


## Article

# The Impact of M&As on the Competitive Positioning of European Energy Firms and Market Power Concentration on EU National Energy Markets

Natalia Wasilewska <sup>1</sup>, Mirosław Wasilewski <sup>2</sup>, Serhiy Zabolotnyy <sup>2</sup> and Dmytro Osiichuk <sup>3,\*</sup> <sup>1</sup> Department of Economics and Finance, Jan Kochanowski University of Kielce, 25-369 Kielce, Poland<sup>2</sup> Department of Finance, Warsaw University of Life Sciences-SGGW, 02-787 Warsaw, Poland<sup>3</sup> Department of Finance, Kozminski University, 03-301 Warsaw, Poland

\* Correspondence: dosiichuk@kozminski.edu.pl

**Abstract:** By studying M&A deals completed by European energy and power companies between 2002 and 2021, the paper inquires into the impact of corporate consolidation on the competitive positioning of individual energy firms and the concentration of market power on the national energy markets in the EU countries. Our evidence suggests that the European energy market may be moving towards a greater concentration of market power as market leaders are shown to primarily acquire their peers from national markets, while outsiders are more likely to diversify into non-energy sectors, which may further endanger their competitive positioning in the future. We also find that M&As allow energy and power companies to substantially increase their market share within national markets. The said impact is stronger in case of cross-border deals, including those within and outside of the EU. At the same time, only cross-border deals are associated with sufficiently strong revenue growth to advance firms' relative positioning within national markets. The relative positioning of firms in the EU market remains unaffected by M&A activities, which may be indicative of extreme rigidity and segmentation of the EU market. While at the country level, M&As are found to contribute to a reduction in market concentration measured by a number of indicators, this negative link is documented to be entirely driven by non-core acquisitions involving targets from non-energy industries.

**Keywords:** mergers and acquisitions; competition; European Union; energy and power generation



**Citation:** Wasilewska, N.; Wasilewski, M.; Zabolotnyy, S.; Osiichuk, D. The Impact of M&As on the Competitive Positioning of European Energy Firms and Market Power Concentration on EU National Energy Markets. *Energies* **2022**, *15*, 8798. <https://doi.org/10.3390/en15238798>

Academic Editor: Erik Gawel

Received: 15 October 2022

Accepted: 18 November 2022

Published: 22 November 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Across all EU countries, the energy and power generation industry has been undergoing rapid changes. The need to undertake a radical transformation of principal business lines as well as of the basic industrial processes within energy firms stems from several trends, which have been unfolding for the last two decades. The first trend is a gradual yet accelerating transition of energy generation towards renewable energy sources [1]. This trend is driven by powerful regulatory pressure [2], which is, in turn, a result of shifting public opinion. The second trend consists in a gradual reduction of the average return on capital in the energy industry. The root causes of decreasing returns are of fundamental nature. Industries with high asset tangibility [3] have long suffered from declining returns due to the transition towards a post-industrial economy. Capital has been flowing towards growth industries lured by higher potential yields, starving traditional sectors of long-term financing at low cost. Secondly, energy and power generation is a heavily regulated industry with significant equity stakes held by governmental bodies at different levels [4]. The growing labor cost, accentuated by the presence of powerful unions, inefficient procurement processes, and staffing processes riddled with symptoms of cronyism [5] have all dented the long-term prospects of the industry.

The energy sector responded to these challenges with a number of fundamental shifts in strategic development plans. One of those shifts is a heavier reliance on inorganic growth through mergers and acquisitions [6]. Although less intensive than at the beginning of the 2000s, the M&A pipelines of energy and power companies in Europe remain full of new deals [7].

In view of the strategic importance of the energy industry for the health of the broader economy, an understanding of the possible consequences of sector-wide corporate consolidations is vital for future policymaking. The present study attempts to look at these processes and determine their possible repercussions based on observations from the last two decades. In this context, we focus on three key issues.

First, we try to establish whether the ongoing processes of corporate consolidation in the energy sector are conducive to a higher concentration of market power. We track the impact of M&A deals on market concentration within separate national energy markets in the EU as well as within the context of the broad European market. Our main purpose is to either (depending on the findings) accentuate or alleviate concerns regarding the possible monopolization of the energy markets by indicating the direction in which the market appears to be moving, i.e., higher or lower concentration of market share by individual companies. Most national energy markets in the EU are highly concentrated due to the industry's capital intensity and huge economies of scale conducive to natural monopolies. Nevertheless, a certain degree of competition is desirable, as recognized by national and supranational legislation. We also measure the magnitude of the impact of M&As on the scale of market concentration by relying on a number of commonly used metrics.

Secondly, we investigate the intra-industry patterns in the choice of acquisition targets by energy and power companies. For several reasons, energy firms engage in vertical and horizontal M&As. We try to identify patterns which characterize matches between acquirers and targets. In particular, we check the differences in target choices between market leaders and outsiders. Together with the findings from the first part, these inquiries should allow us to better understand the overall dynamics of the industry.

Thirdly, we attempt to establish whether M&As allow energy companies to effectively improve their relative competitive positioning within national and EU markets. Due to economies of scale and the systemic importance of the industry, the sheer size of a firm may confer a critical competitive advantage. National champions find themselves under constant scrutiny from regulatory bodies and the public [8]. On the other hand, they frequently become the beneficiaries of governmental aid, subsidies, government procurement contracts, etc. In some companies, these pecuniary and non-pecuniary benefits translate into one of the principal engines of long-term development. Our goal is to establish whether M&As allow energy firms to advance their relative competitive positioning both within national and supranational markets.

The study relies on a comprehensive set of 1932 M&A transactions concluded by publicly listed companies from the energy and power generation sector domiciled across 27 countries of the European Union during a period between 2002 and 2021. We scrutinize the dynamics of national energy markets during the studied period relying on cross-sectional deal data and dynamic panel firm-level data.

Our results clearly suggest that the degree of concentration on the national energy markets within the EU is steadily growing, and M&A deals may be pinpointed as one of the principal engines of this process. We establish and describe the transmission mechanism by which energy sector M&As may be conducive to higher market power concentration. To start with, the bulk of the deals are done by national and supranational market leaders—i.e., the largest companies with the higher market share. But it is not only the higher likelihood of engaging in M&As that pre-determines the gradual growth of the national champions' market share. It is rather their choice of acquisition targets. While market leaders tend to engage in horizontal acquisitions buying targets from the energy and power sector or industrials, market outsiders are likelier to acquire non-energy firms, e.g., those operating in construction, financials, consumer staples, real estate, health care, and telecom. These

preferences cause market outsiders to diversify themselves into sectors, which create no explicitly observable synergies with their core energy and power generation activities. We conclude that, while propping bottom lines and reducing operational risks, diversification into non-core sectors may erode the long-term competitive advantages of non-leaders. This slow process may cause a long-term trend towards market dominance by national champions that may stifle competition. The bulk of renewable energy deals is also carried out by market leaders. While policymakers may expect energy transition to forge new market leaders, we demonstrate that such hopes may be misplaced.

We also show that, from a purely statistical standpoint, M&As are linked to the lowering concentration of market power within national energy markets. However, a closer analysis reveals that the discovered negative link is driven by outsiders acquiring non-energy companies. As a result, the revenues of those companies become more diversified. However, the analysis of market concentration dynamics after excluding the growth of non-energy revenues demonstrates that M&As lead to higher market concentration. Overall, we highlight that the sector needs more stringent supervision as a growth of market concentration in the energy industry, which may be detrimental to consumers. Importantly, we do not provide any jurisdiction-specific regulatory or policy guidelines since the study does not analyze interregional differences in the studies' patterns. This danger stems from the two features of this industry described above: commoditization and declining rates of return on capital invested, which cause the sector to be in relative stasis. The obvious symptom of this perilous state is the observed extreme rigidity of firms' relative competitive positioning. Incumbent leaders are highly likely to stay that way during the analyzed two-decade period, while outsiders remain outsiders. This is also true of the entire European market.

