This paper proposes a methodology to optimize the trading strategies of a proactive distribution company (PDISCO) in the real-time market by mobilizing the demand response. Each distribution-level demand is considered as an elastic one. To capture the interrelation between the PDISCO and the real-time market, a bi-level model is presented for the PDISCO to render continuous offers and bids strategically. The upper level problem expresses the PDISCO's profit maximization, while the lower-level problem minimizes the operation cost of the transmission-level real-time market. To solve the proposed model, a primal-dual approach is used to translate this bi-level model into a single-level mathematical program with equilibrium constraints. Results of case studies are reported to show the effectiveness of the proposed model. (C) 2016 Elsevier Ltd. All rights reserved.