On the other hand, the OSE is responsible for overseeing on-going operations of state enterprises. In practice, the division of responsibilities is not so clear, and there are indications that

¹⁹ Chantanusornsiri, W., "Greater Role Urged for FPO", *Bangkok Post*, August 24 2000, p 2

NESDB's powers in regard to approving state enterprise budgets could be transferred to the OSE. At the same time, the Government intends to establish a new body in the MOF for private involvement in infrastructure delivery, including joint ventures with international firms and institutions, consistent with the government's policy to encourage new more effective modes of ownership, management, and operations of key infrastructure institutions. (See Section 6 below.)

The current TRT Government has made it clear that it is no longer business as usual for state enterprises – 19 are loss making, requiring subsidies on an annual basis.²⁰ New guidelines have been issued by the FPO and the OSE indicating that net financial performance should improve by 10%. (That is, those state enterprises making money should increase profits by 10% annually, those losing should reduce losses by 10%). The OSE now requires that all 58 state enterprises enter into an annual performance agreement with them (a quasi contract), and that each state enterprise establish indicators to measure progress toward performance targets outlined in the performance agreement. This does not mean that the Government will no longer subsidize SOEs, that is an obviously impossible objective in the short term, but all subsidies have to be much more thoroughly justified than in the past. In essence, subsidies will disappear in that the Government will purchase services from SOEs to meet social or environmental goals (e.g., perhaps subsidizing rail travel of waste water treatment). Thus subsidies would be eliminated, but the Government could purchase services to realize economic benefits (essentially positive externalities).

The major changes over the last four years have made the 1998 strategic master plan for state enterprises prepared by OSE somewhat out-of-date. It has a sectoral orientation. But since each state enterprise is attached to a Ministry (or the PMO) and all ministries now are required to have Policy and Planning Divisions, there is less need for the OSE to undertake sectoral level planning, although some Ministries are much stronger than others in this regard.

The Government intends to use some state enterprises in an instrumental way to achieve national goals, e.g., the State Railway of Thailand (SRT), the Port Authority of Thailand (PAT), and Thai Airways (TG) have key roles to play in terms of logistics. On the other hand, other state enterprises, e.g., the Provincial Water Authority (PWA) - responsible for water delivery in most settlements outside Bangkok, and the Metropolitan Electricity Authority (MEA) - responsible for electricity delivery in the greater Bangkok region, will be expected to play more routine, but nevertheless critical roles.

An important priority of the OSE is to corporatize SOEs even if they are not immediately slated for privatization. The Corporatization Act of 1999 led to 7 key state enterprises being corporatized, including the Petroleum Authority of Thailand (later privatized), the Telephone Organization of Thailand (TOT), Thai Post, the Airports Authority of

²⁰ For data, see the "Expenditure by Ministries Section, Table 26 (State Enterprises) in the annually published document: Bureau of the Budget, *Thailand's Budget in Brief: Fiscal Year x*, Bangkok: Bureau of the Budget, (Annual Publication)

Thailand (AOT), also later privatized, the Communications Authority of Thailand (CAT), and Thai Airways. An important implication of corporatization is that state enterprises can no longer grant concessions, e.g., for BOT, that power goes back to Government, although the exact implications of this are somewhat unclear. More difficult corporatizations lie ahead. For example, the OSE intends to corporatize the chronic loss-making Bangkok Metropolitan Transit Authority (responsible for public bus operations in the Bangkok Metropolitan Region Bangkok), encouraging them to behave more innovatively. This would include aggressively franchising bus routes, particularly mini bus routes which are the fastest growing form of public bus transportation in Bangkok, as in much of world, both developing and developed. The OSE has spent considerable energy over the last two years on this issue – the initiative grew out of a master plan for the transport sector prepared by the OSE. In doing so, there has been considerable overlap with the activities of the OTP, which has a mandate to make public transportation more effective, and to encourage higher public transit rider-ship in Thailand.

State enterprises often find themselves operating in a somewhat confusing environment. For example, the Electrical Authority of Thailand (EGAT) is under the Ministry of Energy, which has established a strong Strategy Division, but is also subject to guidance from NEPO. The result seems to have been not better regulation of EGAT but territorial disputes between the three concerned bodies.

A major task confronting the Ministry of Finance, and the OSE in particular, is how to finance the 518 billion Baht (about \$13 billion U.S.) investment in mass transit rail systems currently being initiated by the Government. The mass transit package will be co-ordinated by the MRTA, a state enterprise, so the OSE is playing a key oversight role in this regard. State enterprises will also play a dominant role in co-ordinating the other +600 billion Baht component of the new infrastructure package, mainly oriented to water management, but line agencies have more significant roles to play in that regard. It is estimated that total capital investment in new public infrastructure will total 1.2 trillion baht (\$30 billion U.S.) between 2006 and 2009, so finance is a lead issue. It is the financing of such projects rather than their technical dimensions that challenge the OSE (and sister agencies such as the PDMO). OSE does, however, continue to play a technical role, commenting on major projects as requested by Cabinet (as do other key agencies such as the NESDB). For example, OSE recently commented on the Purple subway line to be constructed shortly.

The OSE frequently plays a key role as secretariat to committees in support of strategic initiatives in which state enterprises will play a significant role. For example, at present, it is the key technical actor in the national logistics initiative.

The goal of the Government is to shift the role and perspective of the Ministry of Finance, and OSE in particular, from being a micro manager and policy setter of/for state enterprises, to that of shareholder. In this regard, the Thai Government intends to establish a State Asset Corporation (SAC), a mechanism that has been deployed by Singapore, and others. In fact, Singapore's State Investment Firm, Temasek Holdings,

appears to be the model for the proposed initiative. All state enterprises in which the Government holds more than 50% of equity would be held in this corporation, the OSE would monitor the financial status of corporatized state enterprises (all would be corporatized) in terms of their performance within the SAC. This reform would change the role of line agencies (Ministries) vis a vis SOEs, they would focus on setting sector policy frameworks (increasingly liberalized according to Government policy), not overseeing state enterprise activities and management. In other words, Ministries would be expected to set policy frameworks for the sector, not for individual state enterprises under their purview. State enterprises would not longer be perceived, or utilized, as direct agents of the State, but would act as businesses operating within liberalized sector policy frameworks. They would expect to be paid at commercial rates for all services, including those to other government entities. As indicated above, subsidies would, in effect, become payments in return for the social value of their output (not reflected in market prices). There are accounting implications of such reform beneficial to state enterprises that can legitimately qualify for “subsidies”. Government transfers would show as income to state enterprises (an accounting positive), not as now, loss compensating subsidies (an accounting negative). Achievement of sector liberalization will require that regulatory agencies be created in economic areas where there are significant barriers to entry, monopolies or oligopolies, etc. Activity in this regard is currently underway. For example, an Act to establish an Energy Regulatory Board is currently being designed by NEPO (as Secretariat to the National Energy Policy Council - NEPC)²¹ that will focus on electricity and natural gas pricing, while the membership of the Telecommunications Regulatory Board has just been announced (late 2004). The Energy Regulatory Board Act is expected to be considered by Cabinet in 2005. An interim Energy Regulatory Board consisting of seven members is likely to be in place by the end of 2004 to be replaced by a permanent Energy Regulatory Board when the Act is passed in 2005.

Beyond corporatization, creation of a State Asset Corporation, and redefining the role of the OSE, the Government’s current policy is to privatize as many state enterprises as possible. However, as the case of EGAT indicates, this is proving difficult.

The OSE indicated that it is concerned with the performance of SOEs but that macro economic parameters such as ceilings on subsidies and debt levels are derived from other agencies such as the PDMO, BOB, and FPO, and thus not a central focus of their activities.

Currently, the OSE is involved in improving the framework for public private partnerships (PPP). In this regard they are working closely with NESDB; NESDB recently (August 2004) prepared a report on, *Guidelines for Amending the Act re the Involvement of the Private Sector in Public Investment*.²² This issue is discussed in Section 6 below.

²¹ The NEPC is chaired by a Deputy PM.

²² NESDB, *Guidelines for Amending the Act re the Involvement of the Private Sector in Public Investment* BE 2535, Bangkok: NESDB, August 2004

Public Debt Management Office (PDMO)

The prime responsibility of the PDMO is to enforce external debt ceilings established annually by the FPO, and acting to ensure that external debt is used selectively for the most appropriate uses, e.g., technical skills transfer, access to technology, international loans to state enterprises with foreign income such as Thai Airways, or projects with high foreign content. The PDMO also plays a role in domestic debt approval; domestic bond issues, etc., must be approved by the PDMO. As well as being an approval agency, the PDMO also acts as a resource within the Thai public sector, e.g., advising and assisting state enterprises and government agencies on debt financing mechanisms most appropriate to their requirements. The over-riding objective of PDMO is to ensure Thailand's fiscal sustainability, thus debt is not to be taken on lightly. Over the last several decades Thailand has established a reputation for being conservative in terms of public sector debt (the 1997 financial crisis was precipitated by private debt, not public debt), erring on the side of caution rather than risk. For example, in past borrowing from multilateral development banks, the full value of loans was often not utilized, e.g., the World Bank financed Regional Cities Program in the 1980s, and the Social Investment Program (SIP) post 1997 financial crisis response program. A similar hard line is taken with many domestic agencies, even those wishing to issue domestic debt instruments. For example, the Bangkok Metropolitan Administration has wanted to issue bonds (international and domestic) for many years (at least eight) but the Ministry of Finance, through PDMO, has discouraged such borrowing (and refused to guarantee such debt) on the grounds that debt should be used for specific projects in a high capacity institutional and technical environment, not as ongoing deficit financing at the sub-sovereign level. (In many developed countries, entities such as New York city, prefer to borrow on a programmatic rather than project basis to enable them to have more flexibility in meeting goals in the most cost effective manner, e.g., undertaking aggressive demand management rather than building another reservoir in their water supply programming.) However, the recently elected new Governor of the BMA, Apirak Kosayodhin, has indicated that he will issue such debt, discussed below in Section 6.

Within the PDMO there is dedicated group that works on mega projects, e.g., the new international airport to Bangkok rail link. Increasingly the work of the PDMO, as in the case of the airport – city rail link involves public-private initiatives, consistent with the Government's policies. Where possible, international borrowing should be by the private company (supplier or concessionaire credit), with the Thai component (often civil works) being from domestic funds.

Thailand is currently experiencing excess liquidity in its banking system, this condition is likely to continue for at least three years. As such, the PDMO, with other offices in the Ministry of Finance, is working to identify and initiate mechanisms, such as revenue bonds, to attract this excess capital. Given this situation, there needs to be compelling reasons to tap international debt markets. Increasingly, state enterprises are tapping domestic funds, e.g., EGAT. (EGAT raised 4.8 billion Baht (\$120 million U.S.) in bonds in August 2004 at a bond coupon rate 40 basis points above that of Thai Government

treasury bonds. It plans to borrow 144 to 154 billion Baht (\$3.6 to 3.9 billion U.S.) in domestic funds, through bond issuance over the next five years.) Given the excess liquidity, there is little danger of a “crowding out” effect according to the PDMO, that is, little risk of state enterprises and public sector borrowing diverting domestic capital from the private sector, even though the manufacturing sector is operating at about 75% of capacity, significantly up from 59.3% in 2002 and 66.3% in 2003.²³

Each year the National Debt Committee in the Ministry of Finance establishes a limit on new external debt to ensure fiscal sustainability. This year (Fiscal 2005) the new debt limit is 1 billion U.S., in 2004 it was \$900 million U.S. But given current conditions, borrowing is normally considerably below debt ceiling levels, the only major loan in 2004 was from JBIC for the new airport.²⁴

A limit on domestic debt exists, but because it is so high (10% of total budget expenditure in a fiscal year) it is of no practical importance. Thailand may want to consider this issue more carefully – especially if the excess liquidity situation ceases to prevail.

