



# Report and Recommendation of the President to the Board of Directors

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Project Number: 40906  
October 2011

## Proposed Loan: Nam Ngum 3 Hydropower Project (Lao People's Democratic Republic)

In accordance with ADB's public communication policy (PCP, 2005), this abbreviated version of the RRP excludes confidential information and ADB's assessment of the project or transaction risk as well as other information referred to in paragraph 126 of the PCP.

Asian Development Bank

## CURRENCY EQUIVALENTS

(as of 31 August 2011)

Currency Unit – kip (KN)

KN1.00	=	\$0.00012
\$1.00	=	KN7,999
B1.00	=	\$0.0333
\$1.00	=	B30.00

## ABBREVIATIONS

ADB	–	Asian Development Bank
COD	–	commercial operations date
EGAT	–	Electricity Generating Authority of Thailand
GMS	–	Greater Mekong Subregion
LDC	–	least developed country
LHSE	–	Lao Holding State Enterprises
LTA	–	lender's technical adviser
NN2	–	Nam Ngum 2
NN3PC	–	Nam Ngum 3 Power Company
NNR	–	Nam Ngum River
NNRB	–	Nam Ngum River Basin
PPA	–	power purchase agreement
PPP	–	public-private partnership
S&P	–	Standard and Poor's

## WEIGHTS AND MEASURES

km	–	kilometer
kV	–	kilovolt
m	–	meter
MW	–	megawatt
GW	–	gigawatt
GWh	–	gigawatt-hour

## NOTES

- (i) The fiscal year (FY) of Nam Ngum 3 Power Company ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

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In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

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## PROJECT AT A GLANCE

<b>1. Project Name:</b> Nam Ngum 3 Hydropower Project	<b>2. Project Number:</b> 40906
<b>3. Country:</b> Laos, PDR	<b>4. Department/Division:</b> Private Sector Operations Department Infrastructure Finance Division 2

**5. Sector Classification:**

Sectors	Primary	Subsectors
Energy	√	Large Hydropower

**6. Thematic Classification:**

Themes	Primary	Subthemes
Regional Cooperation and Integration	√	Cross border Infrastructure
Economic Growth		Widening Access to Markets & Economic Opportunities
Private Sector Development		Public-Private Partnerships
		Private Sector Investment

**6a. Climate Change Impact:**

Adaptation	High
Mitigation	Medium
Not applicable	

**6b. Gender Mainstreaming:**

Gender equity theme	
Effective gender mainstreaming	
Some gender benefits	√
No gender benefits	

**7. Targeting Classification:**

General Intervention	Targeted Intervention		
	Geographic dimensions of inclusive growth	Millennium Development Goals	Income poverty at household level
√			

**8. Location Impact:**

Rural	
Urban	Low
National	High
Regional	Medium

**9. Safeguard Categorization:**

Environment	“A”
Involuntary resettlement	“A”
Indigenous peoples	“A”

**10. ADB Financing:**

Sovereign/Nonsovereign	Modality	Source	Amount (\$ million)
Sovereign	Project Loan	OCR	Up to \$98.2 million
Sovereign	Project Loan	ADF	Up to \$16.9 million
Nonsovereign	Direct Loan	OCR	Up to \$200 million
Nonsovereign	Direct Loan (with Risk Participation)	OCR	Up to \$150 million

## I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on a proposed loan, without government guarantee to Nam Ngum 3 Power Company (NN3PC) for the Nam Ngum 3 Hydropower Project consisting of: (i) tranche 1 of up to \$200 million; and (ii) tranche 2 of up to \$150 million in respect of which, the risk of nonpayment by NN3PC will be assumed by financial institutions acceptable to the Asian Development Bank (ADB) under an unfunded risk participation arrangement.

## II. THE PROJECT

### A. Project Identification and Description

#### 1. Project Identification

2. The hydropower potential in the Greater Mekong Subregion (GMS) is extensive, with an estimated potential of 30,000 megawatts (MW). However, this potential is unevenly distributed among the GMS countries.<sup>1</sup> For example, Thailand, which has a large and growing domestic power requirement, has limited hydropower potential and is highly dependent on natural gas for fuel which is projected to deplete over time. The Lao People's Democratic Republic (Lao PDR), on the other hand, has the largest hydropower potential in the region at 18,000 MW, but the smallest domestic power requirements. The GMS member countries have agreed to promote the development and trading of energy to enable member countries to access cost-efficient energy resources.

