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A New Mandate for the Rural Electrification Board

Area-Based Planning Initiatives to Relieve Power Shortages

by B.D. Rahmatullah
Nancy Norris
John Richards

CENTRE FOR POLICY RESEARCH
IUBAT

IUBAT – International University of Business Agriculture and Technology
Dhaka, Bangladesh

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Foreword

I AM PLEASED TO INTRODUCE THIS SIXTH MAJOR PUBLICATION OF THE CENTRE for Policy Research. In this monograph, we return to the policy issues of the Bangladesh power sector. We have addressed these issues in previous Centre publications (accessible on the Centre's website). This new monograph adds a wealth of up-to-date data, and refines the analysis.

The principal recommendation of the authors is to expand the mandate of the Rural Electrification Board (REB), enabling it to undertake distributed generation. (This term refers to lower voltage generation in smaller plants whose power is distributed, on a priority basis, to local customers.) The REB is an internationally respected innovator in power development, and it now plays a major role in the Bangladesh power sector. Over the last decade, the number of REB connections – now 7.4 million – has doubled.

I take the occasion to thank the authors for their work. B.D. Rahmatullah is a distinguished and dynamic engineer with a long tradition of working on behalf of power sector reform in our country. Nancy Norris is a graduate of the Simon Fraser University Graduate Public Policy Program. She taught and undertook research at IUBAT in 2006. Professor John Richards, who also serves on the IUBAT Overseas Advisory Council, has for many years encouraged links between academics in Canada and Bangladesh.

IUBAT – International University of Business Agriculture and Technology – is the first non-government university established in Bangladesh. Since its founding in 1991, IUBAT has grown in stature and it has become a valuable source of intellectual activity in our country. I hope that, in the years to come, the Centre for Policy Research will serve both IUBAT and our country as a forum for serious, nonpartisan research into economic and social issues facing Bangladesh.

I appreciate our cooperation with Simon Fraser University over the decades in developing IUBAT as a quality educational and research institution. The most vital aspect of this cooperation is the intellectual stimulation provided by the visiting faculty and students from Canada.

— Dr. M. Alimullah Miyan
Vice-Chancellor and Founder, IUBAT

Foreword

IN 2001, I CO-AUTHORED THE FIRST MONOGRAPH PUBLISHED BY THE IUBAT Centre for Policy Research (available on the Centre's website). That monograph assessed options for Bangladesh's natural gas reserves, and stressed the critical need for high quality electrical energy and the potential role of natural gas as feedstock for power plants.

Were I to rewrite that monograph today, I would stress, more than we did at the time, the importance of credible institutions in the generation, transmission, and distribution of electrical power. Since 2001, the problems of load shedding and excessive system loss have unfortunately persisted. On the other hand, the Rural Electrification Board (REB) has maintained its admirable tradition of administrative competence. Relative to other agencies, it has a far superior record in terms of low system loss and high bill collection rates. The REB has doubled the number of customer connections this decade, and now distributes nearly 40 percent of the country's power. These are impressive accomplishments.

However successful the REB has become, it has not addressed the problems of inadequate generation capacity. REB customers face load shedding as often – if not more often – than do customers served by other agencies. Ideally, we might hope for comprehensive reform of the entire power sector. Many projects have attempted to do that, but without much success. As Besant-Jones (one of the international energy analysts quoted in this study) puts it, reform must take seriously a country's "starting conditions."

Among the important "starting conditions" in Bangladesh is the credibility of the REB. Hence, I understand and appreciate the primary recommendation of the authors of this monograph, namely to expand the mandate of the REB, enabling it to undertake distributed generation. The priority for distribution of power generated by the REB would be local customers in the participating Palli Biddyut Samitee (PBS).

A successful experiment is often worth more than system-wide proposals for reform. If the REB can successfully undertake distributed generation projects in a particular PBS, they may well lead to reforms of the entire system. Bangladeshis certainly deserve as much.

— Mark Jaccard, Professor
Simon Fraser University

Executive Summary

ELECTRICITY IS A SCARCE COMMODITY IN BANGLADESH. In a country of 156 million people, an estimated 43 percent have access; the ratio is similar in both urban and rural areas. Over half of all villages have access to power. However, those connected to the national grid face a barrage of related problems: low voltage that may damage household and industrial equipment; frequent interruptions ("load shedding"); potentially destructive power surges when the current is restored. Load shedding occurred on 250 days in 2006.

A lack of reliable power severely impedes economic development. Many foreign investors shy away from Bangladesh because electricity quality is so poor. Seventy-eight percent of Bangladeshi firms cite poor electricity service as a "major" or "severe" obstacle to expansion.

While everyone – business leaders, politicians, and ordinary people – appreciates the importance of reliable power, there is little progress. Why?

- Given shoddy quality of service, customers balk at paying rates adequate to cover costs of supply and distribution. These costs include mark ups to cover losses arising from corruption and inefficient practices.
- Since the state-owned enterprises in the power sector incur chronic deficits, they cannot finance adequate replacement and repair of infrastructure. Which in turn lowers the quality of power delivered.
- Customers fix illegal hook-ups to existing distribution lines to steal electricity.
- Bill collectors and utility managers have a long history of accepting boksheesh in exchange for lowering recorded power delivered to customers and thereby inflat-


ROYANA RASNAT PHOTO

ing "system loss" in the transmission and distribution of power.

- Power sector managers and the public lack good evidence on the much lower costs of power production, transmission and distribution that would be available upon elimination of corruption and related inefficiencies.

The impact of this syndrome is that government must subsidize state-owned enterprises in the power sector to keep them financially solvent. Which diverts scarce tax revenue from other priorities, such as schools and health clinics.

There are many options for power sector reform; our proposals are not exhaustive. We start from the idea that successful reform requires building on a foundation of administrative credibility. By far the most credible of the major agencies in the Bangladesh power sector is the Rural Electrification Board (REB). Given our starting point, we propose an expansion of the REB mandate (under the heading "Area-Based Planning"). The strategy motivating our proposals is to enable the REB and its network of rural cooperatives (Palli Biddyut Samitee – PBS) to create generating capacity independent of the national grid, capacity whose power would be distributed on a priority basis to customers in the local participating PBS.

Such capacity is often described as distributed generation, to distinguish it from capacity whose power is fed into a major regional or national grid. The term distributed generation is used in many ways. For example, the California Energy Commission (2002, 2) defines it as "electric generation connected to the distribution level of the transmission and distribution grid usually located at or near the intended place of use."

The key distinction is between high voltage generation fed into a major grid and lower voltage generation used at or nearby the generation site. If we include back-up generation capacity, the state of California has an estimated 5000 MW of distributed generation capacity. (Which approximately equals the total power capacity of Bangladesh.) In all power systems, in both developed and developing countries, distributed generation plays a valuable role.

In this report, we use the term broadly. We include very small generators serving as back-up for the electrical needs of a particular site. We also apply the term to larger projects entailing a local grid that links a small power plant (usually under 100 MW) to a participating group of customers (such as members of a PBS) and that has a point of interconnection with the national grid.

Our recommendations take account of the under-servicing of rural Bangladesh and the superior reputation of the REB as a respected power sector agency.

RECOMMENDATION 1: *The government should encourage the REB and individual PBS to negotiate multiple captive power projects, the power from which would be distributed within the relevant PBS.*

The two major guidelines governing such contracts are the following:

- the REB be satisfied the captive power generator will not destabilize the larger REB/PBS distribution network, and
- the contracting PBS maintain adequate accounting to assure each project is financially justifiable, inasmuch as expected incremental revenue exceed incremental cost to the PBS.

RECOMMENDATION 2: *The government should encourage the REB to pursue investment in distributed generation capacity, experimenting with alternate financial models.*

There exist several options, each worth serious consideration:

- The REB/PBS could design, build, own, operate several power plants, raising the finance and managing the plants. Given the REB's credible reputation, it may be able to arrange low-interest financing from a bilateral or multilateral donor agency.
- The REB could contract with IPPs to design, build, operate on a cost-plus basis several plants. But, as with option 1, the REB/PBS could retain ownership and arrange financing.
- The REB/PBS could enter into long-term purchase agreements with IPPs. The IPPs would design, build, operate, and own the power plants.

This incremental capacity should initially be limited to, say, 1000 MW. After three years, the REB should undertake an independent review of the performance of these projects. As with captive power projects, it is important that the projects not destabilize the REB/PBS distribution network, and that projects be financially justifiable. It should be understood that this recommendation implies that the REB/PBS can contract free from political constraints imposed by the Cabinet Committee on Government Purchase.

RECOMMENDATION 3: *The government should enact legislation incorporating the PURPA principle of guaranteed sale of surplus power from distributed generation plants into the national grid at prices reflecting the avoided costs of power generated by the BPDB or IPPs.*

As discussed in the report, such sales increase the load factor of the power plants and lower the long run unit cost of operation. Surplus sales also benefit customers relying on the national grid.

RECOMMENDATION 4: *Given rapid growth, the REB/PBS must address its new and more complex managerial difficulties. There are several aspects to this: assuming the utility regulation function in negotiations with IPPs; advising on location of industrial development projects; designing differential rate structures; and reforming Performance Target Agreements (PTAs) to realize improvements in PBS performance, particularly among small-load PBS incurring financial losses.*

The expectation underlying our recommendations is that PBS customers – both small and large – are willing to pay the full costs of power, provided it is of high quality, not subject to voltage variability or load shedding. Future policy must grapple with the fact that the majority of PBS currently have sales below financial break-even levels. Several considerations arise:

Enabling the REB/PBS system to generate high quality power distributed to participating PBS on a priority basis will increase consumer demand. This will enable some near-to-break-even PBS to realize a financial surplus.

There is a potential to decentralize industrial development plants beyond the Chittagong and Dhaka regions. Greater decentralization will increase power sales in the affected PBS.

It may be desirable to merge some PBS with small loads in order to realize administrative scale economies.

The REB could engage in some explicit, limited cross-subsidization. It could, for example, create a fund, financed by a modest levy on high-load PBS devoted to subsidizing the fixed cost of customer connection costs, particularly in PBS with small loads. Preferably, subsidies should target the fixed costs for certain customer groups, such as low-income farmers in rural areas. These one-time subsidies will not have an ongoing impact on financial viability of PBS.

RECOMMENDATION 5: *The REB should explore the potential of obtaining financing for renewable energy projects from firms investing in carbon emission offsets.*

As discussed, the potential for renewable energy projects is modest at present. The REB could enhance the viability of such projects by selling carbon emission offsets to purchasers willing to buy such offsets. The Chicago Carbon Exchange is an example of a market in such carbon offsets (CCX 2008).

সার সংক্ষেপ

বাংলাদেশে বিদ্যুৎ একটি দুর্লভ পণ্য। ১৫৬ মিলিয়ন লোকের এই দেশে আনুমানিক শতকরা ৪৩ জন বিদ্যুৎ ব্যবহার করতে পারেন। শহর ও গ্রামে এই অনুপাত একই। অর্ধেকের বেশী গ্রামে বিদ্যুৎ সংযোগ আছে। তবে যারা জাতীয় গ্রিডের সাথে সংযুক্ত, তারা নানাবিধ সমস্যার সম্মুখীন হয়ঃ লো-ভলটেজ যা আবাসিক এবং কল-কারখানার যন্ত্রপাতি নষ্ট করে দিতে পারে; প্রায়শঃ বিদ্যুৎ সরবরাহ বিঘ্নিত হওয়া ('লোড-শেডিং'); বিদ্যুৎ প্রবাহ পুনঃস্থাপনে ক্ষতিকর মাত্রার বিদ্যুৎ প্রবাহিত হওয়া। ২০০৬ সালে ২৫০ দিন লোড-শেডিং হয়।

নির্ভরযোগ্য বিদ্যুৎ সরবরাহের অভাব অর্থনৈতিক উন্নতির ক্ষেত্রে মারাত্মক প্রতিবন্ধকতা সৃষ্টি করে। অনেক বিদেশী বিনিয়োগকারী নিম্নমানের বিদ্যুৎ সরবরাহ ব্যবস্থার কারণে বাংলাদেশ থেকে তাদের দৃষ্টি সরিয়ে নেয়। শতকরা ৭৮ ভাগ বাংলাদেশী প্রতিষ্ঠান নিম্ন মানের বিদ্যুৎ ব্যবস্থাকে তাদের প্রবৃদ্ধির ক্ষেত্রে 'প্রধান' অথবা 'বিরাট' বাধা হিসাবে উল্লেখ করে।

যেখানে নেতৃস্থানীয় ব্যবসায়ী, রাজনীতিবিদ, সাধারণ মানুষ-প্রত্যেকে নির্ভরযোগ্য বিদ্যুৎ ব্যবস্থার গুরুত্ব উপলব্ধি করেন, সেখানে বিদ্যুৎ খাতে উন্নয়ন খুবই কম। এই অবস্থা কেন?

- নিম্নমানের সেবার কারণে, গ্রাহকরা বিদ্যুৎ সরবরাহ ও বিতরণের ব্যয় পূরণ করার মত মাত্রায় বিদ্যুতের মূল্য দিতে অনীহা দেখায়। বিদ্যুতের মূল্য নির্ধারণের ক্ষেত্রে যে খরচ ধরা হয় তার মধ্যে অন্তর্ভূক্ত থাকে দুর্নীতি ও অদক্ষজনিত ক্ষতিপূরণ।
- রাষ্ট্র মালিকানার অন্তর্গত বিদ্যুৎ বিভাগের বিভিন্ন কর্মকান্ডে প্রতিনিয়ত ঘাটতি থাকার কারণে তারা অবকাঠামো মেরামত এবং পুনর্স্থাপনের জন্য অর্থ বরাদ্দ করতে পারে না। এটি সামগ্রিক বিদ্যুৎ ব্যবস্থার মানকে আরো নামিয়ে দেয়।
- কিছু কিছু গ্রাহক বিদ্যুৎ লাইন থেকে অবৈধ সংযোগ নিয়ে বিদ্যুৎ চুরি করে।
- উৎকোচের বিনিময়ে গ্রাহকের বিদ্যুৎ বিল কমানোর ক্ষেত্রে বিল সংগ্রহকারী এবং ব্যবস্থাপকদের দীর্ঘ ইতিহাস আছে। এই চর্চা বিদ্যুৎ প্রবাহ ও সরবরাহ ব্যবস্থার মধ্যে 'সিস্টেম অপচয়'কে জিইয়ে রাখে।
- দুর্নীতি ও অদক্ষতা দুর করার মাধ্যমে যে কত কম খরচে বিদ্যুৎ উৎপাদন, সঞ্চালন ও বিতরণ সম্ভব তার কোন সুস্পষ্ট প্রমাণ ব্যবস্থাপক ও জনসাধারণের সামনে নেই।

বিরাজমান এই অবস্থার পরিপ্রেক্ষিতে, রাষ্ট্রীয় মালিকানার সংস্থাগুলিকে আর্থিকভাবে সচল রাখার জন্য সরকারকে বাধ্য হয়েই ভর্তুকি দিতে হয়। এই ভর্তুকি দেয়ার জন্য অত্যন্ত গুরুত্বপূর্ণ কর্মকান্ডে যেমন শিক্ষা, স্বাস্থ্য ক্লিনিক ইত্যাদি খাতে বরাদ্দকৃত রাজস্ব স্থানান্তর করতে হয়।

বিদ্যুৎ খাতে সংস্কারের অনেক সম্ভাব্য উপায় আছে এবং আমাদের প্রস্তাবগুলি সম্পূর্ণ নয়। সফল সংস্কারের ভিত্তি হলো প্রশাসনিক বিশ্বাসযোগ্যতা, এই মূল ধারণা নিয়ে আমরা শুরু করতে চাই। বিদ্যুৎ খাতের প্রধান সংস্থাগুলির মধ্যে সবচাইতে বেশী বিশ্বাসযোগ্য হলো পল্লী বিদ্যুতায়ন বোর্ড (আর ই বি)। শুরুতেই আমরা আর ই বি-এর ম্যান্ডেট সম্প্রসারণের প্রস্তাব করছি (এই সম্প্রসারণ হবে "এলাকা ভিত্তিক পরিকল্পনা" এর মাধ্যমে)। যে কৌশলগত কারণে আমরা এই প্রস্তাব করছি তা হলো যে আর ই বি জাতীয় গ্রীডের বাইরে স্বাধীনভাবে বিদ্যুৎ উৎপাদনের ব্যবস্থা নিবে। এই উৎপাদন ব্যবস্থায় আর ই বি-এর সহযোগী পল্লী সমবায় সমিতিগুলি সম্পৃক্ত থাকবে। উৎপাদিত বিদ্যুত অগ্রাধিকার ভিত্তিতে স্থানীয়ভাবে সহযোগী পি বি এস এর গ্রাহকদের মধ্যে বিতরণ করা হবে।