The study contributes to a broad strand of empirical literature analyzing the competitive dynamics within commoditized industries and the industrial organization in the energy sector. We attempt to draw relevant conclusions for policymakers and clarify the motives of inorganic growth within the energy industry. We highlight the threats stemming from the observed trend towards a higher concentration of market power in a sector of systemic and strategic importance for both retail customers and business clients. The remainder of the paper is organized as follows. We proceed with a literature review covering the strand of empirical literature upon which the present study elaborates. Then we present the database and the methodology we use. A section on empirical results concludes.

## **2. Theoretical Overview: M&As in the Energy Sector through the Prism of Competition Policies**

Waves of corporate consolidations in the energy and power sector observed during the last two decades have been driven by a number of juxtaposed systemic, technological, and societal factors [9]. While most deals had the primary purpose of enhancing economies of scope and scale, some of the more recent ones—mostly cross-industry—pursued the goal of diversifying acquirers' operational risks, entering new markets and acquiring know-how in the areas perceived as promising by energy firms' senior management, most notably—renewable energy.

The declared goals of M&As are diverse in nature, affect business domains and have strategic importance to the business [10]. Broadly they can be classified into three categories. The first encompasses deals whose primary purpose is expanding acquirers' core revenues and market share. Such transactions usually consist in takeovers of smaller and weaker peers [11] at attractive valuations. The said acquisitions targets are perceived as doomed for takeover on a stagnant commoditized market, where regulated prices squeeze potential margins and where customer lock-in is strong. The resulting combined entity can expect to benefit from a number of positive post-transaction effects: cost synergies, larger customer base yielding stronger market power, better access to external capital thanks to a larger asset base, better access to infrastructure and other resources, as well as lower operational risks thanks to a more diversified revenue structure. The second category

of deals includes those whose primary goal is to get access to technological know-how. The resulting combined entity may achieve a competitive advantage by tapping a new, possibly prospective source of revenue [12]. This pool of deals encompasses transactions targeting firms with improved/cheaper/promising industrial processes or access to important business infrastructure (e.g., payment processing etc.) [13]. Finally, the third category of deals encompasses cross-industry transactions, whose primary role is to add a new profit center to the acquirer's corporate structure. Some of these transactions feature no identifiable synergies and appear to pursue the goal of diversification of revenue sources for the acquirer.

During the last decade, the third type of transaction became dominant in terms of quantity while horizontal within-industry deals occupy a relatively larger share by deal value. Cheap debt coupled with a difficult operational environment pushed many energy companies—particularly those with stagnant revenue growth and problematic infrastructure—towards inorganic growth. There are many cases of deals involving targets from completely unrelated industries [14]. The long-term repercussions of such transactions are difficult to evaluate accurately.

Empirical literature is almost mute on the topic of the possible impact of different types of mergers and acquisitions on the market structure and concentration of market power in energy markets. Most studies focus on motives behind M&As without analyzing the ensuing relative competitive positioning of firms [15]. The results of such studies could be of particular importance for policymakers responsible for shaping the regulatory environment of the energy sector [16]. In this section, we explain why concentration of market power resulting from mergers and acquisitions, assuming no adequate regulatory action is taken, can have detrimental consequences for consumers as well as for the broader economy.

To start with, the concentration of market power has both positive and negative economic spillover effects. The positive effects materialize through two primary channels. First, the combined entities may optimize their cost structure by slashing duplicate expenses [17], sharing technological know-how, which translates into lower budgets for R&D, reducing redundant staff, etc. The second channel generates positive post-deal synergies through more efficient deployment of available resources [18]. These effects are particularly large if the acquisition target is mismanaged, has below-average productivity, and works on older technologies.

The obvious and well-known downside of market power concentration is a stronger pricing power of the combined entity, which allows it to shape market equilibrium and lead the industry towards higher margins, possibly at the expense of lower consumer surplus [19].

The ultimate regulatory conundrum consists in weighing the two effects and taking necessary remedial action to make sure that the benefits of the process of corporate consolidation in the sector are maximized while the downsides are kept in check [20].

While academic research on the topic of interplay between corporate consolidations, market power, and consumer surplus in the European market is relatively scarce, a rather fundamental work is performed by regulators, such as the European Commission. The regular inquiries covering individual countries' energy markets and the integrated European market allow policymakers to assess the degree of competition in those markets and the evolution of margins [21], and to track the competitive dynamic in order to preclude collusion [22]. The conclusions, which are regularly reported by the European regulators, are as follows. To start with, the majority of extant reports state that the degree of competition in energy markets in Europe is low, while the market share of individual players is excessively high. The markets lack depth, and customers are locked in, which slows down the dynamic and precludes new companies from engaging in competition, even if the latter have adequate access to capital to finance organic development [23]. The pricing mechanisms appear to lack adequate transparency with regard to the consumers.

Another conclusion is that the European market lacks mechanisms to instigate further integration between national submarkets. As a result, firms cannot compete across

jurisdictions, which precludes positive selection [24] and stifles innovativeness as national markets are stagnant and mature. The corollary of this conclusion is that energy firms prefer M&As to organic growth since the former appear to be the only option for entering other jurisdictions and growing market share.

Finally, and possibly most importantly, the level of unbundling of the energy and power industry [25] into generation and delivery/infrastructure appears to be insufficient. This is a direct consequence of the excessive concentration of market power and industry consolidation. While being a solution to some of the industry's most pressing problems, including depressed margins and stagnant revenues, bundling is shown to be detrimental to consumers and other market participants as it makes them dependent on a small set of interdependent players, whose decisions are correlated [26], and thus presents systemic challenges if the industry experiences a shock.

While the reports published by regulators highlight the problems associated with a growing market concentration in the industry, they do not show the transmission mechanisms leading to the observed trend towards higher market concentration. These perceived shortcomings may potentially lead to erroneous policy guidelines and endow the industry lobby with useful arguments in the policy discussion.

In particular, the public policy debates based on industry reports often argue for stricter and faster enforcement of unbundling rules, whereby the large integrated full-cycle energy companies are broken down. While present in all jurisdictions concerned, these rules are lax in many cases and conducive to regulatory capture because of the sheer size and systemic importance of national industry champions. While policymakers argue for a radical solution to the problem through decisive legal action, the industry lobby [27] maintains that bundling is a natural byproduct of economies of scale rather than aggressive inorganic expansion through takeovers of local rivals. Opponents of stricter regulation frequently argue that all energy companies engage in M&A activities, therefore, there is no conclusive argument for the detrimental role of the latter in exacerbating the problems of natural monopolies.

We posit that the lack of robust empirical evidence pointing to the root causes of increasing market concentration causes regulatory focus to be placed in areas which are less likely to result in a more competitive environment within the energy industry than a more stringent monitoring/screening/verification of M&A activities of energy firms. In particular, European regulators argue that the main focus of regulatory action should be placed on facilitating the entry of new companies into the industry. In the opinion of regulators, the highly concentrated nature of the market may constitute an impediment to the creation of new companies and, as a result, reduce the degree of competition. We posit, however, that while being an important component of a comprehensive competition policy [28], measures and legal actions aimed at facilitating entry are unlikely to be effective at reducing the scale of industry concentration since the principal hurdles for new entries reside not in the anti-competitive behavior of the incumbents but rather in the inherent features of the market: economies of scale, commoditization and customer lock-in. Unbundling enforced by decisive regulatory action can partially alleviate the enumerated problems. However, this will not change the fact that they are primarily objective in nature. The capital intensity of the industry, coupled with declining return on invested capital, represents another important consideration for potential investors. The energy transition from fossil fuels to renewable energy [29] can help boost the degree of competition in the medium term as new large actors are likely to emerge on the market, assuming that fast-growing companies possessing the necessary technologies are not quickly taken over by industry incumbents to prevent shifts in market power. In order to benefit from energy transition and make the energy market more competitive, regulatory authorities should try to support or elaborate mechanisms which would help young and fast-growing alternative energy companies remain viable without the need for takeover by large industry incumbents. This may be achieved through favorable legislation and financing vehicles facilitating access to medium and long-term financing for these firms.

