

Accepted Manuscript

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PII: S0959-6526(16)32229-6

DOI: [10.1016/j.jclepro.2016.12.166](https://doi.org/10.1016/j.jclepro.2016.12.166)

Reference: JCLP 8741

To appear in: *Journal of Cleaner Production*

Received Date: 3 August 2016

Revised Date: 27 December 2016

Accepted Date: 30 December 2016

Please cite this article as: Li J-M, Li A-H, Varbanov PS, Liu Z-Y, Distance potential concept and its applications to the design of regional biomass supply chains and solving vehicle routing problems, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2016.12.166.

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Distance potential concept and its applications to the design of regional biomass supply chains and solving vehicle routing problems

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Abstract: This paper presents a new concept, distance potential, which is the sum of the distances from the source points to the demand point being considered (for supply chains), or the sum of the distances from the demand (customer) being considered to other demands and the depot (for vehicle routing problems). We also investigate the applications of the new concept to the design of regional biomass supply chains and solving vehicle routing problems. In designing a supply chain, the values of the distance potentials are used to determine the precedence order: the demand point with the largest distance potential value will be satisfied first. While satisfying a demand point, the source point with the shortest distance to the demand will be used first. In solving a vehicle routing problem, the new concept is used to identify the customer which should be included in the first routing to be considered. Then, the network can be designed starting from the customer identified, and based on a few heuristic rules proposed in this paper. The results obtained in this work are comparable to or even better than that obtained in the literature. It is shown that the method proposed is simple and of high computational efficiency.

Keywords: biomass energy; supply chain; distance potential; vehicle routing problem

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