Addendum-2 to the master plan to make Chandigarh a Solar City

Prepared for

Chandigarh Renewable Energy Science and Technology Promotion Society (CREST) Chandigarh

Project Report No. 2008RT03

The Energy and Resources Institute

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Addendum-2 to the master plan to make Chandigarh a Solar City

Introduction

The Master Plan for Solar City is a dynamic document meant to change with time, experience, and need. TERI prepared the master plan to make Chandigarh a solar city and submitted the final master plan to Chandigarh Renewable Energy Science and Technology Promotion Society (CREST) in July 2009. The development of master plan has benefited from the active participation of CREST, Public Works Department, Municipal Corporation UT, Chandigarh Administration, Municipal Water Supply Department, Forest Department, power utilities, electricity department of Chandigarh Administration; and other agencies with energy-related responsibilities.

The whole exercise of developing a Master Plan for making Chandigarh a solar city has been a collaborative endeavour along with all the major stakeholders in the city. Developing the city as a solar city requires an integrated urban planning approach, which simultaneously involves reducing reliance on fossil fuels by the application of energy conservation and efficiency measures and by replacing/complementing the conventional energy generation with the renewable energy. As decided in the beginning, this exercise did not include the industrial and transport sectors. The Master Plan has been developed on the basis of different energy saving and renewable energy options, along with those technological options that are feasible in long term only.

The key components of the study comprised

- Sector wise baseline energy consumption scenario,
- Energy planning (Sector wise)
  - Energy use projections
  - Energy efficiency measures and audit
  - Utilization of available renewable energy sources and
- Action Plans for development of solar city

Action plan clearly indicates various activities to be carried out for the development of Chandigarh as solar city with the short-medium and long term targets of energy conservation and the renewable energy development. The budgetary estimates for CREST have also been provided for the implementation of the master plan.

The master plan has been approved by the Chandigarh administration and the development activities have started based on the suggestions given in the master plan.

As Ministry of New and Renewable Energy (MNRE) is the central government agency responsible for the promotion of development of master plan for solar cities and for monitoring the progress towards this, it organises the review meetings regularly at certain intervals. In the meeting held at New Delhi on 13 April 2010 the status of various solar city's master plan were discussed and the Chandigarh being the model solar city it has been proposed that the master plan shall also include Bureau of Energy Efficiency (BEE) plan for Chandigarh and the action plan is to specify sources and pattern of funding.

In this regard the addendum-1 to the master plan is prepared which included the BEE's energy efficiency plan for Chandigarh with a comparison to the energy saving potentials estimated in the master plan with that of BEE.

On August 25, 2010, a review meeting for solar cities was held at the office of Punjab Energy Development Agency, Chandigarh. During this meeting it was suggested that the solar city master plan shall contain few pilot renewable energy projects to be installed in the city.

In the 2nd meeting of the committee constituted under the chairmanship of Shri Tarun Kapoor, Joint Secretary, MNRE regarding evaluation and acceptance of the Master Plans held at New Delhi on January 4, 2011 the final status of various solar city master plans were discussed. It was proposed that the master plan shall include list of buildings of government offices/institutions where UT administration desires to install SPV systems and where roofs tops are available, list of existing projects/systems of renewable energy, and details of bye-laws made by municipal corporation/local government in respect of renewable energy application, energy efficiency, green buildings etc.

In this regard this addendum to the master plan is prepared to accommodate the details as discussed during meetings held on August 25, 2010 and January 4, 2012.

Key renewable energy projects identified for Chandigarh City

Solar photovoltaic project

1. 5 MW grid connected SPV project at landfill site in Chandigarh

The landfill site has an area of about 45 acres. The 5 MWp capacity grid connected SPV power plant in this site could be installed covering the area of about 14 acres only and may annually produce approximately 8000 MWh of electricity.

2. 10 MW Rooftop SPV power systems in Residential and commercial sector of Chandigarh covers 73.9 km² area in the city out of total area of 114 km². Roof top solar PV based grid connected system may be quite feasible in the city. It has been observed that the commercial building, Government buildings, markets etc. have very large roof areas which are not being used. Following are the potential range of rooftop SPV systems that could be installed in various buildings depending on the available roof areas.

- Residential buildings (up to 10 kW systems)
- Commercial buildings (5 to 50 kW systems) such as Market complexes of all sectors
- Government office buildings (5 to 50 kW systems) like
  i. Additional Town Hall Building
  ii. Town Hall Building
  iii. Estate office
  iv. UT Municipal Corporation Office
- Institutions (up to 100 kW systems)
  i. Government Medical College and Hospital, Sector-32
  ii. Government Engineering College, Punjab University
  iii. General Hospital Sector-16
  iv. Chandigarh College of Architecture, Sector-12
  v. Other colleges and schools

A study on the potential for rooftop SPV system in the Additional Town Hall (ATH) building is given below.