এই জাতীয় বিদ্যুৎ উৎপাদন ব্যবস্থাকে বিতরণকৃত উৎপাদন বলে আখ্যায়িত করা যেতে পারে, যার বিপরীতে আছে বৃহৎ আকারের আঞ্চলিক বা জাতীয় গ্রীডে সঞ্চালনের জন্য বিদ্যুৎ উৎপাদন। 'বিতরণকৃত উৎপাদন' পদটি অনেকভাবে ব্যবহার করা হয়। উদাহরণস্বরূপ ক্যালিফর্নিয়া বিদ্যুৎ কমিশনের (২০০২, ২) এর সংজ্ঞা উল্লেখ করা যায়। তাদের সংজ্ঞা হলো "যে এলাকায় ব্যবহার হবে সেখানে বা তার নিকটবর্তী স্থানে অবস্থিত বিদ্যুৎ উৎপাদন যা স্থানীয় সঞ্চালন ও বিতরণ গ্রীডের সাথে সম্পর্কিত।"

এর মূল পার্থক্য হলো উচ্চ ক্ষমতা সম্পন্ন গ্রীডে সরবরাহের জন্য উচ্চ ভলটেজের বিদ্যুৎ উৎপাদন এবং উৎপাদন কেন্দ্রে বা নিকটবর্তী এলাকায় ব্যবহারের জন্য নিম্ন ভলটেজের বিদ্যুৎ উৎপাদন। বেক-আপ উৎপাদন ক্ষমতাসহ হিসাব করলে দেখা যায় যে ক্যালিফর্নিয়া রাজ্যের মোট বিতরণকৃত উৎপাদন ক্ষমতা হবে আনুমানিক ৫০০০ মেগাওয়াট, যা প্রায় বাংলাদেশের মোট বিদ্যুৎ উৎপাদন ক্ষমতার সমতুল্য। যে কোন বিদ্যুৎ উৎপাদন ব্যবস্থায় বিতরণকৃত উৎপাদন ব্যবস্থা একটি গুরুত্বপূর্ণ ভূমিকা পালন করে। উন্নত এবং উন্নয়নশীল এই দুই দেশের ক্ষেত্রেই এই অবস্থা সমভাবে প্রযোজ্য।

এই প্রতিবেদনে আমরা এই ধারণাটিকে ব্যাপক অর্থে ব্যবহার করছি। এর মধ্যে আমরা একটি প্রতিষ্ঠান বা স্বল্প পরিসর এলাকার বিদ্যুতের স স্পূরক (বেক-আপ) হিসাবে কাজ করে তা অন্তর্ভূক্ত করেছি। আবার অন্যদিকে আমরা বড় আকারের প্রকল্পের ক্ষেত্রেও এই ধারণাটি ব্যবহার করেছি। যেমন ছোট আকারের বিদ্যুৎ উৎপাদন কেন্দ্র যা সাধারণত ১০০ মেগাওয়াটের কম যা স্থানীয় গ্রীডে সঞ্চালনের মাধ্যমে অংশগ্রহনকারী ক্রেতা গুচ্চের প্রয়োজন মিটায়, যেমন পি বি এস এর সদস্যবৃন্দ এবং যার জাতীয় গ্রীডের সাথেও আন্তঃ সংযোগ থাকে।

আমাদের সুপারিশসমূহ প্রণয়নে বাংলাদেশের পল্লী এলাকার সীমিত সরবরাহ ও বিদ্যুৎ সরবরাহের

ক্ষেত্রে আর ই বি-এর সুনামের বিষয়টি বিবেচনায় রাখা হয়েছে।

সুপারিশ-১

সংশ্লিষ্ট পি বি এস-এর মধ্যে বিদ্যুৎ বিতরণের জন্য, সরকারের উচিত আর ই বি ও প্রতিটি পি বি এসকে একাধিক ক্যাপটিভ বিদ্যুৎ উৎপাদন প্রকল্পের সাথে সমঝোতা চুক্তি করতে উৎসাহিত করা।

এই ধরণের চুক্তি পরিচালনায় দুটি প্রধান নির্দেশাবলী হলঃ

- আর ই বি-এর সতর্ক থাকতে হবে যে ক্যাপটিভ বিদ্যুৎ উৎপাদন যেন কোন অবস্থাতেই আর ই বি / পি বি এস-এর সামগ্রিক বিতরণ ব্যবস্থাকে অস্থিতিশীল না করে, এবং
- চুক্তিবদ্ধ পি বি এস যেন পর্যাপ্ত পর্যায়ে হিসাব পদ্ধতি বজায় রাখে যাতে প্রতিটি প্রকল্পের আর্থিক যথার্থতা যাচাই করা যায়, ন্যূনতম পর্যায়ে পি বি এস-এর অনুমিত রাজস্ব প্রবৃদ্ধি যেন খরচের প্রবৃদ্ধিকে ছাড়িয়ে যায়।

সুপারিশ-২

সরকারের উচিৎ আর ই বি-কে বিতরণকৃত উৎপাদন ক্ষমতা অর্জনের জন্য বিনিয়োগে উৎসাহীত করা। এই বিনিয়োগে বিকল্প আর্থিক মডেলের কার্যকরীতা যাচাই করা যেতে পারে।

এক্ষেত্রে কয়েকটি পদ্ধতি আছে, যার প্রতিটি গভীরভাবে যাচাই করা প্রয়োজনঃ

- আর ই বি/পি বি এস নিজস্ব মালিকানায় অনেকগুলি বিদ্যুৎ উৎপাদন কেন্দ্র পরিকল্পনা, নির্মাণ ও পরিচালনা করতে পারে এবং এইজন্য প্রয়োজনীয় অর্থায়ন ও ব্যবস্থাপনার জন্য জনবল ও সংগ্রহ করতে পারে। আর ই বি-র বিশ্বাসযোগ্যতা ও সুনামের পরিপ্রেক্ষিতে কোন দ্বি-পাক্ষিক বা বহু পাক্ষিক দাতা সংস্থার মাধ্যমে কম-সুদে অর্থায়ন সম্ভব হতে পারে।
- আর ই বি খরচের সাথে একটি নির্দিষ্ট হার যোগ করা যাবে এই ভিত্তিতে কয়েকটি স্বতন্ত্র বিদ্যুৎ উৎপাদনকারীদের (আই পি পি) সাথে অনেকগুলি বিদ্যুৎ কেন্দ্রের পরিকল্পনা, নির্মাণ এবং পরিচালনার জন্য চুক্তি করতে পারে। তবে এই ক্ষেত্রেও, প্রথম উপায়ের মত আর ই বি/পি বি এস উৎপাদন কেন্দ্রের জন্য অর্থ যোগান দিতে পারে এবং মালিকানা বজায় রাখতে পারে।
- আর ই বি/পি বি এস আই পি পিগুলির সাথে দীর্ঘ মেয়াদী বিদ্যুৎ ক্রয় চুক্তি করতে পারে। এই ব্যবস্থায় আই পি পি গুলি তাদের মালিকানায় বিদ্যুৎ কেন্দ্রের পরিকল্পনা করবে।

এই বর্ধিত উৎপাদন ক্ষমতা প্রাথমিকভাবে সীমিত আকারের হতে পারে, যেমন ১০০০ মেগাওয়াট। তিন বৎসর পর আর ই বি এইসব প্রকল্পের কার্যকারীতার উপর একটি নিরপেক্ষ মূল্যায়ন করতে পারে। ক্যাপটিভ উৎপাদন প্রকল্পের মত এই ক্ষেত্রেও নিশ্চিত হতে হবে যে, বর্ধিত ক্ষমতা

যেন আর ই বি/পি বি এস এর বিতরণ নেটওয়ার্কের ভারসাম্য নষ্ট না করে এবং একই সাথে যেন এই প্রকল্পগুলি আর্থিক দৃষ্টিকোন থেকে গ্রহনযোগ্য হয়। এখানে উপলব্ধি করা প্রয়োজন যে এই প্রস্তাবনার মাধ্যমে আর ই বি/পি বি এস সরকারী ক্রয় সংক্রান্ত মন্ত্রী পরিষদের চাপিয়ে দেওয়া রাজনৈতিক সীমাবদ্ধতার বাহিরে গিয়ে চুক্তি সম্পাদন করতে পারবে।

সুপারিশ-৩

সরকারের উচিত PURPA নীতিমালার অন্ত-র্ভূক্ত বিতরণকৃত উৎপাদন কেন্দ্রের অতিরিক্ত উৎপাদিত বিদ্যুৎ জাতীয় গ্রীডে সঞ্চালনের জন্য সুনিশ্চিতভাবে ক্রয় ব্যবস্থা সম্মিলিত আইন প্রণয়ন করা। এই বিদ্যুতের ক্রয় মূল্য হবে বিপিডিবি বা আইপিপি-এর সমপরিমান অতিরিক্ত বিদ্যুৎ উৎপাদন ব্যয় পরিহারের সমান।

এই প্রতিবেদনে দেখানো হয়েছে যে এই প্রকারের বিদ্যুৎ বিক্রির ব্যবস্থা বিদ্যুৎ উৎপাদন কেন্দ্রের লোড ফ্যাক্টর বাড়াবে, যা দীর্ঘ মেয়াদীভাবে এই সব কেন্দ্রের প্রতি কিলোওয়াট উৎপাদন খরচ কমিয়ে আনবে। অতিরিক্ত বিক্রি ব্যবস্থা অন্যদিকে জাতীয় গ্রীডের উপর নির্ভরশীল গ্রাহকদেরও উপকারে আসবে।

সুপারিশ-৪

দ্রুত সম্প্রসারণের ফলে সৃষ্ট নূতন ও জটিল ব্যবস্থাপনার দিকগুলিতে আর ই বি/পি বি এস-এর নজরে দেওয়া অত্যন্ত জরুরী। এর কয়েকটি দিক আছেঃ আই পি পি এর সাথে দর কষাকষিতে জন-উপযোগ নিয়ন্ত্রকের ভূমিকা পালন; শিল্প উন্নয়ন প্রকল্পের উপযুক্ত স্থান নির্ণয়ে পরামর্শ প্রদান; পার্থক্যমূলক বিদ্যুৎ মূল্য কাঠামো প্রণয়ন এবং পি বি এস-এর কর্মদক্ষতা বাড়ানোর উদ্দেশ্যে পারফরম্যান্স টার্গেট চুক্তি (PTAs) এর সংস্কার বেশী জরুরী।

আমাদের সকল সুপারিশের পেছনে প্রত্যাশা হচ্ছে যে, গ্রাহকদের যদি উচ্চ মানের বিদ্যুৎ সরবরাহ করা হয় যা একই সাথে লোড-শেডিং মুক্ত হবে এবং ভলটেজ উঠা-নামার স্বীকার হবে না, তাহলে গ্রাহকরা বিদ্যুতের পুরো খরচ বহন করবে। ভবিষ্যতে যে কোন নীতিমালা প্রণয়নের সময় মনে রাখতে হবে যে, অধিকাংশ পি বি এস-এর বর্তমান বিক্রয় মাত্রা আর্থিকভাবে ব্রেক ইভেন মাত্রার নীচে অবস্থান করছে। কয়েকটি বিষয় এখানে ধর্তব্যঃ

আর ই বি/পি বি এস-কে যদি অংশগ্রহণকারী পি বি এস-দের নিকট সরবরাহের জন্য অগ্রাধিকার ভিত্তিতে উন্নতমানের বিদ্যুৎ উৎপাদনের ক্ষমতা প্রদান করা হয়, তাহলে গ্রাহক চাহিদা বাড়বে। এর ফলে ব্রেক ইভেন- এর কাছাকাছি থাকা কিছু পি বি এস আর্থিক উদ্বৃত্তি অর্জন করবে।

ঢাকা ও চট্টগ্রাম অঞ্চলের বাইরে শিল্প উন্নয়ন স্থাপনাগুলিকে বিকেন্দ্রীকরনের একটি সম্ভাবনা তৈরি হতে পারে। অধিকতর বিকেন্দ্রীকরণের ফলে সংশ্লিষ্ট পি বি এসগুলির বিদ্যুত বিক্রির পরিমাণ বাড়াতে সাহায্য করবে।

কিছু কিছু ছোট ক্ষমতার পি বি এস-কে একত্রীভুত করার মাধ্যমে প্রশাসনিক খরচ কমানো বাঞ্ছনীয় হতে পারে।

আর ই বি সীমিত আকারে কিছু আন্তঃভর্তুকি প্রচলন করতে পারে। উদাহরণস্বরূপ একটি তহবিল তৈরি করা যেতে পারে। এই তহবিলটি উচ্চ ক্ষমতার পি বি এস গুলোর উপর চাঁদা আরোপ করে তৈরি করা যেতে পারে। এই তহবিল থেকে বিশেষ করে স্বল্প ক্ষমতার পি বি এস গুলোর গ্রাহক সংযোগের জন্য প্রয়োজনীয় স্থায়ী ব্যয় কমানোর জন্য ভর্তুকি প্রদান করা যেতে পারে। এই ভর্তুকি বিশেষ জনগোষ্ঠীর জন্য হতে পারে, যেমন স্বল্প আয় ক্ষমতার গ্রামের কৃষক। এই প্রকারের এককালীন ভর্তুকি পি বি এস গুলির পর্যায়ক্রমিক আর্থিক স্বচ্ছলতার উপর কোন প্রভাব ফেলবে না।

সুপারিশ-৫

কার্বন এমিশন অফসেট খাতে বিনিয়োগ করছে, এমন সমস্ত প্রতিষ্ঠানের নিকট হতে নবায়নযোগ্য বিদ্যুৎ প্রকল্পের জন্য আর ই বি আর্থিক সহায়তা নেওয়ার বিষয় খতিয়ে দেখতে পারে। আগেই আলোচনা করা হয়েছে যে, নবায়নযোগ্য শক্তি উৎপাদনের সম্ভাব্যতা বর্তমানে সীমিত। এই ধরণের প্রকল্পের গ্রহণযোগ্যতা বৃদ্ধির জন্য আর ই বি আগ্রহী ক্রেতাদের নিকট কার্বন এমিশন অফসেট বিক্রি করতে পারে। উদাহরণস্বরূপ উল্লেখ করা যায় যে শিকাগো কার্বন এক্সচেঞ্জ কার্বন অফসেট বিক্রির জন্য সম্ভাব্য একটি বাজার (CCX 2008)।

NIZAMUL ISLAM PHOTO

Introduction

ELECTRICITY IS A SCARCE COMMODITY IN BANGLADESH. IN A COUNTRY OF 156 million people, an estimated 43 percent have access; the ratio is similar in both urban and rural areas. Those connected to the national grid face a barrage of related problems: voltage variations that damage household and industrial equipment; frequent interruptions ("load shedding"); potentially destructive power surges when the current is restored. Load shedding occurred on 250 days for firms in 2006. The Asian Development Bank (2006, 1) estimates that the current dependable generating capacity of the country is 4,120 MW, while the peak demand is estimated to be around 5500 MW. Over the past 10 years annual average demand for electricity consumption has been growing at 8.1 percent annually, which will create a probable generation shortfall of at least 2500 MW by 2010.[1]

A lack of reliable power severely impedes economic development of the country. Seventy-eight percent of Bangladeshi firms cite electricity service as a "major" or "severe" obstacle to expansion (World Bank, 2003). (See also Figure 2 on page 30.) And many foreign investors shy away from Bangladesh because electricity quality is so poor.

While everyone – business leaders, politicians, and ordinary people – appreciates the importance of reliable power, there is little progress. Why?

- Given shoddy quality of service, customers balk at paying rates adequate to cover costs of supply and distribution. These costs include mark ups to cover losses arising from corruption and inefficient practices.

