Vision Document of Power Department for Master Plan - 2041

SECTION 6: PHYSICAL INFRASTRUCTURE

The background note of Draft DDA Master Plan for Delhi-2041 has following details:

'The power supply in Delhi is managed under four broad categories—Generation, Holding, Transmission, and Distribution. The three distribution companies namely BRPL, BYPL, TPDDL (and NDMC & Cantonment Board) are responsible for supply of power in Delhi. The per-capita power consumption in Delhi is more than 1561 units per annum as against the national average of 1122 units 2016-17. Delhi's electricity utilization pattern is characterized by 52% for domestic use followed by 26% for commercial use, 12% for industrial use and 10% for others (agriculture/ landscape maintenance/ transport infrastructure maintenance etc.). Delhi's peak demand has doubled in the last 10 years, growing faster than the population of the city. The power transmission network in Delhi consists of four 400 KV and thirty-six 220 KV substations. The existing network consists of a 400 KV ring around the periphery of Delhi interlinked with the 220 KV network spread all over Delhi. Delhi currently has an annual power consumption of 30,197 Mus. The total installed capacity is 7479.01MW. Out of the total installed capacity, 78 % is purchased from sources outside of Delhi such as Dadri (1574 MW), NHPC (478 MW), Jhajjar at Haryana (693 MW), DVC at West Bengal (675 MW), THDC at Uttaranchal (102 MW), Nathpa Jhakri HEP (142 MW), Allocation through bi-lateral agreements (1119 MW) etc. 22% of the installed capacity is from within Delhi such as CCGT at Bawana (1121 MW), Pragati (330 MW), Gas Turbine (270 MW) etc. The composition of existing installed capacity is powered by sources of generation such as Coal (59%), 28% Gas (28%), Hydro (10%) and Solar (3%).

Various efforts are being made within Delhi towards harnessing renewable energy. The overarching national policy through the assigned Renewable Purchase Obligation (RPO) as well as the state level solar policy 2016 sets out clear targets

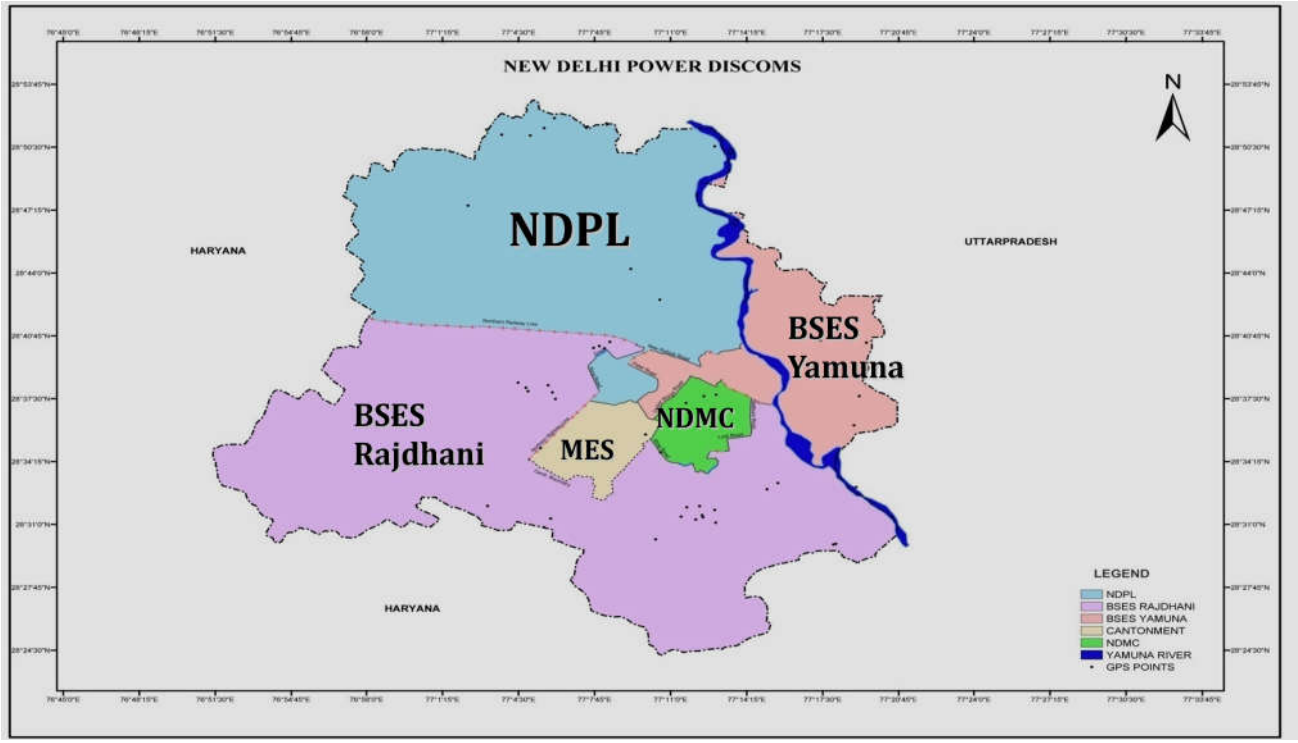
for enabling the transition towards renewable energy. As per the RPO targets for Delhi, it needs to meet about 20% of its consumption from renewable by 2022. Delhi will need to meet roughly 50.5%2 of its power consumption from renewable by 2041 to fulfil its national level targets set by MNRE. The Solar Policy 2016 estimates a solar energy potential of 2500 MW for Delhi, which needs to be installed by 2025 with 75% of RPO targets sourced from within Delhi. As per the trends indicated in the 19th Electric Power Survey of India, the power consumption demand by 2041, is projected to reach 63,979 MU. Peak demand is likely to double and increase up to 13,438 MW respectively. Based on this it is estimated that the total installed capacity would also need to be increased twofold up to 15,454 MW (15% over and above the estimated peak demand).'

Year	*Population (million)*	*Power consumption demand (MU)*	*Peak demand (MW)*	*Overall installed capacity (MW)*
2020	*19*	*30,197*	*7,409*	*7,479*
2031	*24.7*	*51,850*	*10,139*	*11,660*
2041	*29.1*	*63,979*	*13,438*	*15,454*

[2] *Based on further projection of MNRE, GoI target of 450 GW renewable energy installed capacity by 2030*

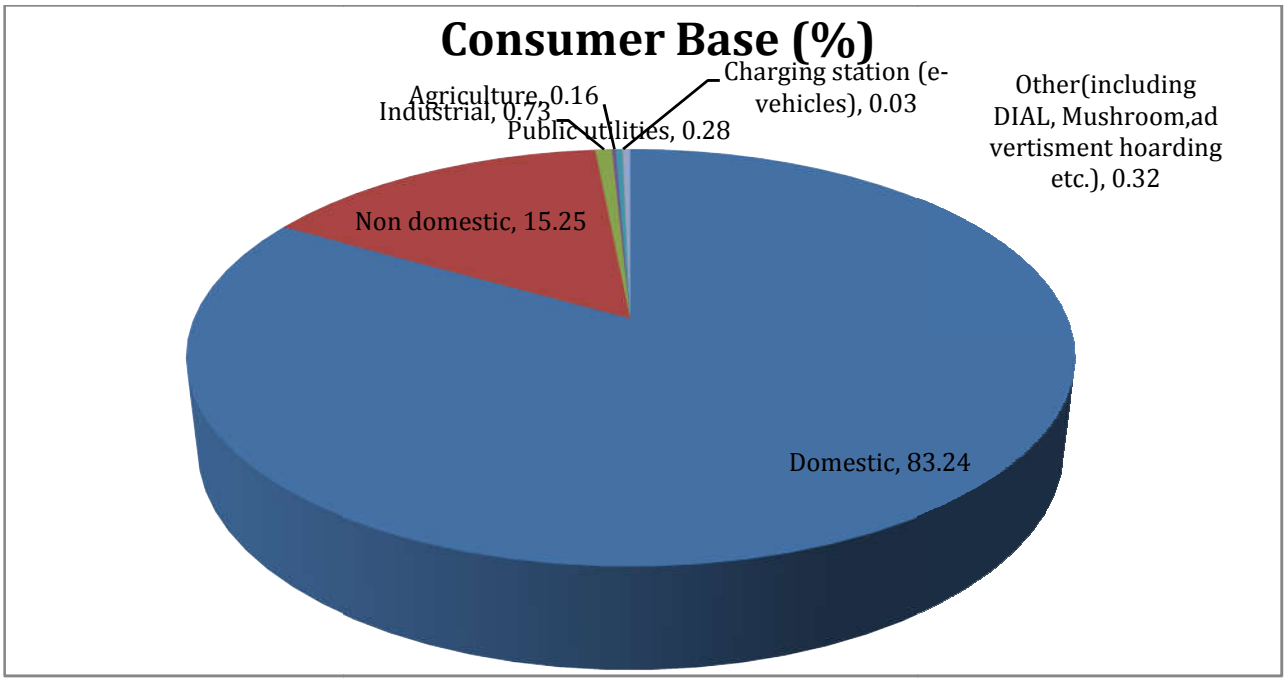
Observation of Power Department on the above is as under:

The power scenario in Delhi has improved considerably after the power sector reform in July 2002. The reforms in power sector were introduced in Delhi in the years 2002. The then Delhi Vidyut Board was unbundled into five entities, w.e.f. 01.07.2002 i.e. Transmission Company (DTL), Generation Company (IPGCL) and three private Distribution Companies (BRPL, BYPL & TPDDL).Delhi being the national capital and hub of commercial activities in the Northern Region has very high demand for power.



The per-capita power consumption in Delhi is more than 1741 units per annum as against the national average of 1208 units 2019-20. Prosperity of population of a city generates diversified demand for electricity covering every facet of life. The domestic power tariff in Delhi is the lowest amongst all the metros in the country. The exponential growth in power consumption can also be attributed to large-scale developments in unauthorized colonies leading to both horizontal and vertical load growth. Better road transport, telecommunication, regular power supply and economic policies have attracted multinational companies, employment seekers, industrial activities and service sector towards the city, thereby raising the demand for power. Delhi has its unique load pattern and peak load problem due to predominant share of domestic consumption and extreme weather conditions.

Delhi's electricity utilization pattern is characterized by 83% for domestic use followed by 15% for commercial use and 2% for others (Industrial/ agriculture/ public utilities etc.).

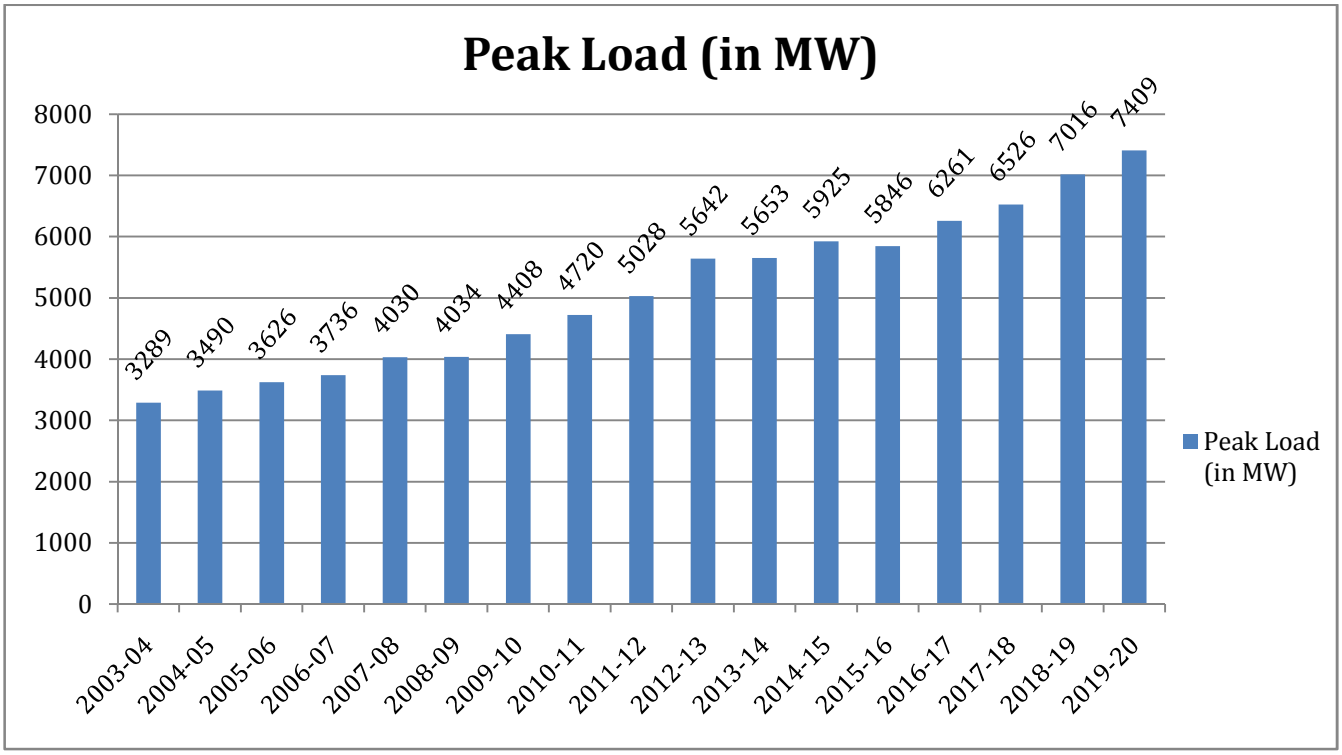


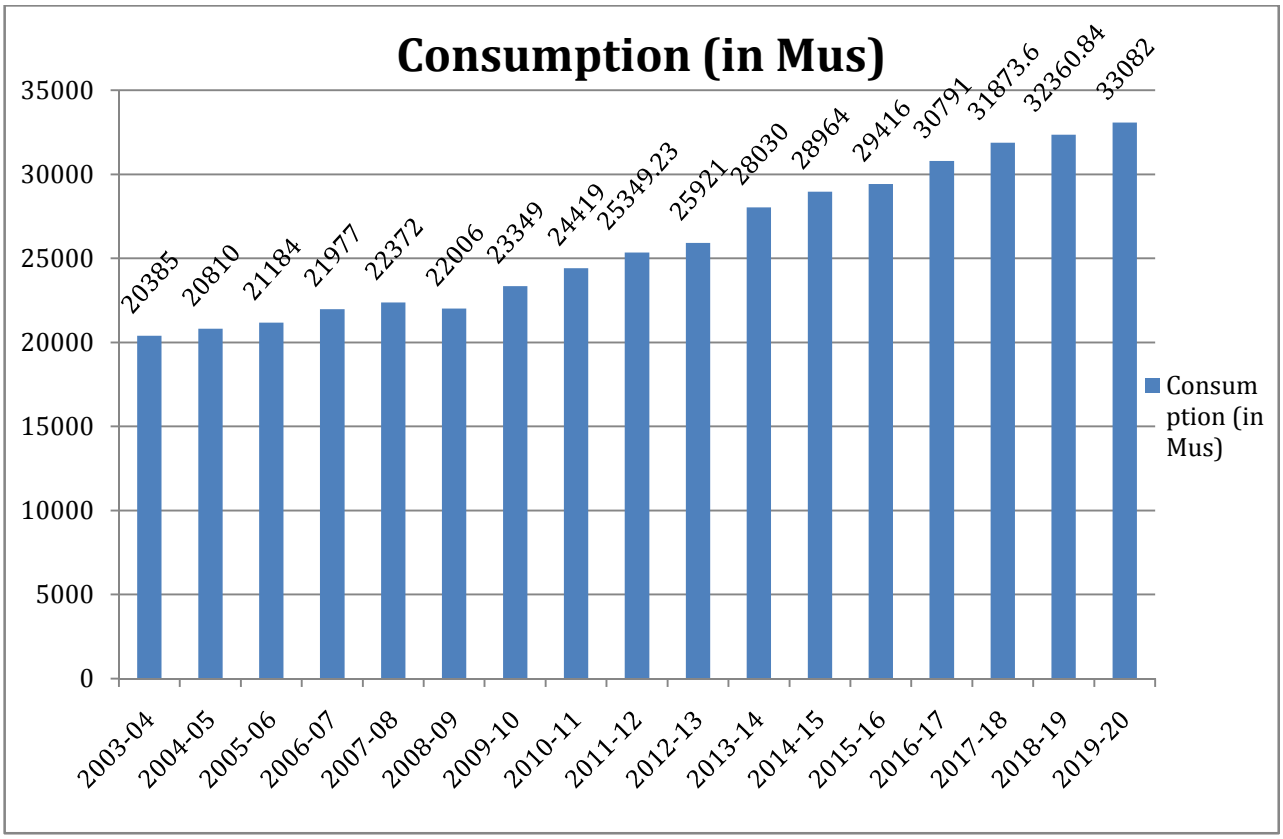
Delhi's peak demand has doubled in the last 14 years, growing faster than the population of the city. Delhi, being an urban place with high load density has seen the electricity consumption increasing from 20385 MUs in 2003-04 to 33082 MUs in 2019-20. Further, the per-capita of energy consumption of Delhi is around 1741 units. The demand/load curve of Delhi is not uniform with respect to time of day, season or area. The power infrastructure is planned based on meeting peak power demand and associated fluctuations. Delhi had its all time peak power demand of 7409 MW on 02.07.2019 in FY 2019-20 and it is expected to touch 8000MW in summers of 2021-22.

