



European Project
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6th Framework
Programme



MINISTRY FOR FOREIGN
AFFAIRS OF FINLAND

WATER AND ENERGY:

Sustainable development of hydropower involving the private sector in research collaboration in the Lower Mekong region

Final Report



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List of abbreviations

Abbreviation	Full name
ACE	ASEAN Centre for Energy
ADB	Asian Development Bank
AFD	Agence Française de Développement
ANZ	Australia and New Zealand Banking Group
AIT	Asian Institute of Technology
AusAID	Australian Agency for International Development
BDP	Basin Development Plan Programme (of the MRC)
BMA	Bangkok Metropolitan Area
BOOT	Build-Own-Operate-Transfer
BOO	Build-Own-Operate
BOT	Build-Operate-Transfer
BTS	Bangkok Transit System Plc.
CBA	Cost-benefit analysis
CDM	Clean Development Mechanism
CDRI	Cambodia Resources Institute for Development
CER	Certified Emission Reduction
CNMC	Cambodia National Mekong Committee
COD	Commercial operation date
CSR	Corporate Social Responsibility
CU_WRSRU	Chulalongkorn University-Water Resources System Research Unit
DANIDA	Danish International Development Agency
DFID	UK Department for International Development
DOH	Department of Highway (Thailand)
DWF	Danish Water Forum
DWR	Department of Water Resources (Thailand)
EAC	Electricity Authority of Cambodia
EC	European Commission
EDC	Electricity du Cambodge

EdL	Electricité du Lao
EEP	Energy and Environment Partnership Programme
EGAT	Electricity Generating Authority of Thailand
EIA	Environmental Impact Assessment
EPC	Engineering procurement contract
EPFI	Equator Principles financial institutions
EPPO	Energy Policy and Planning Office (Thailand)
ERAV	Electricity Regulatory Authority of Vietnam
ESI	Electric supply industry
ESL	Earth Systems Lao
ETA	Expressway and Rapid Transit Authority of Thailand
EUWI	European Union Water Initiatives
FIRR	Financial internal rate of return
GHG	Greenhouse Gas
GIS	Geographical Information Systems
GMS	Greater Mekong Subregion
GoL	Government of Lao PDR
GoV	Government of Vietnam
GTZ	German Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit)
GWh	Gigawatt-hour (= million kilowatt-hour)
HD	Hydropower Development
HIA	Health Impact Assessment
HSAP	Hydropower Sustainability Assessment Protocol
ICS-CDM	Integrated Capacity Strengthening for the Clean Development Mechanism
IDRC	International Development Research Centre (Canada)
IFS	International Foundation for Science
IGES	Institute for Global Environmental Strategies (of Japan)
IPP	Independent power producer
IRR	Internal rate of return
ISH	Initiative on Sustainable Hydropower

IWLRM	Integrated Water Land Resource Management
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
JIID	Japanese Institute of Irrigation and Drainage
JST	Japan Science and Technology Agency
kWh	kilowatt-hour
LMB	Lower Mekong Basin
MCDA	Multi-Criteria Decision Analysis
MDGs	Millennium Development Goals
MEM	Ministry of Energy and Mines (Lao PDR)
MI	Mekong Institute
MICT	Ministry of Information and Communication Technology (Thailand)
MIME	Ministry of Industry, Mine and Energy (Cambodia)
MOE	Ministry of Education (Lao PDR)
MoE	Ministry of Energy (Thailand)
MoF	Ministry of Finance (Thailand)
MONRE	Ministry of Natural Resources and Environment (Vietnam)
MoT	Ministry of Transport (Thailand)
MOU	Memorandum of Understanding
MOWRAM	Ministry of Water Resources and Meteorology (Cambodia)
MRC	Mekong River Commission
MRCS	Mekong River Commission Secretariat
MW	Megawatt
MRTA	Mass Rapid Transit Authority of Thailand
MWA	Metropolitan Waterworks Authority (Thailand)
NEPC	National Energy Policy Council (Thailand)
NESDB	National Economic & Social Development Board
NOMA	Norad's Programme for Master Studies
NORAD	Norwegian Agency for Development Cooperation
NGO	Non-profit organization

NT2	Nam Theun 2 project
NTC	National Telecommunications Commission (Thailand)
NTPC	Nam Theun Power Company
NUOL	National University of Laos
NVE	Norwegian Water Resources and Energy Directorate
NWRC	National Water Resources Committee (Thailand)
NWRP	National Water Resources Policy (Thailand)
OEPP	Office of Environmental Policy and Planning (Thailand)
PAT	Port Authority of Thailand
PCD	Pollution Control Department (Thailand)
PDP	Power Development Plan (Thailand)
PES	Payments for environmental services
PDF	Project Development Fund
PDP	Power development plan
PPA	Power purchase agreement
PPP	Public-Private Partnership
PSO	Public Service Obligation
PWA	Provincial Waterworks Authority (Thailand)
R&D	Research and Development
R4D	Research for Development
RBO	River basin organization
RBC	River basin committees
RED	Renewable energy development
RID	Royal Irrigation Department (Thailand)
ROE	Return on equity (= 'equity IRR')
RPS	Renewable Portfolio Standard
RTG	Royal Thailand Government
RUPP	Royal University of Phnom Penh
SAC	Scientific Advisory Committee
SDC	Swiss Agency for Development and Cooperation
SENSA	Swedish Environment Secretariat for Asia

