Forget BOOT: It should be BOSS

An alternative approach to hydropower financing.

by
Chris Head[1]

Synopsis

The paper proposes an alternative to the BOOT financing model that is traditionally used for private hydro projects. The central feature of the alternative BOSS model is the separation of the development and the operational stages for financing purposes. Under BOSS the government provides an exit route for the developer by guaranteeing to buy the project "at cost" within a few years of commissioning, if it cannot sold more profitably to others. By removing the obligation to transfer the project back to the State free of charge, BOSS allows shares in the project company to assume their full asset value throughout the concession. This releases the underlying wealth in the project to the equity holders at an earlier stage, and overcomes a number of obstacles that are currently inhibiting private investment in hydro.

Introduction

It is fifteen years since the unbundling of state-owned power utilities opened the door to the privatisation of power generation. As the development of power stations increasingly became a private sector activity, the emergence of Independent Power Producers (IPPs) changed the way in which projects were financed. Hydropower was not immune from this trend, but the flow of private funds into the hydropower sector has been disappointing. It is now time to ask if the existing arrangements are working, or whether there is an easier alternative.

The IPPs used the BOOT[2] model, which is well suited to thermal power stations but, for a variety of reasons, much less suitable for hydropower. It is therefore no surprise that when it comes to hydro (with the exception of small run-of-river schemes) BOOT is proving to be difficult to apply. After the initial euphoria that greeted the first invitations to bid for hydro concessions, there has been a noticeable slackening of enthusiasm from the private sector. The path is littered with projects that have failed to reach financial closure, and many prospective developers have turned to easier, more profitable business elsewhere. The attrition has been so great that it is not clear where we shall now find companies prepared to take on the Herculean task of sponsoring major new hydro projects.

There have, of course, been successes that apparently disprove this pessimism. Two that come to mind are the 1,070 MW Nam Theun 2 HPP in Laos, and the 250 MW Bujagali HPP in Uganda. One is under construction, and the other at financial closure. In many respects they are trailblazers. Both are BOOT projects, but it is difficult to imagine that anyone could claim that they represent a sustainable financing model for the future. They took over ten years to negotiate, while their respective sponsors each accumulated front-end costs (carried entirely at risk) of between $50m and $100m. The original sponsors on both schemes withdrew after several years of fruitless effort, and at great financial loss. And the delay in building Bujagali has lead to a serious power crisis in Uganda.

So, while we must celebrate the success of the projects that have been implemented against all odds, the fact remains that the existing formula is not working well. It takes too long; it is

---

[1] *Principal of Chris Head & Associates, United Kingdom.*
[2] *BOOT = Build-Own-Operate-Transfer*

far too expensive, and the failure rate is too high. Many concessions have been signed, but only a few projects have actually materialised. Most of us share the view that there must be a better option. But the question is "What is the alternative, and why has it eluded us for so long?"

The Hard Facts

It is worth starting the search for an alternative model by re-capping on some of the hard facts relating to private hydro:

Fact 1: Privatisation is difficult

- A host Government would generally not be using the private sector to develop a project if it could afford to do so on its own, as a private project usually results in higher tariffs and reduced public sector control over the scheme.
- It is difficult to competitively bid a private hydro concession because of the complex issues involved, and the very long time horizons. In consequence most concessions end up being directly negotiated, which raises concerns over transparency.
- Having brought in the private sector, the Government's first priority will depend on whether it is a domestic or export project. For domestic projects the emphasis is usually to minimise the tariff, whereas on an export project it is to maximise the revenue to the State.
- The State may extract revenue in a number of ways (royalty, tax, dividends) but its "take" has to be proportionate, so as not to threaten the overall viability of the project. In a situation where the concession is negotiated, it is sometimes difficult to determine what a reasonable Government take should be.

Fact 2: Little appetite from the private sector

- There is a shortage of companies with the resources and appetite to sponsor large new hydro projects in the developing world. The balance between risks and rewards is not attractive, as the risks are mainly up-front while the rewards lie far in the future.
- Companies that are willing to invest in hydro projects often have other involvement in the scheme, typically as contractors or equipment suppliers. This can create conflicts of interest. Equity investors with no other stake in the project are rare.
- Energy companies find it more profitable and easier to invest in new thermal power stations, or in the purchase of existing hydro schemes. New hydro projects are a problem because they require significantly more equity and larger commercial loans.