The change in trends of peak power demand and power consumption over the period of last few years is as under:

Year	Peak Load(in MW)	Consumption (in MUs)
2019-20	7409	33082
2018-19	7016	32360.8
2017-18	6526	31873.6
2016-17	6261	30791
2015-16	5846	29416
2014-15	5925	28964

2013-14	5653	28030
2012-13	5642	25921
2011-12	5028	25349.2
2010-11	4720	24419
2009-10	4408	23349
2008-09	4034	22006
2007-08	4030	22372
2006-07	3736	21977
2005-06	3626	21184
2004-05	3490	20810
2003-04	3289	20385





Power Forecasting for 2041

Year	Peak Demand (MW)	Consumption (in MUs)
2024	9062	38351
2025	9461	39502
2026	9878	40687
2027	10314	41907
2028	10770	43165
2029	11247	44459
2030	11747	45793
2031	12269	47167
2032	12816	48582
2033	13389	50039
2034	13989	51541
2035	14617	53087
2036	15275	54680
2037	15964	56320
2038	16687	58009
2039	17444	59750

2040	18238	61542
2041	19070	63389

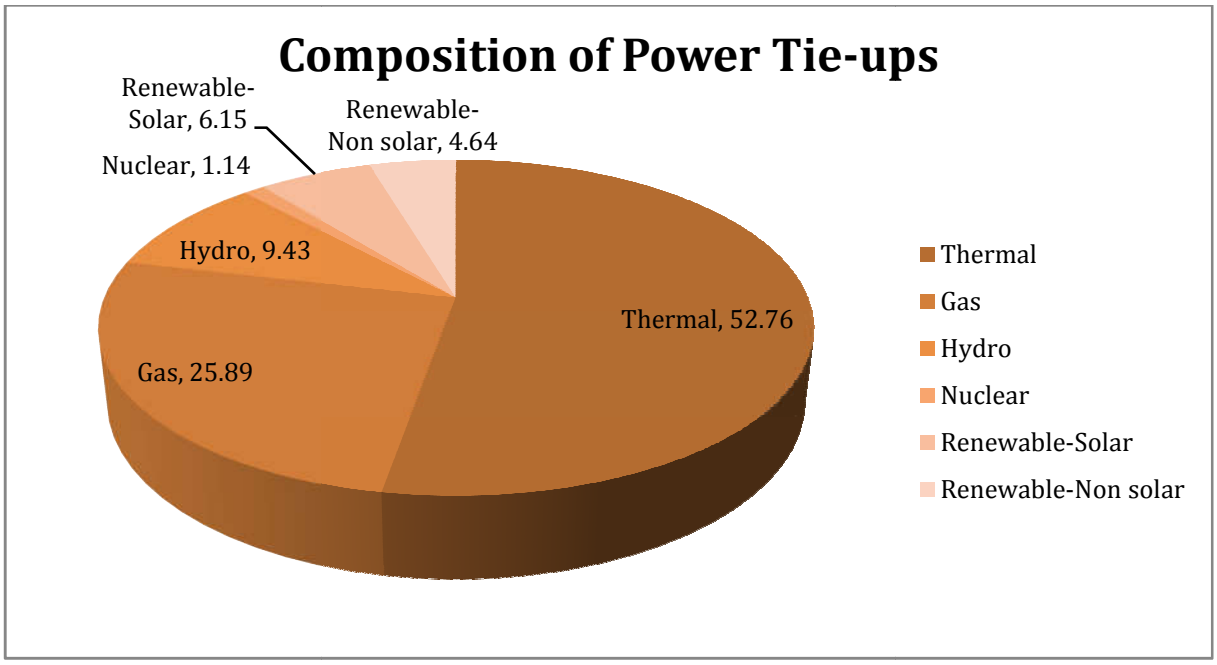
*assuming consumption increase rate at 3%

The power transmission network in Delhi consists of 400 KV and 220 KV substations. The existing network consists of a 400 KV ring around the periphery of Delhi interlinked with the 220 KV network spread all over Delhi. Present Transmission Capacity of DTL is 5410MVA at 400kV level and 14060MVA at 220kV level.

NETWORK OF DELHI TRANSMISSION UTILITY: 2019-20

S.No.	**Details**	**400 KV Level**	**220 KV Level**
1.	Number of Sub Stations	4	41
2.	Transformation Capacity (in MVA)	5410	14060
3.	Transmission Lines (Length in Ckt. Km.)	249.118	852.17

The total power tie-up of Delhi is around 7901MW. The composition of existing installed capacity is powered by sources of generation such as Coal (52.76%), Gas (25.89%), Hydro (9.43%), Solar (6.15%), Renewable-Non Solar (4.64%) and Nuclear (1.14%).



Installed capacity of Solar including outside solar is 485 MW (6.15 %)

Present installed capacity of Delhi Power Gencos is 1971 MW. (31.03.2021)

S.No	Companies/Station	Fuel	Units
1.	Indraprastha Power Generation Company Limited (IPGCL)		
a.	Gas Turbine Power Station (GTPS)	Gas	6 x 30 MW (GTs) + 3 x 30 MW (STGs) = 270 MW
2.	Pragati Power Corporation Limited (PPCL)		
b.	Pragati-I Power Station	Gas	2 x 104 MW (GTs) +1 x 122 MW (STGs) = 330 MW
c.	Pragati-III Power Station, Bawana	Gas	4 x 216 MW (GTs)+ 2 x 253.6 MW (STGs) =1371.2 MW
Total			**1971.2 MW**

Year	Population (in Millions)	Power consumption (in MUs)	Peak Demand (in MW)	Overall installed capacity (MW)
2019	19	33082	7409	7901
2031	24.7	47167*	12269**	14110#
2041	29.1	63389*	19070**	21930#

*assuming power consumption growth rate as 3%

** As per projections of Delhi Transco Limited

#15% over and above the estimated peak demand

Average T& D losses:

AT&C Losses of Delhi Discoms are (as per DERC true-up 2018-19):

i. BRPL : 8.09%

ii. BYPL : 8.93%

iii. TPDDL: 7.90%

iv. NDMC: 5.25 %

True-up awaited beyond 2018-19 from DERC.

Transmission losses

DTL : 0.92% (For FY 2018-19)

Weighted Average AT&C Losses for Delhi: 8.09% against national average of 24.67%, add transmission loss, this makes it 9.01% AT&D loss for Delhi.

With regard to renewable energy, DDA document in Chapter 6 under Chapter Code INF 3, item 2, reads as under:

Shifting to renewable energy and sustainable power consumption

In light of global warming and climate change concerns, it is imperative that majority of Delhi's power demand is met through renewable energy sources. The agencies concerned with energy production and supply shall develop plans to enable the transition from conventional sources such as fossil fuels towards clean energy sources.

EE&REM Centre, GNCTD shall prepare a Renewable Energy Master Plan for Delhi which will identify potential renewable energy generation areas within Delhi along with strategies and projects to meet targets set by Ministry of New and Renewable Energy, GoI.

Delhi has a high potential for generation of solar energy as estimated by the Solar Policy of Delhi, 2016 (2500 MW). Therefore, the following strategies shall be employed for scaling up the production of solar energy in Delhi:

> *Solar farms shall be encouraged in the Green Development Area in line with "The Agriculture-cum-Solar Farm Scheme" by Government of NCT. Renewable Energy Service Company (RESCO) or other power purchase agreement based models may be adopted to incentivise landowners to set up solar farms on their agricultural lands. (Ref: DEV 2)*
>
> *Delhi has a number of canals that can be utilised for harnessing solar energy. The canal owning agencies may leverage this potential for generation of solar energy.*

All government buildings and institutional campuses with a roof top area above 500 sq.m shall install solar PVs as per regulations of Delhi Solar Policy 2016 and Net Metering Regulations 2014.

Large scale public facilities such as airports, metro stations, railway stations, inter-state and city-level bus stations/depots, stadiums etc., may progressively meet majority of their power requirements through solar and other renewable energy. The excess power generated may be fed back into the grid. Chapter code INF3

The following strategies may be adopted to enhance the usage of solar energy in buildings and public spaces:

Solar-based LED lighting shall be used for roads, parks and public places. These shall be implemented as part of area improvement projects by concerned agencies such as Walk Plans and MMI areas.

Rooftop solar PVs have higher efficiency as they are closer to the load which helps in reducing transmission and distribution losses. Installation of solar PVs shall be promoted in all plots with roof area more than 100 sq.m and solar assisted water heating shall be promoted in all plots with roof area more than 300 sq.m as per regulations of UBBL. Installation of the same shall be made mandatory for all new constructions and linked to building permissions.

RESCO or other power purchase agreement based models may be adopted by DISCOMS to incentivise aggregators to augment solar production in multiple buildings/plots, in line with prevailing government schemes.

DISCOMS shall undertake installation of smart meters in a phased manner for all existing buildings. Smart meters shall be mandatory for all new constructions and be linked to building permissions.

Grid scale batteries may be placed at sub-stations to encourage decentralised storage of renewable energy generated from solar PVs. This will help ensure continuous supply even at times when solar energy is not being generated.

The practice of differential pricing for power supply may be adopted by DERC to encourage increased solar usage during peak hours. This will help in significantly reducing the peak load and improving system efficiency.

In order to achieve higher energy efficiency at building level, modular star rated electrical appliances and electrical fixtures (as prescribed by Bureau of Energy Efficiency) may be encouraged.

Thermally comfortable and energy-efficient buildings shall be promoted while giving building permissions in line with the UBBL and Energy Conservation Building Code 2018. The following considerations shall be taken up by the concerned agencies:

Climatology, wind flow, drainage, presence of water body in close vicinity may be taken into consideration while planning of layouts.

Development of green blue features within plots for all new developments shall be mandated as per prescribed Green Blue Factor (ref: ENV2).

Existing buildings may be retrofitted in order to improve their thermal comfort. Retrofitting may include provision of shading, ventilation, insulation etc.

All concerned agencies and departments, DISCOMS, EE&REM and BEE may run aggressive market awareness campaigns to sensitize both the construction community as well as the end-users towards the environmental and economic benefits of using solar panels within buildings.

With regard to above note, it is to mention that EEREM Centre and Delhi DISCOMs have moved forward in this direction. Further progress in this regard is as under:

Various efforts are being made within Delhi towards harnessing renewable energy. The overarching national policy through the assigned Renewable Purchase Obligation (RPO) as well as the state level solar policy 2016 sets out clear targets for enabling the transition towards renewable energy. As per the RPO targets for Delhi, it needs to meet about 19% of its consumption from renewable by 2022. The Solar Policy 2016 estimates a solar energy potential of 2500 MW for Delhi and target implementation of 1995MW to be installed by 2025.

The Government of NCT of Delhi launched "Mukhya Mantri Kisaan Aay Badhotari Solar Yojna" to install Solar Panels in such a way that farmer(s) can do farming (s) beneath the solar panels. This scheme was devised to facilitate land owners to utilise their lands for economic uses by installing solar panels, thereby minimising misuse, unauthorised constructions and ensuring balanced development and retaining the green character of these areas. The farmer(s) of Delhi can get additional fixed income by installation of solar power plants. The salient features of "Mukhya Mantri Kisaan Aay Badhotari Solar Yojna" is as under:

- Solar Panels at raised structure of 3.5 meters to allow farming on agriculture land of peripheral Green Belt villages.

- No change of land use, farmer(s) to continue farming.

- No investment required from farmer(s), investment to be done by Solar Power Developer.

- Farmer(s) to get ₹ 8333/- per month per acre of land with an increment of 6% per annum upto 25 year, additionally, 6000 units electricity per annum per MW of plant

- Minimum capacity of Solar plant 1 MW, to be installed on 06 acres of land (approximately 1/3 rd of the land to be covered by solar plant)

- Evacuation of power to be facilitated by DISCOMs.

Under “Mukhya Mantri Kisaan Aay Badhotari Solar Yojna” the Government Departments were envisaged as the power purchaser, assuming costly power generated through this scheme as solar power plants are to be installed at raised structure.

Further, Government of India launched a scheme named as “Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan” or PM KUSUM scheme under which solar power plants can be installed on agriculture land, barren land, pasturelands and marshlands of farmers. This scheme mandates power generated shall be purchased by DISCOMs at pre-fixed levelised tariff or tariff discovered through bidding.

The salient features of PM KUSUM are as follows:

- PM KUSUM to be implemented through DISCOMs and DISCOMs are entitled for to get Performance Based Incentive @ 40 paise per unit purchased or Rs. 6.6 lakhs per MW of capacity installed, whichever is less, for a period of five years from the COD.

- Solar plant of capacity 500 KWp to 2 MW. In specific cases based on Techno-Commercial Feasibility smaller than 500 KWp are allowed.

- Power shall be purchased by DISCOMs.

Furthermore, Power Department has envisaged merging both schemes for smooth implementation and benefit to stakeholders' viz. DISCOMs and Farmer(s).

- Delhi DISCOMs have been allocated 62 MW by MNRE, GoI under PM KUSUM scheme.
- Draft documents prepared and letters sent to DERC and Delhi DISCOMs for comments on mode of scheme execution, levelized ceiling tariff and draft PPA.

Delhi has a Green belt of around 7339 Ha (18135 acres) with 47 villages in green belt mainly in South west and North-West Delhi. It is desirable that the maximum green belt may be utilized under the comprehensive scheme of Agriculture Solar farm scheme.

An aggressive and proactive approach should be taken by all stakeholders to launch a massive ICE campaign for dissemination of information and guidelines of the scheme, so that maximum number of farmers may come forward and give consent for implementing the said scheme on their agricultural land.

It should be aimed to achieve a target of getting consent of farmers for around 10,000 acres of land, so that a solar capacity of 1667 MW can be installed. Till date, consent of more than 33 farmers from 9 villages has been received for around 225 acres land for installation of the SPV plant under the said scheme.

On making it mandatory for government buildings above 500sqm to install solar panels:

DDA has already amended UBBL in 2019 introducing provision for mandatory installation of Solar PV plant on buildings with area 105 sqm & above.

- Delhi Solar Policy-2016 has been notified which mandates solar installation on all Govt. building having rooftop size of 500sqm.

- Till date solar plants of 103.516 MW on 915 buildings have been installed.

  - The brief details are as under:

Utilities	**No. of Solar systems**
North MCD	164
East MCD	9
SMCD – Installed	135
SDMC- Installation in progress	177
Jail (Rohini, Tihar, Mandoli)	3
DTC Depot	12
ITI/Polytechnic/Institutes	16
Delhi Govt. Schools	266
DJB	48
Delhi Courts	3

- In 2017, Power Department took up installation of rooftop solar with all Delhi Govt. Depts., Delhi Police, DDA, and Delhi High Courts for Solar installations. Education Dept., North MCD, East MCD signed MoUs with IPGCL. Accordingly, solar installation in these depts. was taken up by IPGCL.

- Again, in 2019, all Delhi govt. depts. were requested to undertake solar feasibility studies by E&Y, under technical assistance programme of MNRE. Due to COVID-19, the same was affected. E&Y assessed solar potential of 14 MWs for some sites.

It is proposed that all government building should be mandated to install SPVs on their rooftops in a time bound manner. From govt buildings alone, around 1000MW of solar power can be generated.

Delhi DISCOMs have to adopt an aggressive policy of promoting and installing roof top solar power plants (SPVs) in all residential buildings. BRPL has taken up major campaign in Dwarka, Safdarjung Enclave, Shakur Basti areas and has proactively taken up weekly campaigns in societies. BYPL & TPDDL are also making some efforts, however they have to upscale the efforts significantly to ensure that the solar power plants are installed on maximum number of residential buildings.

