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Renewable Cooperation Mechanisms in the EU: Lessons Learned and Future Perspectives

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Abstract: In 2018, the European Union (EU) adopted a recast of the Renewable Energy Directive (RED), setting the framework for a common EU-wide 2030 target of 32.5% renewables in final energy consumption, for which Member States shall set national contributions. To address the disparities in national targets, the EU introduced three cooperation mechanisms: statistical transfers, joint support schemes, and joint projects. This paper provides an assessment of the utilization of cooperation mechanisms by Member States to meet the 2020 renewable energy target, offering recommendations for the RED III implementation. It analyzes the motivations of both buyer and seller countries, examines the patterns observed in concluded agreements, and interprets the dynamics of the market. The research employs a mixed-methods approach, incorporating a literature review, analysis of official statistics and cooperation agreements, and interviews with government representatives involved in implementing these mechanisms. The study reveals areas for improvement and raises questions about the efficacy of the instruments and their alternatives. To enhance the effectiveness of renewable cooperation mechanisms, a more systemic approach is necessary. The proposed new financing mechanism can ensure certainty in financial allocation and support larger joint projects of European significance. Furthermore, it is anticipated that statistical transfers will continue to be utilized due to established bilateral relationships and the need for last-minute adjustments to achieve renewable energy targets. This research provides valuable insights for policymakers and stakeholders in advancing renewable cooperation mechanisms and driving the EU's progress towards a climate-neutral continent by 2050.

Keywords: renewable cooperation mechanisms; statistical transfers; renewable energy directive; joint projects; joint support schemes; renewable energy targets; RED III

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1. Introduction

The European Union (EU) is committed to limiting global temperature increase to 1.5 °C above pre-industrial levels and becoming the world's first climate-neutral continent by 2050 [1].

This goal was formalized under the framework of the European Green Deal (COM(2019) 640 final), a comprehensive strategy that outlines the EU's path towards sustainability and a cleaner future [2].

One of the pivotal steps in the EU's pursuit of a greener landscape occurred in 2009 with the introduction of the Renewable Energy Directive (2009/28/EC), commonly referred to as the RES (Renewable Energy Sources) directive. This directive was a significant milestone, as it set forth ambitious targets for 2020 aimed at increasing the proportion of renewable energy sources in the overall energy consumption of EU member countries [3].

However, the initial approach to establishing national targets under the RES directive had its limitations. Rather than being based solely on the physical renewable energy

potentials of each member state, the targets were determined by considering factors such as the existing renewable energy production and the GDP of individual countries.

This approach resulted in unequal national gaps between targets and domestic potentials, creating a need for mechanisms to address this disparity. Therefore, the directive introduced three cooperation mechanisms: statistical transfers, joint support schemes, and joint projects within the EU or with third-party countries. These mechanisms were designed to incentivize collaboration between countries and ensure the overall EU target was met in a cost-efficient way, even if some Member States fell short of their individual targets.

Building on this foundation, in 2018, the EU embarked on a further evolution of its renewable energy policy by adopting a recast of the Renewable Energy Directive, often referred to as RED II. This directive laid out a common EU-wide 2030 target of 32.5% renewables in final energy consumption, for which Member States needed to set national contributions. The legislative landscape has evolved since then. In September 2023, the European Parliament passed the second revision of the Renewable Energy Directive (RED III) [4], raising EU's renewable energy targets to 45% [5]. To meet these revised 2030 targets, Member States are still encouraged to make use of the cooperation mechanisms. Notably, RED III introduces a mandatory provision stating that, by 31 December 2025, each Member State should be obliged to establish a framework for cooperation on joint projects. Within such a framework, Member States should aim to establish at least two joint projects by 2030. In addition, Member States whose annual consumption of electricity exceeds 100 TWh should aim to establish a third joint project by 2033 [4]. Given the ambitious targets, it is anticipated that large-scale cross-border projects will be necessary. To facilitate this, the European Commission has launched a new renewable energy financing mechanism, pooling financial contributions from several EU countries and allocating funding to host countries through competitive tenders [6]. Under this framework, contributing countries can financially support renewable energy projects in other countries, which may offer more cost-effective alternatives compared to domestic renewable energy production, while also gaining statistical shares of renewable energy. Moreover, private investors have the opportunity to contribute to the financing mechanism, participating as project developers in the Commission's competitive tenders. This collaborative approach between the public and private sectors aims not only to encourage but also to propel the development of new renewable energy projects across the EU.

This paper conducts an analysis of pre-2020 experiences while taking into account the evolving legislative context, with the aim of deriving insights that can inform potential future implementation of renewable energy policies up to 2030. At the time of publishing, the literature provided limited coverage of the actual deployment of renewable cooperation mechanisms. Therefore, this paper aims to provide an in-depth assessment of Member States' use of these mechanisms, focusing on the concluded agreements to achieve the 2020 renewable energy targets. It analyzes the motivations of buyer and seller countries, examines the patterns observed in concluded agreements, and seeks to understand concrete market dynamics. By filling an important research gap, this analysis will provide a comprehensive understanding of the benefits and challenges associated with statistical transfers and other cooperation mechanism experiences. Furthermore, it will identify opportunities for enhancing their effectiveness within the context of the 2030 framework.

A substantial body of literature offers valuable insights into renewable energy cooperation mechanisms. Klessmann et al. [7] provide a comprehensive examination of design options. They present the benefits and drawbacks of various approaches. For statistical transfers, the authors suggest the establishment of long-term arrangements to encourage the development of additional RES potential and ensure sufficient flexibility. Additionally, they advocate for a coordinated approach involving multiple Member States in joint projects to enhance transparency for project developers.

Expanding on this, Frieden et al. [8] concentrate on fair-sharing mechanisms, particularly within the framework of joint projects, whereas Tuerk et al. (2014) outline different

interests of host countries, seller countries, transit countries, and private investors that need to be considered when determining the transaction price [9]. Caldés et al. [10] provide an insightful assessment of the factors influencing the implementation of cooperation mechanisms. Their work categorizes the drivers and barriers, emphasizing the pivotal role played by a Member State's progress toward its 2020 renewable energy targets and its experience with cooperation mechanisms. In line with this, Jacobsen et al. [11] emphasize the benefits of cooperation mechanisms, especially joint project cooperation, which leverages the potential for cooperation due to differences in renewable energy technology costs and expected differences in power market prices and physical market transfers. However, they also highlight the challenges tied to negotiating credit transfer prices, particularly given the uncertain binding targets post-2020 and the value of future renewable energy credits. Furthermore, Meus et al. [12] contributed to the understanding of renewable cooperation mechanisms in the EU, examining the impact of national RES-E (Renewable Energy Support for Electricity) support schemes on the performance of cooperation mechanisms. The authors highlight the superiority of statistical transfers over no renewable cooperation, regardless of national support instruments.

Taking stock of the developments up to 2020, among the three cooperation mechanisms established by the European Union, statistical transfers were the most commonly used, with six Member States relying on them to achieve their 2020 renewable energy goals [13]. Although there was no joint project, two joint support schemes were set up. Overall, the use of statistical transfers played an important role in achieving the EU's 2020 renewable energy targets, but it also revealed areas for improvements.

The paper is structured into five sections. After the introduction and the methodology sections, Section 3 delves into a detailed analysis of renewable energy statistics and targets for the year 2020, with a specific focus on the utilization of cooperation mechanisms. Within this analysis, Section 3.1 examines the role of statistical transfers in the EU's renewable energy framework, whereas Section 3.2 offers a thorough overview of how statistical transfers were employed in various EU countries. This includes an exploration of the motivations and actions of both buyer and seller countries, shedding light on the dynamics of these agreements. Moving forward, Section 4 synthesizes the findings related to cooperation mechanisms. It delves into the specifics of statistical transfers, joint projects (both within the EU and with third-party countries), and joint support schemes. Finally, Section 5 presents a discussion of the findings and their broader implications. It addresses the growing preference for statistical transfers while also acknowledging the complexities and challenges associated with joint projects. It concludes with policy recommendations aimed at advancing renewable cooperation mechanisms within the European Union.

Renewable Energy—Legal Framework and Targets

The RES Directive of 2009 set a European-wide objective of achieving a 20% share of renewable energy in gross final energy consumption by 2020 [3]. The directive also mandates that the total increase in the use of energy from renewable sources must be distributed among Member States based on an equal increase in each state's share, which is weighted according to their GDP.

