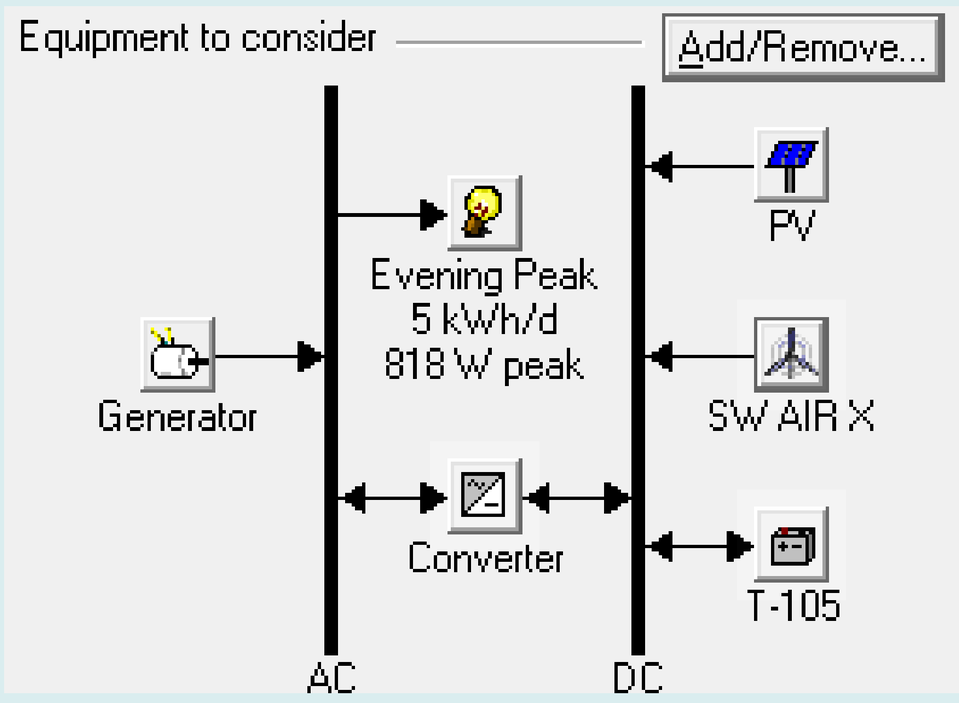
Exploring the Role of Hybrid Energy Systems for Enhancing Green Energy Potential in Urban Areas

HYBRID ENERGY SYSTEMS FOR IMPROVING SUSTAINABLE URBAN ENERGY ATTEMPT TO COMBINE ENERGY SUPPLY, PUBLIC TRANSPORT MODERNIZATION, AND RESIDENTIAL/COMMERCIAL ENERGY DEMAND REDUCTION. DUE TO REDUCED NONRENEWABLE RESOURCES, ALTERNATIVE AND AUGMENTED ENERGY SOURCES ARE REQUIRED EVERYWHERE.

Conclusion

This research explains a typical urban environment to determine the hourly load profile for any urban region to exhibit the role of a hybrid energy system to raise energy potential. It summarizes past, present, and future trends in energy system design, development, and implementation. The design can be enlarged to implementations with several other combinations to provide cleaner and cheaper energy.



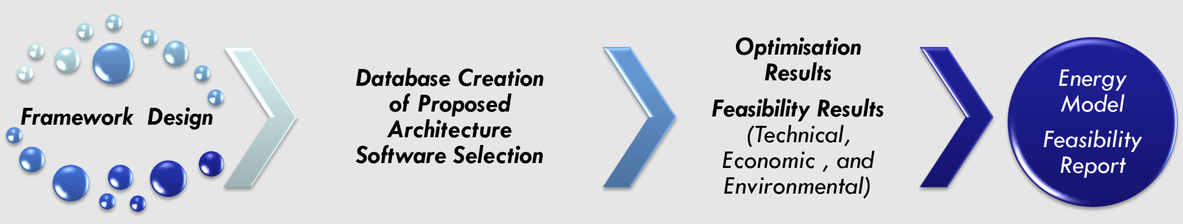
SYSTEM ARCHITECTURE FOR ENERGY SIMULATION MODELLING

Introduction

- **Scientific and industrial development has given escalation to a rapidly increasing energy demand.**
- **Alternative and augmented sources of energy, are being sought everywhere due to the depletion of other non-renewable resources.**
- **Solar and wind energy have emerged as one of the cleaner energy sources offering a promising solution with better efficiency.**
- **Therefore, the attention has now shifted towards the large-scale propagation of hybrid renewable energy systems.**