Presently, the Delhi DISCOMs are installing 31.5 MW SPVs in residential buildings. The cost details have been explained in the statement placed at **Annexure-I**.

In respect of installation of SPVs on rooftop of group housing societies, it is informed that only 59 societies have installed SPVs. There is a huge scope of installing SPVs in the remaining about 1841 societies in NCT of Delhi. It is therefore proposed that all the remaining CGHS societies and other multi storied societies should be mandated to install solar rooftop plants.

With Solar installation on government land, buildings, all private buildings, Delhi can generate about more than 2000MW of solar power. Further, SPVs can also be installed on canals and highways which would enable Delhi to meet 40% of peak

demand of power through solar energy. Together with the renewable energy purchases, Delhi can meet more than 50% demand from renewable energy. To sum up, DDA requires to consider the following:

1. Making mandatory provision for SPV installation in existing buildings also.
2. Promote SPV installation on vacant land available with government agencies. This can also help in mitigating/eliminating encroachment problems.

In respect of large scale public facilities, draft MPD-2041 has made following observations in Chapter 6:

Large scale public facilities such as airports, metro stations, inter-state and city-level bus stations/depots, stadiums etc., may progressively meet majority of their power.

With reference to above, an update on actual installation on these facilities is as under:

- Indira Gandhi International Airport: 7.84 MW (2 Nos. SPV Plants)
- Delhi Metro – 23.614 MW (57 Nos. SPV plants)
- Indian Railway - 5 MW
- DTC Depots: - 0.937 MW (12 Nos.)

There is vast potential of installation of SPVs in large public facilities like Delhi IGI Airport (Terminal T1, T2 & T3). There is huge area under possession of the Airport Authority/GMR. Some other airports like Cochin meet most of their power demand from solar energy. If the entire area under the possession of the Airport Authority/GMR can be solarised, they can meet most of their energy requirement in-house.

Delhi Metro has more than 200 stations and huge over ground track length. They have already installed a capacity of more than 23MW capacity of solar power and are sourcing 99MW solar from REWA solar plant in Madhya Pradesh. If DMRC can install SPVs in the area under their control, they can meet their 100% power requirement from solar energy.

Indian Railways has 5 major terminals (Anand Vihar, New Delhi, Old Delhi, Nizamuddin, Sarai Rohilla) and 42 other railway stations. So far, only 5 MW solar power is being generated by the Indian Railways. If railways could install SPVs on the stations and also along tracks / vacant land under their control, they can also meet large part of their power requirement from the solar power plants.

DTC has 37 and transport department has 15 bus depots. So far SPVs has been installed only on 12 DTC bus depots and 1 cluster bus depot. If SPVs are installed on the rooftops of the depots, they can meet most of their power demand from solar power.

Delhi Jal Board (DJB) have 9 water treatment plants (WTP), 20 sewage treatment plants (STP) and vacant land under their possession. If SPVs are installed on the rooftops of the WTPs, STPs and vacant land, they can meet most of their power demand from solar power.

There are more than 13 big stadiums/ big sports complex in Delhi. The SPVs are installed only in Thyagaraj Stadium (1MW). If SPVs are installed in all the stadiums, most of their power demand can be met by solar power.

The way ahead approach should be Identification of some pockets in Delhi to be 100% powered by green energy. The approach can be further expanded to other areas subsequently.

Delhi should lead by example by moving towards 100% generation of Green Energy with aim to meet its entire power demand with Green Energy. The Master Plan – 2041 should envisage a goal for maximum utilization of Delhi spaces (vacant lands, rooftops, govt buildings, depots, station etc.) for installation of SPVs. Further, SPV installation should be made mandatory for all existing buildings and future constructions in Delhi.

Green buildings norms (green roofs, solar use, energy efficient fixtures):

In this regard, the following is submitted for consideration:

- Unified Building Bye-Laws (UBBL), 2016 has made Provisions on Green Buildings in Chapter: 10. The provisions of Rain Water Harvesting, Solar Energy Utilization by installation of solar Photovoltaic plant & solar water heating systems, Energy Efficient fixture for lighting and Heating, Ventilation & Air Conditioning (HVAC) systems.

- Delhi Development Authority (DDA) has already amended Unified Building Bye-Laws (UBBL) to make mandatory provision of solar plant installations on buildings having plot size more than 105 square meters.

- Further, Power Department is pursuing DDA for making provisions of ECBC for commercial & residential buildings in Unified Building Bye-Laws (UBBL).

- Furthermore, DDA has already amended UBBL to incorporate provisions of Electric Vehicles (EV) & Charging Infrastructure as per the Ministry of Power, GoI guidelines.

- The Delhi EV Policy, 2020 envisaged “accessible public charging facilities within 3 km travel from anywhere in Delhi” (Clause: 6.2.1). And Ministry of Power, GoI vide guidelines and standards notified for Charging Infrastructure for EVs has also envisaged for “At least 1 Public Charging Station is to be available within a grid of 3Km. x 3Km.” DDA should include land planning for creation of Charging Infrastructure for EVs in Master Plan of Delhi 2041.

- There are 63.9 lacs electricity consumers in Delhi. Assuming that each consumer has got 2 fans in their premise, the estimated population of fans is around 128 lacs. The conventional fan consumers approximately 65-70W of electricity. Now, energy efficient BLDC fans are available which consumes 1/3 power. Thus saving 2/3 electricity i.e. 40W for each fan. For the entire fan population, the saving will be to the tune of 500MW. Delhi DISCOMs are running fan replacement programs with the approval of DERC as part of Demand side Management (DSM).

  Further, in Delhi, the air-conditioning load is to the tune of 2000MW. Most of the air-conditioner are unrated or of 2 star rating and a 1.5 ton AC (most common) normally consumes 1.9kW power, whereas 4-5 star ACs consume approx. 1.3 kW of power, thereby saving approximate 30% of electricity. Therefore replacement of ACs with energy efficient ACs alone can contribute to reduction in electricity demand by 600 MW. (approx.). Delhi DISCOMs are running fan replacement programs with the approval of DERC as part of Demand side Management (DSM).

  The conventional tube-light consumes 40-50W of electricity with normal choke whereas LED tube-light consumes 18-20W. Therefore assuming that each consumer has got 2 tube-lights in their premises, the estimated population of tube-lights is around 128 lacs. Replacement of LED tube-lights will save 1/2 the power than conventional tube-lights. A power saving of 250MW can be achieved by replacement of conventional tube-lights with LED tube-lights. Similar power saving can also be achieved by using LED bulbs over CFL

lamps. In Delhi, the consumption LED bulbs has increased through EESL Ujjala Program. But it si still estimated that several more needs replacement.

These can all energy efficiency programmes under Demand side management can add to major savings of electrical Power and therefore should be incentivise because these can contribute to less investment in power infrastructure and purchase of power.

In this regard, various directives have also been issued by Government of India and Govt. NCT of Delhi. We should adopt this in the Master Plan vision document and make it as a part of our culture.

In respect of Building design, DDA MPD-2041 as per Chapter 6 has made following observation:

Building design and layout considerations for reduced demand of HVAC to reduce peak load. (Thermally comfortable and energy-efficient buildings shall be promoted while giving building permissions in line with the UBBL 2016 and Energy Conservation Building Code 2018)

With reference to above, the following is submitted for consideration:

- Provision of HVAC to reduce peak load is there in ECBC – 2017 notified by Bureau of Energy Efficiency (BEE), Ministry of Power, GoI.
- Energy Conservation Building Code (ECBC) for commercial buildings was notified by BEE, GoI in 2007 and updated version was notified in 2017.
- The Energy Conservation Building Code (ECBC), is a document that specifies the energy performance requirements for commercial buildings that have a connected load of 100 kW or greater or a contract demand of 120 KVA or greater that are to be constructed in India and is mandated by the Energy Conservation (EC) Act, 2001.
- ECBC encourages energy efficient design or retrofit of lightning & control fixtures in the existing buildings so that it does not constrain the building functions, comfort, health, or the productivity of the occupants and also have appropriate regard for economic considerations (life cycle costs i.e. construction + energy costs are minimized). ECBC defines the norms of energy efficiency of building equipments and takes into consideration the climatic region of the country, where the building is located. Norms have been developed to

cater different climatic zones in India such as: Composite, Hot & Dry, Warm & Humid, Moderate and Cold.

- ECBC provides design norms for:
  - Building Envelop: It includes Thermal performance requirements for walls, roofs and windows except for unconditioned storage spaces or warehouses.
  - Comfort Systems & Controls: It includes the energy performance of heating, ventilating, air conditioning and service hot water & pumping and their controls.
  - Lighting & Controls: It includes interior and exterior lighting, day lighting and lamps & luminaries performance requirements.
  - Electrical and Renewable Energy Systems: It includes the energy performance of motors, transformers, DG sets, UPS and energy metering.
- ECBC can effectively be implemented by participation of various stakeholders such as DDA, PWD, MCDs, Council of Architecture, NBCC, DISCOMs, and Private Builders/Engineers/Architects etc.
- In Delhi, DDA prepares and notifies the Building Bye-Laws and provisions of ECBC-2007 have already been included in the bye-laws for some building types by DDA. So far DDA has included the provisions of ECBC in UBBL 2016:
- UBBL 2016 U/s 3.2, table 3.5 (4e), has made mandatory compliance measures (for all buildings having plot area from 50,000 m^2 to 1, 50,000 m^2) as recommended in the Energy Conservation Building Code (ECBC) 2007 of the Bureau of Energy Efficiency, Government of India. However, there are no provisions for making ECBC mandatory (as a whole) for buildings except the area mentioned above, only few components of ECBC incorporated.

- Comprehensive mandatory provision is required to be included in the Delhi's Unified Building Bye-Laws (UBBL) 2016 which comes under purview of DDA. Previously, DDA was requested to incorporate provisions ECBC in Delhi's UBBL by DDA vide Secretary (Power) DO letter dtd: 01.09.2020. (copy attached)
- Ministry of Housing and Urban Affairs (MoHUA), GoI has also directed DDA vide OM dtd: 21.09.2020 to consider necessary amendments to include the provisions of ECBC guidelines in Unified Building Bye-Laws (UBBL).
- Further, Bureau of Energy Efficiency (BEE), GoI has also launched Eco-Niwas Samhita (ENS) for residential buildings and residential part of mixed land used projects build on plot area ≥ 500 square meters in 2018. In the first phase minimum standards for the building envelop was launched to limit heat gain or heat loss of the residential building comprising adequate day lighting potential and ventilation. BEE, GoI is developing Eco-Niwas Samhita part–II for setting up minimum standards for the Electromechanical Equipments for efficient use of energy in residential buildings, which may be released shortly. The provisions of ENS have to be incorporated in Unified Building Bye-Laws (UBBL).
- DDA is being continuously followed up by Power Department for making requisite amendments in UBBL to incorporate provisions of ECBC for commercial & residential buildings.

It is proposed that DDA should urgently amend UBBL & incorporate the provisions of ECBC for commercial and residential buildings. It is also proposed to promote adoption of Energy Efficiency measures in electricity usage.

With regard to Smart Meters, DDA planning as per Chapter 6 notes as under:

Installation of smart meters (by DISCOMS)

Comments of Power Department are as under:

The planning for installation of smart meter by respective DISCOMs is as under:

S.No	DISCOM	Total consumers (in lacs)	Total Smart meters installed (in lacs)	DERC approval taken (Nos. in lacs)
1	BRPL	27.3	(4881 numbers)	3
2	BYPL	17.7	(147 numbers)	1.7
3	TPDDL	18.2	2.1	7
4	NDMC	0.7	0.6	-
	Total	63.9	2.7	11.7

Total Consumer base of Delhi : 63.9 Lacs
Total Smart Meters installed : 2.7 Lacs

Balance Smart Meters to be installed : 61.7 Lacs

- Each smart meter costs around Rs. 3000 and approx Rs 6000-7000 including overall logistics. Replacing all balance 61.7 lacs meters with smart meters under CAPEX model, the cost will be around Rs. 3700-4300 crores

- Under OPEX model of EESL, NDMC has installed 60000 meters for project cost of Rs. 61.68 crores for 8 years i.e. Rs. 10280 / consumer for 8 years.

- For balance 61.7 lacs consumers under OPEX Model based on NDMC estimation, the overall cost will be Rs. 6342 Crores for 8 years.

- For targeting all the consumers, DERC will be requested for an early order for approving CAPEX / OPEX model.

- Delhi DISCOMs shall also be asked to go for installation of smart meters for all consumers in NCT of Delhi in time bound manner.

With regard to improving infrastructure for power and gas supply, DDA planning document at item 4 of Chapter Code INF 3 reads as under:

4.1. ***Power Infrastructure:***

4.1.1. Major transmission network shall preferably be developed within the RoW of proposed master plan roads and would follow short route method in agriculture zone. The safe distance for developments along the transmission lines should adhere to safety norms overhead and underground transmission lines as per norms prescribed by CEA (ref: DCN).

4.1.2. All new sub-stations in Delhi shall be developed as gas insulated sub-stations as they require roughly 50% lesser land area as compared to traditional air insulated sub-stations.

4.1.3. All new 11 KV power lines shall be integrated underground within the road cross sections of land pooling zones as per technical and financial feasibility.

Comments of Power Department on above is as under:

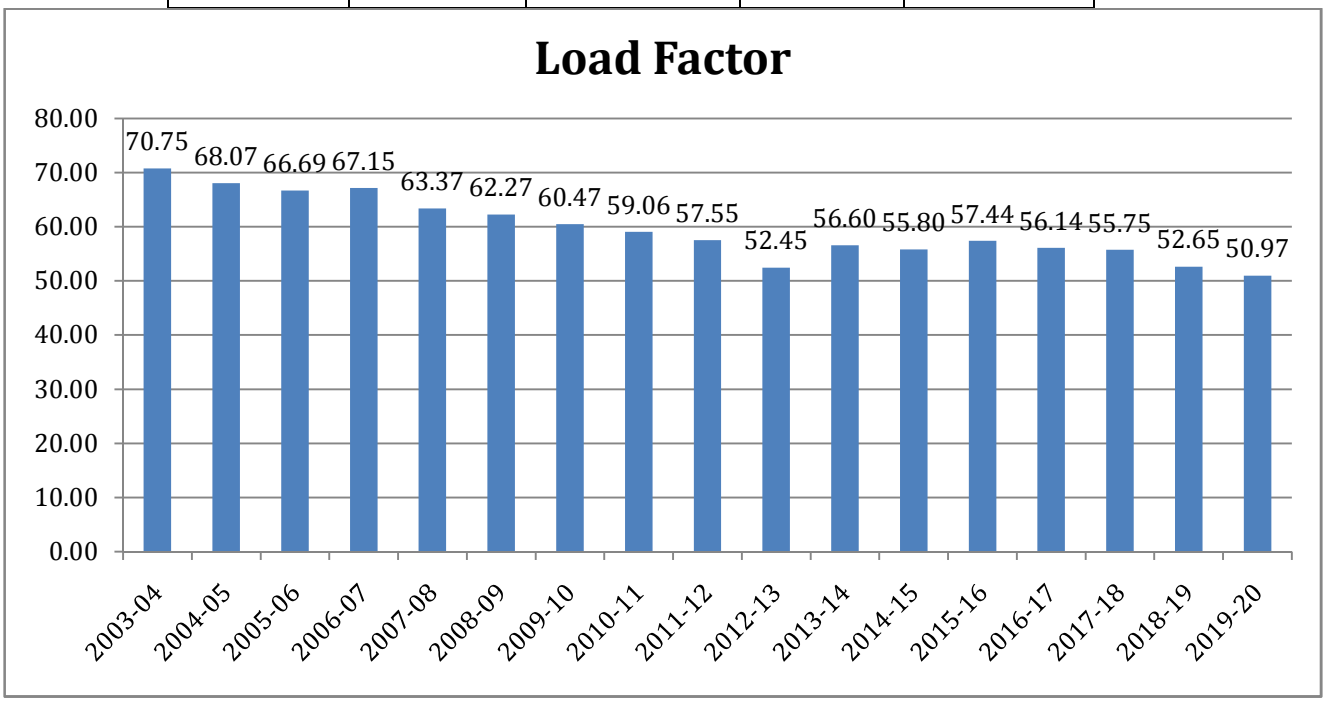
LOAD PROFILE OF DELHI

The demand/load curve of Delhi is not uniform with respect to time, season or areas. The measure of variation of load can be ascertained from the load factor of the area/city/state. The load factor is defined as average load divided by the peak load.