Fact 3: Risk is pricing hydro out of the market

- Perceptions of risk have a strong influence on the final cost of a project. The idea of allocating risk to those best able to control it defies that fact that some risks cannot be controlled. Instead risk should be managed in a way that minimises the overall cost of the project, but this means more collaboration than we have seen in the past.
- Lenders drive up costs by demanding fixed price, turnkey contracts with heavy penalties. As most contractors are unwilling to bid on this basis for a complex multi-disciplinary project, it is difficult to get a competitive price from a reputable firm.
- Exchange rate risk is serious exposure when projects are financed in hard currency while the local currency is prone to devaluation. Although the risk normally lies with the utility, experience shows that the project company is not immune when serious financial disruption occurs.
- The public sector often has to bear many risks in order to make a "private" project bankable. This can cause resentment, although most of the risks in question are the ones that the public sector would anyway have borne in the past in a public project.

No single solution can address all of these issues, but it is evident that any alternative model needs to improve competition and transparency; it must make hydro more attractive to the private sector, and it should aim for a more collaborative and informed approach to the handling of risk.

An Alternative Model

Viewed over a long enough period, hydropower is invariably very profitable. But when judged over the shorter time horizons used by private investors, it can often look unattractive as an investment compared with thermal power. To rectify this we have to find ways of releasing the underlying profitability of hydro at an earlier stage in the project life cycle.

Refinancing is one way of achieving this. Capital can be released by trading equity for debt, or by allowing the owner to sell all or part of his shareholding. It can also reduce costs, as a scheme will always attract more favourable financing terms when it is operational. Finally refinancing can often be used to mitigate any residual exchange rate risk, by allowing the currency of the debt to be adjusted to match the revenue stream.

A number of existing IPPs (e.g. Theun Hinboun and Huay Ho, both Lao export projects) have been successfully refinanced, but at the moment there is no certainty that this can always be achieved. Neither the developer nor his financiers can know what the prevailing market conditions will be six or seven years in advance, so when they are first funding a project they can have no guarantee of being able to refinance it later on completion. It would obviously inject confidence if such a guarantee existed - and that essentially is the basis of the model.

There is a natural break point between the Development and Operational phases in all hydro projects. The type of organisation and skills required in each phase is very different. The developer's role is high risk and short-term; it is a demanding task that requires the ability to manage the financing and construction of a complex multi-disciplinary project. In contrast, the role of the long-term owner/operator is relatively low risk and undemanding. It would be logical for these functions to be performed by entirely different organisation; initially by one prepared to assume high risks for high rewards, and afterwards by one looking for a safe long-term investment.

But it needs to go further than just refinancing. It is arguably in the interests of all parties that at that stage the original developer should be encouraged to leave the project with a hefty profit and move on to the next one. The industry needs strong developers to recycle their risk money and build on their experience, leaving other organisations like local pension funds (and maybe the power utility itself?) as the long-term shareholders in the project.

The only way to do this is to guarantee the original developer an exit route. This might be through selling to another private sector body, but if all else fails the State would have to be prepared to step in. There are many factors that would have to be considered to ensure that the motivation of all parties is well focussed and that the necessary checks and balances are in place but, as a first shot, it is suggested that the model should be based upon the following broad principles:

1. The Concession Agreement is predicated on the idea that the project will be sold by the developer to the long-term owner/operator within a few years of the start of commercial operation.
2. The developer is free to negotiate whatever price he can command in the open market, subject to the buyer (the owner/operator) meeting certain minimum suitability criteria.

3. If the developer cannot find a buyer in the open market, the Government is obliged to purchase the project at the agreed **Project Cost** (see below) otherwise known as the fallback price.
4. At the end of the concession the Government buys the project, if it has not already done so, at the then prevailing **Project Cost** (original cost linked to tariff inflation).

