

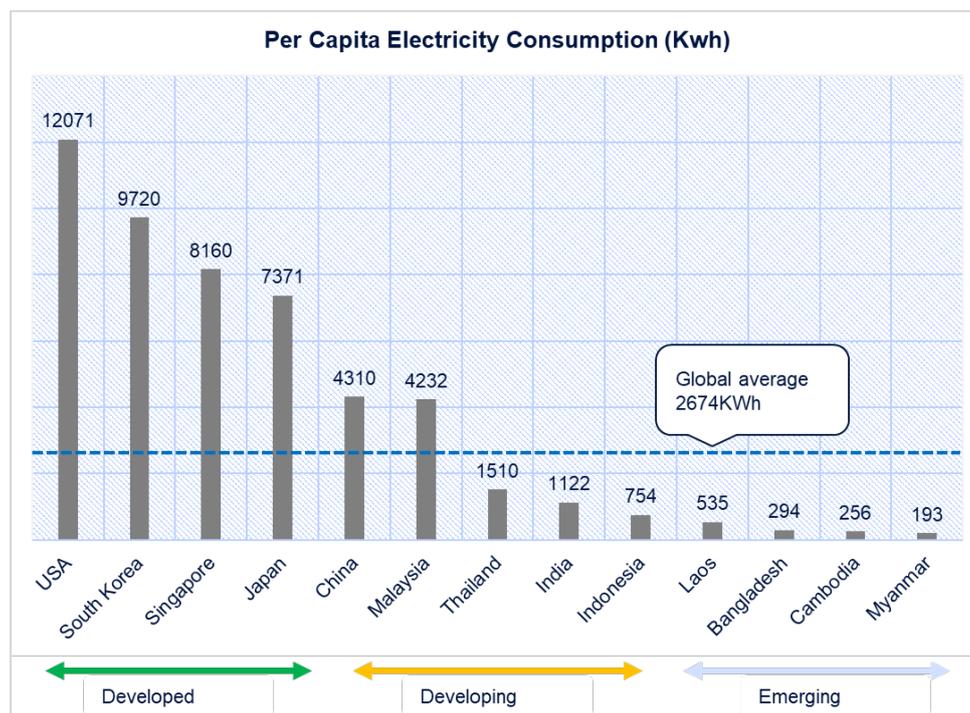
How to overcome challenges when creating a Power Project?

Overcoming Hurdles in Power Projects

Electricity remains one of the most important inventions in history of mankind, revolutionizing the world we live, fuelling innovations. Today, every aspect of our lives is impacted by electricity from transport mode to household appliances, communications, healthcare to financial transactions.

The significance is accentuated when per-capita electricity consumption is seen an important indicator of socio-economic well-being and development stage of the country.

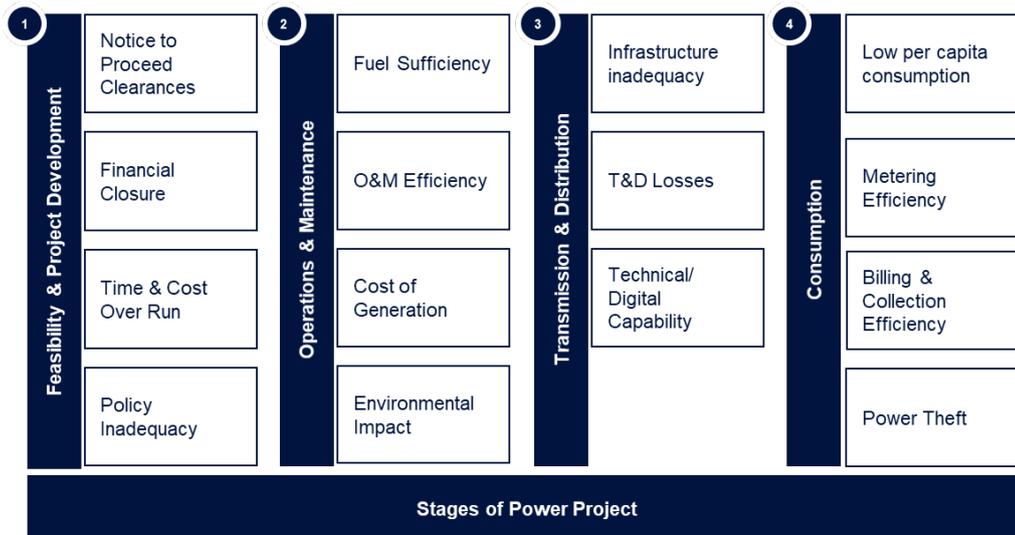
The chart below clearly demarcates the use of electricity in developed, developing and emerging markets.



Apart from low consumption statistics, developing and emerging markets have similar structural challenges in their power sector-- inadequate policy infrastructure, financing, poor project management leading to time and cost over-runs, operational inefficiencies and T&D losses. We have sought to identify the challenges along the life-cycle of a power project and have learned from the experiences of developed and developing economies.

The 4 Key Stages of a Power Project —

1. Feasibility Study & Project Development
2. Generation/ O&M
3. Transmission & Distribution
4. Consumption by end- user.



