

Urban Resilience and its Impact on the Provision of Electricity in Karachi, Islamabad and Peshawar

PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS

Urban Resilience

Urban resilience is the capacity of cities to act efficiently (i.e., to absorb, to adapt and to transform) so that the residents and workforce, especially the vulnerable people endure the stresses or shocks they encounter in their everyday lives.

In cities that are less resilient and have weak governance systems, it is difficult for various utilities to perform efficiently.

Objective

Explores urban resilience across three cities in Pakistan - Karachi, Islamabad and Peshawar; and examines the linkage between the operational (transmission and distribution losses, safety systems, outages etc.) and commercial (recovery rates) performance of a electricity utility and the urban resilience of the city.

Draw lessons from IESCO, PESCO and K-Electric regarding safety hazards related to electricity utility for each other and for other distribution companies.

Figure 1. Electricity Utility Performance

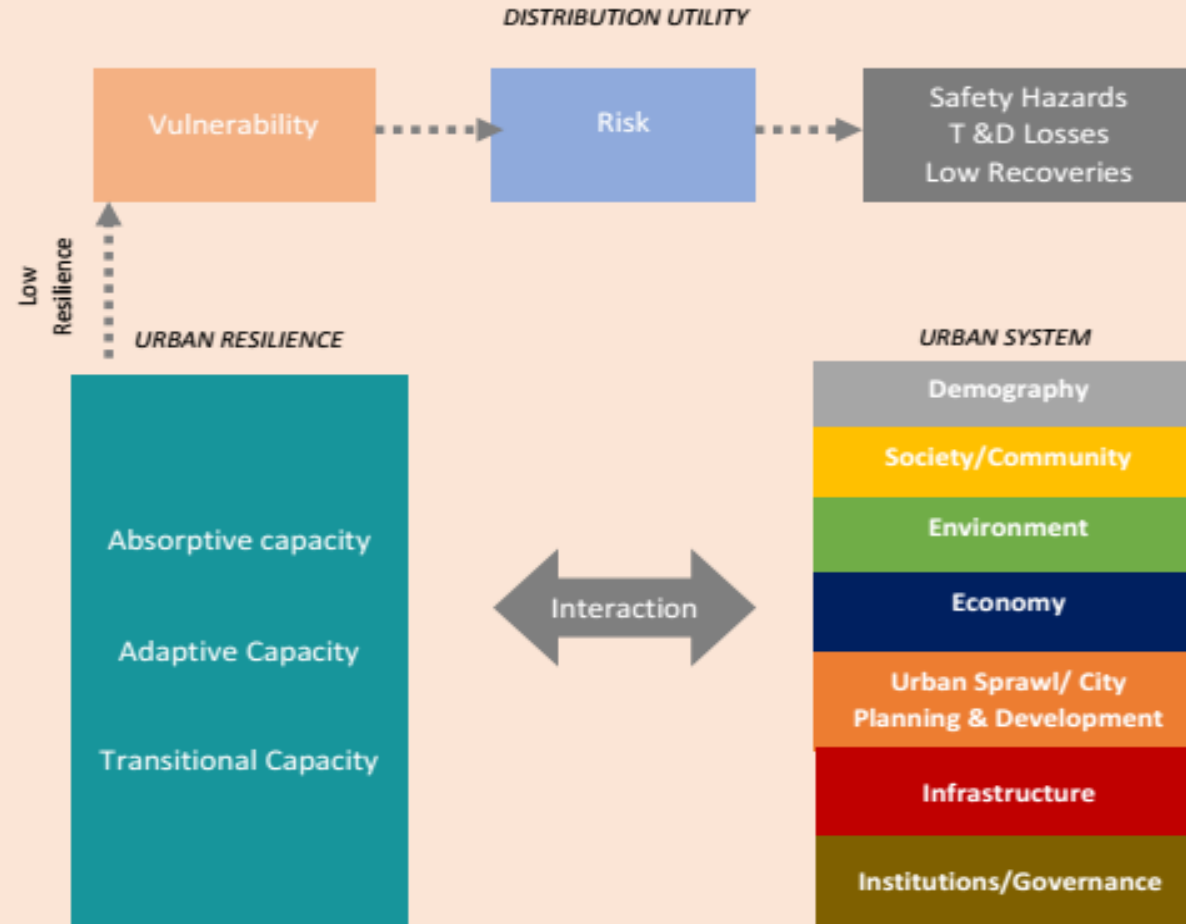
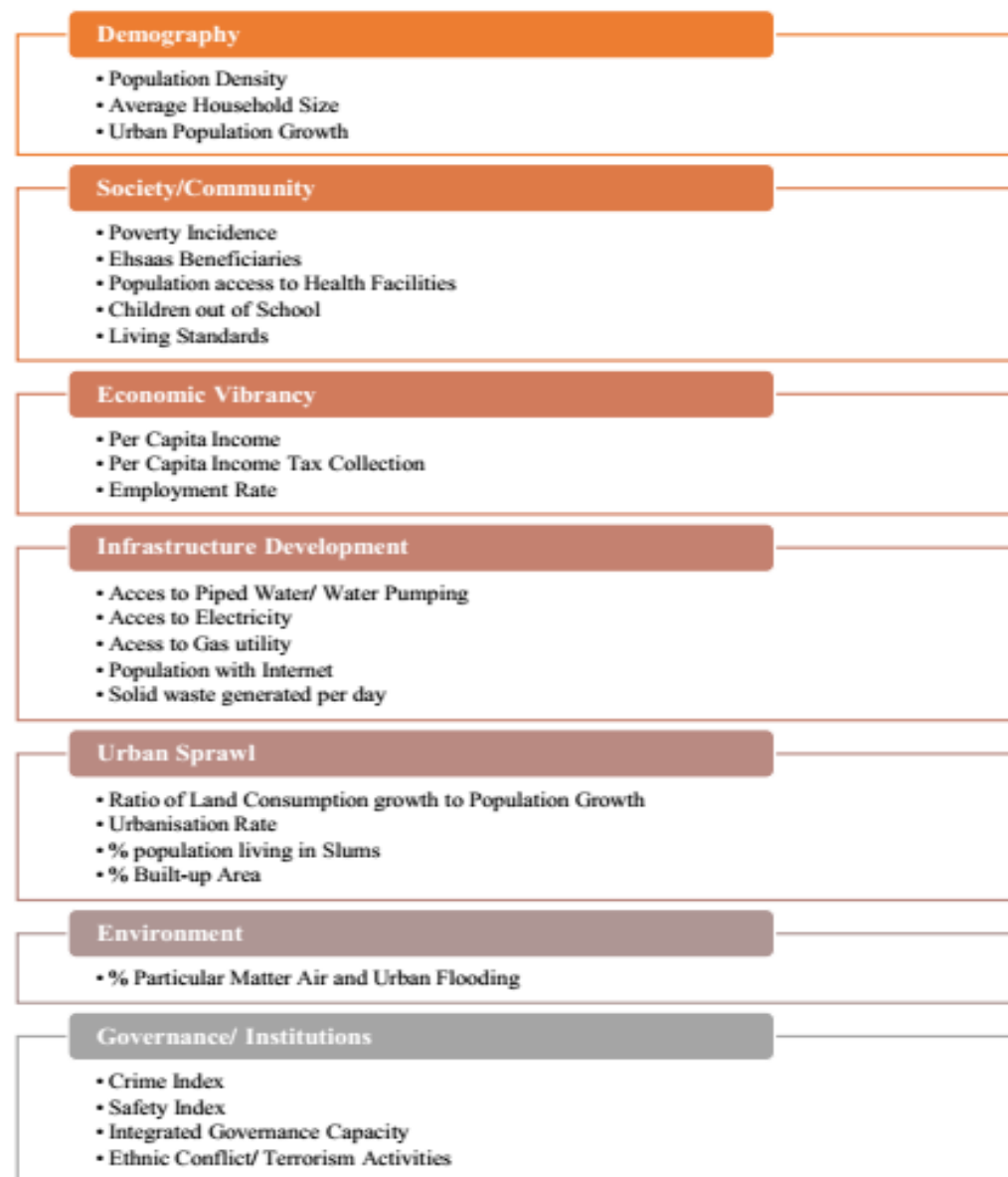


Figure 2 Urban Resilience Dimensions/ Sub-Dimensions



Urban Resilience Index

Modern cities require innovative procedures and processes to address the urban sprawl, and to counter environmental challenges; which we find missing in all the three cities under study, urban resilience index for none of the three cities is closer to 1.