Roof top SPV system in the Additional Town Hall building

The ATH building is located in the Sector 17 C of Chandigarh. It has been observed that the monthly electricity consumption of the building id about 3000 kWh. The total roof top area of the building is approximately 900 m² (Figure 1). Assuming that the 70% is the utilisable area for setting up the rooftop SPV systems an analysis has been made to estimate the potential SPV capacity that could be installed in the rooftop and the estimation of energy generation.

Figure 1: Picture of the roof top of ATH building

It has been estimated that the grid connected rooftop SPV of 60 kW with area requirement of approximately 575 m² capacities could be installed in the roof of the ATH building, which may produce 84.95 MWh of electricity annually. So the installed rooftop PV may easily meet the annual building energy requirement of about 36 MWh and the remaining amount may be supplied to the grid.

2. Solar powered street lights and fountains in
   - Botanical Garden
   - Bougainvillea Garden
   - Rajendra Park
   - Rock Garden
   - Shivalik Garden
   - Rose Garden
   - Shanti Kunj
   - Leisure Valley and others

3. 25 MW grid connected SPV project at Patiala ki Rao

The 25 MW grid connected SPV power project may be developed in the PPP mode. Chandigarh Administration may invite proposals from the private sectors for the development and investment in the 25 MW SPV project at Patiala ki Rao area.

List of government offices and institutions where SPV systems can be installed

Following is the list of buildings where shadow free roof tops are available and SPV systems can be installed as desired by the UT Administration.

Sl. No.	Name of the building
1.	Model Central Jail, Burail, Sector 45,Chandigarh
2.	Govt. Sr. Sec. School, Sector 46, Chandigarh
3.	Judges House, Sector 19, Chandigarh
4.	Paryawaran Bhawan, Sector 19 Chandigarh
5.	PEC University of Technology, Sector 12, Chandigarh
6.	Govt. Medical College & Hospital, Sector 32, Chandigarh (Block A, B & C)
7.	Govt. Medical College & Hospital, Sector 32, Chandigarh (Hostel Complex)
8.	Chandigarh College of Engineering & Technology, Sector 26, Chandigarh
9.	Govt. College for Girls, Sector 11, Chandigarh
10.	Govt. College of Men, Sector 11, Chandigarh
11.	Home Science College, Sector 10, Chandigarh
12.	Govt. Multi-Specialty Hospital, Sector 16, Chandigarh
13.	Additional Town Hall Buildings, Sector 17, Chandigarh
14.	Town Hall Building, Estate Office, Sector 17, Chandigarh
15.	UT Municipal Corporation Office, Chandigarh
16.	Govt. College, Sector 46, Chandigarh
17.	Govt. College for Girls, Sector 42, Chandigarh
18.	Industrial Training Institute, Sector 28, Chandigarh
19.	Police Stations and Police Line
20.	Chandigarh College of Architecture, Sector 12, Chandigarh
21.	Govt. Central Crafts institute for Women, Sector 11, Chandigarh
22.	Govt. Polytechnic for Women, Sector 10, Chandigarh
23.	Govt. College of Arts, Sector 10, Chandigarh
24.	UT Guest House, Sector 6, Chandigarh

The DPR for few pilot projects as listed below have been prepared which can be approved under the Solar City scheme.

Sr. No.	Name of the site	Capacity (KW)	Project cost (in crore)
1.	Model Central Jail, Burail, Sector-45, Chandigarh	100	2.50
2.	Govt. Sr. Sec. School, Sector-46, Chandigarh.	50	1.25
3.	Judges House, Sector 19, Chandigarh.	10	0.29
4.	Paryawaran Bhawan, Sector-19, Chandigarh	50	1.10
	Total		**5.14**

List of existing renewable energy installations in Chandigarh

Chandigarh Administration has been working proactively in promoting renewable energy and energy efficiency systems. Few systems already implemented in the city are listed below.

a) List of already installed SPV power projects

Sr. No.	SPV solar power plant	Size/ Capacity	Tech.	Date of Commissioning	Cost (approx.)	Name of scheme & implementing agency
1.	Judicial Academy, Sec 43, Chd.	50 KW	SPV	June, 2008	175 lac	SPV Power Plant (Pb.)
2.	PEDA Office, Sec 33D, Chd.	25 KW	SPV	Aug. 2003	76 lac	SPV Power Plant (Pb.)
3.	Punjab Mini Secretariat, Sec 9, Chd.	50 KW	SPV	Feb. 2000	190 lac	SPV Power Plant (Pb.)
4.	Punjab Raj Bhawan, Chd.	45 KW	SPV	July 2011	87 lac	SADP (Pb.)
5.	Punjab Civil Secretariat, Chd.	10 KW	SPV	Under installation	24 lac	SADP (Pb.)
6.	Punjab Haryana Assembly, Chd.	12 KW	SPV	Under installation	22 lac	SADP (Pb.)