1. Feasibility Study and Project Development

This is one of the most important stages for any power project being the make or break stage involving multiple stakeholders including regulatory bodies, financial institutions and government.

One of the major milestones in this stage is getting the “Notice to Proceed (NTP)”. Many projects fail to acquire this due to land disputes, environmental clearances (pollution control boards, impact to flora and fauna), water availability, aviation clearance for chimney and other tall structures or issues related to some ethnic/ religious groups. Even when such issues are sorted, the process is cumbersome; involves tedious documentation and approval from various bodies.

It becomes a time consuming and costly affair for the project developers and investors. Many countries have come up with single window clearance mechanism for large power projects. Investor education is also one key area being addressed.

Power projects are capital intensive and financial closure is another major milestone. Securing structured project financing with optimal cost of capital for power projects another major challenge which has its roots in perennially delayed projects impacting the cash projections. The average delay ranges from ~ 2 years in emerging and developing South Asian countries.

Government plays a major in role in shaping up the sector with clear policy framework, fiscal incentives and competitive procurement structure. Emerging economies score low on macro factors of Ease of Doing Business and Corruption Perception Index, thereby losing on investment attractiveness from foreign investors.

India serves as a model for power reforms to the emerging countries, with continuous improvement initiatives. It has come a long way from the major policy reforms in 2003 “Electricity Act 2003” inviting private participation, strengthening the transmission & distribution network, providing incentives to mega projects and renewable energy and now looking forward to rapid digitalization at distribution end.

2. Operations & Maintenance

Fuel is the heart of the power generation plant and fuel sufficiency is of utmost importance to any thermal power plant (coal or gas). Thermal capacity addition is plagued by the growing fuel availability concerns faced by the Industry. It results in low capacity utilization or plants being idle.

The situation goes worse as not all coal may be used in any power plant, the system is designed for a particular blend with tolerances. Many operators rely on imports or high levels of inventory.

The next major challenge in generating plant is its own efficiency defined by plant availability, auxiliary systems power consumption and load factor. Maintenance inefficiency, equipment failure or any other

incident may cause a plant shut-down. Such events at a high frequency affect the plant availability and in case of a major capacity plant, it affects the transmission system also. Auxiliary power consumption above 7% of power generation is a red- flag.

Plant Load Factor (PLF) is an indicator of capacity utilization and power generation companies strive hard to keep the value above 90%.

The above factors of costly fuel, low plant utilization, high auxiliary consumption and frequent failures add to the cost of generation. This eventually either gets passed to the consumer making electricity non- affordable or gets accrued in losses of generation or distribution entity. Cambodia has one of the highest electricity cost at 0.20USD/Kwh while neighbouring Vietnam has at 0.07USD/Kwh and Thailand at 0.10USD/Kwh.

Another major challenge to the power generating units is to produce clean power impacting the environment to minimum. Water withdrawn for plant cooling system needs to comply certain effluent level and temperature so as not to disturb the aqua-life and composition. The flue gas released through chimney needs to have certain level of SOX, NOX and other particulate material.

With environmental regulations being still in formative stages in the emerging countries, a provision of effluent treatment and flue gas de-sulfurization units needs to be planned. Also, cleaner sources of energy is the answer.

3. Transmission and Distribution

The power generation unit usually is responsible to feed the electricity generated to nearest available transmission sub-station and from there it becomes the task of T&D entities to provide to consumers.

Transmission and distribution infrastructure remains poor in emerging countries. Either there is no last mile connectivity to the customer or they transmit at lower voltages.

T&D losses are the largest losses along the journey of power generation to consumer end. In India, these losses cumulate to the extent of 30%-35% of total power generated with some North Eastern areas having as large as 70% T&D losses. Majority of the losses during transmission may be attributed to Low voltage transmission. High Voltage transmission is one of the solutions, also DC (Direct Current) transmission has also been explored.

Also, the data for the network capability assessment and root- cause analysis remains manual and thereby unreliable. Smart devices and digital capability might be the answer.

4. Consumption

One of major consumption metric remains the per capita consumption which is low due to non-generation, high cost to customer and unavailability of last-mile distribution network. This is challenge to the consumer as well as generation and T&D entity. If explored closely, this is not a stand alone isolated challenge but cumulation of above three stages; efficiency at any of them would directly impact the consumption patterns.

Other consumer related challenges are metering, billing efficiency and power theft.

For household consumers, many a times either there is no meter or the traditional one which can be manipulated for faulty readings. Meter is a capital item and convincing the consumer to get a smart meter is difficult. Private distribution entities do invest in the metering equipment; however standard specifications might not be available across the country.

Even when bills are correctly generated, the collections remain partial. Bill generation itself might not be digitized. A structured approach to recover high load long pending invoices might be first to improving the financial health of distribution entities.

Power theft is another common challenge. More than financials of generation and distribution companies, it impacts the power scheduling and grid stability.

To overcome the above challenges, various stakeholders- government, policy makers, equipment manufacturers, EPC players and SMEs need to start working on one singular problem of “Universal Access of Sustainable, Affordable and Reliable Electricity”.