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Hydropower in Myanmar: Moving Electricity Contracts from Colonial to Commercial

Prepared for

Proximity Designs | Myanmar

December 2015

This research paper was written by David Dapice (David_Dapice@harvard.edu). It builds upon two previous papers, “Creating a Future: Using Natural Resources for New Federalism and Unity” which touched briefly on Myanmar’s hydropower sector and was published in July 2013, and “China and Yunnan Economic Relations with Myanmar and the Kachin State: Powering the Peace Process”, published in September 2012. *The views expressed herein are the author’s alone and do not necessarily reflect those of Proximity, the Government of the Union of Myanmar, or Harvard University.* This study, along with other recent Ash-Proximity reports on Myanmar, is posted at <http://www.ash.harvard.edu/Home/Programs/Institute-for-Asia/Publications/Occasional-Paper>

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Background

Myanmar has less electricity per capita than Bangladesh and only a third of its population is connected to grid electricity. Blackouts are common, since generation capacity is inadequate even for the minority who are connected. However, Myanmar also has huge reserves of potential hydroelectricity – the estimated capacity is at least *ten times* the total current generating capacity from all sources including gas and other thermal.

During the 2000 to 2010 period, contracts were signed with Chinese power companies that would allow the construction of many large dams at no cost to the Myanmar government. In return, the companies would get 90% of the revenues while giving 10% of the revenues (often in the form of electricity) to Myanmar. As with current large dams, Myanmar would have an option to use a portion of the 90% of the power otherwise planned for export as long as it paid for it. These contracts were unequal and almost colonial in nature. While Myanmar needs hydro investments, it doesn't really benefit from these type of contracts. Going forward, its contracts should be commercial and fair, not one sided.

There are several problems with these “90/10” contracts. One is that they share only half as much or even less with Myanmar compared to what other Asian nations with hydroelectricity receive from projects developed by private sector companies, such as in Nepal or in Laos. Another problem is that the existing contracts largely ignore local ethnic groups (aside from some of the armed ethnic groups) who live in the areas to be flooded. A third problem is that careful environmental studies have often not been completed, so the true costs in terms of downstream flooding or erosion from large releases of water or interrupted silt deposits are not known. President Thein Sein suspended work on the large Myitsone dam at the headwaters of the Irrawaddy River, and the move was quite popular. It is not clear what policy the NLD Government will have towards Myitsone and hydroelectric development in general, but it will have to reconcile the unpopularity of large hydro – especially on the “90/10” terms – with Myanmar's need for electricity and growing global demand for low carbon power sources.¹

It would be wrong to look at hydroelectric development, which is desirable, only through the lens of electricity development. **How** the projects are approved and developed, and how the revenue benefits are distributed are as important as the electricity. If a stable political framework that promotes national unity and gives ethnic states a degree of decentralized authority is going to be realized, it will be necessary to develop hydroelectricity projects by bringing the affected ethnic groups as partners, in terms of benefits or revenue. They will have to have a voice in the size and location of the projects; be able to monitor the compensation for local people who are displaced; and share in the net revenues of the projects. The need to see the political implications of hydro development is crucial to a peaceful and united future for Myanmar.

¹ Some contracts with Chinese companies are fair and should be upheld. Aung San Suu Kyi correctly argued that a copper mine in Sagaing, which was quite contentious, was a reasonable contract with the Chinese partner. There was a problem on the Myanmar side, but this was not the focus of the Parliamentary inquiry.

It is in this political sense that the “90/10” contracts utterly fail. The contractual benefits from the projects for Myanmar are meager, unbalanced and likely to go to the central government. The ethnic groups with representative legitimacy are not in the decision making loop. The environmental implications are not well understood and could lead to substantial costs that would weaken longer term development and poverty reduction. This is why the contractual terms of past hydro contracts should be revisited, admitting that costs already incurred by the Chinese investors have to be recognized, subject to a close and transparent audit process, as does any income gained from exploiting timber and mining from the land areas of the dams and planned reservoirs.

Comparing Contracts

In this section, we take the 7000 MW Ta Sang dam in Shan state as an example. It is supposed to cost \$12 billion and we will assume 4930 hours per year of operation. That means it would generate 34.5 billion kWh a year. Since China exports power to Vietnam at 6.3 cents per kWh, we will use six cents per kWh as an export price for power. Thus the value of annual output would be \$2.07 billion. (Most of these electricity exports are planned to go to EGAT, the Thai utility, who is also an investor in the project.) It should be noted that this dam would not be completed until well into the next decade. It is also assumed that power sent to Myanmar (even if given free) also has an economic value of six cents per kWh.

This section will compare the existing “90/10” revenue sharing contracts with a hypothetical “contract of work” (COW) in which the government and an investor reach an agreement on the terms of investment, as well as with a Build, Own, Operate, Transfer (“BOOT”) model used between India and Nepal.