b) List of already installed SPV street lighting systems and state level energy parks

Sr. No.	SPV street lights & state level energy park	Size/ capacity	Tech.	Date of commissioning	Cost (approx.)	Name of scheme & implementing agency
1.	SPV street lights	422 Nos	SPV	2007-08 to 2011-12	89 lac	Deptt. Of Sci. & Tech., UT. Chd
2.	State level Energy Park	1 No.	SPV Power Plant + Solar Water Heating Systems + Biogas etc. for demonstration	Under comm-issioning	132 lac	Under SADP

c) List of already installed Solar Water Heating (SWH) systems

Sr. No.	Solar water heating system	Size/ capacity	Tech.	Date of commissioning	Cost (approx.)	Name of scheme & implementing agency
1.	Punjab Raj Bhawan	2000 LPD	FPC	July. 2011	4.8 lac	SADP (Pb.)
2.	Punjab Civil Secretariat	520 LPD	FPC	Nov. 2011	1.10 lac	SADP (Pb.)
3.	Housing Complex, Sec 49, Chd	40000 LPD	FPC	Sep. 2006	80 lac	Housing Board Chd. (Self-finance)
4.	CM Residence Punjab at Chandigarh	500 LPD	FPC	July, 2008	1.10 lac	PEDA (own funds)
5.	Dr. Ambedkar Institute of Hotel Management Catering and Nutrition, Chandigarh	4000 LPD	Flat FPC	2010-11	9.94 lac	Under Solar Thermal Extension Programme (STEP) of MNRE
6.	Sunbeam Hotel Pvt. Ltd, Chandigarh	1000 LPD	Flat FPC	2009-10	1.61 lac	-do-
7.	C.T Scan Research Centre, Chandigarh	1000 LPD	Flat FPC	2009-10	2.18 lac	-do-
8.	Uppal Housing Pvt Ltd., Manimajra, Chandigarh	5400 LPD	Flat FPC	2009-10	11.99 lac	-do-
9.	M/s Baba Makhan Shah Lobana Foundation, Sector-30, Chandigarh	1000 LPD	Flat FPC	2010-11	2.14 lac	-do-
10.	G.J. Hotels Pvt. Ltd, SCO 325-328, Sector-35B, Chandigarh	3000 LPD	Flat FPC	2010-11	6.50 lac	-do-
11.	M/s Anytime India Fitness Pvt.	2000 LPD	Flat FPC	2010-11	6.57 lac	-do-

Sr. No.	Solar water heating system	Size/ capacity	Tech.	Date of commissioning	Cost (approx.)	Name of scheme & implementing agency
	Ltd, Plot No.28, Phase-I, Indl. Area, top floor, Chandigarh					
12.	Arora Nursing Home	1000 LPD	Flat FPC	2008-09	1.54 lac	-do-
13.	Dr. Ambedakar Institute of Hotel Management Catering & Nutrition	1000 LPD	Flat FPC	2009-10	2.32 lac	-do-
14.	Domestic Solar Water Heating Systems of 100 to 500 LPD in Chandigarh	32600 LPD	Flat FPC & ETC	2007-2011		-do-

d) Other renewable energy systems

1. Kitchen waste based biogas plants in Govt college of girls, sector-11, Punjab University, GMCH-32 and other Institutions/hospitals have been planned in Chandigarh. After assessing the performance of few plants, the same will be implemented for other institutions. Two more biogas plants of 6 cum and 4 cum, capacities have been planned in different Cowsheds (Gaushalas).

2. The possible use of solar thermal energy has been recommended in the master plan such as cooking for community kitchens using solar concentrators, solar water heaters for laundry, hostel buildings, hotels etc.

3. Chandigarh UT Government is also exploring utilisation of solar energy in transport sector. In this context a project on solar rickshaw has already been sanctioned to Punjab Engineering College to assess the feasibility of the technology and acceptability in Chandigarh. One energy efficient building by adopting the solar passive concept along with the renewable energy devices are being constructed at Botanical Garden, in consultation with the forest department. The project is in cost sharine basis where the building cost is being borne by DST, UT Government. Since Chandigarh has a very limited ground space and land is costly, the possibility of installation of one solar tree of about 5-10 kW capacity is also being explored at Botanical Garden. Same concept will be replicated for other places based on the success results of this project.

e) Energy efficiency applications

1. The UT electricity department is already installing the energy efficient street lighting systems and ATC signals (60 nos) have been replaced with LEDs which resulted in annual saving of 25 lakh units of electricity. Master plan recommends more installations of LED and induction arc

lamp based street lighting systems and replacing old systems.

