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COST EFFECTIVE PEAK HOUR GREEN ENERGY MANAGEMENT

A. Balamani [1] ,V.Revathi [2]

Professor[1], Assistant Professor [2]

Department of EEE, Karpaga Vinayaga College of Engineering and Technology,
ayyabal@gmail.com,revathibe2007@gmail.com

ABSTRACT—The world scenario of power requirement is going on increasing, especially the peak hour power demand is not able to meet by the various countries.Power generation is being instead of concentration it can be decentralized especially for the domestic connections.A model for the green energy revolution in the domestic sector is proposed with substantial gains in the following areas 1) reduction of Co_2 emission 2) reduction in transmission line losses and also 3) reduction in energy consumption apart from the benefit of carbon credit. Solar powered lighting for the domestic is the optimal solution. The paper deals with various aspects of the data how the green energy revolution using Solar Photo Voltaic (SPV) can be useful to overcome the high cost depleting fossil fuel.

Key Words: Peak Hour Demand, Transmission line losses, Co_2 emission

I. INTRODUCTION

The worldwide power scenario always going on increasing as the percapital consumption of individuals going on increasing causing a wider scope in the supply and demand. Especially the peak hour demand is not able to be met. In the advent of growth of industries in the developing countries like India faces crucial and sharp demand and supply gap.

Power generation from fossil fuel causes more Co_2 emission and pollute the atmosphere. The fossil fuel also is getting depleted. It is absolutely necessary to go for the renewable green energy. The best and easily available is the Solar Photo Voltaic (SPV) energy conversion.

Throughout the world on-grid,off-grid have started functioning in SPV. The total capital investment for a huge generation is very high making the projects delay because of total capital outlay as well as the gestation period. It is proposed in this paper an immediate and minimal capital outlay to meet out the present scenario of power crisis. The proposal also provides reduction in the Co_2 emission ,transmission line losses. This also will give carbon credit. For analysis of the present problem the Indian power Scenario is taken.

II. WORLD POWER SCENARIO:

The access to electricity is deprived to the queen of 1.4 billion people worldwide creating energy poverty. It is estimated even with a steady growth, it may not be possible to meet the total requirement before 2030.The IEAs projections shows 100 percent access to be provided only by 2030.

TABLE 1

2015		**2030**	
Rural	Urban	Rural	Urban
To provide 257 million people with electricity access	100% access To grid	100 % access 30 % with grid and 70% either mini grid or 25% grid off	100% access to grid

III. POWER SCENARIO IN INDIA

The power demand as a shortage of 6.5% of the installed capacity and peak demand shortage is 14.5% of installed capacity. The solar energy which can be derived is available for more than 180 days in most parts of the country. Utilizing the solar energy instead of very big power plants with huge subsidy, it is suggested that the domestic oriented SPV power generation to meet out at least during the peak hour demands.

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Invariably in all the houses in the urban area are equipped with the UPS system to cater the scheduled/unscheduled power shutdown .Even though the UPS supplements the power requirements during the shutdown period whereas in turn it consumes the quantity going to be consumed during the non shut down period.

By adding array of solar panels with chargers to the existing UPS system the energy required during the shutdown period can be derived without much addition of cost. By this, the power required during the shutdown period is supplemented by the SPV instead of power from the grid. Since the drawel (during non shut down period) from the grid for the shut down period is eliminated, the energy consumption is reduced.

TABLE2

Actual Peak Demand / Peak Met (Previous Month)

(Figures in net MW)

