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URBAN, INDUSTRIES & RURAL AREA**

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SOLAR POWERED WATER SUPPLY (24X7) FOR URBAN, INDUSTRIES & RURAL AREA

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Solar power is very curious subject flaming all over the world in all sectors from space station to water supply because of availability of free solar radiation without proprietorships and non-judicial! Concerning to use of solar power in water supply sector is not much developed because of lack of unawareness on design aspects, architectural, built up and special types of electro-mechanical mechanism for utility in water supply system. The concern article throws lights on use of solar power system in water supply system particularly in Urban, Industries and Rural area on 24 x7 basis where everyone is becoming victim of power & water shortage.

Concerning to India, conventional water supply system is normally organized by Municipalities and Corporation or local government authority. In it, principal raw water source is being used as a river or dam or lake etc. located at a distance end from the city and then huge size of pipe line (CI/MS/RCC/HDPE/PVC) and pumping

equipment are used to transport water to central place (water treatment unit) or various distribution points in the city for onwards supply to house hold connections. Such systems require huge capacity (Horse Power) motor pump-sets working for 16-20 hours continuously on daily basis dependent on Government Electrical power supply to meet the water demand of the city if provided electricity available. While supplying water for 16-20 hours on daily basis, recurring cost of electricity is becoming enormous resulting in non-viability of such water supply scheme. Since 5 years, such centralized water supply schemes are facing problems of un-even distribution of water and non-timely supply of water in the territory almost all over the country due to shortage of water and power. Local government is neither capable to fulfill the water demand to existing localities nor to new localities establishing in the territory.

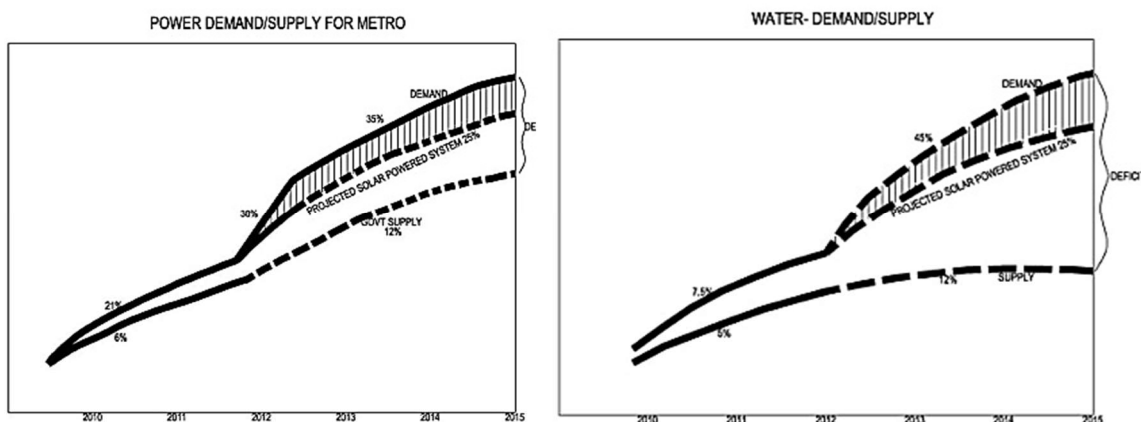
Demand vs supply ratio of power is becoming so low every year, that none of the Government is capable and committed to overcome this ratio in future. Government report says that there is a shortage of 21-40% of electricity & water in many parts of the country and is increasing by 7-12 % every year. (Refer in graphs as below). Hence, more thrust is given to sustainable & individual source creation of water and renewable source of power. i.e. solar power! Although, solar radiation is freely available, it has certain limitations and is not so cost effective to afford & reliable to everyone.

To overall both power and water shortage issues, Jain Irrigation has established a solar powered water supply system (24x7) clustered base suitable for colonies, housing societies, new residential, commercial, rural and industrial complexes. Schematic design layout of solar powered



water supply system for residential, rural and industrial complexes is shown in next sketches.

to lift the Overhead water tank to store in the day time. Stored water is then utilized for 24 hours to each house after proper treatment.