The national Government (Ministry of Finance) does not guarantee loans lightly, although they do for critical strategic infrastructure such as the new airport. Similarly, debt of the Expressway Authority of Thailand, a relatively successful state enterprise, has historically been guaranteed, because of the strategic importance of the expressway system. However, increasingly the debt of most state enterprises will not be guaranteed based on the corporatization principles described above. This has raised concern in some SOEs such as EGAT who argue that they are extremely credit-worthy (true) but a guarantee would still lower the rate of borrowing, benefiting electricity consumers and thus the Thai economy. Critics argue that guaranteeing EGAT’s debt would discourage them from becoming more efficient.

An important role of PDMO is that it monitors projects that have taken on foreign debt to ensure that such moneys have been spent as intended, and effectively. In this sense, infrastructure projects involving foreign debt are monitored much more closely by the Thai Government, often a plus in terms of their performance, or in deriving learning lessons for similar future projects. Often such monitoring is done in conjunction with the foreign lender involved, particularly if it is a multi-lateral bank such as the World Bank or ADB, or a large multi-lateral lender, such as JBIC, is involved.

On the other hand, state enterprises that borrow domestically are not held to such stringent monitoring requirements – they are essentially outside the purview of PDMO once they receive approval to borrow. Since domestic borrowing by state enterprises now averages 10,000 million Baht per month (about \$250million U.S.), there are concerns whether such funds are being used effectively. Domestic borrowing is through bonds,

²³ World Bank, *Thailand Economic Monitor*, Bangkok: World Bank, April 2004, Table 6 (Capacity Utilization, p 19,

²⁴ In Fiscal 2005 the situation could be different because Thai Airways has asked for approval to buy several new aircraft. This purchase alone would exceed the debt ceiling.

private placements, etc., by state enterprises. Twelve Thai state enterprises issue bonds including PWA, the Metropolitan Water Authority (MWA), EGAT, MEA, BMTA. Thai domestic banks like to buy such bonds because of excess liquidity, the high risk involved in lending to local business (NPL rates remain high, including recently issued loans to Thai businesses), and the explicit or assumed Government guarantees implied; in some cases Thai banks retail such bonds creating secondary markets. Given the monthly volume of issues described above, the volume of infrastructure bonds in circulation is large. In the case of the poor performing BMTA (bus fares in Bangkok are far below cost recovery - between 4 and 10 baht per ride [10 to 25 cents U.S.]), the Government has had to forgive BMTA's domestic debt, indicating that risk is inherent in the lending of poor performing SOEs. The PDMO does track all state enterprise borrowing to ensure that the FPO is aware of the macro economic implications - all state enterprise borrowing constitutes public debt. In addition, the Auditor-General monitors off-budget debt. With privatization of state enterprises, even implicit guarantees for debt financing of infrastructure will no longer exist. Additional state enterprises continue to enter the bond market, for example, the National Housing Authority (NHA) and the Government Housing Bank (GSB) are now issuing bonds - driven by the Government's strategic intent to eliminate slums in Thailand over the next five years. In the case of these housing agencies, this is their first exposure to such large scale borrowing using debt instruments.

Overall, government debt in Thailand is low, total foreign debt is 44% of GDP, domestic public sector debt is virtually identical as a percentage of GDP (45% in 2003, down from 54% in 2002).²⁵ Thus there is room for more borrowing, which in the near future is likely to be domestic - the fastest growing areas for debt financing are almost certainly to be housing, mass transit, and electricity generation.

However, this does not mean that ambitious infrastructure programming to be undertaken in Thailand is not without *macro economic risks*. The Fiscal Research Institute (FRI) points out that the main concern is related to current account deficits. The FRI forecasts that Thailand will run a 3% of GDP current account deficit beginning in fiscal 2006, mainly driven by the proposed infrastructure program, assuming constant domestic savings rates (currently 30% of GDP). (FDI assumes 52% of financing will be from domestic and foreign borrowing, 32% from the normal budget, 1% from equity raised on the Stock Exchange of Thailand (SET), the remainder from the profits of SOEs.) The potential current account deficit is driven by the fact that much of the equipment for the infrastructure systems (e.g., rolling stock) will need to be imported - thus even if the funds are raised locally, they will flow out of the country. As noted, the Government intends to try to minimize such leakages by encouraging manufacturers of rolling stock, etc., to do some of their production in Thailand, but there are limits to such possibilities. Thus the potential current account deficit would be driven both by need to import capital as well as physical goods. Since a wide gap in the current account deficit was one of the factors that triggered the financial crisis in 1997, both the International Monetary Fund

²⁵ Latest public debt figure available is for December 2003: Data source: World Bank, *Thailand Economic Monitor*, Bangkok: World Bank, April 2004, Appendix 1

(IMF) and Moody's Investors Services, the U.S. based rating agency, have been monitoring the situation.²⁶

3. The Evolution of Thailand's Infrastructure Provision System

3.1 Changing Infrastructure Priorities

Over the years, the importance accorded to infrastructure has changed dramatically in Thailand's public policy priorities and public resource allocation, particularly if viewed from a sectoral perspective. But it is not a trend, rather the profile of infrastructure in Thailand's overall development strategy / policies and budget rises and falls as a result of politics, reactions to over or under-investment in preceding time periods (the cobweb effect), the competitive environment Thailand faces (regionally, globally), etc.

During the 1961 – 1971 period (National Socio-economic Development Plans 1 and 2), the priority was to build a national infrastructure framework to support the country's industrial takeoff. Particular emphasis was placed on transportation and communications infrastructure (which accounted for 65.5% of the development budget in the Second National Development Plan), but energy was also important (14.8%). During National Socio-economic Development plans three and four (1972 – 1981), the emphasis on infrastructure was lessened, especially in the energy sector. This coincided with an emphasis on agriculture during the fourth plan period. Transport also showed a decline in relative importance, but much less so than in energy which attracted very little investment during the 1976 to 1981 period. In fact, energy investment was only 2.1% of the development budget in the fourth planning period. National Socio-economic Development plans 5 and 6 coincided with the takeoff of the export-manufacturing sector, known as the "Golden Age of Manufacturing" in Thailand – a period that lasted from 1984 to 1997. During this period, energy was needed to power factories and cities, and so energy expenditures dominated development budgets, accounting for 46.8% of the development budget in the Fifth plan period and 44% in the Sixth plan period. The relative role of transport investment declined, in part because a basic road system was already in place – although the Bangkok extended urban region quickly became congested leading to the current upswing in mass transit expenditure and heavy investment in urban expressway construction during the 1990s. The National Socio-economic development plans covering the 1992-2001 period (Seven and Eight) were very general in nature, and emphasized human development and sustainability. The unforeseen fiscal crisis of 1997 resulted in the dramatic cutting of capital expenditure, making the eighth plans forecasts and investment guidelines of little practical use.²⁷ However, during the Eighth Plan period there was a dramatic increase in transport investment (particularly expressways), related to facilitating the movement of goods throughout the country – the

²⁶ For more information, see: Chaitron, W., "Deficit Could Hit 3% of GDP in Four Years: Investment in Mega-Projects and Low Domestic Savings May Spell Trouble", Bangkok: *Nation*, November 5 2004, p 5

²⁷ For a comparison of Eighth Plan key forecasts versus actual Eighth Plan socio-economic performance, see: NESDB/ADB, *Implementing the Ninth Plan*, Bangkok: NESDB / ADB, 2002, Table 2.1 (Forecast Accuracy: Eighth Plan Period, p 17

road system had become congested during the 1984 –1997 export manufacturing oriented development period.

In sum, over a 30 year period (1961-1991), infrastructure played a dominant role in terms of public investment but its importance varied according to external circumstances, national priorities, and demand, and overall developmental styles. Investment in transport was highly volatile, often doubling or halving between five year planning periods, but investment in energy (primarily electricity generation capacity) was even more volatile with swings of up to eight times in level of investment between five year planning periods - swings of 2-3 times in the level of investment between planning periods were not unusual. In other words, investment in infrastructure in Thailand at the sectoral level in particular can best be described as erratic, characterized by wide swings. This should not necessarily be viewed as negative – it may be an indication of the ability of the public sector to drastically change investment priorities in responses to changing circumstances. However, in the case of the transport sector, there is clear evidence that much investment has come too late, with economic costs. For example, rail rapid transit systems and expressways can dramatically shape extended urban regions if constructed early in the city building process, but in Thailand they have usually lagged behind demand, often by a decade or more. (This has changed over the last ten years in terms of expressway construction that is now running ahead of demand, significantly influencing urban form in Bangkok’s outer suburban and peri-urban areas.) On the other hand, Thailand has not experienced electricity shortages over the last three decades, unlike many other East Asian countries, indicating cut-backs in investment at different times in electricity generation and distribution investment were consistent with putting supply and demand into balance, allowing for prudent reserves. (See discussion on EGAT below.)

Table 1 describes actual and planned infrastructure investment by key state enterprises from 2002 to 2006 (fiscal years). The estimates for 2005 and 2006 (especially 2006 given lags to start up) are likely under-estimates given the recent announcement that infrastructure investment will be significantly geared up in Thailand. Again, the significant changes in developmental priorities are reflected in infrastructure expenditure. The increase in land transportation from 12.3 billion Baht (2005) to 70.2 billion Baht (2006) reflects a clear priority to improve the efficiency of the extended Bangkok region, and improve national logistics efficiency. Equally dramatic is the increase in housing funding (mainly through mortgage and developer finance to make housing available and affordable to lower income groups) from 1.3 billion Baht in 2003 to 50.2 billion Baht in 2005 and 56.7 billion Baht in 2006, reflecting the Government’s strategic commitment to elimination of slums.

Table 1: Infrastructure Investment by State Enterprises (Million Baht)

	2002 (actual)	2003 (actual)	2004 (prelim.)	2005 (est.)	2006 (est.)	Plan No. 9 (total)	%
Energy	35,109	30,490	38,524	42,727	84,678	231,528	24.7
Transportation	44,267	52,332	85,622	105,090	98,005	385,316	41.1
Land	26,544	17,695	7,987	12,343	70,184	134,754	
Air	16,111	34,315	77,151	91,141	26,910	245,627	
Water	1,612	321	484	1,607	910	4,934	
Communications	23,359	23,033	32,782	31,160	32,026	142,360	15.2
Public Utilities	11,365	11,534	24,983	60,900	68,806	177,588	19.0
Housing	1,816	1,275	14,391	50,194	56,652	124,328	
Water (supply & treat.)	9,549	10,259	10,592	10,706	12,153	53,259	
Total	114,100	117,389	181,912	239,877	283,514	936,792	100.0

Source: TDRI, 2004

3.2 Stakeholder Involvement in Infrastructure Provision

The 1997 constitution changed the style of infrastructure delivery in Thailand in two ways: (i) it required, more civil society participation in infrastructure planning, and (ii) it mandated administrative and fiscal decentralization in infrastructure delivery.

