Renewable Energy 83 (2015) 905–917

Contents lists available at ScienceDirect

Renewable Energy

journal homepage: www.elsevier.com/locate/renene

The 2013 reforms of the Flemish renewable electricity support: Missed opportunities

O. El Kasmioui [a,*], A. Verbruggen [b], R. Ceulemans [a]

[a] University of Antwerp, Department of Biology, Research Group of Plant and Vegetation Ecology, Universiteitsplein 1, B-2610 Wilrijk Belgium
[b] University of Antwerp, Faculty of Applied Economics, Prinsstraat 13, B-2000 Antwerp Belgium

ARTICLE INFO

Article history:
Received 12 September 2014
Received in revised form
17 April 2015
Accepted 13 May 2015
Available online xxx

Keywords:
Tradable green certificates
Quota-based incentives
Policy instruments
Renewable energy

ABSTRACT

The Flemish renewable electricity support system has struggled to address a number of problematic issues in the past. These included excessive profit margins and general malfunctioning of the green certificate market, as well as a lack of qualification of various existing renewable energy technologies. The Flemish government responded to these issues by introducing major reforms in 2013, including "banding" to differentiate the support for various technologies. However, reliable methods for differentiating renewable electricity technologies and calculating support levels have not been sufficiently developed. The main objective of the 2013 reforms was to reduce support costs, but application of German feed-in tariffs on 18 reference technologies has shown that most projects in Flanders continue to receive high levels of support. The 2013 reforms did not succeed in addressing malfunctioning of the green certificate market. On the contrary, the confidence of investors in renewable electricity plants has decreased as the terms of support can be altered retroactively by adjusting remuneration levels and through political interventions. Future adaptations are likely to be made which will further decrease the overall stability and effectiveness of the system.

1. Introduction

The primary areas of concern regarding current energy supplies in the European Union are: (i) low shares of renewable energy sources in the energy mix; (ii) negative impacts of energy use on the global carbon cycle, and consequently on the climate; (iii) increasing dependency of the European Union (EU) on energy imports (higher than 50%) from non-EU countries [1,2]. In addition to effectively reducing fossil fuel consumption through energy efficiency measures, increased use of renewable energy sources (RES) mitigates current levels and future growth rates of atmospheric CO_2 emissions, but also decreases dependency on fossil fuels [2]. Furthermore, using electricity from renewable energy sources (RES-E) provides favorable political, social and economic benefits as it increases domestic (local) employment, contributes to improving the trade balance by lowering fossil fuel imports and offers greater diversity of energy sources [3].

However, RES-E is still more expensive than electricity sourced from established non-renewable sources, such as nuclear or fossil fuels [4,5]. Investments in nuclear and fossil power plants have, in many cases, been written off and their external costs are not reflected in the cost of electricity [2]. To encourage a more widespread deployment of RES for electricity production and an optimized energy mix from a social-economic perspective, active government interventions are necessary to correct market inefficiencies [6]. Nearly 120 countries have put in place various national and/or regional (financial) incentives[1] to support the production of green electricity [7–9]. These incentives include technology push measures, such as R&D grants and tax credits, and

Abbreviations: BD, Banding Divisor; BF, Banding Factor; CREG, Commission for Electricity and Gas Regulation; FG, Financial Gap; FIT, Feed-in Tariff; LCOE, Levelized Cost of Electricity; MSW, municipal solid waste; PV, Photovoltaic; RE, Renewable Energy; RES, Renewable Energy Source; RES-E, Electricity from Renewable Energy Sources; ROI, Return on Investment; SERV, Social and Economic Council of Flanders; TGC, Tradable Green Certificate; VEA, Flemish Energy Agency; VREG, Flemish Regulator for the Electricity and Gas Market; WWT, Waste Water Treatment.

* Corresponding author.
E-mail addresses: Ouafik.ElKasmioui@uantwerpen.be (O. El Kasmioui), Aviel.Verbruggen@uantwerpen.be (A. Verbruggen), Reinhart.Ceulemans@uantwerpen.be (R. Ceulemans).

[1] More than 150 different policy instruments to support green, low-emission and climate-resilient investments were identified in a study of the United Nations Development Programme (Glemarec, 2011).

http://dx.doi.org/10.1016/j.renene.2015.05.023

market pull (demand pull) measures, such as carbon pricing and deployment incentives (green certificates, feed-in tariffs). An optimal balance between RES-E subsidy schemes and policies that catalyze corporate investments in RES-E technologies will be necessary to decrease the overall burden of support on the government budget [10]. Many existing RES-E support policies have been reformed and/or expanded numerous times following their initial deployment [11].

This present work focuses on the 2013 reforms of the Flemish renewable electricity incentive scheme based on tradable green certificates (TGC), previously analyzed by Verbruggen [12–14]. Offshore wind energy has been excluded, since this is part of federal jurisdiction. Our objectives are: (i) to describe the most important changes resulting from the 2013 TGC reforms in Flanders; (ii) to identify the missed opportunities of the new scheme compared with the previous TGC scheme; (iii) to quantify the level of support for 18 RE categories through the Flemish TGC as compared to feed-in tariffs (FIT) assuming that German FIT rates would have been applied to the Flemish RES-E installations and to their outputs. This contribution is structured as follows: Section 2 describes the history of the green certificate scheme in Flanders and its impact on the deployment of renewable energy (RE). Section 3 elaborates on the data sources that were analyzed. Using these data sources, Section 4 provides an overview of the 2013 TGC reform process and discusses critical issues about the current reformed TGC system relative to its previous version. Section 5 includes a simulation exercise comparing the Flemish scheme with the FIT scheme using the German FIT rates. The final section summarizes the policy lessons and main conclusions.