	Urban Resilience Index
Islamabad	0.20
Karachi	0.12
Peshawar	0.10

Urban Resilience

Though all three cities are suffering from the impact of urban sprawl, its impact on Karachi is relatively greater in absolute terms and started much earlier as compared to urban sprawl in the other two cities.

Karachi is different from the other two cities because of fragmented institutional structure and weak governance.

Urban Resilience and Electricity Utility

Rapid urbanisation has created serious issues/ challenges in the management and provision of utility systems in Pakistani cities.

In the case of electricity utility_

- increase in demand caused by city expansion or sprawl,

- the challenge of ageing and badly maintained networks,

- the need to create more environmentally sustainable networks,

- the increased costs of investment,

- constraints on investments because of the lack of investment-friendly tariffs and other regulatory hurdles.

Urban Resilience and Electricity Utility

In the cities which are more resilient, it is easier for the electricity utility to perform there efficiently.

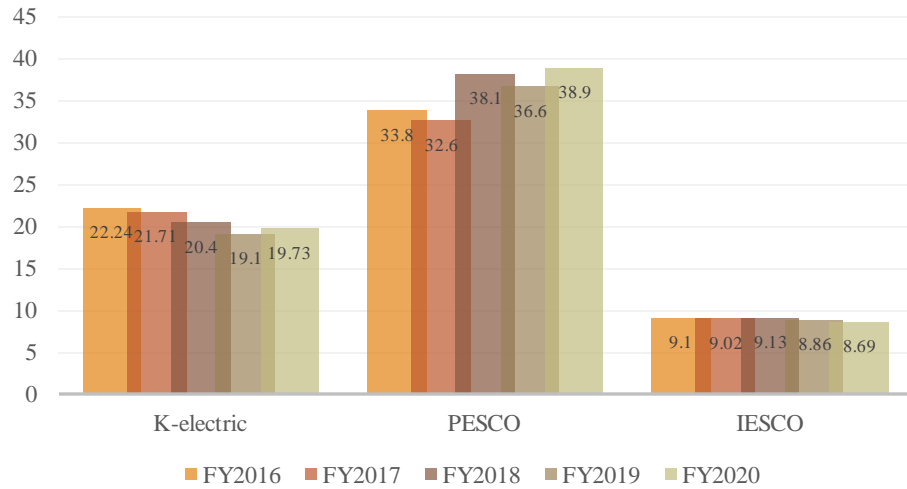
The performance of IESCO is relatively better than PESCO and K-Electric.

In less resilient cities_ Peshawar and Karachi, it is challenging for the electricity utility to transform their systems to cope with the changing needs and to absorb shocks.

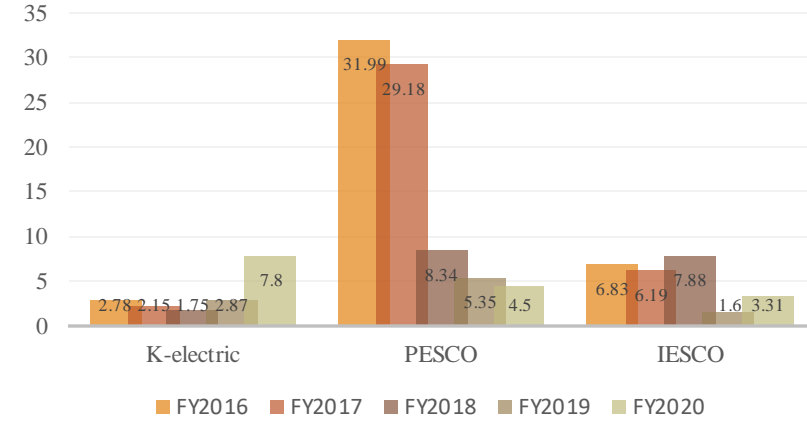
In the absence of these transformations, infrastructure systems are forced to use beyond the available capacity.

