

Control and Optimization of Smart Grid with Distributed Renewable Energy Resources and Conventional Electrical Power System

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Abstract: India is opposite positioning to have meeting with up the electric power for a given time requirement of a quick going up interests, money goods. Restructuring of the power industry has made greater great number of questions for engineers of power systems. Now days sent out act or power of seeing of present possible quick, sharp mind net-work (SG) at a good quality of levels in the Indian power systems has suggested that a greatly developed automation apparatus needs to be adjusted. Well-dressed net-works are introduced to make net-work purpose, use more well-dressed and sharp. Well-dressed net-work operations, upon right placing can open up new roads and chances with momentous money business follow up. This attempt demonstrate a range of well-dressed net-work first move sand follow up in the of power market growth in India. Arrange of examples of having existence structures of automation in India are given work to underline a few of views presented in this go to person in authority. It also papers natural development made in well-dressed net-work technology make observations and development since its start. Attempts are made to make a point of current and view issues had to do with in forward development of well-dressed net-work technology in way of future demands in Indian power of being conscious of.

Index Terms: Solar Power, Smart Grid, Micro Grid, Restructuring of power network, Programmable Voltage source

I. INTRODUCTION

The complete power for a given time shortness of has directly foiled the science to do with the producing, distribution, and using up of goods and work supply, society, development of the nations, and conditions through green-house gases (GHGs) and by getting more carbon Credits . The growing request of power across the round map of earth is being saw in the mind and made record to be increasing change. Feeble amount of property with old network roads and systems, weather, condition change, going higher powering material, substance gives idea of price, has resulted inefficient and increasingly changing electric system. With this, the complete about has lifted up certain full of danger points upon which the power for a given time complete change for a green and able to keep going future are was responsible for and came after

II. SOLAR POWER

There is more than enough solar radio rays ready (to be used) all over the earth to give what is desired, needed to a greatly increased request for solar power systems. The Total put in for solar power (PV) in India is put a value on by the National solar special work (NSM) at around 1095 MW, undertaking on January 2013. This fig. was also taken up by the government as the officer value. Upon the sent out part of a regular payment of PV, Gujarat shares highest of 41% which counts 214 MW of the Total PV producing in the country. The over-all doing work well of the make into different sort of solar power into usable electrics power for a given time by the PV power system, has among its parts PV order lines, changers, cable connections, and so on. is quite low (<6%). Because of the special nature of its I-V qualities, the out-put power is made greatest amount at a special amount for a given level of solar isolation and unit temperature. In addition, unlike a common power producing system, where the powering material, substance input can be controlled depending on the power request, the input can be controlled depending 50% of the Total price. Under these conditions, it makes good of money and goods sense to do medical operation the solar order in such a way in connection with get out the greatest point power for any away from other things level and operating temperature. A of a certain sort mppt algorithm is being designed based upon incremental conductance careful way to unbroken bands over wheels for moving over rough earth the greatest point power upon electric force at greatest point power point (VMPP) and current at greatest point power point (IMPP). The algorithm 5 and the results are being acted the part of in matlab general condition as made clear in figure 1.

The greatest point power of the PV part of a greater unit has been put a value on at different level of irradiance and temperature as made clear in figure 2. Such kind of algorithm putting into effect helps to unbroken bands over wheels for moving over rough earth greatest point power at any not fixed in level conditions of conditions.