The 1997 Constitution requires public hearings for all major projects. The RTG / World Bank RUDF (Regional Urban Development Fund) and SIF (Social Investment Fund) programs initiated in the wake of the 1997 financial crisis did much to realize civil society participation in project review at the local government level.²⁸ Civic forums at which the merits and expected impacts of proposed projects are discussed before a decision is made to proceed have become the norm in terms of infrastructure delivery by urban governments in Thailand. However, nationally initiated large projects in the energy and natural resources sector, e.g., pipelines, ports, dams have shown less progress in terms of stakeholder participation. Since 1992, Environmental Impact Assessments (EIAs), undertaken by project proponents for the National Environmental Board (NEB), have been required for most large projects and projects to be located in sensitive habitats, e.g., forest reserves. The Government regarded the EIA process as an important means to take the local public interest into account in project design. In fact, EIAs in Thailand were (and largely remain) private documents not readily available to the public, which provided a pseudo-scientific rationale to proceed with projects, without real public involvement. For example, the EIA for the new international airport was less than five pages long, and not made public despite the fact that the population in the airport environs will be at least 600,000 by 2020. Thai authorities either did not understand the concept of EIAs, the methodology was developed in the United States and Canada based

²⁸ For details regarding the performance of the RUDF and SIF, including in terms of civil society involvement, see: Adam, S. D. Webster, M. Hahn, *Implementation Completion Report: Social Investment Program Thailand*, Washington: World Bank, 2004

on economies with large point sources of pollution, low population densities, etc. Furthermore, North American societies are comfortable with public conflict and negotiation as means to improve project design. It is accordingly not surprising that the EIA process has failed to serve Thailand well as is the case in most of developing East Asia.²⁹ It appears that Thai authorities do not recognize that a major function of EIAs (we would argue the major function) are to act as catalysts to generate discourse concerning the merits of proposed projects and set off negotiations among affected parties, and that their role as a “scientific” statement of impacts is probably less important, particularly if deployed in a static decision-making environment. In sum, EIAs have been used in Thailand as a means to “expedite” projects, particularly large-scale infrastructure projects.

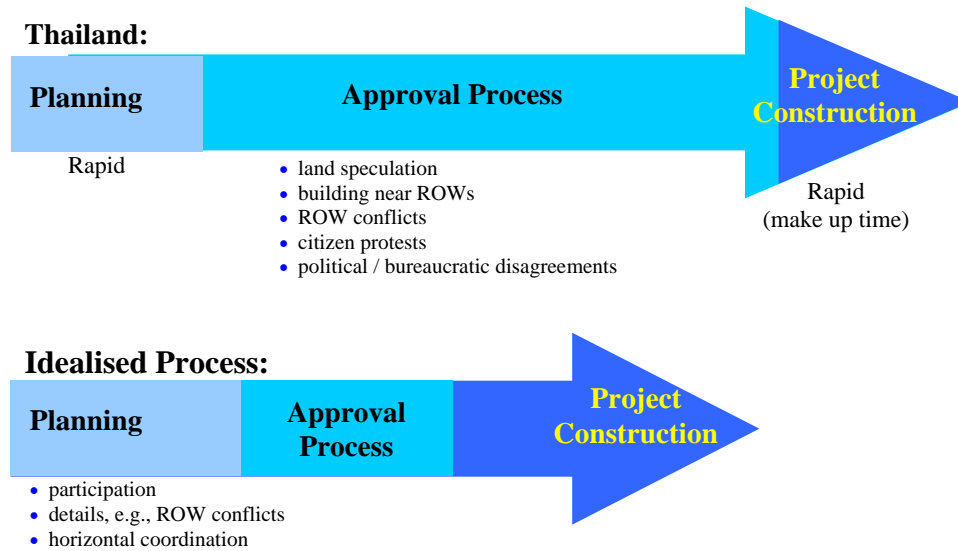
But even in terms of large natural resource projects, the situation seems to be changing. For example, EGAT is changing their public involvement policies. Although EGAT has an excellent technical reputation for delivering energy to meet demand, relatively cleanly, it is perceived to have significant weaknesses in regard to meaningful participation in project implementation, taking a “we know best”, technical “engineering” perspective in dealing with stakeholder groups and potential impactees. EGAT has hired the most respected NGO in Thailand (the Population Development Agency [PDA] led by Senator Meechai – famous for its successful birth control, AIDs prevention, and rural development programs) to establish more meaningful collaborative frameworks to discuss proposed projects with local public groups in areas where EGAT wishes to develop major projects. PDA is currently working with EGAT, starting at Ratchaburi (a large gas fired plant) and Maemaw (emissions from lignite).

The NESDB has produced a manual, *Guidelines for Management of Macro Infrastructure Projects*,³⁰ on how infrastructure implementation could be made more efficient. (The document is unofficially known as the “green” book). It stresses the importance of up-front meaningful involvement of stakeholders to avoid later delays, the importance of physically integrating infrastructure systems (a problem with the current mass transit system being developed in Bangkok), and importantly, the importance of follow-up monitoring (both during construction and operational stages). Figure 5 indicates efficiencies that could be achieved through a more efficient infrastructure delivery process. To date, the recommendations in the “green book” have not been approved by the Cabinet, although it has reviewed the document.

²⁹ The Japanese use a totally different system based on community based voluntary agreements, etc.

³⁰ NESDB, *Guidelines for Management of Macro Infrastructure Projects*, Bangkok: NESDB, June 2003 (in Thai language)

Figure 5: Infrastructure Delivery Process



In summary, outside of local urban government, most infrastructure decisions affecting local communities are still made behind closed doors. However, there appears to be some movement toward collaborative planning processes (the ideal) that would involve key representatives of stakeholder groups engaging in negotiations spurred by an early (not too detailed – with room for change) project proposal (and perhaps accompanying EIAs if that process can be reformed) to create win-win situations.³¹ In part, this trend is the result of significant changes in Thai society, associated with the rise of the middle class, urbanization, etc. But it is also the result of the high economic and financial costs of not involving key stakeholders early in project design, location, impact mitigation, etc., that is driving change. In other words, project proponents are beginning to see that changing the infrastructure provision process, including earlier collaborative public involvement could be in their own interests. It has become very difficult to impossible to build a dam, coal burning power plant, pipeline, solid waste treatment facility, etc., in Thailand – the societal costs are such that the need for change in the process is becoming obvious. Last, but probably least important, the 1997 constitution mandates such reform. Interestingly, advocates of privatization argue that privatization would improve public collaboration in infrastructure project delivery, arguing that private firms would be more sensitive to the financial costs of delays (including falls in their share prices) than state enterprises or government line agencies.

The second major change emanating from the 1997 constitution, decentralization, is discussed in detail below, Section 5.

³¹ For an overview of collaborative planning and project design processes as successfully used in many jurisdictions such as California, see: Booher, D., and Innis, J., “Metropolitan Development as a Complex System: A New Approach to Sustainability”, *Economic Development Quarterly*, 13 (2): pp141-156

3.3 Spatial Programming of Infrastructure Provision

Since the 1970s, an important aspect of Thai infrastructure programming has been the inclusion of the spatial dimension, much more explicitly so than in most East Asian countries. Although taking the spatial dimension into account in economic development programming and associated infrastructure provision may seem obvious, creation of specific development zones is a distinguishing feature of Thai infrastructure delivery, in many ways echoed by China in its development of special economic zones in coastal areas starting in the 1980s. The most important of these zones is the Eastern Seaboard (ESB) area composed of Chonburi, Chachoengsao, and Rayong Provinces, a peri-urban export oriented manufacturing area, home to three million people, many migrants from Northeast Thailand, which is the major industrial production zone in all of Southeast Asia, the leading automotive cluster in Southeast Asia, and one of the most important in all of East Asia.³² The Eastern Seaboard was driven by public policy, its development coordinated by the Spatial Bureau of the NESDB, it would not have happened without state leadership. Over 65% of public investment in the ESB was for infrastructure, delivered mainly by state enterprises, guided by careful planning by NESDB's Spatial Development Bureau. JBIC played a major role in funding the ESB infrastructure; JBCI has lent more money for infrastructure in the Bangkok Extended Urban Region (EUR) than any other EUR in the world. The fact that NESDB is responsible for state enterprise investment programming / budgets, as described previously, made this task easier. Many other areas in Thailand have received significant infrastructure investment because of priority accorded through the spatial planning process, e.g., the Western Amenity area; as noted, a causeway has been approved to significantly reduce travel time between Bangkok and Hua Hin - Cha-Am, a prime amenity area known for tourism, spas, retirees, boutique agriculture and post-secondary education. This spatial programming also extends to cross-border infrastructure provision. Thailand is very active working with the ADB, particularly through NESDB, on its Greater Mekong Sub-region (GMS) development concept. In particular, this co-operation has resulted in development of cross-border linkages, including bridges across the Mekong river, such as the Friendship bridge linking Nong Khai and Vientiane (funded through Australian development assistance). However, perhaps unfortunately, explicit spatial programming of infrastructure is becoming less important in Thailand. In part, this is due to decentralization which makes it harder to shape the spatial economy and settlement systems to meet strategic goals (different places will develop differentially through market forces, their factor endowments, amenity, leadership and management, preferences, etc.), but more importantly because globalization, with its increased competitiveness, has led to the Government acknowledging that market forces will shape the spatial distribution of activities more directly. As is the case throughout the world, in open economies functioning in a highly globally economy, nation states are very carefully about "distorting" their spatial economies away from the most efficient pattern.

³² For an overview of the Eastern Seaboard, see: Webster, D., *On the Edge: Shaping the Future of Peri-Urban East Asia*, Stanford: Stanford University, (Monograph, The Asia Pacific Research Center), 2002. Available on the internet at <http://APARC.stanford.edu>.

The exception is cross-border linkages to China, which the Thai Government has accorded priority in terms of infrastructure investment (roads, rail, port facilities on the Mekong river) given the existing and expected economic importance of linkages between Thailand and Southwest China, which is part of the GMS.