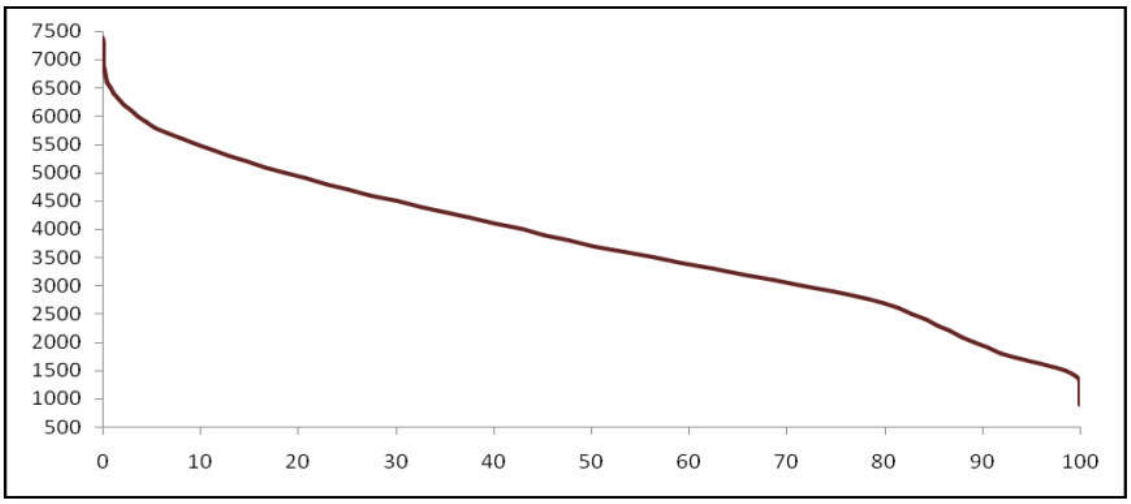
Presently, Delhi has a low load factor of 51%. As compared to Delhi, the load factor of Mumbai is around 67%, whereas in China, the load factor varies from 69 – 83%.

The load factor of the city can be seen vide table below:

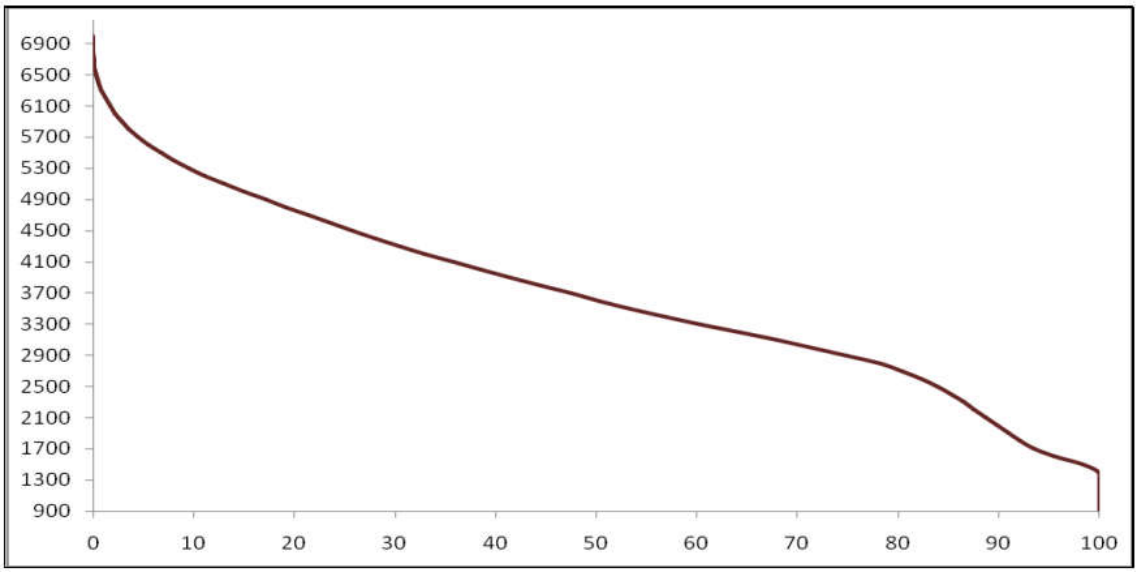
Year	Peak Load (in MW) (A)	Consumption (in MUs)	Average Load (in MW) (B)	Load Factor (%) [(A/B)x100]
2019-20	7409	33082	3776.48	50.97
2018-19	7016	32360.8	3694.16	52.65
2017-18	6526	31873.6	3638.54	55.75
2016-17	6261	30791	3514.95	56.14
2015-16	5846	29416	3357.99	57.44
2014-15	5925	28964	3306.39	55.80
2013-14	5653	28030	3199.77	56.60
2012-13	5642	25921	2959.02	52.45
2011-12	5028	25349.2	2893.75	57.55
2010-11	4720	24419	2787.56	59.06
2009-10	4408	23349	2665.41	60.47
2008-09	4034	22006	2512.10	62.27
2007-08	4030	22372	2553.88	63.37
2006-07	3736	21977	2508.79	67.15
2005-06	3626	21184	2418.26	66.69
2004-05	3490	20810	2375.57	68.07
2003-04	3289	20385	2327.05	70.75



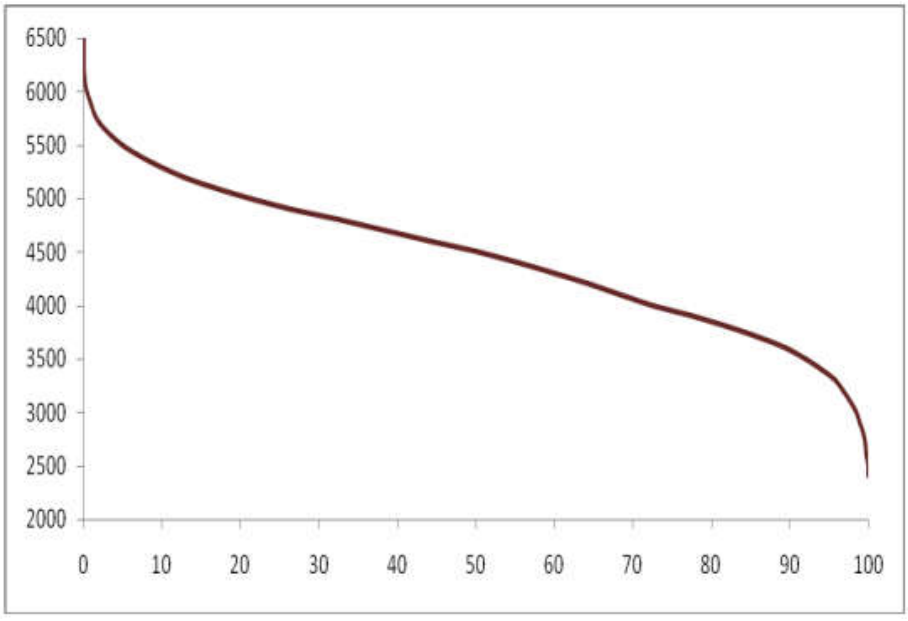
Load Curve 2019-20



Load Curve 2018-19

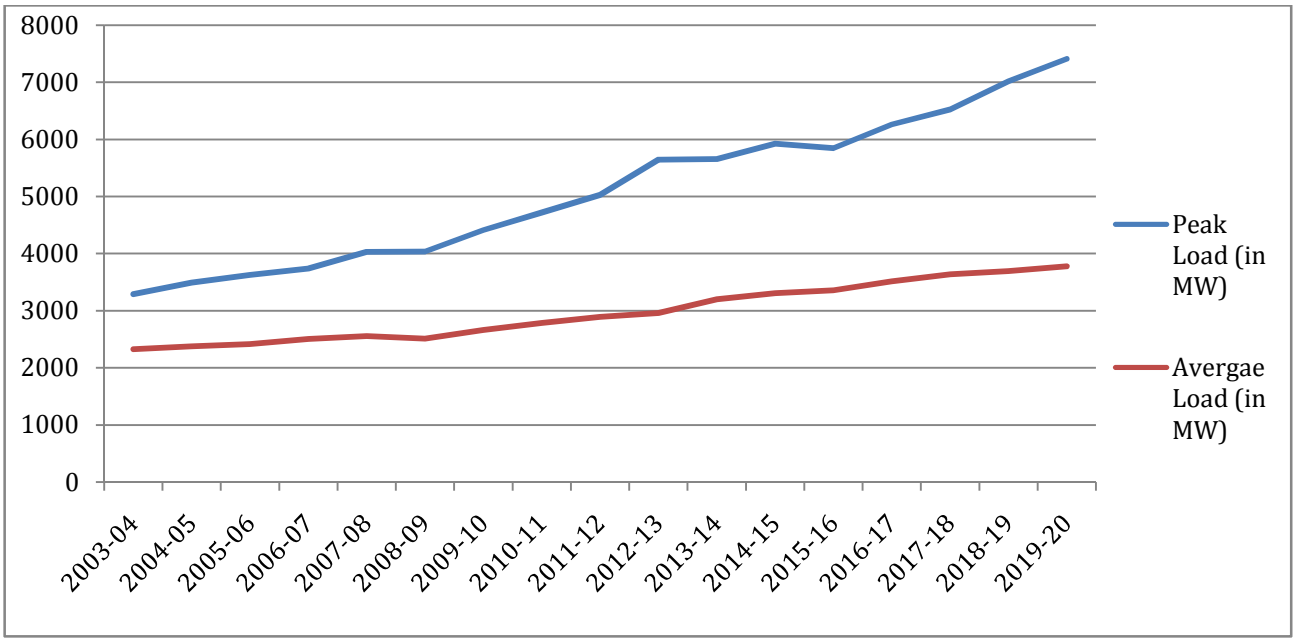


Load Curve 2017-18



A higher load factor is healthy for the power sector of an area. High load factor means that the power system developed for meeting the average power demand is sufficient to meet the peak demand too. From above, it may be seen that the load factor Delhi is on decreasing trend. In such case, the power system is required to be developed over and above the expected peak demands to include the provisions of contingency in case of any failure. Due to this, the assets developed above average demand and meeting peak demand remains stand still most of the time of the year. The peak demand of the city sustain for a very short duration during the year. The same can be seen in the table below, showing the duration of sustenance of Peak Load of Delhi:

S.No	Load Remained Above (in MW)	Time Duration of Load (in %) (2019-20)	Time Duration of Load (in %) (2018-19)	Time Duration of Load (in %) (2017-18)
1.	7300	0.01(52 mins)	-	-
2.	7200	0.02(1hr 45mins)	-	-
3.	7100	0.04(3hr 30mins)	-	-
4.	7000	0.05(4 hr 22mins)	0.003(15mins)	-
5.	6900	0.10(8 hr 45mins)	0.014(1hr 13mins)	-
6.	6800	0.15(13 hr 08 mins)	0.049(4hr 17mins)	-
7.	6700	0.27(23hr 39mins)	0.080(7hr)	-
8.	6600	0.41(1 day 11hr 54mins)	0.163(14hr 16mins)	-
9.	6500	0.73(1 day 15hr 56mins)	0.300(1 day 2hr 16 mins)	0.01(52 mins)
10	6400	1.10(2 days 21 mins)	0.519(1 day 21hr 27mins)	0.04(3hr 30mins)



Growth of peak demand and average demand

As per the projection the peak load will reach 19000 MW by year 2041. To meet such load, provision in Master Plan have to made for space for power infrastructure that will be required to establish sub stations, distribution transformers and right of way for electric poles and cables to meet future power demands.

City Master Planning: Key factor – Demand Curve

- **City Master planning : Key factor – Demand Curve/ Peak Demand**
  - Usage of Electricity results in Power demand.
  - It is not uniform with respect to time, season.
  - Infrastructure is planned based on peak value of demand and associated fluctuations (to bring efficiency).
  - Power demand curve varies with usage, new initiatives, demography etc.
  - ***Delhi/ DISCOM level peak demand is good for power planning and intercity power transmission.***
  - ***However Area / colonies wise peak demand forecasting is required for planning of DTL/ DISCOM grid and EHV/ HT level power***

transmission and substation planning. Town planning based on such load forecasting is essence.

- While forecasting the demand, any upcoming major load, plan to change in land usage, FAR, Govt policies Like EV should be taken in consideration. Per capita consumption also changes with country growth.

- **Demand Curve :**
  - To improve supply reliability, Quality & cost, Demand curve need to be controlled.
  - Three key parameters of demand curve …
    1. Load factor
    2. Demand duration curve: top 10% demand Last for how many hrs/ Demand which last only for 100 Hrs.
    3. Peak demand and sudden demand change

- **Load factor**
  - Average demand = Annual Energy(in MU)/ Nos of hrs in year
  - Load factor = Average demand/ peak demand.
    Ideal load factor is 1, In Delhi it is in range of 50%

City Planning Key consideration: (load curve)

The efficiency of Power distribution network will increase many fold, if we manage the demand curve properly. Management of High peak demand is very crucial.

- Delhi witness a very high peak “Electricity demand” during summer (typically in June/ July months) due to Air conditioned load .
- As can be seen from Load duration curve , these high peak last for few Hrs (less than 1% time of a year).

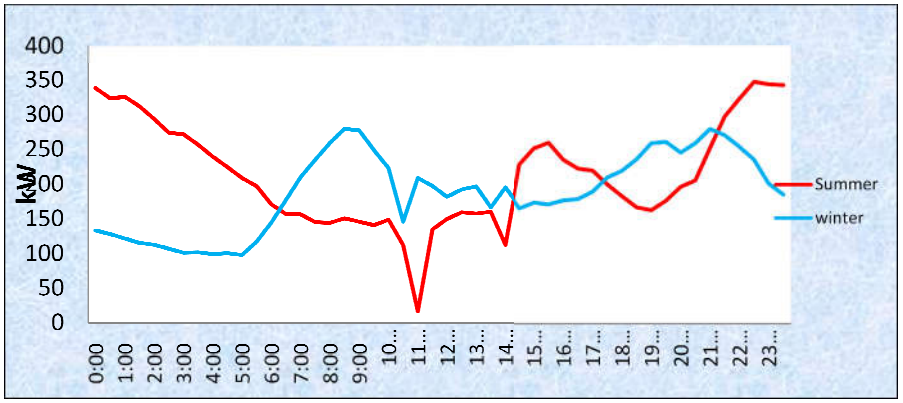
- In order to supply reliable power lot of infrastructure need to be created to ensure power for each consumer even during peak demand.
- Lot of funds, space and other resources are required to create additional infrastructure.
- Since these peak demand, above a certain load last only for few hrs, the additional laid infrastructure remain under utilised.
- This finally impact cost of power and so consumer tariff.

By proper planning, the peak demand can be managed. Various techniques of " Demand Side management" need to be part of City planning. Delhi has a typical peak during afternoon mainly due to office load and late evening till midnight, due to residential load..

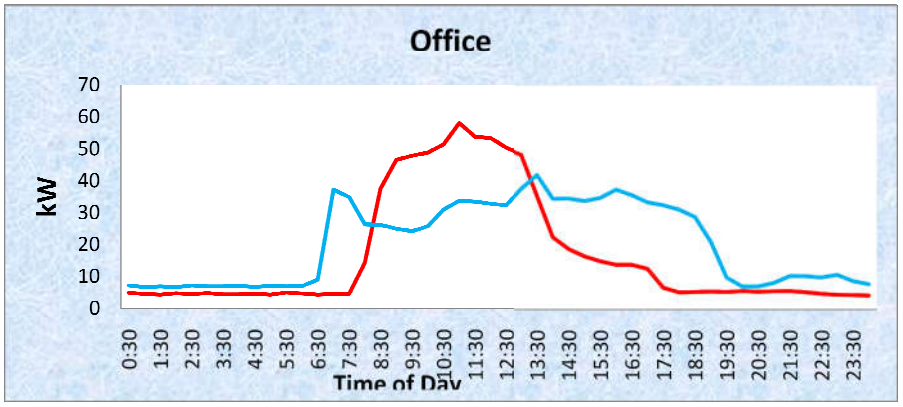
Suggestions: Management of peak demand:

Why area wise demand Curve is critical apart from Total Delhi city Demand Curve:

Residential consumer load curve – more energy in night. AC / heater load dominate.



Commercial consumer load curve – more energy in day . Load curve change with business type



- If Demand increases in both areas, say by 100 KW, being at different time, the demand increase if we see in combined curve will be 100KW only.
- But if areas are separate then additional infrastructure of say 100 KW will be required in both the areas.
- Thus infrastructure planning is done based of each area demand curve. Planning based on Total demand curve of city will not be adequate.

