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Exploring opportunities and risks for RES-E deployment under Cooperation Mechanisms between EU and Western Balkans: A multi-criteria assessment

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ABSTRACT

The recently legislated European Union (EU) Directive 2009/28/EC entitles Member States (MSs) to implement Cooperation Mechanisms, in order to promote the use of energy from renewable sources (RES) and enables them to achieve their binding national targets for 2020. The RES Directive introduces, inter alia, the implementation of joint RES projects between at least one MS and one or more neighbouring countries, in this direction. This paper aims to develop a methodological approach for the multi-criteria assessment of potential opportunities and risks that lie in the implementation of RES electricity (RES-E) projects incentivised by a Cooperation Mechanism between the EU and the Western Balkan (WB) region. Nine evaluation criteria are selected to cover all three aspects of the assessment, namely (a) the Investment Framework, (b) the Social Framework, and (c) Energy Security. Eventually, the seven Western Balkan countries are evaluated and ranked using UTASTAR, a multi-criteria additive value model based on ordinal regression and preference disaggregation, and the presented results are discussed.

1. Introduction

In June 2009, a new European Union (EU) directive entered into force, with regard to the promotion of Renewable Energy Sources (RES). Specifically, Directive 2009/28/EC establishes binding national targets for the levels of renewable energy use based on the GDP and starting point of each Member State (MS) [1], instead of their respective RES potential [2]. At the same time, though, it defines four types of Cooperation Mechanisms that enable MSs to achieve their respective national targets and provides the legal framework in which these mechanisms can be implemented:

- Statistical transfers of a priori specified amounts of renewable energy between MSs (Article 6)
- Joint projects relating to the production of electricity, heating or cooling from RES between MSs (Articles 7, 8)
- Joint projects regarding the production of electricity from renewable energy between one or more MSs and one or more third countries (Articles 9, 10)
- Joint support schemes (Article 11)

According to the mechanism described in Articles 9 and 10 of the EU RES Directive, one or more MSs may cooperate with one or more third countries on joint projects within the territory of the latter, with regard to electricity production from RES. Any amount of electricity generated by such installations may be taken into account for the purposes of measuring compliance with the MSs' national overall targets, if certain demanding conditions are met. Among the four Cooperation Mechanisms, this particular one is by far the most complex one, as it requires that the amount of energy produced in this context be consumed within the European Community, as well as raises infrastructure and communication issues between all responsible Transmission System Operators (TSO), including the TSOs on both contracting sides and those of each third country of transit.

As Karakosta et al. [3] note and compared to the other three mechanisms, barriers to the implementation of the Cooperation Mechanism on joint projects between EU and third countries include poor grid infrastructure (in order for the energy to be transferred into the Community), geopolitical unrest, risks of limited public acceptance, existing legal limitations and complex financing schemes. However, and despite the potential difficulties that lie in the implementation of the mechanism, especially considering that any such project should be

Abbreviations: ALB, Albania; BiH, Bosnia & Herzegovina; CDM, Clean Development Mechanism; CRO, Croatia; DM, Decision Maker; FYR, FYROM; GHG, Greenhouse gas; KOS, Kosovo*; MON, Montenegro; MCDA, Multi-criteria decision analysis; MS, Member State; RES, Renewable Energy Sources; RES-E, Renewable Energy Sources Electricity; SER, Serbia; WB, Western Balkans

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able to attract private funding, there are major benefits as well.

It is obvious that potential domestic investments in RES projects in specific MSs may be considered non-profitable, or at the very least less cost-effective than respective investments in countries outside the EU, by taking advantage of the Cooperation Mechanisms [4]. Besides, a MS may find it hard or even impossible to meet its respective national RES targets for 2020, due to limited renewable energy resources or adverse market conditions, making RES investments in countries with large availability of such resources [3] and/or favourable market conditions that promote joint support [5] worthwhile. This last option would, in fact, result in significant mitigation of the respective investment risks: an international joint project, under the legal framework of an EC directive and for the purpose of achieving national targets, seems more attractive and less risky than a domestic one which inevitably involves the additional uncertainty of future legislation.

According to Jacobsen et al. [4] and assuming that the marginal cost of installing a RES unit in country A (within the EU) is higher than the marginal cost of installing the same unit in country B (outside the EU), the former would obviously benefit from a cooperation mechanism. At the same time, given that both contracting parties would agree upon a price for the amount of energy to be transferred, the latter country would benefit just as well. In addition, a country-to-country trading approach has been proven to be superior to a trading system between private organizations [6]. But, aside from the aforementioned economic benefits, opportunities of other nature can be explored in the implementation of an international cooperation and joint project coordination mechanism—as defined in Articles 9 and 10—such as technology transfer, power generation efficiency increase, improved security of supply and multiple social benefits. For example, investments in renewable energy may lead to job creation in remote areas with a weak job market [7], as well as during all stages of the lifetime of a RES project [8–10]. In fact, even if investments aimed to replace existing technology fleets instead of extending the existing infrastructure, certain technologies (like biomass) would create more jobs than the ones they would replace in conventional generation plants [11].