3.4 Sector Liberalization

Over the last five years another major trend has been sector liberalization. Generally, more competitive environments are being created within infrastructure sectors. For example, local water supply (local governments compete with PWA), electricity generation (through IPPs), domestic airlines (initiating a boom in low cost, no-frills airlines), and mobile and fixed line telecommunications, to a limited extent, have been opened to competition. At the same time, measures are being taken to make regulatory structures more clear. For example, telecommunications and energy regulatory committees are currently being set up. The National Telecom Commission (NTC), first proposed in 2001, has just been established (August 2004). Its mandate is to oversee deregulation of the telecom market, which according to the *Nation* newspaper “has been “saturated with vested business and political interests”.³³ The medium range objective of the NTC is to prepare the industry for market liberalization by 2006, in line with Thailand’s World Trade Organization (WTO) commitment. In many cases in the past regulatory agencies were either in conflict of interest as both regulator and deliverer of services, e.g., the Communications Authority of Thailand, or in conflict of interest as both government line agency and regulator, e.g., NEPO. Sector liberalization raised the question of fiscal risk for the government because most infrastructure delivery is by state enterprises that the government owns. However, the position of the FPO and the BoB is that sector liberalization will force state enterprises to become more efficient, especially given the new performance expectations under which they operate, described above, making government assets more valuable. So far, that appears to be the case. For example, the shares of PTT have gone up enormously (from 35 to 150 Baht) since it was privatized within a more liberalized sector environment.³⁴

4. The View from the Agency / Enterprise Level

This paper is about coordination of infrastructure provision. Since, virtually by definition, co-ordination is better within agencies than across agencies, re-structuring of government can pay high returns if closely related functions are housed in one Ministry. The 2002 - 2003 re-structuring of Thai ministries and agencies did much to improve infrastructure co-ordination. For example, the grouping of environment, natural resources, and water management under one ministry (Ministry of Natural Resources and Environment) led to much better co-ordination of natural resources planning; similarly, the grouping town and country planning and public works was beneficial in terms of co-ordinating city building, as was putting all road building functions under the Ministry of Transport. The

³³ The Nation, “Telecom Commission: Senate Selects its Magnificent Seven”, *The Nation*, August 25, 2004, p B-1

³⁴ Crispin, S., “Bangkok Gusher”, *Far Eastern Economic Review*, September 16, 2004, pp 59-61.

requirement that all ministries had to form a Policy and Planning Division leveraged benefits further.

As has been noted, performance varies widely among agencies. For example, the Waste Water Management Authority (established in 1992) under the Ministry of Environment and Natural Resources has been unable to deliver waste water facilities in a sustainable manner (in Fiscal 2003 it required a subsidy of 170 million Baht), the State Railway of Thailand has required large subsidies for decades. On the other hand, agencies such as EGAT have performed well when assessed from a sustainability perspective. (More detail on a variety of infrastructure provision institutions, including the Department of Highways, Expressway Authority of Thailand, and the Wastewater Management Authority can be found in Kaothien, Webster, and Vorathanyakit.³⁵) Below, EGAT is briefly analyzed as a case study of a state enterprise to illustrate some of the learning from its long history as the major (and formerly monopoly) generator and wholesale distributor of electricity in Thailand. Following, the Air Transport Department is analyzed as a case study of a line government agency involved in infrastructure provision.

Case Study: Electricity Generating Authority of Thailand

EGAT operates quite autonomously, in fact some of its critics would argue that it has partially captured its overseers, the NEPO and the Ministry of Energy (particularly its Strategy Division), through its technical success, professionalism, and corporate stability.

EGAT is required to take guidance from the NEPO in terms of strategic technical matters, e.g., mix of energy sources utilized in generating electricity, while the Ministry of Energy also exercises oversight. In reality, there appears to be a constant discourse among the three actors. NEPO has been a de facto regulator (the *Far Eastern Economic Review* terms it a quasi regulatory agency),³⁶ EGAT's pricing structures have to be approved by NEPO. When an Energy Regulatory Agency is established in the near future, it will exercise powers in regard to consumer pricing, percentage of power that EGAT can generate, etc., taking over these functions from NEPO. NEPO will focus more on technical matters, planning, sectoral co-ordination, establishment of sectoral policy frameworks, and understanding and acting on cross-sectoral linkages that affect energy efficiency.

However, the forces that have been driving change in EGAT have come more from the top and the bottom. From the top, the Cabinet, through the OSE, had slated EGAT for privatization in early 2004. From the bottom, various elements in civil society have sometimes significantly constrained or slowed EGAT's ability to invest in new facilities. The privatization attempt by the Government, supported by the FPO, has been put on hold after strong well-organized protests by the EGAT employees union (technically,

³⁵ Kaothien, U., D. Webster and V. Vorathanyakit, Country Report of Thailand (Chapter 16) in, Brockman, R. and Williams, A., *Urban Infrastructure Finance*, Manila: Asian Development Bank, 1996

³⁶ Crispin, S., "Bangkok Gusher", *Far Eastern Economic Review*, September 16, 2004, p 59

unions in state enterprises are illegal; it is formally an employees' council) who argued that the public would not be well served by privatization, arguing that most of the shares from the PTT Initial Public Offering (IPO) fell into the hands of insiders, etc.

EGAT has played a progressive role in energy planning and management in Thailand and by example in Southeast Asia. For example, it is well known for its sophisticated demand management based on time of day (which now includes residential users, before it only encompassed industrial and commercial users) and type of user. It has also been involved, in conjunction with the Energy Conservation Promotion Fund (ECPF), in establishing subsidy programs for purchase of energy efficient (level 5) appliances. These, and related measures, improve EGAT's financial performance by reducing the need for new energy production and distribution facilities.

EGAT has also played a progressive role on the supply side, pioneering sector liberalization in Thailand by agreeing to give up its power production monopoly. In 1996 it invited expressions of interest from companies and joint ventures with the capability to establish IPP (Independent Power Producer) facilities in Thailand. (The standard IPP module is 700 megawatts.) In all cases, the IPP contracts are for 25 years (purchase of electricity by EGAT at a floor price is guaranteed over that period), the minimum period deemed necessary for the IPPs to obtain competitively priced finance. All the current IPPs are joint ventures between Thai and international firms, several from Japan. Although the 1997 financial crisis slowed some of this investment, electricity demand was below forecast levels between 1997 and 2001, it has now revived along with the Thai economy. The IPP program is universally acknowledged as a success with 4 of 7 IPPs now in operation and the remaining three under construction. Aside from the demand dip after the 1997 crisis, two of the selected IPPs, Gulf Power Electric and Ratchaburi Generating Company Ltd. were slowed in implementing facilities because they intended to use coal-fired plants. Protests by civil society groups led them to move to the Central Region and construct plants using natural gas feed. In some cases, such as BLCF in Rayong and Gulf Power Electric, permission has been granted to add a second 700 megawatt generating unit. The objective of EGAT is to generate about 50% of power from IPPs, and the remaining 50% itself, although the actual allowable split will be determined by the new energy regulator. In effect, the IPP process represented a start to the privatization of electricity generation and distribution in Thailand.

Much of EGAT's success can be attributed to its state-of-the art strategic planning undertaken by its System Planning Division.³⁷ Its forecasting starts with official national GDP and sub-national GRDP forecasts (relying heavily on those produced by the independent Thailand Development Research Institute [TDRI]) but is far more sophisticated than simply relying on GDP forecasts. The System Planning Division analyses the energy intensiveness of future production and household consumption, geo-political risks, etc. The process is strengthened by the critical inputs of a Thailand load

³⁷ For details, see: EGAT, *Thailand Power Development Plan 2004*, Bangkok: EGAT, System Planning Division, August 2004 (available in Thai and English languages)

forecast sub-committee organized by EGAT that includes the Provincial Electricity Authority (PEA), EGAT, MEA, OEP, the Deputy Permanent Secretary of the Energy Ministry, private sector representatives from a cross-section of industries, the Thai Federation of Industries, the Thai Chamber of Commerce, etc. By involving the private sector, EGAT is able to identify major projects on the horizon that could significantly affect energy demand. For example, EGAT is carefully monitoring the status of a proposed steel mill complex on the west coast of Thailand near Chumphon that would generate significant demand for electricity not included in existing regional forecasts. The other geographic area that is being monitored is the environs of the new airport east of Bangkok. The airport will serve approximately 60 million passengers per year by 2020 and attract at least 600,000 residents to the nearby area. EGAT, MEA, and the PTT have already agreed to build a new co-generation facility to serve the new airport area. Other major infrastructure investments are unlikely to generate power demands not already included in power forecasts. For example, a subway line requires only about 100 megawatts to operate, one-seventh of the output of a typical IPP.

Because of its excellent strategic planning process, EGAT is able to avoid too large reserves (which are financially disastrous both to the enterprise and consumers) without ever creating power shortages, such as China is currently suffering from, and Philippines has experienced in the past. The scenario-based forecasting includes high, medium, and low scenarios. The scenarios are reviewed formally by experts on an annual basis, i.e., it is a rolling strategic planning process. Demand forecasts need to be approved by the NEPO before investment is undertaken. Surprisingly, Thailand is still in a stage where the elasticity of electricity demand to GDP growth exceeds 1, it is currently approximately 1.2. Thus a major challenge facing EGAT is to work with agencies responsible for policy frameworks influencing industrial process technologies, building materials and technologies, urban form, vehicle specifications, etc., to use energy more efficiently. EGAT cannot do this directly, but can exert influence through the NEPO which, as described earlier, is an umbrella agency designed both to co-ordinate activities of agencies within the energy sector but also to interact with other agencies that can influence energy consumption in Thailand.

As was argued earlier, the energy sector in Thailand is highly volatile in terms of investment between planning periods. It appears this will hold true into the future. For example (see Table 2) during the Ninth National Development Plan period (2002-2006) electricity generating and distribution infrastructure investment by EGAT will only total 82,527 million Thai Baht (\$206.3 million U.S.) – EGAT has built only one power generation facility since the 1997 crisis. However, during the Tenth Plan period (2007-2011) planned investment is 412,640 million Thai Baht (\$1 billion U.S.), a five times increment. This swing can be accounted for by excess reserves created as a result of the 1997 financial crisis which now stand at an unacceptably high 26.8%, but which will fall to a prudent 14.4% by 2011.³⁸

³⁸ As an industry rule of thumb, reserves should be about 15% of current consumption.

Table 2: EGAT Investment: 2002 –2011

	EGAT Investment		
	Generation	Transmission	Total
Ninth Plan Period (2002-2006)	38,904	43,623	82,527
Tenth Plan Period (2007-2011)	166,019	164,094	330,113
Total (2002-2011)	204,923	207,717	412,640

Source: EGAT, *Thailand Power Development Plan (PDP 2004)*.

Compared with many East Asian countries, especially China, the generating mix is relatively clean. Controversially, 11.7% of electricity is produced from domestic lignite coal and 1.9% from imported coal. However, more than 70% of electricity is produced from natural gas from the Gulf of Thailand and Myanmar. Hydro generation only accounts for 2% of supply but could account for considerably more, based on contracts for future delivery from Laos starting in 2009.

EGAT intends to continue evolving as an institution whether it remains a corporatized state enterprise or is privatized. It hopes to keep its transmission monopoly (a natural monopoly) and remain the single buyer of electricity with multiple suppliers (IPPs) and end-user distributors, e.g., MEA and PEA. It would like to see the distributors privatized as well as the suppliers. Because of its excellent credit rating, EGAT sees no problem financing future expansion, although as noted, would like to retain Government guarantees (unlikely). Based on World Bank guidelines, EGAT intends to finance future facilities 25% from its own earnings and 75% from loans; it is completely self-sufficient not requiring subsidy from the Thai Government. Currently all financing is through local bond issues, a large number of Thai banks issue and buy the bonds. The major issue facing the enterprise is dealing with the public, as discussed above. By its own admission, it recognizes that it needs to change the process of identifying, designing, and locating power generation facilities. The second challenge is to operate successfully in a situation of rapidly rising energy prices (likely a structural change rather than cyclical) and possible energy scarcity in the East Asian market. EGAT's strategy is to increase flows of natural gas from the Gulf of Thailand and Burma, and increase the proportion of hydro-electricity purchased from Laos, plus modestly developing alternative energy sources, of which wind power looks the most promising. (Thai policy requires 5% of incremental capacity by 2011 to be from alternative energy sources, a modest goal; which the new energy regulator may want to consider making more challenging.) In addition, EGAT sees co-operation with China increasing, given the fact that Yunnan Province, directly north of Thailand, is rich in hydro electric resources, many untapped, although the environmental implications of such development need to be very carefully considered.