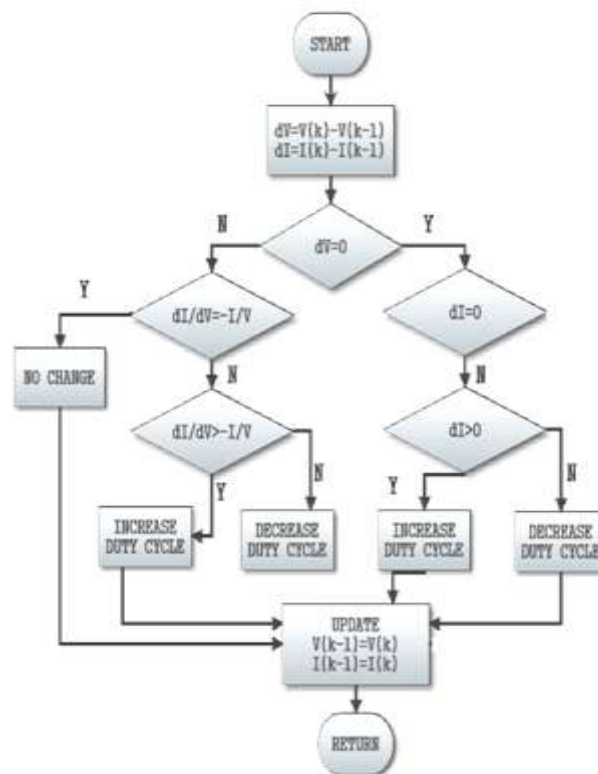


Figure 1: "MPPT algorithm on incremental conductance method."

Irradiance effect on P-V characteristics at constant temperature (25°C)