State / System / Region	May-11				Apr 11-May 11			
	Peak Demand	Peak Met	Surplus / Deficit (-)		Peak Demand	Peak Met	urplus / Deficit (-)	
	(MW)	(MW)	(MW)	(%)	(MW)	(MW)	(MW)	(%)
Chandigarh	263	263	0	0.0	263	263	0	0.0
Delhi	4,845	4,823	-22	-0.6	4,845	4,823	-22	-0.5
Haryana	5,289	5,124	-165	-3.1	5,289	5,124	-165	-3.1
Himachal Pradesh	1,096	1,096	0	0.0	1,141	1,141	0	0.0
Jammu & Kashmir	2,250	1,469	-781	-34.7	2,250	1,469	-781	-34.7
Punjab	6,965	6,965	0	0.0	6,965	6,965	0	0.0
Rajasthan	6,800	6,768	-32	-0.6	6,800	6,768	-32	-0.5
Uttar Pradesh	11,445	10,537	-908	-7.9	11,445	10,537	-908	-7.9
Uttarakhand	1,533	1,366	-167	-10.9	1,533	1,409	-124	-8.1
Northern Region	**35,470**	**33,357**	**-2,113**	**-6.0**	**35,470**	**33,357**	**-2,113**	**-6.0**
Chattisgarh	2,700	2,623	-77	-2.9	3,239	2,745	-494	-15.3
Gujarat	10,036	9,915	-120	-1.2	10,049	9,915	-134	-1.3
Madhya Pradesh	7,097	6,004	-1,093	-15.4	7,442	7,290	-152	-2.0
Maharashtra	20,072	16,058	-4,014	-20.0	20,072	16,340	-3,732	-18.6
Daman & Diu	294	269	-25	-8.5	294	269	-25	-8.5
Dadar Nagar Haveli	501	501	0	0.0	511	511	0	0.0
Goa	514	471	-43	-8.4	514	471	-43	-8.4
Western Region	**38,543**	**33,385**	**-5,158**	**-13.4**	**39,566**	**33,705**	**-5,861**	**-14.8**
Andhra Pradesh	10,658	10,474	-184	-1.7	12,636	11,579	-1,057	-8.4
Karnataka	8,139	7,509	-630	-7.7	8,479	7,509	-970	-11.4
Kerala	3,281	3,015	-266	-8.1	3,281	3,017	-264	-8.0
Tamil Nadu	11,832	10,298	-1,534	-13.0	11,911	10,566	-1,345	-11.3
Puducherry	312	312	0	0.0	318	312	-6	-1.9
Lakshadweep #	7	7	0	0	7	7	0	0.0
Southern Region	**32,304**	**29,995**	**-2,309**	**-7.1**	**33,937**	**31,489**	**-2,448**	**-7.2**
Bihar	2,031	1,423	-608	-29.9	2,031	1,423	-608	-29.9
DVC	2,250	2,007	-243	-10.8	2,250	2,007	-243	-10.8
Jharkhand	1,030	832	-198	-19.2	1,030	833	-197	-19.1
Orissa	3,350	3,139	-211	-6.3	3,350	3,310	-40	-1.2
West Bengal	6,300	6,098	-202	-3.2	6,409	6,098	-311	-4.9
Sikkim	100	68	-32	-32.0	100	68	-32	-32.0
Andaman- Nicobar#	40	32	-8	-20	40	32	-8	-20.0
Eastern Region	**14,000**	**12,879**	**-1,121**	**-8.0**	**14,000**	**12,879**	**-1,121**	**-8.0**
Arunachal Pradesh	90	87	-3	-3.3	90	87	-3	-3.3
Assam	1,050	978	-72	-6.9	1,050	978	-72	-6.9
Manipur	102	94	-8	-7.8	102	97	-5	-4.9
Meghalaya	245	209	-36	-14.7	250	209	-41	-16.4
Mizoram	75	67	-8	-10.7	77	67	-10	-13.0
Nagaland	94	83	-11	-11.7	94	83	-11	-11.7
Tripura	165	163	-2	-1.2	192	181	-11	-5.7
N -Eastern Region	**1,725**	**1,547**	**-178**	**-10.3**	**1,762**	**1,581**	**-181**	**-10.3**
All India	**122,042**	**111,183**	**-10,879**	**-8.9**	**122,391**	**111,163**	**-11,228**	**-9.2**

Lakshadweep and Andaman & Nicobar Islands are stand- alone systems,
power supply position of these,does not form part of regional requirement and availability

IV. SPV POWER GENERATION SCENARIO:

The world is totally turning towards the SPV by providing various legislation and making obligatory for all the commercial and domestic sectors. The following are the some of the initiatives taken. California's million solar roofs plan comes into force. Australia to provide $8000 solar power subsidy introduce feed-in tariffs.