3. The Lao PDR is considered a least developed country (LDC), with a gross domestic product per capita of \$890 in 2009.<sup>2</sup> The Government of the Lao PDR aims to take the country out of the LDC category by 2020. The power sector is critical to achieving this goal, because it is a vital source of export earnings that generated close to 30% of total export receipts in 2008. Today only 2,530 MW (14% of the estimated hydropower capacity) has been harnessed. The government's target is to have some 16,000 MW of installed hydropower capacity by 2020, of which up to 7,000 MW will be exported to Thailand, and 5,000 MW to Viet Nam. However, the government does not have the resources to raise the substantial financing required to build these projects and would need to mobilize financing from the private sector through public-private partnership (PPP) arrangements, with the government holding minority stakes in these projects.

4. ADB support for infrastructure development PPPs has included the construction of Theun Hinboun in 1994<sup>3</sup> and Nam Theun 2 (NT2) in 2005.<sup>4</sup> The government has determined that the Nam Ngum 3 Hydropower Project should be financed through PPP arrangements using the build-own-operate-transfer mechanism. When completed, the project would be among the largest hydropower plants in the Lao PDR. Given the amount of financing required, the sponsors of NN3PC have requested ADB to provide financial assistance and take a prominent role in arranging long-term financing. As an equity shareholder, the Government of the Lao PDR has also requested ADB to consider supporting the financing required for their investment into the project. ADB's

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<sup>1</sup> The GMS countries are Cambodia, the People's Republic of China, Lao People's Democratic Republic, Myanmar, Thailand, and Viet Nam.

<sup>2</sup> ADB. 2009. *Asian Development Bank and Lao People's Democratic Republic Fact Sheet*. Manila. [http://www.adb.org/Documents/Fact\\_Sheets/LAO.pdf](http://www.adb.org/Documents/Fact_Sheets/LAO.pdf)

<sup>3</sup> ADB. 1994. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Lao People's Democratic Republic for the Theun-Hinboun Hydropower Project*. Manila.

<sup>4</sup> ADB. 2005. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Political Risk Guarantee for the Greater Mekong Subregion Nam Theun 2 Hydroelectric Project in the Lao People's Democratic Republic*. Manila.

sovereign and nonsovereign operations have collaborated on this project since 2006. ADB has also been asked to lead the environment and social due diligence to ensure that the project will be developed and operated in a sustainable manner and comply with ADB's Safeguard Policy Statement (2009). As part of its leadership role, ADB provided a technical assistance package in 2007 to conduct a cumulative impact assessment of the Nam Ngum River Basin (NNRB), which was completed in 2010.<sup>5</sup>

5. NN3PC has been in lengthy negotiations with the Electricity Generating Authority of Thailand (EGAT) for the sale of power to Thailand. The negotiations were completed in March 2010 with the signing of a memorandum of understanding. The project was subsequently included in Thailand's 2010 power development plan as an important source of additional electricity to meet Thailand's power requirements by 2017.

## 2. Project Design

6. The project is located along the Nam Ngum River (NNR) in Vientiane and Xieng Khouang provinces and forms a cascade with other hydropower projects in the NNRB.<sup>6</sup> It will operate as a storage system with a maximum storage capacity of 1,407 million cubic meters. Water will pass through a 10.6 kilometer (km)-long headrace tunnel to an underground power station. A nearly 1 km-long tailrace tunnel would carry the water back to the river. The main features of the project include (i) 2 x 220 MW installed capacity; (ii) a concrete-faced rockfill dam, 220 meters (m) in height; and (iii) a 100 km long, 500 kV transmission line.

7. The project will connect to an existing substation in Nabong where transmission lines from other power export projects<sup>7</sup> will also be linked. Currently, only a 230 kilovolt (kV) switchyard exists at the Nabong substation, which is used solely by Nam Ngum 2 Power Company (NN2). This switchyard will need to be upgraded to a 230/500 kV collector substation to be able to serve both the project and NN2. Power from the Nabong substation will then pass through a 27 km-long 500 kV double circuit transmission line that will connect to the delivery point in Thailand. The line was financed and constructed by NN2 and is fully operational, but is currently only energized at 230 kV. NN2 currently owns the line.