We postulate that one of the channels through which M&As translate into higher market concentration originates from the way in which energy companies select targets for acquisitions. Market leaders select targets which, in combination with their pre-existing core operations, are expected to increase their market and pricing power. If this argument is supported by empirical evidence, we would provide a basis for a more stringent regulatory action aimed at curbing transaction activity by industry leaders aimed at increasing the scope of bundling and/or increasing market share in local markets beyond the point deemed critical by national regulators. The anti-trust authorities have been actively monitoring transactions in the European energy sector. A set of criteria has been developed to assess the possible impact of pending transactions on the market concentration. In every case, the regulator determines the market which is likely to be affected by the transaction as well as attempts to identify the possible spillover effects across the entire product/service chain vertically and horizontally. Through our empirical analysis, we attempt to assess whether screening criteria developed by regulators are focusing on the right issues, i.e., whether transaction approval based on those criteria is likely to contribute to the diminishing market concentration in the European energy market in the medium and long-term perspectives.

### 3. Database and Research Design

The study is based on a comprehensive quantitative analysis of a sample of M&A transactions completed by listed European energy and power companies. Raw data were assembled from the Eikon M&A database. The period of analysis encompasses the years 2002 through 2021. The universe of deals from which we compiled the final research sample was filtered relying on several criteria. To start with, we selected transactions for which we managed to assemble all data, which was subsequently used in econometric modeling (e.g., deal value, percentage of equity being acquired, dates of announcement and completion, targets' characteristics, etc.). Secondly, we only included deals in which the acquirer was domiciled and had its core activities in one of the EU countries. Importantly, we imposed no restrictions with regard to the characteristics of the target or the deal settings. The final sample subject to empirical analysis includes 1932 deals. After collecting deal data, we assembled a panel firm-level dataset covering the financials of all acquirers over the analyzed period. Data were collected from the Eikon database. All variables subject to empirical analysis were screened for outliers, which were subsequently dealt with using winsorization at conventional levels. The list of variables used in the study is presented in Table 1. Descriptive statistics are summarized in Table 2.

The empirical analysis is conducted in three consecutive stages. In the first stage, we attempt to verify whether mergers and acquisitions allow sampled European energy companies to increase their relative market share and improve their competitive positioning. Thus, we try to infer directly from firm-level data whether M&As may be leading to higher market concentration. First, we calculate the relative market shares of sampled companies within national energy markets as well as within the European energy market. To that end, we sum up the yearly revenues of sampled energy and power generation companies ascribed to a given market and then estimate relative shares for each studied company. The estimated market share is subsequently used as an explained variable in multivariate econometric modeling in order to elucidate whether inorganic growth may be regarded as an important determinant of market share growth.

The panel data analysis is performed using Arellano-Bond [30] GMM dynamic estimation. The baseline econometric model subject to empirical tests is as follows:

$$MKT.SHARE_{ij} = \beta_0 + \beta_1 L.MKT.SHARE_{ij} + \beta_2 L2.MKT.SHARE_{ij} + \beta_3 L.ACQ_{ij} + \beta' CONTROLS_{ij} + \beta' Year + \beta' Error_{ij}, \quad (1)$$

where  $MKT.SHARE_{ij}$ —market share of the  $i$ -th company in the  $j$ -th year calculated using the method described in Table 1 (prefixes L1. and L2. indicate the first and the second lags of the dependent variable included in line with the GMM methodology);  $ACQ_{ij}$ —binary

variable encoding instances of finalized M&A transactions during a given year by the  $i$ -th company;  $CONTROLS_{ij}$ —a set of firm-level control variables (enumerated in Table 1) for which the coefficients are not reported whenever we refrain from interpreting them.

**Table 1.** List of variables used in the study.

Variable Name	Definition
MKT.SHARE	Market share of a given company during a given year on the national energy market calculated as a ratio of the total revenue of a given company to the total revenue of sampled energy companies from a given national market
MKT.SH.RANK	The ordinal rank of a given company during a given year on the national market based on market share
MKT.SHARE.EU	The ordinal rank of a given company during a given year on the EU integrated energy market calculated as a ratio of the total revenue of a given company to the total revenue of sampled energy companies from the EU
FIRM.SIZE	Reported total assets (log-transformed)
DEBT	The ratio of total interest-bearing debt to total assets
TANGIBILITY	The ratio of property, plant, and equipment to contemporaneous total assets
LIQUIDITY	The ratio of cash and short-term investments to contemporaneous total assets
LEADER	Binary variable equal to 1 if a given company is the leader by market share on a given national market during a given year
ACQ	Binary variable equal to 1 if a given company completed an M&A transaction during a given year
ACQ.FOREIGN	Binary variable equal to 1 if a given company completed a cross-border M&A transaction during a given year
ACQ.EU	Binary variable equal to 1 if a given company completed an M&A transaction during a given year involving a target from an EU country
ACQ.RENEWABLE	Binary variable equal to 1 if a given company completed an M&A transaction during a given year involving a target from the renewable energy industry
ACQ.CORE	Binary variable equal to 1 if a given company completed an M&A transaction during a given year involving a target from one of the core industries (high technologies, industrials, materials)
ACQ.NONCORE	Binary variable equal to 1 if a given company completed an M&A transaction during a given year involving a target from one of the non-core industries (consumer products and services, consumer staples, real estate, healthcare, media and entertainment, retail, telecommunication, financials)
ACQ.DOMESTIC	Binary variable equal to 1 if a given company completed an M&A transaction during a given year involving a target from the domestic market
ACQ.SERIAL	Binary variable equal to 1 if a given company completed an M&A transaction during a given year which is second or subsequent for a given acquirer
PCT.ACQUIRED	Equity stake acquired in the analyzed transaction
DEAL.SIZE	The value of equity stake acquired (million USD), log-transformed
HH.INDEX	Herfindahl-Hirschman index of market concentration for a given country for a given year based on data for sampled energy and power generation companies
AVG.SHARE	Average market share of energy companies on a given national market during a given year based on data for sampled energy and power generation companies
LEADER.SHARE	Market share of the market leader on a given national market during a given year based on data for sampled energy and power generation companies

The definitions of variables used in the equation are presented in Table 1. The key experimental variable is  $ACQ_{ij}$ , binary-codes acquisitions of sampled energy and power companies. All tested model specifications include fixed effects. Reliance on the GMM estimation method allows us to mitigate the potential problem of endogeneity and establish a robust link between the studied variables by introducing lags into the model. Two lags of the dependent variable are included in the baseline model specification since their inclusion improved the statistical properties of the model. As a result, all interpreted models exhibit satisfactory econometric properties, including AR1, AR2, and Hansen tests. The set of control variables is based on the extant literature and includes common proxies for determinants of firms' market share (e.g., the scale of operations, access to debt, liquidity, and asset base). Whenever we do not interpret the coefficients at control variables resulting from econometric analysis, we do not report those coefficients in the tables for reasons of brevity.

