

Development of an Energy Independent DC Building Demonstrator for Insulated Island Site

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Abstract : In the context of climate change, it is essential that island territories gain energy autonomy. Currently mostly dependent on fossil fuels, the island of Reunion located in the Indian Ocean nevertheless has a high potential for solar energy. As the market for photovoltaic panels has been growing in recent years, the issues of energy losses linked to the multiple conversions from direct current to alternating current are emerging. In order to quantify these advantages and disadvantages by a comparative study, this document presents the measurements carried out on a direct current test bench, particularly for lighting, ventilation, air conditioning and office equipment for the tertiary sector. All equipment is supplied with DC power from energy produced by photovoltaic panels. A weather station, environmental indoor sensors, and drivers are also used to control energy. Self-consumption is encouraged in order to manage different priorities between user consumption and energy storage in a lithium iron phosphate battery. The measurements are compared to a conventional electrical architecture (DC-AC-DC) for energy consumption, equipment overheating, cost, and life cycle analysis.

Keywords : DC microgrids, solar energy, smart buildings, storage

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