Is There an Asian Energy Crisis?

Photo taken by Karissa Coltman.

By Zaheer Hassan, Nuri Telecom

Asia comprises many developing countries. Their need for energy is extremely high and growing; industrial sectors are expanding, but they are experiencing an energy shortage.

Countries are trying to develop power plants to supply this exploding demand for electricity, and they are experiencing high system losses as a result of outdated infrastructure, theft and corruption. Smart grid technology, however, with an advanced metering infrastructure (AMI) as its foundation, can eliminate growing problems related to theft and corruption.

Electricity system losses include transmission and distribution. Distribution losses are categorized as technical and nontechnical. It is difficult to separate these losses in some Asian countries because unmetered supplies are provided to a variety of consumers (such as those in agricultural areas and small, rural households).

The industrial growth, coupled with high system losses, has resulted in a major demand-supply imbalance resulting in an energy shortage with a devastating domino effect on countries' economies. Energy shortages create blackouts, and without energy to run industries and commerce, companies either shut down or production is reduced greatly. In addition, shipping dates are drawn out, work forces are reduced and companies' competitive effectiveness in world markets is severely limited.

How Bad Is This Crisis?

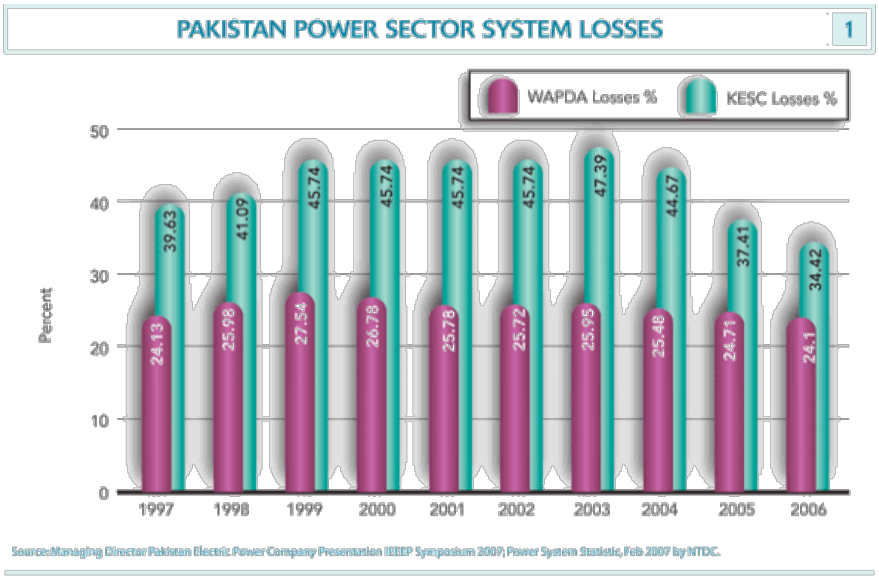
According to 2009 U.S. Census Bureau figures, India, Pakistan and Bangladesh account for 22 percent of the world's population and 40 percent of the Asian population. According to the World Bank South Asia Region Report from June 2007, "Total system losses in this area of the world vary from 20 to 45 percent and collection efficiency is in the range of 80 to 90 percent of the revenues these utility companies generate."

India is the largest southern Asian country with a population of more than a billion people. India's electricity grid is known for its huge transmission and distribution losses, which are between 35 and 45 percent. Total losses made by all electricity companies in fiscal year (FY) 2005 amounted to $4.9 billion, or about 1.2 percent of the country's gross domestic product (GDP), according to the World Bank.

Pakistan is the second-largest southern Asian country with more than 17 million people. It also faces significant system and financial losses. Between 1996 and 2005, Water and Power Development Authority's (WAPDA) total system losses ranged between 24.13 and 27.55 percent. (WAPDA oversees the operations of eight of the nine electric utility companies operating in the country.)

Karachi Electric Supply Corp.'s (KESC) system losses during the same period ranged between 35.14 to 47.39 percent. Theft of electricity and nonpayment of bills were so rampant in the KESC area that the army was called in to prevent theft and enforce collections.