- Since the state-owned enterprises in the power sector incur chronic deficits, they cannot finance adequate replacement and repair of infrastructure. Which in turn lowers the quality of power delivered.
- Customers fix illegal hook-ups to existing distribution lines to steal electricity.
- Bill collectors and utility managers have a long history of accepting boksheesh in exchange for lowering recorded power delivered to customers and thereby inflating "system loss" in the transmission and distribution of power.
- Power sector managers and the public lack good evidence on the much lower costs of power production, transmission and distribution that would be available upon elimination of corruption and related inefficiencies.

The impact of this syndrome is that government must subsidize state-owned enterprises in the power sector to keep them financially solvent. Which diverts scarce tax revenue from other priorities, such as schools and health clinics.

There are many options for power sector reform; our proposals are not exhaustive. We start from the idea that successful reform requires building on a foundation of administrative credibility. By far the most credible of the major agencies in the Bangladesh power sector is the Rural Electrification Board (REB). Given our starting point, we propose an expansion of the REB mandate (under the heading "Area-Based Planning"). The strategy motivating our proposals is to enable the REB and its network of rural cooperatives (Palli Biddyut Samitee – PBS) to create generating capacity independent of the national grid, capacity whose power would be distributed on a priority basis to customers in the local participating PBS.

Such capacity is often described as distributed generation, to distinguish it from capacity whose power is fed into a major regional or national grid. The term distributed generation is used in many ways. For example, the California Energy Commission (2002, 2) defines it as "electric generation connected to the distribution level of the transmission and distribution grid usually located at or near the intended place of use."

The key distinction is between high voltage generation fed into a major grid and lower voltage generation used at or nearby the generation site. If we include back-up generation capacity, the state of California has an estimated 5000 MW of distributed generation capacity. (Which approximately equals the total power capacity of Bangladesh.) In all power systems, in both developed and developing countries, distributed generation plays a valuable role.

In this report, we use the term broadly. We include very small generators serving as back-up for the electrical needs of a particular site. We also apply the term to larger projects entailing a local grid that links a small power plant (usually under 100 MW) to a participating group of customers (such as members of a PBS) and that has a point of interconnection with the national grid.


PAT Z PHOTO

Present Status of Power Sector in Bangladesh

Problems Facing the Bangladesh Power Sector

Corruption

The power sector has traditionally been a target for private gain, and performance of the power sector in the last two decades has been unsatisfactory. These problems are not unique to Bangladesh. As one analyst pointedly observed,

> *… from the early 1990s [most developing] countries have been experiencing power shortages and frequent interruptions. Their power generating plants emit toxic pollutants, their power utilities are bankrupt, their power tariffs do not cover costs (particularly for residential users), electricity is widely stolen by customers (frequently with the active support of existing employees), many citizens – especially those in rural areas – lack access to electricity supply, and the power sector drains the government's fiscal resources. (Besant-Jones 2006, 10)*

To date, the interim government has done little to launch major reform in the power sector. Severe problems of corrupt and inefficient practices persist. Admittedly, a total of 360 MW of "Rental Power" capacity either has been or shortly will be connected to the grid. Power from this source is, however, unreasonably expensive.

The interim government has a limited mandate and contested legitimacy. Many fear that, following a future election, administrative standards in the power and gas sector will simply return to the pre-2007 norms.

The following sections outline three aspects of corruption in Bangladesh – political,


STEVE RICHMOND PHOTO

bureaucratic and institutional – and their impact on the power sector.

Political

A first consideration is the culture of confrontational politics. In a 2007 speech the Bangladesh Resident Mission country director of the Asian Development Bank pointed to a "limited accountability and transparency within the country's political parties and a lack of democratic processes and value …[that has] given rise to intolerance within and between political parties." Bangladesh has a strong democratic tradition since Partition in 1947; however the long-standing, divisive nature of political behavior between the two dominant parties has been a source of social unrest and political instability. This in turn harms Bangladesh's investment climate and economic performance.

Both of the two principal political parties are controlled by small elites. These elites control the country's highly centralized political system, a system that lacks the transparency and regulatory predictability necessary to encourage private investment in the power sector.

An example is the awarding of IPP contracts. The decision regarding government awarding tenders above Tk. 25 crore (US$3.6 million) ultimately resides with the politically appointed Cabinet Committee for Government Purchase and the Prime Minister's Office (ADB/OECD 2004). A typical Power Purchase Agreement between the government and an IPP represents well over Tk. 25 crore, and therefore falls under the jurisdiction of this committee.

Furthermore, "Tenderers are not permitted to complain to a review panel if the Cabinet Committee on Government Purchase has made a decision for procurement award" (Government of Bangladesh 2004, 90). In effect, the Purchase Committee can accept or reject an IPP offer with no threat of public review. IPP tenderers must voice any complaints to the procurement agency, not an independent review panel. In the case of IPP tenders, the procurement agency is the Ministry of Power, Energy & Mineral

Resources, a representative of which sits on the Purchase Committee.

Bribery is a common practice to ensure that tenders are accepted by government and that existing plants are allowed to continue operation. Bribes often take place through direct payment before the tender is sent for review by the higher levels of government and through over-billing for services and products. However, paying off the officials does not always garner the desired result. It is estimated that generation plant proposals stalled or rejected for political reasons over the past three years total 1500 MW of potential new capacity.

The interim government has, to date, left the Purchase Committee in place. The members are non-partisan, which is an improvement, but the centralized bureaucratic control remains.

Bureaucratic

Bangladesh's bureaucracy has long suffered from corruption. A top-down structure limits the ability of civil servants to show initiative or act independently. This in turn results in an absence of accountability amongst officials. Inadequate staff compensation and reward for professional performance result in a low commitment to the job and the organization. The absence of professional development and training for employees hampers overall improvement in public administration and the possibility of career progression.

Unfortunately, nepotism plays a large role in hiring and promotion. Reassignments often take place for political and other reasons unrelated to job performance. Those who speak out against corruption or show too much initiative are often punished by reassignment to less rewarding positions (ADB 2007).

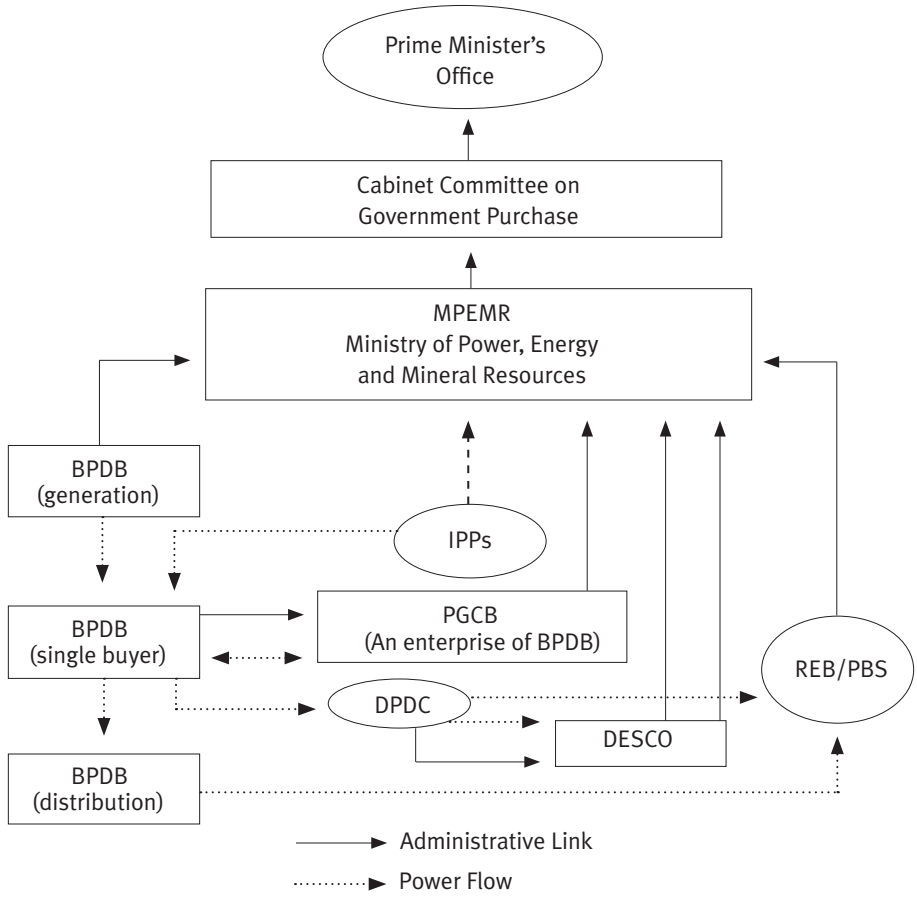
Institutional

Since 1990, the World Bank and Asian Development Bank have argued to "unbundle" the Bangladesh Power Development Board (BPDB), the vertically integrated state-owned power utility. Their intent has been to create separate state-owned enterprises, each responsible for a specific function: generation, transmission, distribution and retail of electricity. No one entity is to have undue control or influence. As a consequence, several restructuring plans have attempted to break down the centralized organization of the power sector.[2]

A major 1994 report (Power Sector Reforms in Bangladesh) described the inefficiencies in the sector and outlined a process of legally separating generation, transmission and distribution agencies, increasing private generation, and implementing regulatory oversight of the sector. In 1996, Power Cell, a policy agency within the Ministry of Power and Energy, began operation. Funded by the World Bank, it was mandated to shape the direction of the sector. (Figure 1 gives a schematic illustration of de facto relationships among various branches of the government, state-owned agencies, the REB/PBS and IPPs.)

In the same year that Power Cell came into being, the government formally enabled private investment in the power sector

Figure 1: Stylized Organization Chart of Major Public and Private Institutions in Bangladesh Energy Sector



(Bangladesh Ministry of Power, Energy & Mineral Resources 1996a, 1996b). This policy offers fiscal incentives such as tax exemptions to IPPs (greater than 30 MW) and small power producers (less than 30 MW). The policy outlines the contract framework, including financing arrangements, fuel supply agreements, allocation of plant locations and rate formulation for bulk purchase of power by the government.

Ultimately, these attempts to disaggregate central control of the power sector and encourage private sector involvement have not achieved their aim. In all cases, the chair

GUY MARTORANA PHOTO

of the board of these "unbundled" corporations is a secretary (in service or retired) and most of the directors are additional or joint secretaries. Usually, they lack detailed knowledge of the corporation's activities. This problem has even affected the REB/PBS system.

Furthermore, both IPPs and government can manipulate outcomes via regulatory policies and strategic action plans that become increasingly difficult to interpret. Often with the advice of donor agencies, the government has produced a myriad of regulatory policies to direct the IPPs and unbundled power sector agencies. These policies – such as the IPP Policy, Small Power Plant Policy, Captive Power Policy, and implementation strategies such as Power Sector Master Plan and Power Sector Reform Road Map – all overlap. The lack of clarity in establishing rights and responsibilities of IPPs discourages most investors from entering the market.

In sum, the World Bank and ADB proposed "cookbook" reforms based on experience elsewhere. The reforms paid insufficient attention to the history of highly centralized Bangladesh politics. Not surprisingly, these reforms have in general failed. Centralized political and bureaucratic elites have continued to dictate agency decisions.

Lack of Regulatory Oversight

While arbitrary government intervention has hampered the power sector, elimination of the government role is not the answer. The sector cannot function without government provision of professional regulatory oversight. Non-partisan regulation of electricity rates charged to different consumers and of contacts between buyers and sellers is an essential component of the electricity sector. This becomes more crucial as most countries, including Bangladesh, move towards greater involvement of private firms in power generation. Electricity regulators must adopt a quasi-judicial role, to assure that both buyer and seller honor their contracts. Successful regulators act quickly to adjudicate allocation of unexpected costs and revenues as they occur in the life of a contract. Regulation should be comprehensive but not overburden the market by adding unnecessary paperwork to the process.

In the fall of 2007, the two-year attempt at establishing an independent oversight body, the Bangladesh Energy Regulatory Committee (BERC), was abandoned. BERC was to oversee electricity operations, licensing and tariff structures. Continued unresponsiveness by political and bureaucratic elites eventually undermined its authority. Interference in the operations of BERC took two main forms: delays in releasing funds for operation of the regulator, and slowness to approve regulations essential to daily operations of the energy and power sector.

Lack of Informed Electricity Consumers

Understanding how the power sector functions and how to set fair electricity rates is a difficult job even for experts. The electricity market involves the skills of engineers, lawyers, business people, and bureaucrats, all with different areas of expertise and often competing interests. Furthermore, electric-

ity demand and supply must be balanced at all times to maintain stable and reliable operations.

Consumers and producers in developing countries often lack access to good information on the sector. Government departments do not have funds to research and report on up-to-date changes in technology and regulatory policy. Many customers lack access to the internet and other sources of current information. Furthermore, in Bangladesh many small customers – especially in rural areas – are illiterate and ignorant of their rights.

Consequences

Load Shedding

In many developing countries, generation and transmission capacity is inadequate to meet the peak demand among those connected. Power authorities manage by load shedding – eliminating power to regions of the country, or neighborhoods within cities, on a rotating basis.

Despite reforms over the 1990s to encourage generation by IPPs, and despite the installation of new power plants, transmission lines and distribution networks, the Bangladesh power system remains inadequate to the demands of connected customers – to say nothing of the potential demand by the majority of Bangladeshis who have no access to electricity. The BPDB has resorted to significant load shedding to reconcile demand with available capacity.

Load shedding is a significant drain on the economy and a major irritant to the public, both in rural areas and cities. To minimize load shedding, old plants are not retired. The Minister responsible for the power sector and his Secretary postpone plant shutdowns for routine maintenance – which in turn gives rise to unexpected plant shutdowns at later dates. Neither power plant managers nor senior BPDB administrators have the authority to shut down power stations for urgent maintenance. Even in these cases, permission for shut down must be obtained from the Minister via the Secretary.

System Loss

The term "system loss" refers to the difference between electricity generated and electricity for which customers are billed. Technical system loss is the energy lost as heat in electrical equipment and along transmission lines, due to resistance as electricity is transferred from one location to another. Currently, the overall system loss in Bangladesh transmission and distribution system is about 21 percent. Technical system loss should not be above 10 percent; the remaining 11 percent non-technical system loss is a reasonable estimate of power theft.

Non-technical system loss arises in several ways. People may make unauthorized connections. Meter readers may be bribed to lower the recorded amount of electricity delivered to a home or business, which inflates the energy "lost" in the system. The BPDB and other regional operators may create non-existent non-paying customer accounts to cover up power losses to the

ADRENALIN PHOTO

system. This in turn exacerbates the problem of uncollected receivables.

Non-technical system-loss makes it difficult for system operators to estimate demand and manage the amount of energy flowing through the grid at any given time. An unpredictable flow of electricity through the grid places further strains on the aging, poorly maintained system.

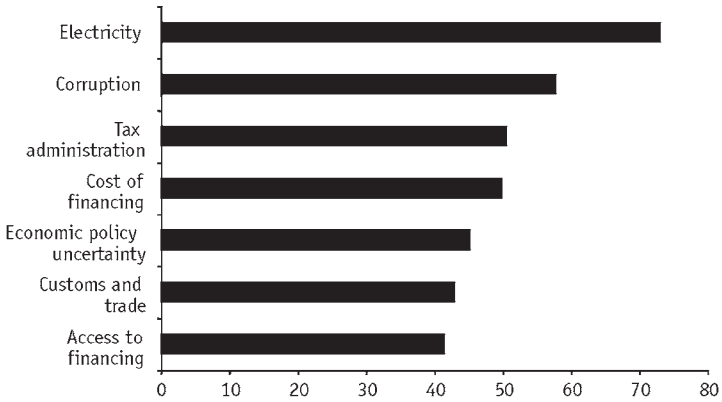
Economic and Financial Impact

The economic impact of inadequate performance in the power sector is large. Placing a precise value on the cost to the Bangladesh economy requires, however, making contestable assumptions. One study, of losses in the year 2002, concluded costs were equivalent to 11.5 percent of industrial production or 1.7 percent of annual GDP (Nexant 2003, iv). That is probably an understatement because it ignores foregone potential output.