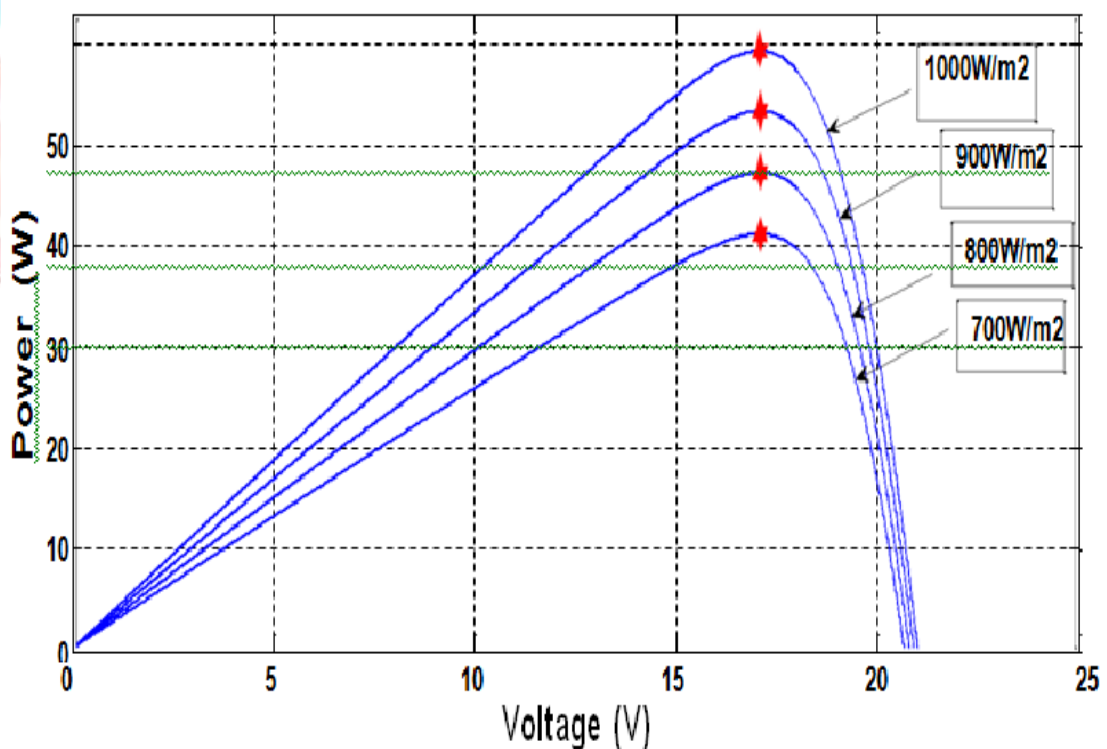
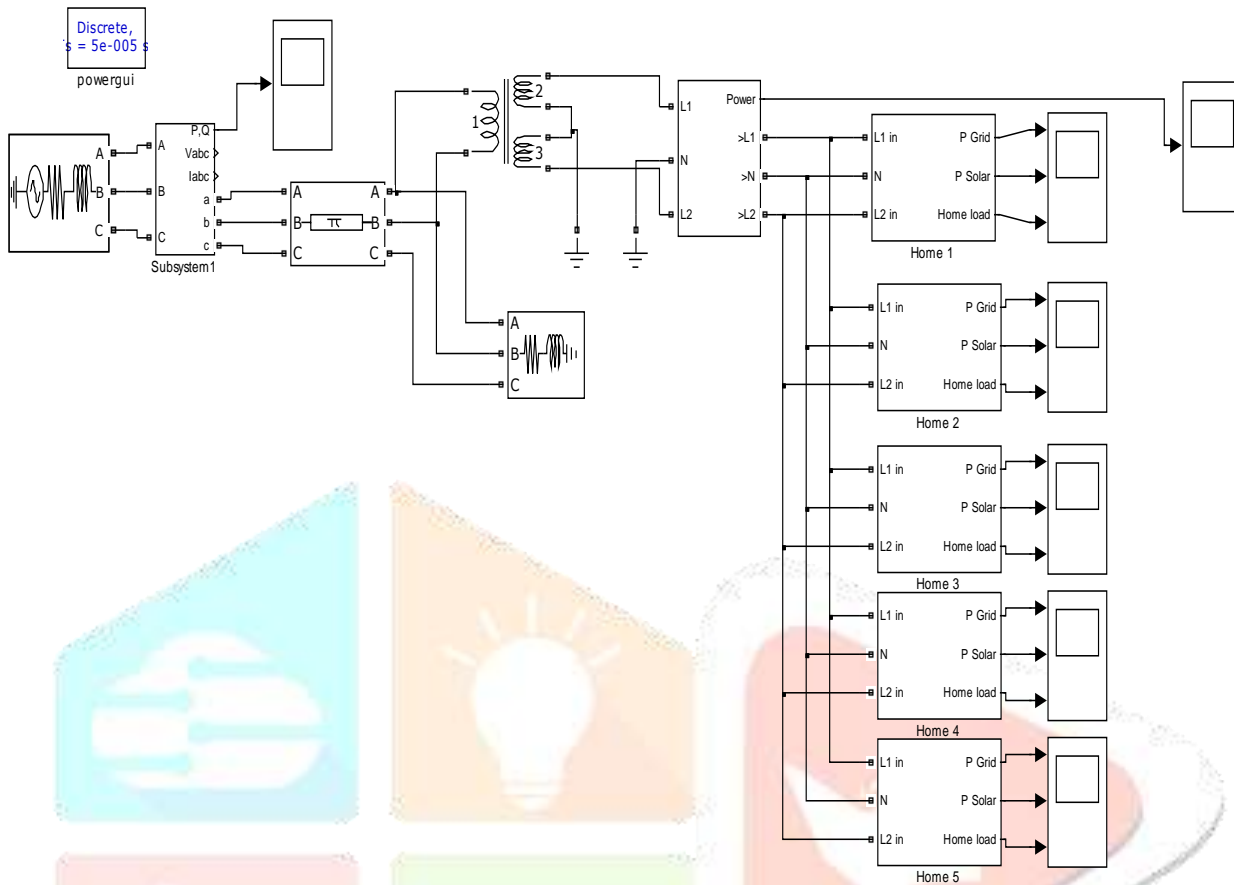


Figure 2: For different value of irradiance level and constant temperature (25 °C).

III. SOLAR MICRO GRID AND ITS SIMULATION

The diagram shown in Figure 3 represents schematic arrangement of solar micro grid in matlab/simulink. Solar panel is connected at every home1 to home5 with individual power rating. As shown in figure utility supply is also connected with every

home so there will be directional power flow can be possible. As shown in figure street houses are connected to distribution transformer, rating of which is 50 KVA, 13.3kv/120v with centre tape two secondary winding.



Figure

3: Diagram of solar micro grid.

As shown in Figure 4 connection ac supply block represent main distribution substation of the city. From that point voltage is step down at different city using step down centre tape transformer. Here in the simulation we have connected five homes with the distribution transformer with individual solar system.

