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**BUSINESS MODELS FOR SUSTAINABLE ENERGY-  
EVIDENCE FROM THE GERMAN SOLAR THERMAL & CHP  
MARKETS**

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**Overview**

Distributed renewable energy systems are widely seen as an important element of a future sustainable energy system. On the residential building level, two important technologies are solar thermal energy and combined heat and power generation (CHP). While there has been strong technological progress in this area, large-scale market penetration is still hampered by a lack of successful business models (Chesbrough and Rosenbloom 2002). Business models have been widely investigated with regard to e-commerce (Afuah and Tucci 2001), and a future distributed energy system has been referred to as the "energy internet" by the Economist and others, but surprisingly little research has been done from management scholars into what makes a successful business model for a distributed energy venture.

**Methods**

Our paper is based on an extensive literature review and an empirical survey of 64 German firms in the solar thermal and CHP sectors. Company executives were asked to rate the effectiveness of alternative value propositions for different customer groups, to identify current and future popularity of alternative delivery configurations (distribution channels) and to comment on current and future revenue models in these two sectors.

**Results**

Our survey shows that distributed energy firms are predominantly using traditional revenue models based largely on hardware sales. Installation and maintenance services are offered by 43 % of solar thermal and 69 % of CHP firms. Financing and contracting services, on the other hand, are offered by only 6-9 % of solar thermal and 15-23 % of CHP firms. Only 12 % of the CHP firms in our sample offer fuel supply options. In terms of distribution channels, two thirds of the solar heating firms supply into the traditional heating boiler delivery chain, while just 7.2 % sell their products directly to the final customer and only 0.6 % use energy suppliers as distributors. For CHP, distribution via energy suppliers is done by 14.0 % of the firms, whereas the traditional heating industry has a share of just under 50 %. The level of internationalization of the firms in both industries is low, with a share of 50.8 % (94.4 %) of revenues being generated domestically in Germany by solar thermal and CHP companies respectively. Companies in both industries have experienced double-digit growth rates over the past five years and expect annual growth rates of 21.8 % (29.0 %) for the 2007-2010 period, indicating the high attractiveness of the distributed energy business. In terms of value proposition, the survey respondents saw a key differentiating factor between customers with high and low environmental awareness in that "eco-active" customers are looking at life-cycle cost (initial + operating cost), while "eco-ignorant" customers are predominantly concerned with initial cost, pointing to the need to offer appropriate financing packages (to lower initial cost) if distributed energy is going to diffuse from eco-niche to mainstream market (Villiger et al. 2000).

### **Conclusions**

Our research fills an important gap in the literature about distributed energy in that we investigate the success of business models from a company perspective. The empirical results clearly show that both the solar thermal and the CHP sectors are still nascent industries with a lot of experimentation with regard to key elements of the business model including the value proposition, the configuration of value creation and the revenue model. Business model innovation, such as for example new revenue models and financial service packages, will be helpful in further accelerating market penetration in these high-growth segments of the energy market.

### **References**

- Afuah, A. & Tucci, C.L. 2001. Internet business models. New York: McGraw-Hill.
- Chesbrough, H., Rosenbloom, R.S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies." *Industrial and Corporate Change* 11(3), 529-555.
- Boehnke, J. (2007). Business models for micropower. PhD thesis, University of St. Gallen (forthcoming).
- Villiger, A., Wüstenhagen, R., Meyer A. 2000. *Jenseits der Öko-Nische [Beyond the Eco-Niche]*. Basel: Birkhäuser.