The EU's approach to target setting was aimed at ensuring that the burden of reducing greenhouse gas emissions and promoting renewable energy was shared fairly among all Member States; at the same time, this approach also recognized that Member States have different levels of resources and capabilities, and that some may require more support and guidance to meet their targets than others. However, as Klessman et al. [7] confirm, the allocation of differentiated national targets based on a flat-rate approach (same additional share for each country), adjusted to the Member State's GDP, does not necessarily correlate with the Member States' RES potentials. Some countries with significant potential for renewable energy production have been allocated relatively low targets, whereas other (relatively wealthy) countries with little potential have been assigned very challenging targets [14]. In fact, some Member States, particularly those with abundant wind or solar

resources, may have a greater physical and/or economic potential to increase their share of renewable energy than others. This means that the equal increase approach may result in some Member States being required to make greater efforts than others if their potential for increasing renewable energy is low compared to their target. Additionally, this method fails to consider the differences in sectoral energy consumption patterns among Member States. Certain Member States may have a larger percentage of energy consumption in sectors such as transportation, which are more challenging to decarbonize compared to other sectors [15]. As a result, this approach may impose a greater burden on these Member States to meet their targets.

As part of their 2020 target commitment, each Member State was required to adopt standardized National Renewable Energy Action Plans (NREAPs) and submit them to the European Commission by June 2010 [3]. These NREAPs served as comprehensive roadmaps outlining the strategies to achieve the legally binding 2020 targets. Member States were tasked with considering the impact of energy efficiency policies on final energy consumption while specifying a non-binding technology mix, outlining the trajectory they intended to follow, and proposing measures and reforms to overcome barriers in renewable energy development [16].

Importantly, cooperation mechanisms were introduced with the RES directive as part of the various measures and reforms available to Member States to achieve their renewable energy targets. Article 6 of the 2009 RES directive enables the transfer of a specific quantity of renewable energy from one EU Member State to another. This transfer does not require a physical transfer or additional generation of renewable energy. Instead, it relies on adjusting national statistics, i.e., the agreed-upon amount of transferred renewable energy is subtracted from the seller country's statistics and added to the buyer country's statistics. These transfers may occur over one year or multiple years and must be reported to the Commission annually [3].

Article 7 of the RES directive allows multiple EU Member States to cooperate on joint projects for the production of electricity, heating, or cooling from renewable sources. In this partnership, an investing Member State would support another Member State in meeting its renewable energy targets by contributing to its renewable energy production. The participating Member States need to inform the Commission about the specific amount or proportion of renewable energy involved. This renewable energy amount is then moved from the host country to the investing country's renewable energy statistics. For this transfer, a physical flow of energy between the cooperating Member States is not necessarily required. Joint projects between Member States and third-party countries (Article 9 of the RES directive) are based on the same principle as joint projects within the EU but require physical imports of the energy to be transferred to an EU Member State [3].

According to article 11 of the RES directive, two or more Member States may join or partly coordinate their national support schemes. In such cases, a portion of renewable energy generated in one participating Member State can contribute to meeting the renewable energy goals of another participating Member State. This transfer may be done through a statistical transfer of specified amounts of energy or by setting up a distribution rule that allocates amounts of energy from renewable sources produced as a result of joint investments between the participating Member States [3].

The reasoning behind these mechanisms is comparable to the flexible mechanisms of the Kyoto Protocol ("Kyoto mechanisms"), which allowed countries to meet their emissions reduction targets through different project and trading mechanisms [17]. Similar approaches are continued under the Paris Agreement's Article 6 for the achievement of the nationally determined contributions (NDCs). However, joint projects involving the physical transfer of electricity represent a major difference to the mere trading of allowances or other types of transfers under the Kyoto Protocol and Paris Agreement, as it leads to additional complexities and design questions.

2. Materials and Methods

A mixed-methods approach was applied that incorporated quantitative and qualitative data sources. In addition to conducting a literature review and examining press releases from Member States, the study involved an in-depth analysis of publicly available cooperation agreements, Eurostat data on final energy consumption [18] and renewable energy sources [19], and interviews with both seller and buyer countries.

The initial step involved conducting a literature review to assess the current state of research on the topic, identifying existing analyses and research gaps. This review aimed to provide valuable insights into cooperation mechanisms and statistical transfers.

Subsequently, official statistics were utilized to investigate completed deals and amounts of statistical transfers across various countries. The data were obtained from official reports, such as the national energy and climate plans (NECPs), Eurostat, and the European Commission. To complement these official statistics, the study also examined the details of agreements pertaining to cooperation mechanisms and statistical transfers, as well as official press releases. Through this analysis, the scope and clauses related to statistical transfers were identified, and data on quantities and prices negotiated in the agreements under study were collected.

In a next step, a more detailed analysis of seller and buyer countries' energy developments was conducted. Eurostat SHARES data were utilized to investigate the emergence of surpluses in seller countries and to ascertain which specific technologies or energy demand patterns contributed to a higher share of renewable energy.

The design of questions and considerations about the use and design of cooperation mechanisms, drawn from existing literature and informed by quantitative analyses, served as the foundation for interviews with government representatives (Appendix A—Table A1). The selection of these representatives was based on their involvement in implementing these mechanisms and transfer processes. The interviews were conducted to gain further insights and validate our findings, and focused on topics such as the choice of the utilization of cooperation mechanisms to meet the 2020 renewable energy target and how this instrument was incorporated into the country's strategy. Additionally, the interviews explored partner selection, price formation, conditions related to the deal (such as the use of revenue), the degree of flexibility (e.g., minimum transfer volume, additional quantity transferred), and the interviewees' perspectives on the future of cooperation. Finally, robust conclusions on the use and role of the cooperation mechanisms could be drawn.

3. EU Renewable Energy Statistics for 2020

According to Eurostat, the European Union exceeded its renewable energy target in 2020 by relying on renewable sources for 22% of its energy consumption, which was higher than the intended 20% set by the 2009 RES Directive [6].

Among EU Member States, Sweden had the highest proportion of renewables in final energy consumption, with a rate of 60.1%, followed by Finland at 43.1% and Latvia at 42%. Notably, Sweden and Croatia both exceeded their EU-set targets by 11 percentage points, whereas Bulgaria beat its goal by 7 percentage points, with a rate of 23.3%. Malta and Luxembourg had the lowest share of renewables in their energy mix, with 10.7% and 11.7%, respectively, but they still managed to meet their targets with the help of statistical transfers. In contrast, France did not meet its goal, producing only 19.1% of its energy from renewable sources [13], and did not make use of cooperation mechanisms to meet it. Currently, there is an ongoing discussion between France and the European Commission regarding whether France will be subject to a fine or whether it will need to purchase statistical quotas to address its shortfall [20].

Although the results overall may seem positive, it is worth noting that the achievement of targets was not solely due to an increase in renewable energy production across all Member States; other factors were also influential. In a report for the European Commission [21], which was published alongside the Commission's 2022 State of the Energy Union report, the significant impact of the COVID-19 pandemic on the energy sector in 2020 was

underlined, with lockdowns and restrictive measures causing a substantial decrease in energy consumption in all Member States. The total gross final energy consumption in the European Union decreased by approximately 8% in 2020 compared to 2019, the lowest level since 1990 [22]. The reduction in total gross final consumption in 2020 may have also been influenced by other factors, such as weather fluctuations and the implementation of energy efficiency policies. Despite this, the generation of RES was unaffected by the lockdowns [23]. Therefore, this shift towards a higher RES share in the power mix was only partially attributable to the actual addition of new installed capacity, and it can be inferred that the reduction in energy consumption facilitated the achievement of targets by the Member States [24].

3.1. Statistical Transfers in the EU's Renewable Energy Framework

The use of statistical transfers has played a key role in helping the EU achieve its renewable energy objectives. The mechanism allows Member States with a surplus of renewable energy to virtually transfer it to other Member States that are struggling to meet their targets. The Member State that exceeds its target is then compensated financially by the Member State importing the renewable energy [7]. This is exclusively an accounting procedure, without any actual exchange of energy. If a Member State has exceeded its target, it is allowed to transfer the excess to another Member State that is falling short of its target.

In the years before 2020, the use of statistical transfers saw a significant increase after a slow start. This was possible thanks to the Member States that achieved their 2020 targets in advance, leading to a surplus of renewable energy. For instance, by the end of 2017, eleven Member States had already surpassed their national RES targets [18].

By 2021, eleven agreements were concluded to meet the 2020 targets, involving the transfer of approximately 11.6 TWh of renewable energy. (Statistical transfers may be concluded for the past year (to flexibly account for unexpected shortfalls), current year, year ahead, or coming years (i.e., forward products) [25]. The RES Directive sets a stringent deadline for the notification of statistical transfers, which is in December of the year following the target year. Therefore, several agreements for 2020 were concluded in 2021.) The mechanism has been particularly beneficial for smaller Member States with limited renewable energy resources. In particular, six Member States—Belgium, Ireland, Luxembourg, Malta, the Netherlands, and Slovenia—opted for this instrument, as the national measures did not seem sufficient to generate the volumes of renewable energy required to achieve their 2020 binding targets.