2. Background of the RES-E policy in Flanders

In 2002, the Flemish government introduced a quota-based TGC system to support the deployment of RES-E. With its introduction, Flemish authorities issued one TGC for every 1 MWh of RES-E generated by RES-E producers, irrespective of the technology or source used [15]. There was no time limitation for obtaining TGC, i.e. the certificates were assigned as long as the RES-E unit continued to produce electricity. TGC are purchased by companies that supply electricity. On a yearly basis, every March 31, the latter must submit certificate quota to the Flemish Regulator for the Electricity and Gas Market (VREG). The mandated quota equal annually increasing shares of the suppliers' electricity sales of the previous year. In addition to buying TGC, electricity suppliers have the option of producing RES-E themselves for which they receive additional TGC [15]. A high penalty is charged for the inability to submit a certificate; this penalty also serves as the ceiling price for TGC exchanges (Fig. 1).

In 2004, functioning of the free market slowed considerably due to the fact that RES-E producers had the right to sell TGC at a guaranteed minimum price to the distribution network company located in their region. Distribution network companies are required to buy certificates from RES-E units that are connected to their distribution grids and commissioned on or after June 8, 2004 at a mandated minimum price over a period of 10 years [16]. This obligation was extended for PV beginning on January 1, 2006 with a payment plan extending over 20 years [17]. The obligations introduced some differentiation by technology, as the minimum amount of support differed depending on the RE technology used [13] (Table 1). Since 2004, the minimum level of support for the different RE technologies has changed several times, as shown in Tables 1 and 2. The guaranteed minimum price and remuneration period changed the most for photovoltaic (PV) power generation (Table 2). Electricity supply companies were no longer interested in buying PV TGC as their minimum prices were higher than the

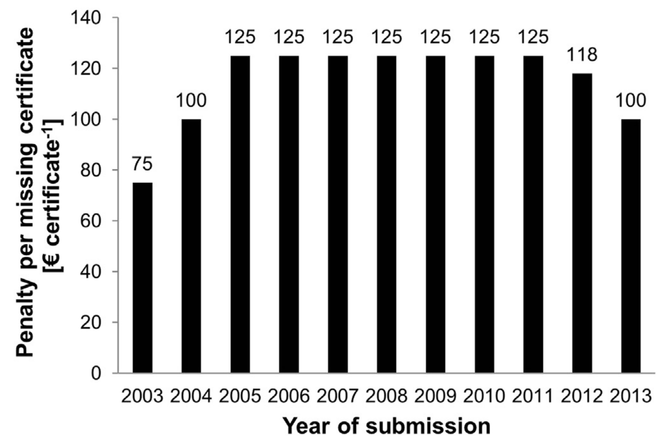

Fig. 1. Evolution of the penalty for missing certificates at submission date (period 2003–2013). Source: [16].

penalty levels until mid-2012 (compare Fig. 1 with Table 2). The high minimum support for PV was in fact the reason why PV certificates were not offered in the TGC market. The obligation imposed on distribution network companies to buy PV certificates at prices higher than the TGC penalty level, assigns the properties of an actual feed-in premium for PV owners to the prices paid.

In addition to revenues earned from TGC sales at (posted or negotiated) variable prices to power suppliers or at minimum prices to distribution network companies, RES-E producers earn revenues from selling (physical) electricity to the grid, or from lowering their electricity costs in case of own RES-E use. In addition to RES-E support systems, a diverse range of direct and indirect measures at different government levels (federal, regional and municipal) exists to encourage RES-E investments. A full overview of these support measures is beyond the scope of this article.

The number of TGCs issued in Flanders cannot be considered to be a precise indicator of RES-E generated power, but is the most representative indicator up to 2012 (Fig. 2a). Following the introduction of RE support in 2002, the share of RES-E in the electricity supply increased slightly from 0.6% in 2002 to 1.1% in 2004 [18]. Since 2004, minimum levels of support have been guaranteed and the number of issued TGC is growing at a faster rate, with the RES-E share in supplied electricity increasing to 7.5% by 2011 [18]. The impact of high support levels is most explicit for PV: from 1356 certificates in 2006 to 1.95 million in 2013 [19]. The high support rate, combined with significantly declining investment outlays per kW_p, resulted in a financial payback period of about five years for well-designed systems. The high prices per MWh generated guaranteed surplus profits over a 20-year support period. In 2013, a relapse of the increase of assigned TGC for PV occurred.

Fig. 2b also reveals high growth in assigned certificates for bioenergy, from 0.1 million in 2002 to almost 3 million in 2013, with a slight decrease in 2013 as compared to 2012. Biomass from separately collected or sorted organic waste, and biomass from agriculture and forestry were the highest contributors to this growth in terms of certificates with a 75% share in the bioenergy mix in 2012 (Fig. 2b). The steep increase in 2005–2006 in the share of biomass from agriculture and forestry is due to co-firing biomass in (existing) coal power plants. The surge of biomass from separately collected or sorted organic waste is associated with the eligibility of two existing biowaste incineration plants (81 MW and 55.7 MW) and the commissioning of four new plants between 2004 and 2006 (installed capacity of 69.8 MW), followed by the addition