

Game-theoretic modelling of natural gas networks and markets

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First, we summarize some of the physical aspects of natural gas pipelines from a game theoretic perspective and show how flow externalities do arise. Second we give an overview on the proposed game theoretical approaches to gas transportation and trade, with an emphasis on cooperative approaches. Third, we propose a linear-programming based model to characterize the bargaining power of countries in the natural gas markets, focussing primary on pipeline transports. The defined framework distinguishes between state and privately owned pipelines. The model serves as a basis for a cooperative savings game, where the reference scenario is the no-trade case. As the model accounts for transfer profits paid by a coalition to external countries, it can also serve as a basis for a partition function form game. We show that a partition function form game is more efficient in representing the bargaining power of countries originating from transfer fees.