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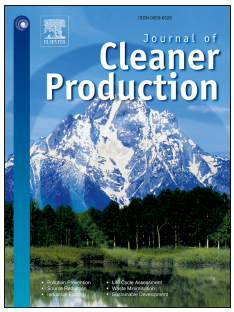

Energy flexibility of manufacturing systems for variable renewable energy supply integration: Real-time control method and simulation

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Energy flexibility of manufacturing systems for variable renewable energy supply integration: real-time control method and simulation

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Abstract

A central strategy for climate change mitigation is expanding electricity generation from renewable energy sources, with an increasing share of decentralized generation. Some of these sources are variable renewable energy (VRE) sources, such as wind and solar resources. Measures have to be enacted to integrate VRE into an existing power supply system. One approach is switching from grid electricity supply towards direct demand of VRE generation to reduce grid transportation requirements and variable electricity grid feed-in. Within this context, energy flexibility control of manufacturing systems can be used to match energy demand of manufacturing systems with on-site VRE generation. Nonetheless, due to their inherent dynamic behavior, interlinked manufacturing systems provide additional operational and technical challenges such as maintaining throughput when energy control actions are executed. Further, stochastic influences from, for example, VRE generation and manufacturing system behavior constitute the requirement for a real-time approach on the level of manufacturing execution systems. Consequently, this paper presents a method for real-time control of manufacturing systems with several processes and intermediate buffers to increase utilization of (on-site) generated VRE without compromising system throughput. An initial method for an energy flexibility

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