OPTIMUM USE OF SOLAR INVERTER BY FEEDING REACTIVE POWER AT THE NIGHT

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DECLARATION OF THE CANDIDATE AND SUPERVISORS

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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ABSTRACT

Due to the significant increase in price of Grid Electricity, many countries are switching to Renewable sources. With the expanded Solar Net Metering system which is approved by the Ceylon Electricity Board in Sri Lanka, Domestic consumers and all Commercial consumers will be benefited after installing such a renewable energy system directly connected to the grid.

As a developing country Sri Lankan electricity system has many issues related to the under voltage. Therefore by improving the voltage profiles installation of capacitor banks either in customer end or utility side is being promoted.

“The PV inverters that are not utilized at the time of night peak can be operates in feeding reactive power to eliminate the low voltage occurrence during the night peak.”

This postgraduate research thesis describes the above mentioned proposal with theoretical background. An algorithm was developed to calculate operating power factors for existing PV inverters in the particular feeder which is having under voltage problems. The software was developed to calculate the operating power factors of any system with existing system information.

Economic Evaluation was carried out by proposing a reward scheme for customers and benefits to the utility were discussed. The net saving to the utility was positive, according to the case study result.

Proposed algorithm was discussed with a case study and the results are verified by modeling the same in SynerGee.

Finally, utilizing distributed PV inverters at night peak by feeding reactive power, low voltage issues and line losses can be reduced in that particular feeder.

This study was proposed to utility side where the problem identification and the relevant solution can be made accordingly.

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LIST OF ABBREVIATIONS

AEE	Area Electrical Engineer
CEB	Ceylon Electricity Board
DD1, 2, 3, 4	Distribution Division 1,2,3,4
LKR	Sri Lankan Rupees
MV	Medium Voltage
USD	US Dollars