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Impact of support schemes and barriers in Europe on the evolution of cogeneration

José Antonio Moya *,[1]

Institute for Energy and Transport, European Commission, Joint Research Centre, Westerduinweg 3, NL 1755 LE Petten, The Netherlands

HIGHLIGHTS

- Support measures to promote cogeneration are analysed.
- The growth of cogeneration in European countries is not aligned with the measures in place.
- None of the reported barriers for cogeneration can be considered a clear show-stopper.
- The variation in the development of cogeneration when some barriers are reported raises questions about the reporting.
- Countries with a high share of cogeneration are sensitive to the continuity or discontinuity of support.

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ABSTRACT

This paper analyses the effectiveness of different support measures to promote cogeneration in the European Union. The analysis looks into the average progress of cogeneration between two different periods. The economic effect of the support measures in each country is quantified with the help of a cost–benefit analysis carried out by the Cogeneration Observatory and Dissemination Europe (CODE) project. The scope of this study is necessarily affected by the need to limit the number of projects and support measures. However, there is no evidence of a relationship between the economic advantage offered by support measures and the deployment of cogeneration in the Member States. The study considers the effect of different barriers (reported by the Member States) on the promotion of cogeneration. The individual analyses of the barriers differ widely in quality and depth. When some barriers are reported, there is an increase of the variability of the penetration of cogeneration. This counter-intuitive fact leads us to conclude that there is a lack of consistency in the barriers reported, and a clear need for consistent reporting on barriers. The possible effect of competition between measures supporting combined heat and power and renewable energy sources is also analysed.

1. Introduction

Improving energy efficiency is an important priority of the European Union's Energy and Climate Policy and is a key element for fostering its competitiveness, ensuring its security of supply and meeting its greenhouse gas reduction target. As part of its Energy and Climate Change Policy package, the EU has set ambitious targets for the reduction of greenhouse gas (GHG) emissions, energy savings and the promotion of renewable energy sources by 2020, the so-called 3 × 20% targets. The EU's energy and climate goals have been incorporated within the Europe 2020 Strategy for Smart, Sustainable and Inclusive Growth (COM (2010) 2020), and its flagship initiative 'Resource-Efficient Europe' (COM (2011) 21).

In April 2009, the European Council adopted a climate-energy legislative package containing measures to fight climate change and promote renewable energy. Central to this package is the revision of the Emissions Trading System (ETS) for greenhouse gases in order to achieve greater emission reductions in energy-intensive sectors (Directive 2009/29/EC). Also, in 2011, the EU Commission proposed a comprehensive Energy Efficiency Plan 2011 (COM (2011) 109), which complements the 2006 Energy Efficiency Action Plan (COM (2006) 545). Both documents indicate that a significant potential for energy savings is still to be exploited in all energy sectors.

The most recent initiative of the European Commission to enhance the measures already in place is the proposal for a Directive on energy efficiency and repealing Directive 2004/8/EC and Directive

* Tel.: +31 224565244; fax: +31 224565616.
E-mail address: jose.moya@ec.europa.eu

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2006/32/EC (COM (2011) 370). Directive 2004/8/EC aimed to promote cogeneration based on useful heat demand in the internal energy market. However, the impetus provided by this Directive needs to be enhanced to ensure that the EU objectives for 2020 are within reach. In fact, the Commission's latest estimations, considering the national energy targets for 2020, suggest that the EU will achieve only half of the 20% target by 2030. Consequently, the European Commission's proposal (COM (2011) 370) includes a series of binding measures to tap all energy-saving avenues.

It should be underlined that the analysis in this paper is based on the support measures provided for the projects covered by the Cogeneration Observatory and Dissemination Europe (CODE) project (this project was co-funded by the Intelligence Energy Europe (IEE) programme of the European Commission, its aim was monitoring the implementation of the cogeneration directive (CODE, 2010a). The possible effect of these support measures on other projects is ignored, as is the effect of other complementary measures in place. The support measures described in the impact assessment of the European Commission (SEC (2011) 779) encompass both those analysed in this paper and those excluded. This paper aims to compare the different effectiveness of groups of support measures without entering into a discussion on the effectiveness of any particular support scheme.