2. Energy Efficient Chiller Machine having capacity of 3600 tons are installed at various places like Pb. & Hry. High Court, Chandigarh Engineering College to reduce consumption of central AC plants that results to annual energy savings of about 26 lakh units.

3. UT administration replaced all FTL tubes (2x40w) with energy efficient T5 lights (28w) at following Govt. buildings with investment of Rs 8 lakh and annual energy saving of 1.40 lakh units.
   a. Deluxe building, Sector 9D, U.T. Secretariat Chandigarh
   b. DC office, sectot 17, Chandigarh
   c. U.T. Police Headquarter, sector 9D, Chandigarh
   d. Chandigarh Housing Board, Sector 9, Chandigarh

Details of bye-laws made by Municipal Corporation/local government

Bye-laws made by Chandigarh Administration

1. Order of Office of the Chief Administrator, Union Territory, Chandigarh (Dated 16 October 2008)

In exercise of the powers conferred under Section 4 of the Capital of Punjab (Development and Regulation) Act, 1952, I, Sanjay Kumar, IAS, Chief Administrator, Union Territory, Chandigarh issue following orders. These orders shall come into effect from the date they are notified in the official gazette:-

1. All the buildings/sites, except residential, in Sectors 1 to 30 shall continue to be governed by architectural control. All buildings/sites in Sectors 31 and beyond in sectoral grid and other locations shall be governed by such volumetric controls duly approved and prescribed.

2. All sites/plots in Chandigarh shall have a zoning plan duly approved by the Chief Administrator. Due to increase in ground coverage area, consequent to these orders, the front building line will not change. The increased area will be first adjusted within the existing footprint of building. If need be, increased coverage can be adjusted on the rear side or on either sides of the existing building.

3. Owners/Lessee of those buildings who want changes in accordance with these orders, they will require a fresh clearance and approval of the building plans.

4. All changes/ extra space etc. which shall now be available as per these orders shall be allowed on payment of such fee as determined by the Department of Finance, Chandigarh Administration from time to time. Those buildings which have committed violations and, now, if those violations are permissible as per these orders, can get the violations compounded by paying compounding fee, penal charges, etc. which are payable at such rates as determined by Department of Finance from time to time within one year from the date these orders are notified in the official gazette.

5. Any owner/lessee of the building who wants changes in the approved architectural control and/or building plans as per these notifications will have to resubmit a revised plan for approval. While submitting the plans for approval following documents/ details shall also be attached in addition to those attachments which are already prescribed under the building Rules: -
   a) Stability of the structure especially keeping in view the safety from point of view of high intensity earth quake.
   b) Adequate provisions of light, ventilation, circulation, air circulation and safety as per building rules and norms in this regards.
   c) All fire safety norms and requirements are met with.
   d) Adequate provisions for different services including public health, electricity, air, fire services etc. are provided.

6. The terraces of all buildings in Chandigarh shall be allowed to be accessed by staircase mumty to be located within the service zone to create refuge area in case of fire. The service zone on the terrace shall be allowed to have 3 feet high parapet wall all around, which shall not be used for any other purpose except for specified services. For this purpose standard design of mumty shall be issued.

7. Machine Room-less Lift (Monospace lift) shall be allowed to be installed also in SCO/SCF buildings in Chandigarh and for this purpose extra height up to one meter above terrace level shall be allowed.

8. The wide glazing in place of traditional brick jali/ brick wall on first and second floors of Shop-cum-Offices (SCOs) and Shop-cum-Flats(SCFs) or similar buildings in all Sectors in Chandigarh shall be allowed without any change in architectural control/frame control subject to the condition that all the owners/allottees/lessees/occupiers in a row of a given block shall make a joint request for this purpose to maintain the homogenous character. The permissible wide

glazing shall be allowed only on 70% of surface area of brick jali/brick wall.

9. Covering of back courtyard of the Bay shops in Chandigarh shall be allowed in conformity with building rules. If the bay shop is also having/going to have basement, while covering of back, a set back of 2.25 mtrs. shall be left.

10. There shall be no bar henceforth on providing additional staircases in commercial buildings (including SCOs/SCFs) to meet with the fire safety requirements as per National Building Code.