Table 1 below provides a recap of the statistical transfer agreements that were concluded to meet the 2020 obligations.

Table 1. Statistical transfer agreements for the 2020 targets.

Year of the Agreement	Seller MS	Buyer MS	Amount (GWh)	Price (EUR/MWh)
2017	Lithuania	Luxembourg	800	15
2017	Estonia	Luxembourg	950	15
2020	Estonia	Malta	20	20
2020	Denmark	Netherlands	13,650	12.5
2020	Denmark	Belgium (Flanders)	1800	12.5
2020	Denmark	Ireland	1000	12.5
2020	Estonia	Ireland	2500	15
2021	Finland	Belgian federal government	1376.5	13.5
2021	Finland	Belgium (Flanders)	270	13.5
2021	Lithuania	Belgium (Brussels region)	152	15
2021	Czech Republic	Slovenia	465	10.5

The current Renewable Energy Directive (RED II), defining the RES target for 2030, requires Member States to annually maintain their baseline shares after 2020, which are

determined by their national 2020 renewable energy targets under the previous Renewable Energy Directive (2009/28/EC). (In June 2016, the European Parliament adopted a resolution that established the 2020 targets as the minimum baseline when revising the Renewable Energy Directive: "the targets already agreed for 2020 must be taken as the minimum baseline when revising the Renewables Energy Directive, so that Member States cannot go below their 2020 national target after 2020" [26].) To prevent the 2021 renewable shares from falling below their 2020 targets, several countries, such as Slovenia, Belgium, and Luxembourg, agreed to engage in statistical transfers in 2022 [27–29].

3.2. Overview of Use of Statistical Tranfers in EU Countries

This section provides an overview of statistical transfer agreements implemented in EU countries, highlighting the perspectives of both buyer and seller countries. To gather valuable insights, interviews were conducted with country representatives (see Appendix A), supplemented by the analysis of relevant documentation such as the European Commission's "Assessment of Member States' reports for the year 2020" [21], National Renewable Energy Action Plans [30], and press releases.

Figure 1 illustrates the large magnitude of statistical quotas that a few countries, such as the Netherlands, Ireland, Belgium, and Luxembourg, needed to purchase, as well the volumes transferred by seller countries.

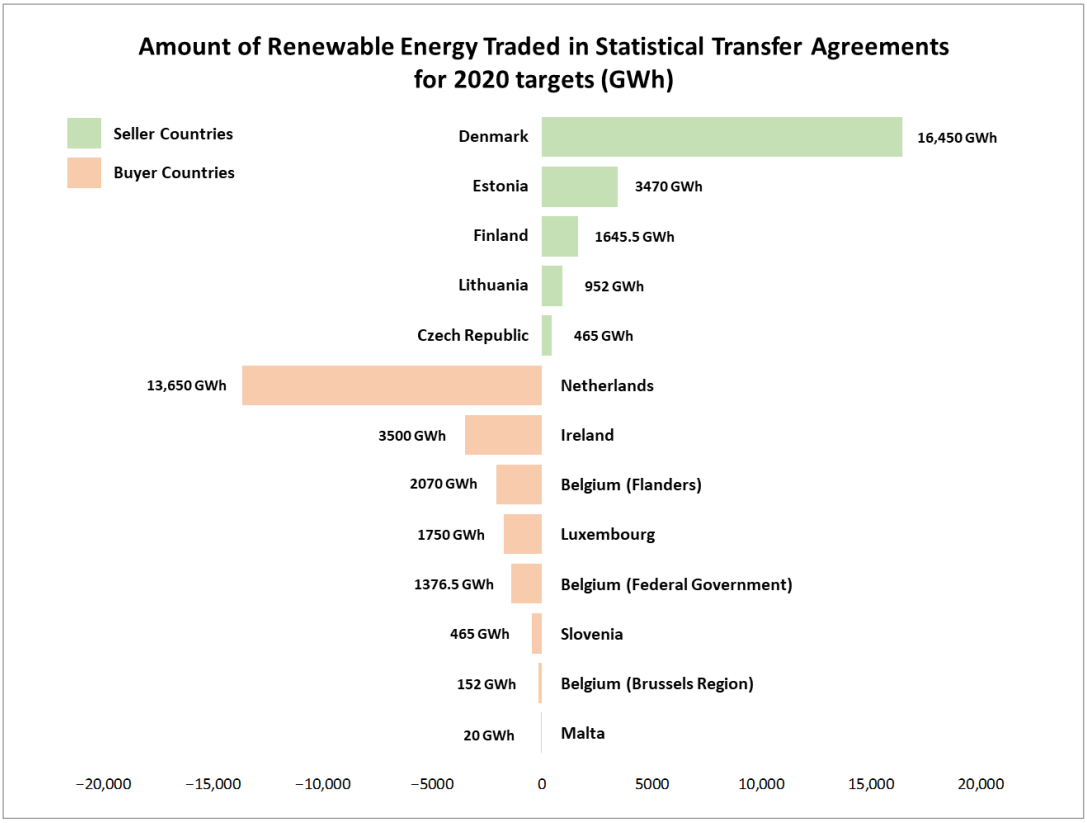


Figure 1. Total volumes of renewable energy transferred per country. Source: own elaboration based on Eurostat [18].

In the upcoming section, dedicated to individual countries, we offer an evaluation of energy consumption trends, renewable expansion, contractual agreements, and the strategic considerations guiding partner selection and the volume of statistical transfers. This analysis combines insights gathered from interviews, cross-referenced and enriched with Eurostat data, offering a comprehensive perspective on the dynamics shaping these agreements.

3.2.1. Buyer Countries

Luxembourg, being a small landlocked country, faces challenges in developing renewable energy projects within its territory. Nonetheless, like all EU Member States, it was required to achieve its national renewable energy target by 2020, set at 11% of its gross final energy consumption. In light of this obligation, it was recognized by the government at the time of the RES Directive's publication that cooperation mechanisms would be indispensable to realize the 2020 objective, and such mechanisms have been integrated into Luxembourg's strategic plan since 2009. Notably, Luxembourg's share of renewables was less than 3% in 2009 and just below 5% in 2015 [18], making it unfeasible for the country to meet the target without relying on some form of cooperation. In October 2017, Lithuania—which had already achieved the renewable goal for 2020 in 2014—signed the first ever statistical agreement with Luxembourg. The agreement provided that Lithuania, between 2018 and 2020, would transfer a share of its surplus to Luxembourg for EUR 10 million to be invested in energy projects and scientific research [31].

A second deal was signed between Luxemburg and Estonia a few weeks later, in November 2017. The agreement stipulated that Estonia would engage in the transfer of a minimum volume of renewable energy target amounts in 2018 and 2020, with the option of additional transfers in the future. In the interview, Luxembourg stressed the significance of transparency and fairness in the negotiation process for both parties. The same conditions, including pricing, were applied in both deals. This price set a reference point for future statistical transfer deals among EU countries.

The agreements with both countries also included a clause that outlined the utilization of revenue generated from the statistical transfer. Although this clause was quite general, it underscored the significance of utilizing these funds to accelerate the transition to renewable energy sources in the host countries. Specifically, the revenue generated from these transfers were to be earmarked for the development of new renewable energy and energy efficiency projects, thereby supporting the Union's transition to cleaner sources of energy.

Overall, Luxembourg's use of the statistical transfer mechanism proved to be a valuable strategy in meeting its renewable energy targets. Due to the country's limited potential for developing renewable energy projects within its borders, cooperation mechanisms were crucial to reach its 2020 objectives. Luxembourg, however, is exploring other options for future cooperation and is participating in the new financing mechanism for renewable energy initiatives [6].

Malta had a target of achieving a 10% share of renewable energy in its gross final energy consumption by 2020. However, year-on-year increases in energy consumption, driven by population growth and exceptional economic growth, and delays in the development of large-scale PV projects posed a significant challenge to country's ability to meet this target [32].

In response, the Maltese government opted for cooperation mechanisms to complement its local investment in renewable energy. This led to the signing, in January 2020, of the statistical transfer agreement between Malta and Estonia, which enabled Malta to meet its renewable energy obligations. The deal stipulated that the parties could transfer 100 GWh of renewable energy for the price of EUR 20 per MWh. However, Malta had the flexibility to decrease or increase the amount of renewable energy transferred depending on its energy needs. In the end, the quantity transferred was 20 GWh, demonstrating Malta's commitment to using cooperation agreements for statistical transfers as a measure of last resort.

The Netherlands had a target of a 14% share of renewable energy by the year 2020. However, based on provisional figures for 2020, the Dutch government estimated that an import of approximately 16 TWh of renewable energy would be required to meet this target. The forecasted deficit primarily resulted from an expected increase in gross final energy consumption for the year. Additionally, the implementation of renewable energy projects experienced delays, particularly in the case of onshore wind energy projects, due to objection and appeal procedures [33].

In June 2020, the Netherlands entered into an agreement with Denmark for the transfer of between 8 and 16 TWh of renewable energy [34]. Eventually, the transferred amount of renewable energy was set at 13.65 TWh for EUR 12.5 per MWh. The government had earmarked a maximum of EUR 200 million for statistical transfers, but due to the higher share of renewable energy achieved, the actual cost was almost EUR 30 million lower. The cost for the statistical transfer ultimately amounted to EUR 170.6 million.

These funds are to be used by Denmark for a tender for Power-to-X projects, such as, for example, the production of green hydrogen using electrolysis [35]. Thus, the agreement with Denmark contributes to further energy transition in Europe and know-how exchange between the Netherlands and Denmark. Nevertheless, the government recognizes that a statistical transfer is not an ideal situation to meet the renewable energy target. Currently, the Netherlands has no plans to engage in the new financing mechanism for renewable energy. Instead, it will make maximum efforts in the coming years to significantly increase the share of renewable energy, in particular by strongly increasing its offshore wind capacities [36].

Belgium aimed to achieve a 13% share of renewable energy in its gross final energy consumption by 2020. However, as of 2017, only 9.1% had been reached, indicating that further action was required to meet the country's target [37].

In order to reach the binding national RES target, the Belgian entities have agreed to set four internal renewable energy targets for the country (regulated by a burden-sharing agreement), one for the Federal Government and three others for the regions of Wallonia, Flanders, and the Brussels Capital Region. The targets set for each entity reflect their respective competencies and capacities. In Belgium, energy policy is under the jurisdiction of regional authorities, with only offshore wind power and biofuel increase being subject to federal regulations. This means that each entity has the responsibility to implement measures that are best suited to their specific circumstances and can also individually conclude agreements with other Member States in order to reach their renewable energy targets.

The Walloon region is the only jurisdiction that attained and exceeded its renewable energy goal by 2020. However, the efforts of the Walloon region did not compensate for the deficits of the other entities, which meant that they had to offset their gaps through the use of cooperation mechanisms.

Due to lower-than-expected domestic offshore wind production, there was a need for the Belgian Federal Government to engage in statistical transfers. As statistical transfers do not involve the actual transfer of renewable energy and the buying Member State is unable to utilize it to meet its own energy needs, it was considered a last resort after exploring all other options.

For the 2020 target, the Federal Government of Belgium reached out to multiple Member States and received several positive responses, as stated in the interview. Based on the quantity of renewable energy needed, the government ultimately selected Finland. Under the deal, Finland agreed to transfer 1376.5 GWh of renewable energy to Belgium at a cost of EUR 13.5 per MWh, with the revenue to be used by Finland for wind expansion. The price was the main factor considered in the selection process, and the Federal Government used previous agreements as a reference to determine a reasonable price for the statistical transfer. For the 2021 target (baseline share), the Federal Government of Belgium reached an agreement on a statistical transfer with Denmark as part of a broader agreement to cooperate. The long-term aim is to develop common renewable energy projects in the North Sea.

Flanders entered the cooperation mechanisms relatively late, in October 2020, and the primary factor driving their decision to opt for a statistical transfer was the timing constraints related to the availability of energy consumption statistics that determined whether the 2020 targets could be met at the national level.

In fact, during the interview, a representative from the Flemish government explained that the country selection was driven by a practical approach. Flanders reached

out to several Member States; however, the limited time frame forced them to select a country that offered a reasonable price and an efficient and straightforward process. Preferably, the country selected should have had previous experience in concluding statistical transfer agreements.

Flanders followed the example set by the Netherlands, which successfully negotiated a statistical transfer with Denmark, and felt confident in procuring from the same partner, which had already experience with this mechanism. This approach reflects the importance of practicality and efficiency in decision-making, as the objective is to meet renewable energy targets in a timely and cost-effective manner.

Flanders ultimately entered a contractual agreement with Denmark for the transfer of 1800 GWh at a rate of EUR 12.5 per MWh. Additionally, the country also signed a separate agreement with Finland in 2021 for a smaller quantity of 270 GWh at a slightly higher rate of EUR 13.5 per MWh.

Following the burden-sharing agreement within Belgium, the Brussels Capital Region should have attained a renewable energy share of 4.4%, reflecting its limited potential [37]. Indeed, the region is small, densely populated, and exposed to restrictions from the national airport. All of these factors severely limit the potential for large-scale wind turbines [37].

The Brussels Capital Region opted for a statistical transfer agreement that involved the purchase of 152 GWh of renewable energy from Lithuania at a fixed price of EUR 15 per MWh [38]. The revenue generated from statistical transfers was to be directed towards supporting new energy projects within the Republic of Lithuania. Furthermore, the parties involved collaborated to ensure that a maximum of 15% of the total revenue was dedicated to advancing scientific research in the renewable energy field within Lithuania [38].

To fulfill its obligation of achieving a 16% renewable energy share, as mandated by the RES Directive, Ireland opted to utilize statistical transfers. Throughout 2020, Ireland actively engaged in discussions with several Member States to explore this cooperation mechanism. This ultimately led to successful negotiations with Denmark and Estonia, resulting in agreements for the purchase of designated volumes of renewable energy through statistical transfers [39].

The total cost of statistical transfers in 2020 was EUR 50 million, consisting of:

- The purchase of a statistical transfer of 1000 GWh from Denmark costing EUR 12.5 million;
- The purchase of a statistical transfer of 2500 GWh from Estonia costing EUR 37.5 million.

The agreement also covers an option for further purchases of between 500 and 1000 GWh.

The Irish government stressed that funds received by both Estonia and Denmark will be used to accelerate the deployment of renewable electricity in their jurisdictions, in line with their national energy and climate plans [40].

In 2019, the share of renewables in gross final energy consumption in Slovenia was 22.5%. This was below the country's target of 25%, as set out at the EU level. The country signed an agreement with the Czech Republic to purchase 465 GWh of renewable energy surplus for about EUR 4.8 million, as it was the cheapest offer (selling price: EUR 10.50).

3.2.2. Seller Countries

Lithuania was a pioneer in establishing statistical transfer agreements, being the first country to do so in 2017. Its 2020 renewable target of 23% was already surpassed in 2014; however, the surplus was rather moderate (See Figure 2). Since the first deal, ten additional agreements were signed between EU Member States to reach the 2020 targets, with many using the agreements between Lithuania and Luxembourg as a model.

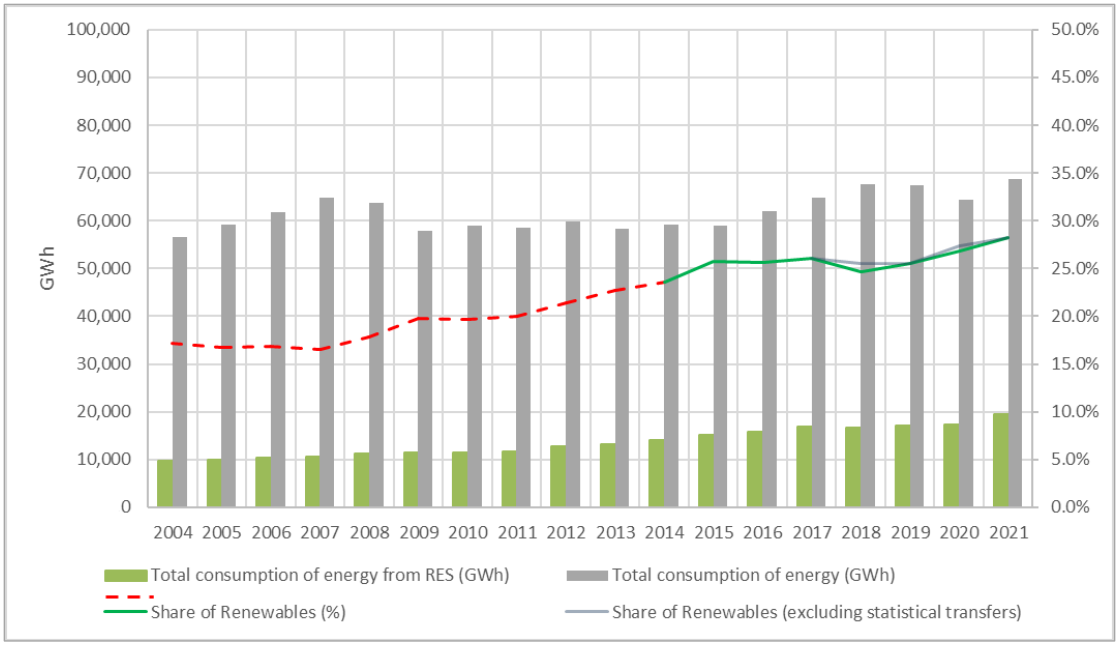


Figure 2. Energy consumption and target achievement over time in Lithuania. Source: own elaboration on the basis of Eurostat SHARES 2021.

