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The European Union possibilities to achieve targets of Europe 2020 and Paris agreement climate policy

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ABSTRACT

The Europe 2020 strategy and recently ratified Paris agreement are the main documents in the European Union (EU) involving energy and climate policy. Therefore, the aim of this paper is to reveal the possibilities of EU countries to achieve the Europe 2020 strategy and Paris agreement targets. Referring to the regression analysis, the results showed that the growth of economy and primary energy consumption stimulate GHG emissions in EU-28; meanwhile, the increase of RES share decreased them. Moreover, the paper revealed that if the EU will achieve its targets committed in the Europe 2020 strategy, even assuming fast economic growth, the target to reduce GHG emission by 20% by 2020 compared to 1990 will be achieved. According to different tendencies of economic growth, energy consumption and share of RES changes, the results showed that only recent (2005–2012) tendencies are the most suitable for the implementation of GHG emissions targets of Europe 2020 strategy but not of the Paris agreement. Therefore, the EU countries should attempt more to reduce energy consumption and to increase the share of RES seeking to implement the target of GHG emissions committed in Paris agreement.

1. Introduction

The European Union (EU) as a whole is one of the biggest energy consumers and the one of the largest greenhouse gas (GHG) emitters in the world [23,25]. Thus, the energy and climate policy is one of the cornerstones of EU policy [63]. The EU energy and climate goals have been incorporated into the Europe 2020 Strategy for smart, sustainable and inclusive growth [16], and into its flagship initiative of Resource Efficient Europe [3,15,55]. Thereby, the EU has set overarching targets of GHG emissions reduction to be achieved by the year 2020 through a combination of energy efficiency and the use of renewable energy resources (RES). Further, in the Paris agreement formally ratified by the EU on 5thof October 2016, the EU and its Member States governments agreed on a long-term goal of keeping the increase in global average temperature to well below 2 °C compared to pre-industrial levels and binding target to decrease GHG emissions by 2030 at least by 40% compared to 1990.

A number of studies applying different forecast methods analysed how successfully the EU will achieve the Europe 2020 strategy targets concerning the climate and energy policy. The EEA [18], Picazo-Tadeo et al. [50], Roelfsema et al. [52], Saikku et al. [53], Gulbe [27], Simoes et al. [57], Streimekiene and Roos [61] analysed how successfully EU countries will achieve the GHG emissions targets, Smit et al. [59] and Thollander et al. [62] – primary energy consumption targets, Boie et al. [6], Nagy and Körmendi [47], Klessmann et al. [38], Giacomarra and Bono [26], EC [16], Śmiech and Papież [58], and Scarlat et al. [55] – the targets of RES. Thus, our study enriches research in this field as we will analyse how EU-28 and separate EU countries will achieve their GHG emissions, primary energy and RES targets according to their past experience. Furthermore, in this study we will analyse the possibility to achieve the GHG emissions target which the EU committed in Paris agreement and to the best of our knowledge we are the first to analyse this possibility.

For implementation of climate policy it is very important to analyse the determinants of GHG emissions. Thus a number of studies (see Refs. [9,23,34,43,57] and etc.) analysed the factors affecting GHG emission in EU countries. However, there is the lack of analysis encompassing the impact of the Europe 2020 targets on GHG emissions. In our previous study [40], applying decomposition method, we analysed determinants of GHG emissions involving the

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Europe 2020 strategy components. Therefore, in this paper we expanded the research applying regression models (using first difference (FD), fixed effects (FE) and random effects (RE) estimations) to panel data to reveal how the primary energy consumption, the share of RES and economic growth influence changes in GHG emissions in EU-28 countries. Moreover, applying the results of regression analysis we will model how successfully EU-28 will achieve the targets of Europe 2020 and Paris agreement of GHG emissions according to the past trends of determining factors and according to EU-28 commitments of primary energy consumption and usage of RES.

Thus, the rest of the paper proceeds as follows: Section 2 presents the literature review of the determinants of GHG emissions, and the performed forecasts; the methods of paper are described in Section 3; Section 4 discusses the predicted results to achieve the energy and climate policy targets (primary energy, share of RES, and GHG emissions) in EU-28 and separate EU countries considering the strategy of Europe 2020, also, according to the regression analysis, the following results are presented: i) main determinants of GHG emissions in EU-28 countries and ii) modelling of EU-28 possibilities to achieve climate targets of the Europe 2020 and Paris agreement; Finally, Section 5 closes the paper with the main conclusions.

2. Literature review

2.1. Europe 2020 strategy, Paris agreement and the achievement forecast of climate and energy policy targets

The Europe 2020 is the umbrella strategy of the EU aiming at enhancing the economic growth of EU over the year 2010–2020 [35]. The Europe 2020 strategy is an economic ten-year strategy adopted by the European Council in 2010, "emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy" [3,16]. This strategy involved energy and climate policy including the so called 20/20/20 targets, namely reduction of greenhouse gas emissions (by 20%), the increase of RES share (to 20%) and the increase of energy efficiency, thus, saving up to 20% in the energy consumption [15].

