



US HYDROPOWER

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Untapped Resources

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For companies seeking to invest in overseas markets, hydropower projects are an attractive choice with plentiful water available and numerous economic and social benefits to developing nations. Why, then, aren't more projects being built?

Adequate access to energy and water are primary developmental concerns in emerging markets. Energy and water are essential building blocks that can spur economic growth, national stability, governance, and sustainability in developing countries. Often, these countries are desperate to find willing investors to help them address the basic needs of drinking water, irrigation, rural development, and energy. Hydropower is uniquely suited to this infrastructure development, and it provides a necessary revenue stream to attract additional investment capital.

Besides hydropower's developmental benefits, it provides a critical contribution to energy sector expansion. A low life cycle cost and a long operating life are valuable to a developing economy, especially because it means cheaper power and lower energy prices for consumers. Quick start-up time and an ability to provide peak and base load power are also important to ensuring reliable, low cost power system expansion in emerging markets. Hydropower is renewable as it harnesses the energy generated from moving water and does not emit any pollutants into the water or air, making it an attractive environmental choice.

While there are impacts with any kind of development, with the proper planning—including partnering with host governments to assess a country's most pressing infrastructure needs—there can be tremendous social and economic benefits from hydropower. In many recent cases, private developers have worked on local community development issues as part of their projects. Some of these collaborative efforts have yielded construction, upgrades, and repair of roads; health clinics and schools; potable water and irrigation; and maximized energy efficiency to water projects. When Hurricane Mitch struck Central America, hydropower developers helped areas that were hit the worst recover. During a recent project in the Philippines, developers built

a charcoal-making plant and a quilt-making school that will ensure continued opportunities for community growth.

Development Trends

Recently, the number of U.S. companies investing in foreign energy markets has taken somewhat of a downturn, for a number of reasons. Even though domestic markets lack many opportunities for expansion and are cutthroat competitive, they still tend to prove more profitable than their foreign energy counterparts. Unstable economic conditions in various parts of the world—for instance, in Argentina—have contributed to the discouragement of investors as well, especially as those conditions spill over to neighboring nations. In some cases, overextended developers are selling off assets that, for any number of reasons, are not profitable. Mirant recently decided to pull out of China's Shandong International Power Development consortium, a stake worth nearly \$1 billion. According to Platts research, the number of new independent power projects being built in Asia—48 projects representing 25,787 megawatts (MW)—is declining as well, relative to the 256 projects, or 97,597 MW, brought online since 2000.

The same situation seems to be true for international private hydropower development. To date, for example, only 30 projects—representing a tiny percentage—have been financed out of 300,000 MW of hydropower investment planned in Latin American and Asian markets. The truth is, far less hydropower has been built in the developing world in recent years than reason would dictate, while thermal plants have provided the greatest share of new generation capacity. (See Figure 1.) Why aren't companies jumping in what seems to be a more than ready international hydropower market?

Hydropower essentially has been handicapped from contributing its long-lasting, emissions-free power to the benefit of national economies. Too often, U.S. companies that make the leap into international waters find themselves mired in the projects they begin. While privatization and restructuring activities in some developing markets have sought to create new opportunities for the private sector to build hydropower, the reality is that most projects have stalled, far exceeding the normal two to three year timeline that they should follow. The Bhandardara project in India is case in point. A 14-MW project, it began in 1995 and only came online last year.

This deficit has resulted in the need for foreign governments to implement incentives or other policy signals to encourage hydropower development. Foreign policymakers are becoming much more open about soliciting advice on how to attract private investment. U.S. investors that continue to be active in these markets feel this is a positive sign, and that overall, hydropower investment holds the promise of a profitable future.

It comes as no surprise that developing markets would seek to encourage private investment in hydropower, with its numerous energy and infrastructure benefits. Given the normal ups and downs that private investors in any market face, neither is it surprising that companies recently have shown themselves reluctant to get their feet wet. What is more problematic is that the disconnect appears to run much deeper in the actual mechanisms—financial, regulatory, and otherwise—that enable and encourage outside investment in developing countries' projects.

Barriers to Investment

Over the last twenty years, more than two-thirds of hydropower development took place in developed countries. Most of these projects were public sector-managed and financed by bilateral and multilateral development banks.

Over the next two decades, two-thirds of all investment will occur in developing countries. Perhaps more importantly, future investments in transitioning countries are expected to come from the private sector. This is largely because of the trend towards privatization of markets in the developing world. Multilateral banks and programs such as those implemented by the U.S. Agency for International Development (USAID) have played an important role in this shift towards increased privatization.