Data and statistics on renewable energy are publicly available for each Member State, which allows countries with deficits to identify which countries have surpluses and approach them for negotiations. This transparency has facilitated partner selection for Lithuania, which concluded agreements with Luxembourg and Belgium's Brussels Capital Region.

Concerning the price negotiation, the selling price in the agreement with Luxembourg and Belgium's Brussels Capital Region was EUR 15/MWh, thus falling within the range of the average support for RES electricity in 2016 of EUR 20.1/MWh, whereas RES heating was strongly supported by EU funds [41].

The revenue from statistical transfers was to be invested into three key areas: renewable energy sources, energy efficiency, and innovation projects. Specifically, the revenue received from the statistical transfers to Luxembourg was invested in tenders for decentralized energy production facilities during 2020. Around EUR 7 million were allocated to renewable energy communities, farmers, and small and medium-sized enterprises for small-scale renewable projects [42].

The agreement between Lithuania and Belgium's Brussels Capital Region included a clause allowing for the possibility of future statistical transfers beyond 2020. However, according to projections in the National Energy and Climate Plan (NECP), Lithuania is not expected to have a surplus of renewable energy until 2027 (considering the 2030 national target of a 45% renewable share on the total gross energy consumption). Instead, Lithuania plans to collaborate with other countries on joint projects, such as offshore wind farms, and explore other cooperation mechanisms envisaged by the new directive.

Figure 2 illustrates a significant rise in renewable energy's contribution to final energy consumption between 2010 and 2020 in Lithuania. This is explained by a moderate increase in wind energy and a substantial surge in renewables used for heating and cooling [19]. It is worth noting that, during this period, there was a slight overall increase in energy consumption.

Estonia's decision to engage in statistical transfer agreements to sell its surplus renewable energy was driven by several factors, as confirmed in an interview by a government official. Firstly, Estonia reached the national renewable share target of 25% in 2011. Additionally, statistical transfers were regarded as an efficient and straightforward mechanism for facilitating cooperation in the realm of renewables. Lastly, following the successful completion of the initial deal in 2017, Estonian political decision-makers became familiar

with the instrument, making subsequent implementations a more straightforward and favorable choice.

Estonia's three agreements were concluded with Luxembourg, Malta, and Ireland. The selling prices were set at EUR 15 per MWh for Luxembourg and Ireland, whereas Malta paid a higher price of EUR 20 per MWh, which can be attributed to the relatively low quantity traded (20 GWh) and the requested flexibility to receive additional amounts. The prices also reflected Estonia's need to recover domestic subsidies for renewables, which were EUR 53.7 per MWh in addition to the market price. Estonia was cautious not to oversell its renewable energy surplus, as it can be difficult to forecast and negotiate with certainty, especially in the long term. Therefore, only after it became clear that Estonia would achieve its 2020 target did it opt for statistical transfer mechanisms. This resulted in an unallocated surplus of renewable energy by the end of the 2014–2020 period (see Figure 3).

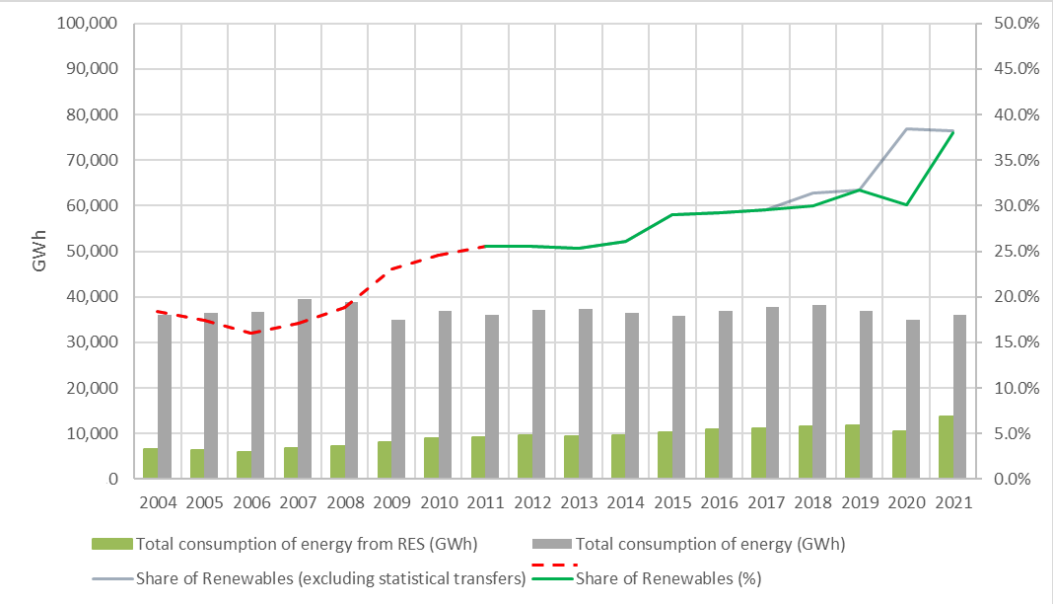


Figure 3. Energy consumption and target achievement over time in Estonia. Source: own elaboration on the basis of Eurostat SHARES 2021.

The three agreements Estonia concluded with Luxembourg, Malta, and Ireland included an obligation for the selling country to reinvest the revenue in the deployment of renewable energy production and energy efficiency projects. This clause was important because it obligated the buyer countries to communicate the use of the money to the public and for the seller country to indicate where the income would be distributed. Estonia used the revenue generated from statistical transfers to specialize in wind energy production by investing in air surveillance radar systems (EUR 74.5 million), which allowed for the establishment of wind farms without height restrictions [43]. This investment is strongly accelerating renewable energy expansion in Estonia. The revenue was also redistributed to finance domestic renewable energy production, enabling the country to better respond to the current energy crisis and maximize the effort for the new 2030 target.

Denmark is among the EU countries with the highest share of renewable energy in its energy mix (see Figure 4). Denmark experienced a substantial rise in renewable electricity generation from 2010 to 2020, primarily driven by wind power, with solid biomass also contributing notably after 2016 [19]. Concurrently, a decrease in energy demand resulted in a substantial surplus. Under the RES directive, Denmark had to achieve a 30% share of renewable energy in its final energy consumption by 2020. However, by 2019, the country had already exceeded this goal, with a share of 37% [18]. Consequently, the country chose to trade its surplus of renewable energy through a statistical transfer, selling nearly 16.5 TWh

of renewable energy. In 2020, Denmark concluded three statistical transfer agreements, with the Netherlands for 13,650 GWh, with Belgium (Flanders) for 1800 GWh, and with Ireland for 1000 GWh, all at the same selling price of EUR 12.5 per MWh. Denmark would use the proceeds to upscale power-to-X technologies, with a particular focus on the production of green hydrogen.

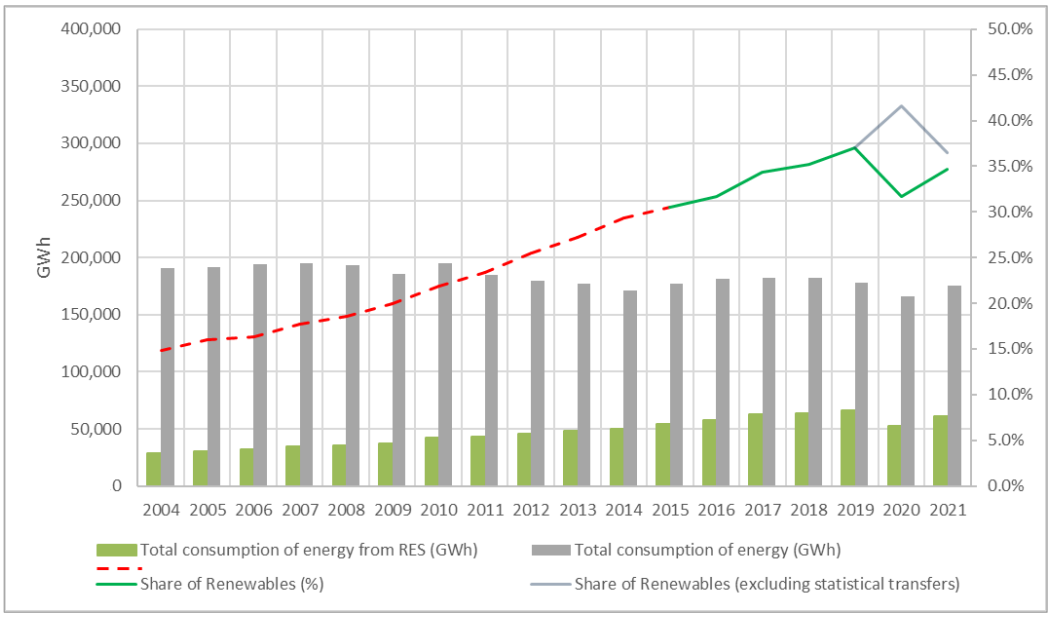


Figure 4. Energy consumption and target achievement over time in Denmark. Source: own elaboration on the basis of Eurostat SHARES 2021.