The Project Cost is deemed to include the cost of construction, plus all agreed development and transaction expenses, plus interest during construction (IDC), all escalated in line with the tariff.

Project Cost = (Development Costs + Construction Cost + IDC) x tariff inflation

As tariff escalation in hydro projects is generally low, the private developer is not seen to be profiting unduly if the State is required to buy the project early at the fallback price. Indeed it can be argued that the cost to the Government would not have been significantly less if the project had been developed in the public sector, unless the State had access to low-cost concessionary finance.

Before public sector readers become apoplectic at the suggestion that the State should pay for the project, it is worth observing that elsewhere in the commercial world it is most unusual to find a profitable asset with a secure future being given away free of charge. This feature of the BOOT model distorts the commercial basis of private hydro, and effectively undervalues the shares in the project company to the point where their value converges to zero as the transfer date approaches. This is ironic as most Concession Agreements require the project to be extensively rehabilitated before transfer, so that it has an indefinite working life ahead.

An Illustrative Example

The model is best illustrated through a simplified financial analysis, assuming a notional 500 MW project, with the principal assumptions shown in Table 1 below.

Installed capacity	MW	500
Construction cost	$m	750
Development costs	$m	150
Concession period	Years	5+20
Investment schedule	5 Years (% PC)	10%, 20%, 25%, 25%, 20%
Commercial operation	Start of:	Year 6
Capacity factor	Percent (average)	65%
Energy tariff (year 1)	$/kWh	0.06
Tariff escalation	Years 1-15 only	1.5% (0% from Year 16)
O & M costs	% construction cost	1.0% p.a.
O & M costs escalation	Years 1-25	1.5% p.a.
Financing: development stage		
Financing structure	Debt/Equity	70/30
Drawdown terms	of debt and equity	In parallel
Interest rate, weighted average	Percent p.a.	9.5% p.a.
Loan tenor (nominal)	Years	5 + 12
Financing: operation stage		
Financing structure	Debt/Equity	0/100 or 70/30
Drawdown terms	of debt and equity	In parallel
Interest rate, weighted average	Percent p.a.	8.5% p.a.
Loan tenor	Years	12

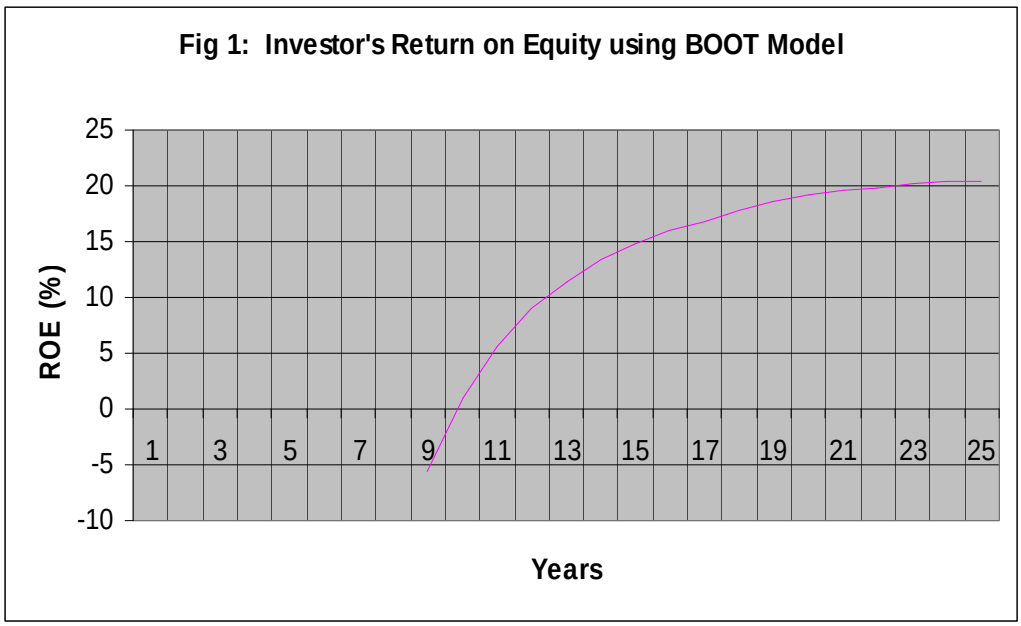
Table 1: Principal assumptions used in the financial modelling