Yet, even though many markets have capitalized energy assets, there is much work to be done to create a level playing field for the various generation options. While hydropower is considered an established and reliable technology, financial models and structures supported by complete regulatory and power purchase mechanisms are few. As governments worldwide continue to restructure their energy sectors to encourage private investment, they struggle to create market systems that foster bona fide competition.

Despite cutting edge technology, repowering of existing plants, and innovative plant efficiency practiced by U.S. private developers, the rapidly developing independent power producer sector is dominated by thermal generation. This outcome is not a consequence of any inherent defect of hydropower but, rather, stems from structural problems in new and emerging energy markets that inadvertently discount the advantages of hydropower and highlight its disadvantages.

Uncertain criteria and timelines. Private developers seeking multilateral financing (funding from a donor country to a developing country, via a lending institution such as the World Bank) and bilateral financing (essentially funding between two countries with an emphasis on trade and development) for hydropower projects have encountered significant uncertainty in the process. For example, the soft costs involved in providing the exhaustive studies required for hydropower projects are ten times the average for other generation projects. These can include lengthy and expensive environmental studies and mitigation, such as are often required by the World Bank.

But contrary to stereotype, environmental barriers, while significant, are not the largest hurdle hydropower developers have to jump over. Companies are required practically to bushwhack their way through an internally inconsistent and uncertain permitting process. To complicate matters further, many countries continue to restructure their markets during this years-long process, meaning that requirements and conditions can change midway through.

There also are no specific timeframes by which to review a project. Based on recent U.S. industry case studies in several markets, developers are facing timelines—from initial financing efforts to completed construction and commissioning—of two to three times the anticipated lengths. The 672-MW Birecik dam, the first privatized hydro project in Turkey, took 9 years to reach financial closure. The smaller 36-MW Bhote Koshi project in Nepal took 3 ½ years to reach financial closure, and 5 years to reach completion.

Disparity in debt repayment terms. With global movement toward more competitive electricity markets, hydropower must compete on a short-term price basis with other technologies. While hydropower has the advantage of having mostly fixed costs over a project's operating life, it faces the disadvantage of having higher initial development costs than thermal alternatives—some 100 to 200 percent higher, depending on the site—due both to higher construction costs per unit of capacity and higher interest as a result of longer construction

periods. (See Table 1.) The result is that hydropower does not enjoy long-term financing and instead is forced to compete on 7- to 10-year financing. (Nuclear projects, for example, enjoy 15-year debt financing.)

This financing problem has been addressed in some cases by using very complicated debt structure that includes World Bank guarantees for foreign currency debt during the last few years of an extended loan repayment period. But simpler structures with lower transaction costs are needed.

Debt repayment terms of 15 to 20 years beyond the date of commercial operation would make most hydropower plants competitive in the early years of operation. Longer debt terms reduce the political and financial problems that result when power sales tariffs are front-loaded with high rates during the debt repayment period and much lower rates after the debt is retired. With longer term financing, many sound hydro projects can compete, over a useful life of 50 years or more, with any alternative technology. Plus, hydropower projects have far less operating risk, and will almost always have very low operating costs which are little affected by inflation, volatile and uncertain future fuel prices, or other external changes—unlike thermal alternatives. Longer repayment terms are justified given the long useful lives of hydropower projects and their minimal operation and maintenance expenses.

Lack of financing support for high front-end costs. At the local level, hydropower projects face the burden of securing financing for upfront capital costs, including civil works, which can amount to 40-70 percent of the total project. These costs are not generally eligible for Export Credit Agency (ECA)-supported financing. ECA is responsible for arranging for the export of services and manufactured goods; in this case, from the U.S. utility to the host country. Another international organization, the Organization for Economic Cooperation and Development (OECD), helps fund local costs up to 15 percent of the total, leaving a large chunk of financing on these projects unaccounted for. And local development banks and capital markets—with a few exceptions such as China and Malaysia—can't supply long-term local currency financing for large expenditures like hydropower projects, either because they traditionally have not done so or they simply are unable to.

Bidding costs and abuses. Preparing bids for developing hydropower projects is extremely expensive, easily costing more than a million dollars for each developer. To prepare the bid, a developer must estimate output by evaluating hydrology (water availability) and efficiencies; determine project costs (land acquisition; construction costs including access roads, transmission lines, project civil works, and mechanical and electrical equipment; operation and maintenance cost; and financing costs); determine a permitting and approval plan; prepare a detailed project implementation schedule; and arrange preliminary financing. There is never enough detail or assurances of the accuracy of project fundamentals provided in the bidding package to allow inexpensive bid preparation.