Finland reached its 2020 renewable energy target of 38% as early as 2014, primarily due to a slower recovery from the 2008 financial crisis. The gradual economic rebound resulted in lower-than-expected energy demand, which, in conjunction with increased biomass production and a generally reduced energy consumption rate, allowed Finland to attain its target and create an energy surplus (See Figure 5).

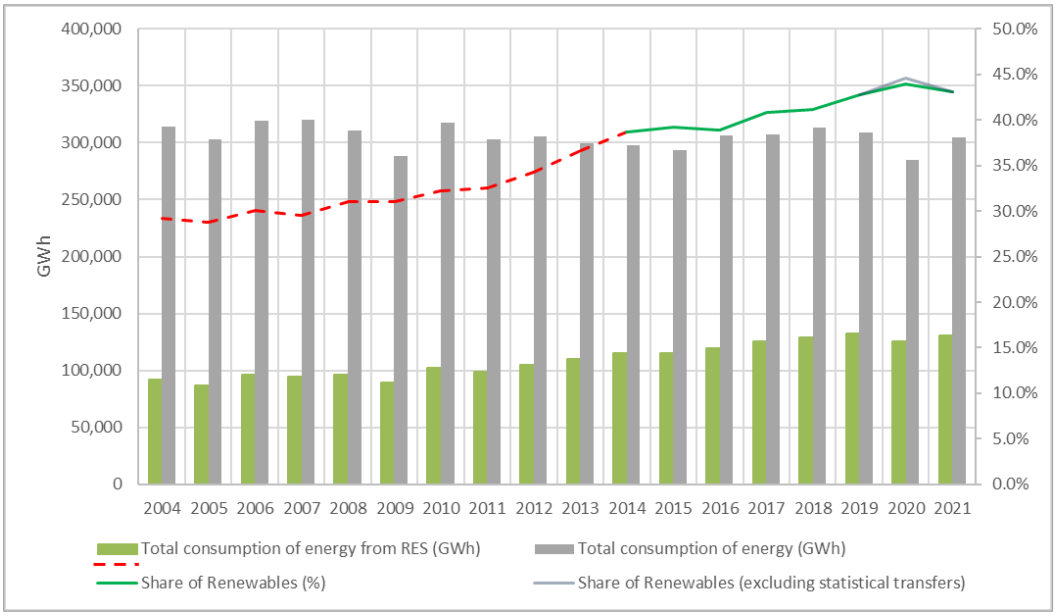


Figure 5. Energy consumption and target achievement over time in Finland. Source: own elaboration on the basis of Eurostat SHARES 2021.

Because of this surplus, Finland was not pressured to engage in long-term cooperation mechanisms or invest in additional renewable energy projects, as a governmental representative highlighted during the interview.

In 2020, the country concluded two statistical transfer agreements: one with the Belgian Federal Government for 1376.5 GWh and one with Belgium Flanders for 270 GWh. The selling price for both deals was fixed at EUR 13.5 per MWh.

Finland agreed to use the revenue received from the statistical transfers for renewable energy projects and/or scientific research in the field of renewable energy sources.

In determining the selling price, Finland evaluated the pricing arrangements in previous agreements and monitored the progress reports of EU countries. However, the negotiations were not solely driven by price, according to a Finnish government representative; Finland also took into account factors such as the speed at which an agreement could be reached and the contractual terms proposed by potential buyers. During the negotiations, the renewable energy market was characterized by an oversupply, leading Finland to fix the price point without room for adjustment.

At present, Finland does not have plans to sell any surplus energy and instead is prioritizing the achievement of its 2030 targets before considering surplus sales as a future prospect.

In 2020, the Czech Republic had an excess of renewable energy compared to its 2020 target of 13% (see Figure 6). It monitored the countries in which there was a gap in achieving the RES targets and engaged in talks with several Member States, but only negotiations with Slovenia resulted in a specific offer. The Czech Republic opted for a statistical transfer, as it was the simplest tool to use in terms of time and administration. The final deal was concluded at a price of EUR 10.5 per MWh, which was the lowest price agreed on for a statistical transfer for the 2020 targets.

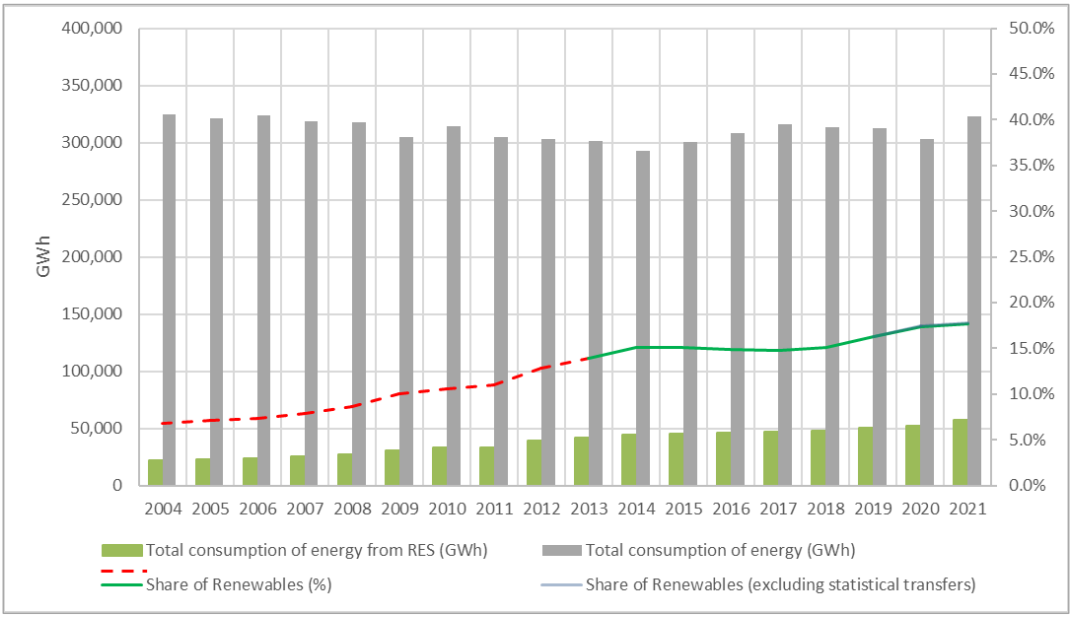


Figure 6. Energy consumption and target achievement over time in the Czech Republic. Source: own elaboration on the basis of Eurostat SHARES 2021.

Regarding the negotiations, Slovenia requested a specific amount of energy to be transferred, and other Member States were given a deadline to submit their price offers. The selection process was based purely on price, and, following several months of negotiations [44], Slovenia ultimately chose the Czech Republic for the agreement [45].

According to its national energy and climate plan, the Czech Republic [46] does not currently plan on using statistical transfers. Nevertheless, such a potential transfer is not

being ruled out. In the case of a RES surplus, a statistical transfer to another Member State will be considered.

4. Synthesis of Cooperation Mechanisms

As of today, the EU Member States have agreed on thirteen cooperation initiatives (of which eleven are statistical transfers and two are joint support schemes). Although this indicates that implementation might be speeding up, the use of the cooperation mechanisms is still low.

Due to the novelty of the mechanisms and a lack of familiarity with these instruments, when examining the Member States' NREAPs submitted in 2010, it becomes evident that the plans for utilizing cooperation mechanisms were still unclear or absent. In contrast, NECPs submitted by Member States in 2019 showed more specific intentions for using these mechanisms. This shift was largely attributed to discussions between Member States on a bilateral or multilateral basis, as well as through various groups and forums that gathered key stakeholders and encouraged dialogue. However, there remains a lack of concrete plans, which highlights the perceived challenges in applying these cooperation mechanisms [47].