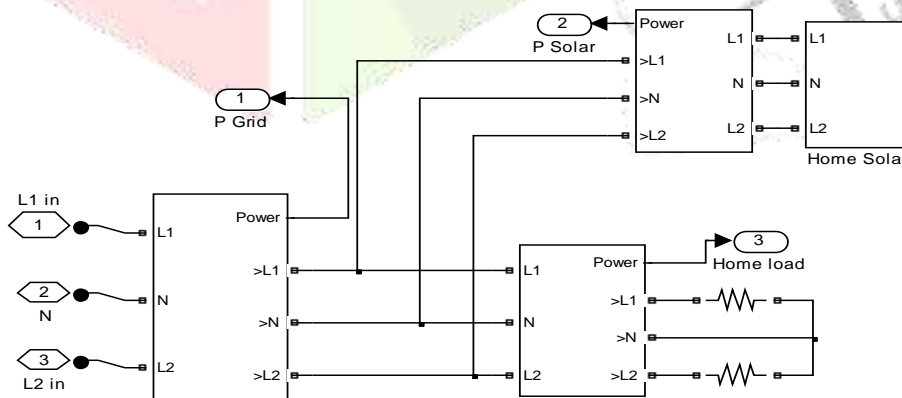


Figure 4: Internal block diagram of home.

The connection of solar system and utility at individual home is shown in Figure 5 It such that during day time when PV panel produces power user will utilize solar energy. If energy produced by solar panel is not enough in that case the remaining energy demand will be compensated of utility. In other case solar energy generation is more than demand of individual consumer can be supplied to utility grid and user can get rewards for that, so in this manner by direction flow of energy can be possible. Simulation is done for 24 hours at the every hour the power generation from solar system is different because of position of the sun and solar insulations.

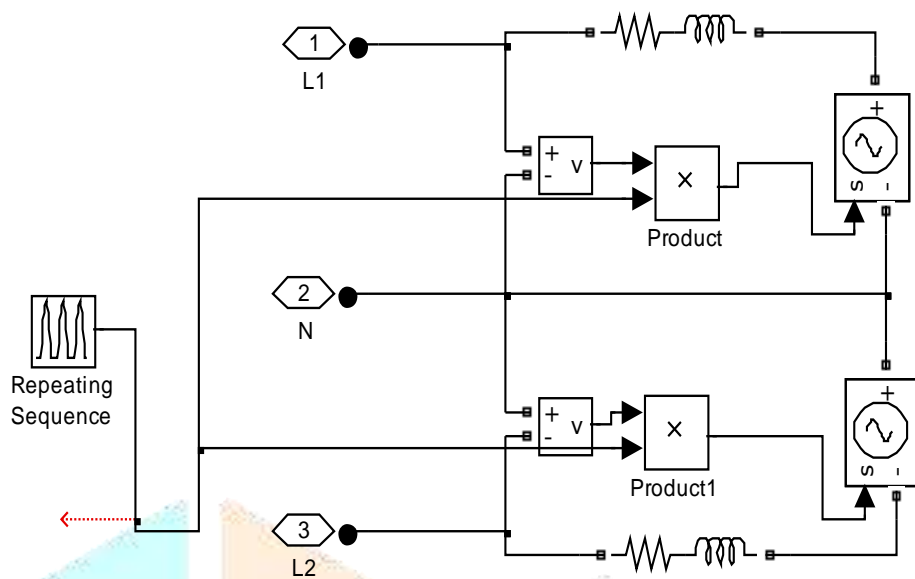


Figure 5: Diagram of solar panel (programmable voltage source)

As shown in above figure, we have modeled solar system at every home using programmable voltage source which is acting as solar panel. The connection and the design is given in figure. On other hand the main distribution substation is also connected to industrial load that we have represented by three phase resistive load which is connected before distribution transformer. During a day hour, if individual home solar system generation is more than individual demand then excessive power is utilized by industries.