Furthermore, the developer and his team are given little flexibility to improve on a proposed project. The utility often cites the need to make competing proposals easier to compare, or to use its standards since it will own the project after the concession expires. However, these attitudes are seriously counterproductive—and squarely at odds with the goal of producing competitively priced power.

In addition, the bids submitted are usually not considered final bids by the utility, but simply starting points for further negotiations. These subsequent negotiations invariably damage the developer's position. In the Philippines, for example, very large performance bonds posted

with bids are held hostage during these negotiations, and a developer who walks away risks forfeiting a very large amount of money.

Building Partnerships

Very recently, there have been indications of a possible resurgence in international hydropower projects. In Guatemala alone, over \$150 million in projects are planned for the near-term, meaning they will be operational in the next three to four years. Last year, companies working with U.S. Hydropower financed \$1.5 billion in hydropower worldwide. These are hopeful signs for private sector hydro developers—but until the financial and regulatory roadblocks are removed, the path to certain and streamlined profitability remains difficult and sometimes impossible.

Bilateral and multilateral finance institutions are essential to the success of hydro projects in developing nations. As a result, lending institutions on all levels need to focus on both the benefits and special needs of hydropower. They should realize that hydropower can play a critical role in addressing politically- and environmentally-charged issues like global climate change, and that it is a key resource in fostering sustainable development. To facilitate this potential, agencies like the World Bank need to be more proactive with regard to hydropower development, and thereby set an example for other lenders to follow.

An initial step that would reap numerous benefits would be for prospective lenders to revisit the World Bank's environmental guidelines. This could be accomplished via collaboration among USAID, the World Bank, IFC, U.S. Export-Import Bank, and the Overseas Private Investment Corporation, to refine these guidelines and develop institution-specific criteria and approaches for lending. Additionally, the USAID experimental loan guarantee program could be broadened to support hydropower projects within a pre-approved envelope. Similarly, the World Bank could allocate a certain amount of its guarantees (both partial credit and partial risk) for lending to this sector.

The U.S. government could handle regulatory ambiguity and unconditioned markets—major barriers for the private sector wanting to invest in overseas hydropower—by addressing market barriers and implementing complete regulatory frameworks. Such assistance is critical to helping answer the most basic needs of developing nations.

Through a partnership with the U.S. government, the U.S. industry is working to create the necessary policy and finance mechanisms to enable hydropower to compete fairly with other energy sources. But until all stakeholders involved combine their efforts in a cooperative and open manner to break down barriers to international hydropower trade and investment, the benefits that this energy source brings will continue to elude developing nations.

Sidebar

U.S. Hydropower, Council for International Development is a trade association working to help industry bridge the uncertainties in new global markets. Membership includes investor-owned utilities and private power producers, equipment manufacturers and suppliers, financiers, and consultants including engineering, design, and legal expertise. The Council provides financial, policy, and advocacy expertise in addition to regular communications and a chance to participate in industry events such as conferences, trade missions, policy initiatives, and emerging market opportunities.

The Council is currently working with foreign government representatives and private sector groups in Latin America, Asia, Africa, and Eastern Europe to encourage a competitive environment for hydropower investment.

To learn more or get involved, contact Debby Stone, U.S. Hydropower's director of trade promotion, at 202/383-2536 or by e-mail: debbys@us-hydropower.org. You can also visit the website at www.us-hydropower.org.

Figure 1

Worldwide Hydropower Situation in 1998—Undeveloped Potential

Total: Approximately 1.5 million to 2 million megawatts

Percent

China – 21

Asia – 26

Africa – 17

South America – 25

North America – 6

Europe – 5

Source: Hydro Review Worldwide

Table 1

Thermal vs. Hydro—Factors Affecting Bankability

Factor	Thermal	Hydro
Capital cost (\$/kilowatt)	400-1,400	800-3,000
Operating cost	high	low
Construction risk	low	high
Construction time	2-4 years	3-6 years
Project life	15-20 years	>50 years
Decommissioning costs	yes	unlikely
Electrical and mechanical plant	80 percent	30 percent
Site influence	low	high
Technology	changing	mature

Source: Private Financing of Hydro Projects by C.R. Head, PSWG, Croatia 1997.