**Table 2.** Descriptive statistics.

Variable	Mean	Std. Dev.	Min	Max
Firm-level panel data				
MKT.SHARE	0.134	0.282	0	0.896
MKT.SH.RANK	15.219	22.97	1	93
MKT.SHARE.EU	0.006	0.059	0	0.107
FIRM.SIZE	19.211	2.871	8.108	29.502
DEBT	0.212	0.221	0	0.85
TANGIBILITY	0.388	0.29	0	0.94
LIQUIDITY	0.161	0.192	0.001	0.834
LEADER	0.212	0.409	0	1
ACQ	0.039	0.193	0	1
ACQ.FOREIGN	0.022	0.148	0	1
ACQ.EU	0.022	0.147	0	1
ACQ.RENEWABLE	0.002	0.039	0	1
ACQ.CORE	0.009	0.096	0	1
ACQ.NONCORE	0.003	0.051	0	1
Deals data				
ACQ.FOREIGN	0.604	0.489	0	1
ACQ.EU	0.503	0.5	0	1
ACQ.RENEWABLE	0.044	0.205	0	1
ACQ.CORE	0.27	0.444	0	1
ACQ.NONCORE	0.084	0.277	0	1
ACQ.SERIAL	0.628	0.484	0	1
PCT.ACQUIRED	65.259	37.899	1	100

As a robustness check at this study stage, we run ordered logit tests to check whether acquisitions allow sampled energy and power generation companies to advance their relative position by market share. First, we rank all sampled companies by market share within a given geographical market (national or the entire integrated European market). Subsequently, we test ordered logit models with the following base specification:

$$\text{ologit}(MKT.RANK)_{ij} = \beta_0 + \beta_1 L.ACQ_{ij} + \beta' CONTROLS_{ij} + \beta' Year + \beta' Error_{ij}, \quad (2)$$

The variable *MKT.RANK* is a discrete ordinal variable indicating the market rank of the company by market share on the given market. The ranking is performed in ascending order with the rank '1' denoting the leader by market share (as indicated in Table 1). As previously, all models control for time-variant effects. The set of control variables is the same as in model specification (1).

We differentiate analyzed acquisitions by type of target to elucidate whether the studied link between inorganic growth and market share/position is contingent upon the geographical or industry scope of the transactions.

In the second stage of the analysis, we focus on aggregate market-level data and try to establish whether the intensity and frequency of M&As completed by energy and power companies are associated with the degree of market concentration at national and supranational levels. To start with, we calculate yearly indicators of market concentration relying on data from sampled energy companies. The Herfindahl-Hirschman index is used as a primary gauge of the degree of concentration. Additionally, within the scope of robustness checks, we use alternative regress and average market share sampled energy companies within national markets-in order to verify the validity of the initial results. In combination, the suggested measures of market concentration allow us to gauge different dimensions of the competitive situation within specific markets. We also aggregate data on the number of M&As completed by energy companies on a given national market while simultaneously classifying transactions by geographical and industry scopes. The resulting



country-level panel database is subject to GMM dynamic modeling with the following model specification used as a baseline:

$$HH.INDEX_{ij} = \beta_0 + \beta_1 L.HH.INDEX_{ij} + \beta_2 L2.HH.INDEX_{ij} + \beta_3 L.ACQ_{ij} + \beta' CONTROLS_{ij} + \beta' Year + \beta' Error_{ij}, \quad (3)$$

At the final stage of empirical analysis, we try to elucidate whether firms' relative proclivity to engage in M&As or acquire specific targets is contingent upon their initial market position. Primarily, we attempt to measure whether the likelihood of completing acquisitions differs between market leaders and outsiders. More importantly, we try to elucidate any possibly existing differences in firms' preferences with regard to the choice of acquisition targets by classifying the latter by industry. We conduct our analysis in two steps. First, we run binary logit regressions on firm-level panel data in order to check whether the likelihood of acquisitions by a specific company is contingent upon market position. The baseline model has the following specification:

$$\text{logit}(ACQ)_{ij} = \beta_0 + \beta_1 L.MKT.RANK_{ij} + \beta' CONTROLS_{ij} + \beta' Year + \beta' Error_{ij}, \quad (4)$$

Next, we run the same model and substitute binary variable interacting *ACQ* with variables encoding specific types of targets by the industry for explained variables in model (4). Thereby, we attempt to check whether firms with different market position exhibit varying proclivity to acquire specific types of targets.

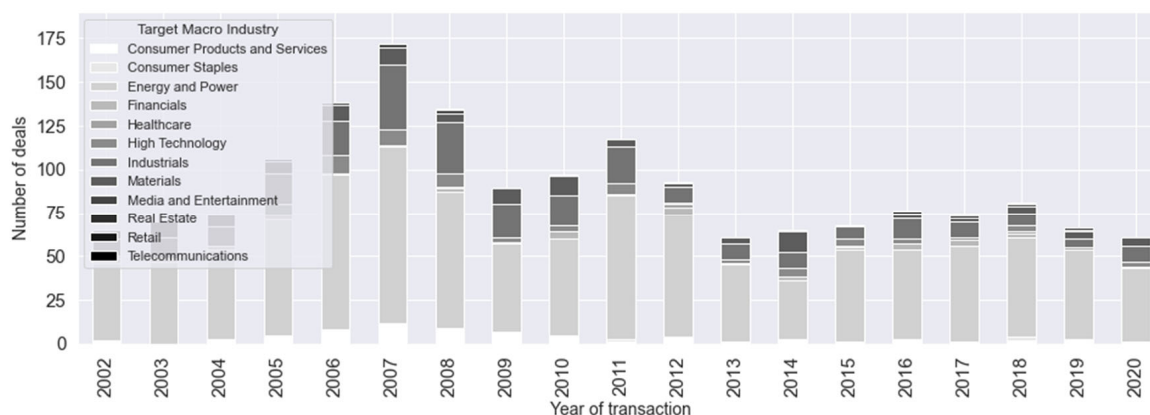
Overall, our analysis provides comprehensive insights into the interplay between M&As by energy and power companies and market concentration within national and overall European energy markets. We not only show associative links and quantify them but also delve into the possible transmission mechanisms underpinning the analyzed nexus operating through target selection and proclivity towards inorganic growth by market leaders. The following section presents the key empirical findings.

#### 4. Principal Empirical Findings

During the analyzed period, sampled energy and power companies completed 1932 M&A deals. The sample is heterogeneous in terms of both the geographical and industry characteristics of the participating entities. At the outset, it is worth noting that the dynamics of the transaction pipeline exhibit a pronounced cyclicity with local peaks in 2007, 2011, and 2018. The observed growth of the number and volume of transactions is attributable to a broad set of factors encompassing industry transformation, a transition towards cleaner energy generation, and relaxed monetary policy settings. Importantly, the relative share of transactions involving targets from non-energy industries has diminished significantly since 2011. Prior to that, energy companies exhibited a higher proclivity to venture into adjacent or complementary industries, particularly those belonging to industrials and materials macro-segments (Figure 1). Importantly, the present study does not focus on differences between regions. Instead, we analyze trends and patterns applicable to the entire research sample. While this approach allows us to investigate market-wide phenomena, it also precludes us from formulating any geography-specific policy and regulatory guidelines. Therefore, we refrain from formulating any such jurisdiction-specific conclusions or guidelines.

In Appendix A, we present a sample breakdown based on targets' industry disregarding their distribution in time. While the dominant majority of transactions involved targets from the energy and power generation industry, there was a non-negligible number of deals where synergies and asset complementarity were more difficult to gauge. While industrials and materials represent segments where energy and power companies can find substantial synergies with their core business, other segments including consumer products and services, financials, high technologies healthcare, telecommunications, etc., pose much more difficulties in terms of post-deal integration into energy firms' core business structure, day-to-day management in which executives of energy firms may lack expertise

and transfer of pre-existing knowledge due to lack of substitutability of workers' skills and competences.



**Figure 1.** Distribution of sampled mergers and acquisitions by target industry.

Having noticed a marked divergence between firms in terms of preferences with regards to target selection, we decided to quantify such within-sample differences by classifying transactions into those involving targets from 'core' and 'non-core' industries. The core transactions involve targets from energy and power generation industries, which are complementary to acquirers' core business. Deals involving targets from other industries are labeled non-core.