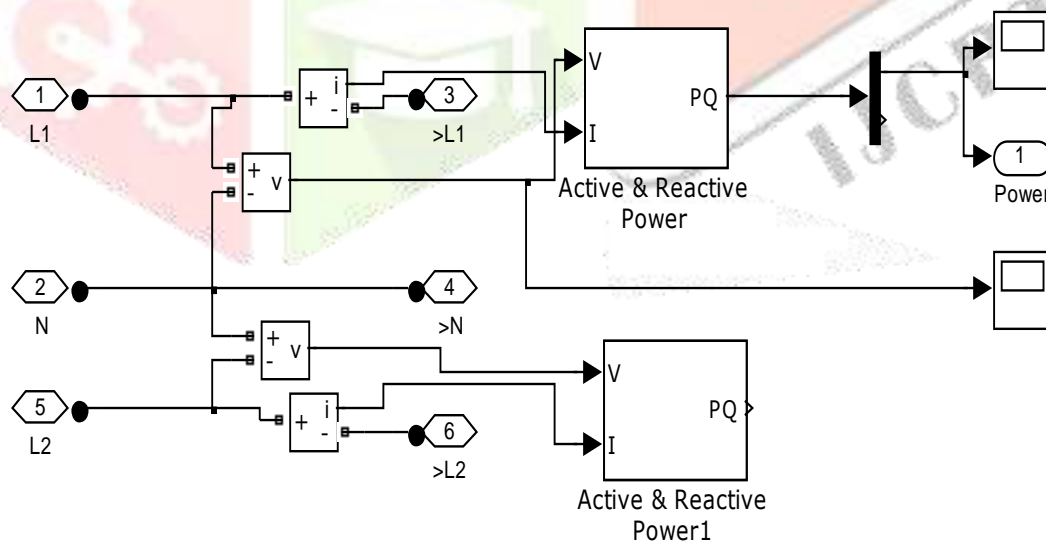


Figure 6: Three phase power measurement block

We have analyzed the simulation results. Also the three phase power measurement diagram is given in Figure 6. The analysis related to the result is to continue to next section. The simulation parameters are:

- Connected load (home): 2kw
- Distribution transformer: 50 kw, 13.3kv/120v
- Solar system rating: (home 1-3) 1kw, 120V
- Solar system rating: (home 4-5) 1.4 kw, 120V

The block shows the measurement blocks for power transfer between utility and home. Active and Reactive power can be measured by this block. Also current and voltage waveform will be done by it

IV. SIMULATION RESULTS.

Figure 7 shows the graph of time vs power supplied by utility. The graph shows that during the day time power supply by utility grid is less compared to the night hours. This is because of power generated by solar system is utilized. The variation in power at main distribution is not significant because in simulation we connected only five homes. With more connectivity of solar system the variation would be more. Figure 8 shows the voltage waveform at transmission line. And Figure 9 shows the current waveform at transmission line.