Aim

- **Evaluation of energy sustainability by combining data from a wide range of sources.**
- **To suggest a framework for future development to address operational challenges for energy sector.**
- **Summarizing and communicating multifaceted information for quantitative or qualitative analysis.**



Energy Simulation Modelling Methodology Framework

Objective

- **Evaluation Of Costs Of The Energy Systems**
  - ✓ **Investment Costs**
  - ✓ **Costs For Maintenance,**
  - ✓ **Servicing And Insurance Against Damage**
- **Analysis Of Cash Flows**
- **Sensitivity analysis for significant Parameters.**

Tools

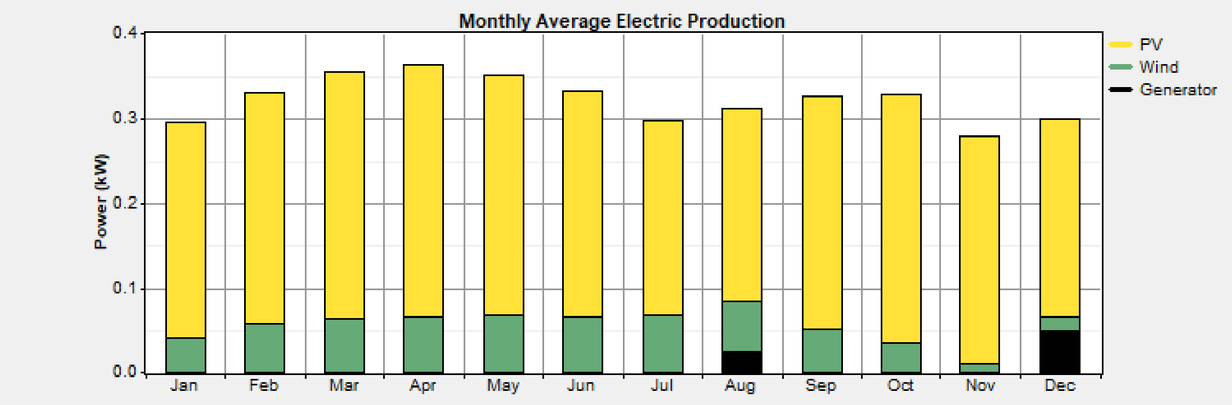
- **HOMER (Hybrid Optimization of Multiple Energy Resources) Tool**
- **ArcGIS 9.x/10.x**
- **Energy Plus 8.0**
- **PV Studio 5.0**
- **Solar Path Finder Assistant 5.0**
- **Geospatial Toolkit (NREL)**

Production	kWh/yr	%
PV array	2,331	83
Wind turbine	436	15
Generator	55	2
Total	2,823	100

Consumption	kWh/yr	%
AC primary load	1,825	100
Total	1,825	100

Quantity	kWh/yr	%
Excess electricity	544	19.3
Unmet electric load	0.00000820	0.0
Capacity shortage	0.00	0.0

Quantity	Value
Renewable fraction	0.980



Trends Of Monthly Average Electricity Production (in kW)

Scheme of the small standalone application represents a household or other single load with one or two small evening loads such as a television and efficient room lighting, and a small fan only during the day. Average 5 kWh/day, peak 818 W in HOMER.

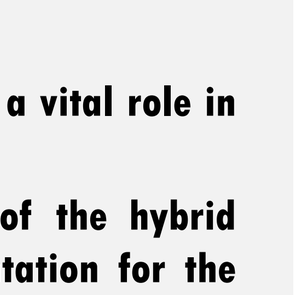
Data Analysis

- **Energy Simulation Modelling**
- **Economic Analysis**
  - *Net Present Value(NPV)*
  - *Economic Indicators*
  - *Economic Considerations on PV installations*

Summary

- **Due to continued acute energy shortage, it may play a vital role in its economic development.**
- **Summarizes the past, present, and future trends of the hybrid energy system design, development, and implementation for the urban region, which can be used in other parts of the world.**
- **PV technology fills a significant need in supplying electricity, creating local jobs and promoting economic development, avoiding the external environmental costs associated with traditional electrical generation technologies.**
- **The case of a typical urban setup to understand the progressions with the use of a hybrid energy system.**
- **Policies have created investment friendly environment for entire range of activities.**

The main limitation of the study is it limitation of database access for accomplishing the research work. Therefore, the papers not indexed in Scopus are not screened and considered for this research. In the future, other researchers may include other databases like MEDLINE, PubMed, AGRICOLA, ERIC, Web of Science (WoS) and Google Scholar.



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