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Title of the paper:
A Cybernetic Multi-Agent Approach for a Micro Grid in Rural Areas

Abstract:
Due to the rising installed power of distributed regenerative energy sources and enhanced flexibility by the installation of local house batteries and battery electric vehicles, today's power grids are facing new challenges. In rural areas farmers are using their roof surfaces to harvest sun energy with photovoltaic cells. This leads to the fact, that small groups of houses may produce more power than the transformer is able to feed into the grid. This paper examines a supervisory control method to route the locally generated energy intelligently to demanding consumers and incorporates local power storages. We propose a design approach that uses the viable system model by Stafford Beer for deriving a hierarchical structured but also distributed control system. The layers of the model possess agents that bargain between local components and beyond household border to act as energy management. Hence it results in a market-based behavior to route the energy optimally. Eventually this cybernetic agent architecture is implemented as Simulink model and evaluated in the rural grid scenario.

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