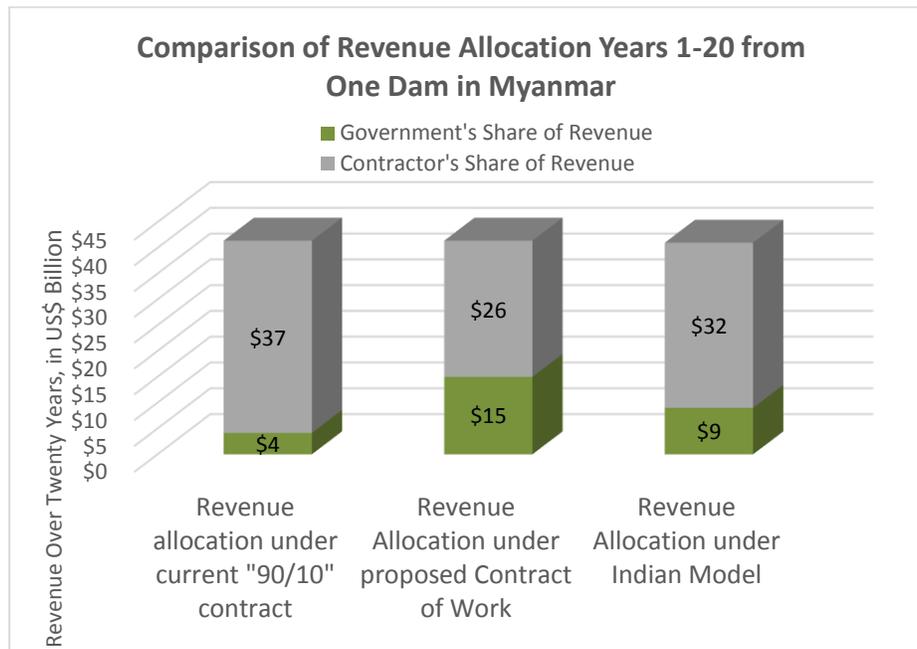
Under the “90/10” contracts, the Myanmar government or its designated utility would get electricity worth \$207 million a year from this dam. It is possible that some tax on profits would be paid but unless there is careful negotiating and monitoring, profits can be brought into other, low-tax jurisdictions. Thus, it is not likely that there would be large additional payments made to Myanmar. More electricity could be bought from the company by Myanmar, but this would be a cost – not income.

A “contract of work” is an agreement between a company and a government in which the rights and obligations of the company are defined with respect to a resource. These contracts have been used extensively for mineral resources in Indonesia since the 1960’s.² The financing of projects undertaken under a contract of work typically involve 25% equity (investor money) and 75% debt. Assuming typical debt service rates and return to capital (see Appendix for details), the project would generate a surplus of \$800 million a year, minus any (small) variable operating costs. ***Thus, this contract would pay 3-4 times more than the “90/10” contract during the first 20 years.***

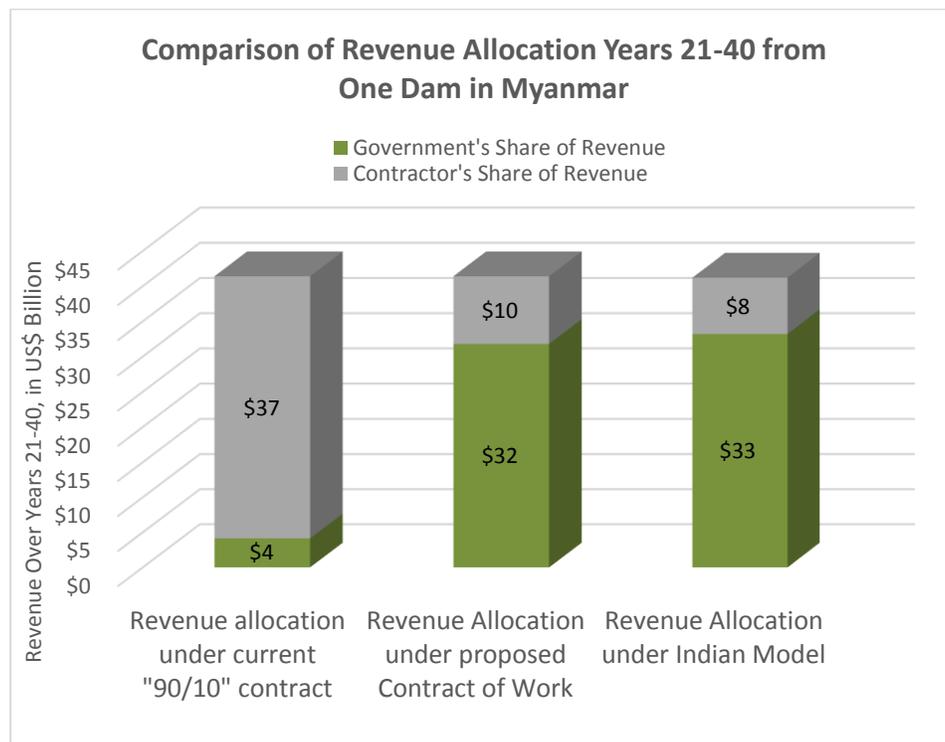
² For a detailed explanation see “Mining in Indonesia: Investment and Taxation Guide” by PriceWaterhouse Coopers, 1998

