

Green energy market development in Germany: effective public policy and emerging customer demand

Rolf Wüstenhagen*, Michael Bilharz

Institute for Economy and the Environment (IWÖ-HSG), University of St. Gallen, Tigerbergstrasse 2, CH-9000 St. Gallen, Switzerland

Available online 21 November 2004

Abstract

This paper reviews the development of renewable energy in Germany from 1973 to 2003. It investigates the relative importance of energy policy and green power marketing in shaping the renewable energy market. More than a decade of consistent policy support for renewables under the feed-in law (StrEG) and its successor (EEG) has been an important driver for increasing renewable electricity generation to date, putting the country in a better position than most of its peers when it comes to achieving European Union targets for renewable energy. Green power marketing driven by customer demand, on the other hand, is growing, but has had limited measurable impact so far. We discuss potential intangible benefits of green power marketing and scenarios for future market development. The paper concludes with lessons that can be learned from the German case for policy design and market development in other countries.

© 2004 Elsevier Ltd. All rights reserved.

Keywords: Renewable energy; Feed-in law; Green power marketing

1. Introduction

1.1. Background

The share of renewable electricity in Germany has more than doubled within the past decade. While Germany is still far from a sustainable electricity supply, relying heavily on coal (50%) and nuclear (28%), no other country has been successful in growing new capacity as quickly as Germany, particularly in the wind power sector. Germany accounts for 39% of installed world wind power capacity, and 55% of the incremental capacity installed worldwide in 2002 (AWEA, 2003). The country is an interesting success story for renewable energy development. This paper aims at understanding the drivers and dynamics behind this growth. After providing an overview of events that have led to the

current market situation, we will investigate two factors in detail, namely the prime public policy instruments driving green energy supply—the Renewable Energy Law (EEG) and its predecessor, the Feed-in Law (StrEG)—and green power marketing driven by customer demand.

1.2. Methodology

This paper is based on a review of existing literature on renewable energy policy in Germany between 1973 and 2003. To understand the quantitative fundamentals of both supply of and demand for renewable electricity, we have compiled a database including time series of renewable energy development since 1990, which has also allowed us to run calculations on growth rates, market shares, comparisons to other European countries and plausibility checks for future trends. In two specific parts, the paper is also based on new empirical research. For the analysis of public policy (Section 3), we have performed a written survey among a dozen key energy policy players from various political parties, electric utilities and associations who have been involved

*Corresponding author. Tel.: +41-71-224-25-87;
fax: +41-71-224-27-22.

E-mail address: rolf.wuestenhagen@unisg.ch (R. Wüstenhagen).
URL: <http://www.iwoe.unisg.ch>.

in the renewable energy policy making process. For an in-depth analysis of green power marketing (Section 4), we have surveyed all the 16 marketers currently offering green power products nationwide, gathering information about products, customers, electricity sales, and new capacity created as the result of green power sales. For the few marketers who did not disclose their customer numbers to us, we made own estimates based on publicly available information and data we gathered for a similar survey that we have performed worldwide in 2001 (Bird et al., 2002). Information about individual marketers is confidential, but the summary data provides insights about market development.

2. Background: renewable energy trajectory

2.1. Public opinion

The German sustainable electricity discourse started during the oil crisis in 1973 demonstrating dependence on energy imports (Pulczynski, 1991). In 1974, the controversy on nuclear energy reached a first peak when civil society organisations campaigned heavily against a planned nuclear power plant in Wyhl (South-western Germany). The Green Party, which became part of the federal government in 1998, originated from the 1970s anti-nuclear movement. In 1980, scientists from Öko-Institut (Institute for Applied Ecology) in Freiburg published a book featuring alternative energy scenarios (Krause et al., 1980), with particular emphasis on energy conservation. In the 1980s, *Waldsterben* (environmental damages to forests) became the centrepiece of the public discourse. The Chernobyl nuclear accident in 1986 recalled the nuclear dispute. In 1988, Hermann Scheer, a social democrat and Member of the German Parliament, initiated the foundation of Eurosolar, the first organisation to actively promote a vision of 100% renewable energy supply. The Rio Conference in 1992 added climate change as a new important driver for promoting renewables.

A large representative survey carried out six times between 1984 and 2003 provides a picture of shifting public perception of energy sources in Germany (BPA (Federal Public Relations Office), 2003, Fig. 1)¹. The percentage of Germans who expect wind energy to make an important contribution to the energy supply in the next 20–30 years has consistently increased since the late 1980s.² Nuclear energy, in contrast, has lost popularity

throughout the 1990s, with a slight recent rebound. For the first time in 2003, wind energy scored higher than nuclear. The most attractive energy source in public opinion is solar energy.³

The survey also reveals that young people attach more importance to renewable energy than old people. Fifty-seven per cent of under 30-year-old Germans think that renewables will make a key contribution to future energy supply, while this view is shared by only 36% of over 60 year olds. Future support for renewable energies is widely accepted—49% think support should continue at current levels, 47% think it should be increased, and only 14% think that subsidies should be reduced. The government's decision to phase out nuclear energy is being increasingly supported by the public (61% in 2003 vs. 46% in 2000).

2.2. Technology change and industrial development

The wind power sector is a particularly good example for technological change and the emergence of a renewable energy industry in Germany. The development of wind turbines had two very different roots (Durstewitz et al., 1999). The GROWIAN project in the late 1970s and early 1980s was a top-down approach by government and established research and industry players aimed at building a large (3 MW) wind turbine from scratch. This eventually failed (Pulczynski, 1991; Hoppe-Klipper, 2003). On the other hand, a more successful approach to wind turbine development, although much less visible in the beginning, has been pursued by several small new entrants entering in the mid-1980s. The size of newly installed turbines increased from 10 to 50 kW in the 1980s to an average of 182 kW in 1992. This is mostly due to the introduction of the 300–500 kW class in Europe (Durstewitz et al., 1999), finally reaching over 1500 kW in the first half of 2003 (BWE, 2003). While some of the new entrants from the early days are still active as independent players, others have been sold or merged during the recent industry consolidation. Lately, technology development shifted towards offshore turbines. Manufacturers are currently testing 2–5 MW prototypes. Commercial offshore projects in the North Sea are expected to be completed towards the end of the decade.

The renewable energy sector has become an important economic factor in Germany, providing for revenues of €8.2bn (BMU, 2003) and an estimated 120,000 direct and indirect jobs in 2001.⁴ This includes 35,000 jobs in the wind industry (of which 4700 are direct jobs), 40,000

¹There is some inconsistency in the 1999 and 2003 data that is included in BPA's summary. We used the data from Table 3 in the confidential original report from Institut für Demoskopie Allensbach for Fig. 1.

²*N*=2059. Respondents were asked to name up to three energy sources. Survey carried out by Institut für Demoskopie Allensbach in September/October 2003, on behalf of the German Federal Ministry of the Environment, summary published by the Federal Public Relations Office (BPA (Federal Public Relations Office), 2003).

³For comparison: In the same 2003 survey, other energy sources were named as significant contributors in the next 20–30 years as follows. Natural gas (46%), hydropower (36%), oil (34%), electricity imports (17%), coal (15%), other (1%), don't know (4%).

⁴This figure includes solar thermal collectors.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات