HYDROPOWER DEVELOPMENT IN THE LOWER MEKONG BASIN (LMB)

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I. INTRODUCTION

- LMB & HYDROPOWER POTENTIAL

Mekong is one of the world large rivers:

• Average Discharge: 15,000 m$^3$/s
• Length: 4,800 km
• Catchment Area: 795,000 km$^2$
• Over 50 million inhabitants
• Rich in Biological & Natural Resources

Huge Hydropower Potential:

• Over 30,000 MW in LMB (13,000 MW in Lao PDR, 13,000 MW on mainstream and remaining in Cambodia, Viet Nam and Thailand).
  Only 7% developed to date and several projects with over 2,000 MW are under construction and/or investigation

• 23,000 MW in Upper Mekong or Lancang River in Yunnan. About 13% developed and Xiaowan of 4,200 MW is under construction
Hydropower Potential in the Mekong Basin

Mainstream: 13,000 MW
Tributaries: 17,900 MW

* Cambodia: 2,200 MW
* Thailand: 700 MW
* Lao PDR: 13,000 MW
* Viet Nam: 2,000 MW

TOTAL (LMB): 30,200 MW
Lancang: 23,000 MW

MRC Mandate in 1995 Agreement

“COOPERATION ON THE BASIS OF SUSTAINABLE DEVELOPMENT, UTILIZATION, MANAGEMENT AND CONSERVATION OF WATER AND RELATED RESOURCES OF THE MEKONG RIVER BASIN”. HYDROPOWER IS INCLUDED.

MRC Major Tasks in Hydropower Development at Regional Level

COORDINATION BETWEEN THE MEMBER STATES AND OTHER RELEVANT STAKEHOLDERS IN SUSTAINABLE DEVELOPMENT, INCLUDING INTERNATIONAL ORGANIZATIONS, LENDING AGENCIES AND INVESTORS FROM STRATEGIC PLANNING, PROMOTION AND FACILITATION TO MONITORING.

MRC Hydropower Studies

• INVENTORY OF WATER RESOURCES PROJECTS IN 1970s
• BASIN WIDE AND PROJECT STUDIES
• 2001 HYDROPOWER DEVELOPMENT STRATEGY
• 2005 CONCEPT PAPER ON HYDROPOWER DEVELOPMENT

II. ENERGY SITUATION IN GMS & MRC COUNTRIES

• Energy Situation in GMS: High Demand and Large Supply Potentials
• Power Demand & Markets:
  * Yearly Increase: 2,000 MW (2000-10) - 4,000 MW (2010-20)
  * MOUs: T-L = 3,000 MW; Ch-L = 630 MW; V-L = 1,500 MW;
    T-Ch = 1,500 MW; T-My = 15,000 MW
• High Oil Prices
• LMB Hydropower Development (HD) to date 2,124 MW
  and Potential 30,900 MW
• Percentage of HD in Total Supply (Capacity): L = 80%; V = 50%;
  T = 13%; C = few
• Access to Electricity: C = 15%; L = 42%; T = 96%; V = 80%
• Per Capita Consumption (kWh/yr): C = 30; L = 100; T = 1,400; V = 200
• Financing for HD: Investors/ Lending Agencies/ MRC Constraints
• Environmental Concerns & 7 WCD Strategic Priorities

**Demand Forecast (GWh) in Mekong Basin**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Yunnan</td>
<td>31,635</td>
<td>57,976</td>
<td>91,689</td>
<td>5.5%</td>
<td>14.9%</td>
</tr>
<tr>
<td>Myanmar</td>
<td>4,401</td>
<td>7,883</td>
<td>16,378</td>
<td>6.8%</td>
<td>2.7%</td>
</tr>
<tr>
<td>Cambodia</td>
<td>586</td>
<td>2,502</td>
<td>5,720</td>
<td>12.1%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>865</td>
<td>2,468</td>
<td>4,437</td>
<td>8.5%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Thailand</td>
<td>96,781</td>
<td>184,213</td>
<td>328,429</td>
<td>6.3%</td>
<td>53.3%</td>
</tr>
<tr>
<td>Vietnam</td>
<td>26,722</td>
<td>72,014</td>
<td>169,428</td>
<td>9.75%</td>
<td>14.9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>160,991</td>
<td>327,057</td>
<td>616,082</td>
<td>6.9%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### III. MRC & HYDROPOWER DEVELOPMENT