When asked the secret of EGAT's success in the turbulent world of East Asian electricity generation, the answer from senior management was corporate culture and corporate leadership. The founding Governor of EGAT stayed in the position for approximately 20 years, from the enterprise's founding in 1969, establishing the basic corporate framework and principles that continue to the present.³⁹

Case Study: Air Transport Department

The Department of Air Transportation (DAT), a unit of the Ministry of Transport (MOT) is responsible for the operations of Thailand's airports, with the exception of Thailand's major airports, i.e., Bangkok (Don Muang), Phuket, Chiang Rai, Chiang Mai, and Hat Yai. DAT is also responsible for Thailand's air traffic infrastructure, e.g., air traffic control. The five key airports noted above are run by the Airports of Thailand Public Co Ltd (AOT), which is slated for privatization.

The DAT is a classic government agency, not corporatized. It is allowed to keep 75% of airport taxes to fund its operations, but all other revenues, e.g., from landing fees, vehicle parking fees, leasing of space within terminals, goes directly to the Ministry of Finance. Since passenger levels are the product of the economy, airline seat availability, pricing, promotions, etc., DAT's income is significantly outside their control. They have had no success in awarding regional airport (there are 26) operations to concessionaires, but there is little incentive for them to do so, since revenues would go to MOF. And given that the high traffic airports are outside their purview, it is not surprising that interest in concessionaire contracts to operate regional airports is very limited. Total revenues generated by DAT (including moneys sent to MOF) are sufficient to meet operational costs, but given airport depreciation, overall aviation infrastructure requires government subsidy. In Fiscal 2002, the regional airports incurred a small loss of 376 million Baht (\$9.4 million U.S.).

The DAT operates within strong regulatory frameworks. The Civil Aviation Board, chaired by the Minister of Transport, is responsible for aviation safety and security, approval of routes, etc.

Airports are high profile infrastructure - associated with the prestige and local economic development potential of communities. As such, allocation of resources for airport construction is highly politicized with local politicians and officials strongly lobbying for new airports, upgrades, etc. The result is gross oversupply with many excellent facilities having no commercial services. For example, Chumphon possesses a strikingly-designed high quality airport typical of that serving a city of one million people but there are no airlines serving this small city; there is no longer service to Petchaboon, nor to Nakhon Ratchasima, Thailand's second largest free-standing city. Other medium and small-sized communities have also lost air service, although new routes have been opened to tourist

³⁹ Prior to 1969, EGAT consisted of three predecessor enterprises.

destinations such as Krabi and Hua Hin in response to market forces. Most of the airports managed by DAT have no commercial service; many are essentially abandoned. But the pressure to build more regional airports persists – for example, the MOT proposes that a new airport be constructed in the southern province of Phangnga, about 100 kilometers from Phuket or Phangnaga cities. The emergence of low cost airlines has not helped the situation because low cost carriers focus on high volume routes.

The Bureau of the Budget has the most power in determining the allocation DAT's resources and the uses to which such resources are to be put. Another key actor is the Policy and Planning Division of the Ministry of Transport, which responds to both top-down and bottom-up pressures, as well as technical planning input from the DAT. The Policy and Planning Division of the Ministry of Transport is the key interface with the BoB. As indicated, short cut infrastructure budgeting systems enable the NESDB to be largely bypassed in many aviation planning decisions, often reducing the national strategic perspective in resource allocation. There is, however, a strategic element in the allocation, largely emanating from the Government itself, e.g., improving aviation services in the North given increased interaction with the Greater Mekong Sub-region, including Yunnan Province of China. However, the resource allocation process significantly reflects local successes and failures in lobbying for air facilities – resulting in the over supply situation noted.

Officials of DAT would like to see less year-to-year volatility in their operations. That is, they would like to operate within a relatively stable 4 year planning perspective. Although DAT prepares 3-5 year plans, these are largely over-ridden by the volatility of the aviation allocation system, dramatically reducing their value.

The DAT's vision for the Thai aviation system is one that would cater more to general aviation (small planes, specialized carriers, etc.) enabling the national aviation infrastructure to be used as a resource, responding to market demand. In the past DAT's operations have been oriented to the national flag carrier's needs. However, Thai Airways is now operating in a much more liberalized sector environment and is cutting back on domestic services.

DAT is buffeted by many of the forces affecting infrastructure provision in Thailand across agencies. For example, as a result of decentralization, some provinces, with rapidly increasing fiscal resources, indicate that they will construct their own airports. Consistent with the Government's policy of focusing deconcentration efforts on the Provincial scale, the Transport Ministry is considering turning operations of the regional airports over to Provincial Governors who, it is argued, could better promote their use. At the same time, the Ministry of Transport is considering how the DAT could become more financially self-sufficient – an outcome that would require modifying current incentive structures facing DAT, and allowing them more latitude in their operations, e.g., to concentrate on more successful airports.

In summary the DAT case indicates a variety of issues:

- (i) The stresses that occur when the components of a system with highest revenue are “creamed off”
- (ii) The susceptibility of certain types of high profile infrastructure to local lobbying resulting in over supply and mis-allocation
- (iii) The trade-offs between decentralized versus centralized management of regional infrastructure facilities
- (iv) The fact that some facilities, e.g., those serving smaller communities as a public service, may require continued subsidy. However, such facilities need to be justified case-by-case

5. The Role of Local Government in Infrastructure Provision

5.1 Decentralization

Based on the 1997 Constitution, Thailand set course to decentralize its administrative and fiscal systems.⁴⁰ The structure of the decentralization process was legislated in the 1999 Act “Determining Planning and Staging of Decentralization”. The Office of the National Decentralization Committee, housed in the Prime Minister’s Office, gave further shape to the decentralization process in two plans enacted in 2000.⁴¹ Thai decentralization is almost totally on the expenditure, not the revenue side, this is a short-coming in the decentralization process, essentially making local governments accountable to local populations for their actions. Most revenues continue to be collected by the national government, as described earlier, and are subsequently transferred to local governments. Municipalities have benefited less from the ongoing decentralization process than the lowest level Tambon Administrative Organizations (TAOs) and the Provincial Administrative Authorities (PAOs). The latter parallel the more important nationally deconcentrated provincial administrative system co-ordinated by a Governor appointed by the Minister of Interior. By 2005, according to the 1997 Constitution, 35% of public expenditure was to be at the local level, that is, Provincial Governments (PAOs) and lower. The Government has already stated that it will not reach that goal. According to the BoB, 20% of public expenditure in Thailand was by local governments in 2002, rising to 22.5% in 2003, and 23.5% in 2005. BOB estimates that 24-25% of public expenditures will be by local governments in the target year 2005. However, these figures over-

⁴⁰ For an overview of the decentralization process in Thailand, see:

Webster, D., *Implementing Decentralization in Thailand: The Road Forward*, Bangkok: Office of the Decentralization to Local Government Organization Committee and The World Bank, August 2002

Wegelin, E., Thailand: *Decentralization Capacity Assessment: Findings and Recommendations*, Bangkok: Office of the Decentralization to Local Government Organization Committee and The World Bank, August 2002

Krongkaew, M., “The Political Economy of Decentralization in Thailand”, *Southeast Asian Affairs 1995*, Singapore: Institute of Southeast Asian Studies, 1995, pp 343 - 361

⁴¹ *The Plan to Decentralize Administrative Power to Local Administrative Organizations*, Bangkok: Office of the Decentralization to Local Government Organization Committee, 2000; and *The Operations Plan on Staging of Decentralization to Local Government Organizations*, Bangkok: Office of the Decentralization to Local Government Organization Committee, 2000

estimate the real magnitude of fiscal decentralization, current practices such as local governments contracting back national agencies to deliver services locally exaggerate the real impact of decentralization. Nevertheless, it is clear that there has been a significant shift of public fiscal resources to local governments, particularly for infrastructure provision, e.g., roads, water management infrastructure, solid waste treatment facilities, etc., especially given the fact that only about 8% of national public expenditure was by local governments before the new Constitution was enacted in 1997.

As noted, the largest impact of decentralization has been on the TAOs and PAOs. Infrastructure delivery has been the focus of the activity of TAOs and PAOs in part because the national Ministries of Health and Education have not co-operated in the decentralization process, except for minor exceptions such as school lunch programs. Secondly, low capacity local governments are biased toward infrastructure delivery because they perceive it to be less complex than delivery of social services, etc. Unfortunately, the decentralization process has resulted in increased inefficiency in infrastructure delivery, and possibly increased corruption. The 6,745 TAOs each consist of approximately 10 villages, but some are so small as to not be able to support even a primary school, virtually all have no capacity to deliver infrastructure – they possess no equipment or technical skills (by law only junior staff can be appointed at the TAO level). So, TAOs sub-contract small scale infrastructure (feeder roads, wells, small dykes, small bridges) to local contractors or to the PAOs. Most projects are delivered at greater cost and less efficiently than when such projects were implemented directly by the Department of Public Works or an equivalent line agency. The PAOs have more capacity; given their infrastructure focus, most have purchased construction and road maintenance equipment, etc. The national Government is well aware of the problem.

Given this problematic situation - essentially too many local governments were created and decentralization was pushed too far down the government hierarchy, the current TRT government has decided (wisely in the view of the authors) to focus decentralization on the provincial scale – making provinces the building blocks of the decentralization process. Controlling for Thailand's population (about 63 million), the 76 provinces in Thailand correspond to the Kabupaten (District) level in Indonesia – which has proved, in the latter case, to be a more viable geographic scale for decentralization. The provincial Governors have been titled, "CEO Governors" and their role is to co-ordinate most public sector activities within their provinces based on a strategic plan that they are required to prepare. (In many cases, these strategic plans are very sketchy or more lists of projects than true strategies.) The shortcoming in the system is that the Governors are appointed, not elected; ideally, the popularly elected PAOs will gain enough capacity over time to become key players in the decentralization process. Essentially the outcome has been creation of a more deconcentrated, rather than decentralized development system, focused on the provincial level.

The negative impacts of low capacity of TAOs and low level municipalities (*Teseban Tambon*) are exacerbated by the fact that they are the dominant mode of local government in peri-urban areas surrounding municipalities. Peri-urban areas are the

fastest growing settlement type in Thailand, as in most of East Asia. Meanwhile, municipalities, which have much higher governance capacity are experiencing little or no population growth because they are usually already substantially built-out. Thus the infrastructure provision challenges are in the peri-urban areas, more than in the core cities themselves, a mismatch between governance capacity and need. It is not unusual for a peri-urban TAO, staffed by personnel in their twenties, with generalist educations, to be the site of an industrial park housing some of the world's leading Fortune 500 companies demanding world class infrastructure services. The mismatch becomes obvious.