While we realize that this dichotomy and labelling may be restrictive, as they essentially ignore the complex and multi-stage nature of energy firms' core operational activities, which frequently necessitate inputs and know-how from adjacent industries, we justify our reliance thereupon with the following rationale. To start with, we believe that cross-industry diversification leads to more opaque and less efficient operational structures delivering inferior outcomes. Industry focus within a single entity brings simplification of performance management, makes corporate hierarchies flatter and reduces the need to reach out for outside expertise in the domains where the firm has no competencies or no prior operational experience. This argument is in line with the tenets of modern value-based management [31], which postulates that diversification of operational profile should be achieved through closer cooperation between operationally independent entities. It reduces the likelihood of one operational segment subsidizing the other. The second argument is closely linked with the purposes of the current study. We try to establish how M&As impact market concentration in the power and energy sector. To that end, we need to take into account incremental changes in energy firms' revenues attributable to takeovers of other energy firms yielding revenues from the same operational activities. The fact that an energy firm acquired a non-energy company (for example, one involved in construction supplies) may allow the combined entity to enjoy higher revenues, but the competitive situation in the energy market may remain unaffected since incremental revenues, in this case, are derived from a completely distinct market segment. To affect the degree of concentration on the energy market, an acquisition would need to involve a target belonging to the same industry as the acquirer or provide a product/service suitable to the bundle sold by the combined entity within the scope of the same segment.

The first part of our inquiry attempts to establish whether M&A transactions allow acquirers to increase their market share effectively. Table 3 presents the results of dynamic panel modeling using the Arellano-Bond GMM estimator based on firm-level panel data for a sample of European energy and power generation companies. All models for which the results are presented in the paper possess the required econometric properties to allow valid inference. In particular, we report the results of AR1 and AR2 tests for serial correlation of error terms as well as of the Hansen test for overriding restrictions.

**Table 3.** The relationship between acquisitions and market share of sampled energy companies (N = 2898).

	(1)	(2)	(3)	(4)	(5)
L.MKT.SHARE	0.861 *** (9.93)	0.866 *** (10.07)	0.862 *** (9.99)	0.866 *** (10.01)	0.861 *** (9.89)
L2.MKT.SHARE	0.002 (0.03)	0.005 (0.07)	0.001 (0.01)	0.004 (0.07)	0.002 (0.03)
L.FIRM.SIZE	0.007 (1.53)	0.006 (1.49)	0.007 (1.55)	0.006 (1.43)	0.007 (1.51)
L.DEBT	−0.008 (−1.00)	−0.008 (−1.05)	−0.008 (−0.98)	−0.008 (−1.04)	−0.008 (−1.04)
L.TANGIBILITY	−0.005 (−0.61)	−0.005 (−0.55)	−0.005 (−0.60)	−0.004 (−0.55)	−0.005 (−0.63)
L.LIQUIDITY	−0.009 (−1.22)	−0.009 (−1.15)	−0.010 (−1.24)	−0.008 (−1.08)	−0.009 (−1.20)
L.ACQ	0.015 ** (2.20)				
L.ACQ.FOREIGN		0.029 ** (1.99)			
L.ACQ.EU			0.030 ** (2.15)		
L.ACQ.RENEWABLE				0.100 (1.41)	
L.ACQ.CORE					0.020 * (1.87)
_cons	−0.109 (−1.49)	−0.102 (−1.45)	−0.109 (−1.51)	−0.102 (−1.40)	−0.109 (−1.47)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
ar1	−2.291 **	−2.301 **	−2.296 **	−2.318 **	−2.293 **
ar2	−1.241	−1.277	−1.281	−1.177	−1.230
chi2	5791 ***	6107 ***	5775 ***	6315 ***	5858 ***
hansen	3.369	3.226	3.362	3.536	3.500

Note: the table reports the results of dynamic GMM panel regressions. The explained variable is the firm-level market share of sampled companies on the national market during a given year. All models include firm-level controls and year fixed effects (not reported for brevity). The models include heteroscedasticity-robust standard errors. Significance of respective variables is denoted with asterisks: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  ( $t$ -values are reported in parentheses). Importantly, the calculations of market shares for the purposes of the present study rely on data only for sampled companies rather than for the exhaustive population of companies operating on a given market.

We document a significant increase in acquirers' market share following the completion of M&A deals (coeff.: 0.015; sig.: 5%). The explanatory variable is lagged by one period, thus mitigating endogeneity concerns and allowing us to make conclusions with regard to possible causal links between the studied variables. An increase in market share is more pronounced in the case of cross-border acquisitions (the coefficient at ACQ.FOREIGN variable is positive at 0.029 and significant at the 5% level). This nexus is, however, almost entirely driven by deals involving targets from within the EU, which dominate among cross-border transactions. Importantly, the documented statistical link between acquisitions and firms' market share may be ascribed in large part to within-industry acquisitions, that is, to transactions involving targets from the energy and power generation segment (coeff.: 0.02; sig.: 10%). Acquisitions involving targets from non-core industries are found to have no statistically significant impact on acquirers' market share. A similarly insignificant link is found to be exercised by acquisitions of renewable energy companies. Overall, our findings strongly suggest that M&A transactions have a lasting impact on the market structure by increasing the market share of acquiring companies by an average of ca. 1.5 percentage points following deal completion. It remains unclear whether this market share growth persists over time or wanes under competitive pressure. Another matter is whether the positive impact on the market share of individual acquirers translates into higher market concentration at the industry level.

In order to establish the latter, we run additional tests. Control variables are found to exhibit no persistent statistical link with the explained variable.

It remains unclear whether regulators and supervisory bodies should take any decisive remedial actions in order to impede or reverse the observable trends. Market concentration may have important advantages by consolidating the sector's resources and channeling them towards fulfilling capital-intensive goals such as transition towards sustainable energy generation. Cost rationalization may also help the sector attract new capital. The latter is one of the key long-term problems of the sector struggling to attract long-term capital due to excessive regulatory pressure and substantial systemic risks. At the same time, excessive concentration has long been seen as one of the sector's key problems, posing a challenge to consumers and putting a drag on innovation. The key regulatory conundrum consists in findings the correct trade-off between pros and cons.

Having analyzed the dynamics of market shares within national energy markets, we switch to the EU market and study the interplay between M&As of energy companies and their relative market share (benchmarked against the remainder of the research sample) within the integrated European energy market. The model specification is the same as above, but the explained variable is the market share of each company relative to the remainder of the sample within the EU. The results are reported in Table 4. We find no persistently significant link between firms' M&As and their market share regardless of the industry or geographical scope of the transaction. The type of the target does not alter the results. These findings point to the extreme rigidity of the European energy market, where the relative competitive positioning of firms is fixed over time and determined by the potential of national markets in which the firms are domiciled rather than by external growth opportunities beyond domestic boundaries. The European regulatory bodies often allude to entry barriers as one of the key reasons for the persistently excessive degree of market concentration in the energy sector. Our findings suggest that further action is necessary to enhance competition on the supranational scale within the EU and make it possible for firms to compete beyond their home markets. In fact, we posit that regulatory action should facilitate market entry and expansion beyond domestic markets. These measures would not only enhance competition, but also provide market leaders with additional resources necessary to carry out systemically important tasks such as transition towards sustainable energy generation.

In order to check the robustness of our initial results, we switch the tool of analysis and the explained variable. Instead of market share, which is a continuous variable, we encode the sampled firms' rank by market share. Subsequently, we use ordinal logit regression to check whether acquisitions translate into higher market share following transaction completion. The results of ordered logit tests (model specification 2) are reported in Appendix B. We find that the completion of M&As translates into the advancement of the combined entities' market share rank. The magnitude of the relationship is found to be almost entirely driven by cross-border acquisitions. In contrast to prior findings, we document no heterogeneity of the analyzed relationship contingent upon the industry or geographical characteristics of the target.

