IE 453: Energy Systems Planning

Term Project Proposal

“A MILP methodology to optimize sizing of PV - Wind renewable energy systems” [1]

Group Members

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As our Energy Systems Planning project, we decided to build our project based on the paper titled “A MILP methodology to optimize sizing of PV - Wind renewable energy systems” (Lamedica et al., 2018). The paper proposes a mixed-integer linear programming (MILP) methodology to calculate the optimal sizing of a hybrid wind-photovoltaic power plant in an industrial area in Rome used as a train depot for maintenance purposes. Researchers consider the load needed, the physical and geometric restrictions, the cost of operation and maintenance, and the amount of electricity used by the public network. In the paper, monthly load and seasonality fluctuation are taken into account. Real world data will be found by us and the data for the solar and wind potentials will be simulated according to the given graphs. The outcome of the mathematical model indicates the best possible solutions and the pertinent savings made possible by fusing the availability of renewable energy with the requirements of plant activities. Moreover, the significance of renewable energy sources (RESs) in contemporary businesses, the expansion of RESs in Italy, the potential rise of microgrids (MGs), and the difficulties in integrating large-scale RES production with power systems are also covered in the paper. The paper concludes that using mathematical models while creating an MG gives a comprehensive understanding of complicated systems and enables wise judgments. The main upsides of this paper is can be broken down into three main categories:

1. The availability of buying the required energy exceeds the system’s capacity from the grid, which addresses the intermittency problem of renewable sources.
2. The requirements for the case were logically considered, covering load requirements, physical and geometric constraints for renewable plant installation, operating and maintenance costs of both wind and PV power plants, and electric energy absorbed by the public network.
3. Investment evaluation and economic analysis were also conducted, which may attract other investors interested in such systems.

Hence, overall, this comprehensive approach that is followed in the paper, implementation on a real case and location, and inclusion of the economic aspects are the main reasons why we have chosen this paper as a group.

REFERENCES

[1] R. Lamedica, E. Santini, A. Ruvio, L. Palagi, and I. Rossetta, “A MILP methodology to optimize sizing of PV - wind renewable energy systems,” *Energy*, vol. 165, pp. 385–398, 2018.