There are several dimensions to any cost calculation:

- **UNDULY HIGH SOCIAL COST PER KWH GENERATED AND DISTRIBUTED:** Given unreliability of the grid, many industrial customers install captive back-up generating capacity, which significantly increases industrial production costs relative to an efficient power system. To begin, the total cost (operating plus capital) of generating a kWh of electricity from an isolated small power station may well be three or four times that of power from a large-scale plant. In addition, when industrial consumers abandon the grid in favour of captive capacity, the overall load factor of the distribution utility falls, which further increases overall system costs.

Figure 2: Top Constraints to Business Operation and Growth in Bangadesh, as Viewed by Firms



Note: Percent of firms rating issues as major or very severe obstacles (percent).

Source: World Bank (2003, 8)

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- **FOREGONE DEVELOPMENT:** In surveys, business leaders have cited "erratic and poor quality of electricity supply" as the most important single barrier to business expansion. (See Figure 2.)
- **DISTRIBUTIONAL CONSEQUENCES:** Electricity is disproportionately available to customers of above-average incomes. Village customers typically suffer more load shedding than do those in cities.

The Power Sector Master Plan (developed by Power Cell in the Power Division) undertook an estimate of the economic cost of load shedding in 2006. It estimated the cost to the economy of unmet demand due to load shedding at Tk.30 / kWh. To have supplied unmet demand in 2005/06 and 2006/07 would have required 500 MW additional capacity, operating at 60 percent load factor. Using these parameters, we estimate the annual economic cost of unmet demand at Tk.79,000 million (US$1.13 billion).[3]

Another aspect of the overall cost of poor electricity is the amount paid in bribes and power theft. Based on the data in the appendix Table A1, we assume Tk.2.5 / kWh as an average cost to generate and distribute electricity. If we estimate the actual cost of supply to customers (given power theft and corruption) at Tk.5.0 / kWh, the difference is Tk.2.5. The distribution agencies annually import 20,000 GWh. This implies an estimated annual excess cost to power customers of Tk. 50,000 million (US$700 million).[4]

Rural Electrification Board

The Requirements of Power Sector Reform

In any country, such as Bangladesh, whose power sector is manifestly inefficient, the potential benefits from reform are large. However, realizing reform has never been an easy task. There are many reasons for this but they can be summarized under two headings: the threat posed by interest groups benefiting from the status quo, and the time required to build trust between sellers and buyers:

- **LOSSES AMONG CONCENTRATED INTERESTS:** Reform means that customers with illegal connections risk losing them. State-owned power agencies are typically overstaffed; reform threatens job losses. Meter readers risk losing boksheesh arising from their discretion over billing. Senior power sector officials risk losing boksheesh from discretion over tendering and other major decisions. Farmers risk losing irrigation power sold to them at prices below cost. Politicians can no longer campaign on the basis of promises of uneconomic tariff structures and non-viable line construction in their constituencies. To succeed, reform must generate important "winners." And the winners must be numerous, not simply urban elites.
- **REQUIREMENT FOR TRUST AND CREDIBLE REGULATORY INSTITUTIONS:** The power sector requires large fixed investments in generation and transmission. Which, in turn, implies the need for long term contracting. Honoring long term contracts requires trust between buyers and sellers of power. If the power sector is characterized by mistrust, private firms will not invest. While there may be widespread understanding of the need for trust and credible institutions in the power sector, building respect for transparent ac-

countable administration requires time. If, in the absence of trust, governments substitute public for private finance, inevitably they incur large financial losses that divert limited public revenues from higher priorities, such as schools and health clinics.

Given these difficulties, Besant-Jones makes the obvious, but frequently ignored, argument that reformers must not import a cookbook of generic policies. They must build on what he describes as the "starting conditions":

> *These conditions include the size of the country and its power system and market, the country's location relative to other power markets, its income level and macroeconomic condition, its political situation, and the capacity of its domestic financial markets and institutions. They reflect the many dimensions of power market reform and critically influence the feasibility of reform programs and hence the outcomes that can be achieved from them in the short to medium term. The variety of starting conditions among developing countries partly explains the diversity of their power market reform programs and the development of innovative power market and industry structures and regulatory arrangements. (Besant-Jones 2006, 3).*

In any assessment of the "starting conditions" for reform in Bangladesh, the Rural Electrification Board is an immensely valuable institution. In this chapter we discuss its history and significance.

Origins of the REB

In 1977, the Rural Electrification Board was created through a Presidential Ordinance to oversee electricity distribution and expand access to electricity in rural Bangladesh. Since Partition in 1947, the focus of infrastructure investment has been the economic centers of Dhaka and Chittagong. The REB mandate was to bring power to those living outside the main cities, the rural poor.

The REB has adapted a model of rural electricity cooperatives prevalent in the United States. The REB acts as the umbrella organization over a series of Palli Biddyut Samitee (PBS). These rural electric societies are based on cooperative principles of col-

Quick Facts About REB/PBS Operations

Number of PBS: 70

Number of district under the program: 61

Number of villages electrified: 47,061

System loss: 11.68% (cumulative), 12.76% (March 2008)

Total distribution line constructed: 2,13,337 Km

Total distribution line energized: 2,10,779 Km

Total 33/11 KV sub-stations constructed and commissioned: 404
(305 Constructed by REB, 68 taken over from BPDB and DESA)

Installed capacity of sub-stations: 2704 MVA

Total number of consumers: 72,45,732

Total number of irrigation pumps connected: 1,95,164

Population in program area: 92,513,296

Connections

- Domestic: 6,153,906
- Commercial: 736,563
- Irrigation: 195,164
- Others: 12,854
- Total: 7,245,732

Source: REB website

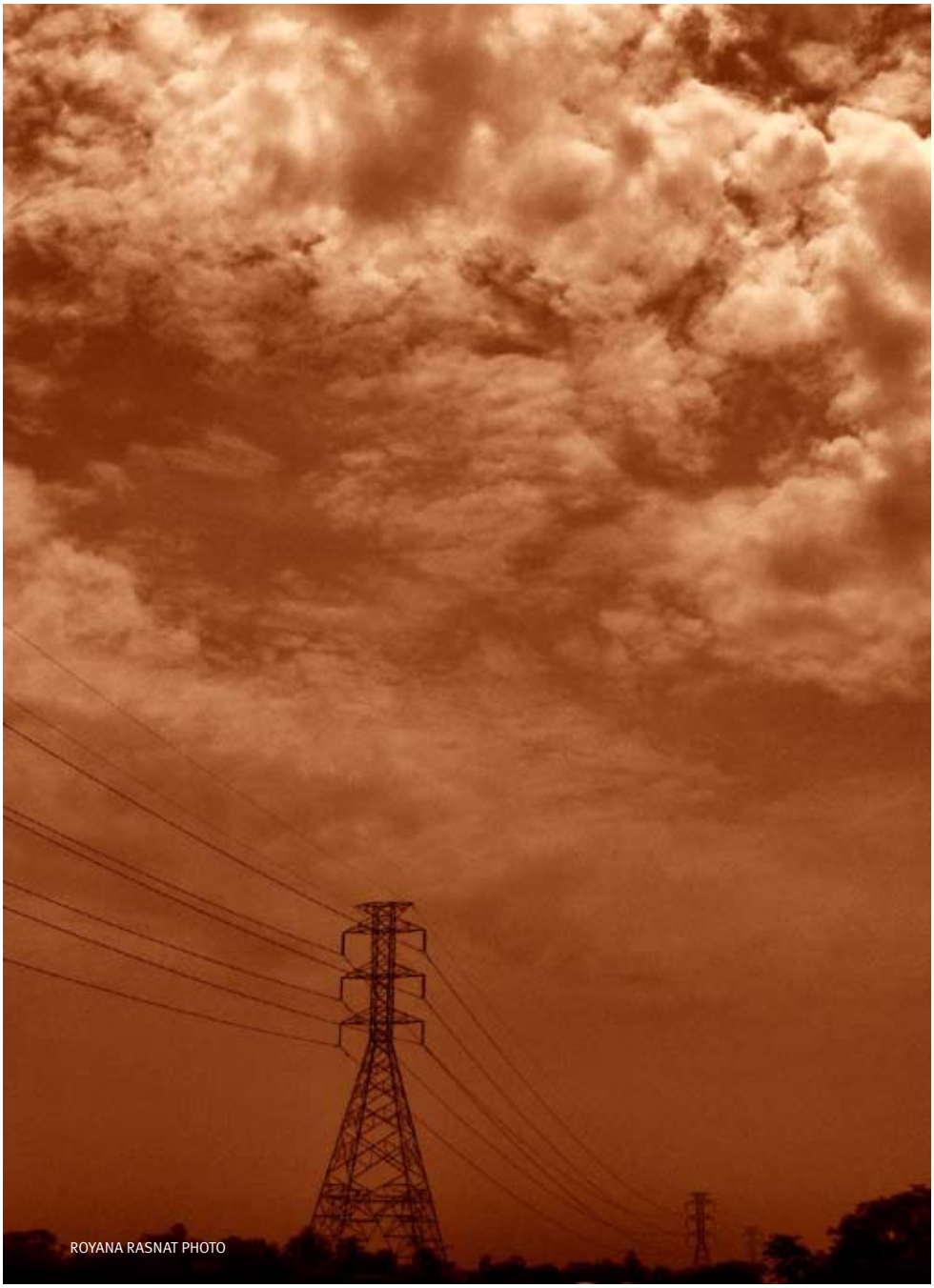
lective ownership by consumers. Each PBS operates as a semi-autonomous unit registered with the REB. A Board of Directors governs the PBS operations and management planning. Women are encouraged to run for election and serve as female directors.

The REB is the liaison between the PBS and government agencies: first, the Ministry of Power Energy and Mineral Resources; second, agencies that own and operate the electrical system in urban areas; third, government agencies, donors and NGOs engaged in rural development. The REB Board includes members from various agencies to facilitate this liaison in an effective manner. The REB also aids PBS with initial organization, training of employees, operational and management activities, procurement of funds and conduct of board elections.

After setting up an initial 13 PBS in 1977, the REB now supervises 70 operating PBS that serve 47,000 villages. The rural electrification program aims to electrify all villages under the REB mandate by 2020. This decade, the number of connections has doubled, and now exceeds 7.4 million. The total population of the area served is 92.5 million. Each PBS is responsible for a geographical area of 1500 to 2000 square kilometers. The REB is progressively assuming responsibility for areas formerly served by the BPDB and DESA.

Having a large number of small accounts, the REB/PBS system employs a larger staff than any other distribution agency. Head office REB officers and staff number about 1,000; PBS officers and staff total over 25,000. It is worth noting that the REB/PBS achieves impressively better efficiency in terms of the customers/employee ratio. The REB ratio is 300 customers/employee; the comparable ratio for other agencies is 90 (Rahmatullah 2005).

Financing for PBS infrastructure is organized through the REB. The need for infrastructure such as substations and



ROYANA RASNAT PHOTO

distribution networks is assessed based on 20-year demand forecasts for the area. These are reviewed every year and updated every fifth year. Low interest long-term loans are issued with a grace period of eight years at 3 percent annual interest.

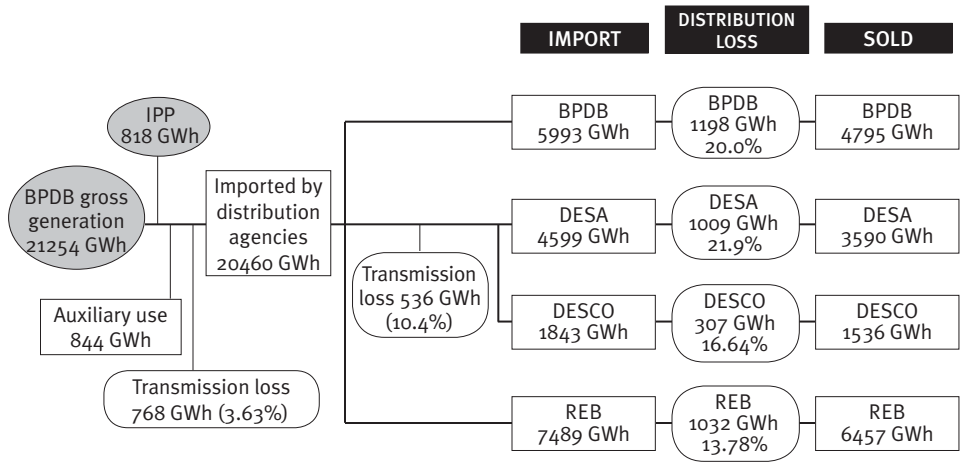
Achievements

Over the last three decades, the REB has dramatically expanded its share of power distributed. In 2005/06, its share of aggregate national power distribution was almost 40 percent. (See Figure 3.) Relative to the other distribution agencies, the REB has maintained a much superior level of accountability, in terms of system loss and bill collections.

The system loss experienced by the REB has been consistently lower than for either the BPDB or DESA (now DPDC). As example, consider the year 2003 in Table 1, and subtract 10 percent as an estimate of technical loss. That implies 7.4 percent non-technical loss for the REB; 13.0 percent for the BPDB and 21.0 percent for DESA. Another measure of system integrity is the ability to collect amounts owing on billed power sales. In 2003, the REB failed to collect on approximately 2 percent of bills, the BPDB on 11 percent, and DESA on 8 percent.

Slow but steady expansion of the REB/PBS system, combined with local PBS participation in planning and operating has engendered confidence that customers will receive good service. One result has been a steady decrease over time in system loss. (See Figure 4 on page 38.)

Figure 3: Transmission and Distribution Losses, 2005/2006



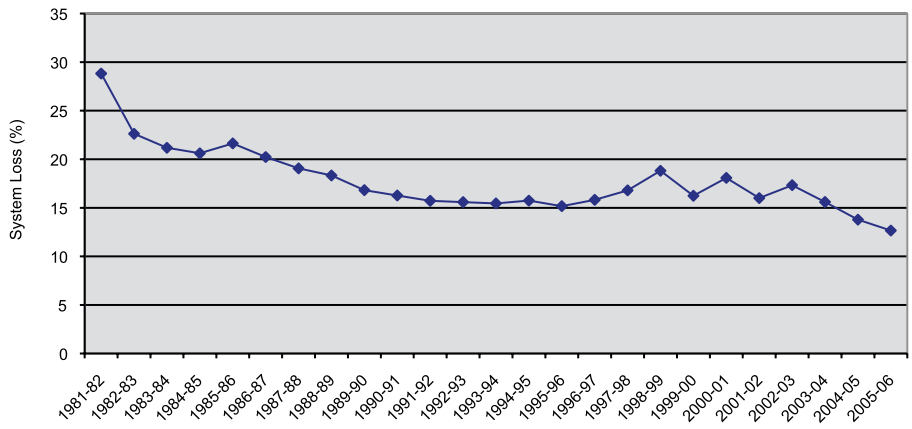
Source: Rahmatullah (2007)

Table 1: Total System Loss and Bill Collection Rate in Electricity Distribution Companies in Bangladesh, 1994–2005 (Percentage)

Year	System Loss			Bill Collection		
	REB	PDB	DESA	REB	PDB	DESA
1994	15.45	30.26	32.77	98.95	82.11	79.54
1995	15.74	29.42	31.71	95.72	90.17	89.45
1996	15.17	28.44	31.30	98.24	92.77	84.69
1997	15.82	27.59	29.55	95.17	87.98	81.91
1998	16.80	29.09	30.13	95.62	80.98	80.40
1999	18.81	29.69	29.89	93.88	70.69	76.15
2000	16.24	26.72	34.56	96.95	82.29	87.60
2001	18.08	24.93	36.55	96.00	86.00	87.61
2002	16.00	23.00	NA	96.92	89.00	NA
2003	17.35	23.00	31.00	97.90	89.00	92.00
2004	15.60	NA	NA	97.72	NA	NA
2005	15.67	NA	NA	NA	NA	NA

Source: Asian Development Bank and REB, in Nathan 2006.

Figure 4: REB System Loss, 1981-82 to 2005-06



Source: Source: authors' calculations from REB (2008a)

Keys to Success

Why has the REB been able to maintain its superior performance in an environment where other power distribution agencies have not? A recent consultant's study examines several explanations. The explanations fall into two broad categories: (1) procedures and systems that secure collection and efficient electric power distribution; and (2) environmental factors that protect those procedures and systems from political interference that could undermine their integrity (Nathan Associates 2006, i).