The second part of our analysis focuses on the possible impact of M&A of energy companies on the market concentration within national and integrated European markets. The analysis is based on country-level data regarding the evolution of market concentration over the studied timespan. An important limitation of the study resides in the fact that only data for sampled companies were included in the calculation of concentration indices. At the same time, due to the relative maturity and stability of the analyzed sector, the composition of the sample remains relatively persistent over time. In Table 5, we present the results of the dynamic panel analysis of yearly country-level data. The explained variable is the Herfindahl-Hirschman index of the energy sector on the given national market (subject to sample constraints mentioned above). Unexpectedly, the results of GMM models suggest that acquisitions by energy and power generation companies are associated with a lower Herfindahl-Hirschman index. (coeff.:  $-0.033$ ; sig.: 5%). At the same time, further analysis

of this link using interaction terms suggests that the discovered negative coefficient may be almost entirely ascribed to acquisitions involving targets from non-energy sectors (coeff.:  $-0.034$ ; sig.: 1%). Core acquisitions in the energy sector exhibit no significant associative link with market-level concentration indices. Importantly, acquisitions of renewable energy companies by the sector incumbents are also found to exercise no significant impact on the degree of market concentration. From the methodological standpoint, it is important to underline an important caveat regarding the findings: while non-core acquisitions appear to be negatively associated with the degree of market concentration, they may also skew the measurement of the same coefficient for core acquisitions. Overall, our findings are inconclusive with regard to the interlink between M&As in the energy sector and the aggregate degree of market concentration in the energy and power generation sector. These results are further corroborated in Table 6, where we show the results of panel models based on specification (3) and country-level data but using different explained variables—average market share of sampled companies within national energy markets. The coefficient at ACQ variable remains persistently negative and significant (coeff.:  $-0.013$ ; sig.: 5%), thus presenting corroborating proofs for our prior findings. At the same time, core acquisitions are found to be weakly and negatively associated with the degree of market concentration measured by this indicator.

**Table 4.** The relationship between acquisitions and market share of sampled energy companies relative to the remainder of the research sample across the EU (N = 2898).

	(1)	(2)	(3)	(4)	(5)
L.EU_MKT.SHARE	0.804 *** (16.78)	0.804 *** (16.84)	0.804 *** (16.76)	0.804 *** (16.81)	0.803 *** (17.15)
L2.EU_MKT.SHARE	0.193 *** (3.39)	0.192 *** (3.40)	0.192 *** (3.38)	0.193 *** (3.40)	0.193 *** (3.49)
L.FIRM.SIZE	0.000 (1.73)	0.000 (1.74)	0.000 (1.74)	0.000 (1.74)	0.000 (1.76)
L.DEBT	-0.002 (-1.49)	-0.002 (-1.49)	-0.002 (-1.48)	-0.002 (-1.49)	-0.002 (-1.48)
L.TANGIBILITY	-0.000 (-0.44)	-0.000 (-0.47)	-0.000 (-0.42)	-0.000 (-0.47)	-0.000 (-0.39)
L.LIQUIDITY	-0.001 (-1.93)	-0.001 (-1.93)	-0.001 (-1.93)	-0.001 (-1.94)	-0.001 (-1.92)
L.ACQ	-0.000 (-0.05)				
L.ACQ.FOREIGN		-0.000 (-0.81)			
L.ACQ.EU			0.000 (1.39)		
L.ACQ.RENEWABLE				-0.001 (-1.27)	
L.ACQ.CORE					0.001 (1.23)
_cons	-0.002 (-1.52)	-0.002 (-1.53)	-0.002 (-1.52)	-0.002 (-1.53)	-0.002 (-1.55)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
ar1	-1.566 **	-1.568 **	-1.568 **	-1.568 **	-1.570 **
ar2	-1.016	-1.015	-1.016	-1.015	-1.016
chi2	4,699,608 ***	4,749,212 ***	4,839,299 ***	4,410,464 ***	4,519,582 ***
hansen	7.285	7.382	7.401	7.893	8.125

Note: the table reports the results of dynamic GMM panel regressions. The explained variable is the relative firm-level market share of the EU energy market during a given year (benchmarked against the remainder of the research sample). All models include firm-level controls and year fixed effects (not reported for brevity). The models include heteroscedasticity-robust standard errors. Significance of respective variables is denoted with asterisks: \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  ( $t$ -values are reported in parentheses).

**Table 5.** Corporate consolidations and market power concentration on national energy markets (N = 523).

	(1)	(2)	(3)	(4)	(5)
L.HH.INDEX	0.825 *** (16.87)	0.823 *** (16.80)	0.828 *** (17.38)	0.832 *** (18.20)	0.832 *** (18.43)
L2.HH.INDEX	−0.062 (−1.47)	−0.065 (−1.61)	−0.063 (−1.51)	−0.066 (−1.58)	−0.066 (−1.58)
L.ACQ	−0.033 ** (−2.13)				
L.ACQ.DOMESTIC		0.035 ** (2.15)			
L.ACQ.EU			−0.020 (−1.53)		
L.ACQ.RENEWABLE				0.000 (0.00)	
L.ACQ.NONCORE					−0.034 *** (−2.58)
_cons	0.189 *** (4.03)	0.153 *** (3.39)	0.182 *** (3.83)	0.163 ** (3.29)	0.176 *** (3.83)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
ar1	−2.500 ***	−2.489 ***	−2.515 ***	−2.513 ***	−2.527 ***
ar2	2.092	2.072	2.109	2.151	2.183
chi2	431,482 ***	35,812,723 ***	174,185 ***	63,007,519 ***	394,823 ***
hansen	0.648	6.390	0.537	0.345	0.384

Note: the table reports the results of dynamic GMM panel regressions. The explained variable is the country-level Herfindahl-Hirschman index of market concentration (calculated based on data for sampled energy companies). All models include controls and year fixed effects (not reported for brevity). The models include heteroscedasticity-robust standard errors. Significance of respective variables is denoted with asterisks: \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  ( $t$ -values are reported in parentheses).

**Table 6.** Corporate consolidations and average market share of participants of local energy markets (N = 523).

	(1)	(2)	(3)	(4)	(5)
L.AVG.SHARE	0.985 *** (33.58)	0.988 *** (33.42)	0.987 *** (33.97)	0.992 *** (34.49)	0.988 *** (34.06)
L2.AVG.SHARE	0.008 (0.25)	0.009 (0.28)	0.010 (0.29)	0.012 (0.35)	0.010 (0.28)
L.ACQ	−0.013 ** (−2.06)				
L.ACQ.DOMESTIC		0.009 (1.34)			
L.ACQ.EU			−0.012 ** (−2.19)		
L.ACQ.RENEWABLE				−0.005 (−0.91)	
L.ACQ.CORE					−0.016 * (−1.91)
_cons	0.007 (0.48)	0.013 (0.29)	0.022 (0.48)	0.000 (0.01)	0.004 (0.28)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
ar1	−1.814 *	−1.812 *	−1.812 *	−1.803 *	−1.805 *
ar2	−0.233	−0.255	−0.205	−0.294	−0.266
chi2	43,691,161 ***	29,496,260 ***	$4.902 \times 10^8$ ***	$9.126 \times 10^8$ ***	$3.624 \times 10^8$ ***
hansen	2.641	0.182	1.661	0.000	0.820

Note: the table reports the results of dynamic GMM panel regressions. The explained variable is the country-level average market share of sampled energy companies operating during a given year (calculated based on data for sampled energy companies). All models include controls and year fixed effects (not reported for brevity). The models include heteroscedasticity-robust standard errors. Significance of respective variables is denoted with asterisks: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$  ( $t$ -values are reported in parentheses).