11. The ground floor of existing commercial buildings shall be allowed to have depression upto 2'- ½ " feet subject to structural stability at site and provision of mezzanine floor shall be allowed subject to provision of minimum permissible height in conformity with building rules.

12. The back courtyard wall in Shop-cum-Office (SCOs)/ Shop-cum-Flat (SCFs) shall be of 12'-0" height from centre line of road.

13. The cut out in roof slab on top floor of all the non-residential buildings shall be allowed subject to the provisions of adequate light, ventilation, circulation, air circulation and safety requirements.

14. There shall be no restriction on having only square and rectangular shaped doors and windows in residential buildings.

15. Lift shall be allowed to open in basement of buildings in Chandigarh.

16. Projection/cantilever on first and second floor of all marla houses and one kanal houses governed by Frame control/Architectural control, not exceeding three feet from the building line in the front and rear courtyard and at least three feet away from either side of the building line from the center line of the common wall subject to structural feasibility, shall also be allowed. However, no projection shall be allowed on terrace level.

17. Basement can be allowed upto the entire zoned area for exclusive purpose of parking (minimum of 80%) and services/storage (maximum of 20%) in non-residential buildings. In residential buildings, basement can be allowed only below built up space. Basement can be allowed only

below the built up area of ground floor including the rear courtyard in Show Rooms, SCOs, SCFs, Bay-shops and similar buildings. In show-rooms, SCOs, SCFs, bay-shops and similar buildings the same can also be used for habitable purposes (without toilet, kitchen or any hazardous activity) provided they meet other requirements of building rules and further provided that they meet the requirement of circulation, safety, air circulation, ventilation, light and requirement of two separate staircases. Multi level parking above the ground level shall also be allowed which shall be free from FAR. However, the footprint of the separate parking building block shall be counted upto 50% of the ground coverage permissible. In this block, no other use except parking, driver's rest room with toilet, toll center and any other facility which is essential for parking facility shall be allowed subject to condition that these facilities shall not exceed 150 sq. mtrs. per 1000 ECS (Equivalent Car Space) of parking space or in multiple of that. Other parameters such as ground coverage, height etc. for such parking shall be governed by the existing rules for any other multi-level building. Multi-level mechanical parking shall also be permissible for which the norms shall be decided on case-to-case basis.

18. A Silent Generating set of any capacity and Dry Type Transformer/Substation equipments shall be allowed on the terrace/roof top of all Commercial, Industrial, Public and Apartment Buildings in Chandigarh within service zone subject to the following conditions:-
    i. that the structural stability is certified by a Structural Engineer;
    ii. that the Chief Fire Officer, Municipal Corporation, Chandigarh issues a No Objection Certificate for the purpose;
    iii. that consent/clearance is obtained from the Chandigarh Pollution Control Committee, Chandigarh;
    iv. the applicant shall apply to the Electricity Department, Chandigarh Administration for clearance and electricity connection.

19. There shall be no objection in installing of a Silent Generating Set of capacity beyond 25 KVA in the basement or ground floor of the premises of Commercial, Industrial, Public and Apartment buildings in Chandigarh within the covered area norms subject to the clearance by the Chandigarh Pollution Control Committee and the Electricity Department of Chandigarh Administration as per their norms.

20. A Silent Generating set up to 25 KVA capacity shall be allowed on the lowest level of the residential building subject to meeting the norms of the air pollution and structure born noise levels being as approved by the Chandigarh Pollution Control Committee and the Electricity Department of Chandigarh Administration as per their norms.

21. Following areas in various buildings in Chandigarh shall not be counted towards FAR:-
    i. Mumty or stair covers leading to terrace where no habitable use is proposed.
    ii. A watchman shelter at every entry/exist point each not exceeding 10 sq. meter in area.
    iii. Mezzanine floor which shall be only 25% of the total area in the hall where such facility is being proposed.
    iv. Machine room for lift on top floor as required for lift installation.
    v. Open to sky ramp/staircase for emergency exit.
    vi. Service chutes, service ducts for essential services.
    vii. Service floor.
    viii. Non habitable stilt floor for parking.
    ix. Basement for parking and services/storage (minimum of 80% area for parking and maximum of 20% area for services/storage).
22. There shall be no restriction in the number of storeys in all buildings having volumetric controls in Chandigarh where height, FAR and ground coverage are already restricted subject to the condition that clear height shall be maintained as per rules.