This paper comprises five sections including this introduction. Section 2 introduces the potential explanatory variables that might have affected the evolution of cogeneration. The support measures designed by the different European countries to support cogeneration are described in Section 2.1. Section 2.2 describes the parameters used to quantify the economic intensity of the support measures. The Barriers that could have affected the unfolding of cogeneration are described in Section 2.3. Section 2.4 spells out the variables selected to characterise the rise of cogeneration in two periods of time (pre- and post-Directive 2004/8/EC), i.e. 2002–2004 and 2006–2008.

The analysis carried out in Section 3.1 and Section 3.2 uses the parameters characterising the evolution of cogeneration in the two time periods. The values of these parameters are split between two groups depending on the value of an explanatory variable. If there is statistical evidence that the means of the two groups are different, then this difference can be assigned to the explanatory variable. In this case, it is highly likely that this explanatory variable is the cause of the different progression of cogeneration in the two groups. Section 3.1 uses as the explanatory variable the support schemes introduced in Section 2.1. Section 3.2 repeats this analysis using as explanatory variables the barriers described in Section 2.3. Section 3.3 analyses the sensitivity observed in the growth of cogeneration to the presence or lack of support measures. The lack of any clear relationship between the deployment of cogeneration and the support measures or barriers prompts consideration, in Section 4, of the potential hampering effect of the blooming of other renewables on the evolution of cogeneration. Finally, Section 5 collects all the conclusions reached in the different sections of this paper.

2. Information used in the analysis

2.1. Support measures

Table 1 summarises the support measures described in CODE (2010a). These measures are a snapshot of those in operation in 2007. They are divided into tax advantages, feed in tariffs, certificates, grants or other kinds of additional support. A '1' in the table signifies that the measure is in place, while a '0' signifies that no such measure is in place.

Table 1
Overview of support measures for fossil fuel-based CHP in the European Union in 2007. (1=measure in place; 0= measure not in place).

Member State	Support measures				
	Tax advantage	Feed-in tariff	Certificates	Grant	Other
Austria	0	1	0	0	1
Belgium	1	0	1	0	1
Bulgaria	0	1	0	0	1
Cyprus	0	0	0	0	1
Czech Republic	0	1	0	0	1
Denmark	0	0	0	0	0
Estonia	0	0	0	0	1
Finland	0	0	0	1	1
France	0	1	0	0	1
Germany	0	1	0	0	1
Greece	1	1	0	0	1
Hungary	0	1	0	0	1
Ireland	0	0	0	0	1
Italy	1	1	0	1	0
Latvia	0	1	0	0	1
Lithuania	0	1	0	0	1
Luxembourg	1	0	0	0	1
Malta	1	0	0	0	1
Netherlands	1	1	0	1	1
Poland	0	0	1	0	1
Portugal	0	0	0	1	1
Romania	0	1	0	1	0
Slovakia	0	1	0	0	0
Slovenia	0	1	0	0	1
Spain	1	1	0	0	1
Sweden	0	0	0	1	1
United Kingdom	1	1	0	1	0

The most widely used support measure is the feed-in tariff. This is a special incentive for electricity supplied to the grid, mainly a generation bonus for total electricity generated in CHP mode or a fuel-related concession. Tax advantages or capital grants for specific sizes of projects are offered in 7 and 8 countries, respectively. Annex X of (SEC (2011) 779) contains more details about the extent of these support measures.

The effectiveness of support measures depends not only on their existence in the first place, but also on their intensity. This intensity is understood as the change produced on the main parameters (payback period) used in the decision-making process of investments.

The effectiveness of support measures depends not only on their existence in the first place, but also on their intensity, this intensity is understood as the change caused in the main drivers or parameters used in the decision-making process. That is, the effectiveness relies on the ability of the support measure to be a significant market driver. Section 3 analyses the effectiveness of the support measures (or barriers) in fostering (or hampering) the development of cogeneration.

2.2. Economic intensity of support measures

This section presents all the information quantifying the intensity of support measures in two periods of time (from 2002 to 2004 and from 2006 to 2008). The first period corresponds to the three years before Directive, 2004/8/EC, while the second corresponds to an interval in which the Directive should have been implemented. Analysing time periods instead of annual snapshots enables annual effects to be smoothed out, for example uneven annual hydro-electric output.

The analysis uses for every Member State the cost–benefit analysis carried out in the CODE project (CODE, 2010b). The CODE project estimates the payback period and the internal rate of