4.1. Statistical Transfers

Although legal or administrative barriers may occasionally pose challenges when arranging and executing contracts, statistical transfers do not require the creation of elaborate frameworks. Due to the streamlined implementation process and the minimal administrative effort required, statistical transfers present a swift and efficient mechanism that can also be implemented ex-post [8]. Additionally, to make this process as smooth as possible, the European Commission has taken steps to facilitate the process of statistical transfers by creating the Union Renewable Development Platform (URDP), which provides a comprehensive overview of the surplus or excess of statistics for renewable energy across all 27 EU countries. The platform also includes a "matching mechanism" that displays potential options for statistical transfer agreements, along with volumes and pricing. Moreover, templates are available to provide guidance on how to prepare agreements, thus reducing the administrative burden of the process.

Although statistical transfers have proven effective in assisting the EU Member States in achieving their renewable energy targets, the mechanism also presents some weaknesses. On one hand, although statistical transfers provide a means to reduce the overall cost of meeting the renewable target by enabling a more cost-effective distribution of green energy production across Member States, it does not per se support the expansion of renewable energy generation. It is worth noting that the surplus being sold may not always be solely attributed to the expansion of renewable energy or energy efficiency measures but could also stem from lower-than-predicted energy demand caused by economic challenges.

Most buyer countries, therefore, have requested that the generated revenue from these transactions be reinvested in projects or initiatives aimed at increasing the renewable energy share of the seller countries. This approach aligns with similar practices observed in the trading of Kyoto protocol greenhouse gas certificates, where the surplus of seller countries was largely attributed to the economic recession following 1990 [17]. Similar to Kyoto certificate trading, this requirement also serves the purpose of justifying the purchases to their respective national public and ensuring the responsible allocation of resources.

Notably, some buyer countries impose specific requirements on the use of revenue. For instance, funds may be earmarked solely for new projects, excluding those already under construction and thus safeguarding the additionality of investments. Others mandate that revenue be invested in electricity-generating projects that are easier to monitor than in the case of, e.g., biomass-based heating.

Some buyer countries even advocate for the allocation of revenue to projects of European significance, such as hydrogen production or a European wind hub in the North Sea.

Furthermore, most buyer countries demand a defined monitoring and reporting process of revenue investments to ensure compliance.

This mirrors the practices observed in the Kyoto trading of AAU carbon certificates, where revenue generated from trading were required to be invested in greenhouse gas reduction measures within the seller country, supported by putting follow-up monitoring mechanisms in place [17].

Typically, the pricing of statistical transfers is determined through bilateral negotiations between Member States. Prices can vary significantly depending on a range of factors, including the demand and supply of renewable energy at the EU level, the availability of surplus in the individual seller country, the demand for flexible options by the buyer, or the volume that is purchased.

The initial agreement between Luxembourg and Lithuania that was based on an assessment of the Lithuanian energy agency served as a benchmark for subsequent deals, but the pricing in these subsequent agreements was not based on in-depth analysis, according to our interviews. Although in principle a seller country would like to recover the support costs for renewables (past or future), the prices have declined over time due to an increasing oversupply of renewable energy shares (Figure 7).

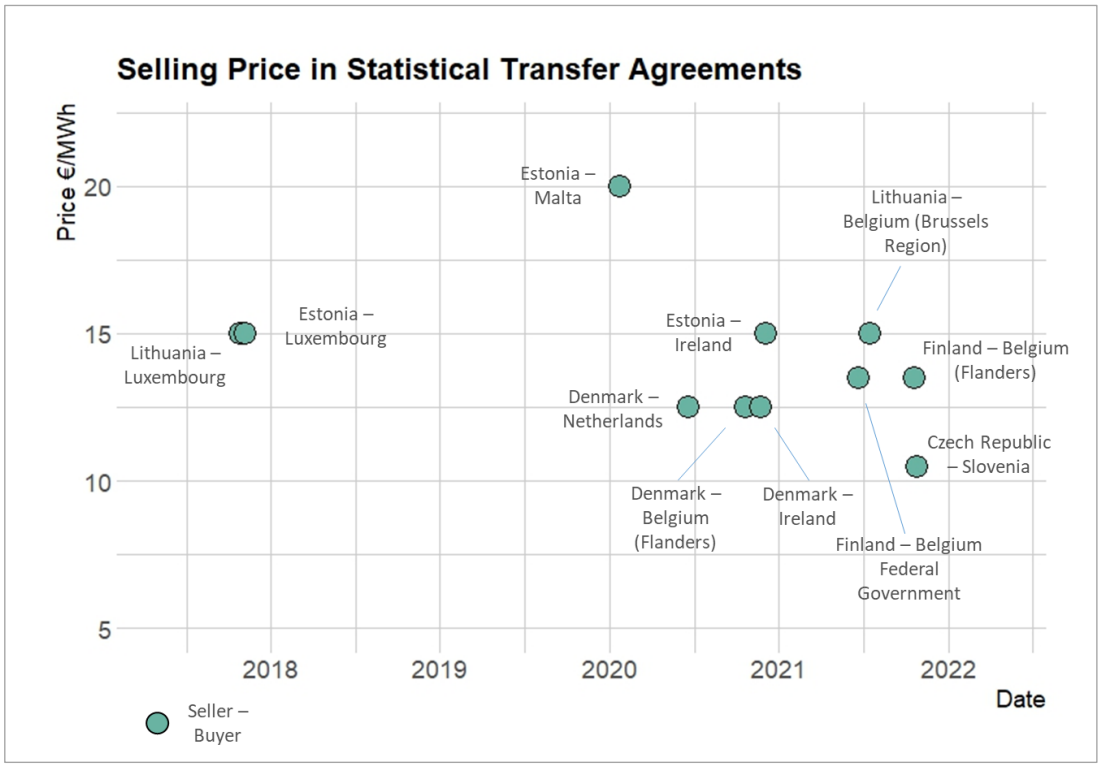


Figure 7. Transfer price negotiated in the agreements for 2020 targets.

Another main challenge is that statistical transfers rely on the availability of surplus renewable energy in some Member States. This means that tradable surpluses may not be available in all years, which can create uncertainty for Member States that are counting on them to meet their targets. In fact, the accuracy and predictability of energy consumption is a matter of concern. The difficulty lies in accurately forecasting future energy demand and in the availability of consumption statistics, which poses a significant challenge for countries in terms of long-term planning. For example, a lack of statistical methods for transferring renewable energy hindered Bulgaria—which has had a surplus since 2016—to participate in this mechanism [48].

Additionally, the time constraint was mentioned in interviews as being an issue, as definitive data on renewable energy are typically only made available between Septem-

ber and October for the year before. This leaves only a narrow two-month window to address any shortfall and meet the renewable energy targets before the final data on energy consumption are released in November/December. A few buyer countries, therefore, have signed contracts that enable them to receive a minimum and maximum amount over a few years.

4.2. Joint Projects (between EU Member States and Third-Party Countries)

Several of the interviewed governments expressed concerns about the complexity of joint projects. The economic viability of joint projects strongly depends on the set-up of the agreement in terms of the share of the foreign investment, the export and concession period, and domestic and export electricity prices. Countries would need to share the produced energy fairly, and there is a need for transmission infrastructure or integration into the buying country's energy system. Overall, the mechanism was seen as too complex despite a few countries investigating its use. Joint projects within the EU were investigated by the Netherlands, Estonia, and Ireland.

The Netherlands had concerns that a joint project in Romania would not be finalized in time and that it would be too small in size to contribute to its deficit in a relevant manner. In addition, Estonia investigated joint projects and signed a MoU with Latvia on a joint renewable offshore wind farm. The size of the planned offshore wind farm, according to the MoU, is up to 1000 megawatts, which is up to 20% of the power consumption of the two countries [49]. The parties did not opt for a cooperation mechanism because this option was considered to be too complex (e.g., design complexity or parameters to be agreed upon for the project).

The United Kingdom and Ireland undertook an initiative to strengthen their electricity markets' integration through a Memorandum of Understanding. The aim was to "achieve closer integration of the UK and Irish electricity markets" [50] and explore the development of Irish renewable energy resources, both onshore and offshore, to benefit both countries. Initially, a jointly funded feasibility study demonstrated the mutual benefits of such an export scheme, and it seemed like a promising initiative. However, negotiations between the UK and Ireland reached a deadlock when they could not agree on a joint regulatory framework. Later, Ireland realized that it would shift its role from a potential exporter to a buyer country.