23. Following shall be volumetric controls for residential buildings/sites.
    a). **Marla houses of less than one kanal:**
    FAR: 2.0
    Ground coverage: 70%
    Height: As permissible under the rules
    b) **One Kanal and above but less than two Kanals**
    FAR: 1.50
    Ground coverage: 50%
    Height: As permissible under the rules
    c) **Two Kanals**
    FAR: 1.25
    Ground coverage: 45%
    Height: As permissible under the rules
    d) **Above Two Kanals**
    FAR: 1.0
    Ground coverage: 25%
    Height: As permissible under the rules

24. Following volumetric controls shall be allowed in **Rajiv Gandhi Chandigarh Technology Park** for Build to Suit, Main Campus and Small campus sites:-

Site	Site coverage	Allowed FSI	Height
BTS	40%	1.50	74'-3"
Main Campus	40%	1.50	74'-3"
Small campus	40%	1.50	74'-3"

The existing allottees, who have already built up their buildings in the IT Park will only be allowed extra space/additional volumetric control, as above, provided that they shall upgrade the parking facility as per new parameters in these orders for the entire built up space including the existing built up space and proposed built up space.

25. There shall be following volumetric controls for all **integrated residential housing schemes** outside Sectoral grid of Chandigarh:-
    i) Campus having population of 6250 persons approximately (4.5 persons per dwelling unit) shall be termed as Integrated Housing.
    ii) Minimum area 25 acres
    iii) Ground coverage 40%
    iv) FAR 2.0
    v) Height 62'-3" upto top of parapet
    vi) Commercial area upto 2.5% of the entire area of the site can be allowed for commercial use to meet day-to-day requirements of the residents living in the integrated scheme. For commercial area, permissible ground coverage shall be 30%, FAR 2 and height upto 62'-3" upto parapet level.

26. There shall be following volumetric controls for the construction of **educational** buildings **in Education City** in Chandigarh:
    i) Ground coverage - 40%
    ii) FAR - 1.5
    iii) Height - 57'-6" upto top of parapet.

The following shall be the volumetric control for construction of stand-alone Banquet Halls specifically earmarked in Chandigarh:-
i) Ground coverage - 40%
ii) FAR - 1.0
ii) Height - 48'-9"
iv) Parking facility - Atleast 130 cars per acre of gross area and further on prorata basis.

27. The following volumetric controls shall be followed in construction of building in **Medicity or other such dedicated/integrated projects** in Chandigarh:

Distribution of various covered area uses	Ground coverage in % age	Height	FAR
Institutional/ dedicated Zone-70% of the total area of the site	35%	83'-7"	2.0
Residential zone-25 % of the total area of the site	40%	75'-0"	2.0
Commercial zone-5% of the total area of the site.	35%	75'-0"	2.0

28. Parking Norms:
Following parking norms shall be applicable in UT of Chandigarh:
(ECS means Equivalent Car Space)

i) Commercial Plots/Sites:
a) 2 kanals and 4 kanals plots – 2 ECS per 100 sq. mtrs. of built up area.
b) 1 acre and above plots – 4 ECS per 100 sq. mtrs. of built up area.

ii) School Sites:
20% of the total plot area shall be devoted to parking on the surface. In addition, parking space for 33 ECS per acre of plot shall be created in basement and on pro-rata basis further.

iii) Nursing Home Sites:
3 ECS per 1 kanal of plot area and on pro-rata basis further.

iv) Integrated/dedicated projects like Medicity etc.:
a) On Educational/Institutional part of it, norms of educational/ institutional sites shall be applicable.
b) On the Hospital part of it norm of 3 ECS per 100 sq. mtrs. of built up hospital area shall be applicable.
c) On residential part of it norm of 1.8 ECS per 100 sq. mtrs. of built up area shall be applicable.
d) On commercial part of it a norm of 4 ECS per 100 sq. mtrs. of built up commercial area shall be applicable.

v) Stand alone Marriage Palaces/Banquet halls specifically earmarked:
For every acre of plot, a minimum of parking space equivalent to 130 ECS per acre shall be provided.

vi) Multiplexes/Malls:
4 ECS for 100 sq. mtrs. of built up area.

vii) Cinema Halls converted into Multiplexes:
For sites more than 1 acre and above 4 ECS per 100 sq. mtrs. of built up area and for sites less than 1 acre 2 ECS per 100 sq. mtrs. of built up area.

viii) Industrial Plots:
2 ECS per 100 sq. mtrs. of built up area.

ix) Institutional Sites and IT Park:
Less than 1 acre - 2 ECS per 100 sq. mtrs of built up area.
One acre and above - 4 ECS per 100 sq. mtrs. of built up area.

x) Hotel Sites:
a) 1 ECS for every 3 bed rooms in the Hotel.
b) For entire commercial area including restaurant, banquet, Conference hall, commercial sites etc. 4 ECS per 100 sq. mtrs. of built up area under commercial use.
c) For rest of the area, 2 ECS per 100 sq. mtrs. of built up area.

xi) For any other projects not mentioned above parking norms shall be decided on case to case basis keeping in view the area which is to be built up, the nature of use of area and expected gathering at the peak level.

xii) As regards to residential buildings, all buildings located on site of one **kanal** or above shall have parking facilities equivalent to 1 ECS per floor of the building and further subject to the condition that adequate parking is planned to ensure that no vehicle of the owner/ occupier of any such building is parked outside the premises.