The REB has a solid reputation of measuring inputs and outcomes, and using common sense managerial techniques:

- The PBS and REB measure many dimensions of performance. This provides useful benchmarking information for an individual PBS. It helps identify best practices and points out potential problems. Measurements are exhaustive and scrupulously undertaken. (See box on Performance Target Agreements.)
- While managers in the head office wield authority over major REB decisions, the cooperative tradition of local PBS control matters. The decentralization of many managerial decisions is in sharp contrast to the operation of the other power sector agencies.
- Given the culture of boksheesh among meter readers with the other agencies, the REB trains its meter readers, checks on their performance, and limits the length of their tenure with any one PBS.

Supporters of the REB have created a legislative framework and "corporate culture" that buttresses procedural and managerial efficiency:

- By law, unions are not allowed within the PBSs.
- The election of PBS boards of directors contributes to a sense of trust between customers and the REB. PBS directors are expected to refrain from partisan politics.
- The initial REB leadership in the 1970s benefited from the professionalism of senior military officers. This tradition has survived over the three decades of the REB's existence. Nonetheless, the REB does suffer from some of the same bureaucratic problems that afflict other power sector agencies.

Limitations

Despite the REB's accomplishments, its ability to improve overall performance of the country's power sector is limited by the fact it has been restricted to power distribution. Except for a small amount of capacity added to the national grid under the auspices of the Rural Power Company Limited (RPCL), the REB has not generated power. As a distribution agency, the REB/PBS system is subject to the same voltage variations as others drawing on the national grid. And, by all anecdotal accounts, its rural customers experience more load shedding than do those in the major urban centres.

The rural population is, on average, less affluent than their urban counterparts. In deciding whether to connect to the system, potential low-income rural customers must weigh the connection charges, which are not easy to pay, against the mediocre quality of power to be supplied. Although the REB has been successful in electrifying half of all villages, less than half of residents in these villages have taken up service.

Performance Target Agreements (PTAs)

The REB formulates annual PTAs, signed by the PBS presidents, to govern activities of each PBS. Staff in PBS that attain the agreed targets are rewarded with incentive bonuses, up to 15 percent of their salary. On the other hand, PBS that fail to achieve targets face financial penalty. The REB holds open discussions with the PBS presidents and general managers on socio-economic, financial and administrative aspects. But unfortunately, PTA targets often do not give due consideration to the problems and potentialities of the geographical area of the particular PBS. The methodology of the PTA has limitations.

Among the accounting measures of each PBS are the following:

- System loss
- Accounts receivable
- Account payable
- Debt service coverage
- Plant revenue ratio
- Equity status
- Recovery of amounts written off
- Payment of debt service liability
- Annual load factor
- Revenue per KM of line
- Total cost of providing electric service per km of line
- Percentage of billing each month
- Annual growth in consumers (service in place)
- Annual growth in kWhs or MWhs sold
- Ratio of services in place and consumer connected (cumulative)
- Ratio of connected and stacked consumer
- Inspection of distribution line (KM)
- Maintenance of distribution line (KM)
- Preventive maintenance of transformer (number)
- Repair of damaged transformer (number)
- Consumers hour outage
- Ratio of disconnected and disconnectable consumers.

Source: REB (2008c)

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ASIF SALEH PHOTO

Area-Based Planning Options

THERE ARE MANY OPTIONS FOR IMPROVING THE BANGLADESH POWER SECTOR: the options discussed here are not exhaustive. However, we believe introduction by the REB of the Area-Based Planning options discussed below are important. The strategy underlying these options is to create generating capacity independent of the national grid, capacity whose power would be available on a priority basis to customers in the participating PBS.

We start by summarizing the status quo. In the next section, we introduce three distributed generation options. We summarize the criteria for evaluating options in Table 2 on page 45.

Status Quo – Generation Fed into National Grid

Starting in the early 1990s, the government created separate distribution companies; later, it unbundled transmission. It has also encouraged IPPs to invest, supplying additional capacity for the grid. The REB has played a role in this strategy.

To address inadequate generation capacity, the REB established in 1994 the Rural Power Company Limited (RPCL) – initially with five PBS (Dhaka PBS-1, Comilla PBS-1, Narsingdi PBS-1, Tangail PBS and Moulvibazar PBS) – using the financial assistance and guidance of the Asian Development Bank (ADB). Three small power plants have been built under the auspices

of the RPCL with a total initial capacity of approximately 35 MW. In 1999, expansion increased this capacity to 70 MW; later in 2002, to 140 MW; in 2007, to 210 MW.

Unfortunately, these additions to national capacity have been relatively minor and any generation interconnected to the grid automatically falls prey to the many issues that plague the national system.

REB Distributed Generation

The REB, or partnerships among adjacent PBS, could arrange financing and build several plants whose power would be distributed via the REB/BPDB 33 kV distribution lines to the relevant partnering PBS. Alternatively, the REB could contract with IPPs to generate power and the partner PBS could buy at an agreed price. Since the power generated would be distributed over a relatively small area using existing REB/PBS infrastructure, the power could be generated and transmitted at a lower voltage (namely, the 33 kV used by the REB distribution lines). The essence of these options is that the REB or PBS control distribution of this power, directing it to meet local demand.

To give an example, a 100 MW plant, operating at 60 percent capacity, would generate annually approximately 530 GWh of electricity. The three largest PBS each require annually more than this quantity of electricity. Many combinations of three or four adjacent PBS have aggregate power requirements well in excess of 530 GWh. Hence, plants should be designed with the potential to at least double capacity.

Within this strategy, there exist several options whose feasibility must be assessed.

Small Power Plants Owned by the REB or Partnering PBS

The REB or partnering PBS could design, build, own and operate small power plants (with a capacity of, say, 100 MW) that would generate power for the sole purpose of satisfying demand among partnering PBS. If the capacity exceeds the load in a particular PBS, several adjacent PBS could integrate their distribution lines. The existing Local Area Based Planning methodology that governs the location of PBS could provide the framework for the REB to install small power stations that combine three or four PBS. Also, the 1996 Small Power Plant Guideline allows for direct sale of electricity from generator to end-user (SPP Section 4).

A variation on this option is that the REB arrange finance and own the power plants, but contract with IPPs to design, build, and operate them on a cost-plus basis.

If the REB integrates backward into power generation, it will be obliged to assume new tasks. It will have to arrange financing for plant construction; it will have to assume all the complex managerial tasks associated with power generation.

Small Power Plants Owned by IPPs

Given the institutional credibility of the REB/PBS system, it may be feasible to negotiate with private IPPs that they design, build, own, and operate power plants subject to

long term contracts to sell to the participating PBS. The REB/PBS could lower risk, and hence lower cost of private financing to the IPPs, by offering insurance against breach of purchase agreements.

This option inevitably raises issues arising in the context of utility regulation. It would require the REB to replicate on a small scale the functions that reformers hoped the Bangladesh Energy Regulatory Commission (BERC) would accomplish at the national level.

While this option would relieve the REB of arranging financing and operating

Table 2: Assessment of Strategic Options to Expand REB Capacity

	Status quo	Area-based planning (distributed generation options)		
		Plants owned by REB/PBS	Plants owned by IPPs	Purchases from owners of captive power generators
System stability	System remains at current, poor level of stability	Increased system stability as scheduled power flows can be controlled by REB operators. Adequate levels of electricity would reduce load shedding		Potential stability issues as existing infra-structure may not adequately control power flows from many small private generators
Price/cost per kWh of power imported into REB distribution system	Lower purchase price (about Tk.2 / kWh), based on past agreements between BPDB and REB	Higher average cost or purchase price (about Tk.2.5 / kWh) required to cover full long-term costs of supply; price depends on several variables: ability to sell surplus power to national grid at reasonable price, cost of finance		Price will vary across providers, depending on terms of contract
Quality of power (load shedding and voltage variability)	Low quality, power subject to extensive load shedding and voltage variability	High quality, subject to shutdown of plants for maintenance		Variable quality and intermittent availability, subject to needs of captive generator
Complexity of contracting by REB/PBS	Simple, contracting based on past precedents	Complex, requires REB to expand scope of management and develop sources of finance	Complex, requires REB to expand scope of management and engage in bilateral negotiations with IPPs	Moderately complex, requires many small contracts with captive power generators
Fuel source	Choice of fuel depends on decisions of BPDB	Gas creates fewer environmental problems than coal; use of gas as feed constrains plant locations to be near gas pipeline grid; coal reserves are established – proved gas reserves are limited, but little recent exploration has taken place		Choice of fuel depends on decisions of captive power generators

power plants, it would still need to expand its managerial scope in order to undertake competently the bilateral negotiations between itself and IPPs.

Captive Power

A third option for distributed generation is that the REB negotiate with owners of small generators installed as back-up power (used during periods of load shedding). Although individual captive generators are usually of low capacity (less than 5 MW), there is cumulatively in Bangladesh at least 1000 MW of captive capacity. It has been estimated that owners of 600 MW of this capacity may be willing to negotiate contracts to sell surplus power to the relevant PBS (Rahmatullah 2007). The benefit of this option is more efficient utilization of pre-existing generation sources that would otherwise be under-utilized.

As of July 2007, the REB had signed six captive power agreements with various generators in the areas of Chittagong, Narayangonj, and Gazipur. The maximum supply of contracted power from the generators is 21 MW with a minimum of 10.75 MW. The net amount pumped into the distribution grid depends on the amount consumed by the original generator (REB 2008d).

The intermittent availability of captive power poses reliability issues for distribution infrastructure. Electricity is a "real-time" commodity. The amount injected into the grid must be instantaneously balanced with the amount being consumed in order to keep the physical properties of electricity (voltage, current, impedance) within acceptable reliability limits. System planners have become adept at forecasting supply and demand patterns in order to schedule the correct amount generated at any given time. They also have protection schemes at their disposal to "trip" or disconnect certain generators or portions of the grid that have become unstable.

The uncertainties of availability and volume of energy associated with captive power pose potential system problems. An unbalanced system is susceptible to voltage variations and blackouts. However, a well implemented captive power policy can resolve these technical problems via installation of appropriate protective equipment at the interconnection point.

Further Considerations

Fuel Choice

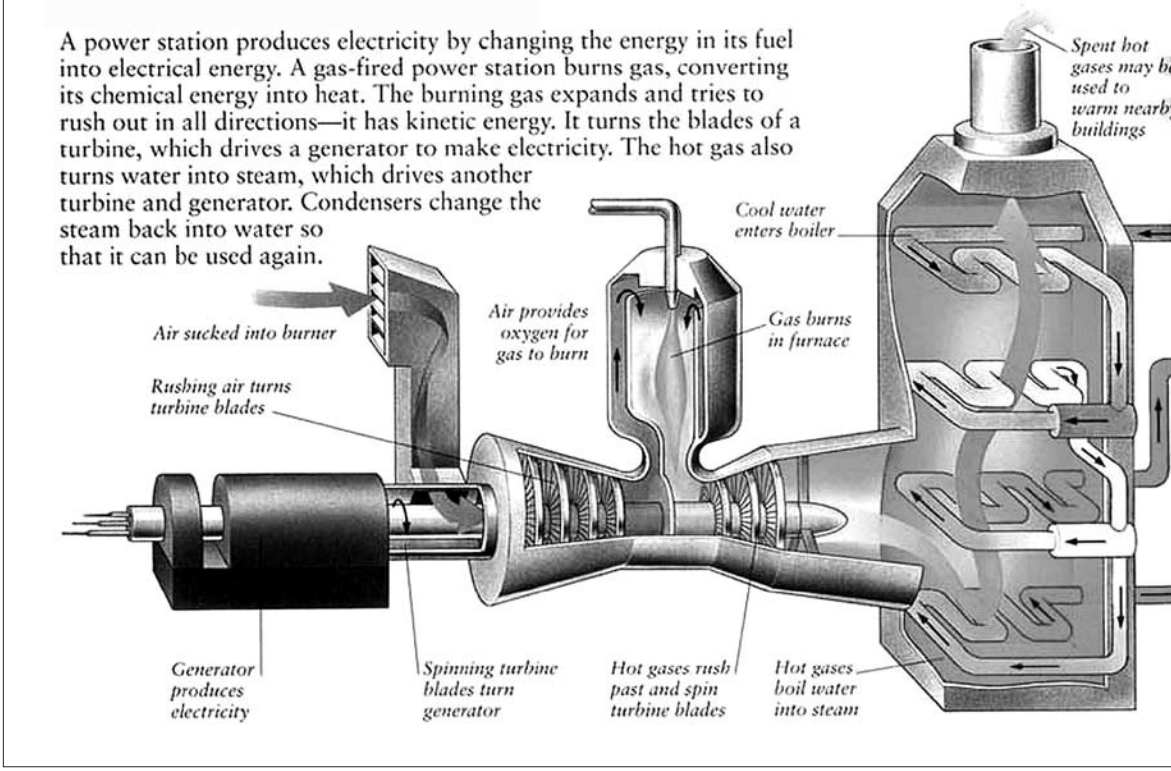
Coal

Bangladesh has abundant reserves of coal in the north, and potentially large – but under-explored – natural gas reserves in the eastern portion of the country and in the Bay of Bengal. Either can be used as energy source to generate electricity.

In coal-fired plants, coal is burned to produce steam, which is then pressurized and released to spin turbines. The disadvantages of coal as energy source are the associated health and environmental concerns. Internationally, coal-fired power plants are the major source of carbon dioxide, the most important greenhouse gas. Airborne pollution from coal plants causes acid rain and can interfere with ground water and water tables. Furthermore, open-pit coal mining displaces farmers and reduces valuable arable land, a major concern in a country as densely populated as is Bangladesh.

Recent innovations attempt to sequester the carbon either before the coal is burned as fuel (coal gasification combined cycle) or after it is burned but before its emissions escape into the atmosphere. Extensive research and development of these sequestration methods is taking place. However, carbon sequestration techniques are not yet economically viable, even for developed countries where customers are prepared to absorb the additional costs. Current estimates conclude that at least 10 to 20 years of extensive research and development are necessary to bring clean coal technologies to a marketable level of scale and efficiency (EPRI/EEI 2007).

Figure 5

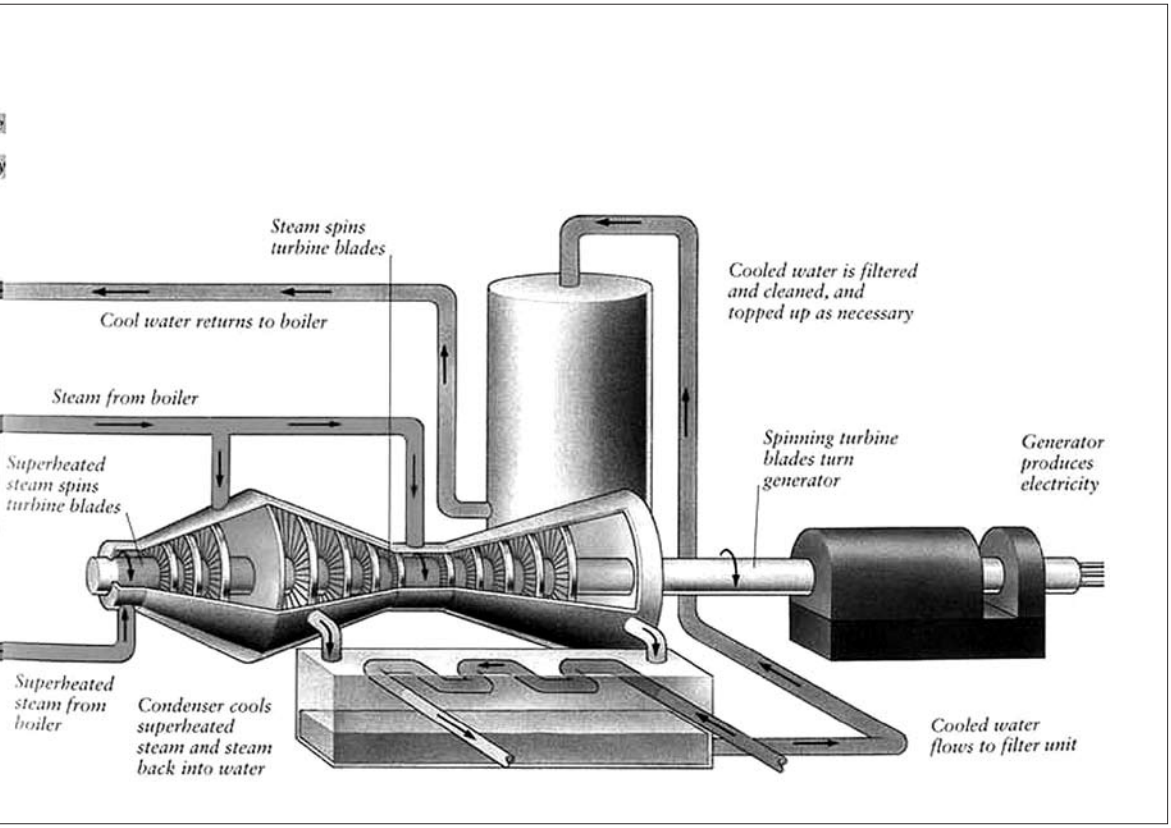


Natural Gas

Another fuel choice in Bangladesh is natural gas. Combined cycle gas turbines (CCGT) fueled by natural gas employ a proven readily available technology. In a combined cycle plant, exhaust heat from the first turbine is used to produce steam that powers a second turbine. Relative to coal-fired plants, such combined cycle turbines can readily reduce greenhouse gas emissions per kWh generated by 50 percent.