Joint projects with third-party countries were planned by Italy, and a few Member States, such as Germany, explored joint projects with North Africa. Italy planned to realize joint projects in Western Balkan countries [8] and signed a Memorandum of Understanding (MoU) with Serbia in 2011. Under the agreement, Italy would have provided a feed-in tariff of EUR 155/MWh for a 15-year period for hydropower plants in Serbia [51]. Pricing was challenging, as in this case, rather expensive potentials were earmarked for cooperation despite the host country aiming to keep the most cost-efficient potentials for the domestic supply and targets to ensure a strategic buffer for future targets. In addition, the pricing mechanism was aggravated by the involvement of potential private investors and transit countries, which contributed to making renewable electricity imports expensive [51]. Furthermore, an Italy–Montenegro undersea power interconnector was intended to facilitate the export of electricity to Italy. Later, a PV boom made the use of cooperation mechanisms unnecessary for Italy, and the country faced risk with the timely operation of the Serbian power plants and the establishment of the interconnector.

Regarding North Africa, despite the significant renewable energy potential, planned initiatives such as DESERTEC [52] were not pursued due to various factors, including insufficient infrastructure for large-scale exports, economic and political instability in the region, and limited export potential within the next decade [53]. This decision was also influenced by concerns about the challenges in assessing sustainable development benefits and variations in project performance among host countries [54].

Nevertheless, the concept of exporting solar electricity from North Africa to Europe remains highly relevant, with the potential in point-to-point interconnections for dispatch-

able solar power being recognized [52]. Affordable and on-demand solar electricity aligns with Europe's commitment to a green transition and emissions reduction objectives. The main challenge lies in clearing away misunderstandings stemming from past failures.

Notably, the North African region offers substantial opportunities for future collaboration under the RES cooperation mechanism, aligning with goals of enhancing energy security, reducing emissions, and stimulating economic growth [54].

4.3. Joint Support Schemes

Two joint support schemes have been established thus far: one between Norway and Sweden and the other between Germany and Denmark. In 2020, these joint support schemes led to statistical transfers of 50.84 GWh from Denmark to Germany and 2644 GWh from Sweden to Norway [21].

The scheme between Norway and Sweden was established through a common market for electricity certificates. Previously, the electricity markets in Denmark, Finland, Norway, and Sweden had already undergone liberalization, opening them up to competition in both the generation and the retail sector. These developments culminated in the integration of these four national markets into a single Nordic electricity market [55]. In this context, Swedish and Norwegian electricity suppliers had to buy certificates based on their electricity production or consumption. However, before putting this system into action, the two countries had to engage in extensive negotiations. Finding a fair way to divide the costs and benefits proved challenging. Eventually, a political agreement was reached, leading to a 50:50 cost-sharing arrangement that cleared the path for the final agreement [47].

Producers of renewable electricity can sell their certificates in this market, resulting in increased market participation and strong competition. This approach promotes the development of renewable energy and facilitates a more efficient allocation of resources within the electricity sector. Between 2012 and 2020, the Swedish–Norwegian electricity certificate market contributed to financing renewable electricity production totaling 45 TWh [56]. Norway and Sweden, however, signed an agreement in 2020 that the joint system effectively will close down by the end of 2035, 10 years earlier than planned, as faster-than-expected technology and market developments will make it unnecessary in the future [57].

In 2016, Germany and Denmark reached a mutual agreement to partially and mutually open up their support schemes to market actors from both countries. Two cross-border PV auctions were held. As part of a first auction conducted that year, Germany offered support for 50 MW of renewable energy. Remarkably, all of this support was awarded to Danish bidders at a price of EUR 0.538 /kWh [58].

The outcomes of these initiatives faced criticism from various industry associations. For instance, the German solar association raised concerns, pointing out that taxes in Denmark were lower, leading to perceived unfair competition. A fundamental prerequisite for the establishment of a joint support scheme would necessitate uniformity in all economic and tax-related boundary conditions, a condition that would likely not be met for the majority of countries [59]. Since 2016, there have been no follow-up activities or developments while the legal framework still exists [60].

5. Discussion and Conclusions

The academic literature initially suggested the feasibility of joint projects, but subsequent developments have revealed the complexity and challenges. Interestingly, as of 2020, no joint project had been realized, and statistical transfers emerged as the predominant instrument of choice among governments. The implementation of statistical transfers, characterized by streamlined processes, has indeed proven successful. However, to ensure fairness and actual progress toward the EU's renewable goals, it is crucial to critically examine and plan their implementation.

Joint projects offer valuable opportunities for technology development, innovation, and knowledge sharing among participating countries. However, as highlighted in

Section 4, they encountered various barriers that hindered their implementation. In the interviews, many governments expressed concerns about the complexity of joint projects, which depend heavily on factors such as sharing of the investment between the countries, export and concession periods, domestic and export electricity prices, and the need for transmission infrastructure or integration into the buyer's energy system in the case of physical electricity transfer. Joint projects also proved challenging for Member States in terms of accurately predicting when they would ultimately deliver accountable energy for their investments, ensuring timely delivery in such arrangements.

Two joint support schemes have been implemented and both will be discontinued, putting the future of this mechanism in question.

Statistical transfers, although relatively easier to implement, involved negotiations between countries that extended over several months. Notably, the pricing of cooperation mechanisms lacked a systematic approach. The majority of the deals were concluded in 2020 and 2021, with 2020 experiencing an oversupply of renewable energy compared to preceding years, thus providing buyers with a stronger position for determining prices than sellers.

The choice of seller and buyer countries, however, depended on a range of factors, including price considerations, the speed at which an agreement could be reached, proposed contractual terms, sellers' prior experiences with these mechanisms, flexibility options regarding the transferred volumes, and the potential for strategic cooperation.

To justify statistical purchases to the public, most buyer countries have requested reinvestment of revenue in projects or measures that increase the seller countries' renewable share and mechanisms to monitor review spending. Requesting that revenue be reinvested served as a safeguard against possible windfall surpluses, as the origin of surpluses in statistical transfers was not always clear, and renewable expansion and energy efficiency measures may contribute to renewable energy surpluses, lower-than-predicted energy demand, or easily achievable renewable energy targets could also play a role. Additionally, specific projects were defined in some instances where seller and buyer countries could establish long-term cooperation or share knowledge. However, the reluctance of some countries to act early as sellers, especially when they are uncertain about their surplus capacity, leads to statistical transfers primarily being a short-term instrument. Although this serves for balancing short-term fluctuations in demand and supply, its suitability for long-term planning is dependent upon the clear predictability of surpluses.

Statistical transfers improve the seller country's chances of achieving future renewable targets; however, the buyer country does not make any progress in terms of its domestic renewable energy share. Therefore, statistical transfers may even strengthen the uneven situation between Member States and might lead to further dependencies on the side of the buyer countries. Nevertheless, because of their relative ease of use and their short-term availability in the case of available surpluses, statistical transfers are likely to play a role in the achievement of the 2030 targets.

Although much more complex and requiring long lead times, joint projects or joint support schemes would provide a better basis for the longer-term trajectory of all involved Member States. The introduction of the new financing mechanism could address some of the weaknesses of the current mechanisms by providing ex ante certainty on the allocation of pooled financial contributions, facilitating the realization of larger joint projects of European importance, all while ensuring transparent price setting. This approach offers a systemic means of investing in renewables, ensuring transparency in price determination and directing funds towards innovation and projects that effectively contribute to the EU's objective of becoming a climate-neutral continent by 2050. Nevertheless, countries may still want to engage in bilateral cooperation, particularly for purposes such as technology transfer and knowledge sharing. Additionally, for the countries already involved in existing bilateral collaborations, the transaction costs associated with future agreements may remain relatively low.

To conclude, although statistical transfers are expected to play a role in achieving the 2030 targets, certain concerns persist, such as their long-term effectiveness and their potential to enhance and balance the renewable energy capacity of EU member states. The requirement of RED III to implement joint projects will put pressure on Member States to explore cost-efficient cross-border renewable potential, a crucial step toward Europe's long-term decarbonization. The success of the new financing mechanism will depend on the availability of attractive projects for investing countries, projects that offer benefits extending beyond the acquisition of renewable shares, as was observed with statistical transfers. Additionally, Member States will seek assurance that their financial contributions and efforts will result in tangible outcomes. This can be achieved by the EU certifying projects as being of strategic importance, providing guarantees, and establishing clear timelines for project completion. Ensuring for all mechanisms that projects meet the EU's standards of accountability and transparency will foster trust and cooperation among Member States.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. List of interviewees.

No.	Interviewee	Country Typology (Buyer/Seller)
1	Member of the Ministry of Economic Affairs and Communications of Estonia	Seller
2	Member of the Ministry of Economic Affairs and Employment of Finland	Seller
3	Member of the Ministry of Energy and Spatial Planning of Luxembourg	Buyer
4	Member of the Ministry of Economy of Belgium	Buyer
5	Climate expert advisor from Flanders, Belgium	Buyer
6	Member of the Ministry of Industry and Trade of the Czech Republic	Seller
7	Member of the Ministry of Economy and Innovation of Lithuania	Seller

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