U.S sets aside $60 million for solar sector development. PV obligatory for commercial buildings in Spain. Spain has issued an ordinance making construction of PV systems obligatory for buildings with high energy demands, such as warehouses recreational facilities, administrative, hotels buildings, hospitals, exhibition halls,etc.

India also taken measures to implement off - grid and on- grid with SPVs providing with subsidies. The measures are intended to ensure that in the future, all buildings will save 30 to 40 percent of their energy, and produce 40 to 55 percentage less Co_2.

V. CO_2 EMISSION

Limiting temperature rise to 2 degree Celsius require a low carbon energy revolution. The concentration of Green Gouse Gases (GHG) in the atmosphere would need to be stabilized at a level around 450ppm. Co_2 emissions peak at 30.9Gt just before 2020. The proposed Green energy SPV generation offers the biggest scope for reducing Co_2 emission as 1MW of power.

The reductions in the power generation using fossil fuel as the peak load demand is being met by using green energy (SPV) approximately per MW the Co_2 reductions will be 3000 tons.

VI. TRANSMISSION LINE LOSSES

The statistics available in the Central Electricity Authority (CEA), the transmission and distribution losses are above15-55% in the various parts of India. The average transmission and distribution losses amounts to approximately 20%of the power transmitted.Eastern and Western Regions and even higher—43.4%—in the northeastern region. The southern region fares the best with T&D losses of 19.77%.

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VII. CARBON CREDITS

The Clean Development Mechanism and Emission Trading will facilitate the Green House

TABLE 3
T & D Losses by State (2007-2008)

0-15 %	15-25%	25-35%	35-45%	45-55%	Above 55%
Puduchery	Himachel Pradesh	Delhi	Uttarhand	Bihar	Jammu & Kashmir
	Punjab	Haryana	Madhya Pradesh		Arunachal Pradesh
	Chandigarh	Rajasthan	Orissa		Manipur
	Goa	Uttar Pradesh	Sikkim		Nagaland
	Daamn & Diu	Gujarat	Assam		
	Dadra & Nagar Haveli	Chhattisgarh	Meghalaya		
	Andhra Pradesh	Maharashtra	Mizoram		
	Kerala	Andaman & Nicobar	Tripura		
	Tamil Nadu				
	Lakshadweep				
	Jharkhand				
	West Bengal				

Gases emission reduction project. The tradable Certified Emission Reductions (CERs) – one CER being equivalent to one metric ton of Co_2 . As the CER are traded at €3-€15 per CER,This means an income can also be derived from the installation of green energy (SPV) for domestic purposes and for commercial purposes also.

Owing to the modernization in all fields the usage of computers growing exponentially, the usage of UPS also increasing in the same proportion to maintain Un-interrupted Power Supply for the systems. Instead of drawing power from these grids this paper proposes to switch over to the power from the green energy SPV.

The additional cost for converting the UPS systems from grid to SPV can be traded off with the CERs.Even the CERs are not traded the cost of converting grid to SPV could be recovered in 2.5 to 3 years. As the life span of SPV is about 25 years,the SPV provides 22 years of free energy for the UPS systems.

VIII. CONCLUSION

This paper proposes to decentralize SPV power generation by creating off-grid.The advantages of creating isolated off-grid peak hour generation using green energy SPV and for the grid-connected UPS system.

The energy is saved by reducing to the tune of 15-55 percent energy by way of reduction in transmission losses.Co_2 emissions causing temerature rise could be minimized as the green energy SPV reduces to the extent of 3000 tons per MW.The green energy SPV will provide not bonly the green energy but also provide free energy after the payback period.Certified Emission Reductions (CERs) will provide an extra income for using the green energy SPV.

Even through the current scenario of SPV power generation is satellite based solar power (SBSPG) generation which could generate huge power, it is preferred to have an isolated SPV power generation since SBSPG will take atleast two decades to come in use.

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