For comparative purpose, the example of India's investment in Nepalese hydropower under a "BOOT" (Build, Own, Operate, Transfer) is also provided. Under this arrangement, India builds the dam, pays 21.9% of gross output (\$453 million a year), and hands over the dam after 25 years for free.

The following graphs illustrate this with non-discounted amounts.



Note that these revenue amounts in the graph simply add up each year and do not "discount" or adjust for the time value of money. A full financial analysis would do this. Discounting has the effect of making cash flows further into the future less valuable, reflecting the time value of money. Thus, getting \$2.07 billion a year for 20 years is \$41.4 billion in simple terms (used here) but only \$23.7 billion in present value if the discount rate were 6%.



Together these graphs show that under the COW, the government would receive \$10 billion more revenue in the first 20 years compared to the “90/10” contract and \$28 billion more revenue over the next 20 years. If this total \$38 billion difference were extended to all potential hydroelectricity in Myanmar, the difference would be roughly six times as much, or \$200 billion in cash.

Implications for Myanmar’s Electricity Supply

If we assume that up to a total of 40,000 MW of hydropower can be developed in Myanmar, how does this compare with its likely demand? Right now there are about 4,800 MW of capacity and this is not enough to meet current demand. Electricity demand can be expected to double every five or six years for some time. Myanmar currently consumes about 200 kWh of electricity per capita while Vietnam has more than 1400 kWh per capita. For Myanmar to catch up in 20 years to where Vietnam is now, it would need seven times more electricity per capita or eight times more than at present with population growth.³ Yet it could easily take 20 years to build out 30,000 MW of new hydroelectricity.

If Myanmar needs nearly 40,000 MW of capacity by the years 2030-35 and has only 4800 MW now, it will need to build 35,000 MW that it can use solely for domestic purposes. If it commits to exporting 90% of its hydropower, it will have only 3-4000 MW of new hydroelectricity dedicated for its own use, while 90% would be exported. A decision to go ahead with the “90/10” contracts implies that Myanmar would either have to buy back its own power or replace it with expensive fossil fuels. If Myanmar

³ Vietnam has seen electricity production grow more than 12% a year since 1990, a doubling every six years.

proceeded with more equal and typical contracts, this problem would be eliminated or much reduced. Furthermore, the revenues for development for both local and central governments would be increased by tens of billions of dollars – perhaps enough to cement a real nation instead of holding restive ethnic groups at gun point. Hydroelectricity could finance federalism **and** provide much of the electricity demand in the next few decades.

It should be clear that there is nothing wrong with the responsible development of hydropower or with foreign investment for it. Indeed, FDI in hydropower is desirable, including from China and Thailand, although many others from Europe (e.g. France and Norway) and Asia have expressed interest and often offer better contract terms. Just because unequal, ill-advised and unfair contracts were made earlier by an unrepresentative regime, it does not mean that future generations and governments should be burdened by those past agreements. It is not in Myanmar's interest to support such odious contracts⁴. It is also not in China's interest to continue with these odious contracts if China hopes to be viewed as a partner.

If Myanmar is to secure its own power supply, get a fair share of the value of its resources and develop a mature relationship with global infrastructure investors, it needs to move forward with contracts similar to those of Nepal or Laos. This means negotiating contract terms that attract investors and fairly benefit Myanmar. Even if development is slower than under the old contracts, new negotiated contracts would be better for Myanmar as they would result in safer, fairer and more acceptable hydroelectric development. Commercial contracts are often renegotiated when circumstances change, and the changes in Myanmar in the last five years or so have been substantial.

Things that can be done

1. The leadership of the new government and of the military could agree on a hydroelectric strategy that includes physical/engineering and political aspects. Ethnic groups should be consulted.
2. A leadership figure representing the government could travel to China and negotiate for fairer contracts, underlining Myanmar's desire to involve China but only on terms similar to those India offers to Nepal or terms offered by other nations wanting to participate in Myanmar's hydro development. Use of the Asian Infrastructure and Investment Bank (AIIB) might be requested to replace old CPI (China Power Investment Corp.) contracts. An offer could be made to compensate Chinese companies for internationally/ independently audited costs incurred, less revenues gained by CPI from timber and mining of areas slated for development – areas that were exploited by the same companies or their agents. The need to move from a monopoly to a commercial relationship could be emphasized.