One estimate places the annual financial losses of WAPDA and KESC at about $585 million in the early years of this decade (see figure, page 40).



Chronically Short of Power

Electricity theft and corruption is forcing companies to install new generation capacity. Power cuts resulting from load shedding, which happens when demand exceeds supply, occur regularly in Indian and Pakistani cities. The problem is likely to get worse as rapid economic growth leads to greater energy consumption.

Utility companies in many Asian countries have considered adding generation capacity to reduce the demand-supply imbalance. Building power plants takes time and is extremely expensive. Additional capacity is needed to support the growth, but the first step is to stop the electricity hemorrhage. If they can stop this leakage, they may be able to solve 50 percent of the problem.

The World Bank reports that for Pakistan, "reducing electricity transmission and distribution losses are more cost-effective measures for reducing the demand-supply imbalances than adding generation capacity." Reducing nontechnical losses can provide significant amounts of additional electricity.

Theft and corruption usually originate from inside the utility companies. Employees seeking extra income tell customers how to steal electricity. Utility personnel corruption also includes a variety of side payments: not enforcing connections, making illegal connections, under-billing, writing off debts or recording fictitious payments, not recording actual electricity usage, reporting a much lower use and agreeing it will never go above that, making no effort to read meters, creating numbers and not reporting meter-tampering incidences.

Hot, muggy climates also contribute to electricity theft. The green gas effect is escalating in Asian countries, and as a result, they are becoming hotter. Window air conditioners have become relatively inexpensive in the past 10 years, attributed to China's production. The Asian population, even with modest means, can afford the luxury of these air conditioners.

This same population previously used relatively low levels of electricity to operate portable and overhead fans. Within the past few years, however, millions have used electricity to run their air conditioners—often without paying for it.

What's Being Done to Check Theft, Corruption?

Utility companies don't have an effective way to address corruption problems, but they have started building monitoring systems to stop theft and pilferages. Measures have been taken to slow revenue bleeding to at least a trickle. Equalized billing, for example, is focused on customers served by transformers. If utility companies know the amount of energy supplied by one transformer, they can determine if someone is stealing within that customer group, but they don't know specifically who's stealing.

To recoup theft losses, utility companies bill each customer equally in that particular group regardless of energy used. Billing is done indiscriminately. Penalties are meted out to one and all. Honest customers getting billed for more than their usage are outraged, and utility companies are being taken to court. This initiative might help contain losses to an extent, but it is not the solution to utility companies' challenges.

Until now, the human element served as the basis for meter reading, thus opening Pandora's Box for the variety of electricity losses described. Given the severity of this crisis, Asian utility companies are being forced to seek resolutions.

The most effective way is to use technology with effective, enforceable legislations to replace the human element.

AMI technology is the answer to quell energy theft and corruption-related challenges. It is an intelligent technology that includes two-way metering systems capable of recording and reporting energy consumption, tampering information and other measurements in real time. Earlier detection of energy theft reduces associated revenue losses.

Technology companies are coming to the forefront of this issue to provide answers with their AMI installations. Nuri Telecom, for example, has installed its wireless AMI communication network in cities worldwide. Their AMI includes several components: AMI-equipped smart meters, repeaters, data concentrators, WAN communication technology, head end servers, metering and load management software and data warehouses.

AMI provides utility companies with unprecedented system management capabilities, enabling much greater efficiencies and performance. It takes the human element out of the meter reading and commercial aspect of the utility business. As a major side benefit, it provides utility companies with a foundation to build a smart grid.

When the human interface is omitted, meter tampering goes away. If someone tampers with a smart meter, it is detected and a warning is generated. Advanced metering also puts commercial and industrial utility companies under the same scrutiny.

AMI can play an important role in stopping theft and corruption, and in so doing, breathes new life and survivability into Asian utility companies. Implementation of AMI technologies varies by type. The deployment of wireless AMI depends on terrain, population density, high-rise buildings and other associated factors. In the case of using powerline communication (PLC) AMI, electricity distribution infrastructure is important. It is essential, therefore, to use AMI technology specific to the requirements of a utility and the region.

