CHAPTER V

CONCLUSION AND SUGGESTIONS

5.1 Conclusion

Based on the planning and technical analysis of the hybrid-connected rooftop PV system at Warehouse PT. COSL Indonesia Duri Base, the following conclusions can be drawn:

1. The designed PV system consists of 108 Canadian Solar 450 Wp modules, arranged into 3 arrays (18S3P), resulting in a total system capacity of approximately 48,64 kWp. This configuration is sufficient to meet the warehouse's daily peak load of 13,7 kW and total daily energy demand of 139,136 kWh.
2. The inverter selected is the Solis S5-GC(50-60)K 60 kW with an efficiency of 98,7%. This hybrid inverter supports both grid and battery operation and is already equipped with an internal MPPT, which validates the SCC requirement (≥42 A) without the need for an external unit.
3. The battery chosen is the $LiFePO_4$ Delong HV32-10 with a 3S1P configuration (370,2 V, 30,72 kWh). This capacity exceeds the backup requirement, providing a safe margin of reserve.
4. For protection, the system is equipped with AC MCB (125 A) on the inverter output side, DC MCBs (16 A per string and 50 A per array) on the PV side. These devices ensure system reliability and operational safety.
5. The types and sizes of cables are determined according to the current of each part of the system, namely:

   a) Series string (10.96 A) → NYYHY 2×2.5 mm²
   b) Parallel string (32,88 A) → NYYHY 2×16 mm²
   c) Inverter output (95,95 A, 3-phase) → NYY 4×35 mm²

6. The Auto Transfer Switch (ATS) is determined based on the critical load of 40,72% of the total load (8.072 kW), yielding a nominal current of 11,09 A. With a safety factor of 125%, the calculated I_ATS is 13,86 A. Therefore, a ATS with a standard rating of 16 A was selected. The ATS operates only

when the grid supply is lost, while day–night transitions are managed by the inverter control.

7. Overall, the hybrid-connected rooftop PV system design is technically feasible to be implemented at Warehouse PT. COSL Indonesia Duri Base, as it is capable of meeting daytime energy demand with solar power, providing energy backup from the battery, and ensuring supply reliability during grid outages. Thus, the objectives of this study have been successfully achieved.

5.2 Suggestions

Based on the results of this study, the following recommendations can be provided:

1. The field implementation should consider detailed technical aspects such as PV racking design, lightning protection, grounding, and system monitoring to enhance reliability.
2. Economic analysis (investment cost, payback period, and NPV analysis) should be conducted in future research to provide financial feasibility in addition to technical feasibility.
3. Long-term monitoring is recommended once the system is implemented, in order to evaluate the actual performance compared to the design results.
4. Further development can be carried out by integrating a Smart Energy Management System (EMS) to optimize energy utilization between PV, battery, and the grid.
5. Future research may also expand the analysis through software simulations (e.g., HOMER Pro or PVsyst) so that manual calculations can be validated using more comprehensive modeling approaches.

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