⁴ A good paper on the topic, including odious contracts as well as debt, can be found at:

<http://www.cgdev.org/publication/preventing-odious-obligations-new-tool-protecting-citizens-illegitimate-regimes>

3. A study of terms of hydroelectric investment contracts could be prepared for the Myanmar government to form a factual basis for detailed negotiations. This could include proposed hydroelectric contracts in Myanmar from other nations.
4. Better contracts could be drawn up by including the participation of ethnic groups and state governments, and not only with the central government. Insofar as national security is involved, the military could also be consulted.
5. Revenues from hydroelectricity production could be shared with the locality that is generating the power and territories impacted by upstream reservoirs or downstream releases of water. These revenues, contributed to trusts with high standards of transparency and governance, could help to compensate those displaced or unable to return as hostilities in ethnic areas cease.

Myanmar should keep in mind that carbon credits for non-carbon power may make the electricity even more valuable in the future. (If global carbon taxes as a response to global warming are imposed and make coal-fired electricity more costly, hydroelectric power would sell for an even higher price. The benefit could be split with the investor.) Carbon taxation would also promote better environmental impact studies, so that the real implications of investment are known and those harmed are compensated. External review of such studies would help to ensure they include all relevant issues. If hydroelectric development is done correctly, it will be a blessing. If it is done according to past practices, it will ensure conflict, inequality and poverty for those excluded and displaced in Myanmar. Pursuing the old model would be a tremendous lost opportunity for a new way of doing business in Myanmar.

Appendix: The Three Contracts in Detail

The Ta Sang dam project has been under study for several years. Its cost estimates have risen over time and there are slight differences in the capacity estimates. The most recent sources available have been used in this illustrative example. Critical information is given below, along with assumptions – which can be modified – for estimating reasonable costs under each contract.

Name of Project: Ta Sang Dam

Capacity/Cost of Project: 7000 MW/\$12 billion

Hours of Production per Year: 4930

Kilowatt-Hours of Annual Production: 34.5 billion

Assumed Price of 1 kWh of Electricity: \$0.06 (US\$ cents)

Annual Value of Electricity: \$2.07 billion

Contract Details:

- a. The “90/10” contract: A company builds the dam and gets 90% of the revenues. The remainder, typically paid in the form of electricity, goes to Myanmar. Myanmar normally is allowed to buy more than 10% of the electricity at the price paid by the importing country. There is a provision for other taxes on profits, but these are usually very low since prices can be set so as to minimize taxes.
- b. The “contract of work” (COW) assumes the government is the ultimate owner of a resource and hires a company to build and operate the dam for forty years. The assumption is that $\frac{3}{4}$ of the project (\$9 billion) will be debt financed at 6% over 20 years with equal annual payments to retire the debt and interest, like a mortgage. The remaining $\frac{1}{4}$ will be equity that earns a 16% return. If the debt were a 20 year bond at 6% and the equity earned a 16% rate of return, the blended cost of capital would be 8.5%. Over 20 years, an annual payment of 10.57% of the invested amount would pay off debt and compensate the equity invested at a 16% rate. This would equal \$1.27 billion a year, to be deducted from the annual value of electricity generated, leaving an annual revenue of \$800 million to Myanmar.⁵ After the debt is retired in twenty years, the equity would still earn \$480 million a year⁶, leaving a surplus of more than \$1.5 billion a year for the resource owner – the government. In such a case, it would be normal for the contractor/investor to secure a “take or pay” contract at a fixed or slowly escalating price for the electricity from both the Myanmar utility and the export buyer.

⁵ The variable operating costs would probably be less than \$50 million a year. From the available data, it is not clear if the \$12 billion dam cost includes interest charged during construction or is an “overnight cost” of labor and materials only. If the latter, than some cost adjustment is needed for the cost of construction including interest until operation begins and revenues start being earned.

⁶ It would be normal to transfer the dam back to the government after 25 to 40 years, so the equity payments would not continue forever.

- c. The “India-Nepal” contract terms are very similar to the “90/10” terms in that a company builds the dam at its expense, but in this case it pays 21.9% of all revenues to Myanmar (these could be in cash or electricity) for 25 years, after which ownership is returned to Myanmar.

Cash Flows Under Each Contract (Undiscounted Sum for 20 Year Periods) in Billion \$

		Years 1-20	Years 21-40	Total
“90/10”	To Myanmar	\$4.1	\$4.1	\$8.2
	To Company	\$37.3	\$37.3	\$74.6
COW	To Myanmar	\$15.0	\$30.8	\$45.8
	To Company	\$26.4	\$10.6	\$37.0
India/Nepal	To Myanmar	\$9.1	\$33.3	\$42.4
	To Company	\$32.3	\$8.1	\$40.4