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| **Title:** | Design and Development of Sustainable Smart DC Micro-Grid and its Control with Multiple Renewable Sources | | |
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| **Abstract:** |  |
| Abstract— Smart DC micro-grid systems connect the multiple distributed DC power generation sources into a small network serving some or all parts among the various participating energy users. It is mainly dedicated to local power generation systems for both local DC and AC loads. Thus, it can provide benefits including reduced energy costs, increased overall energy efficiency, improved environmental performance, and system reliability. This paper aims to study a sustainable smart DC microgrid with multiple renewable energy sources as well as its control strategies. Our study is based on wind and solar power as renewable energy sources. A new scheme is proposed to make it cost-effective, energy-efficient, and reliable design, technically and economically sustainable, and optimized energy supplier. We studied both energy sources and identified the parameter specifications for electrical energy generation to meet energy as well as peak power demands of remote villages by producing renewable energies locally. It also reports price and performance forecasting for solar and wind energy, grid energy storage, and microgrid power electronics. Grid modeling and simulation (including loads, storage energy, energy production, and generation cost) are done by MATLAB. Finally, it discusses the existing problems of this grid control and current situations on the regular grid and then recommends for implementation of intelligent control and power management system that would make this micro-grid design more perfect. | |