8. The government is required under their concession agreement with NN3PC to (i) expand the existing Nabong substation to enable the project to connect to it, and (ii) own and operate both the Nabong substation and the common transmission line. At the government's request, ADB's sovereign operations is considering supporting the financing required by the Government of the Lao PDR to meet its obligations to NN3PC under the concession agreement. ADB financed project preparatory technical assistance to prepare the Nabong Udon Thani Transmission Line in 2009.<sup>8</sup>

## 3. The Borrower/ Sponsor

9. NN3PC, a special-purpose Lao PDR incorporated company, was established by a consortium consisting of the Axia Power Holdings (Axia), the Ratchaburi Electricity Generating Holding Public Company (Ratch), the GMS Lao Company (GMS Lao), and the Lao Holding State

<sup>5</sup> ADB. 2007. *Technical Assistance to the Lao People's Democratic Republic for Preparing the Cumulative Impact Assessment for the Nam Ngum 3 Hydropower Project*. Manila (approved on 21 February 2007 for \$800,000) included a 2-year water quality and fisheries monitoring program. The final report was completed in December 2010.

<sup>6</sup> A total of 14 hydropower projects are expected to be located in the Nam Ngum River Basin.

<sup>7</sup> It is envisaged that the Nabong substation and the common transmission line will be used by the following hydropower projects: Nam Ngum 2, Nam Ngum 3, Nam Ngiep 1, and Nam Theun 1. Nam Ngum 2 was commissioned in 2011. Nam Ngiep 1 is under development while the status of Nam Theun 1 is unclear.

<sup>8</sup> ADB. 2007. *Technical Assistance to the Lao People's Democratic Republic for Preparing the Nabong Udon Thani Transmission Line Project*. Manila. The final report was submitted in November 2009.

Enterprises (LHSE), to develop, construct, own and operate the project. With the exception of LHSE, the shareholders have extensive power generation experience.

10. Axia is a wholly owned subsidiary of Marubeni Corporation (Marubeni). Established in 2003, Axia currently owns 16 power generating assets globally with a combined generating capacity of 2,493 MW. Marubeni is one of the largest Japanese companies, with a diversified business portfolio. Marubeni has a strong presence in the global power market, having been involved in the development of 33 power projects in 22 countries, with a combined gross generating capacity of 23,604 MW.

11. Ratch is Thailand's second-largest electricity generator and the country's largest independent power producer with a market share of about 14.2% of Thailand's total generating capacity (as of March 2011). The company was founded in March 2000, and currently has investments in several commercial operating power plants with a stand-alone production capacity of 3,645 MW. Ratch is listed in the Stock Exchange of Thailand. However, EGAT owns and controls about 45% of the equity.

12. GMS Lao is a wholly owned subsidiary of GMS Power Public Company Limited (GMS Power). GMS Power is one of Thailand's leading private power developers. It is part of the consortium that developed, owns and operates the 210 MW Theun-Hinboun Hydropower Plant in the Lao PDR and the lead sponsor for the Bang Bo 350 MW combined cycle power plant in Thailand.<sup>9</sup> GMS Power is currently spearheading the construction of the 280 MW Theun-Hinboun expansion.

13. LHSE is the holding company specifically established by the Government of the Lao PDR to own and manage its equity investments in various power projects. ADB's sovereign operation is considering the financing of LHSE's equity in NN3PC.

## **B. Development Impact, Outcome, and Outputs**

### **1. Impact**

14. **Promote private sector investment.** The project, which has been developed under a PPP arrangement, will largely be financed through private sector equity and commercial debt. The success of this project will further increase the flow of private sector funds into infrastructure development in the Lao PDR. Roughly 10 PPP projects, including this one, are expected to be implemented over a 10-year period beginning in 2011.