29. All commercial, institutional and hotel buildings which have use of hot water shall have solar water heating system of adequate capacity installed. The existing buildings which do not have those facilities shall provide this facility within one year from the date these orders are notified in the official gazette.

30. As regards to residential buildings, all houses on a site of one kanal will make provisions for solar water heating system having capacity of atleast 100 ltrs. and on a site of two kanals and above that of atleast 200 ltrs. The existing houses will provide these facilities within two years from the date these orders are notified in the official gazette.

31. In all the buildings having toilets/washrooms, henceforth duel flushing system of not more than 7 ltrs. capacity per W.C. shall be mandatory in order to take care of water

conservation. All the commercial institutions and non-residential buildings will install the requisite flushing system within two years from the date of issuance of this notification.

32. As per new fire safety norms, minimum of two staircases are to be provided in buildings above 15 mtrs. height. In old buildings which already stand constructed with one staircase as per the approved plan and architectural control, it shall be mandatory to have more staircases as fire safety staircases. If the fire staircase cannot be provided within the existing building it can be allowed beyond the architectural control of the building and beyond the zoned area. These staircases shall be open to sky and hence shall not be counted towards FAR. While providing the extra staircase the uniformity shall be maintained.

33. All the buildings which are or will be located on plot of one kanal and above shall have rain harvesting system to recharge ground water installed as per the specifications given by the Administration. All the existing buildings shall install rain water harvesting system to recharge the ground water within two years from the date of issuance of this notification.

34. The owner/lessee of any existing building, who may like to avail the benefit(s) of additional volumetric control being granted through these orders shall only be granted the benefit if they upgrade the parking facilities as per norms given in this order (wherever applicable), set up the solar water heating system, duel flushing system and rain water harvesting system to recharge ground water in the respective buildings.

35. All the new public buildings which shall be approved after issuance of these orders shall conform to requirements of Persons with Disabilities Act, 1995 and Rules made there-under. The owners/ lessee/occupier of existing Public Buildings shall make their building as friendly as possible to persons with disabilities.

36. In case of any contradiction between these order(s) and any order issued in past by Chief Administrator, the provisions of these order(s) shall prevail. Before these orders are made part of Building Rules, they shall be reviewed after 60 days.

2. Order issued by Science & Technology Department of Chandigarh Administration

(1) Mandatory use of solar water heating systems

1. The use of solar water heating systems will be mandatory in the following categories of buildings, namely:
   i. Industries where hot water is required for processing.
   ii. Hospitals and Nursing homes including Government Hospitals.
   iii. Hotels, Motels and Banquet halls.
   iv. Jail Barracks, Canteens.
   v. Housing Complexes set up by Group Housing Societies/Housing Boards.
   vi. All residential buildings built on a plot of size 250 square yards and above falling within the limits of Municipal Corporation of Chandigarh.
   vii. All Government buildings, residential Schools, Educational Colleges, Hostels, Technical/Vocational Education Institutes, District Institutes of Education and Training, Tourism Complexes and Universities etc.

2. The Department of Science & Technology will approve source for supply and installation of solar water heating systems to ensure the installation of optimally designed quality systems as per the specifications.

3. All the line departments like Town and Country Planning Department, Urban Development Department, Public Works Department (Building and Roads), Housing Board, Public Health Department and Architecture Department will amend their rules/bye-laws within a period of two months from the date of issue of this order to make the use of solar water heating systems mandatory.

4. These departments will also designate a district and a nodal officer to monitor and report the progress of enforcement of the Administration's decisions to the Department of Science & Technology, on quarterly basis in the prescribed format. .

(2) Mandatory use of Compact Fluorescent Lamp (CFL) in Government buildings/Government aided institutions/boards/corporations.

1. The use of incandescent lamps in all new buildings/institutions constructed in Government sector/Government aided sector/Board and Corporation/ Autonomous bodies is banned with immediate effect.

2. It will be mandatory that in existing buildings the defective incandescent lamps when replaced would be replaced by only compact fluorescent lamps (CFL).