The result is overload, congestion, and adverse implications on service and reliability for utilities operating in such settings. This is exactly what is happening in the case of K-Electric and PESCO.

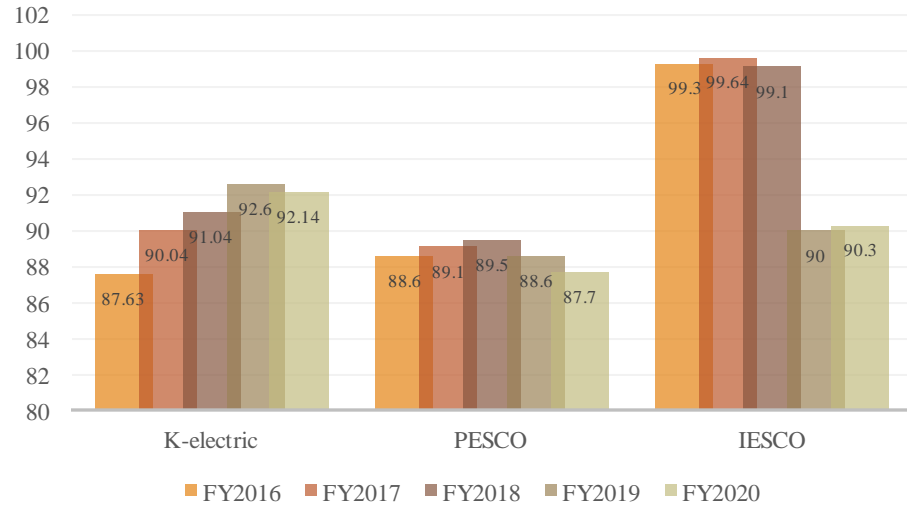
% T & D Losses



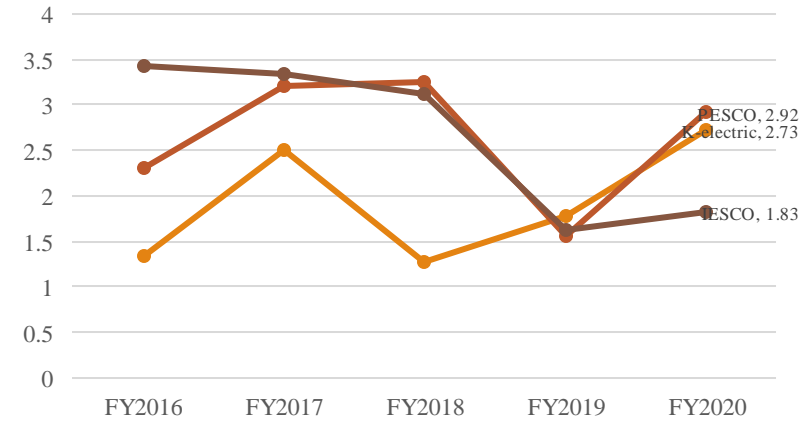
Distribution Transformers Overloaded Above 80 %



% Recovery Ratio



Load Shedding (hrs)



Urban Resilience Challenges

In all the three cities_ there are issues of urban sprawl, lack of civic amenities, informal settlements, impact of climate change etc.

In Islamabad, its impact on electricity infrastructure is not as grave as in other two cities, in particular, Karachi.

One major issue common in all three cities is the encroachment around or in the vicinity of electricity distribution networks. Rapid urbanisation in the absence of urban planning has resulted in an illegal (vertical and horizontal) expansion of buildings/ houses beyond the allowed limit. Thus, creating safety hazards.

This kind of encroachment happens continuously due to weak governance checks by the civic authorities. City agencies, in general, are not responsive to curb the encroachment of electricity infrastructure.