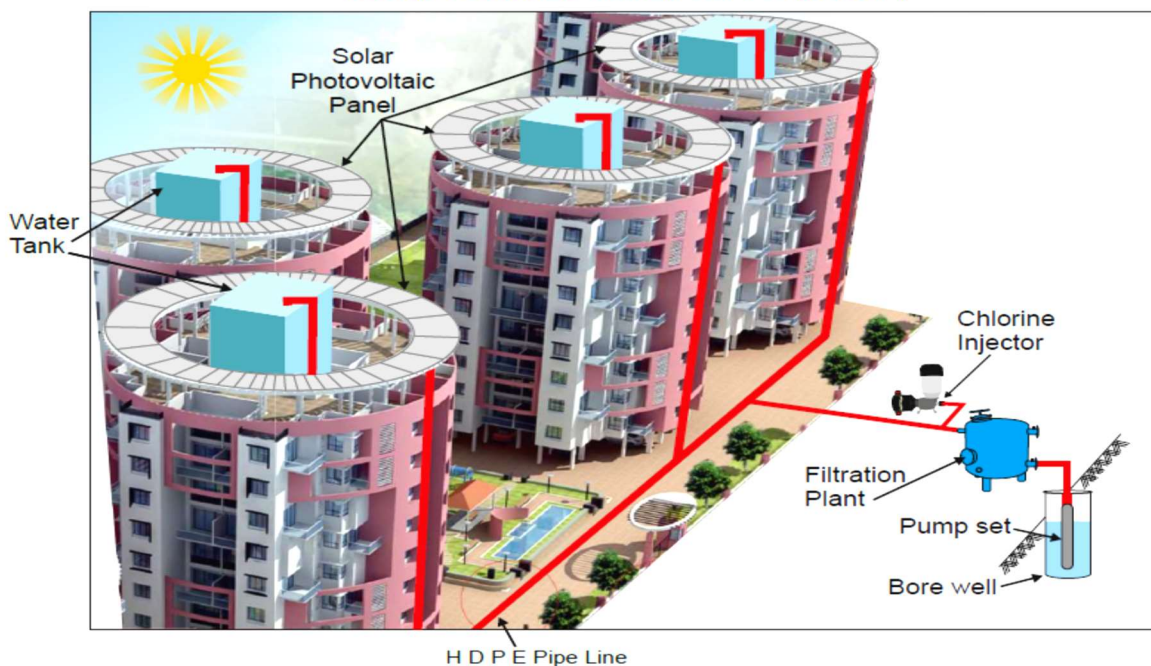
SOLAR POWERED WATER SUPPLY (SPWS)

In this system, independent water source has been identified to meet the water demand of the particular areas and localities. General in such localities, ESR (Elevated Storage Reservoir) is constructed of capacity base on 12-24 hours. Photovoltaic Solar Panels are provided at terrace or roof top to power the submersible motor pump-set introduced into the bore well (water source)

Main components of Solar Powered Water Supply System are:

- Photovoltaic Solar Panels.
- Control Panel.
- Filtration System
- Chlorine + Ozone Injector
- HDPE Main Supply Pipe
- Water Metering
- Control Accessories
- House Connections.

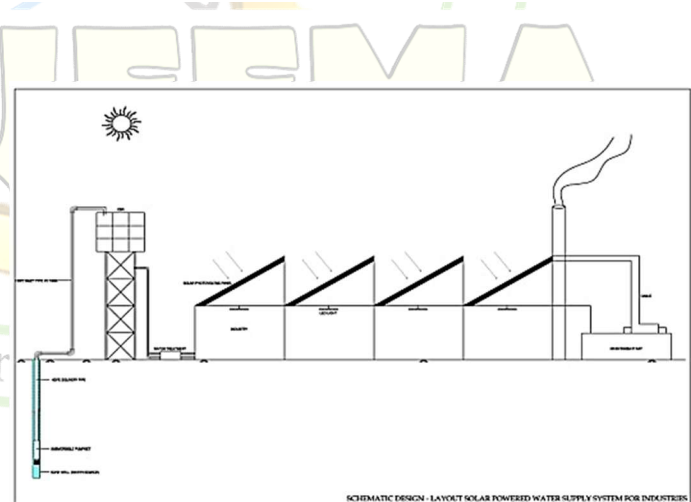
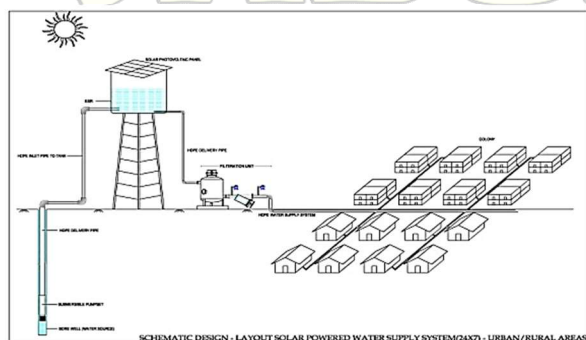
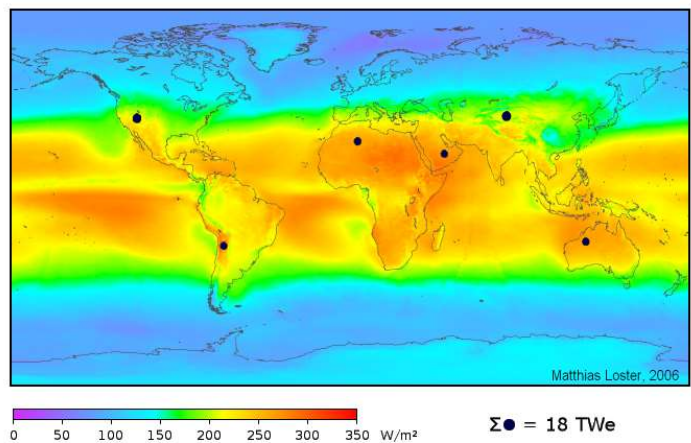
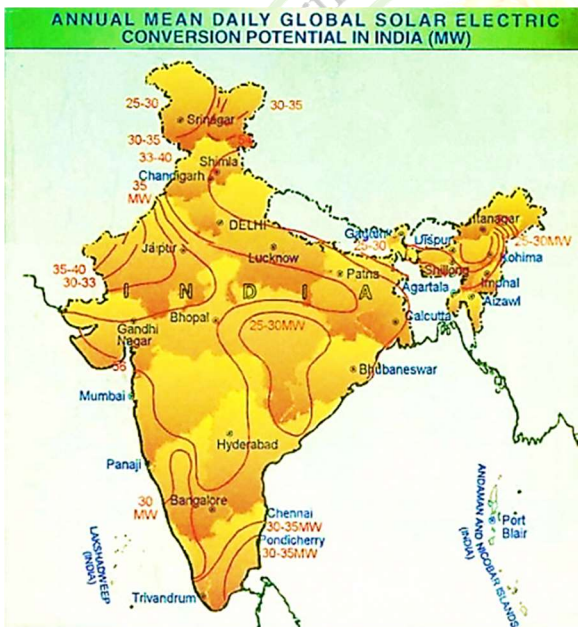
SOLAR POWERED WATER SUPPLY (24 X 7)