Identifying responsibility for infrastructure delivery at the local level is complex. For example, major highways, etc., that may form arterials in urban areas remain the responsibility of the national government. In the past, different national agencies have competed to install environmental infrastructure, with no thought being given to sustainability. For example, the Department of Public Works built an incinerator (costing over \$50 million U.S.) in Phuket that the Municipality has insufficient capacity and financial resources to operate. In Hat Yai, half of the city's sewer system was built by the (then) Ministry of Environment and Science, the other half by the Department of Public Works.

The decentralization legislation and plans (and previous legislation related to local government functions) is very unclear regarding the functions of different levels of local government (there is considerable overlap), and sharing of functions vis a vis the national government. The situation can either be interpreted positively - allowing competition within government, or negatively, that is, a recipe for confusion.

For example, water supply can be delivered by the local government or by the state enterprise, the PWA. In some cities, such as Phitsanulok, the municipal government operates the water supply system very effectively and sustainably, even supplying low capacity local governments (TAOs) in the peri-urban area. However, jurisdictions such as Phitsanulok argue that they are constrained in expanding such systems by the fact that they are not allowed to charge more than the PWA rate – currently seven Baht per cubic meter. But in other jurisdictions, e.g., Kan Ham TAO in the fast growing Ayutthaya peri-urban area (north of Bangkok), local governments unsustainably extract ground water, distribute it through below standard pipe networks, etc. (Technically this is illegal.) In Kan Ham, as in many other local areas (especially low level TAOs, and Tesaban Tambons [the lowest level of Municipality]), PWA would like to supply water on a sustainable basis (e.g., from the Chao Praya river in the case of Kan Ham) but cannot because the local government can supply unsustainable, below standard water at lower rates. This is an area where innovative solutions need to be developed. In addition, existing environmental regulations need to be enforced based on effective monitoring, to provide a further incentive to sustainable water delivery. For example, PWA could operate local systems on a contract basis. Private concessions are possible if tariff ceilings were raised to economically sustainable levels.

The worst infrastructure provision performance in Thailand is in waste water treatment.⁴² Virtually none of the 160+ systems are operating, whether developed locally (almost always involving subsidies from the national government) or by national agencies as described above. Literally billions of dollars (U.S.) has been spent on waste water systems in the Bangkok extended region, involving loans from multi-lateral lenders, yet only 3 waste water plants operate sporadically. The problem is that no user fees are assessed or collected and that households and firm are not required to connect to the systems. Water supply authorities, MWA and PWA in particular, have consistently refused to add waste water charges to their water supply bills, despite clear evidence from international experience that this is best practice. Consequently, the capital has been totally wasted. In smaller cities, based on calculations by the authors, municipal governments would need to spend 100% of their discretionary budgets on waste water system operations, assuming up-to-standard operations covering their built up areas, and no user fees are collected.

Thailand has had some success, and shows considerable promise in the use of sub-national lending to fund infrastructure in local areas. The RUDF (Regional Urban Development Fund) was established by the Royal Thai Government (NESDB and the Ministry of Finance) and the World Bank at the time of the 1997 crisis to on-lend money at close to market rates to local governments to build infrastructure such as flood control facilities, public markets, libraries, water supply systems, youth centers, slaughter houses, etc.⁴³ Based on a recent Implementation Completion Report (ICR) by the World Bank, the program, delivered by the Government Savings Bank (GSB) has been a success with over 80% of sub-projects meeting feasibility study expectations, and a 100% repayment rate. The RUDF pioneered many improvements in the local infrastructure provision process such as civic forums (discussed earlier), credit-worthiness assessment of local governments (user friendly software was developed) and capacity building in the domestic consulting industry to enable higher quality design and feasibility analyses of urban infrastructure at the local government level. The one problem has been scale, only about \$15 million U.S. was disbursed over a 5 year period (half the budgeted amount), explained by a variety of factors, many of which were not related to real demand for credit by local governments to deliver infrastructure. The Thai Government intends to continue to engage in on-lending to urban governments, expanding the scope of this activity. FPO has indicated that it will create a Local Development Financial Corporation (LDFC) that will be capitalized in the amount of 2 billion Baht (\$49 million U.S.). The LDFC will not only on-lend money (as the RUDF did – its funding came from a World Bank loan) but also raise money through bond issuances, securitization, etc. Meanwhile,

⁴² For detailed information on infrastructure delivery at the extended urban region level in Thailand see outputs of the ADB funded project, *Planning for Sustainable Urbanization in Thailand*. Outputs include case studies on Ayutthaya, Nakhon Ratchasima (Korat), and Hua-Hin – Cha Am. The flagship document is: NESDB/Asian Development Bank, *Toward Urban Sustainability in Thailand: A Discussion Paper*, Bangkok: NESDB / ADB, 2004

⁴³ For further information regarding the RUDF, see: Borden, C., *Operation Manual: Regional Urban Development Fund*, Bangkok: NESDB / World Bank, August 1999; and Adam, S, D. Webster, M. Hahn, *Implementation Completion Report: Social Investment Program Thailand*, Washington: World Bank, 2004

the GSB has announced that it will continue operating the RUDF using its own funds, injecting another 1 billion Baht (\$24.4 million U.S.) in operating capital into the ongoing RUDF facility at least until the LDFC is operational (in the view of the authors, the two entities should be merged into one entity once the LDFC is fully operational). Furthermore, commercial banks, in particular the Krung Thai Bank, are establishing programs to lend to local governments on a non-guaranteed basis, based on learning from the RUDF. Recently, the ADB commenced design of a program, in conjunction with the Ministry of Finance, whereby local governments (initially seven pilot urban areas will be identified) can borrow directly from commercial sources based on ADB guarantees for which the local government will pay a fee. The IFC of the World Bank group has expressed interest in continued involvement in the area of local government lending (sub-sovereign lending) in Thailand.

Meanwhile, the new Governor of Bangkok (BMA) has announced that BMA intends to issue bonds worth between two and three billion Baht in the very near future. To facilitate this process, the new Governor appointed Panich Vikitsreth as Deputy Governor for Finance. Mr. Vikitsreth is the former executive director and chief investment officer of Ayudhya JF Asset Management Company, one of Thailand's leading investment and mutual funds groups. The rating for the bonds would be about 80 points above Thai Government treasury bonds reflecting the fact that they would not be guaranteed by the national government and that it is a first issue.

The Bureau of the Budget plays a role in terms of local government finance, through its Local Government Division. Transfers to local governments, which are increasing rapidly under decentralization take the form of block grants (which local governments can spend as they see fit within the liberal constraints set by legislation delimiting their functions – discussed above) and tied or specific grants. The latter grants flow through the Department of Local Affairs (DOLA) in the Ministry of the Interior, which is responsible for local governments. According to the BOB, local governments are not legal budget agencies by law – they are delegated this function by DOLA. The BOB plays not role in determining the magnitude of block grants, which are determined by formulae established by the Ministry of Finance and DOLA, and directly delivered by DOLA. However, specific grant requests do pass through the Bureau of the Budget. The exceptions to the above process are BMA (Bangkok) and Pattaya who are autonomous agencies, who do not have to work through DOLA. The BOB would prefer to see more transfers in the form of specific grants (essentially an anti-decentralization stance) as they have concerns regarding the capacity and performance of local governments.

6. The Role of the Private Sector

In 1992 much legislation were passed to update Thailand's environmental laws and infrastructure delivery system. Especially important was the umbrella law which established the environmental planning and management system, "The Enhancement and Conservation of the National Environmental Quality Act". In 1992, importantly legislation was enacted to facilitate private sector involvement in infrastructure delivery,

importantly including public-private partnerships. The key act in this regard was the “Act on Private Participation in State Undertaking”. This act produced a flurry of activity both on the part of the private sector - firms submitted unsolicited proposals country-wide for solid waste disposal facilities, incinerators, trunk water supply, etc. Following enactment of the law, the Government created corporations, usually spun off from Government Ministries or state enterprises to provide structures for private involvement in infrastructure provision such as the Waste Water Management Authority (spun off from the (then) Ministry of Environment and Science – it has not been successful), East Water (spun off from the PWA – it is technically reasonably successful with its shares listed on the Stock Exchange of Thailand performing well, but it receives virtually free water from the Royal Irrigation Department), several expressway companies spun off from the Expressway Authority of Thailand and the Ministry of Transport (a mixed record, but generally performing well), etc. At the local level, there was much less action although the Bangkok Transit System (BTS), the 23 kilometer elevated heavy rail system in Bangkok, a BMA BOT concessionaire represents a significant exception. The BTS is a technical and economic success, but financial re-structuring has been needed – see the companion paper on this topic. However, actually implemented projects involving private sector participation were a fraction of those proposed by private firms, and public agencies. As documented by Kaothien and Webster,⁴⁴ private sector involvement in infrastructure provision was limited to a few sectors: primarily expressways, electricity generation (as documented above) water supply, telecommunications, and affordable housing (for households earning approximately 10,000 baht per month and above – which would include couples working in factories).⁴⁵ However, there was little interest shown in other sectors such as waste water. Secondly, also documented by Kaothien and Webster, it became clear that the private sector was mainly interested in the Extended Bangkok Region, including the surrounding peri-urban Eastern Seaboard, Ayutthaya, and Western Amenity regions, but not the remainder of the country.

Thailand has retained a reasonably good record as an environment for private sector investment compared with many other East Asian countries such as the Philippines (see companion paper). However, the second stage expressway was essentially nationalized (based on a quick Thai Supreme Court Decision) after a toll collection dispute between the Japanese BOT concessionaire and the Expressway Authority of Thailand (the Japanese company was reimbursed in full for construction costs). And the Hopewell (Hong Kong based) elevated suburban train (a concession granted by the State Railway of Thailand under the Minister of Transport in the pre TRT period when Ministries could and did function relatively autonomously in regard to granting private concessions, contracts, etc.) was abandoned after the 1997 financial crisis. In this case, Hopewell’s financial problems appear to have been the cause of the rupture. Nevertheless, not too much damage was done by these two incidents to Thailand’s reputation for private sector

⁴⁴ Kaothien, U., D. Webster and V. Vorathanyakit, Country Report of Thailand (Chapter 16) in, Brockman, R. and Williams, A., *Urban Infrastructure Finance*, Manila: Asian Development Bank, 1996

⁴⁵ Thailand has an excellent record in terms of the private sector providing affordable housing for workers compared with most other developing Asian countries. However, the private sector does not provide housing for those near the poverty line – about 10% of the urban population.

co-operation in infrastructure provision; and given Thailand's excellent credit worthiness (as argued above), Thailand is a promising environment for future public private cooperation, although future private sector participation is again likely to focus on the Bangkok Extended Urban Region which account for three-quarters of bank deposits (and corresponding consumer power), over 70% of public sector revenues (BMA alone accounts for about 56%), etc.