It is critical for utility companies to select and work in tandem with AMI suppliers that understand Asian countries, cultures and protocols, political inner workings and how utility companies operate in those regions. Understanding the core issues causing electricity losses and theft in a country is equally important.

There are several critical steps during the early stages of adopting AMI. Because most Asian utility companies are new to AMI, first they should consider hiring a technology consultant with impeccable credentials or work closely with a well-known AMI company. In order of importance, there are five consecutive, critical steps a utility company should take:

1. Develop a business case based on AMI technology suitable for its region.
2. Generate an AMI request for proposal keeping the utility's strengths and weaknesses in mind.
3. Carefully review the proposal received and recommend an AMI supplier.
4. Present a case to its board or ministry for approval.
5. Develop an internal AMI team with the help of the selected AMI supplier acting as consultant.

Utility companies should partner with an experienced AMI provider who can help them with technology selection, requirement definition and a comprehensive return-on-investment scenario.

AMI is the most important consideration in the minds of top utility executives. A discussion with an AMI supplier should involve detailing reasons for electricity and power losses, AMI installation costs, savings they will realize, the time it will take for their return and other considerations. Experienced AMI suppliers can increase confidence with utility companies by sharing case studies from Asian and nonAsian countries that have installed AMI successfully and are reaping its benefits.

Zaheer Hassan has more than 25 years of engineering, sales, marketing and business development experience in semiconductors, communications, AMR and application services. He has extensive marketing and business development experience throughout North America, Europe, Japan, South East Asia and the Middle East.

Theft and Corruption Problems

Distribution

- Tapping of distribution lines
- Unauthorized supply of energy
- Organized resistance to paying for electricity
- Tampering with or bypassing meters
- Use of multiple connections for misuse of slab
- Sanctioned load lower than actual usage

Metering

- Meter not traceable
- Stop or slow meter
- Defective meter
- Meters not read
- Meter number mismatch

Billing

- Errors in bill
- Consumer not billed or underbilled
- Provisional billing
- Billing based on factors other than actual use (such as average consumption or load factor)
- Bills pending for quality check
- Bills pending for assessment
- Meters installed, but not appearing in database

Collection

- Bills not delivered
- Partial payments
- Consumer not paid (defaulters)
- Disconnected with dues

AMI Benefits

Integrated communications infrastructure

- Meter data management systems
- Advanced transmission and distribution operations
- Advanced asset management

Billing and operations benefits

- Provide accurate, timely billing
- Detect and reduce energy theft
- Pinpoint grid problems
- Locate and identify power quality issues
- Real-time outage management
- Remote connect and disconnect service

Demand response and innovative tariffs benefits

- Reduced price and demand
- Reduced peak capacity requirements
- Reduced transmission and distribution costs
- Reduced generation costs
- Improved electric system efficiency and reliability

ROI Considerations

Project financials

Cost/benefit analysis

- Annual savings
- Annual costs
- Annual net savings
- Per-meter equivalent (benefits)
- Total investment over life of project
- Payback period
- Project net present value
- Project internal rate of return

Annual benefits

AMI benefits

- Meter-reading benefits
- Connect/disconnect
- Accounting and customer service
- Outage management
- Revenue protection
- Field operation efficiency
- Demand response
- Carbon/environmental savings

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Teresa Hansen wrote:

Thanks Narindra, you're correct. It looks like we left off a number, which obviously makes a big difference. Thanks for alerting us to the error.
Teresa Hansen
Chief Editor
1/21/2010 10:27 AM CST on ELP.com
Recommend Report Abuse Permalink

Narindra N Sikka wrote:

Article titled, "Is there an Asian Energy Crisis" is very well written. I had one comment on third paragraph under "How Bad is this Crisis". It states that Pakistan's population is 17 million. According to 2009 census, the population of Pakistan is about 176 million.

Thanks
12/2/2009 11:14 AM CST on ELP.com
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