- Needless to say MIX load in an area helps as infrastructure is used better. Rather than clustering one activity type at one place- plan and develop area for mix usage.
- If mixing is inevitable – keep interface area say road between two such area, exclusively for Utilities and civic agencies.
- In Residential area, typical peak load is in night 09:30 to 00:30. Parks, local markets, sports facilities etc. should be kept open in night to balance/flatten power load.
- Explore more possibilities so as residents go out during late evening so as house load is minimal.
- Plan installation of giant screens – for public gathering resulting in less people at home, which will lower the demand.
- Encourage district level/centralised AC even for residential areas. These are more efficient than individual AC.
- Planning of EV charging station is must – location like low traffic road, in parking area, near to DISCOM grid/ DT, should be encouraged.
- Usage of vacant office building/ schools etc for night parking and charging.
- Install roof top solar in commercial/ office/ education centres. It is best option to address Afternoon peak demand.
- No more agriculture connections – encourage solar/ solar pumps.
- Over head water tanks on roof should have solar panels and all water pumping should be through solar energy.
- In future, City will be needing lot of EV charging station. All such charging station :
    - Should have batteries to avoid large in rush current.
    - Should not draw power during peak. Discourage charging during peak by have very high tariff for charging.

- Look for battery swapping system – batteries in swapping bank will be charged during non peak hrs or through solar.

❖ **City Master planning:** Some laws/ directive to ensure high reliability and service

- Law to address indiscipline regarding encroachment, unauthorised construction, construction near/ beneath network, damaging of Other's network by public/ other department.

- Law regarding usage of Non essential load during peak – say water pumping or over drawing during peak.
- Law to empower SLDC/ DISCOM-- to use/ control consumer DG set/ inverters/ batteries in emergency/ routine usage with proper compensation.
- Plan DJB water supply hours based on load curve i.e. time when power demand is less.
- Higher consumer participation – consumer engagement
- Dynamic tariff, Demand side management & demand response

Other: Planning for Gas based generation and centralised batteries is essential to accommodate large solar energy generation and to manage demand Curve.

Land Requirement for Power Infrastructure in 2041 :

The land requirement has been worked out by Delhi Transco Limited and Delhi DISCOMs broadly in line with norms issued by DDA & Delhi Govt and as per their experience at ground conditions.

DTL

The summary of perspective plan for Power Transmission Services for Delhi-2041 (MPD-2041) as under:

Voltage Level	Tentative Land Reqd. (sqm)	No. of Existing substations	No. of proposed substations (under pipeline or execution)	No. of proposed substations (MPD-2041)	Total
765kV	1,60,000	01	01	02	04
400kV	40,000	07 (including Mandola)	03	09	19
220kV	7000	41	04	37	82

- Total Grid Land: 2 x 160000 + 9 x 40000 + 37 x 10000sqm = 10,50,000 sqm

TPDDL

The current load in TPDDL area is served by 78 nos. of grid substations which is a mix of 66/11 kV and 33/11 KV. For the 33 kV belt, which is densely populated, it is assumed that the new land would be in smaller sizes and thus it has been considered that a 2 transformer grids (2 x 31.5 MVA, usable 44 MVA). For the 66 kV belt, 3 transformer grids (3 x 31.5 MVA, usable 66 MVA) is considered. Considering a diversity factor for power transformer loading, it is estimated that additional 70 nos. new grid substations will be required to meet normal load growth and an additional 20 grid substations to meet EV charging load. Thus a total of 90 new grid substations would be required. Space required for grids is 1250 sq meters (50 x 25 sq. mtrs., min. two sides open)

Considering diversity factor between power transformers, feeder and distribution transformers and accounting for bulk consumers, an additional 6850 MW or 7850 MVA of peak load has to be served by distribution transformers. Assuming 50-50 mix of dual and single transformer substation (32sqm), approximately additional 3750 dual transformer (80sqm) and 3750 single transformer substations (total 7500) would be required.

- Total Grid Land: 90 x 1250 sqm = 1,12,500 sqm
- Total Distribution Transformer land requirement = 3750 x 80 + 3750 x 32 = 4,20,000 sqm

BYPL

Based on CAGR of 3%, BYPL load will increase from the present 1653MW to 3075MW in 2041. After including demand on account of EV and go electric drive, peak load is expected to increase further to 3600MW (approx). Based on peak load of 3075MVA, total grids required to meet the load is 88 nos. (approx). Considering the present 54 nos grids, land will be required for establishment of 52 new grids. Requirement for EV load will be additional. Land required for each grid will be 2000 Sqm (50 X 40 m). However with emerging technologies, we will try to optimize the land requirement.

To meet 3600 MVA, desired capacity is 7200 MVA considering diversity factor. Based on the same, atleast 1873 Nos new 11/0.433kV Substations will be needed. Requirement for EV load will be additional. Land required for each substation is 80Sqm (8 X 10 m). However with emerging technologies, we will try to optimize the land requirement.

- Total Grid Land: 52 x 2000 sqm = 104,000 sqm
- Total Distribution Transformer land requirement = 1873 x 80 = 149,840 sqm

BRPL

BRPL serves about 750 sq kms with current annual peak load growth of about 5.88%. In FY 19-20, BRPL recorded peak load of 3211 MW which is 43.33% of Delhi peak (7409 MW). Assuming same share in 2041, the peak load of BRPL would be about 8263 MW (5052 MW additional) out of Delhi's projected peak demand of 19070 MW.

Key upcoming loads in BRPL area includes, DIAL, DMICDC, RRTS by NCRTC, ITPO, DMRC, redevelopment projects by CPWD (Sri Niwaspuri, Kasturba Nagar, Tyagraj Nagar, Mohammadpur), urban extension in 4 zones (J, K1, K2, L).

Presently, the load in BRPL area is being served by 99 nos. of grid substations which is a mix of 66/11 kV and 33/11 kV voltage levels. Considering a diversity factor for power transformer loading, 115 new grid substations will be required to meet normal load growth. Required space for a grid substation is 50x60 sqm. Each Substation area will accommodate 3 Power Transformers, GIS and 11 kV Panels, SCADA, Shunt Reactors, Batteries, Solar Systems, possible expansion in capacity and possibility to accommodate substation of voltage higher than 66 kV.

Considering diversity factor between power transformers, feeder and distribution transformers and accounting for bulk consumers, an additional capacity of 11788 MVA at distribution transformers level would be required. For each 11/0.4 kV substation with two Distribution transformers of 1 MVA each, there will be space requirement of about 80 sqm.

Space requirement for BRPL:

a. Total Space requirement for 66/11 kV and 33/11 kV Grid Substation: 115 x 3000 sqm = 3,45,000 sqm
b. Total space requirement for 11/0.4 kV substation = (11788/2) x 80 sqm = 4,71,520 sqm
c. Apart from above (a and b) land requirement for normal load growth, there will be additional requirement of land 57,000 sqm for 19 nos. grid

substations and 77,120 sqm for 964 nos. of 11/0.4 kV sub station in BRPL area, assuming 10% of normal load demand will be on account of EV charging load in 2041. Upcoming EV charging load includes DTC Bus, ESSL load on SDMC parking and other EV charging stations

With above loading conditions and space provisions, on an average, there would be one grid substation in every 3 sq km and one DT substation in every 50,000 sqm area of BRPL.

Gas insulated sub-stations shall be promoted by DISCOMS (lesser space requirement)

- Present Status of GIS substations are as under:

S.No	**DISCOM**	**Total Sub-stations**	**GIS Sub-Stations**
1	BRPL	99	13
2	BYPL	54	04
3	TPDDL	78	10
	Total	231	27

- Provision must be kept in Master Plan-2041 for designated spaces in all new development projects and redevelopment projects for establishment of sub-stations, installation of distribution transformers and laying of power cables.

Space for power infrastructure must be provided at right places (near to load centre). Technically feasible space for substations must be allocated for DTL/ DISCOM and proper "Right of way" to be ensured for power poles/ laying underground cable for present and future requirements.

The Standard norms for Grid/Substation sizes is annexed as **Annexure-A**

<u>Proposed key parameters for Delhi City planning:</u> System/ Stakeholders **Expectation** about **Electricity**

a) **To meet each Registered consumer Electricity demand - Whatever (Quantity), wherever (location), whenever (time):**

- In general the capacity and capabilities to distribute power is gauged by Power generation / power arrangement capacity and the network capacity to handle the peak.
- In-spite of having required total network capacity and enough power generation, still power supply at the door of consumer cannot be assured.
- The above way of gauzing the capacity does not address the issue of local distribution constraints. Further this doesn't address the issue of safe and quality power.
- The purpose is to distribute power to EACH consumer at the place of usage, which can be assured only if even the last part of network is reliable.

Suggestions:

- To forecast/ Estimate power demand in each area, localities and plan land/ route for electrical system. While estimating same it is important:
    - To plan upcoming big load like stadium, metro, college, offices, market, govt buildings, hotels etc.
    - Impact of change in FAR, land usage.
    - Need of space for DTL grid, DISCOM grids and substation. It is important to note that Grid and substation should be right in middle of load centre. Far off will impact power quality, loss and infrastructure cost.

b) Safe to use/ safety issues:

- Ensuring electricity availability is not enough. The need is safe and quality power.
- Apart from Network characteristics and capacity & load characteristics, consumer and city discipline impacts a lot Regarding Network safety.
- Town planning should address these issue by planned network laying and issuing directives for consumers/users.

Suggestions:

- Location of panel / meters has a very important role in safety of premises and occupants, especially whenever there is an accidents. The location of meters/ panels & route path of service cable shall be part of building drawing and should be inspected to ensure for compliance of safety guidelines/ CEA regulations for electrical safety.
- Planning and Directive to ensure building construction, building revamping, road construction and revamping should maintain necessary Horizontal and vertical clearance between building/ road/ construction and Electricity network.
- Road design and construction in way that frequent laying COAL TAR/ road raising is not required. This not only affects vertical clearance but also cause water logging issue near substation / RMU installed next to road.
- Planning and Directive to ensure no construction take place beneath HT and EHV over Net network.
- Planning to ensure minimum interference of road side tree with overhead network. Also a system needs to be planned to handle issue of Dead tree, as when these tree fall, it invariably damage network.

c) Power Quality:

Merely availability of Electricity is not sufficient . the power available should be quality power compiling with Central electricity Authority Norms. Distance and capacity of network Affects the power quality and thus having Transformers/ Grids near to load is must to ensure power quality. Through Lone feeder Power can be delivered but it will affect the power quality.

Suggestions: Suitable Space and resources to be provided to ensure right location of substation, grid station and other network assets. Space size and location both are critical.

d) **Reliable Power: Suggestions**

With more and more dependency of residents on power, every one expects a highly reliable power. Needless to say, any outage of power, not cause inconvenience to the users, but also impact city economic and life flow.

- Reduction in failure: There are multiple reasons for power failure. Apart from age, loading condition, network asset own quality, network installation workmanship, many failures are due to
  - Improper clearance between building and network
  - Damage by other utilities.
  - Road raising causing water logging and affecting vertical clearances.
  - Tree / object falling during thunderstorm or due to strong wind.
- Unplanned/ uninformed load growth – more than network capacity
  - Un-authorised colonies
  - Change in Land/ space usage/ change in FAR(say building height)
  - New big load and no space to augment network.

- Delay in outage management :
    - Network become inaccessible – construction near, beneath the network assets.
    - No approachable road.

e) **Best services**:

Including faster processing of new connections :

- Refusal for new connections / delay in new connections forced people to either run DG sets or go ahead with electricity Theft.
- Main reason for Delay / refusal of connections are:
    - Constructed building are as not as per by laws specially height.
    - Building on un-authorised area - Restriction / no permission to lay network
    - Usage Nature – activities not allowed in that area.
    - Non availability of space for network revamping.

Suggestions:

- Ensuring all newly constructed building/ Building revamping should be as per City By-laws so as electricity connections can be released.
- Building construction should be allowed only in area where network laying is permitted. Boundaries of such prohibited area shall be well marked on map and on site also.
- Boundaries with neighbouring state should be clearly marked, both physically and on map. Further guidelines for supplying across the state boundary, theft by resident on other side of border shall be prepared.
- Clear directive need to be issued, Giving RIGHT to power department/ DISCOM to lay infrastructure.

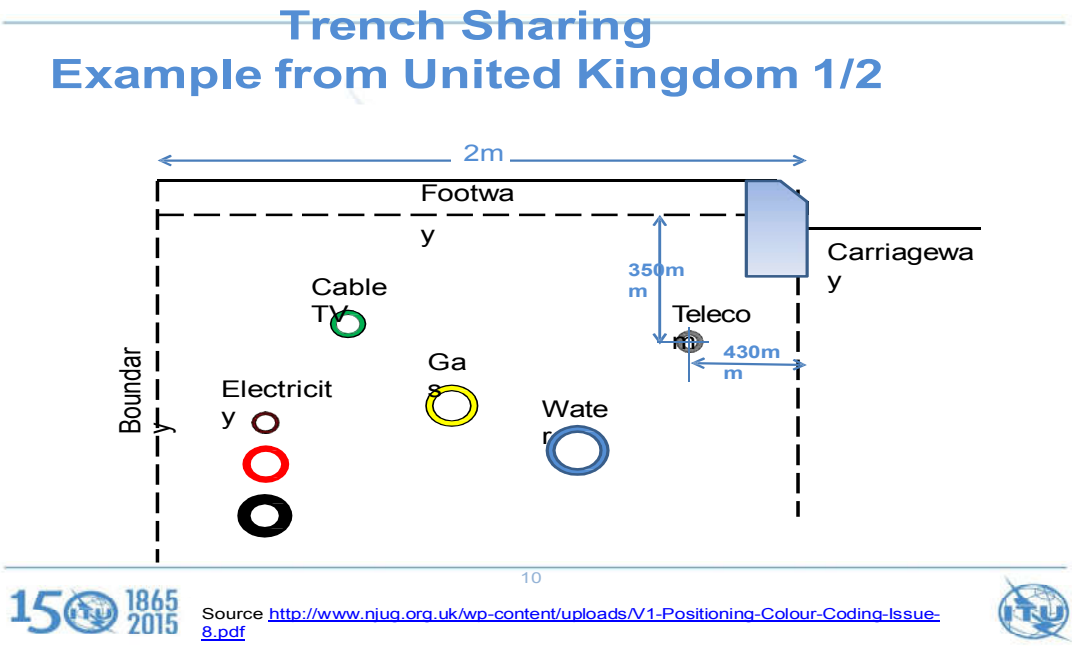
Review of Road construction – Reliable Electricity

- Utility Duct along and across the roads.

  Utility Ducts are critically required to ensure proper laying of city infrastructure and also to maintain the laid infrastructure. The importance of same is acknowledged by all.

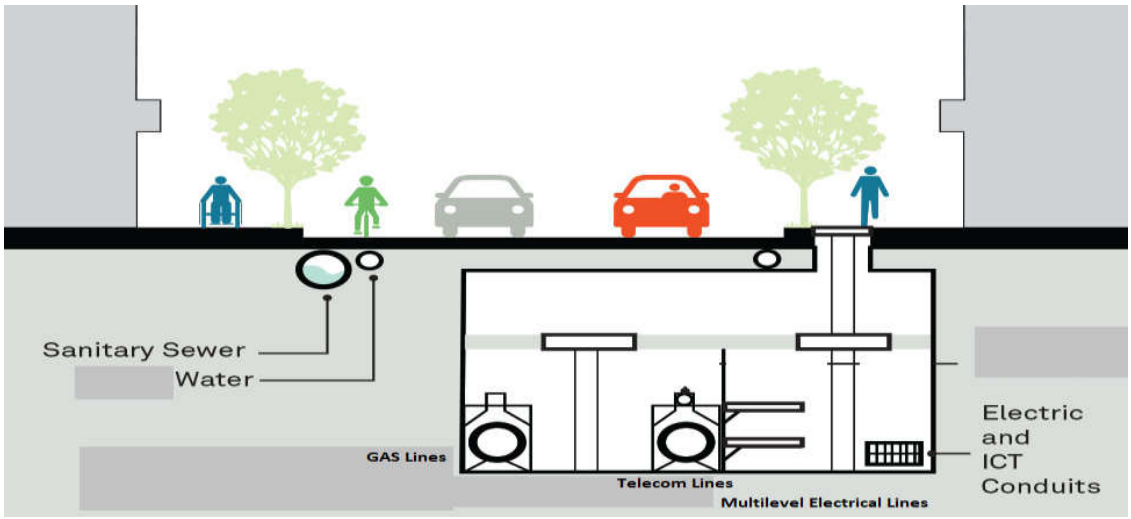
- Ministry of Road & transport issued circular vide F.No. RW/NH33044/29/2015/S&R(R) Dated 22.11.2016 regarding policy guidelines for accommodation of Public and Industrial utility services along and across National Highways.