A major problem is the lack of clear regulatory environments for private involvement in infrastructure provision, both at the national and local levels. Thus, for example, when the private sector, e.g., European and Japanese firms, would attempt to negotiate BOO and BOT contracts for incinerators, solid waste collection, etc., in places such as the Eastern Seaboard and Samut Prakarn, Bangkok's heavy industry suburb to the east, there would not be a clear regulatory environment, nor local capacity to draw up agreements fair to both parties. The same is true at the national level; in other words, the 1992 law should have been followed up by developed sector specific regulatory environments – something that is only starting to happen now (2004). At present, Thai authorities are working on a new act to replace the 1992 law on private participation in state undertakings; OSE is a key actor in drafting this law. In particular, clearer guidelines are needed for public private partnership (PPPs), the new act will address this issue. The new act will also outline frameworks for evaluation of projects (pre-approval, construction, operations) and put forward clearer guidelines regarding feasibility study requirements, and criteria to evaluate feasibility studies. NESDB has developed proposed guidelines for PPP ventures but to date they have not been officially adopted. Private involvement in infrastructure delivery will be promoted, administered, and regulated by a new Office in the Ministry of Finance; the new act will provide the legal framework for the operations of this Office. Technocrats in the Ministry of Finance, and NESDB, advocate higher quality contracting in the case of private sector participation, e.g., granting of concessions. The current two committees structural framework (see Figure 3) one to assess the TORs and contract based on high quality supporting feasibility studies, and one to monitor the construction and operating stages provides a structural basis for improving the quality of the process.

Many central agency officials expressed the view that the existing legal and institutional framework for private involvement in infrastructure delivery (PPPs, concessions, BOT, BOO, sub-contracting, etc.) often does not lead to value for the Government and citizens of Thailand. In particular, officials expressed concern re open-ended Design and Build and turnkey contracts because of the lack of detailed enough specifications to hold private contractors accountable.

Given the desire of the Government to minimize use of the national budget to finance the proposed 1.4 trillion Baht in infrastructure spending, officials in the Ministry of Finance, BOB, and NESDB, are working hard to identify innovative forms of private sector involvement in infrastructure provision. This goes beyond proven modes such as BOT concessions to provide rolling stock, tracks, signaling, operating systems, as was granted by MRTA for the 21 kilometer subway that opened in Bangkok in mid 2004. For example, preliminary negotiations have been held with Bombardier in regard to building

a rolling stock factory in Thailand in exchange for concessions, etc. This would generate benefits in terms of balance of trade, technology transfer, etc., and would make local financing of the system easier.

PART II Assessment: Looking to the Future

7. Thailand's Infrastructure Performance

Thailand's infrastructure provision system has performed remarkably well in some sectors, and much less so in others. However, if there is an overall weakness it is the slowness in approval processes and delivery. For example, the Suvarnabhumi airport was first designed (and the site purchased) in the 1970s but it will only open in 2005 or 2006. (Two different sets of squatters had to be compensated for land use rights because of the decades long delay.) The relatively well-planned Bangkok mass rail system network was designed by the early 1990s but will only be in place post 2010. In other words, the right infrastructure systems are usually identified, and eventually delivered, but ten to twenty years later than originally proposed. In part this is due to very slow bureaucratic decision-making (there are over 500 committees dealing with infrastructure in the Thai Government). To a considerable extent slow decision-making has been rectified under the current Government. A second problem is lack of involvement of key stakeholders and impactees in design. A third problem is the failure to undertake more detailed design before commencing construction. For example, the BTS elevated rail system was under construction before the issue of how to route the rail line around the historically important Victory Monument was resolved. The two heavy rail mass transit lines currently in operation in Bangkok, where they intersect, are not well connected. For example at Silom Road (the heart of the Central Business District), passengers have to walk one city block to connect between the lines. When the Don Muang elevated expressway was built (to the existing international airport) motorists rejected the contract provision that stoplights be placed on the existing toll free ground level expressway (under the elevated structure), resulting in the need for the Government to compensate the Don Muang elevated highway concessionaire. There is a need for earlier and more open-ended collaborative involvement of key interest groups, providing space for negotiation, rather than the current practice of public hearings at which the project is a virtual *fait accompli* and the proponents main goal it to get "buy in" from the public at all costs. Needless to say, the result is often conflict and delays. And, as has been described, the current EIA process is of virtually no value either in improving the quality of projects or in setting frameworks for constructive negotiations among different stakeholders.

A strength of the Thai infrastructure provision system, and the governance system as a whole, is its flexibility and adaptability. As has been documented, although the formal structure may remain essentially the same (or go through periods of significant restructuring such as in 1992 and 2002 - 2003), power shifts rapidly among agencies in the bureaucracy (both line agencies and state enterprises) and between the bureaucracy and the elected Government. The present system relies heavily on decisive strategic thinking and decision-making from the Cabinet and PMO. The result is a new pipeline of coherent

infrastructure systems / projects oriented to key strategic themes such as logistics, urban accessibility (Bangkok mass transit), water management (Thailand has many emerging water deficit areas such as Nakhon Ratchasima and the fast-growing Western Amenity Region), small settlement water supply, and energy conservation. (Thailand is one of the most vulnerable countries in East Asia in terms of impacts of increases in energy prices. Energy imports have historically represented about 4.6% of GDP.) A key question is what will happen if Thailand returns to a situation of minority coalition governments? Will NESDB or another agency be able to play a strategic co-ordination role, a role currently being played by the Government and its direct advisors?

As has been argued, the Ministry of Finance and the Bureau of the Budget are now the key bureaucratic actors in infrastructure co-ordination and planning, liaising with the Policy and Planning Divisions of Ministries and key sectoral umbrella agencies such as NEPO and OTP. In many ways, MOF and BOB have taken over the strategic functions of NESDB. This is not atypical in contemporary Southeast Asia, where similar national developmental planning agencies such as BAPPENAS in Indonesia and NEDA in the Philippines are experiencing diminished roles. On the other hand, in China, the National Development Reform Commission (NDRC) has completely reshaped its role (to become a strategic development institution and high level think tank) and is more powerful than ever – this change is reflected in its name change from the National Development Planning Commission, associated with its former “command and control” function. (See the companion paper on China’s infrastructure provision system for more details.) To a lesser, but significant, extent, Malaysia’s Economic Planning Unit (EPU) continues to play an important role in infrastructure co-ordination in Malaysia. We argue that the important issue is not whether NESDB regains a significant co-ordinating function in regard to infrastructure provision, but whether such capacity exists somewhere in Government. In other words, it may be appropriate to build up strategic co-ordinating capacity in regard to infrastructure delivery in the Ministry of Finance (as advocated by MOF), or even in the Bureau of the Budget. Critics would argue, probably correctly, that the weakness of placing strategic planning capabilities in Ministries of Finance is that such agencies generally operate on no more than a three to five year time horizon. Alternatively, such capacity could be developed in a set of umbrella agencies that concentrate on broad sectors, as NEPO and OTP do currently. The advantage of the latter model is that it is easier to build up state-of-the art technical capacity within a sector than in planning and policy agencies that are responsible for all forms of infrastructure or are economy wide in orientation. Furthermore, under such a system that could consist of approximately five broad sector-wide agencies, a mechanism could be created for them to interact with each other, co-ordinating overall national infrastructure delivery. However, such a mechanism would in many respects resemble a national strategically-oriented planning agency. The bottom line is that somewhere in the bureaucracy a strategically oriented, infrastructure co-ordination function is needed – especially in times when the elected Government has less of a mandate, e.g., coalition governments.

The question of highly variable performance across infrastructure agencies in Thailand is an intriguing one for which there is no easy answer. However, significant diversity in

corporate cultures seems to explain such variation best. Some agencies got off to a better start, which initiated a virtuous cycle, attracting better staff, attracting capital, etc. But another key variable is the mandate given to agencies by the Government. For example, the State Railway of Thailand (SRT) has always been expected to transport the poor for very low fares. Thus it has been locked into a perpetual money-losing subsidy spiral. (For example, the Cabinet granted an additional 3.2 billion baht “loan” to the SRT at the end of the 2004 fiscal year, in addition to what had been formally budgeted for the fiscal year.) Yet, if SRT management were to “think outside the box” a different reality might prevail. The SRT has one of the largest public land banks in Thailand, much of it in prime urban locations (near or in central business districts), land that is being left idle, sometimes used by squatters, and / or often rented / leased far below market value. It is obvious that a new orientation by SRT management that focused on maximizing the revenue potential of its land assets could completely change its financial picture. (There are many international precedents, e.g., the Canadian Pacific railway, through its property arm, Marathon Realty, consistently generated high revenues from its land assets, operating in a land ownership context similar to SRT.)

The greatest obstacle to sustainable infrastructure facility / services provision in Thailand is the lack of user fees (as in the case of waste water treatment), or user fees that are too low (as in the case of water supply or solid waste collection and disposal). Local politicians will not raise fees on their own, it is political suicide in Thailand. Therefore, the only way to break this impasse is for the national government to mandate fee collection. The Government seems to understand this, the Pollution Control Department (PCD) in the Ministry of Natural Resources and the Environment recently indicated that it will mandate user charges (albeit initially very low) for waste water treatment that local governments will be expected to collect.

Decentralization to date has reduced the efficiency of infrastructure delivery in Thailand. Much of the problem is related to the structure of decentralization – the process focused too much on very low levels of government, particularly the TAOs. The Government is trying to rectify this problem by focusing on the Provincial scale, as well as by attempts to consolidate TAOs (through the TAO consolidation legislation).

Related to the foregoing is the problem of fragmentation of governance within extended urban regions. The average middle sized urban region (100,000-500,000) in Thailand is governed by 10-15 local governments. The Extended Bangkok Region is composed of over 500 local governments. With close to 100% of demographic growth (and the vast majority of urban construction and infrastructure provision) occurring outside the normally well-run Municipalities in low capacity TAOs and *Teseban Tambons* (former Sanitary Districts) the nature and scale of the problem is obvious. The issue could be addressed through annexation (probably politically impossible) or through inter-jurisdictional co-operation using mechanisms such as Councils of Local Government, bilateral and multilateral contracting among local governments, etc. The Thai experience clearly indicates that such co-operation only occurs where there are incentives, e.g., matching grants from the national government, access to credit (by working with the core

municipality), etc. Expecting voluntary agreement among local governments is naïve, yet the lack of such co-operation can spell economic disaster, as the case of the CALA peri-urban region in the extended Manila urban region illustrates.

In sum, Thailand has performed relatively well in terms of infrastructure provision, despite the lack of a well-defined infrastructure planning and provision system. Rather, the Thai system is one of over-lapping jurisdictions, lack of a flagship infrastructure co-ordinating agency, poorly defined functional allocations among agencies, etc. The relative success of the system seems to lie in its adaptability, flexibility, and unlike some countries in Southeast Asia, a commitment among most actors to the overall public good.⁴⁶

8. Lessons Learned

What are the lessons that can be drawn from the Thai experience of relevance to East Asia infrastructure provision?