The final part of our study attempts to establish the differences in patterns of target selection by sampled energy and power generation companies depending on their relative market position. In Table 7, we analyze the interplay between market position and the likelihood of acquiring different types of targets differentiated by geography and industry. Several patterns emerge from the analysis of binary logit regression results based on model specification (4). To start with, we demonstrate that a higher market position is associated with a higher likelihood of domestic acquisitions (coeff.: −0.016; sig.: 1%). Market leaders

are likelier to acquire domestic peers than outsiders. They are also likelier to engage in serial acquisitions involving two or more consecutive transactions (coeff.:  $-0.018$ ; sig.: 1%). The more revealing patterns emerge from analyzing the relative proclivity of national market leaders (based on the relative market share of sampled companies) to acquire specific targets. Respective findings are reported in Table 8. National leaders appear to be significantly likelier to acquire core companies from the energy sector (coeff.:  $0.704$ ; sig.: 5%) rather than from adjacent or unrelated industries. These findings complement a prior study [32] exploring market leaders proclivity to engage in serial M&As. The odds ratio is 2.02 for market leaders compared to the remainder of the sample. A similar odds ratio is observed for serial acquisitions by leaders. Overall, our analysis of within-sample patterns of acquisition target selection strongly suggest that market leaders' proclivity to acquire their domestic peers may be the driving force behind the observed persistently high degree of market concentration on national energy markets. Therefore, in our opinion, more attention should be paid to the screening of pending deals in order to preclude excessive concentration of market power by national industry leaders through inorganic growth and takeovers of domestic peers. Mechanisms of enhancing supranational competition may also be necessary to inject dynamics into otherwise rigid national market structures. While energy and power markets have a natural tendency to tilt towards natural monopolies in the long run due to large economies of scale and high capital intensity, we posit that competition in this industry is not only desirable from the standpoint of optimization of consumer surplus, but may also be vital from the standpoint of industrial policies aimed at providing unimpeded and affordable access to energy to businesses and households. An insufficient degree of competition between players or a lack thereof may cause detrimental consequences for long-term economic growth due to excessive costs or inferior service quality.

**Table 7.** The link between market position and likelihood of M&A deals.

	(1)	(2)	(3)	(4)
Explained variable	ACQ.RENEWABLE	ACQ.CORE	TGT.FOREIGN	ACQ.SERIAL
MKT.SH.RANK	−0.025 (−1.085)	−0.009 (−1.353)	−0.016 *** (−3.062)	−0.018 *** (−3.185)
_cons	−2.005 * (−2.182)	−1.469 (−1.576)	1.417 (1.280)	2.314 *** (4.034)
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Log-likelihood	−42.689	−275.980	−329.791	−265.551
chi2	3.647 *	63.205 ***	39.576 **	45.949 ***

Note: The table presents maximum likelihood estimates of binary logit models with the explained variable enumerated in the second row of the table. All models include control variables and year fixed effects. Z—coefficients are reported in parentheses beneath coefficients. Significance of respective variables is denoted with asterisks: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table 8.** Marginal propensity to engage in M&A activity by national market leaders.

	(1)	(2)	(3)	(4)
Explained variable	TGT.FOREIGN	ACQ.RENEWABLE	ACQ.CORE	ACQ.SERIAL
LEADER	0.378 * (1.773)	−0.650 (−1.199)	0.704 ** (−2.559)	0.751 *** (3.252)
_cons	0.864 * (2.063)	−2.671 * (−2.557)	−0.310 (−0.824)	−2.543 *** (−3.445)
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Log-likelihood	−978.067	−265.486	−844.360	−954.963
chi2	79.779 ***	61.965 ***	53.668 ***	125.286 ***

Note: The table presents maximum likelihood estimates of binary logit models with the explained variable enumerated in the second row of the table. All models include control variables and year fixed effects. Z—coefficients are reported in parentheses beneath coefficients. Significance of respective variables is denoted with asterisks: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 5. Concluding Remarks

The purpose of the current study is to identify and quantify the possible impact of M&A deals completed by European energy and power generation companies on the market concentration within national and integrated European markets.

The study pursued three key goals. First, we tried to establish the nexus between M&As and market concentration on national and macro-regional energy and power markets. While the analyzed industry is traditionally characterized by high concentration indicators, we depart from the premise that a certain degree of competition within large and medium-sized economies is desirable regardless of the general industry-wide movement towards natural monopolies. Secondly, we attempted to analyze the mechanisms shaping the link between M&As and market power concentration. In particular, we focus on the choices of targets by incumbent market leaders as they are likely to exhibit higher proclivity to engage in inorganic growth. Finally, we outline the patterns of competitive dynamics within the industry by investigating how M&As shape the relative competitive positioning of firms within national and supranational energy markets. Overall, the study attempts to provide a comprehensive analysis of the ongoing consolidation processes within the energy power industry within EU countries and draw relevant policy guidelines. Importantly, in the normative part of the study, we highlight the possible problems which may stem from the currently observable trends unless proper regulatory actions are taken.

Our empirical findings demonstrate that corporate takeovers within the energy industry lead to a higher market share of acquirers within national markets and allow the latter to advance their relative competitive positioning. Further analysis of industry specificity of transactions undertaken by national industry leaders suggests that the gain in market share is achieved primarily thanks to a higher proclivity of acquiring domestic peers from the energy industry rather than greater diversification into the adjacent or unrelated sector. The latter is somewhat characteristic of industry outsiders, which appear to be significantly likelier to diversify their operational risk, which may carry a negative side effect of eroding their long-term competitive positioning within the commoditized energy sector.

Cross-border deals within the EU are found to have no impact on the relative competitive positioning of European energy companies. This attests to the extreme rigidity of the market and possibly excessive barriers to entry into adjacent markets. These problems may cement the prevailing excessive concentration of national energy markets and erode regulatory efforts aimed at increasing the degree of competition.

At an aggregate country level, we document a negative link between the intensity of M&As and the degree of market concentration in the energy industry. However, we show that this negative link is entirely driven by non-core acquisitions with targets from non-energy industries. Therefore, the net impact of energy-only deals on market concentration appears neutral.

Overall, our findings suggest that, unless properly screened, deals completed by national industry leaders are almost certain to contribute to higher market concentration. Regulatory attention should, therefore, be pointed towards a careful analysis of pending transactions from the standpoint of competition law in addition to the effort aimed at reducing barriers to entry which appears to be at the forefront of the regulatory agenda. This recommendation should be treated with caution since the present study does not analyze interregional differences and, therefore, does not allow elaboration of any 'one-size-fits-all' regulatory guidelines. We also do not analyze intertemporal patterns in the empirical relationships subject to econometric modeling. While observing a marked trend in the degree of market concentration, we do not present a breakdown by geography, therefore individual trends among geographies may deviate from the average for the entire observation sample.



**Author Contributions:** Conceptualization, N.W., M.W. and D.O.; methodology, N.W. and D.O.; software, D.O.; validation, N.W., S.Z. and M.W.; formal analysis, N.W. and S.Z.; investigation, N.W. and D.O.; resources, N.W. and M.W.; data curation, N.W., S.Z., D.O. and M.W.; writing—original draft preparation, N.W., D.O. and S.Z.; writing—review and editing, D.O., N.W. and S.Z.; visualization, S.Z.; supervision, N.W. and M.W.; project administration, N.W. and M.W.; funding acquisition, N.W., M.W. and S.Z. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Data Availability Statement:** Data is available upon request from the corresponding author. Restrictions with regard to public dissemination of data apply.