Encroachment of electricity poles_ unauthorised use of these poles by internet and cable operators without the permission of utility also sometimes becomes the reason for accidents.

Utilities Response

As informed by IESCO officials, daily record keeping is done at the utility, not only to identify the safety hazards but to address these as well through operation or shifting of electricity networks to appropriate places, away from the hazard radius.

In Peshawar, especially the old city has narrow unplanned streets – it is a challenge to find the right place to install feeders in these unplanned narrow streets. People have constructed houses under high tension cables (like 66 KV) wires or close to these wires. This causes safety hazards. PESCO approaches municipal authorities and the police to prevent such unauthorized construction but to little avail.

Utilities Response

Karachi is the largest city among the three, so is the magnitude of safety hazards in the city. There is widespread encroachment of sensitive distribution and transmission infrastructure to the extent that entire homes are built around electricity infrastructure.

Encroachment of the electricity wires by internet and cable wires which are haphazardly placed on electricity poles due to no alternate arrangements. Utility is facing tremendous resistance on the part of the cable TV operators.

The utility is investing regularly to remove these hazards_ through the replacement of old infrastructure, running earth-wire on LT network, replacement of delapidated HT/LT poles, PMT structures, installation of HT double earth & guard wires, and conversion of LT mains to LT Aerial Bundled Cables (ABC) etc.

Utilities Challenges

K-Electric (privatized) operates in a regulated environment and has to deal with umpteen number of organisations in Karachi for approvals, delays in tariff determination, delays in the disbursements of Tariff Differential Claims, and delays in receivables from the government departments.

PESCO's main challenges are human resources constraints and lack of capital, and delays in disbursements of public funds for the upgradation of existing infrastructure, which is old and damaged.

Utilities Challenges

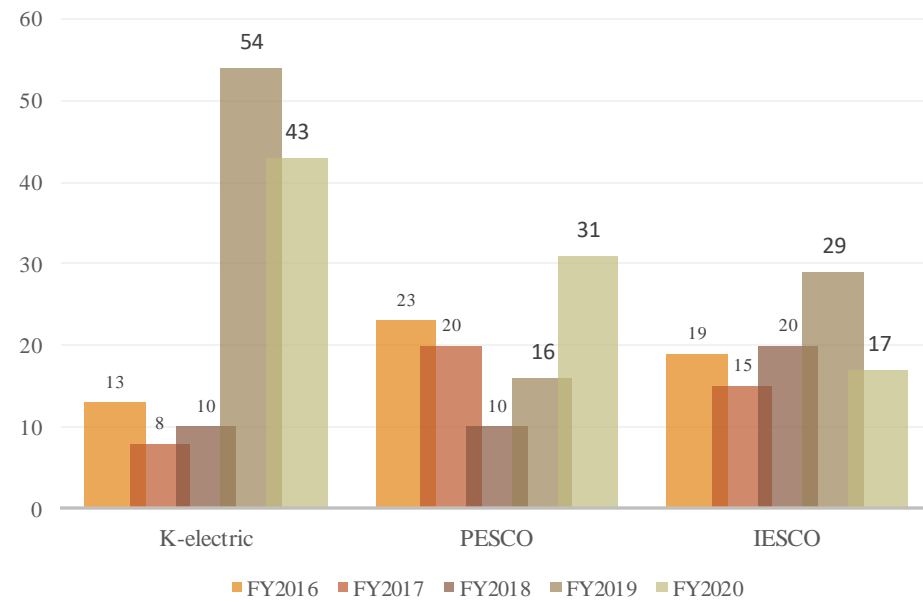
No doubt it is the job of the utility to ensure reliable and safe electricity to city dwellers. But it needs support from the administrative management of the city.

Among the three utilities IESCO, PESCO and K-Electric, IESCO is working in a city with a relatively better governance system. It also gets due support from various administrative units, when required. But this is not the case with PESCO or K-Electric.

Both PESCO and K-Electric are not getting support from law enforcement agencies. Among these two, the situation is more challenging for K-Electric. It is not easy for the utility company (K-Electric) to register an FIR for theft.