15. **Improve energy security in Thailand.** Thailand is one of the largest electricity consumers in Southeast Asia. As of December 2009, installed power generation capacity was 29,212 MW, 71% of which is natural gas. The Government of Thailand has stressed the importance of diversifying its energy sources and securing alternative sources of fuel for power generation to ensure energy security that would sustain their economic growth. The goal is to reduce power generation from natural gas to about 50% by 2030, and increase power imports to about 25% of the system's power supply requirements. The project will achieve this objective by providing an alternative, low cost and renewable energy source.

### **2. Outcome**

16. The project's outcome is increased regional cooperation between the Lao PDR and Thailand through the trade of clean energy. The Lao PDR has limited opportunities for trade and

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<sup>9</sup> The Bang Bo power plant has been recently recognized for setting a world record of continuous operating performance. The facility also has an outstanding health, safety and environmental record.



economic growth. However, it has a very large hydropower potential that can be harnessed to generate foreign currency receipts. Thailand, on the other hand, has a strong and growing economy, but this growth may be at risk due to its heavy reliance on its dwindling sources of natural gas. This project is an example of an economic partnership in the region that addresses the development constraints of both countries through the trade of electricity.

17. The Government of Thailand has developed a plan to cut down greenhouse gas emissions because of increasing concerns regarding the environmental impact of power generation.<sup>10</sup> The plan calls for the increase in the portion of renewable energy in power generation to 2.4% by year 2020. Through the project, up to 2,072 gigawatt-hours (GWh) of clean energy will be sold to Thailand which will help Thailand avoid about 1.0 million tons per year of carbon dioxide emissions.

### **3. Outputs**

18. The output will be the construction of a 440 MW hydropower plant in compliance with ADB's Safeguards Policy Statement. The project will demonstrate that large infrastructure projects can be developed in a sustainable manner while providing economic benefits to the country.

19. The project will spur economic growth in the Lao PDR by increasing government revenues, employment generation and the provision of community infrastructure. It will generate about \$771 million in revenues for socioeconomic development and provide employment opportunities during the construction and operation phase for the Lao PDR nationals. Moreover, the project will construct community infrastructure (i.e., schools, health centers and improved roads) that will facilitate economic and social activities.

## **C. Alignment with ADB Strategy and Operations**

### **1. Consistency with Strategy 2020**

20. The project is consistent with ADB's Strategy 2020,<sup>11</sup> which identifies infrastructure development and regional cooperation as two of the five core areas of operation. Under Strategy 2020, ADB's infrastructure operations will promote a larger role for the private sector in infrastructure financing. ADB will also scale up its support for regional cooperation by increasingly investing in projects that accelerate growth and economic partnerships in the region.

### **2. Consistency with Regional Strategy**

21. The regional cooperation operations business plan (2010–2012) for GMS<sup>12</sup> aims to achieve an integrated and prosperous region through the promotion of economic growth, environmental sustainability and private sector development. This project will demonstrate the economic benefits that will accrue to both countries as a result of the trading of power. It also promotes the development of large-scale infrastructure in the region with significant debt and equity coming from private sector institutions based in other regions. Project implementation will meet high environmental and social standards.

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<sup>10</sup> Roughly 50% of Thailand's greenhouse gas emissions are attributable to power generation.

<sup>11</sup> ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

<sup>12</sup> ADB. 2009. *Regional Cooperation Operations Business Plan: Greater Mekong Subregion, 2010-2012*. Manila.

### 3. Consistency with Country Strategy

22. ADB's country strategy and program (CSP) 2007-2011 for the Lao PDR<sup>13</sup> is focused on promoting pro-poor sustainable growth. This project mobilizes large-scale private sector investment into the Lao PDR which will (i) generate employment opportunities for the Lao PDR nationals, (ii) improve the skills of the workforce; and (iii) provide community infrastructure, all of which will have economic multiplier effects. At the end of the concession period, the project will be turned over to the government at no cost. The project will continue to generate income for the country for at least another 25 years after the turnover.

### 4. Consistency with Sector Strategy

23. ADB's Energy Policy<sup>14</sup> requires energy operations to be aligned with ADB's overall strategy, with one emphasis being on energy security. The project is consistent with the policy as it would diversify Thailand's power supply.<sup>15</sup> Having a diversified energy source will help ensure that Thailand's economic growth will not be derailed by energy supply shortages or price volatility.