The relative advantage of natural gas arises from the higher heat content, the lower carbon intensity of gas relative to coal, and the higher overall efficiency of a CCGT relative to a coal-fired plant (US DOE/NETL 2007, 446).

The US Environmental Protection Agency (EPA) provides the following statistics. The average emissions rates in the US from natural gas-fired generation are 1135 lbs/MWh of carbon dioxide, 0.1 lbs/MWh of sulfur dioxide, and 1.7 lbs/MWh of nitrogen oxides. Compared to the average air emissions from coal-fired generation, natural gas produces half as much carbon dioxide, less than a third as much nitrogen oxides, and



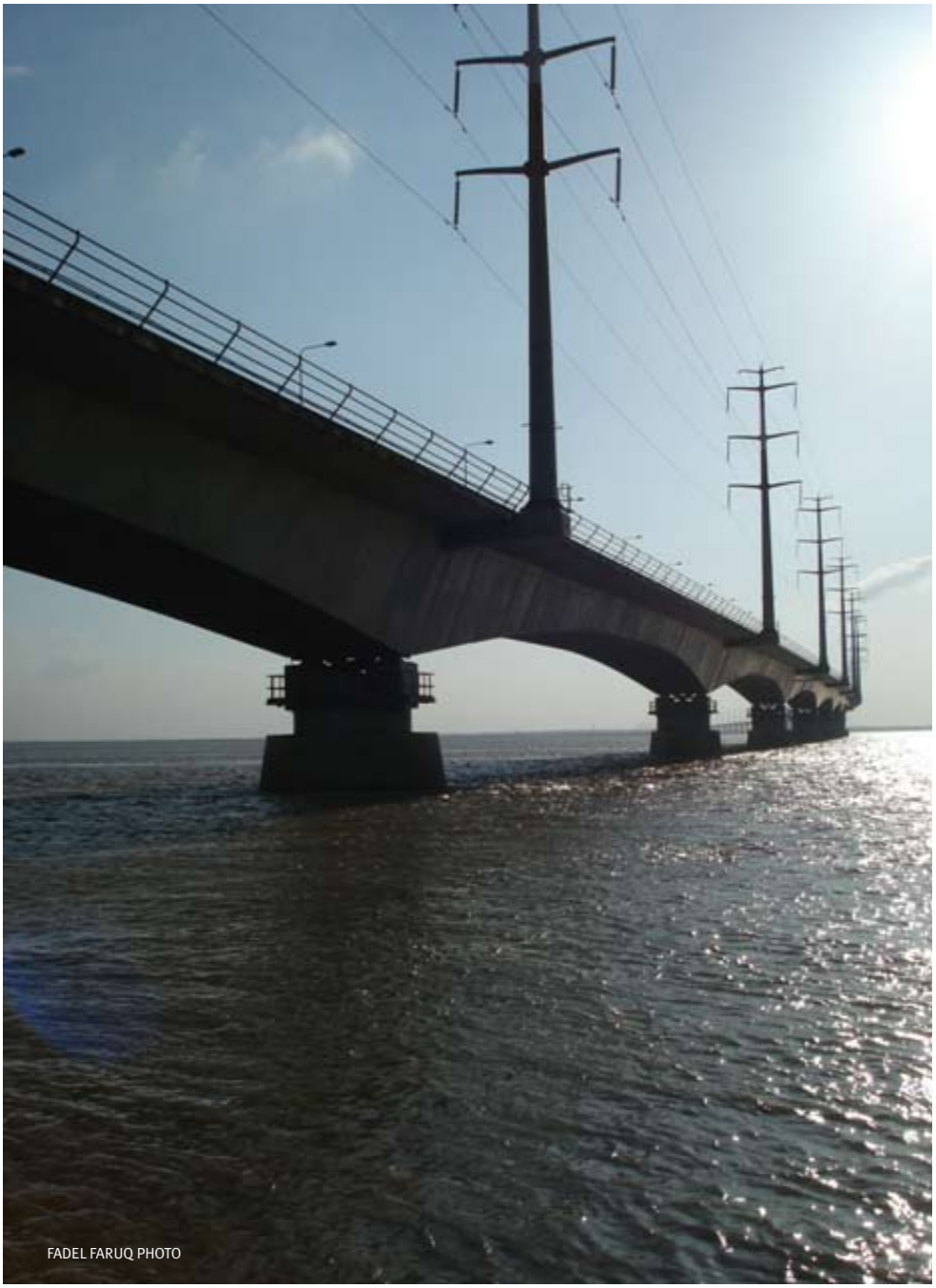
one percent as much sulphur oxides per unit of electricity generated (EPA 2008).

Estimating gas reserves in Bangladesh has been subject to much controversy in recent years. Estimates of ultimate discoverable reserves range between 11 and 80 TCF (Miyan and Richards 2004, 24-28). Whatever the size of undiscovered reserves, it is safe to say that sizeable undiscovered reserves exist. There has been little private investment in exploration due to the poor overall credibility of regulatory institutions and state-owned agencies in the sector.

Size of Plant

New technologies such as CCGT have significantly reduced the minimum efficient scale of generating plants, increased the efficiency of transforming the energy source into electricity, and reduced the time needed to plan and build new generating capacity. Kessides summarizes as follows:

> *In electricity new technologies have significantly reduced the minimum efficient scale of generating plants, the investment costs of new units, and the time needed to plan and build new*



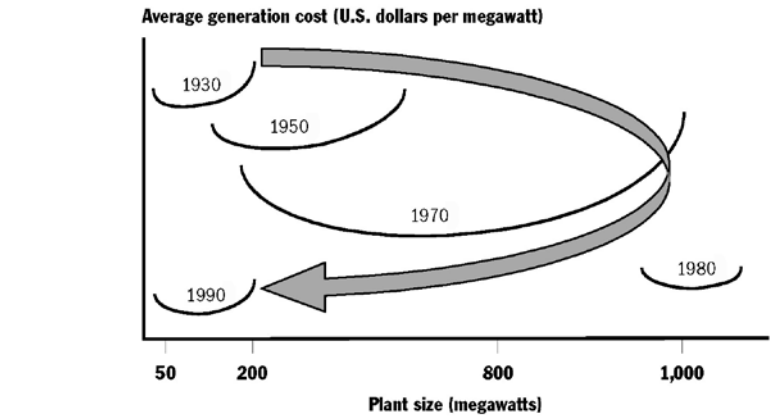
FADEL FARUQ PHOTO

plants … Generation could be structurally competitive in many developing and transition economies, especially those with access to natural gas. Smaller plants considerably increase the range of ownership options. Moreover, low cost, small-scale generation units allow electric power to be produced closer to end users, reducing reliance on transmission and even distribution networks and undermining their natural monopoly characteristics as well. Small-scale, off-grid supply may ultimately prove a practical solution to the electricity problems of many low-income developing countries, especially in Africa. (Kessides 2004, 38)

The schematic Figure 6 illustrates trends over the previous century in long run unit costs in generation for plants of varying scale. The significance of these trends is twofold: the decline in total (levelized) cost per kWh of electricity and, of equal importance, the technological changes that now allow small power plants of 100 MW to realize unit costs as low as large plants of 1000 MW capacity.

Despite technological advances, unit costs are higher for very small (below 50 MW capacity) plants than for somewhat larger plants. This may pose a tradeoff. The lowest technical cost of power generation may require a plant whose power can be efficiently consumed only by assembling several PBS into a mini-grid. This may create more administrative and managerial problems than would arise from a smaller plant serving a single PBS. A balance needs to be struck between technical cost efficiencies of somewhat larger plants (100 MW and over) and the desire to preserve a decentralized, autonomous organization among PBS.

Figure 6: Schematic Figure of Trends in Long Run Average Cost Curves per Megawatt of Electricity Generating Capacity



Sale of Surplus

Banerjee (2006) analyzes unit costs of alternate power generation technologies intended for use in distributed generation projects in India. A key conclusion of his analysis is the importance of maintaining a high load factor. To realize satisfactory load factors for most distributed generation projects requires an interconnection with a major power grid, and the ability to sell surplus power into the grid at a reasonable price.

In the case of PBS distributed generation projects, there should be in place agreements whereby the BPDB buys surplus electricity after local demand has been met. Negotiating the terms of such agreements is a potential source of conflict. Legislation setting guidelines for such agreements is important.

Such legislation could be modeled on the Public Utility Regulatory Polices Act (PURPA) in the US. It specifies the terms and conditions of sale from small power producers to regional utilities. Enacted in 1978 by the US Congress, the goal of PURPA is to create a market for non-utility small power plants - many using renewable energy technologies - by obliging utilities to buy power at prices equivalent to "avoided costs" faced by the utility if it had to generate or purchase additional power from sources other than its own generators. Legislating a standard agreement between small generators and utilities has given both parties a sense of certainty that a fair market for surplus power will exist.

Reliability issues are also a concern, given the aging BPDB plants, and questionable professional standards in the BPDB. Detailed scheduling and monitoring of power transactions between PBS-generated electricity and the national grid will be needed to ensure that the system stays within reliability and safety limits.

REB/PBS Institutional Capacity

The REB/PBS system has grown dramatically over the last decade, and now serves over 7.4 million customers. Inevitably, such growth has created new managerial difficulties. We refer briefly to several aspects, but these issues deserve much fuller discussion than we can provide here.

Assuming the utility regulatory role

It is essential that agreements for power purchased from IPPs set rates that ensure adequate, but not excessive, financial returns to both the IPP as generator and PBS as distributor. As discussed by Kleinschmidt (2007), a regulator applying a "rate of return" regulatory strategy in North America determines a rate structure for a regulated distribution company after taking into account the following:

- Variable costs: Cost of electricity purchased
- Fixed costs: Operations and maintenance
  - Administration
  - Depreciation and amortization
  - Property taxes and fees
  - Corporate income taxes
  - Allowed return on rate-base
  - Total costs

STEVE RICHMOND PHOTO

In the absence of a national regulator, the REB will have to exercise this regulatory role in negotiating with any IPP providing distributed generation capacity. Determining the allowed return on the rate-base is often the most controversial decision. There must be a return to those who provide finance, whether finance be in the form of debt or equity. Without adequate return, there would be no IPP investments. The greater the political risk perceived by those who provide finance the higher will be their expected return.

Improving PTAs

As discussed in Sidebar 2, there is need to implement PTAs that actually work. Targets must be set in a more reasonable manner. One of the authors has proposed a five-step procedure that emphasizes stages of implementation:

- **STEP 1:** Set PBS objectives and targets on the basis of a new expanded REB mandate that entails distributed generation
- **STEP 2:** Develop program of action with relevant groups
- **STEP 3:** Implement the program
- **STEP 4:** Monitor, evaluate, and report progress to PBS directors and to REB
- **STEP 5:** Regularly review and reset objectives and targets as necessary. (Rahmatullah 2005)

Differential rates

Within reason, setting different rates for different customer classes makes sense. For example, it makes sense to price power at lower rates for customers prepared to be cut off at times of high demand. Pricing power at higher rates during peak hours and lower rates off-peak also makes sense. (Electricity demand peaks at certain times of day, such as time of cooking evening meals.) This obliges peak-hour customers to bear more of the fixed costs of capacity than those able to use off-peak power. High peak-load pricing is efficient since it is peak demand that determines required capacity. As Kleinschmidt (2007, 8) states, high prices for peak-hour consumption "not only recovers the costs of the extra capacity that needs to be built from the customers that incurred the load during that time, but also will provide an incentive for shifting discretionary loads to off-peak periods."

The above illustrates the logic behind peak-load pricing. But, in practice, there are many obstacles. It may be impossible to meter time of use of power. Rate setting may become politicized in which case politicians promise artificially low off-peak rates that jeopardize the financial solvency of the distribution agency.

Small low-load PBS

Furthermore, the REB must grapple with the fact that the majority of PBS have sales below financial break-even levels. Break-even annual sales for a PBS have been estimated at 300GWh. In 2005, in terms of sales, the top

10 PBS averaged 380GWh; the remaining 60 averaged 80GWh (Rahmatullah 2005). Several considerations arise:

- Enabling the REB/PBS system to generate high quality power distributed to participating PBS on a priority basis will increase consumer demand. This will enable some near-to-break-even PBS to realize a financial surplus.
- There is a potential to decentralize industrial development plants beyond the Chittagong and Dhaka regions. Greater decentralization will increase power sales in the affected PBS.
- It may be desirable to merge some PBS with small loads in order to realize administrative scale economies.
- The REB could engage in some explicit, limited cross-subsidization. It could, for example, create a fund, financed by a modest levy on high-load PBS devoted to subsidizing the fixed cost of customer connection costs, particularly in PBS with small loads. Preferably, subsidies should target the fixed costs for certain customer groups, such as low-income farmers in rural areas. These one-time subsidies will not have an ongoing impact on financial viability of PBS.

Renewable Energy Projects

There is a modest potential to generate power from renewable sources such as wind and solar. At present, unit costs for these sources are above costs for thermally generated power except in isolated locations facing high transmission and distribution costs. However, the costs of renewable power technologies (such as wind and photovoltaic) have declined dramatically over the last decade and will probably continue to do so. Either now or in the near future, there may be a potential to make such projects financially viable.

MUSFEQUE-US-SALEHEEN PHOTO

Conclusions and Recommendations

IN CONCLUSION, WE MAKE SEVERAL RECOMMENDATIONS THAT TAKE ACCOUNT of what Besant-Jones identifies as "starting conditions." Two of these conditions are of particular importance: the relative under-servicing of rural Bangladesh and the superior reputation of the REB as a credible institution in the power sector.

RECOMMENDATION 1: *The government should encourage the REB and individual PBS to negotiate multiple captive power projects, the power from which would be distributed within the relevant PBS.*

The two major guidelines governing such contracts are the following:

1. the REB be satisfied the captive power generator will not destabilize the larger REB/PBS distribution network, and
2. the contracting PBS maintain adequate accounting to assure each project is financially justifiable, inasmuch as expected incremental revenue exceed incremental cost to the PBS.

RECOMMENDATION 2: *The government should encourage the REB to pursue investment in distributed generation capacity, experimenting with alternate financial models.*

There exist several options, each worth serious consideration:

1. The REB/PBS could design, build, own, operate several power plants, raising the finance and managing the plants. Given the REB's credible reputation, it may be able to arrange low-interest financing from a bilateral or multilateral donor agency.


MONIR-UZ-ZAMAN PHOTO

2. The REB could contract with IPPs to design, build, operate on a cost-plus basis several plants. But, as with option 1, the REB/PBS could retain ownership and arrange financing.
3. The REB/PBS could enter into long-term purchase agreements with IPPs. The IPPs would design, build, operate, and own the power plants.