IESCO and PESCO did not cite FIR registration as a challenge.

No. of Fatal Accidents (Employees & Gen. Public)



Utilities Challenges

In Karachi, more problematic areas are at the city periphery with relatively more informal settlements or illegal housing.

These are congested areas where in many cases, it is difficult for the utility staff to enter the area.

Most of such areas are sensitive from political, ethnic or income perspective. In the absence of reasonable city infrastructure, these areas are more prone to natural and man-made disasters as well, making it more vulnerable to accidents.

In such congested and risky areas, not only it is difficult to identify safety hazards, but to move utility network away from such hazardous areas as there is no space left for installation.

Utilities Challenges

In Peshawar, just like Karachi, there are several such areas where there is no space left_ making it difficult for the utility to maintain or shift network away from hazardous area. The existing distribution infrastructure is old and in dilapidated form requiring immediate replacement/ improvement. Lack of investments and government approvals.

In the public sector, it is often difficult to make investment decisions to stay ahead of demand until there is a crisis of service and a level of public inconvenience which motivates action.

The pressure to improve infrastructure and service normally comes from overall city governance, awareness and socio-economic class residing in the area.

Besides, overall organisational capacity to make timely decisions is important. This is obvious from the difference in the performance of IESCO and PESCO.

Way Forward

A city economy depends on reliable electricity services. Thus, building the resilience of electricity systems is crucial for human welfare and economic growth.

A utility company must have the capacity (sufficient investments) to remain prepared for absorbing the effects of dangerous events_ in a timely and efficient manner. Similarly, it must have the human and financial capacity to replace/ upgrade/ expand its infrastructure for ensuring reliable supplies to the rising urban population.

Need to address regulatory challenges_ investment-friendly tariff, its timely determination, and timely disbursements of tariff differential claims if the government likes to apply the national uniform tariff policy to Karachi as well. This is crucial for sustainable investments in the upgradation and expansion of distribution infrastructures, which in turn, benefits consumers through safe and reliable electricity services.

Way Forward

In PESCO, the focus should be on making a long-overdue investment in strengthening and upgrading the crumbling infrastructure and in the enhancement of technical human capacity.

Reduction in utility losses via engaging with consumers/ communities through social uplift programs (like Sarbulandi by K-Electric) is a good strategy to be followed in other loss-making utilities, PESCO. Peshawar is a relatively poor city; it needs such projects not only from a utility perspective but for improving the overall resilience of the city as well.

In Pakistani cities, urban expansion is near hazard-prone areas and built through informal and unplanned settlements. For building sustainable and resilient cities requires intensive policy coordination. The government at every level (Federal, Provincial and Local or Municipal) has an important role to play to take timely decisions to shape the future of city development.

Way Forward

Population-dense cities are huge sources of power demand. Not only consuming more energy but emitting a similar proportion of carbon as well. That's why large cities are at the heart of the climate change discussion. So is the case of cosmopolitan city_ Karachi; where electricity infrastructure needs to be developed in a way that supports economic growth and high quality-of-life while also integrating more sources of renewable energy .

In Pakistani cities (in general), urban development policies and energy policies are required to be integrated via improving energy efficiency of housing and other buildings.

Local urban planning must include land use and regulations of the physical environment considering renewable energy.

Way Forward

In densely populated cities, the Smart Grid offers long-term solutions to urban energy dilemmas. Despite the threat seemingly presented by the emergence of distributed generation, existing utilities (e.g., K-Electric) still have a critical role to play in preparing current grids for more advanced smart city technologies. But of course, this requires huge investments.

Public-private partnerships are an option to finance the necessary improvements. Similarly, performance contracting and other concession agreements provide ways to enhance investments without exerting an undue burden on consumer bills.

Conclusion

Pakistani cities demand planning, innovative solutions for water and sanitation, affordable housing, standard education and health facilities, improved law and order, and a sustainable environment.

For densely populated cities like Karachi, a smart city with smart energy systems could be an option for future.