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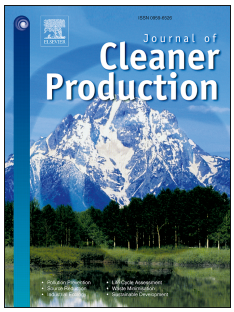

Cooling down: A simulation approach to reduce energy peaks of reefers at terminals

J.H.R.(Ron) van Duin, H. (Harry) Geerlings, A. (Alexander) Verbraeck, T. (Tushar) Nafde

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ABSTRACT

The increase in population, high standards of living and rapid urbanization has led to an increasing demand for food across the globe. The global trade has made it possible to meet this demand by enabling transport of different food products from one part of the world to another. In this trade, refrigerated containers (reefers) play an important role, due to their ability to maintain the quality of product throughout the journey. However, the transportation and operation of reefers requires a constant supply of power throughout the supply chain. This results in a significant energy consumption by reefers. When large numbers of reefers are involved, this results in high amount of energy consumption at terminals as well. From a terminal perspective, the monthly throughput of reefers shows a lot of variation due to the seasonality of food products. As a result, the growth of reefer trade, the seasonality of food trade and the special requirements of reefers has led to an increase in the peak power demand at terminals. Because utility companies apply extra charges for the highest observed peak demand, it is beneficial for terminals to keep this demand as low as possible to reduce energy costs. There is no prior research on peak energy consumption caused by reefers at a terminal To investigate the opportunities for container terminals to reduce their peak demand, an energy consumption simulation model is developed. With the model two energy reduction strategies are tested to analyze their impact on peak demand: intermitted distribution of power among reefer racks and restriction of peak power consumption among operating reefers. Both strategies show significant opportunities for cost reductions.