India receives average solar radiation power of 200-to 500 watt per square meter free of cost. Solar radiation is mainly dependent on temperature, relative humidity, clouds, rain fall, latitude, longitude and obstructions. (refer graph as shown below).If we harvest this solar power, atleast 15-25% need of power would be curtailed in overall requirement of power and around 40 to 60 % problem of water supply would be re-solved in country. Rural and Industrial area could be made self-sufficient in water supply by adapting this methodology.

allowing them to act as charge carriers for an electric current. The photovoltaic effect was first observed by Alexandre-Edmond Becquerel in 1839. The term photovoltaic denotes the unbiased operating mode of a photodiode in which current through the device is entirely due to the transduced light energy. Virtually all photovoltaic devices are some type of photodiode. Solar cells produce direct current electricity from sun light, which can be used to power equipment or to recharge a battery. The first practical application of photovoltaics was to power



SOLAR PHOTOVOLTAIC (SPV)

Photovoltaics are best known as a method for generating electric power by using solar cells to convert energy from the sun into a flow of electrons. The photovoltaic effect refers to photons of light exciting electrons into a higher state of energy,

orbiting satellites and other spacecraft, but today the majority of photovoltaic modules are used for grid connected power generation. In this case an inverter is required to convert the DC to AC. There is a smaller market for off-grid power for remote dwellings, boats, recreational vehicles, electric cars, roadside



emergency telephones, remote sensing, and cathodic protection of pipelines. The first practical application of photovoltaics was to power orbiting satellites and other spacecraft, but today the majority of photovoltaic modules are used for grid connected power generation.

MASTER PLANNING

Master planning is very important aspects while going for Solar Powered system. Conventional planning and methodology of water supply system may not be useful and become expensive in overall. Master planning is mainly proportional & matching to maximum water demand per capita to maximum solar radiation. Means there should not be the shortage of solar radiation while water demand is more. Sufficient water quantity should be made

available to meet the water demand per capita in the day time till solar radiation exists. Design of Solar Powered Water Supply Components i.e. piping network, filtration system and Solar photovoltaic panel etc. should be adequate and harmonized to cope up the demand at fluctuated solar radiations on daily and seasonal basis. In other word, Solar Powered Water Supply should be harmonized with availability of solar power (radiation) to meet water demand.

CONCLUSION

Considering overall benefits compared to conventional water supply system, solar powered water supply system is one solution for our future water supply scheme and development of India.

Representative Comparison of Conventional and Solar Powered Water Supply

Sr.	Heads	Conventional Water Supply System	Solar Powered Water Supply System
1.	Coverage of localities	Large	Smaller, individual.
2.	Piping Network	Large grid.	Small cluster.
3.	Contamination possibility	Always	Very rare chances.
4.	Water supply hours	Limited to few hours	24 hours.
5.	Frequency of water supply	Alternate day basis.	Daily basis.
6.	Monitoring water supply	Difficult & cumbersome	Very easy and automatic.
7.	Maintenance	Always difficult	Very easy because of loop.
8.	Blocking roads & traffic disturbance.	Always.	May be. But not required.
9.	Power requirement at source	Higher	Less.
10.	Operating cost Power per year	Higher	Not required.
11.	Initial investment	Very huge	Substantial.
12.	Additional booster pump require	Yes.	Not require.
13.	Additional power require	Yes.	Not require.
14.	Dependency on electrical supply	100 %.	Not at all.
15.	Dependency of bill payment	100 %.	Not at all.
16.	Risk – hazardous & Safety	Electrical shock.	Zero Risk. Safe.
17.	Pollution.	Pollution	Pollution free.
18.	Installation cost	Very high	Low.
19.	Additional benefits	No	Solar power can be used for powering outdoor lights.
20.	Govt Policy interference	Yes.	No.
21.	Political Interference	Yes.	No.