- Utility ducts are part of City planning.



- New main road development plan shall include the provision for subsurface space allocation among various utilities. That is dedicated corridors for power, telecom, gas, water and sewer need to be developed during the development of roads so that damage to other utilities can be minimized and systematic planning can be made for future growth. These utility work requires digging or trenching which leads to water seepage and surfacing of potholes. In some western countries, all utilities run

inside these ducts which have entries at regular intervals. This will have a positive impact at the speed utilities can provide new power supply connections as well maintain existing ones. As one of the major reasons for faults in the underground network is damage by 3rd party, utility ducts would results in a near fault free network. This will help to increased ranking in Ease of Doing Business (EODB). Indicative arrangement as below.



- The utility corridor requirement details as below:

a. Subsurface utilities

Type	Capacity	Corridor Width
66 kV/33kV/ 11kV UG cables for main roads	Around 100 MVA	Min. 1.2M
11 kV & LT U/G cables for interconnecting internal roads	Around 5 MVA	Min. 0.7M

b. Overhead network requirements,

Type	Capacity	Corridor Width
66 kV O/H Double Circuit OH Line	110 MVA	Min. 6M and 2.3M each side
33 kV O/H Double Circuit OH Line	60 MVA	Min. 6M and 2.0M each side
11 kV O/H Line	5 MVA	Min. 1.1M and 1.2M each side
LT O/H Line	0.18 MVA	Min. 1.0M and 1.2M each side

As we can see from above the subsurface requirement is very smaller than for Overhead network hence in new plan of city we must go for underground network with dedicated corridors. This shall not only improve the aesthetic of city but also ensure judicious utilization resources and improved reliability of each utility.

There is a need to ensure constructing utility duct in all newly constructed roads and also explore possibilities to implement same in existing road also.

4.1.3 All new 11 KV power lines shall be integrated underground within the road cross sections of land pooling zones as per technical and financial feasibility.

- Provision must be kept in Master Plan-2041 for mandatory development of utility ducts in all new development projects and redevelopment projects for housing all utilities like electricity, water etc.
- Development of utilities duct for keeping electric wires underground make maintenance easier in case of failure as no road cutting

permissions will be required. The restorations of power will be quick, reducing the overall down time.

- Estimates given by DISCOMs for converting 100% 11kV power cables to underground: (Without Ducting)

	BRPL	**BYPL**	**TPDDL**
11kV network	729	27	2369
HVDS network	2574	726	790
Total cost (in crores)	3331	753	3159

Total Cost: 7243 Crores

- Under Jagmati Delhi, initial budget of 50 crores has been kept for FY 2021-22, for conversion of 11kV bare conductor to insulated conductor.

Road Construction: To avoid need of frequent laying of Coal-Tar layer

- Laying of additional layer of coal tar affects the vertical clearance between road and network and makes network accident prone.
- Further Road raise results to water logging issue for assets near to the road.
- It is important all road revamping should be analyses before hand for its impact on other civic agencies assets on road.

Guidelines to lay various utilities asset beneath pavement/ along the road

- Since most of civic agency assets are going underground, a guidelines is required about asset placement, directions etc so as neither the assets gets damage nor it create safety risk or maintenance issues.
- The guidelines should have future for new assets due to technology advancement.

Centralised agency – space and conflict management.

- There is a need to have an agency that ensure implementation of Guidelines and ensure all utilities follow guidelines.
- It should ensure, prior digging, concerned are well informed about risk. Information infrastructure to be developed for intimation of digging by any agency to all concerned utilities. GIS mapping of all utilities on common Delhi land-base shall be shared with all concerned utilities. A provision of periodic (at least quarterly) updation of utility network on land base should be made mandatory for all utilities.
- It settle all dispute arise due to cable damage, space issues or make others asset inaccessible.

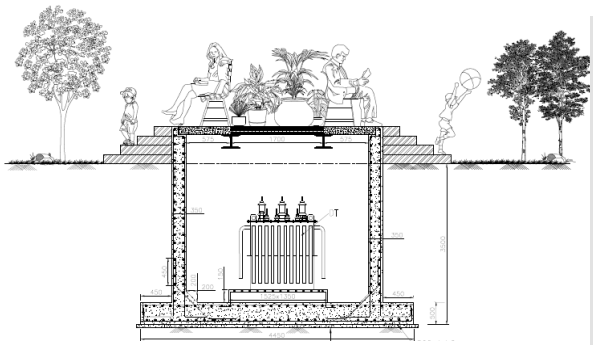
Other:

a) Law to have Right of way – to lay required infrastructure.
b) Law for road owning agency to plan and provide "space" for future infrastructure laying.
c) Constraints in Laying Undergrounding Network
    - Dedicated utility corridors of appropriate size are imperative to achieve the target of undergrounding of network.

- A policy should mandate the construction of dedicated utility corridors in all existing and new areas. All new public/private developments must also provide dedicated Utility corridor as a part of their project plan.
- Respective civic/land owning agency shall be made responsible for construction of such corridors.
- Size of the corridor may be decided after consultation with all relevant stakeholders including Discoms.
- Construction and handing over of the corridors to Discoms needs to be ensured in a time bound manner for undergrounding of feeders as per plan.
- Space constraint for substations/associated equipment and ROW issues for cables need to be addressed on priority to achieve the objective of 24 x 7 power.
- Underground Utility duct shall be provided for power cables along roads with adequate access for new laying, repair and maintenance. Separate tier for 33 kV & 66 kV, 11 kV and LT Cables in the duct shall be required. Moving space for manpower and material shall be required. Provision of proper ventilation shall also be provided. In utility duct, a separate tier to be designated for communication Cables (OFC, Copper, etc.) also.
- Special and strict instructions to land/road owning agencies may be included in master plan, with legal repercussions, mandating shifting/height raising of electrical infrastructure where land filling is planned or road widening is planned or new drainage system is planned or wherever such interface is involved.

- A Coordination Committee comprising various utilities (water, power, sewerage, telecom, roads etc.) may be set up to ensure the proper coordination between the utilities coming in the same area.
- Culverts / hume pipe / duct / cable truss to be provided at regular intervals (say 500m) on main roads, under-passes, DMRC line, flyover, major drains and at all sides of red-light-crossings.
- Process for availing permission for cable laying shall be simplified and made time-bound especially for Indian Railways, UP Irrigation/Flood Control, DMRC IOCL, etc.
- RoW for overhead tower line to be considered in main road design in outer west and south west portion of Delhi.
- 10mx20m space for Bijli Seva Kendra at every 6 sqkm area on an average will be needed.
- For unauthorized colonies, new construction should not be allowed till proper redevelopment with all utilities is done as per norms. Special provisions to be kept to allocate substation space and RoW for power cables in such areas. Provision should be made to demolish or relocate such unauthorized development to give way for planned electrical network.
- Separate Meter room on ground floor should be made mandatory in building design.
- All the parks and parking lots can be developed with provision for underground submersible power equipment such that the top surface can be used for general application like in parks and parking areas. Some pictures which is done in America are as below. We have also undertaken the pilot projects and one is installed in our IFC Narela grid substation and other is being commissioned at Model Town. The required technology is available in India. Hence can be considered.

- In unplanned colonies there is no space for electricity infrastructure expansion for meeting load growth and hence all the parks and government/MCD office premises parking lots to be used for installation of underground submersible equipment for power distribution. The top surface in side office building shall be used for parking.



- Any new multistory building and mall shall have the provision for utility basement for power, gas and other utility supply. So that there shall not be stress on existing utility infrastructure. Also DERC supply code amendment dated 31.08.2017, amendment no. 6 for change in regulation no. 22 of original Supply Code has mandated that developer shall provide land for installation of distribution transformers when the total cumulative built up area of the premises in the plot/building exceeds 1000 square meter; or plot of size above square meter.
- Malls parking space and dedicated parking lots shall be equipped with EV charging stations for provision for charging infrastructure should

be kept in all new constructions. The DDA new buildings shall have Solar PV installation provisions on terrace.

- There shall be space or provision kept in existing colonies for vertical tower substations, these are compact installation solution.
- The interconnecting roads inside colony or inside industrial area roads shall be kept with space for utility network on any side of road about 2.5 meters for laying of underground cables, feeder pillars, power substations and service boxes of telecom or gas utilities.
- The crossing utilities below flyovers and on the flyover becomes a challenge hence for crossing utilities across flyovers the duct to be kept at regular interval. Also for streetlight connections on the flyovers the duct for power cables to be kept in the flyovers.
- For crossing the open nala or drains provision for making structure above nala to be kept and flood control department shall be informed accordingly for meeting future expansion needs.

City Planning Key consideration: National Policy & Trends

Master city plan need to be aligned with national Policies and new upcoming technology. For are few key national policies and upcoming technologies. It is important to note that these initiatives also affect demand curve:

- To encourage renewable energy – Renewable Integration.
  - Roof top solar
    - Building layout

        - Maximum roof facing south.
        - Uneven building height affect solar efficiency
    - Define usage of “Roof common area”
    - Ideal for location where load timing is not critical.
    - Solar good for commercial activities especially which work on 365 days.
- With solar Power integration plan for:
    - Battery/ gas based generation-To take care of fluctuation/ Uncertainties
    - Mixing with wind renewable-as Compliment so a good combination

- Vehicle switching from Fossil fuel to electricity.
    - Location of EV charging Furthermore, DDA has already amended UBBL to incorporate provisions of Electric Vehicles (EV) & Charging Infrastructure as per the Ministry of Power, GoI guidelines. (copy enclosed)
    - The Delhi EV Policy, 2020 envisaged “accessible public charging facilities within 3 km travel from anywhere in Delhi” (Clause: 6.2.1) and the Ministry of Power, GoI vide guidelines and standards notified for Charging Infrastructure for EVs has also envisaged for “At least 1 Public Charging Station is to be available within a grid of 3Km. x 3Km.” DDA should include land planning for creation of Charging Infrastructure for EVs in Master Plan of Delhi 2041.
    - Battery swapping
    - Deterrent Policy for charging during peak and incentive if change during non peak
- Batteries – can act both as source and load

- 5G/ high bandwidth communication - laying of OFC – trench/ on pole.
- City Master planning : Review of Two key projects
    - Islanding facility – Power management if Regional power grid fails.
    - Dressing/ beautification of Overhead cable and DT on Pavements.

City Master planning: Review & learning from Present constraints

A review and analysis of present constraints will help to avoid same in future.

- Space- at right place (near to load centre) is one of the biggest constraints.
    - Space for DTL/ DISCOM Grid and DT
    - Right of way – to put pole/ lay underground cable
    - Unauthorised colonies – no planned space for infrastructure.

1. Land/ Space Constraints:

1.1 Discoms face severe space constraints for substations, feeders and other associated equipment despite taking several measures to reduce footprint of substations (like GIS, E-House, Package S/stn etc).

1.2 There is rampant encroachment of power infrastructure in many areas leading to reliability, safety and power theft issues.

1.3 A clear land policy is required for space allocation for substations, feeders and associated network equipment (like feeder pillars, distribution boxes etc) in all existing areas based on present load density and future load growth.

1.4 Land policy should specify land requirement for substations and associated network equipment in new developments including electrification of new areas, private development, EV charging stations and all new infrastructure development projects. Any new project should

be cleared only after appropriate land allocation for substations and provision of utility ducts of appropriate size.

1.5 Land Policy needs to incorporate measures to prevent encroachment of power infrastructure.

1.6 Key Considerations for land allocation for 66/11kV & 33/11kV Grids

- 66/11kV or 33/11kV grid is required for serving a load of 35MVA.
- Based on projected peak load, total grids will be required to meet the load.
- Considering the present numbers of grids, additional land will be required for establishment of new grids. Requirement for EV load will be additional.
- Land required for each DISCOM grid will be 2000 Sqm (50 X 40 m). However with emerging technologies, we will try to optimize the land requirement.

1.7 Key Considerations for land allocation for 11/0.4kV Substations

- Considering 1484 sq. Km area of Delhi and projected population of 29.1 million in 2041, the load density will increase which will probably highest in India.
- Typically 1 Nos substation is required for each MW and thus considering demand density in Delhi, around 15,000 substations/Distribution transformers will be required of different voltage levels.
- Requirement will be higher for areas with higher load density.
- Land required for each substation is 60Sqm (12 X 5 m). However with emerging technologies, we will try to optimize the land requirement.

1.8 Land allocation to the concerned Discom need to be ensured in a time bound manner to maintain the reliability and quality of power.

2. Demarcation of Delhi-neighbouring state Border

2.1 Absence of demarcation in Delhi-UP border areas is leading to rampant power theft and high T&D losses in these areas.

2.2 Clear demarcation of Delhi-UP border should be done to differentiate between consumers of Delhi and UP. This will help in reducing power theft in border areas, which is not observed at Delhi-Haryana borders

3. Installation of Smart Meters

3.1 The installation of smart meters is mainly dependent on reliable and widespread coverage of telecom/communication technologies.

3.2 Communication technology constraints are a major hurdle for smart meter rollout.

3.3 RF mesh technology lacks interoperability and same needs to be resolved before rollout of smart meters using this technology.

3.4 Cellular coverage/penetration issues in densely populated/congested areas needs to be addressed before smart meter rollout using cellular communication.

3.5 However, as mentioned earlier at pg 25, smart meters must be installed for all the consumers of Delhi

4. Issues in releasing new connections:

- Occupied Premises where new connections cannot be given
  - Unauthorised colonies – on Govt land
  - Unauthorised colonies – on Agriculture land (still upcoming)
  - Policy for Building Height more than 15/17.5m
    - Discoms in Delhi are facing major issues while processing applications seeking new electricity connections
    - Discoms neither have the statutory right nor the technical wherewithal to verify or certify as to whether the declaration made by an applicant relating to total height of the building is

correct or not. Discoms process the application for new connection on the basis of undertaking tendered by applicant.

- The task of verifying the height may be assigned to a architect registered with the respective municipal body.

5. Electricity Demand vs. Supply Gap from State generation:

5.1 NCT of Delhi has installed capacity of 1971 MW from three gas based plants i.e. Pragati-I, Pragati-III & GT. The current APM gas allocation for the power generation is available for only around ~500MW capacity.

5.2 Delhi having major VVIP areas and the grid security is the utmost priority. But, due to non-availability of APM gas, state generation is not being fully utilized. To ensure the grid security APM gas allocation must be arranged for Delhi.

Other constraints faced by power department

- Infrastructure development work by one agency – affecting safety level/ damaging asset/ asset becoming in-accessible for O&M.
  - Road raise – safety issue as vertical clearance affected.
- Too many assets/ infrastructure going underground – incidence of damage/ inaccessible/ accident
  - Need for U/G space allotment
  - Agency to Plan land usage, issue guidelines, monitor/ allotment/ permission to work, handling of dispute/ damage.
- Safety issue / frequent accidents
  - Illegal construction - Building encroachment
  - Construction beneath/ near existing electricity network
  - Damaging network assets

- Fund Transfer: In-spite of law, Agencies damaging the existing network is not funding revamping/ shifting process.

Ease of Doing Business – Getting Electricity

Ranking of India in Getting Electricity over the years:

Year	2014	2015	2016	2017	2018	2019
Rank*	**137**	**70**	**26**	**29**	**24**	**22**

*The consumer category under study for EoDB ranking are owners of warehouses with sanctioned load of 100-150kW.

India's Performance – Getting Electricity -Doing Business Report, 2020 (DBR 2020)

S. No.	Indicator	DBR 2019	DBR 2020
1.	Rank India (Overall)	77	63
2.	Rank India (Electricity)	24	22
3.	Procedures	3	4
4.	Time	31	53
5.	Cost (% per capita income)	46.4	28.6
6.	Reliability of Supply and transparency of Tariff index*	6	6

Delhi, Mumbai Performance comparison – Getting Electricity -Doing Business Report, 2020 (DBR 2020)

S. No.	Indicator	DBR 2020		
		Best Regulatory Performance	Delhi	Mumbai
1.	Procedures	3	3	4
2.	Time	18	27	82
3.	Cost (% per capita income)	0	46.3 (INR 64,521)	8.6 (INR 11,928)
4.	Reliability of Supply and transparency of Tariff index	8	6	7
i	SAIDI		4.6	2.7
ii	SAIFI		2.6	2.2

Major reforms undertaken by Delhi

I. The nos. of procedure has been reduced from 3 to 2

Earlier the procedure existed for raising the demand note and payment of demand note has not been required now as the demand note is required to be raised in the first bill as per DERC order dt.31.05.2019.