A few points of explanation follow:

- The total Project Cost (PC) at the start of commercial operation is $1,084m. This includes an assumed $150m of front-end development costs, plus computed IDC of $184m.
- The weighted average cost of debt in the development stage is taken to be 9.5%. This is deemed to include fees and other charges. Despite the plan to sell early, the phasing of capital repayments is based on a nominal 12 year tenor until the loan is redeemed.
- The tariff of $0.06/kWh is approximately what would be needed to make the project viable under BOOT arrangements. It is assumed to inflate at 1.5% p.a. for the first 15 years, and to remain constant thereafter.
- Commercial operation begins at the start of Year 6 and the Developer is assumed to sell the project after it has been operating for between one and two years.
- The owner/operator (who buys from the developer) is assumed to finance his purchase either a) entirely from equity or b) through a 70/30 combination of debt and equity. Both are examined.
- At the end of the concession period it is assumed that the State would buy the project at the defined (year 1) Project Cost, plus tariff inflation. Using the assumptions made in the example, tariff inflation would add about 25% to the original project cost.

The BOOT Option

The model shows the Return of Equity (ROE)[3] achieved by the developer and owner/operator under a number of different scenarios. Fig 1 shows the ROE achieved by then owner using a conventional BOOT model. It clearly demonstrates why long concession periods are needed to reach an acceptable return, because in this case the ROE is actually negative until Year 9. It takes over twenty years to reach 20%. From the viewpoint of a private sector company exposed to heavy risks early in the project cycle, this is a long time to wait for the returns.



[3] *As the term "ROE" tends to be used somewhat loosely, for the avoidance of any doubt it is used here in its most common form as the Financial Internal Rate of Return (FIRR) of the equity cash flow. This includes investments, dividends, and any returns from the eventual sale of the asset.*

Alternative Model

Tables 2 and 3 show the returns for the developer and the owner/operator separately under the alternative model, where it is assumed that the project is sold within a few years of completion. The Tables present ROE for the following scenarios, assuming that:

1. The sale takes place either at the end of Year 6 or 7 (after 1 or 2 years operation).
2. The selling price ranges from the Project Cost (PC*1.0) to a situation where the developer sells at a 40% premium on the Project Cost (PC*1.4).

The Tables make it possible to compare the returns to each party for any particular scenario. For example, if the project is sold after one year of operation (Year 6) at a 20% premium (PC*1.2) Table 2 shows that the developer will get an ROE of 22.4%, and that the owner/ operator will eventually reach an ROE of 17.6% by the end of the concession.

If the developer is forced to sell to the Government at the fallback price (PC*1.0) he will receive an ROE of around 9% if the sale occurs at the end of the first year of operation. But it will increase to 18% if the sale is delayed for a year, and remain fairly constant thereafter. This apparent anomaly that the developer can still achieve an ROE while selling at "cost" can be explained by the fact that the ROE is derived from revenue and that the sale price does not change despite the debt being reduced by capital repayments.

Sale price	Assuming sale at the end of:	Year 6	Year 7
PC * 1.0	Developer's ROE	8.9%	18.6%
	Owner/operator ROE with 100% equity	21.7%	19.6%
PC * 1.2	Developer's ROE	22.4%	26.8%
	Owner/operator ROE with 100% equity	17.6%	15.7%
PC * 1.4	Developer's ROE	32.1%	33.1%
	Owner/operator ROE with 100% equity	14.6%	13.0%

Table 2: ROE for Developer and Owner/operator (buyer) Assuming that O-O uses 100% equity for purchase

The difference between Tables 2 and 3 is that former assumes that the owner/operator finances the purchase entirely from equity, whereas Table 3 assumes that he finances it on the basis of a 70/30 debt-equity split. This arrangement can significantly gear up the returns of the owner/operator. The developer's ROE naturally remains unaffected.

