

Optimisation of a Stand-Alone Wind-Solar Hybrid Power Generating System for a Green Home

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Motivation

- The country is currently in a drive to use alternative sources of energy to complement the power from the national grid.
- Such alternative sources of energy include solar and wind.
- The current installation setups of solar and wind power generating systems are not maximizing usage of the power generated.

Background of the problem

Charge controller losses

- A charge controller works in three different modes:
 - Bulk
 - Absorption
 - Float
- During absorption charging the current is reduced.
- At float charging the charging current is almost zero.

Background of the problem

Mismatch losses

- For safe charging a battery bank requires a charging current between 5% and 13% of its capacity.
- Solar panels often exceed this capacity thus destroying the batteries.

Methodology

- A typical solar system designed to supply 2700 Wh on a low income home was studied for a year and the average daily demand was recorded as follows;

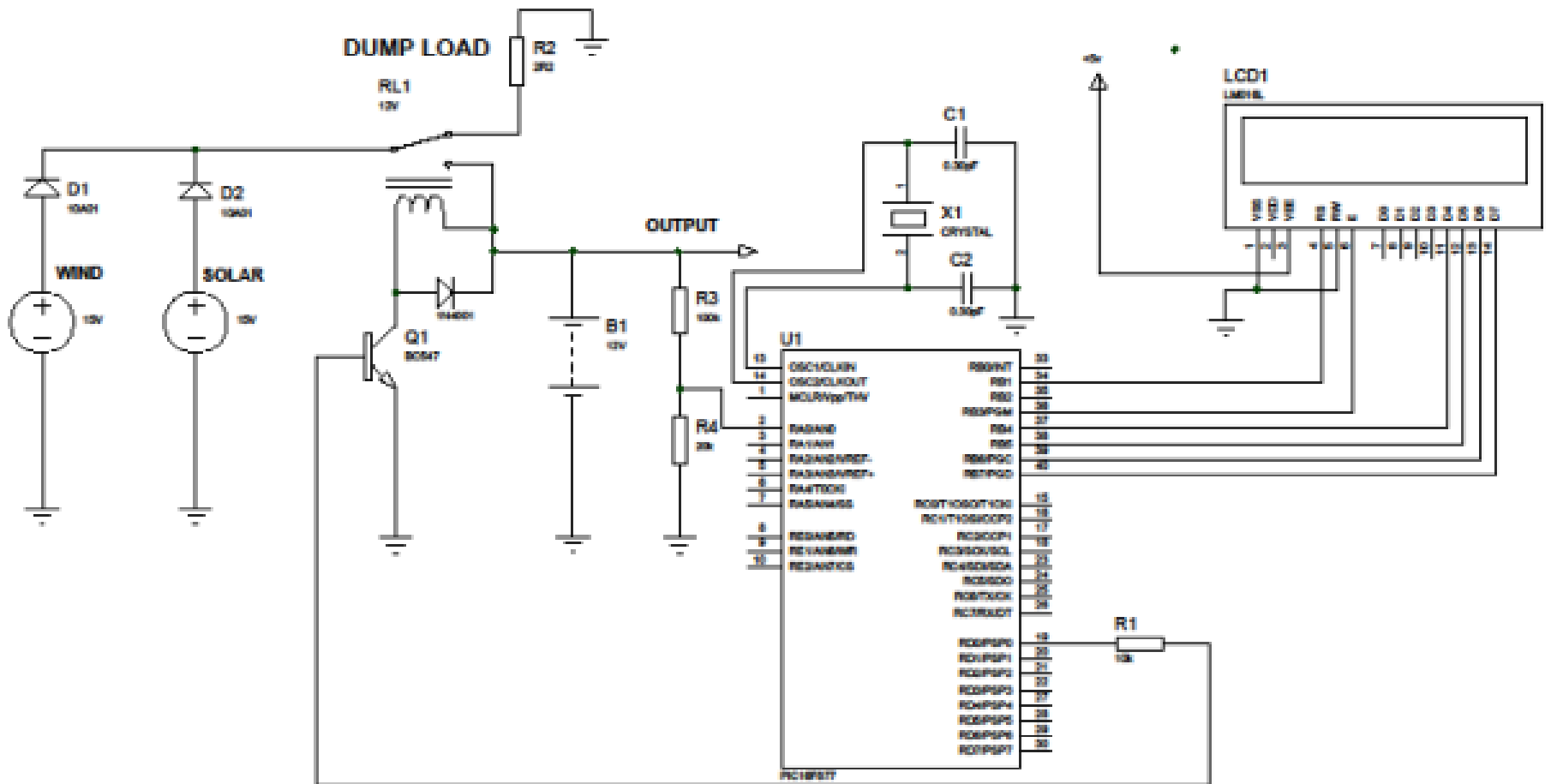
Day	Avg. daily demand	Surplus
Mon	1750	950
Tue	1752	947
Wed	1755	945
Thur	1754	946
Fri	1995	705
Sat	2690	10
Sun	2570	130

- Average weekly surplus power generated amounted to 4.633kWh
- 240.916kWh/year
- 6MWh/25 yrs
- \$422 loss on standard tariff.

Proposed Solution

- This work proposed a control system that can utilise the excess power generated by heating water that can be used in the bathroom or kitchen.
- Average weekly surplus power generated amounted to 4.633kWh
- This energy can heat 160 litres of water from 25 deg to 50 deg.
- Which translates to 8320 litres in a year.

Working Principle



Conclusion

- The developed control system was able to increase utilization from 75% to almost 100%.
- The system was projected to bring savings of \$145 per year on a high income home.
- It was also projected to bring savings of about \$48000 per year for solar powered air conditioned 100 room hotel.

THANK YOU