Further, DERC vide order dt.18.12.2020 i.e. called Delhi Electricity Supply Code and Performance Standards (Relaxation) Third order 2020, reduce the number of procedures from three to two for release of Electricity connection the details are as follows:

Procedure 1 : Submission of application along with all documents

Procedure 2 : Field inspection & Energisation of connection

II. Time

For the period to be consider for DBR 2021 (i.e. May 2019 to April 2020),the electricity connections have been provided within 7 days where RoW permission is not required & within 14 days where RoW permission is required by Delhi Discoms.

III. The cost of getting electricity connection

DERC vide order dt.23.10.2019 has reduced the cost for electricity connection for 150kVA consumers from Rs. 25,000/- to Rs. 15,000/-.

For sanctioned load More than 5kW and up to 150kW the cost is (Rs. 3000 + Rs. 500 per kW or per kVA as the case may be for the load beyond 5kW), limited to a maximum of Rs. 15000/-. (This reform has been implemented post DBR-2020 report)

IV. Reliability of Supply:

1. Following steps are required for improvement of reliability of supply (SAIFI & SAIDI) in long term:
   a. Conversion from Overhead to Underground System
   b. Dedicated corridors for laying Electrical network.

Steps taken by DISCOM's to improve SAIFI & SAIDI

Upgraded from the conventional SCADA to Advanced Distribution Management System (ADMS). ADMS is an integrated platform with one user

interface for SCADA, DMS, OMS, GIS, ERP, CRM, FFA and Meter Data Management System (MDMS).

SAIFI- System Average Interruption Frequency Index
SAIDI- System Average Interruption Duration Index

V. Formulation of Dig and Restore Policy

Dig and Restore Policy has been formulated by PWD Department for granting Online Right of Way permission by boarding all the Road owing agency on the single portal i.e. PDM (Plan, Dig & Monitor) software by Delhi Govt.

VI. Government of the NCT of Delhi has notified self certification for DISCOM's installations up to 33 kV in place of 650 V vide notification dated 04.01.2017

VII. Pole mounted transformers capacity enhanced from 250KVA to 500KVA as per CEA gazette notification dated 06.04.2015.

VIII. **Simplification of Documentation for Getting New Electricity connection :** Only 2 documents required i.e. ID proof and ownership proof vide DERC order dated 12.05.2016

IX. Revision of application form for Getting New Electricity connection by removing certificate details of Electrical contractor, Lift inspector & Fire services by DERC order dated 24.04.2017

X. New Connections up to 200 KW sanctioned load to be released at LT voltage level in place of 100KW only previously –Guidelines issued by DERC vide order dated 31.08.2017.

XI. Payment of Demand note for release of electricity connection in first bill for applicants taking supply at LT level vide DERC order dated 31.05.2019.

XII. Mandatory online applications in lieu of offline option for load above 50KVA as per DERC (Supply code and performance standards) Regulations 2017.

Reducing regulatory compliance burden:

1. Deptt. of promotion of Industry and Internal Trade (DPIIT), Govt. of India is Nodal Department for coordinating exercise of minimizing compliance burden on Industries/ business and on citizens. Department of Industries, GNCTD, is nodal agency on behalf of GNCTD

2. Under the initiative, Department have been asked to identify and examine various acts and regulations in the NCT of Delhi with the objective of scrutinizing, reducing and simplifying the existing acts and their relevance and necessity of various compliances. It is to identify further that which regulatory compliances, acts and rules can be repealed, simplified or made online.

3. The Power Department, GNCTD, operates within the ambit of Electricity Act, 2003 (Central Govt. Act). Delhi Electricity Regulatory Commission (DERC) formulates regulations and guidelines for power utilities in Delhi in line with provision of Electricity Act.

4. Thirteen services in consultation with DISCOMs were identified which required compliances from citizens of Delhi and referred to DERC for examining to reduce compliance burden on citizens.

5. Presently only one compliance has been identified for making it online. The reform is as under:

Deptt.	**Burdensome Act/ Rule & Provision**	**Short Description**	**Compliance type**	**Action to be taken Renewals**	**Timeline**
Delhi Electricity Regulatory Commission	Filing of Petitions under Section 142 of Electricity Act 2003 and other than section 142 of Electricity 2003 before the Hon'ble Delhi Electricity Regulatory Commission	DERC adjudicates on Petitions filed under Section 142 and matters other than under Section 142 of Electricity Act 2003	Filing of Petition	Implement e- filing petitions	31.03.2021

On **Disaster Preparedness and Resilience (Chapter Code INF 4 at item 3.1.3 & 3.1.4** reads as under;

3.1.3 Department of Power with support from local bodies and other concerned agencies shall take joint action to ensure electrical safety in identified vulnerable areas in a phased manner, by taking care of elements that cause fire within buildings such as faulty wiring etc. Area level fire safety shall also be ensured especially in the Walled City and urban villages and other dense areas by removal of unsafe overhead wires and cables that hang exposed in streets.

3.1.4 The Delhi Electric Vehicle Policy, 2020 by GNCTD, for promoting electrical vehicles needs to be reinforced with clear guidelines regarding storage, charging, use, and disposal of EV batteries, which are a potential fire hazard.

The comment of Power Department on 3.1.3 has already been covered earlier in the head Power Infrastructure. On 3.1.4, it is to be mentioned that Power Departments has the mandate for charging infrastructure and accordingly, we are working on it. So far 83 nos of Public Charging Stations have been installed and tender for public charging stations on Govt land has been floated.

Annexure-A

Norms for Land Size for different Grids / Substations:

I. GIS (66kV / 33kV)

The guidelines for plot size of GIS substations were framed vide minutes of meeting dated 12.09.2016. The guidelines are as under:

- 50m x 30m
  (Two side open and rectangular plot. Right of Way of 6m required)

- 55m x 30m
  (One side open (longer side of plot). Rectangular plot. Right of Way of 12m required)

- 40m x 50m
  (One side open (Shorter side of plot). Rectangular plot. Right of Way of 12m required)

- In case of irregular shaped plot or no parallel road to plot, the plot size will be decided on the basis of joint inspection of officials of DDA & DISCOMs.

II. DDA order dated 09.09.2003 for Air insulated Sub Stations:

- 185m x 160m : Plot size for 220kV sub stations.
  Size can be further reduced if 33kV / 11kV not required.

- 95m x 90m : Plot size for 66kV sub stations.

- 60m x 45m : Plot size for 33kV sub stations.

- 10m x 8m : Plot size for 11kV sub stations.

III. Reference for 11/0.4 kV DT Substation space requirement

- Clause 6(4) of Chapter on schedule of charges of DERC Supply Code 2017 read with amendments
- SDMC Circular dated 30.03.2017 regarding provision of substation space.

- MNRE Phase - II rooftop program is applicable to residential consumers only. The discovered cost in the recent Delhi tender under CAPEX mode is

Sr. No	Part	Category	Discovered rates	Subsidy Applicable as per MNRE
1	Part A	1-3kWp	₹37,000 per kWp	40% of Project Cost
2	Part B	3-10kWp	₹37,000 per kWp	up to 3 KW – 40% > 3 kW – 20%
3	Part C	10-100kWp	₹37,790 per kWp	up to 3 KW – 40% > 3 kW and upto 10 kW – 20% > 10 kW – 0%
4	Part D	Above 100-500kWp	₹33,931 per kWp	
5	Part E	1-3 kWp (with elevated structure)	INR 37000 /kWp with 1 m structure and INR 1100 per kW per m for additional structure upto 3 m	40% of Project Cost

- The discovered tariff in the recent Delhi tender under RESCO mode is

Sr. No	Part	Category	Discovered tariff
1	Part A	25-100 kWp	₹3.09 per kWh
2	Part B	100-500 kWp	₹3.41 per kWh
3	Part C	25-100 kWp (with elevated structure of 3 m)	₹3.99 per kWh
4	Part D	100-500 kWp (with elevated structure of 3 m)	₹3.91 per kWh

*As per terms and conditions of MNRE Grid Connected Rooftop Solar Program (phase II) for Residential category consumers

MNRE's CENTRAL FINANCIAL ASSISTANCE SUBSIDY

Installations in Residential Sector Subsidiary	Central Financial Assistance of project cost
Up to 3 kWp capacity	40 %
Above 3 kWp capacity and up to 10 kWp capacity*	40 % up to 3 kWp plus 20% for Roof Top Solar system above 3 kWp and up to 10 kWp
Group Housing Societies/Residential Welfare Associations (GHS/RWA) etc.	20 % (limited to 10 kWp per house with a maximum limit of 500 kWp)

*The residential sector users may install RTS plant of even higher capacity however, the Central Financial Assistance will be limited up to 10 kWp capacity of Roof Top Solar plant.

72/c

GOVT. OF NCT OF DELHI
DEPARTMENT OF POWER
8th Level, 'B' Wing, Delhi Secretariat,
I.P. Estate New Delhi.

No:F.11/99/2015/Power/ 4008 Dated: 12-9-2016

Minutes of the meeting held under the Chairmanship of Spl. Secretary (Power), GNCTD on 12.09.2016 at 03.00 p.m. to discuss the size of plot to be allotted to Discoms by DDA for setting up of 66KV and 33KV Sub-station.

The meeting was held under the Chairmanship of Spl. Secretary (Power) on behalf of the Secretary (Power). The list of officers of Delhi Govt., DDA, DTL and Discoms who attended the meeting is at Annexure-A.

1. The Chief Engineer (Elect.), DDA informed that the proposals for allotments of land for establishment of 66KV & 33KV Grid Sub-Stations based on GIS technology are under consideration of DDA. He requested that uniformity in land requirement may be arrived at by the Discoms.

2. Accordingly, the officers of DTL and Discoms deliberated upon the minimum requirement of land alongwith available ROW and recommended the following requirements:

   i) Plots where roads are available on two sides and plot is rectangular in shape

   Land requirement : 50m x 30m
   The right of way of six meters would be required.

   ii) Plot where road is on the longer side of the plot, which is rectangular in shape.

   Land requirement : 55m x 30m
   The right of way of 12 meters would be required.

   iii) Where road is on the shorter side of the plot

   Land requirement : 40m x 50m
   The right of way of 12 meters would be required.

   iv) In case of ir-regular shapes of plots or where road is not parallel to the dimensions of the plot, a joint inspection shall be conducted by the concerned Discom with DDA to decide the suitability of the plot size and right of way.

The meeting ended with vote of thanks to the Chair.

12/9/16.
(Chandan Sengupta)
Dy. Secretary (Power)

Copy to:

1. Vice-Chairman, DDA, Vikas Sadan, INA, New Delhi.
2. Managing Director, Delhi Transco Ltd., Shakti Sadan, Kotla Road, New Delhi
3. Managing Director, IPGCL/PPCL, Himadri, Rajghat Power House, New Delhi-110002.
4. Chief Engineer (Elect.), DDA, D-3/4 Vasant Kunj, New Delhi.
5. Director (Opr), Delhi Transco Ltd., Shakti Sadan, Kotla Road, New Delhi
6. The Chief Executive Officer, BRPL, BSES Bhawan, Nehru Place, New Delhi.
7. The Chief Executive Officer, TPDDL, Hudson Lane, Kingsway Camp, Delhi.
8. The Chief Executive Officer, BYPL, Shakti Kiran Building, Karkardooma, Delhi-110092.

Copy for information to:

1. PS to Secretary (Power)
2. PS to Spl. Secretary (Power)

DELHI DEVELOPMENT AUTHORITY
OFFICE OF THE CHIEF ENGINEER (ELECT.)
D-4 VASANT KUNJ, NEW DELHI-70

F. 2(1)/CE/Elect./DDA/2003/ 1 1 2-

Dated: 9.9.2003

To:

1. Shri S.R. Sethi, Director (Tech.)
   Delhi Transco Ltd.,
   Shakti Sadan, Kotla Road,
   New Delhi.

2. Shri V.D. Aple,
   General Manager (TS & CMG),
   NDPL, Hudson Lane,
   New Delhi

3. Sh. A.T. Tamankar,
   Chief Engineer (Plg.),
   BRPL/BYPL, BSES Bhawan,
   Nehru Place, New Delhi.

Sub: Size of land required for sub-stations.

Sir,

The size of plot demanded for establishing 220 KV/66 KV/33 KV/11 KV Sub Stations are on higher side as quite a substantial part of it remains unutilized. The land being scarce in Delhi, it is desirable that land is demanded only to the extent it is required. A study has been conducted along with Central Electricity Authority and it is seen that it is possible to reduce plot sizes as under:

1.	220 KV Sub-Stations.	-	185M x 160M (size can be reduced further if 33 and 11 KV levels are not required.)	
2.	66 KV Sub-Stations	-	95M x 90M	8550 Sq.M
3.	33 KV Sub-Stations	-	60 M x 45 M	2700 Sq.M.
4.	11 KV Sub-Stations	-	10M x 8 M	80 Sq.M

The sizes indicated above are supposed to be maximum size required for establishing sub-stations at different levels. Possibility of reducing the sizes further may be examined at your end and demand for land in future be raised accordingly.

Yours faithfully,

[S.K. SINHA]
CHIEF ENGINEER (ELECT.)

Copy to:

1. OSD to VC for information of the latter.
2. Engineer Member, DDA
3. Commissioner (Plg.), DDA
4. Chief Architect, DDA
5. Commissioner (LD), DDA
6. Commissioner (LM)-I & II.
7. Project Manager (Elect.)/Dwarka
8. SE (Elect.), Circle-2 & 3.

CHIEF ENGINEER (ELECT.)

दिल्ली ट्रांसको लिमिटेड
(राष्ट्रीय राजधानी क्षेत्र दिल्ली सरकार का उपक्रम)
पंजीकृतकार्यालय: शक्तिसदन, कोटलारोड, नईदिल्ली -110002

DELHI TRANSCO LIMITED
(A Govt of NCT of Delhi Undertaking)
Regd office : Shakti Sadan, Kotla Road, New Delhi – 110 002
CIN: U40103DL2001SGC111529

No. F.DTL/202/Oprns.plg/DGM(Planning)/20-21/F-18/46 Dated: 16.12.2020

Vice Chairman
Delhi Development Authority
Vikas Sadan, INA
New Delhi-110023
Email:- vcdda@dda.org.in

Subject: Perspective Plan for Power Transmission Services for Delhi-2041 (MPD-2041).

Respected Sir,

This is in reference to your letter no. F.18 (7)2018-MPD-159 dt. 16.07.2020, regarding preparation of perspective Plan for Power Transmission Services for Delhi-2041 (MPD-2041.

In this context, DTL has attended various meeting earlier for "POWER" Base lining Group for MPD-2041 organized by DDA. During these meeting, DTL has presented "Norms/infrastructure/challenges etc. of Transmission Network.

For the preparation of perspective plan for Delhi power transmission network, a load growth around 4% for developed area, 2% for NDMC area and 7% developing area like Dwarka has been considered. Further, the areas which are going to be developed under DDA land pooling policy, a thumb rule being practices in Power sector, for catering power requirement for 16-20L urban population, 1 no. 400k220kV substation and 3 nos. 220kV substation has been considered for ensuring the system reliability.

Accordingly, a DDA zone wise perspective plan for Power Transmission Services for Delhi-2041 (MPD-2041) has been prepared and enclosed herewith. The downstream network (66kV, 33kV, 11kV) as Power Distribution Services for Delhi is required to be provided by the concerned DISCOMs of Delhi.

Pankaj

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दिल्ली ट्रांसको लिमिटेड
(राष्ट्रीय राजधानी क्षेत्र दिल्ली सरकार का उपक्रम)
पंजीकृतकार्यालय: शक्तिसदन, कोटलारोड, नईदिल्ली -110002

DELHI TRANSCO LIMITED
(A Govt of NCT of Delhi Undertaking)
Regd office : Shakti Sadan, Kotla Road, New Delhi – 110 002
CIN: U40103DL2001SGC111529

The summary of perspective plan for Power Transmission Services for Delhi-2041 (MPD-2041) as under:-

Voltage Level	No. of Existing substations	No. of proposed substations (under pipeline or execution)	No. of proposed substations (MPD-2041)	Associated ROW requirement
765kV	01	01	02	67m ROW for overhead (O/H) Transmission line (T/L)
400kV	07 (including Mandola)	03	09	52m ROW for overhead (O/H) Transmission line (T/L)
220kV	41	04	37	35m ROW for O/H T/L or 2x2 mtr for U/G Cable.