3. Power utilities will affect necessary modification in the load demand notices within two months time from the date of issue of this order to promote the use of Compact Fluorescent Lamps instead of conventional bulbs while releasing/sanctioning new connections/loads.

(3) Mandatory use of energy efficient tube light system/retrofit assembly in Government buildings/Government aided institutions/boards/corporations.

1. The use of 40 watt conventional tube lights with blast in all new buildings/institutions constructed in Government sector/Government aided sector/Boards and Corporations/Autonomous Bodies is banned with immediate effect. These buildings/institutions constructed in Government sector/Government aided sector/Boards and Corporations/Autonomous Bodies shall use only true light/TLD Super/T-5 or any energy efficient tube light of other brands having lumen output of 80 lm/w or more (5 star rated).

2. It shall be mandatory that in existing buildings, the defective 40 watt conventional tube lights with blast, when replaced, would be replaced by only true light/TLD Super/T-5 or any energy efficient tube light of other brands having lumen output of 80 lm/w or more (5 star rated).

3. It shall be mandatory that in existing building using conventional fluorescent tubes fitted with wire wound ballasts (chokes) to replace these ballasts with electronic ballasts within 12 months of issue of this order.

4. Power utilities shall affect necessary modification in the load demand notices within two months time from the date of issue of this order to promote the use of energy efficient tube light system/retrofit assembly instead of 40 watt conventional tube light with blast while releasing/sanctioning new connections/loads.

(4) Mandatory use of CFLs and T-5 (28 watt) tube lights

1. The use of Compact Fluorescent Lamps (CFLs) and /or T-5 (28 watt) energy efficient tube lights and/or Light Emitting Diode (LED) lamps shall be mandatory for all electricity consumers in industrial, commercial and institutional sectors having connected load of 30 Kilo Watt or above.

2. In all Central Government Offices and Central Public Sector Undertaking Institutions/establishments located in the U.T of Chandigarh, the use of Compact Fluorescent Lamps (CFLs) and/or T-5 (28 Watt) energy efficient tube lights and/or Light Emitting Diode (LED) lamps shall be mandatory.

3. The consumers under the above categories shall have to replace all conventional bulbs and tube lights in their establishments with CFLs/Light Emitting Diode (LED) Lamps/T-5 (28 watt) tube lights within 3 months of issue of this order at their own cost.

Note: In case of non-compliance of these orders, the Power Utilities Department shall have the power to disconnect the electricity connections after serving due notice after the expiry of the deadlines mentioned above. The Executive Engineer (Operation) of the Power Utilities Department shall be the enforcing authority of these orders and they shall send quarterly progress reports in this regard to the Department of Science & Technology.

(5) Mandatory use of ISI marked motor pump sets, power capacitor, foot/reflex valves in agriculture sector.

1. For all new tubewell connections, the use of ISI marked pump sets and accessories will be mandatory.

2. The Superintending Engineer, Electricity Circle, Chandigarh will make the amendments in the load demand notices for tubewell connections within two months time from the date of issue of this order to ensure use of only ISI marked pumps in the U.T.

(6) Promotion of energy efficient building design

1. All the new buildings to be constructed in the Government/Government Aided Sector will incorporate energy efficient building design concepts including Renewable Energy Technologies with effect from 30th June, 2012.

2. The Architecture Department will ensure the incorporation of energy efficient building design concepts in all buildings to be constructed in future in the Government/Government Aided Sector. A committee shall be formed in the Architecture Department to examine all new building plans/drawings to be constructed in the Government/Government Aided sector to ensure that all the features of the energy efficient building design concepts, have been incorporated in these.

3. The Architecture Department will designate a nodal officer for coordination and monitoring of these measures who will report the progress in this regard to the Director, Department of Science & Technology, Chandigarh Administration.

(7) Mandatory use of energy efficient street lights

It shall be mandatory that the street lighting in all existing and new colonies and urban areas notified by the Urban Local Bodies Department, Residential sectors, Industrial estates, housing complexes, colonies and townships developed by private/semi government/autonomous institutions shall use energy efficient street lighting fixtures using T-5 tube lights/Light Emitting Diode (LED) Lamps/High Pressure Sodium Vapour (HPSV).

The above said organizations responsible for street lighting systems shall have to replace the conventional street lights or install energy efficient street lights on or before 31st December, 2012 at their own cost.

Note: In case of non-compliance of these orders, the Power Utilities Department shall have the power to disconnect the electricity connections after serving due notice after the expiry of the deadlines mentioned above. The Executive Engineer (Operation) of the Power Utilities Department shall be the enforcing authority of these orders and they shall send quarterly progress reports in this regard to the Director, Science & Technology.