

DAFTAR ISI

| | |
|--|-----|
| LEMBAR PENGESAHAN TUGAS AKHIR | i |
| ABSTRAK..... | ii |
| <i>ABSTRACT</i> | iv |
| KATA PENGANTAR | v |
| DAFTAR ISI..... | vii |
| DAFTAR GAMBAR | x |
| DAFTAR TABEL..... | xii |
| BAB I PENDAHULUAN..... | 1 |
| 1.1 Latar Belakang Masalah | 1 |
| 1.2 <i>State of The Art</i> | 2 |
| 1.3 Rumusan Masalah..... | 5 |
| 1.4 Tujuan | 5 |
| 1.5 Manfaat | 5 |
| 1.6 Batasan Masalah | 6 |
| 1.7 Kerangka Berpikir..... | 6 |
| 1.8 Sistematika Penulisan | 8 |
| BAB II TEORI DASAR | 9 |
| 2.1 Pembangkit Listrik Tenaga Surya (PLTS)..... | 9 |
| 2.2 Komponen Utama PLTS..... | 11 |
| 2.2.1 Panel Surya..... | 11 |
| 2.2.2 <i>Solar Charge Controller (SCC)</i> | 13 |
| 2.2.3 <i>Inverter</i> | 13 |
| 2.2.4 Baterai | 14 |
| 2.3 <i>Automatic Transfer Switch (ATS)</i> | 15 |
| 2.4 <i>Wattmeter</i> | 16 |
| 2.5 Perhitungan Kapasitas PLTS <i>Off-grid</i> | 16 |
| 2.5.1 <i>Peak Sun Hour (PSH)</i> | 16 |
| 2.5.2 Perhitungan Beban..... | 17 |

| | | |
|---------------------------------------|--|----|
| 2.5.3 | Kapasitas Baterai | 17 |
| 2.5.4 | <i>Days of Autonomy (DoA)</i> | 18 |
| 2.5.5 | Kapasitas Panel Surya | 18 |
| 2.6 | <i>Performance Ratio</i> | 19 |
| 2.7 | <i>Software Homer</i> | 19 |
| 2.8 | Analisis Ekonomi Sistem PLTS | 20 |
| 2.8.1 | Analisis Biaya | 20 |
| 2.8.1.1 | Biaya Operasional dan Perawatan | 20 |
| 2.8.1.2 | Biaya Siklus Hidup (<i>Life Cycle Cost</i>)..... | 21 |
| 2.8.1.3 | Analisis Aliran Kas..... | 21 |
| 2.8.2 | Analisis Investasi | 22 |
| 2.8.2.1 | <i>Net Present Value (NPV)</i> | 22 |
| 2.8.2.2 | <i>Payback Period (PP)</i> | 22 |
| BAB III METODOLOGI..... | | 23 |
| 3.1 | Metodologi Penelitian | 23 |
| 3.1.1 | Studi Literatur | 23 |
| 3.1.2 | Identifikasi Masalah | 24 |
| 3.1.3 | Analisis Kebutuhan | 24 |
| 3.1.4 | Perancangan PLTS Sistem <i>Off-grid</i> | 25 |
| 3.1.5 | Implementasi dan Pengujian Sistem | 25 |
| 3.1.6 | Analisis Hasil..... | 25 |
| BAB IV ANALISIS DAN PERANCANGAN | | 26 |
| 4.1 | Analisis | 26 |
| 4.1.1 | Analisis Masalah..... | 26 |
| 4.1.2 | Analisis Kebutuhan..... | 26 |
| 4.1.2.1 | Analisis Kebutuhan Sistem..... | 27 |
| 4.1.2.2 | Analisis Perangkat Lunak (<i>Software</i>) | 27 |
| 4.1.2.3 | Analisis Perangkat Keras (<i>Hardware</i>)..... | 27 |
| 4.2 | Perancangan | 28 |
| 4.2.1 | Perancangan dan Perhitungan Sistem | 28 |
| 4.2.1.1 | Perhitungan Beban..... | 29 |

| | | |
|----------------|--|----|
| 4.2.1.2 | Perhitungan Panel Surya..... | 29 |
| 4.2.1.3 | Perhitungan SCC | 30 |
| 4.2.1.4 | Perhitungan <i>Inverter</i> | 31 |
| 4.2.1.5 | Perhitungan Baterai | 31 |
| 4.2.1.6 | Perancangan <i>Wiring</i> ATS | 32 |
| 4.2.2 | Perancangan PLTS (<i>Software</i>)..... | 33 |
| 4.2.3 | Perancangan PLTS (<i>Hardware</i>) | 35 |
| BAB V | IMPLEMENTASI DAN PEGUJIAN | 37 |
| 5.1 | Implementasi..... | 37 |
| 5.2 | Pengujian | 39 |
| 5.2.1 | Pengujian Panel Surya | 42 |
| 5.2.2 | Pengujian <i>Inverter</i> | 49 |
| 5.2.3 | Pengujian Baterai pada Beban | 49 |
| 5.2.4 | Pengujian Sistem ATS pada Beban | 51 |
| 5.3 | Analisis Ekonomi..... | 52 |
| 5.3.1 | Nilai Investasi Awal PLTS | 52 |
| 5.3.2 | Nilai Operasional dan Perawatan PLTS | 52 |
| 5.3.3 | Biaya Siklus Hidup PLTS..... | 53 |
| 5.3.4 | Biaya Energi yang Dihasilkan PLTS | 53 |
| 5.3.5 | Nilai Arus Kas Rancang Bangun PLTS..... | 54 |
| 5.3.6 | Nilai <i>Net Present Value</i> PLTS | 54 |
| 5.3.7 | <i>Payback Period</i> (PP)..... | 55 |
| BAB VI | KESIMPULAN DAN SARAN | 56 |
| 6.1 | Kesimpulan | 56 |
| 6.2 | Saran | 57 |
| DAFTAR PUSTAKA | | 58 |
| LAMPIRAN | | 60 |