In view of the above, it is requested to earmark/allocate land/ROW in Master Plan of Delhi-2041 as per DTL perspective plan for establishment of Power transmission infrastructure (enclosed).

Thanking you.

Enclosures:- as above

Pankaj 16/12/2020

(Pankaj Kumar Vijay)
Dy. General Manager (Planning)

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Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - A

Sr.	Existing 400/220kV substation	voltage level	Requirement for MPD 2041	Tentative Area required (In Sqm)	Requirement by the Year	Remarks
1	NIL No ESS in this zone.	-	-			
2		220/33KV Installed capacity 400MVA	Asaf Ali road (Walled city)	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2027	This will provide power to new Delhi railway station, Delhi Metro Rail and upcoming multi story developments.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - B						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	Dev Nagar (Karol Bagh)	220/33kV	Under Construction			
2		400/220/33KV	IARI Pusa/Dev Nagar	200 x 200 sqmtr (40000 Sqm)	. 2025	All existing 400kV substation in Delhi are at the outer part of Delhi. Due to non availability overhead corridor, power is being transmitted through underground cables. The 220kV underground cables have the limitations of shorter length and power carrying capacity. Therefore, a strong source of 400kV level has become the urgent requirement in central part of Delhi. IARI PUSA are seems that 400kV substation can be established for power requirement of central Delhi.

3.		220/33KV (400MVA)	Kirti Nagar	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2032	This proposed ESS is required to meet the load growth of existing area.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE – C						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	Sabji Mandi	220/33kV	Existing			
2.	Sanjay Gandhi Transport Nagar (SGTN)	220/66kV				
3.	Gopal Pur	220/66-33kV				
4.	Timar Pur	220/33kV	Under Construction			
	Gopal Pur	400kV	Up-gradation is under tendering			
New proposal to be included in MPD-2041						
1		220/33KV (400 MVA)	Azad Pur	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2031	This substation will be required to cater the natural growth of nearby area and will provide the relief to existing Gopal Pur (33kV level) and Sabji Mandi Area

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE – D

Sr.	Existing 400/220kV substation	voltage level	Requirement for MPD 2041	Tentative Area required (In Sqm)	Requirement by the Year	Remarks
1	Electric Lane (Harish Chandra Mathur Lane)	220/33KV		-	-	
2.	Lodhi Road	220/33KV				
3.	Park Street	220/66-33kV				
4.			Sarojini Nagar	10000 Sqmtr	2023	NDMC is in process of Redevelopment of General Pool residential Accommodation (GPRA) colony at Netajee Nagar, Nauroji Nagar & Sarojini Nagar through NBCC. NBCC has earmarked a piece of land for establishment of 220kV substation.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE – E						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	Harsh Vihar (East of Loni Road)	400/220/66KV	**Existing substation**			
2.	Patparganj	220/66-33kV				
3.	Gazipur	220/66kV				
4.	Preet Vihar	220/33kV				
5.	Geeta Colony	220/33kV				
New proposal to be included in MPD-2041						
1.		220/33KV	Dwarka Puri/Shahdara/Welcome colony	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	**Immediate**	This proposed substation has been planned for future development to meet the industrial and residential load growth around Shahdara, Welcome Colony, Seelam Pur, Jafrabad etc.
2.		220/66KV	GTB Hospital/Dilshad Garden/ Nand Nagri	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2025	This proposed substation has been planned for future development to meet the industrial and residential load growth around Jhilmil, Dilshad Garden, Nand Nagri etc.

3.		400/220 kV	Geeta Colony	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2025	DDA may allot an area near existing 220kV DTL Geeta Colony substation from where 440kV transmission line can easily be connected. Therefore, no separate corridor for 400kV Transmission line is required.
4.		220/33kV	Mayur Vihar	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2027	This proposed substation is for future development to meet the industrial and residential load growth around Mayur Vihar area.
5.		220/66kV	Yamuna Vihar/Loni Road	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2038	This proposed substation is for future development to meet the industrial and residential load growth around Yamuna Vihar area.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE – F						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	Masjid moth	22/330KV	**Existing**			
2	AIIMS	220/33KV				
3.	Sarita Vihar	220/66kV				
4.	RK Puram	220/66-33kV				
5.	Vasant Kunj	220/66kV				
6.	Okhla	220/66-33kV				
7.	Tuglakhabad	400/220/66kV				
8.	Ridge Valley	220kV				
9.	BTPS	220/66kV (480 MVA)	**Under tendering (66kV level)**			
New proposal to be included in MPD-2041						
1.		400/220kV	Near Sarita Vihar/BTPS	200 x 200 Sqm (40,000 Sqm)	2032	To meet the long term load requirement of south Delhi area.
2.		220/33KV (300MVA)	Nehru Place	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	**Immediate**	The location has already been earmarked by DDA for establishment of 220/33kV ESS but land has not been handed-over to Power Deptt/DTL yet.

3.		220/33KV (300MVA)	Malviya Nagar	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2027	During recent communication with DDA has informed that there is earmarked plot for ESS of area of about 3100 Sqmtr in Malviya Nagar. After going through the DDA offer, the plot size is not sufficient. Therefore, it is requested to increase the plot size or earmarked sufficient area for 220kV ESS at near by area.
4.		220/66KV (480 MVA)	West of JNU	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2036	**This ESS** will provide relief to existing 220KV ESS (Vasant Kunj), and will help to manage the load growth. **DDA may kindly earmark an area near Priya PVR area, for easy evacuation of power.**
5.		220/66KV (480MVA)	Jasola	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2038	**This ESS** which will provide relief to existing 220KV ESS (Sarita Vihar and Okhla) and upcoming BTPS and will help to manage the load growth. **DDA may kindly earmark an area near Okhla waste to power generation plant.**

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE – G						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	**Peeragarhi**	220/33KV	**Existing**			
2.	**DIAL**	220/66 kV				
3.	**Naraina**	220/33KV				
4.	**Budella**	220/66kV	**Under tendering**			
New proposal to be included in MPD-2041						
1.		220/33KV (400MVA)	Punjabi Bagh	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	**Immediate**	**This ESS is top priority**, to meet the load growth of the area, a 220KV ESS implementation is a must. **DDA may kindly earmark an area near the road crossing of MG road and Vashisht Kumar Gulla marg (vacant land), for easy evacuation of power.**
2.		220/66kV	Aero City	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2025	**To cater the load growth of commercial hub around airport**
3.		220/33KV (400MVA)	Janakpuri (Pankha road)	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2029	This will provide relief to Panjabi Bagh & existing Naraina ESS and will help to manage load growth. **DDA may kindly earmark an area between C3 road and C2 park (vacant land), for easy evacuation of power.**

4.		220/33KV (400MVA)	Hari Nagar/ Pratap Nagar	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2041	This will provide relief to existing Papankalan-I & Naraina ESS and will help to manage load growth up to 2021 & beyond. **DDA may kindly earmark an area near bus depot at Pratap nagar (<u>vacant land</u>), for easy evacuation of power.**

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - H						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1.	Rohini-I	220/66kV	**Existing**			
2.	Wazirpur	220/33kV				
3.	Peera Garhi	220/33kV				
New proposal to be included in MPD-2041						
1.		220/66KV (520MVA)	Rohini sector -1	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2038.	This will provide relief to existing Rohini ESS and will help to manage load growth up to 2041 & beyond. **DDA may kindly earmark an area near the existing NDPL grid in this sector.**
2.		220/33KV (400MVA)	Ashoka Vihar	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2029	This will provide relief to existing Shalimarbagh and Wazirpur ESS and will help to manage load growth up to 2041 & beyond.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - J						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	**Mehrauli**	220/66kV	**Existing**			
New proposal to be included in MPD-2041						
1.		**765/400/ 220KV**	Mandi Village	400 x 400 Sqm (160,000 Sqm)	2030	One 765KV ESS is required to meet the load growth of South Delhi, which will provide grid power to existing and proposed 400KV ESS. This proposed substation is planned at Mandi Village. **This substation is required for major source of power supply to new developing as well as existing area at the South boundary of Delhi. DDA is also requested to provide RIGHT of WAY for 765KV overhead double circuit in feed for this proposed 765KV ESS from existing Agra-Jhatikara 765kV transmission Line.**
2.		**400/220/ 66kV**	Rang Puri	200 x 200 Sqm (20,000 Sqm)	2027	To provide the 220kV source to Vasant Kunj and future load growth of near by area.
3.		220KV	Maidan Garhi	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2024	This will provide relief to existing Mehrauli & Okhla ESS and will help to manage load growth up to 2021 & beyond **The location may be earmarked by DDA near/beneath DTL 220kV Mahrauli-Tuglakhabad overhead Line.**

4.		220KV	Aya Nagar	10000 Sqmtr	2028	This will provide relief to existing Mehrauli ESS and will help to manage load growth up to 2021 & beyond. Further DTL has no 220KV ESS in this South area to cater to the future load growth.
5.		220KV	Fatehpur beri /Asola	10000 Sqmtr	2032	This will provide relief to existing Sarita Vihar & Okhla ESS. Load growth up to 2021 & beyond will be very difficult to meet without this proposed substation. DDA may kindly earmark an area near Tuglakabad industrial area.
6.		220KV	Bhati Mines	10000 Sqmtr	2038	This will provide transformation capacity to meet the load growth of this extreme south corner of Delhi.

ZONE - K - I						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	**Najafgarh**	220/66kV	**Existing**			
New proposal to be included in MPD-2041						
1.		220KV	Bakkarwala	10000 Sqmtr.	2027	DDA may earmark an area to meet the load growth due to new residential colonies like Lok Nayak Puram and other industrial developments are also proposed in this area. **It will much better, if an area may kindly be earmarked near Pocket-C of Lok Nayak Puram (vacant land), for easy evacuation of power, as the area is closer to existing 220KV EHV overhead line.**
2.		**220kV**	Dichoan Kalan	10000 Sqmtr	2036	**This 220kV ESS will be required for long term load requirement.**

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE – K – II						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1.	Bamnauli	400/220kV	**Existing**			
2.	Papankalan- I	220KV				
3.	Papankalan-II	220KV				
4.	Papankalan-III	220KV				
5.	Dwarka Sector-5	400/220kV	**Under Execution (400kV level)**			
6.	Bharthal	220/66kV	**Under Tendering**			
New proposal to be included in MPD-2041						
1.		220/66KV	Dwarka Sector-23	Being the land scarcity in the area, minimum area required 7000 Sqmtrs	2034	The load growth is very in this zone. Therefore, this ESS will be required to cater the load in long term.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - L						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1.	Jhatikara	765/400KV	**Existing**			
2.	Tikri Kalan	400/220/66 KV				
New proposal to be included in MPD-2041						
1.		400/220/66 KV	Jhatikara	200 x200 Sqmtr.	2023	**This zone has been notified to develop under DDA landpooling scheme. These substations are required to cater the load of proposed to be developed under landpooling scheme. Further, DDA is requested earmarked the RoW for 400kV and 220kV overhead transmission lines.**
2.		400KV	Mitraon	200 x200 Sqmtr..	2036	
3.		220KV	Mundela Khurd	10000 Sqm	2040	
4.		220KV	Chawala/Tej Pur	10000 Sqm	2030	
5.		220KV	Dhansa			

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - M						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	**Rohini-2**	220/66KV	**Existing**			
New proposal to be included in MPD-2041						
2		400/220/66KV	Barwala, Sector-37	200 x 200 Sqm (40,000 Sqm)	2026	This will meet the demand of land pooling area of Zone-N and growing demand of Rohini area.
3.		220KV	Begampur	Being the land scarcity in the area, minimum area required 7000 Sqmtrs.	2034	No area has been earmarked at this area, but the load growth of residential colonies of sector-21, 22,41, Begampur, pratap vihar and other developments are also to be met through this proposed ESS. So, DDA may kindly be requested to allot an area in this zone, positively to meet the load. **It will much better, if an area may kindly be earmarked near existing 66KV ESS at Sector-22 Rohini (vacant land), for easy evacuation of power, as the area is closer to existing 220KV EHV overhead line.**

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - N

Sr.	Existing 400/220kV substation	voltage level	Requirement for MPD 2041	Tentative Area required (In Sqm)	Requirement by the Year	Remarks
1.	Kanjawala	220/66kV	**Existing**			
2.	765kV Narela	**Under Planning ISTS**				
New proposal to be included in MPD-2041						
1.		400KV	Chandpur	200 x 200	2033	Already earmarked in MPD 2021
2.		220KV	Nizampur	10000 Sqm	2036	DDA may allot an area near Daryapur / Bazidpur to cater to the proposed Kanjhaala industrial area.
3.		220KV	Qutub Garh	10000 Sqm	2041	DDA may allot an area near nizampur to cater to the proposed Kanjhaala industrial area also DTL do not has any 220Kv ESS at this western area to cater to the load growth.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - O						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1	Wazirabad	220/66KV	**Existing**			
2.	Kashmiri Gate	220/33kV				
3.	Rajghat	220/33kV				
4.	IP Power	220/33kV				
5.	Pragati Power	220/66kV				
6.	Maharani Bagh	400/220/66-33kV	**400/220 kV is existing and creation of 66kV 33kV Level is under tendering**			
7.	IP Power	400kV	**Up-gradation of existing 220kV will be done in due course of time.**			
New proposal to be included in MPD-2041						
1.		220/66KV	Karawal Nagar/Sabha Pur (beneath of existing DTL 220kV overhead transmission line)	100 x 100 (10000 Sqmt)	2028	DTL do not has any ESS on this North Part of Delhi, only one distribution substation of BYPL is there. To meet the load growth of Soniya Vihar, Karawal Nagar, Sabha Pur, Shiv vihar etc area, an area may be earmarked for future developments along the Pusta & beneath of existing DTL 220kV overhead transmission line (Mandola-Wazirabad-two lines). So that, no separate corridor could be required of connectivity to this.

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - P – I						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
1.	Bawana	400/220/66kV	**Existing**			
2.	Narela	220/66kV				
3.	Tikri Kurd	400/220/66kV	**The project is proposed to be commissioned by Year 2023 on land allocated by DDA.**			
4.	DSIIDC Bawana	220/66kV	**Existing**			
New proposal to be included in MPD-2041						
1		220/66KV (480MVA)	Holambi Kalan	100 x 100 (10000 Sqmt)		DDA may allot an area near Holambi Kalan to cater to the industrial area also with 35 Mtr RoW corridor for overhead transmission Line as this area has under development.
2.		220/66KV (480MVA)	Budhpur	100 x 100 (10000 Sqmt)		DDA may allot an area near Budhpur to cater to the industrial area around sirsapur, budhpur, Chandpur etc to cater to the load growth.
3.		220/66KV (480MVA)	Bankner village			DDA may allot an area near Bankner to cater to the industrial area around DSIIDC Bawana and Narela etc to cater to the load growth of residential areas around this location. **If possible DDA may allocate a land near Bankner village area, just beside the existing 220KV EHV line.**

Perspective Plan for Power Transmission Services (765/400/220 kV) for Delhi MPD 2041

ZONE - P - II						
Sr.	**Existing 400/220kV substation**	**voltage level**	**Requirement for MPD 2041**	**Tentative Area required (In Sqm)**	**Requirement by the Year**	**Remarks**
	Nil					
New proposal to be included in MPD-2041						
1.		765/400/220KV	Palla Village	400 x 400 Sqmtr (160,000 Sqm)	2041	This area has been notified to develop under DDA landpooling scheme. This substation is required for major source of power supply to new developing as well as existing area at the North boundary of Delhi. DDA may allot the land near to the Yamuna bank and border of Delhi.
2.		220KV	Burari	100 x 100 (10000 Sqmt)	2026	Load demand of Nathhu Pura, Burari, Sant Nagar is growing in rapid rate. This substation will provide the relief to existing Gopal Pur substation. DDA may allot the land near DTL existing lines. Note:- Although the location has been earmarked in MPD 2021
3.		220KV	Mukhmel Pur Village	100 x 100 (10000 Sqmt)	2032	This area has been notified to develop under DDA landpooling scheme. DDA may allot the land near DTL existing lines Note:- Although the location has been earmarked in MPD 2021
4.		220KV	Mohmad Pur village	100 x 100 (10000 Sqmt)	2041	**This area has been notified to develop under DDA landpooling scheme. DDA may allot the land near DTL existing lines**