- (i) It is important to deliver infrastructure within a strong macro economic framework that carefully monitors debt levels. The FPO and PDMO within the Ministry of Finance act cautiously. High budgetary deficits are avoided to finance infrastructure projects; debt ceilings, especially for foreign borrowing, are strictly set and observed. The PDMO monitors off-budget debt of state enterprises carefully and includes such debt as part of the overall public debt calculation. The Government borrows from domestic sources first when macro economic conditions are appropriate, e.g., when excess liquidity allows domestic public infrastructure borrowing without crowding out the private sector with its capital needs. The result is that Thailand enjoys relatively high levels of credit-worthiness enabling it to borrow for key infrastructure when it wants to, or has to act fast to take advantage of strategic opportunity or overcome a bottleneck. In sum, because infrastructure is so capital intensive, it is very important that it be provisioned within a well-managed macro economic structure.
- (ii) Time spent in meaningful dialogue with stakeholders and potential impactees affected by major projects to alter design, scale, location, operating conditions, and mitigation measures can yield significant net time savings in project execution.
- (iii) If detailed design is left too late in the process (design as you go), this can delay project execution significantly. “The devil is in the details” applies to infrastructure as much as any other field – local opposition often occurs late in projects when details are released, and lack of detailed design can result in severe technical problems emerging that can derail projects.

⁴⁶ For a discussion of the importance of adaptability in Thai society and governance, see: Webster, D., “The Future of Thai Urbanization: New Drivers, New Outcomes” in Warr, P., *Thailand Beyond the Crisis*, London: Routledge, 2004

- (iv) Decentralization per se does not ensure more efficient (e.g., unit costs) or effective (facilities and services that meet local needs) infrastructure delivery. It is important that political and administrative power and fiscal resources be devolved to the scale and level of government appropriate for delivering a given type of infrastructure. In addition, a variety of other measures need to be taken, importantly including local capacity enhancement, changes in incentive structures facing local governments, etc.
- (v) Like virtually every other country in East Asia, Thailand is losing rural population, at a rate of -.22% per year (and will continue to do so for about 30 years at approximately the same rate) while the core urban areas are demographically stagnant. Virtually all population growth is accounted for by peri-urban areas. Infrastructure best suited to regional scale planning and operation, e.g., solid waste and transportation systems, needs to be delivered in extended urban regions, including peri-urban areas, which are characterized by fragmented local governance, in a coherent and integrated way, at a geographic scale larger than local governments. This means creating incentive structures that encourage inter-jurisdictional co-operation. Decentralization processes greatly exacerbate this problem unless they are implemented in tandem with measures to ensure integrated infrastructure delivery in extended urban regions, and other coherent regions (environmentally or functionally defined) such as watersheds.
- (vi) Effective infrastructure delivery will not result if only micro level techniques such IRR, ERR, EIA, technical feasibility studies, are utilized in assessment processes, as important as these tools may be. There needs to be higher order strategizing that aligns infrastructure delivery with supply/demand conditions, shifting economic competitiveness advantages, social and environmental targets, and changing domestic and international conditions (opportunities and threats). The Thai case indicates that this strategizing can be based at the Cabinet level but that long run sustainability of the function requires strategic planning capabilities in a flagship group within the Bureaucracy. Sector-wide infrastructure policy and planning co-ordinating groups can enhance such a flagship function, particularly because of their deeper technical expertise, and may be able to substitute for it, provided they co-operate with each other. There is a trend in Thailand and Southeast Asia to re-locate this flagship infrastructure co-ordinating function from traditional national development planning agencies. It may be that the function is appropriately placed in Ministries of Finance, as the Thai Government is now contemplating, but the substantive and time horizon orientations of Ministries of Finance is often inconsistent with strategic thinking over a medium to long time horizon.

- (vii) Thailand currently undertakes debt financing project by project. However, programmatic financing may be a more appropriate long term goal, especially in terms of urban infrastructure, for it may result in more cost effective solutions to infrastructure challenges. For example, as in the case of New York City, debt financing for water supply may be more appropriately used both for supply (e.g., reservoirs) and demand measures, e.g., replacing toilets in all households with lower flush (water consumption) models.
- (viii) The Thai infrastructure provision system lacks clear functional delineation by agency, exhibits overlaps, and power is spread throughout the bureaucracy. Although this has advantages in terms of adaptation, competition in governance, and to some extent checks and balances, a clearer definition of individual agency roles might increase system effectiveness.
- (ix) Many state enterprises are stuck in a downward spiral that has cumulatively developed over the years. In such cases a shock, be it new leadership, privatization, etc. may be appropriate to induce improved performance.
- (x) Privatization per se does not appear to be a prerequisite for effective infrastructure delivery. For example, EGAT, Thai Post, MEA, , PWA, etc., are highly respected and effective infrastructure delivery organizations. What appears more important is the quality of the management, and (correlated) that the enterprise is autonomous and responsible for its own destiny, i.e., corporatized. Privatization represents just one more step down that trajectory.
- (xi) The Thai case illustrates the volatility of infrastructure investment by sector. Swings of four to eight times in investment levels between five year planning periods, by sector, are not uncommon. To some extent this is an indication of failure to forecast accurately, or allowing infrastructure backlogs to accumulate. But the future is becoming increasingly unpredictable with more open economies (globalization), so such swings are likely to continue – demand forecasting is likely to become more inaccurate in the future despite the best efforts of planners, economists, and futurists to develop better methodologies. To the extent that investment can be smoothed over time, that is desirable. However, what is more important is an early warning system at the strategic flagship and sectoral policy and planning agencies levels that anticipates change, and games possible responses based on differing scenarios. The most successful infrastructure planning systems of the future will not be those based on rigid five year plans but those based on anticipation and foresight. Such systems will require high levels of monitoring, fortunately monitoring is becoming less

expensive with advances in technology, such as software and sensors.⁴⁷ In Thailand, environmental monitoring equipment is import tariff exempt, further reducing the costs of such equipment.

- (xii) The case of Thailand unequivocally indicates that urban services can not be sustainably delivered without appropriate user charges. In the extreme case of waste water treatment, systems literally fail to operate. And if waste water systems did operate in Thailand, the situation would be even worse in terms of public welfare, diverting scarce public resources to waste water treatment operations, depriving other sectors such as health and education of needed funds.
- (xiii) Thailand has had some success with innovative private participation in infrastructure delivery since the passage of facilitating legislation in 1992. With updates in the law, creation of a new private infrastructure office in the Ministry of Finance to facilitate private investment in infrastructure, new regulatory bodies, and improved monitoring processes, there is scope for considerably increased private participation in infrastructure delivery in Thailand. Thailand is showing high levels of innovation in terms of use of mechanisms such as supplier credits.
- (xiv) Thailand has demonstrated that lending to local governments can be effective. To date the RUDF has a 100% repayment rate and over 80% of projects are performing to, or above, feasibility study expectations. Upscaling these efforts, while prudently monitoring local debt, is likely to improve the quality of urban areas and make them more fiscally self-sufficient and sustainable. Reasonable levels of debt will encourage Thai local governments to raise more revenues. At present local governments utilize only a fraction of the powers they have to effect revenue generation.
- (xv) Thailand has wasted billions of dollars on certain types of infrastructure, e.g., waste water, but has also invested in areas such as state-of-the art electricity systems and the new international airport, that will result in high economic returns because of the alignment of these systems to the country's economic development and changing economic realities. Thus it is essential that infrastructure planning and co-ordination occur in a strategic level. Because of its importance, this point is re-emphasized below. Overall, Thailand spends a higher percentage of its GDP on infrastructure than any other Southeast Asian nation; it would appear that high economic returns are generated from much of this spending.

⁴⁷ For a detailed description of how anticipation-foresight methodologies could be introduced into Thailand's planning systems, see: NESDB / Asian Development Bank, "Thailand's New Planning System: Opportunities for the NESDB" (Chapter 3) in *Implementing the Ninth Plan*, Bangkok: NESDB / ADB, 2002

9. Looking to the Future

NESDB has recently attempted to align infrastructure priorities with Thailand's development objectives. It is obvious that given the scarcity of capital, infrastructure investments will have to be carefully prioritized based on strategic priorities to maximize human welfare and economic competitiveness. At this strategic level, benefits can be major. For example, logistics costs now total over 15% of GDP in Thailand. If these were reduced to 9% (still higher than in the United States), massive efficiency gains would be realized. Improving the alignment of infrastructure with Thailand's areas of comparative advantage, e.g., tourism, automotives, business and professional services, would significantly improve the country's long-term economic performance. Thailand has a good track record in this regard, but there is room for improvement. For example, the rapid growth of business, professional, and hospitality services is creating demand for infrastructure that enables dense, high transaction, but accessible, urban environments. This contrasts with the need to focus on peri-urban infrastructure focus that is needed to support economic development when manufacturing is the dominant engine of growth.

At a lower level, the efficiency of public investments will need to be improved to lower costs to producers and reduce user charges to consumers. For example, inefficient infrastructure acts as a tax on all producers, and especially serious in the case of exports, acting as a hidden export tax. The Thailand Development Research Institute (TDRI) estimates that if 10% improved efficiency could be realized in electricity generation and distribution, 0.33% would be added to Thailand's economic growth rate, the corresponding figure for the telecommunications sector is 0.17%. Given that electricity and telecommunications are two of the more efficient infrastructure sectors in Thailand, yet together could add 0.5% to GDP growth through improved efficiency, even greater gains to GDP growth through increased efficiency improvements in infrastructure operations could easily be realized in Thailand. For example, improving the efficiency of logistics systems in Thailand could significantly contribute to increased GDP growth.

There are threats of a structural nature looming on the horizon that mean infrastructure planning cannot be done on an "as usual" basis. The most important of these threats is the possibility, indeed probability, of major increases in energy prices, particularly petroleum products. Threats of this nature cross-cut infrastructure sectors and need to be worked into infrastructure planning for all sectors. For example, cities need to be denser, a requisite being mass rail transit, transportation systems need to be more efficient so fuel is not wasted in delays and diversions, buildings need to be constructed in new ways conforming to new types of building codes, and demand management pricing systems are needed. The only way that cross-cutting issues can be effectively internalized into infrastructure planning is if there are units undertaking strategic thinking at the overall planning and sectoral levels, as advocated in this paper.

Appendix 1

Preliminary Identification of Infrastructure Priorities (NESDB)

- (a) Improving the cost-effectiveness of *logistics*
- (b) *Improving accessibility within urban areas* (especially the extended Bangkok region) in support of the rapid, and structurally fast changing, growth occurring in urban areas (in particular the rapid rise in output in business, professional, and producer services; and the re-structuring of manufacturing around fewer, but deeper, dominant clusters such as automotives). Much of the accessibility improvement would be accomplished through *rapid transit systems*
- (c) Improving nation-wide rapid movement of goods and people, this could involve a *national expressway system*, such as is being (or has been) developed in Malaysia, China, Japan, the United States, South Korea, etc.
- (d) *Elimination of slums* through a *national housing program* focused on facilitation of private sector provision of housing, but including direct public delivery of housing targeted to the poorest socio-economic groups
- (e) Improved *water distribution (including at the small settlement level) and waste water systems*. The latter at present are non-sustainable. Related, improving water management at the river basis (and sub-basin) scale
- (f) Improvements in the *telecommunications* system with a goal of achieving a national level playing field in terms of access, quality of service, and cost
- (g) Given the likely future prices of energy (\$60 - \$80. per barrel petroleum over the programming period) , and Thailand's macro economic vulnerability in this regard, the above analysis would be nested in a concern for *improving the energy efficiency of the economy*, significantly supported by improved infrastructure systems.