Sale price	Assuming sale at the end of:	Year 6	Year 7
PC * 1.0	Developer's ROE	8.9%	18.6%
	Owner/operator ROE with 30% equity	45.3%	34.8%
PC * 1.2	Developer's ROE	22.4%	26.8%
	Owner/operator ROE with 30% equity	27.3%	22.0%
PC * 1.4	Developer's ROE	32.1%	33.1%
	Owner/operator ROE with 30% equity	19.0%	15.5%

Table 3: ROE for Developer and Owner/operator (buyer) Assuming that O-O purchases with 70/30 debt/equity

Observations

The analysis demonstrates that by splitting a project into two separate tranches for financing purposes, it can be made more attractive than it would be if the development and operational phases are treated as a unified entity, as in BOOT. It suggests that there is enough money in the average hydro project - if there is such a thing! - to provide companies with a strong incentive to enter the market solely as developers. This is where the need exists.

The model also demonstrates the attractiveness of the long-term owner/operator role. In fact it looks so good that there appears to be plenty of headroom for the developer to add a large premium over the actual Project Cost when selling. For this reason it appears unlikely that projects will fail to reach the fallback price in the open market, so it will be unusual for the Government to be required to buy the project from the developer after completion unless there are extraneous circumstances.

The key to the alternative model is the guaranteed exit route to be offered by the government to the developer, and the abolition of the principle of the free transfer of the asset to the State. The use of these devices means that:

- The developer is able to secure his returns to a much earlier point in the project cycle, with recovery of the full project cost if a commercial buyer cannot be found to offer more than the fallback price.
- The host Government will have more control over the project (because it will be party to all the key decisions that lead to the build up of the Project Cost) giving greater transparency than would be the case under a BOOT arrangement.
- The financiers will hopefully begin to take a more relaxed view of the risks involved, when they see a clear exit route based on cost recovery. This might allow them to relax their insistence on expensive fixed-price EPC contracts.

To make this work it will be necessary to put certain facilities in place. For example, in most countries the buy-out obligation of the Government would have to be backed by international guarantors such as the Multilateral Development Banks. This will not be easy as the sums involved are large, but if a project is viable under private ownership, it should still be viable in the public sector. There would need to be rigorous checks and balances between the Government and its private partner for auditing the different elements that make up the Project Cost, especially the construction contracts if the shareholders in the project company are also acting as contractors and suppliers.

Conclusions

This paper is intended to stimulate discussion. It does not purport to present a finely honed alternative to the BOOT model, but instead to draw attention to the fact that there should be a better solution. The details would need to be worked out on a project-specific basis, but from the general analysis undertaken so far the evidence suggests that the alternative model offers advantages.

Logically the model should bring more prospective developers into a market where there is a demonstrable lack of players at present. If it fails to do this then the only alternative for larger hydro schemes is revert back to public sector financing.

The financial analysis shows that if the Government had to buy out the developer at the fallback price (PC x 1.0) it should prove to be a profitable move for the State. However, the practicability of achieving this will still hinge around having suitable guarantees in place.

The separate financing of the two phases introduces flexibility into the concession arrangements. There may be a case for providing more flexibility through making provision for government buy-out options at other points during the concession period.

The model should result in more cost-effective construction arrangements based upon the competitive bidding of single-discipline contracts. The improved contractual clarity, lower costs, and increased transparency should all be good for the industry.

With the Government effectively underwriting the cost of development through the buyback provision, the public sector will inevitably become more involved than it would be under the BOOT model. Although this might be regarded by some as a disadvantage, the reality is that the trend is towards Public-Private Partnerships, and most people recognise that the public sector has to be closely involved in the larger, strategic water infrastructure projects - even when they are ostensibly private.

Hydropower has always suffered from the fact that the cost of energy is initially too high and then, perversely, almost too low. The model outlined here releases the underlying wealth of a project at an earlier stage in order to make it more attractive for developers, cheaper to construct and easier to finance. It will not be easy and there are a lot of details that need sorting out. In the author's view, there is now a strong case for forgetting BOOT and using instead what we should now be referring to as the "**BOSS** Model" - meaning **Build, Operate, Sell, and Start** again**.**

Chris Head
31th August 2007

Words: 3,800