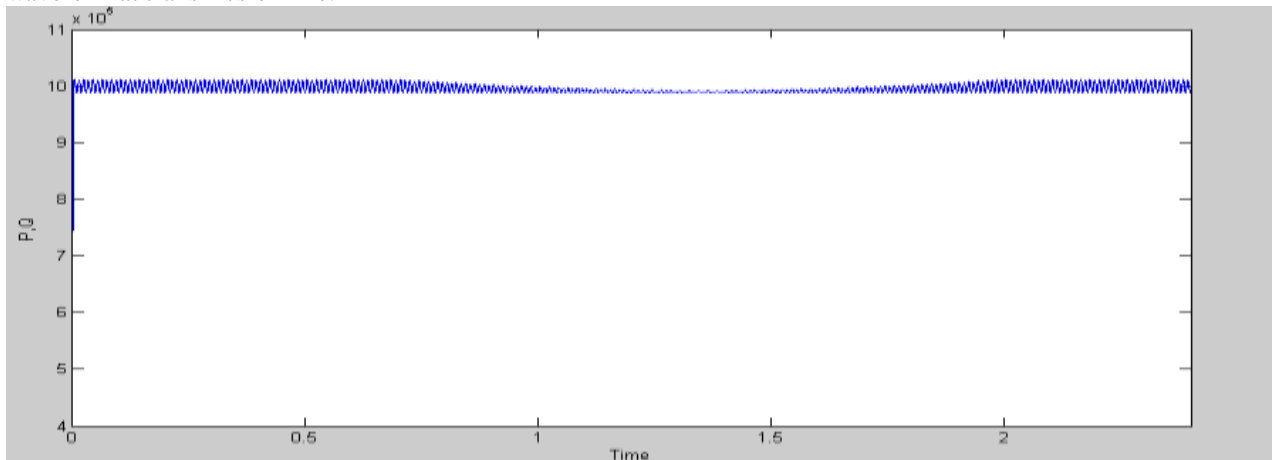


Figure 7: P, Q v/s Time

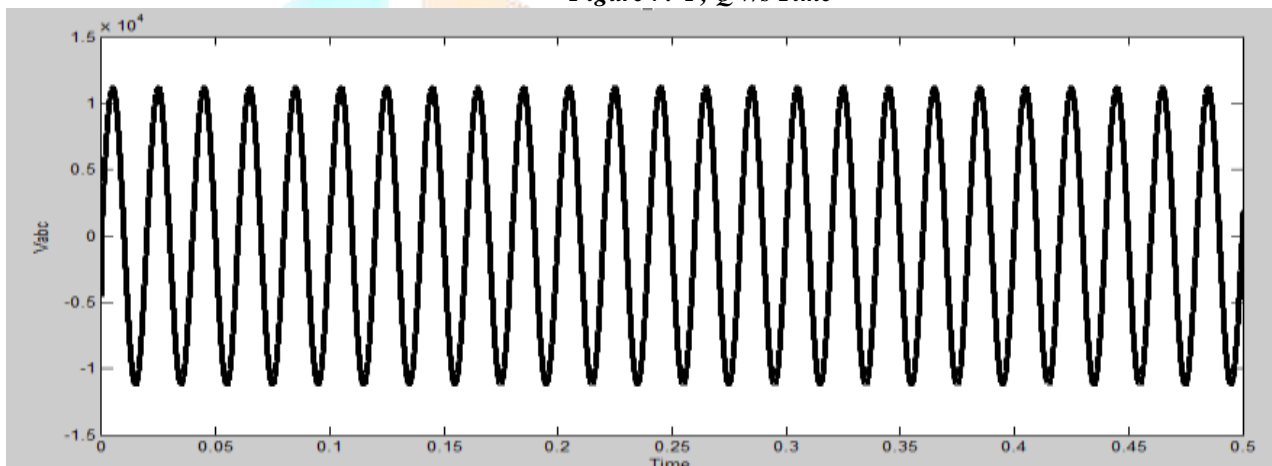


Figure 8: Vabc v/s Time

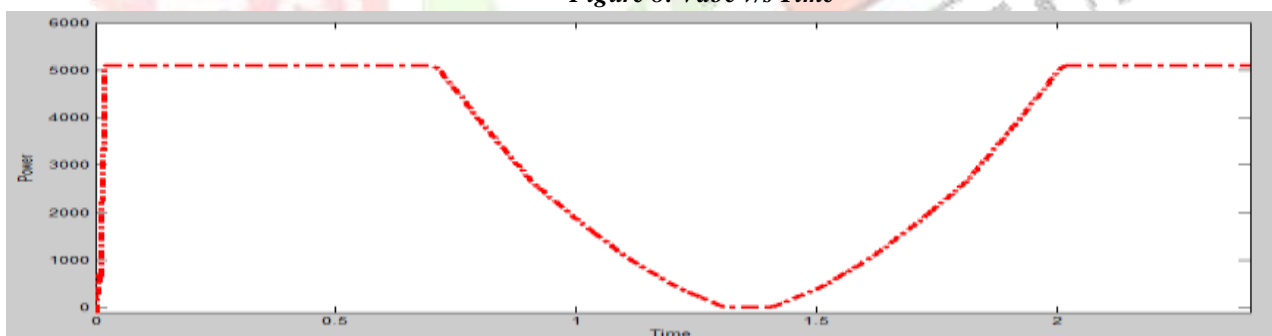


Figure 9: Pabc v/s Time

V. SIMULATION RESULTS OF HOME-1

The Figure 10 shows the net power drawn by home 1 from grid during 24 hours. The waveform shows that during the day time the power drawn from the utility is decreasing and it is minimum during the afternoon hours. The load demand of home 1 is 1kW which is considered constant for 24 hours. The Figure 11 shows the power generated by home 1 from solar system during 24 hours. The waveform shows that during the day time the power generated from the solar system is increasing and it is maximum during the afternoon hours. Figure 12 shows the load demand of individual house which is considered as constant for 24 hours and its value is 1 kW. It is supplied by utility grid and solar system. A same analysis has been done for all homes.