- **Existing Projects in LMB:**
  - 13 Projects with over 2,000 MW (Chulabhon: 15 MW–Yali: 720 MW)
- **Planned Projects in LMB (2005-2020):** 54 Projects with over 30,000 MW
  (Nam Long: 12 MW - Nam Theun 2: 1,070 MW)
- **SWOT Analysis**

#### Projects (over 10 MW) Developed in LMB

- **Number of Projects**
- **Installed Capacity (MW)**
## Hydropower Projects in the MRB and Salaween

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>EXISTING PROJECT</th>
<th>PLANNED PROJECT (2005-2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Capacity (MW)</td>
</tr>
<tr>
<td>Cambodia</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>6</td>
<td>660</td>
</tr>
<tr>
<td>Thailand</td>
<td>5</td>
<td>740</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2</td>
<td>730</td>
</tr>
<tr>
<td>Sub-Total (LMB)</td>
<td>13</td>
<td>2,130</td>
</tr>
<tr>
<td>Yunnan (China)</td>
<td>2</td>
<td>2,850</td>
</tr>
<tr>
<td>Total (MRB)</td>
<td>15</td>
<td>4,980</td>
</tr>
<tr>
<td>Myanmar (Salaween Basin)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Grand Total (GMS)</td>
<td>15</td>
<td>4,980</td>
</tr>
</tbody>
</table>

## Existing Hydropower Projects (over 10 MW) in LMB

<table>
<thead>
<tr>
<th>Project</th>
<th>Capacity (MW)</th>
<th>Year of Completion</th>
<th>Project</th>
<th>Capacity (MW)</th>
<th>Year of Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lao PDR</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. Nam Ngum 1 **</td>
<td>150</td>
<td>1971/84</td>
<td>1. Ubol Ratana **</td>
<td>25</td>
<td>1966</td>
</tr>
<tr>
<td>2. Xeset 1 *</td>
<td>45</td>
<td>1994</td>
<td>2. Sirindhorn **</td>
<td>36</td>
<td>1971</td>
</tr>
<tr>
<td>3. Theun-Hinboun *</td>
<td>210</td>
<td>1998</td>
<td>3. Chulabhorn **</td>
<td>40</td>
<td>1972</td>
</tr>
<tr>
<td>5. Nam Leuk</td>
<td>60</td>
<td>2000</td>
<td>5. Lam Takong (pump storage)</td>
<td>500</td>
<td>2001</td>
</tr>
<tr>
<td>6. Nam Mang 3</td>
<td>40</td>
<td>2005</td>
<td>Sub-total</td>
<td>737</td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td>655</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viet Nam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Yali Falls *</td>
<td>720</td>
<td>2000</td>
<td>2. Dachaoshan</td>
<td>1,350</td>
<td>2000</td>
</tr>
<tr>
<td>Sub-total</td>
<td>732</td>
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<tr>
<td>TOTAL (LMB)</td>
<td>2,124</td>
<td></td>
<td>TOTAL (Lancang)</td>
<td>2,850</td>
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</table>

Notes: ** Active involvement of MRC
* Partly involvement of MRC

**GRAND TOTAL (Mekong)** : **4,974 MW**
“SWOT” ANALYSIS

COMPONENTS:

- **S**= *Strength*: internal issues & relationships with customers
- **W**= *Weakness*: internal issues & external view point
- **O**= *Opportunity*: external issues & positive effects due to changes
- **T**= *Threat*: external issues & negative effects due to changes