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

## Appendix A

**Table A1.** Distribution of Acquisition Targets by Industry.

Target Macro Industry	Freq.	Percent
Consumer Products and Services	82	4.24
Consumer Staples	9	0.47
Energy and Power	1249	64.65
Financials	38	1.97
Healthcare	10	0.52
High Technology	81	4.19
Industrials	306	15.84
Materials	134	6.94
Media and Entertainment	8	0.41
Real Estate	9	0.47
Retail	4	0.21
Telecommunications	2	0.10
Total	1932	100.00

## Appendix B

**Table A2.** Acquisitions and Market Share Rank (N = 3159).

	(1)	(2)	(3)	(4)	(5)
L.ACQ	−0.276 * (1.90)				
L.ACQ.FOREIGN		−0.337 * (1.76)			
L.ACQ.EU			−0.279 (1.49)		
L.ACQ.RENEWABLE				−0.016 (−0.02)	
L.ACQ.CORE					−0.061 (−0.22)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
chi2	216.960 ***	216.463 ***	215.588 ***	213.371 ***	213.418 ***

Note: The table presents maximum likelihood estimates of ordered logit models, with the explained variable being the rank of a given company in terms of market share (by revenue) on a given national market. All models include control variables and year fixed effects. Z—coefficients are reported in parentheses beneath coefficients. Significance of respective variables is denoted with asterisks: \*  $p < 0.1$  \*\*\*  $p < 0.01$ .

## References

1. Blazquez, J.; Fuentes, R.; Manzano, B. On some economic principles of the energy transition. *Energy Policy* **2020**, *147*, 111807. [\[CrossRef\]](#)
2. Zhang, Z.; Chen, H.; Manzano, B. Dynamic interaction of renewable energy technological innovation, environmental regulation intensity and carbon pressure: Evidence from China. *Renew. Energy* **2022**, *192*, 420–430. [\[CrossRef\]](#)
3. Dietrich, D. Asset tangibility and capital allocation. *J. Corp. Financ.* **2007**, *13*, 995–1007. [\[CrossRef\]](#)
4. Steffen, B.; Karplus, V.; Schmidt, T. State ownership and technology adoption: The case of electric utilities and renewable energy. *Res. Policy* **2022**, *51*, 104534. [\[CrossRef\]](#)
5. Sovacool, B. Clean, low-carbon but corrupt? Examining corruption risks and solutions for the renewable energy sector in Mexico, Malaysia, Kenya and South Africa. *Energy Strategy Rev.* **2021**, *38*, 100723. [\[CrossRef\]](#)
6. Shen, H.; Liang, Y.; Li, H.; Liu, J.; Lu, G. Does geopolitical risk promote mergers and acquisitions of listed companies in energy and electric power industries: Evidence from China. *Energy Econ.* **2021**, *95*, 105115. [\[CrossRef\]](#)
7. Alcalde, N.; Powell, R. Government intervention in European mergers and acquisitions. *N. Am. J. Econ. Financ.* **2022**, *61*, 101689. [\[CrossRef\]](#)
8. Xu, X.; Cui, X.; Chen, X.; Zhou, Y. Impact of government subsidies on the innovation performance of the photovoltaic industry: Based on the moderating effect of carbon trading prices. *Energy Policy* **2022**, *170*, 113216. [\[CrossRef\]](#)
9. Andriuskevicius, K.; Streimikiene, D. Developments and trends of mergers and acquisitions in the energy industry. *Energies* **2021**, *14*, 2158. [\[CrossRef\]](#)
10. Niemczyk, J.; Sus, A.; Borowski, K.; Jasinski, B.; Jasinska, K. The Dominant Motives of Mergers and Acquisitions in the Energy Sector in West-ern Europe from the Perspective of Green Economy. *Energies* **2022**, *15*, 1065. [\[CrossRef\]](#)
11. Hossain, M. Merger & Acquisitions (M&As) as an important strategic vehicle in business: Thematic areas, research avenues & possible suggestions. *J. Econ. Bus.* **2021**, *116*, 106004.
12. Fikru, M.; Gautier, L. Electric utility mergers in the presence of distributed renewable energy. *Energy Econ.* **2021**, *101*, 105436. [\[CrossRef\]](#)
13. Wu, Y.; Huang, S. The effects of digital finance and financial constraint on financial performance: Firm-level evidence from China's new energy enterprises. *Energy Econ.* **2022**, *112*, 106158. [\[CrossRef\]](#)
14. Lim, M.; Lee, J. The effects of industry relatedness and takeover motives on cross-border acquisition completion. *J. Bus. Res.* **2016**, *69*, 4787–4792. [\[CrossRef\]](#)
15. Reddy, K.; Xie, E. Cross-border mergers and acquisitions by oil and gas multinational enterprises: Geography-based view of energy strategy. *Renew. Sustain. Energy Rev.* **2017**, *72*, 961–980. [\[CrossRef\]](#)
16. Drago, C.; Gatto, A. Policy, regulation effectiveness, and sustainability in the energy sector: A worldwide interval-based composite indicator. *Energy Policy* **2022**, *167*, 112889. [\[CrossRef\]](#)
17. Wang, W. Bid anticipation, information revelation, and merger gains. *J. Financ. Econ.* **2018**, *128*, 320–343. [\[CrossRef\]](#)
18. Suk, I.; Wang, M. Does target firm insider trading signal the target's synergy potential in mergers and acquisitions? *J. Financ. Econ.* **2021**, *142*, 1155–1185. [\[CrossRef\]](#)
19. Keller, J.; Kuper, G.; Mulder, M. Challenging natural monopolies: Assessing market power of gas transmission system operators for cross-border capacity. *Energy Policy* **2022**, *170*, 113228. [\[CrossRef\]](#)
20. Scholz, U.; Purps, S. The application of EC competition law in the energy sector. *J. Eur. Compet. Law Pract.* **2010**, *1*, 37–51. [\[CrossRef\]](#)
21. Lim, K.; Morris, D. Thresholds in natural resource rents and state owned enterprise profitability: Cross country evidence. *Energy Econ.* **2022**, *106*, 105779. [\[CrossRef\]](#)
22. Heim, S.; Gotz, G. Do Pay-As-Bid Auctions Favor Collusion? Evidence from Germany's market for reserve power. *Energy Policy* **2021**, *155*, 112308. [\[CrossRef\]](#)
23. Almeida, L.; Esposito, F.; Van Zeben, J. When indicators fail electricity policies: Pitfalls of the EU's retail energy market Barrier Index. *Energy Policy* **2022**, *165*, 112892. [\[CrossRef\]](#)
24. Amenta, C.; Aronica, M.; Stagnaro, C. Is more competition better? Retail electricity prices and switching rates in the European Union. *Util. Policy* **2022**, *78*, 101405. [\[CrossRef\]](#)
25. Sugimoto, K. Ownership versus legal unbundling of electricity transmission network: Evidence from renewable energy investment in Germany. *Energy Econ.* **2021**, *99*, 105290. [\[CrossRef\]](#)
26. Newbery, D.; Greve, T. The strategic robustness of oligopoly electricity market models. *Energy Econ.* **2017**, *68*, 124–132. [\[CrossRef\]](#)
27. Lockwood, M.; Mitchell, C.; Hoggett, R. Incumbent lobbying as a barrier to forward-looking regulation: The case of demand-side response in the GB capacity market for electricity. *Energy Policy* **2020**, *140*, 111426. [\[CrossRef\]](#)
28. Consoli, D.; Costantini, V.; Pagliarunga, E. We're in this together: Sustainable energy and economic competitiveness in the EU. *Res. Policy* **2023**, *52*, 104644. [\[CrossRef\]](#)
29. Hainsch, K.; Löffler, K.; Burandt, T.; Auer, H.; Granado, P.; Piscicella, P.; Zwickl-Bernhard, S. Energy transition scenarios: What policies, societal attitudes, and technology developments will realize the EU Green Deal? *Energy* **2022**, *239*, 122067. [\[CrossRef\]](#)
30. Roodman, D. How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata J.* **2009**, *9*, 86–136. [\[CrossRef\]](#)

31. Malmi, T.; Ikaheimo, S. Value Based Management practices—Some evidence from the field. *Res. Policy* **2003**, *14*, 235–254. [[CrossRef](#)]
32. Wasilewski, M.; Zabolotnyy, S.; Osiichuk, D. Characteristics and shareholder wealth effects of mergers and acquisitions involving European renewable energy companies. *Energies* **2021**, *14*, 7126. [[CrossRef](#)]