

Dear Prof. Borgonovo,

Thank you for the opportunity to revise and resubmit my article, "Are Solar Panels Commodities?" In this revision I have worked at doing a better job of placing my article within the operations research literature. I have done this most substantively in two areas. First, topically. I try to show how this article fits in with the operations research literature on solar panels, and in particular the literature on investment and procurement of solar panels. The first paragraph of page 1 now reads:

Solar power has been the fastest growing source of energy generation in recent decades, and a large and growing literature within operations research addresses the challenges associated with this technology. One branch of the literature considers the operation of electricity markets and transmission planning with large shares of solar and other intermittent energy (see for example Gianfreda and Bunn (2018), Pritchard et al. (2010), or Morales et al. (2014)). This article, however, contributes to the branch of the literature that concerns investment decisions, procurement and supply chains for solar power. A popular approach has been designing multicriteria decision models (MCDM) for solar investment and planning decisions. Here, multicriteria takes on a range of meanings. For example, it can mean modelling dueling objectives between governments and developers (Garcia-Bernabeu et al., 2016). Alternatively, it can refer to the decision of a planner who must balance financial considerations with environmental and social factors (Georgopoulou et al., 1997; Henao et al., 2012; Linares and Romero, 2000), or analysing how multiple sources of risk, such as prices and weather, inform the design decisions of a photovoltaic plant (Merzifonluoglu and Uzgoren, 2018). Finally, and most closely related to the subject of this article, a multicriteria decision model can refer to the decision of choosing a certain type of solar panel. Socorro García-Cascales et al. (2012), for example, analyse the decision of choosing panel characteristics such as monocrystalline vs. polycrystalline or alternatively, various thin-film type panels. The criteria used for choosing a certain type of cell include manufacturing cost, efficiency, and emissions of greenhouse gases during manufacturing. Notably, however, an analysis of procuring solar panels of uncertain quality and reliability does not exist in the literature, to the best of my knowledge.

In addition, I have tried to place the article within the operations research literature theoretically, showing how the article relates to research on asymmetric information of quality in procurement and supply chains. The last two paragraphs of page 6 now read:

Issues of asymmetric information of quality in supply chains and purchasing manager decisions have become prominent in the operations research literature. Quigley et al. (2018), noting that validating the quality of suppliers is expensive, develop a model to optimally choose an investment level for ensuring quality of supplies. Nagurney et al. (2014) model a situation with information asymmetry of quality with multiple supply and demand markets, where spatial distance is correlated to information asymmetry. This model was motivated by an increasingly globalised supply chain, which of course also describes the sourcing of solar panels.

Bakshi et al. (2015) develop a game theoretic model of a market where reliability is uncertain, and the seller holds private information. The authors show how service contracts can be used as credible signals of product quality. Gumus et al. (2012) analyses a similar dynamic, where a buyer must choose between a reliable but more expensive supplier and a less reliable but cheaper supplier who also holds private information about quality. Here a guarantee is used as a signal of quality. Interestingly, in relation to this article, a spot market is allowed to exist for the underlying good, thus implying that the underlying good is a commodity. Reliability here is then, presumably, associated not with the good but the supplier. Related research on procurement often assumes the existence of spot- or other financial markets (Zhao et al., 2015; Li et al., 2018). But to my knowledge there lacks research analysing the underlying conditions necessary for the formation of such financial markets in the operations research literature. In the context of this article, one of those conditions would be that the traded good is a commodity with a certain uniform quality level.

Otherwise, I have added references and some added points to the discussion of the definition of commodity (page 1, paragraph 3), definition of quality in operations research (page 2, paragraph 1), and the discussion of warranties (page 4, paragraph 1).

If there are aspects of the article that you still find lacking, I am happy to try to address them in a further revision.

Thank you for your time and consideration,

Best wishes,

Johannes Mauritzen