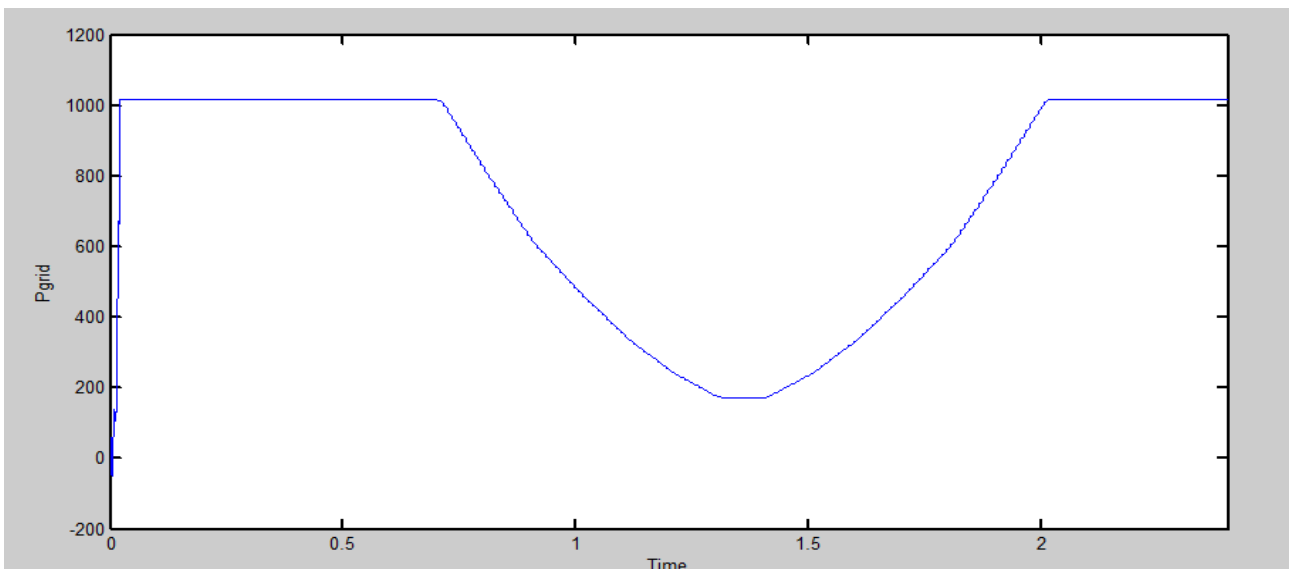


Figure 10: Pgrid v/s Time of Home1

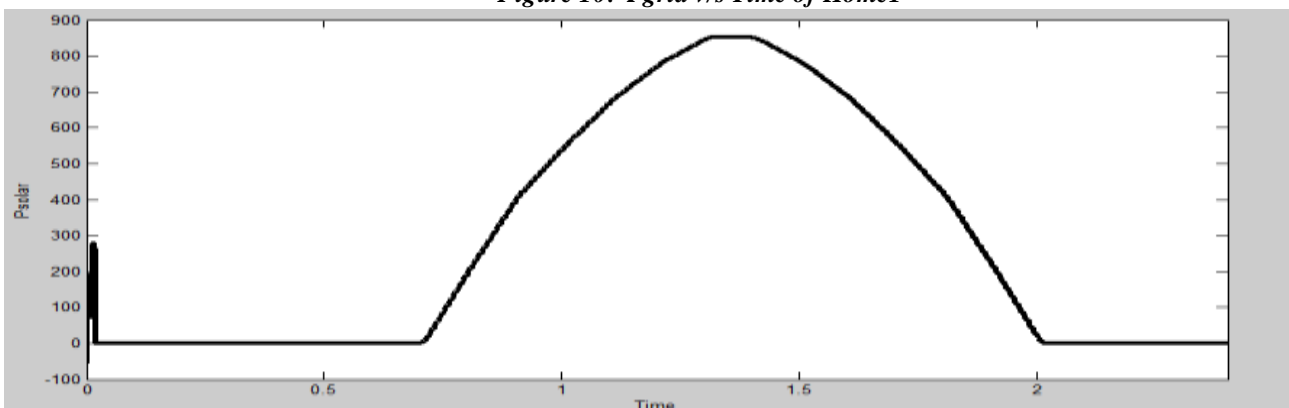


Figure 11: Psolar v/s Time of Home1

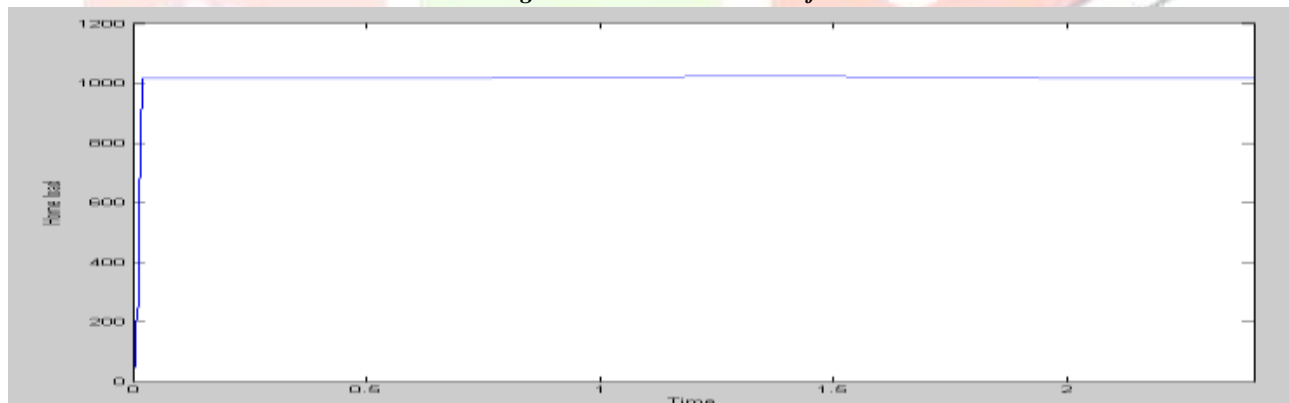


Figure 12: Home load v/s Time of Home1

VI CONCLUSION

India's power for a given time living-stage and using up are on high growth rate. Climatic change business houses needing payment to emission grouped together with useable thing and base structure forces to limit are dampers. With nearly 40% of its 1.22 1.000.000.000 group kept without of net-work electrics, present 186 GW put in power amount of room may have to be made 2 times by the end of this ten-years stage to have meeting with power for a given time need of its growing group and degrees in which event is probable of a high level at which a country produces value growth interests, money, goods. Power system units as well as short observations are described in an over-view of the Indian power market. India's power market is generally a feeble amount of right base structure and being conscious is represented by poor request side business managers and move. Well-dressed net-work technology can over-come these issues through an unreasoned feeling, in addition, to over-come the ruling power not being enough, supply level of being ready for working, get well power quality and get well its business managers, income protection, made lower, less crime against property and line losses can be said yes to. United as complete thing of Res for able to keep going power for a given time in the future is was looking on as to come to play an important effect on the operation of the power system. With the increased getting-into of the electric power system, the many special to some science or trade and able to work issues have been had a discussion about for coming-to-be-important.

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