Further at the Paris climate conference in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2 °C. The Paris Agreement encompasses today's policies and climate-neutrality before the end of the century. The EU was the first major economy to submit its intended contribution to the new agreement and binding target of at least 40% of domestic reduction in GHG emissions by 2030 compared to 1990, when the EU formally ratified the Paris Agreement, thus enabling its entry into force on 4 November 2016.

2.1.1. Achievements of GHG emissions targets

A vast number of authors analysed how successfully EU countries will achieve the energy and climate policy targets of Europe 2020 strategy. Taking into account the GHG emissions, the EEA [18] and Picazo-Tadeo et al. [50] forecasted that in 2020 emissions (outside the EU Emissions Trading System) in most of EU members will be lower than their national targets set under the EU Climate and Energy Package. Moreover, Saikku et al. [53] testing the feasibility of meeting the targets of GHG emissions revealed that dematerialization and decarbonization did occur, but not enough to offset the slight growth of population plus rapidly increasing affluence in the period of 1993–2004. Therefore, they declared that if GHG emissions in EU27 are to be reduced by 20% below the 1990 level, this will happen in 2008–2020, because in 1990–2007 the emissions did not change much. Roelfsema et al. [52] also analysed whether the most effective policies of national climate and energy are sufficient to meet the proposals of emission reduction that countries made for 2020. Thus, they revealed that currently planned policies would not be sufficient to meet the conditional pledge of 30% reduction below the 1990 level in 2020. Therefore, to deliver the conditional target of 30%, the EU would need to develop and implement additional policies and measures beyond the policies currently planned by Member States. Meanwhile, Streimekiene and Roos [61] revealed that GHG emission projections, according to "with measures" scenario, the Baltic States will be able to implement their target when some circumstances of energy sector in the Baltic States are taken into account. Meanwhile, the medium-term targets of GHG emission which were presented in the Paris agreement to the best of our knowledge was not analysed. Therefore, in this paper we will fill this gap.

The long-term targets of GHG emission were presented in 2011. The European Commission presented the 'Roadmap for moving to a low-carbon economy in 2050' [21]. This Roadmap aims at a reduction of greenhouse gas emissions in the EU-27 by at least 80% in 2050 comparing with1990. The forecasts and different scenarios of achievements of long-term targets were presented by other authors (see: [11,30–32,43].

2.1.2. Target achievements of primary energy consumption

Taking into account the targets of energy consumption, Fernández González et al. [24] revealed that in the EU-27 as a whole, the efforts through energy actions and programmes to increase energy efficiency were not sufficient in order to reduce aggregate energy consumption. They found that at the country level, aggregate energy consumption increased in most of them, particularly in Eastern and Central countries, Spain, Ireland and Greece, meanwhile only a few Western countries (Belgium, France, Germany, and the Netherlands) reported reductions in energy consumption. Smit et al. [59] found that the EU as a whole in 2020 will achieve primary energy saving by 16.4%, meanwhile only Slovakia, Latvia, Italy, Greece, Portugal, Spain, Ireland, Bulgaria, and Lithuania will exceed the targets of primary energy saving in 2020. Moreover, Thollander et al. [62] analysed the possibilities of achievement of Europe 2020 primary energy target in Sweden and found that if the Europe 2020 primary energy target is to be achieved, it will lead to significant changes in energy supply and energy end-use in Sweden. Furthermore, EEA [19] in report stated "considering the progress across EU Member States towards Europe 2020 strategy, the progress on energy efficiency remains slow".

2.1.3. Achievements of RES targets

The EU has implemented mandatory renewable energy targets [32]. Thereby, a number of authors (see [6,13,29,55]) declared that the RES has increased considerably in the EU and it is expected to keep growing in the future years. Thus, according to Klessmann et al. [38]; 15 Member States of EU are even planning to overachieve their national RES 2020 target. They also found that the majority of Member States are on track to achieve the RES targets of 2020. Moreover, Giacomarra and Bono [26] found that indeed, almost half of the Member States (Austria, Bulgaria, Czech Republic, Denmark, Germany, Greece, Spain, France, Lithuania, Malta, Netherlands, Slovenia and Sweden) planned to exceed their own targets and were able to provide surpluses for other Member States. Thus, if all these production forecasts are fulfilled, the overall share of RES in the EU could exceed the 20% target in 2020 COM [12]. The Ecofys [17], Śmiech and Papież [58] and Scarlat et al. [55], also concluded that the future progress for 2020 would allow the EU Member