

# Investment and Efficiency under Incentive Regulation: The Case of the Norwegian Electricity Distribution Networks

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## Abstract

Following the liberalisation of the electricity industry since the early 1990s, many sector regulators have recognised the potential for cost efficiency improvement in the networks through incentive regulation aided by benchmarking and productivity analysis. This approach has often resulted in cost efficiency and quality of service improvement. However, there remains a growing concern as to whether the utilities invest sufficiently and efficiently in maintaining and modernising the networks to ensure long term reliability and also to meet future challenges of the grid. This paper analyses the relationship between investments and cost efficiency in the context of incentive regulation with ex-post regulatory treatment of investments using a panel dataset of 126 Norwegian distribution companies from 2004 to 2010. We introduce the concept of “no impact efficiency” as a revenue-neutral efficiency effect of investment under incentive regulation which makes a firm “investment efficient” in cost benchmarking practice. Also, we estimate the observed efficiency effect of investments in order to compare with no impact efficiency and discuss the implication of cost benchmarking for investment behaviour of network companies.

**Keywords** Investments, cost efficiency, incentive regulation, distribution network

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