### Internal
- Mandate in the MRC 1995 Agreement
- MRC spirit existed since 1950s
- Success stories / mutual benefits
- Re-emphasis on HDP by Council & Joint Committee

### Resources
- Large viable economic potential
- Supply close to expanding demand markets
- Number of promising projects ready for implementation

### External
- Constraints on donor support
- Negative public reaction w/o projects beneficial/poverty reduction to inhabitants
- Risk of transboundary impacts
- Social impact to local population

### Action
- If cooperation in HD not substantial & less emphasis on joint projects
- Development of HD by countries w/o MRC involvement

### Market
- Readiness by investors & lending agencies
- Increase in demand after 1997 crisis
- Attraction as clean energy

### Regional
- Limited information exchange
- Reduced roles in HDP
- Less emphasis on joint projects
- Limited manpower & budget at MRCS compared to members countries
- No intensive specific monitoring

### SWOT Diagram

- **Strengths**
- **Weaknesses**
- **Opportunities**
- **Threats**
GOALS:
1) Convert Weaknesses into Strengths
2) Convert Threats into Opportunities
3) Match Strengths & Opportunities to optimize potential

OUTCOMES OF SWOT ANALYSIS: MRC & HDP
- HDP should be modest, realistic, workable and in line with MRC Agreement, with active cooperation among member countries to convince donor for support
- Joint projects should have high priority in HDP
- Projects included in the HDP should be in line with MRC Strategic Directions for IWRM
- At present, conditions for development of hydropower are favorable and support from investors and lending agencies are increasing
- Competition will be tough as power from Lancang, Salaween and IPPs available soon
- Improvement needed on MRC capacity in hydropower, information exchange and monitoring of impacts

IV. IMPACTS OF HYDROPOWER DEVELOPMENT

Electricity Supply Source
Hydropower is a source of energy supply in MRC countries, together with thermal plants (using coal, gas, oil & diesel as fuel). In Lao PDR, hydropower supplies about 80% of demand, Viet Nam 50%, Thailand 13%, while demand in Cambodia is mainly provided by thermal sources

Benefits
- Green and renewable energy
- Minimal operation cost compared to high oil prices
- Might be helpful in terms of emission reduction and as a source for “carbon trade” in future
- Rural electrification provides electricity access to rural population & helps poverty alleviation
- Example: Revenue from Lao power export funds economic development and national poverty reduction programme with pro-poor growth initiatives

Impacts
- Create problems and impacts to local communities and environment including changes in hydrological regime, ecology, sediment, erosion, resettlement, etc.
• Cumulative effects of large projects or combination of medium-size projects should be studied
• Public participation would be encouraged

V. MRC HYDROPOWER DEVELOPMENT PROGRAMME

Role of MRC in HDP

[1] As promoter/facilitator/coordinator & “service provider” (in terms of technical and managerial expertise & basin and countries’ knowledge to members and funding agencies)
[2] Provide value added to planning and monitoring process
[3] Short-term & long-term development
[4] MRC task in regional/joint projects: suitable sites to be investigated
[6] Due consideration to downstream & trans-boundary impacts

Nature & Scope of HDP

- Promote HDP in line with IWRM approach & WCD guidelines with a view to develop hydropower in sustainable manner
- Data gathering for tributaries and mainstream, and conduct baseline study on flow regime changes due to existing hydropower projects
- Undertake planning, pre-investment studies, SEA EIA & support joint projects, power grid & sub-basins’ plans
  - Identify joint projects with synergies between hydropower generation and other purposes, such as irrigation, navigation, flood management,....
- Ranking projects in a regional & national priority

Plan and conduct investigations for MRC priority projects

Coordinate with MRC member countries, donors and lending agencies in programming
Formulate suitable scenarios tp provide inputs to BD
Monitoring on water quantity, quality and impacts, especially on trans-boundary issues
The HDP is planned for a 5-year period initially including short and long terms scenarios, taking into account flow regulatory effects and possible impacts of existing and future upstream development