SIA	Social Impact Assessment
SIU	Norwegian Centre for International Cooperation in Higher Education
SIDA	Swedish International Development Agency
SODs	Strategic operation directives
SPP	Small Power Producers
SRT	State Railway of Thailand
SYKE	Finnish Environment Institute
T-GLOB	Research Development and Co-ordination Center for Global Warming and Climate Change
THBX	Theun Hinboun Expansion Project
TRF	Thailand Research Fund
UBU	Ubon Ratchatani University
UCA	Uniting Church Australia
UKCDS	UK Collaborative on Development Sciences
UMB	Upper Mekong Basin
USAID	United States Agency for International Development
VSPP	Very Small Power Producers
WB	World Bank
WR	Water resources
WREA	Water Resources and Environment Agency (Lao PDR)
WRSRU	Water Resources System Research Unit

Executive Summary

Hydropower is the most important energy resource in the Mekong region and Lower Mekong Basin (LMB). The total hydropower capacity in the LMB is estimated to be about 30,000 megawatts, consisting of potential sites on various tributary systems and the mainstream. The integrated development of hydropower in balance with other beneficial uses of the Mekong's water resources is central to underpin economic growth and poverty alleviation strategies. It is also an integral part of the strategy to improve regional energy security and reduce vulnerability to international energy price shocks.

In the region, the shortage of public funds for development of hydropower has led to a strong drive for private investment. However, the private sector involvement in hydropower development in the LMB has been seen as rather unsustainable, for example due to lack of proper EIA/SIA/HIA studies, lack of transparency, unclear benefit sharing, etc. This may lead to serious, adverse environmental, social and health effects such as environmental degradation, loss of livelihood, loss of biodiversity, diseases, poverty, inequity, etc. These challenges have highlighted the need to understand the comparative advantage of the various Public-Private Partnership (PPP) approaches. Whichever participation model for private sector involvement in hydropower development is adopted, the common need is for appropriate regulation, legislation, control, and investment including innovative financing. This is an important new area for research and knowledge sharing, where all the factors of sustainable hydropower development, private sector involvement and new issues such as climate mitigation and adaptation converge. Research can help inform the policy and regulatory framework in important areas such as the allocation of risk between government and private developers and how to maximize returns to both partners ensuring transparency and building of public confidence.

Although hydro-energy is a renewable and clean energy source, it may also have negative consequences, i.e. on the environment, social and health issues, including some limited greenhouse gas emissions, water availability for other uses, etc. The application of different methods and approaches for assessing social and environmental impacts for watercourse development projects, such as multi-criteria decision analysis (MCDA) methods and the water footprints concept, is important. Climate change will also affect the river hydrology, extreme weather (such as floods, droughts) that in turn will have negative impacts for hydropower development in certain settings. This is a topic that research could contribute to sustainable hydropower by assessing the current and predicting the future potential of hydro-energy, especially in the remote rural areas that are vulnerable to changes.

There are great needs for making scientific research findings available and of good use at the policy-making and practical levels. Inclusion of various stakeholders in research including the private sector would be a way to facilitate the application of research results beyond the usual academic circle.

The project entitled "Water and Energy: Sustainable development of hydropower involving the private sector in research collaboration in the Lower Mekong region" was funded by the Ministry for Foreign Affairs of Finland to the Norwegian Water Resources and Energy Directorate (NVE), who is a member of EUWI-ERA Net SPLASH project, to carry out the study related to hydropower development in the Lower Mekong Basin (LMB) together with other SPLASH members, namely the Danish Water Forum (DWF) and the Finnish Environment Institute (SYKE), as well as a team of national and regional consultants from the LMB.

The project consists of 3 main parts:

1. Assessments/reviews of existing research, knowledge transfer and capacity building in hydropower related subjects at the academic level in Cambodia, Lao PDR, Thailand and Vietnam; the review of private sector involvement in hydropower development; and the study on multi-criteria decision analysis (MCDA) by an Internet questionnaire and interviews on hydropower development in the LMB analyzing state-of-the-art in water resources education in the 4 Mekong countries.
2. Multi-stakeholder workshop, entitled “Regional Workshop for Coordination of Research on Hydropower Development in the Lower Mekong Basin” held in Vientiane, Laos, 14-15 September 2010. The workshop aimed at improving the research and cooperation among research/academic institutions, private sector and policy-makers in the Lower Mekong Basin in order to contribute to the sustainable hydropower development. This was to share knowledge and develop recommendations, to establish links and initiate coordination among stakeholders. There were 58 participants, mainly from the four LMB countries, Cambodia, Lao PDR, Thailand and Vietnam, with a small number from Europe, Australia and Africa. 17 presentations were made by participants from different groups of society, including NGOs, academics, and practitioners. The workshop proceeding is available on the SPLASH website (link: http://splash-era.net/news_events3.php) together with all the presentations at the workshop.
3. Recommendations on inclusion of various stakeholders in research, outlines of research and capacity building themes related to sustainable hydropower, and outlines of funding opportunities were made together with other dissemination documents, namely the fact sheet on research and capacity building for sustainable hydropower in the Lower Mekong Basin, and the policy brief which is published as Learning Note on coordination of research on hydropower development in the Lower Mekong Basin. These documents will be disseminated widely as hard copies sent to relevant stakeholders and as electronic form available on the SPLASH website.