This incremental capacity should initially be limited to, say, 1000 MW. After three years, the REB should undertake an independent review of the performance of these projects. As with captive power projects, it is important that the projects not destabilize the REB/PBS distribution network, and that projects be financially justifiable. It should be understood that this recommendation implies that the REB/PBS can contract free from political constraints imposed by the Cabinet Committee on Government Purchase.

RECOMMENDATION 3: *The government should enact legislation incorporating the PURPA principle of guaranteed sale of surplus power from distributed generation plants into the national grid at prices reflecting the avoided costs of power generated by the BPDB or IPPs.*

As discussed in the report, such sales increase the load factor of the power plants and lower the long run unit cost of operation. Surplus sales also benefit customers relying on the national grid.

RECOMMENDATION 4: *Given rapid growth, the REB/PBS must address its new and more complex managerial difficulties. There are several aspects to this: assuming the utility regulation function in negotiations with IPPs; advising on location of industrial development projects; designing differential rate structures; and reforming Performance Target Agreements (PTAs) to realize improvements in PBS performance, particularly among small-load PBS incurring financial losses.*

The expectation underlying our recommendations is that PBS customers – both small and large – are willing to pay the full costs of power, provided it is of high quality, not subject to voltage variability or load shedding. Future policy must grapple with the fact that the majority of PBS currently have sales below financial break-even levels. Several considerations arise:

- Enabling the REB/PBS system to generate high quality power distributed to participating PBS on a priority basis will increase consumer demand. This will enable some near-to-break-even PBS to realize a financial surplus.
- There is a potential to decentralize industrial development plants beyond the Chittagong and Dhaka regions. Greater decentralization will increase power sales in the affected PBS.
- It may be desirable to merge some PBS with small loads in order to realize administrative scale economies.
- The REB could engage in some explicit, limited cross-subsidization. It could, for example, create a fund, financed by a modest levy on high-load PBS devoted to subsidizing the fixed cost of customer connection costs, particularly in PBS with small loads. Preferably, subsidies should target the fixed costs for certain customer groups, such as low-income farmers in rural areas. These one-time subsidies will not have an ongoing impact on financial viability of PBS.

RECOMMENDATION 5: *The REB should explore the potential of obtaining financing for renewable energy projects from firms investing in carbon emission offsets.*

As discussed, the potential for renewable energy projects is modest at present. The REB could enhance the viability of such projects by selling carbon emission offsets to purchasers willing to buy such offsets. The Chicago Carbon Exchange is an example of a market in such carbon offsets (CCX 2008).

Notes

[1] The opinions and any errors in this report are those of the authors, and are not the responsibility of IUBAT, CPR, or those who provided assistance with this report.

[2] Numerous state-owned agencies and corporations have come into existence. In 1996, the Dhaka Electrical Supply Company (DESCO) was created to further develop and operate the distribution system in Dhaka, improve customer service, and share administrative burdens with the Dhaka Electric Supply Authority (DESA). In July 2008, the Dhaka Power Distribution Company (DPDC) assumed the remaining activities of DESA. The Electricity Generation Company of Bangladesh (EGCB) has assumed responsibility for most BPDB power stations. The Power Grid Company Of Bangladesh (PGCB) manages the national transmission grid. There exist also the Ashuganj Power Station Company Limited (APSCL – which took over the 750 MW Ashuganj power station) and the West Zone Power Distribution Company (WZPDC – responsible for distributing power in Khulna, Jessore, Faridpur, Kushtia, Barisal, Perojpur, Madaripur, Bhola, Jhalkathi Shariatpur, and elsewhere). These organizations all have autonomous legal status.

The BPDB distribution area under BPDB will be further subdivided, into the North Zone Power Distribution Company (covering the districts of Rajshahi, Bogra, Rangpur, Pabna, Dinajpur, Nilphamari, Jaldhaka, Thakurgaon, Joyporhat, Kurigram, Panchagar, and elsewhere), the South Zone Power Distribution Company (covering the districts of Chittagong, Noakhali, Cox's Bazar, Chittagong Hill Tracts, Comilla, Feni, Chadpur, Laksmipur, Brahmanbaria, and elsewhere) and the Central Zone Power Distribution Company (covering the districts of Mymensingh, Sylhet, Moulavibazar, Sunamganj, Habigonj, Tangail, Kishoreganj, Jamalpur, Sherpur, and elsewhere).

[3] This estimate of economic cost of load shedding is based on the following calculation: Tk. 30 / kWh (economic cost per kWh of unmet demand) x 500 MW (capacity required to eliminate load shedding) x 60% (load factor of incremental capacity) x 8,760 hours / year. The US dollar equivalent is based on an exchange rate of Tk.70 = US$1.

[4] This estimate is based on the following calculation: Tk.2.5 / kWh (cost / kWh of non-technical system loss or theft) x 20,000 GWh (power imported by distribution agencies).

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Appendix

Technical System Loss Estimates and Generating Costs of Power Plants

In 1996, an expert team (comprising representatives of the BPDB, REB, DESA and the World Bank) estimated actual transmission and distribution losses due to technical reasons. (B.D. Rahmatullah, headed the team.) The team studied REB, BPDB and DESA distribution areas of various circuit configurations. The team considered the existing load, base case load growth, with and without system improvements. Tables A1 and A2 indicate expected technical losses of a utility system and reasonable technical losses for the BPDB, DESA, and REB.

Tables A3 and A4 provide summary information on unit generating costs of IPP and public power plants.

Table A1: Standard Technical Loss of a Utility System

Loss source		Type of power system		
Equipment rating	Location	Strong	Medium	Weak
		%	%	%
Step up 11/132 KV transformer	At power station	0.25	0.375	0.50
Primary 230 KV line	Transmission line	0.50	0.750	1.00
Primary 230/132 KV Grid	Grid sub-station	0.25	0.375	0.50
Secondary 132 KV line	Transmission line	1.00	1.500	2.00
Secondary 132/33 KV Grid	Grid sub-station	0.25	0.375	0.50
Sub Total (Transmission Loss)		2.25	3.375	4.50
Primary 33 KV line	Distribution line	2.00	3.000	4.00
Primary 33/11 S/S.	Distribution substation	0.25	0.375	0.50
Secondary 11 KV or 0.4 KV line	Distribution line	3.00	4.000	5.00
Secondary 11/0.415 S/S.	Distribution substation	0.25	0.375	0.50
	Service drop	1.00	1.500	2.00
	Metering equipment			
Sub total (distrubution loss)		6.50	9.25	12.00
Grand total (transmission & distrubution loss)		8.75	12.63	16.50

Source: United Nations (1990).

Table A2: Technical Loss Estimates of the Utlities of Bangladesh

Organization	Technical loss		
	Transmission	Distribution	Total
	%		
BPDB System	3.00	7.00	10.00
DESA System	2.00	7.50	9.50
REB/PBS System	0.50	8.50	9.00

Note: Results from BPDB, DESA, REB, WB expert team.

Table A3 Unit Cost of IPP Electricity Generation

Generator	Type of fuel	Installed capacity (MW)	Plant factor	F2004	F2005	F2006
				(Tk. / kWh)		
KPCL, Khulna	Furnace oil	110	67%	5.43	5.87	7.65
ANEPC, Haripur	Gas	110	67%	3.79	3.83	3.85
Westmont, Baghabari	Gas	90	68%	3.06	2.90	3.27
RPCL	Gas	140	57%	3.97	3.66	3.54
AES, Haripur	Gas	360	80%	1.23	1.30	1.33
Aes, Meghnaghat	Gas	450	77%	149	1.49	1.62
IPP AVERAGE	-	1260 (total)	73%	2.11	2.18	2.46

Table A4 Unit Cost of Public Electricity Generation

Generator	Type of fuel	Installed capacity (MW)	Plant factor	F2004	F2005	F2006
				(Tk. / kWh)		
BPDB	Hydro	230	32%	-	-	0.68
	Gas	2235	51%	-	-	1.73
	Coal	250	21%	-	-	2.56
	Diesel	387	28%	-	-	8.75
	Isolated diesel	17	2%	-	-	22.75
APSCL	Gas	3797	44%	1.41	1.55	1.52
APSCL including BPDB				-	1.98	2.11
AVERAGE Generation Cost				1.90	2.05	2.23

Glossary of Terms

CAPACITY: 1. The instantaneous power output of a generator at any given time, normally measured in kilowatts (kW) or megawatts (MW), of a power plant. 2. The instantaneous electricity demand at any given time, normally measured in kilowatts (kW) or megawatts (MW). 3. A transmission facility's ability to transmit electricity, at any instant.

COMBINED CYCLE GAS TURBINE (CCGT): The combination of combustion and steam turbines to generate electricity from two thermodynamic cycles. Exhaust gases from a combustion turbine flow to a heat recovery steam generator (HRSG) that produces steam to power a steam turbine, resulting in higher thermal efficiency than achievable by operating the combustion or steam turbines individually.

DISTRIBUTED GENERATION: The term distributed generation has been used in many ways. For example, the California Energy Commission (2002, 2) defines it as "electric generation connected to the distribution level of the transmission and distribution grid usually located at or near the intended place of use." The key distinction is between high voltage generation fed into a major grid and lower voltage generation used at or nearby the generation site. In this report, we use the term broadly. We include very small generators serving as back-up for the electrical needs of a particular site. We also apply the term to larger projects entailing a micro-grid that links a small power plant (under 100 MW) to a participating group of customers (such as customers of a PBS) and that has a point of interconnection with a major grid.

DISTRIBUTION SYSTEM: Electrical lines, cables, transformers and switches used to distribute electricity over short distances from substations to the customer, generally at voltages lower than 69 kV.

ENERGY: The amount of electricity produced or used over a period of time, usually measured in kWh, MWh or GWh.

GENERATION: The production of electricity.

GIGAWATT HOUR (GWH): A unit of bulk energy; 1 million kilowatt hours (= 10E6 x 1 kWh).

GREENHOUSE GASES (GHG): Gases that are thought to contribute to global climate change, or the "greenhouse effect," including carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O).

INTERCONNECTED SYSTEM: A system which has two or more individual power systems normally operating in synchronism and having connecting tie lines.

KILOWATT HOUR (KWH): The basic unit of electric energy equal to 1,000 watts of power used for one hour. The amount of power used by individual customers is usually measured in kilowatt hours (kWh). A 100-watt light bulb operated for 10 hours uses 1 kWh.

LOAD: The total amount of electricity required to meet customer demand at any moment. The load fluctuates depending on electricity use throughout any given day.

LOAD SHEDDING: Occurs when power authorities manage excess demand by eliminating power to regions or neighbourhoods on a rotating basis.

MEGAWATT HOUR (MWH): A unit of bulk energy; 1,000 kilowatt hours (= 10E3 x 1 kWh).

PEAK DEMAND / LOAD: The maximum instantaneous demand on a power system. Normally the maximum hourly demand.

POWER: The electrical energy supplied by a current to an appliance enables it to do work or provide some other form of energy such as light or heat. Electric power is usually measured in Watts, kilowatts (1,000 watts), and megawatts (1,000,000 watts). The amount of electrical energy used by an appliance is found by multiplying its consumed power by the length of time of operation. The units of electrical energy are usually watt-seconds (joules), watt-hours, or kilowatt-hours.

RATE STRUCTURE: Represents the prices paid by the classes of customers for use of electricity.

REVENUE REQUIREMENT: The amount of revenues the utility needs to receive in order to cover operating expenses, pay debt service and provide a fair return on invested capital.

SYSTEM LOSS: The difference between electricity generated and electricity for which customers are billed. Technical system loss refers to the energy that is lost as heat in electrical equipment and along transmission line, due to resistance as electricity is transferred from one location to another. System loss may also arise due to theft of power.

TRANSMISSION: The process of transporting electric energy in bulk on high-voltage lines from the generating facility to the local distribution company for delivery to retail customers. Transporation of energy is usually at voltages over 69 kV.

TRANSMISSION CAPACITY: The amount of electric power that can be transferred over the interconnected transmission system network in a reliable manner while meeting all of a set of defined system conditions.

TARIFF: A statement that explicitly defines the rate and the terms and conditions of sale for electric power and energy between a utility and its customers, including the type of service, delivery point(s), limitations of obligations to serve, minimum charges and any other terms.

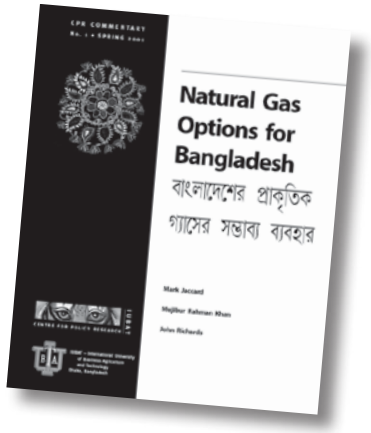
VOLTAGE: The force that pushes electricity through a wire (just as pressure causes water to flow in a pipe). Voltage can be “low” or “high.”

WATT (W): The basic unit of measurement of electric power, indicating the rate at which electric energy is generated or consumed.

CPR COMMENTARY NO. 1

Natural Gas Options

বাংলাদেশের প্রাকৃতিক গ্যাসের সম্ভাব্য ব্যবহার



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The very low level of available commercial energy is a serious constraint on economic development in Bangladesh. Fortunately, there is one bright prospect – sizeable discoveries of natural gas.

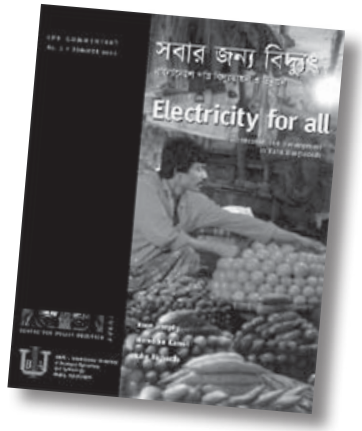
This report explores three options for how Bangladesh might use its natural gas endowment: exporting gas to provide public revenues that could be directed to many other development needs; expanding the many possible end-uses for gas in domestic industry, agriculture and households; or concentrating natural gas use on accelerated electrification. After assessing the three options, the authors conclude that rapid electrification should have the highest priority.

In addition, the report discusses institutional reforms to foster private investment and to improve the transparency, efficiency and consistency of government corporations, ministries and agencies. There is an important case to be made for integrated resource planning that includes environmental and social objectives.

