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Using Advanced Life Cycle Costing for Assessing Novel Business Models – Cases from Manufacturing and Beyond.

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This paper discusses how Life cycle costing (LCC) or Total cost of ownership (TCO) can be applied in different contexts and for different stakeholder perspectives to assess novel business models based on circularity. Environmental LCC models consider a perspective from cradle to grave for equipment similar to life cycle assessments and are intended to be used as a complementary evaluation method in sustainability assessments (Hermann et al 2011, Enparantza et al 2006; Hunkeler et al. 2008; Citroth et al. 2015). Close collaboration between suppliers and users of machining equipment over the life cycle potentially leads to improved efficiency and performance. Equipment manufacturers monitor the use phase, and all maintenance and modification plans are thoroughly implemented. Therefore the equipment's condition and suitability for re-use, re-manufacturing or recycling can be predicted, and end-of-use options can be planned on a large scale. Machine users consider product service systems or functional supply when purchasing commodities. This paper elaborates how LCC, including non-linear factors, for manufacturing equipment from a Swedish company can be used to develop business models and the supplier customer relationships. As an additional example with a business to consumer relationship, the case of used electric vehicle batteries as storage solutions in low voltage grids is discussed.

Today, industrial investment and costing models often mainly take estimated energy into account while more advanced models use empirical cost data based on fluctuating energy, fluid and maintenance demand and prices during the use phase. In the current study, factors that influence machine design and business relations between the user and the machine supplier are analyzed. In addition, significant aspects that have relevance to the case study will be accounted for. Impact from automation, and predicted technology development such as energy storage is reflected upon. For machining equipment case, we will outline how LCC results is used to give guidelines on how to consider this when the customer is choosing a business relation to the supplier. Aspects like energy use, energy storage, maintenance and repair costs, downtime costs as well as chemicals need to be considered when setting up the supplier-customer relationship.

Different stakeholder perspectives and a wider system including open loop recycling is discussed for the case of used electric vehicle batteries as storage solutions in low voltage grids.

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