### 5. Lessons from Previous Operations

24. A key finding from ADB's independent review of the Lao PDR power sector program in 2010<sup>16</sup> indicates the government lacks the capacity to identify and manage environmental and social impacts. Further interventions to increase the government's capacity are recommended, including through continued financial assistance by ADB for the development of hydropower projects to ensure proper environmental and social safeguards are adopted. These would include incorporating lessons learned from the NT2 experience such as (i) an improved stakeholder consultation and grievance mechanism; (ii) the early implementation of the livelihood restoration programs; and (iii) the establishment of realistic targets that take into account the affected peoples' capacity to assimilate new practices.

## D. Implementation Arrangements

25. Table 3 summarizes the implementation arrangements.

**Table 3: Summary of Implementation Arrangements**

Aspects	Arrangements
Regulatory framework	NN3PC was awarded, on a negotiated basis, a concession covering a period of up to 27 years after commercial operations date.
Management	Supervised by the private shareholders, all of whom have extensive experience in the development and operation of large power plants.
Implementation period	October 2011–December 2018
<b>Construction Arrangements</b>	
Type of arrangement	There will be no single turnkey construction contract. Instead, the project will be constructed under three main interdependent contracts with detailed design and construction supervision provided by the engineer. (i) Contract C2: contract for main civil works including the supply

<sup>13</sup> ADB. 2006. *Country Strategy and Program: Lao People's Democratic Republic, 2007–2011*. Manila.

<sup>14</sup> ADB. 2009. *Energy Policy*. Manila.

<sup>15</sup> Natural gas currently accounts for 70% of installed capacity.

<sup>16</sup> ADB. 2010. *Sector Assistance Program Evaluation for the Energy Sector in the Lao People's Democratic Republic*. Manila.

Aspects	Arrangements
	and installation of all hydromechanical equipment. (ii) Contract C4: supply, delivery and installation of electromechanical equipment including turbines, generators and transformers. (iii) Contract C5: construction and commissioning of a transmission system that includes the 100 km 500 kV transmission line from the switchyard to Nabong substation.
<b>Operations Arrangements</b>	
Revenue structure	Power purchase agreement with EGAT, which will have provisions that will obligate EGAT to pay for declared availability on a take-or-pay basis for a period of 27 years from commercial operations date.
Performance monitoring	Key performance indicators, including output and outcome indicators, compliance with ADB's safeguard requirements, construction progress, updates and financial performance during operation, which will be reported by NN3PC.

ADB = Asian Development Bank, PRC = People's Republic of China, EGAT = Electricity Generating Authority of Thailand, km = kilometer, kV = kilovolt, NN3PC = Nam Ngum 3 Power Company, O&M = operations and maintenance.

Source: Asian Development Bank.

### III. THE PROPOSED ADB ASSISTANCE

#### A. The Assistance

26. ADB will provide a (i) direct loan in the amount of up to \$200 million, and (ii) a second tranche, in the amount of up to \$150 million. ADB will enter into an unfunded risk participation agreement for the full amount of the second tranche with eligible commercial banks. Both tranches will carry an interest rate as well as commitment and front-end fees to be determined by ADB's Investment Committee. Both tranches will finance only eligible project costs under ADB's Procurement Guidelines (2010, as amended from time to time).

27. In addition to assistance from ADB's nonsovereign operations, ADB is also considering a loan to the Government of the Lao PDR in the amount of up to \$115.1 million to finance LHSE's equity investment in the project. The sovereign loan will be considered separately by management and will follow the approval process for ADB's sovereign loan proposals.

#### B. Value-Added by ADB Assistance

28. The nature of the project (i.e., long construction period, high upfront capital expenditure, competitive tariffs, long asset life and revenue contracts) is appropriately financed by long-tenor debt to match its cash flow profile. The proposed long-tenor debt from ADB plays a crucial role in ensuring the economic and financial viability of the project.

29. The development of hydropower resources as an export commodity is a critical component of the Government of the Lao PDR's strategy to achieve its poverty reduction goal. A substantial amount of financing from the private sector is required to build these projects. However, the private sector continues to perceive inherent risks in supporting these types of projects without the involvement of development financial institutions, such as ADB. They find confidence to co-invest alongside ADB because the project will be financed in a structurally sound manner and will comply with high environmental and social standards.