বাণিজ্যিক খাতে জ্বালানি শক্তির অতিস্বল্পতা বাংলাদেশের অর্থনৈতিক উন্নয়নের পথে একটি গুরুত্বপূর্ণ অন্তরায়। সৌভাগ্যক্রমে প্রাকৃতিক গ্যাসের বড় ধরনের উৎস আবিষ্কৃত হওয়ায় উন্নয়ন ক্ষেত্রে একটি উজ্জ্বল সম্ভাবনা সৃষ্টি হয়েছে। এই প্রতিবেদনে বাংলাদেশের প্রাকৃতিক গ্যাস সম্পদ ব্যবহারের তিনটি সম্ভাবনা নিয়ে পর্যালোচনা করা হয়েছে ঃ গ্যাস বিদেশে রপ্তানী করে সরকারী রাজস্বখাতে অর্থ আয় যা উন্নয়নের চাহিদা মিটাতে পারবে, দেশীয় শিল্প, কৃষি, গৃহস্থলি ও অন্যান্য সম্ভাব্য কাজে গ্যাসের ব্যবহার সম্প্রসারণ; বা দ্রুত বিদ্যুতায়নের ক্ষেত্রে প্রাকৃতিক গাসের ব্যবহার কেন্দ্রীভূত করা। এই তিনটি সম্ভাবনা যাচাই করে প্রতিবেদকগণ এই সিদ্ধান্তে পৌছেন যে দ্রুত বিদ্যুতায়নই সর্বোচ্চ প্রাধান্য পাওয়া উচিৎ।

অধিকন্তু এই প্রতিবেদনে কিছু কিছু প্রাতিষ্ঠানিক সংস্কারের বিষয় আলোচনা করা হয়েছে যা বেসরকারী বিনিয়োগকে উৎসাহিত করবে এবং সরকারী প্রতিষ্ঠান, মন্ত্রণালয়সমূহ এবং এজেন্সিসমূহের কাজের স্বচ্ছতা, দক্ষতা এবং নির্ভরযোগ্যতা বৃদ্ধি করবে। পরিবেশগত এবং সামাজিক লক্ষ্যগুলি অন্তর্ভূক্ত করে সমন্বিত সম্পদ পরিকল্পানার গুরুত্বের বিষয়ও এই প্রতিবেদনে সুপারিশ করা হয়েছে।

CPR COMMENTARY NO. 2



সবার জন্য বিদ্যুৎ

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বাংলাদেশে পাঁচজনের মধ্যে মাত্র একজন বিদ্যুতের সুবিধা পান। গ্রাম বাংলায় বিদ্যুতের সুবিধা পান প্রতি সাতজনে একজন।

বাংলাদেশে বিদ্যুৎ খাতে এই সমস্যাগুলি কেন অব্যাহত থাকছে? এই সমস্যাগুলি সমাধানের জন্য কি ব্যবস্থা নেয়া যায়? এই রিপোর্টে দ্রুত বিদ্যুতায়ন, বিশেষ করে পল্লি বিদ্যুতায়নের ক্ষেত্রে বাধা সমূহের মূল্যায়ন করা হয়েছে। একই সাথে এই বাধাসমূহ দূর করার জন্য কিছু বাস্তবধর্মী সুপারিশ রাখা হয়েছে।

বর্তমানে পল্লি বিদ্যুতায়ন বোর্ড (আর ই বি) এবং তার সমবায় নেটওয়ার্ক পল্লি বিদ্যুৎ সমিতিগুলির মাধ্যমে পল্লি এলাকায় দেশে ব্যবহৃত বিদ্যুতের এক চতুর্থাংশ বিতরণ করে। এই আকর্ষণীয় সাফল্য সত্ত্বেও, বাংলাদেশে বিদ্যুতায়নের ক্ষেত্রে আরো অনেক কিছু করার বাকি আছে।

গবেষকগণ সুপারিশ করেন যে আর ই বি'কে স্বাধীনভাবে বিদ্যুৎ উৎপাদনের প্রতি অগ্রাধিকার ভিত্তিতে অধিক গুরুত্ব দিতে হবে, বিশেষ করে জাতীয় সঞ্চালন গ্রীড বহির্ভূত এলাকাসমূহে। এই সম্প্রসারণের জন্য প্রয়োজন হবে অধিকতর মাত্রায় ব্যক্তিখাতে বিনিয়োগে এবং আর ই বি গ্রাহকদের ক্ষেত্রে বর্ধিত হারে গড় ট্যারিফ।

অধিকতর হারে নতুন বিনিয়োগ আকর্ষণ এবং ট্যারিফসমূহের সংস্কার কঠিন কাজ, তবে বিদ্যুৎ ব্যবস্থার ব্যাপক সম্প্রসারণের লক্ষ্যে গুরুত্বের সাথে এই প্রয়োজনীয় সংস্কারসমূহ বাস্তবায়ন যুক্তিসঙ্গত।

Only one in five Bangladeshis has access to power; among those in rural areas the ratio is about one in seven. What can be done to improve access? This report assesses the barriers to accelerated electrification – rural electrification in particular – and offers practical recommendations.

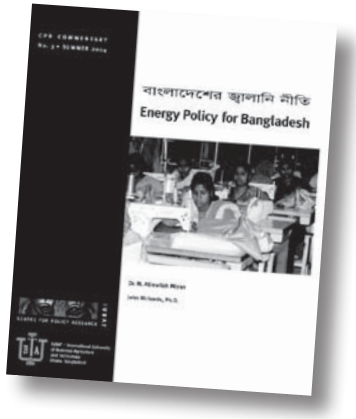
The Rural Electrification Board (REB) and its network of cooperatives – Palli Biddyut Samitees – now distribute nearly a quarter of electricity consumed in the country. Despite this impressive accomplishment, they need to do more.

The authors recommend that the REB place a high priority on power generation independent of the national transmission grid. This expansion will require private investment and higher average tariffs for REB customers. Securing major new investment and revising tariffs will not be easy, but the goal of increased electrification is sufficiently important to justify the required reforms.

CPR COMMENTARY NO. 3

Energy Policy for Bangladesh

বাংলাদেশের জ্বালানি নীতি



by **DR. M. ALIMULLAH MIYAN**, *Vice Chancellor and Founder, IUBAT, and* **JOHN RICHARDS,** *Professor, Master of Public Policy Program at Simon Fraser University*

বাংলাদেশের ভবিষ্যৎ সমৃদ্ধির জন্য পর্যাপ্ত পরিমাণ বাণিজ্যিক জ্বালানি সরবরাহের গুরুত্ব সম্বন্ধে অতিরঞ্জনের কোন অবকাশ নেই। বাংলাদেশ সরকার ২০০৪ সালের মে মাসে একটি খসড়া জাতীয় জ্বালানি নীতি ঘোষণা করে এবং এর উপর জনসাধারণের অভিমত আহবান করে। সরকারের এই প্রতিবেদনে বর্তমান নীতির গুরুতর সমস্যার বিষয় এবং নূতন নীতি প্রণয়ন যে অতীব বিতর্কপূর্ণ তা স্বীকার করা হয়।

সেন্টার ফর পলিসি রিচার্সের এই তৃতীয় প্রতিবেদনটির মাধ্যমে খসড়া জাতীয় জ্বালানি নীতির উপর মন্তব্য এবং সুপারিশ করা হয়েছে। ড. এম আলিমউল্যা মিয়ান, উপাচার্য ও প্রতিষ্ঠাতা, আই ইউ বি এ টি - ইন্টারন্যাশনাল ইউনিভার্সিটি অব বিজনেস এগ্রিকালচর এন্ড টেকনোলজি এবং ড. জন রিচার্ডস, অধ্যাপক, সাইমন ফ্রেজার ইউনিভার্সিটি, কানাডা এবং আই ইউ বি এ টি'র ভিজিটিং অধ্যাপক এই প্রতিবেদনটি প্রণয়ন করেছেন। তাঁদের সুপারিশ মালার মধ্যে প্রাকৃতিক গ্যাসের রপ্তানি থেকে শুরু করে জৈব জ্বালানি শক্তি ব্যবহারের উন্নতি সাধনসহ গুরুত্বপূর্ণ বিষয় সমূহ অন্তর্ভূক্ত হয়েছে।

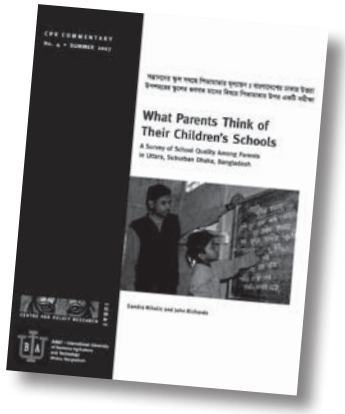
It is hard to exaggerate the importance of adequate supplies of commercial energy for the future development of Bangladesh. In May 2004, the Government of Bangladesh released a draft National Energy Policy, and invited public commentary. The government report acknowledges the serious shortcomings of present policy and the dilemmas in designing new policy.

In this third report of the Centre for Policy Research, Dr. Alimullah Miyan, Vice-Chancellor and Founder of IUBAT – International University of Business Agriculture and Technology, and Dr. John Richards, Professor at Simon Fraser University in Canada and Visiting Professor at IUBAT, respond to the draft National Energy Policy and offer a series of recommendations. The recommendations cover major issues from export of natural gas to improvements in the utilisation of biomass fuels.

CPR COMMENTARY NO. 4

What Parents Think of Their Children's Schools

A Survey of School Quality Among Parents



সন্তানদের স্কুল সম্বন্ধে পিতামাতার মূল্যায়ন ঃ বাংলাদেশের ঢাকার উত্তরা উপশহরের স্কুলের গুণগত মানের বিষয়ে পিতামাতার উপর একটি সমীক্ষা

by **SANDRA NIKOLIC,** *Planner, Health Services Authority of British Columbia, and* **JOHN RICHARDS,** *Professor, Master of Public Policy Program at Simon Fraser University*

বিগত এক দশকে শিক্ষার প্রাপ্যতা বিস্তারে বাংলাদেশ প্রশংসনীয় সাফল্য অর্জন করেছে। ২০০৪ ইংরেজি সালে ১৮ মিলিয়ন শিশু, ১,১০,০০০ প্রাথমিক স্কুলে ভর্তি হয়। এতদ্সত্ত্বেও অনেক পিতামাতা তাঁদের সন্তানদেরকে বেসরকারি স্কুলে ভর্তি করান, যার ব্যয়ভার তাঁদেরকে বহন করতে হয়। আরো অনেকে বেছে নেন বেসরকারি সংস্থা কর্তৃক পরিচালিত স্কুল, যেমন ব্রাক পরিচালিত স্কুল বা মাদ্রাসা। সরকার পরিচালিত স্কুলের চেয়ে বেসরকারি পর্যায়ে পরিচালিত স্কুলের জনপ্রিয়তার মধ্যে আমরা দুটি বিষয়ের দিক নির্দেশনা দেখতে পাই যথা স্কুলের গুণগতমান সম্বন্ধে পিতামাতার উদ্বেগ এবং স্কুলে স্থান সঙ্কুলান সম্পর্কে সচেতনতা।

স্কুলের গুণগতমান সম্পর্কীয় সমস্যা সম্পর্কে পিতামাতার মনোভাব যাচাই করার জন্য, ঢাকা শহরের উত্তরে অবস্থিত উত্তরায় আইইউবিএটি-ইন্টারন্যাশনাল ইউনিভার্সিটি অব বিজনেস এগ্রিকালচার এবং টেকনোলজি'র গবেষণারত ছাত্র-ছাত্রীরা একটি জরিপ পরিচালনা করে। জরিপের ফলাফল এই প্রতিবেদনে উপস্থাপন করা হয়েছে। এই সমীক্ষায় শিক্ষার ফলাফল উন্নত করার লক্ষ্যে কয়েকটি কৌশলের মূল্যায়ন করা হয়েছে।

Over the last decade, Bangladesh has made impressive gains in the *quantity* of education available. As of 2004, there were 18 million children enrolled in 110,000 primary schools. Still, many parents choose to enrol their children in private schools where parents pay, in nonformal schools run by NGOs such as BRAC, and in madrasas. The popularity of school types other than government-run schools suggests that parents have concerns about school quality – as well as the availability of school spaces.

To assess parental attitudes to problems of school quality, student researchers from IUBAT – International University of Business Agriculture and Technology surveyed residents in Uttara, a suburb in northern Dhaka. This study reports their findings. The study also assesses broad strategies for improving education outcomes.

CPR COMMENTARY NO. 5

Barriers to Girls' Secondary School Participation in Rural Bangladesh

গ্রাম-বাংলায় মাধ্যমিক স্কুলে মেয়েদের অংশগ্রহণে প্রতিবন্ধকতা

by **JENNIFER HOVE,** *Bachelor of International Relations at University of British Columbia 2000, Master of Public Policy at Simon Fraser University 2007, Visiting Fellow, IUBAT*

বিগত ১৫ বছর মাধ্যমিক স্কুলে ছেলে-মেয়ে উভয়ের ভর্তির হার নাটকীয়ভাবে বেড়েছে। অবশ্য মেয়েদের ৬ষ্ঠ থেকে ১০ম মান পর্যন্ত লেগে থেকে পড়া শেষ করার হার হতাশাব্যঞ্জকভাবে কম। তুলনামূলকভাবে যদিও ছেলেদের টিকে থকার হারও কম। ৬ষ্ঠ মানে ভর্তির বেলায় ছেলে-মেয়ের ভর্তির হার প্রায় সমান সমান। ১০ম মান পর্যায়ে ছেলেরা মাধ্যমিক সরকারি পরীক্ষায় বিশেষভাবে মেয়েদের থেকে এগিয়ে। দশম মানের পরবর্তী উচ্চ মাধ্যমিক পর্যায়ে ভর্তির বেলায়ও ছেলেদের হারই বেশি। মেয়েদের মধ্যে যাঁরা ১০ম মান শেষ করে উচ্চ মাধ্যমিক একাদশ ও দ্বাদশ শ্রেণীতে প্রবেশ করে তাদের হার মাত্র ১৩%। স্কুল, পরিবার ও বৃহত্তর পর্যায়ে সমাজের মধ্যে এমন কিছু ক্ষমতাধর শক্তি কাজ করে যা মেয়েদেরকে স্কুলে টিকে থাকতে নিরুৎসাহিত করে। পল্লী এলাকার ৪টি স্কুলের শিক্ষক, ছাত্রী ও পিতামাতার মধ্যে সমীক্ষা চালানোর মাধ্যমে এই গবেষণায় ছাত্রীরা কেন স্কুল ছেড়ে যায় তার কারণ বিশেষণ করা হয় এবং একই সাথে কি নীতিমালা অবলম্বনে ছাত্রীদের মাধ্যমিক স্তরে স্কুল শেষ করার হার বাড়ানো যায় তার সুপারিশ পেশ করা হয়।

Over the last 15 years, secondary school enrolment rates among both boys and girls have risen dramatically. However, girls' rates of progression and completion of the secondary cycle (from grades six through ten) are disturbingly low – albeit the comparable rates for boys are also low. At grade six there is near parity between the number of boys and girls enrolled. By grade ten, boys are significantly ahead of girls in participation in public examinations and promotion to higher secondary school. Only 13 per cent of girls who complete the tenth grade transition to the higher secondary grades of eleven and twelve. There are powerful forces at work within schools, families and the broader society that dissuade girls from staying in school. Based on interview responses among teachers, students and parents in four rural schools, this study analyses why girls drop out of school, and offers policy recommendations to increase completion rates.

নির্ভরযোগ্য বিদ্যুৎ অভাব বাংলাদেশের অর্থনৈতিক উন্নয়নকে দারুণভাবে বাধাগ্রস্ত করছে। বাংলাদেশের শতকরা ৭৮ ভাগ প্রতিষ্ঠান দুর্বল বিদ্যুৎ সেবাকে তাদের ব্যবসা সম্প্রসারণে প্রধান অন্তরায় হিসাবে চিহ্নিত করে।

সফল সংস্কারের ভিত্তি হলো প্রশাসনিক বিশ্বাসযোগ্যতা। বিদ্যুৎ খাতের প্রধান সংস্থাগুলির মধ্যে সবচাইতে বেশী বিশ্বাসযোগ্য হলো পল্লী বিদ্যুতায়ন বোর্ড (আর ই বি)। বিগত একদশকে আর ই বি বিদ্যুৎ সংযোগের সংখ্যা দ্বিগুণ করেছে এবং এই সংস্থা বর্তমানে বাংলাদেশে উৎপাদিত মোট বিদ্যুতের শতকরা ৪০ ভাগ বিতরণ করে থাকে। এই মনোগ্রাফের প্রণেতাগণ সুপারিশ করেন যে আর ই বি-এর ম্যান্ডেট সম্প্রসারণ করে জাতীয় গ্রীডের বাইরে স্বাধীনভাবে বিদ্যুৎ উৎপাদনের ব্যবস্থা করা। স্বাধীনভাবে বিদ্যুৎ উৎপাদনে স্বাভাবিকভাবেই এই সংস্থার সহযোগী পল্লী সমবায় (পল্লী বিদ্যুৎ সমিতি)গুলি সম্পৃক্ত হবে। উৎপাদিত বিদ্যুত অগ্রাধিকার ভিত্তিতে স্থানীয়ভাবে সহযোগী পি বি এস এর গ্রাহকদের মধ্যে বিতরণ করা হবে।

A lack of reliable electrical power is severely impeding Bangladesh economic development. Seventy-eight percent of Bangladeshi firms cite poor electricity service as a “major” or “severe” obstacle to expansion.

Successful reform requires building on a foundation of administrative credibility. The most credible of the major agencies in the power sector is the Rural Electrification Board (REB). Over the last decade, it has doubled the number of customer connections, and now distributes 40 percent of all power generated in Bangladesh. The authors of this monograph recommend an expansion of the REB mandate to enable the REB and its network of rural cooperatives (Palli Biddyut Samitee) to create generating capacity independent of the national grid, capacity whose power would be distributed on a priority basis to customers in the local participating PBS.

US$15 – Taka 200