All arguments for and against the implementation of the Cooperation Mechanisms of the Directive 2008/28/EC, including joint projects between EU and third countries, have been thoroughly studied in the literature [12].

Having explored the major advantages and drawbacks of this particular Cooperation Mechanism, it is necessary to determine which region or group of countries qualifies for consideration for potential cooperation with MSs on joint projects, to begin with. From a geopolitical perspective, one of these regions can be found in the Western Balkans (WB). Countries of the WB region undoubtedly have significant amounts of unexploited renewable energy resources, which could remarkably contribute to improving the security of supply, both within and outside the region, while their location facilitates the transmission of electricity bound to be consumed within the Community [13]. However, all of these countries face significant challenges regarding energy production, transmission and distribution, including an excessive dependence on fossil fuels and the resultant environmental impact, the consequently high dependence on corresponding energy imports in order to meet domestic needs, low energy efficiency, poor grid infrastructure, and a severely limited development of RES technologies [14].

In addition, certain fundamental questions arise and must be answered from the perspective of a MS, before proceeding with the development of a joint project in cooperation with one of the countries:

- What evaluation system could be used in this context? What should the criteria be, so as to fully assess the potential risks and opportunities associated with each country?
- What would the appropriate multi-criteria decision analysis (MCDA) method be, given the nature of the problem at hand and the available data?
- Which Western Balkan countries qualify for contracting partners in the framework of the RES Directive, with respect to the selected method and criteria? How do they rank against each other?

This paper aims to answer these questions and is structured in this respect. In other words, the aim of this study is to provide a concrete methodological framework for evaluating and selecting host countries with which other countries can cooperate in order to develop joint clean electricity projects, including a meaningful and complete set of evaluation criteria; to contribute to the literature by exploring the applicability of preference disaggregation multi-criteria approaches in the field of Energy Policy; and to evaluate the attractiveness of seven Western Balkan countries in terms of implementing the Directive 2009/28/EC joint project development mechanism. In this direction, Section 2 provides a short overview of the specific characteristics of the case study countries, while Section 3 introduces the evaluation axes and the selected criteria. In Section 4, a thorough literature review is conducted, with regard to the various MCDA methods that have been used in the aim of evaluating renewable energy projects. Section 5 presents the implementation of the proposed methodological framework in the set of the seven Western Balkan countries, while Section 6 discusses the results of our analysis. Finally, in Section 7, the main points of this study are summarized, conclusions are drawn and future perspectives are proposed.

2. The case study countries

The WB countries that will be studied and evaluated in this paper—namely Albania, Bosnia & Herzegovina, Croatia, Former Yugoslav Republic of Macedonia (FYROM), Kosovo*,[1] Montenegro and Serbia—differ to a large extent from each other in their economic, energy and environmental dimensions, thus cultivating the need to sketch a short profile for each one.

It should be noted that, although only Croatia officially joined the EU in 2013, all seven countries have joined the European Energy Community and, as a result, are bound to national RES targets similar to those of all EU countries [13]. At the same time, they are entitled to use of the Directive 2009/28/EC Cooperation Mechanisms in practically the same way as MSs [15].

Albania (ALB) has made great progress in the electricity sector, given its energy mix: its technology fleet is considered outdated [14], but is mostly based on hydroelectric power plants [16]. The country has adequate long-term potential in terms of wind and solar power resources [17], enough to both cover its domestic needs while meeting its national RES target—even after 2020, by taking advantage of the limited unexploited potential in hydroelectric power plants—and sell renewable energy to MSs via the Mechanism. Any unexploited RES potential that serves no national purpose for the time being could attract foreign investments through the use of the Cooperation Mechanism and, past the contract period, extend low-cost electricity to the country's supply.

Quite similar to Albania and considering the fact that it has the largest amount of cost-efficient hydro potential in the Western Balkans [13,17], **Bosnia & Herzegovina (BiH)** can expand its own RES share in the energy mix, as well as sell renewable energy to the Community, in order to even use corresponding funds towards investments in more expensive renewable technologies in the country. Despite adequate interconnection between BiH, Serbia, Montenegro and Croatia—which is now a MS—as well as another 400 kV planned interconnection with its neighbours [18], the country appears to suffer from a poor legislative framework and weak, restricted support mechanisms [19].

[1] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.