## IV. POLICY COMPLIANCE

### A. Safeguards and Social Dimensions

30. The project is classified category A for environment, for involuntary resettlement, and for indigenous people under the Safeguard Policy Statement. The potential environmental and social impacts and risks of the project and its associated facilities were identified and assessed in the environmental impact assessment prepared by NN3PC and posted on ADB's website on 14 January 2011.<sup>17</sup> NN3PC will undertake an updated comprehensive biodiversity study on project areas commencing in the last quarter of 2011 to reconfirm the extent of conservation and offset programs. An independent advisory panel, to be financed by ADB, will be constituted to assist the government evaluate the impacts on biodiversity, assess the adequacy of recommended measures and implement an effective biodiversity offset programs to achieve a no net loss of biodiversity. Measures to address the social impacts of the project are described in the draft resettlement and ethnic minority development plan (REMDP) which has been initially posted on ADB's website on 6 June 2011.<sup>18</sup> Broad community support for the project has been provided by Khmu ethnic community living in Ban Xiengdet that will be directly affected by the Project. Such support is documented in meeting agreements and household level consent to relocate forms authenticated by village leaders. Effective measures to avoid, minimize, mitigate and compensate for the adverse impacts, and to ensure compliance with ADB's social protection requirements, are incorporated in the various social plans in the REMDP. The institutional capacity and commitment of NN3PC to manage the project's environmental and social risks are deemed adequate,<sup>19</sup> while collaboration with the NNRB Committee is considered crucial in managing cumulative impacts at the river basin level. Information disclosure and consultations have been and will be conducted in accordance with ADB requirements.

### B. Anticorruption Policy

31. NN3PC has been advised of ADB's Anticorruption Policy (1998, as amended to date), and its policy of implementing best international practices relating to the combating of money laundering and the financing of terrorism. ADB will ensure that the project documentation includes appropriate anti-corruption provisions and remedies for ADB in the event of noncompliance.

### C. Investment Limitations

32. The proposed direct loan is within ADB's approved medium-term, country, industry, single obligor, and group exposure limits for nonsovereign operations.

### D. Assurances

33. Consistent with the Agreement Establishing the Asian Development Bank (the Charter),<sup>20</sup> the Government of the Lao PDR will be requested to confirm that it has no objection to the proposed assistance to Nam Ngum 3 Power Company. ADB will enter into suitable finance documentation, in form and substance satisfactory to ADB, following approval of the proposed assistance by the Board of Directors.

<sup>17</sup> GMS Lao Company Limited. 2011. *Lao PDR: Nam Ngum 3 Hydropower Project Draft Environmental Impact Assessment*. <http://www.adb.org/Documents/Environment/LAO/40906/40906-01-lao-eia-draft.pdf>.

<sup>18</sup> Nam Ngum 3 Power Company. 2011. *Lao PDR: Nam Ngum 3 Hydropower Project Draft Resettlement and Ethnic Minority Development Plan*. <http://www.adb.org/Documents/REMDPs/LAO/40906/40906-01-lao-remdp-01.pdf>.

<sup>19</sup> Both the Environmental and Social Safeguards Summary and the Summary Poverty Reduction and Social Strategy are accessible from the list of linked documents in Appendix 2.

<sup>20</sup> ADB. 1996. *Agreement Establishing the Asian Development Bank*. Manila.

## V. RECOMMENDATION

34. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve a loan, without government guarantee, to Nam Ngum 3 Power Company for the Nam Ngum 3 Hydropower Project in the amount of: (i) up to \$200,000,000 under tranche 1; and (ii) up to \$150,000,000 under tranche 2, in respect of which the risk of nonpayment by Nam Ngum 3 Power Company will be assumed by financial institutions acceptable to ADB under an unfunded risk participation arrangement. The terms and conditions of the proposed loan will be substantially in accordance with those set forth in this report, and as may be reported to the Board.

