

*Stephanie Ropenus*

## **EXEMPTION OR NOT? – A THEORETICAL PERSPECTIVE ON UNBUNDLING OF DISTRIBUTED GENERATION**

Systems Analysis Department, B. 130, Risø National Laboratory, Technical University of Denmark,  
P.O. Box 49, DK-4000 Roskilde, Denmark  
Phone: (+45) 4677 5144, Fax (+45) 4677 5199, E-mail: Stephanie.Ropenus@risoe.dk

### **Overview**

This paper examines from a theoretical perspective the impact of unbundling of distribution system operators (DSOs) on distributed generation (DG). The liberalisation of the electricity industry entails the vertical separation of competitive segments (e.g., generation and supply) from regulated segments (network activities) [1]. According to the Electricity Directive [2], the Member States of the European Union have to implement legal and functional unbundling of DSOs by July 2007. However, integrated electricity undertakings serving less than 100,000 connections may be exempted from this provision at the national level. This implicates that a relatively large share of DSOs falls under the exemption clause [3,4]. The effect of unbundling of DSOs on DG, which is fed directly into the distribution network, is ambiguous: on the one hand, unbundling is a presupposition for non-discriminatory network access and the avoidance of cross-subsidies between the generation and the network segment. Therefore, unbundling is necessary for the creation of a level playing field for incumbents and new DG operators that enter the market. On the other hand, unbundling deprives DSOs of the possibility to invest in and operate DG units themselves [5] which may be detrimental for an increase in DG.

The goal of this paper is to theoretically analyze the impact of unbundling on the profit structure of a vertically integrated incumbent DG operator. Prior to unbundling, the incumbent DG operator has a dual revenue stream consisting of her revenue obtained from electricity sales in the generation market and from the provision of network services where she operates the monopoly. In the absence of regulation, the vertically integrated DG operator seeks to maximize her profit by setting both the price for her electricity delivery and the network access price other electricity producers have to pay for the provision of network services. After the implementation of unbundling, the DG operator solely sells electricity on the generation market and has to pay an access price for usage of the network that is then operated by an independent DSO subject to network regulation.

### **Methods**

A simple analytical model with a DG monopolist and a competitive fringe will be applied to analyze the effect of unbundling on the profit structure of the vertically integrated DG operator, i.e., the DG monopolist.

The DG monopolist seeks to maximize its profit by setting two parameters: the access price and the price for electricity. The competitive fringe acts as a price taker and makes its supply decision accordant to the network price it has to pay and the electricity price it will obtain for electricity sales.

### **Preliminary Results**

The electricity price set by the DG monopolist after the implementation of unbundling will be higher than prior to vertical disintegration as profits now solely stem from electricity sales, and there is no more markup derived from the network segment.

In the presence of vertical integration, the electricity price set by the vertically integrated DG operator is dependent on her incurred generation and network costs. The access price

that the charges are higher the higher her incurred costs from running the network are. Furthermore, the access price is the higher the lower the supply costs of the competitive fringe in the generation market are.

### Conclusions

The impact of unbundling on DG deployment is ambiguous. For the incumbent DG monopolist, the retention of vertical integration is favourable as it allows her to obtain and cross-subsidize revenue from two business segments, namely the generation market and the network business. This finding is of particular relevance as the current level of transparency in connection charging methodology in the EU-15 generally remains low [6], which in the presence of vertical integration may increase the potential for cross-subsidies. However, for the very same reason, from the perspective of the competitive fringe unbundling is the preferable solution to guarantee equal conditions on the generation market. When unbundling is properly implemented, the access price set by the independent DSO bound to regulation equals the marginal costs of providing access that all DG operators have to pay.

### References

- [1] Joskow, P.L. (2003) "Electricity Sector Restructuring and Competition: Lessons Learned", *Latin American Journal of Economics*, December 2003, 40, Vol. 121, p. 548
- [2] "Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the market in electricity and repealing Directive 96/92/EC", OJ L 176/37-55
- [3] Gómez-Acebo & Pombo Abogados, S.L. Charles Russell LLP (2005) "Unbundling of Electricity and Gas Transmission and Distribution System Operators", *Final Report*, 1 December 2005
- [4] Ropenus S. Skytte K. (2005) "Regulatory Review and Barriers for the Electricity Supply System for Distributed Generation in EU-15" *Conference Proceedings of International conference on future power systems, FPS 2005, Meeting the challenges of a reliable and sustainable power supply*, Amsterdam, NL, 2005
- [5] van Werven, M.J.N. Scheepers, M.J.J. (2005) "DISPOWER. The Changing Role of Energy Suppliers and Distribution System Operators in the Deployment of Distributed Generation in Liberalised Electricity Markets", June 2005, p. 25
- [6] Knight, R.C. Montez, J.P. Knecht, F. Bouquet, T. (2005) "Distributed Generation Connection Charging Within the European Union. Review of Current Practices, Future Options and European Policy Recommendations", *ELEP Project – European Local Electricity Production, (2005), Deliverable 2.1, Issue 1*, p. 3