Haruhiko Kuroda  
President

6 October 2011

## DESIGN AND MONITORING FRAMEWORK

<b>Design Summary</b>	<b>Performance Targets and/or Indicators</b>	<b>Data Sources and/or Reporting Mechanisms</b>	<b>Assumptions and Risks</b>
<p><b>Impact</b></p> <p>Increased private sector investment in hydropower in the Lao PDR</p> <p>Increased reliability of power supply in Thailand</p>	<p>At least 10 public–private partnerships for hydropower are successfully implemented between 2011 and 2020 in the Lao PDR.</p> <p>Diversify Thailand’s power supply sources through the importation of up to 25% of its power supply requirements regionally by 2030 from only 2.2% at the end of 2009</p> <p>Up to 7,000 MW of power will be produced from the Lao PDR and sold to Thailand by 2020, an increase from only 640 MW at the end of 2009.</p>	<p>Information released by the Ministry of Energy and Mine of the Government of the Lao PDR</p> <p>Statistics and information released by the Ministry of Energy of Thailand</p>	<p><b>Assumptions</b></p> <p>The Government of the Lao PDR is able to attract private sector investment to finance the construction of hydropower projects in the country.</p> <p>Thailand continues to diversify its electricity generation mix with investments in hydroelectricity, including imports from the Lao PDR.</p> <p>Thailand continues to purchase hydropower from the Lao PDR at economically viable prices.</p>
<p><b>Outcome</b></p> <p>Increased regional cooperation between the Lao PDR and Thailand through the trade of clean energy</p>	<p>Incremental sale of up to 2,072 GWh of electricity annually to Thailand beginning in 2017 (2010 baseline: 7,951 GWh) until 2044</p> <p>Yearly reduction of 1.0 million ton of CO<sub>2</sub> equivalent in Thailand starting in 2017</p> <p>The average carbon dioxide emission level per generation unit in Thailand’s power generator sector decreases by 0.095kg CO<sub>2</sub>/kWh in 2020 (2010 baseline: 0.482 kg CO<sub>2</sub>/kWh)</p>	<p>Various monitoring reports will be submitted by NN3PC and technical advisors.</p> <p>Annual energy statistical reports published by EGAT</p>	<p><b>Assumptions</b></p> <p>NN3PC operates the plant according to specifications.</p> <p>EGAT takes the power generated by the project when the plant is available.</p> <p>Sufficient availability of water resources to generate electricity</p> <p><b>Risk</b></p> <p>The Government of the Lao PDR is unable to complete the financing and/or construction of the Nabong Facilities.</p>

<b>Design Summary</b>	<b>Performance Targets and/or Indicators</b>	<b>Data Sources and/or Reporting Mechanisms</b>	<b>Assumptions and Risks</b>
<p><b>Outputs</b> Construction of Nam Ngum 3 Hydropower plant in the Lao PDR as a public–private partnership in an environmentally sustainable and socially inclusive manner</p> <p>Economic benefits to the Lao PDR in the form of increased government revenues, employment opportunities for the Lao nationals, and economic activity in the Lao PDR</p>	<p>Construction of a 440 MW hydropower project along the Nam Ngum river financed by private companies and government completed by 2016</p> <p>Appropriate environmental and social mitigation measures implemented by 2016 in accordance with safeguard documents</p> <p>Royalties to the Government of the Lao PDR of about \$7.6 million annually starting 2018</p> <p>Taxes to the Government of the Lao PDR of about \$2.5 million starting in 2022 and increasing to \$14.1 million by 2034</p> <p>Dividends to LHSE of \$7.1 million starting in 2018, increasing to \$17.8 million in 2033</p> <p>Locally purchased goods and services amount to about \$141 million of total civil works contract as of 2016</p> <p>Employment opportunities for the Lao PDR nationals during construction and operations</p>	<p>Monitoring reports submitted by NN3PC</p> <p>Environmental and social safeguard implementation reports submitted by NN3PC and lenders’ technical advisor</p> <p>Audited financial reports by the state audit organization on dividends transferred by LHSE to the Government of the Lao PDR</p>	<p><b>Assumptions</b> Debt to partly finance project construction is successfully raised.</p> <p>The implementation of livelihood restoration and resettlement activity is carried out as planned.</p> <p>Suitable biodiversity offset locations are found.</p>

NN3PC = Nam Ngum 3 Power Company  
Source: Asian Development Bank